



# **JOURNAL OF DENTAL SCIENCES**

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**Dharmsinh Desai University Publication**



Faculty of Dental Science  
**Dharmsinh Desai University**

NADIAD

# Faculty of Dental Science

Dharmsinh Desai University  
NADIAD



# FACULTY OF DENTAL SCIENCE DHARMSINH DESAI UNIVERSITY

## Mission

- GLOBAL LEADERSHIP IN HUMAN DEVELOPMENT, EXCELLENCE IN EDUCATION AND HEALTH CARE.
- TO REDUCE MORBIDITY AND MORTALITY FROM ORAL AND CRANIOFACIAL DISEASES AND THERE BY INCREASE THE QUALITY OF LIFE.
- TO PROMOTE SUSTAINABLE, PRIORITY-DRIVEN POLICIES AND PROGRAMMES IN ORAL HEALTH SYSTEMS THAT HAS BEEN DERIVED FROM SYSTEMATIC REVIEWS OFBEST PRACTICES.
- TO REDUCE DISPARITIES IN ORAL HEALTH BETWEEN DIFFERENT SOCIO-ECONOMIC GROUPS WITHIN COUNTRY AND INEQUALITIES IN ORAL HEALTH ACROSS COUNTRIES.

## Vision

- TO SPREAD EDUCATION GLOBALLY IN THE FIELD OF DENTAL SCIENCES USING EXISTING RESOURCES AND TECHNOLOGY.
- DEVELOPING EXEMPLARY CLINICIANS, EDUCATORS AND SCIENTISTS.
- TO PROVIDE NEED-BASED INFRASTRUCTURE AND FACILITIES TO THE STUDENTS AND STAFF.
- TO MINIMIZE THE IMPACT OF DISEASES OF ORAL AND CRANIOFACIAL ORIGIN ON HEALTH AND PSYCHOSOCIAL DEVELOPMENT. GIVING EMPHASIS TO PROMOTING ORAL HEALTH AND REDUCING ORAL DISEASE AMONGST POPULATION WITH THE GREATEST BURDEN OF SUCH CONDITION AND DISEASE.



**VICE CHANCELLOR**

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## Vice Chancellor's Message



Knowledge is power, information is liberating and education is the premise of progress in every society. It brings me immense pride and gratitude, looking at Faculty of Dental Science achieve this kind of growth and progress in the field of education, knowledge and discipline. I congratulate the editorial committee for coming up with yet another issue of the annual journal, enriched with scientifically reasoned articles, reviews and cases. My blessings and wishes remain with the entire Faculty of Dental Science for continued growth.

A handwritten signature in black ink that reads "Dr. H.M. Desai". The signature is written in a cursive, flowing style.

**Dr. H.M Desai**

Vice Chancellor

Dharmsinh Desai University

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## **Trustee's Message**

I have been a spectator of the upward growth of the Faculty of Dental Science since over a decade now. I appreciate the thorough perseverance of each and every student and faculty members in attaining this peak. It is indeed the university's pleasure to keep lending support to the faculty in any form for the upliftment of the education. My heartfelt congratulations for the new issue of the annual journal.



**Mr. Ankur Desai**

Trustee

Dharmsinh Desai University

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## Coordinator's Message



*“The value of a college education is not learning of many facts but the training of the mind to think.”- Albert Einstein*

I believe that education is all about being excited about something. Seeing passion and enthusiasm helps push an educational message. It is again a matter of immense pride, that Journal of Dental Science has been successful this year too with content rich in innovative research work. It brings me great pleasure seeing our students as well as faculty grow as an institute, molding and shaping to reach newer heights and dimensions. I congratulate the entire faculty and students for coming up with yet another issue of our annual journal.

A handwritten signature in black ink, appearing to read 'Bimal S. Jathal', written over a horizontal line.

**Dr. Bimal S. Jathal**

University Co-Ordinator  
Dharmsinh Desai University  
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## Dean's Message



*“An investment in knowledge pays the best interest.”- Benjamin Franklin*

It's a matter of gratitude and pride for me for being a part of this inspiring and ever-growing journey of our Journal of Dental Science. It has grown from a humble beginning to great heights in this short span of years. Our faculty has been working hard, year after year in providing scientifically based research articles, surveys and case reports. I continue to extend my support to the faculty to excel in the coming years. I congratulate the entire editorial committee for coming up with another brilliant issue of our annual journal.

A handwritten signature in blue ink that reads "Hiren Patel". The signature is written in a cursive style and is underlined.

**Dr. Hiren Patel**

Dean

Faculty of Dental Science  
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## From the Editor's Desk



*“Dreams...is not what you see in sleep,*

*is the thing which doesn't let you sleep.”- Dr. A.P.J. Abdul Kalam*

I have an ambitious dream of taking our journal to a higher level. The mainstay of our journal passing through several metamorphosis phases, is due to the unflinching loyalty and patronage of our reader base and the contributing authors. I am grateful to both and request to continue the same for the future issues also. Wishing to receive a greater number of original research articles in the coming years to help both in elevating the impact factor and indexation. Our editorial committee has been working hard and putting their best foot forward in updating the readers with the current as well as innovative changing trends in dentistry.

**“Man can have nothing, but what he strives for” ...**

**“Together we can” ....**

A handwritten signature in black ink, appearing to read 'Shalini', with a horizontal line underneath.

**Dr. Shalini Gupta**

Editor

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# A CASE REPORT ON MANAGEMENT OF RADIX ENTOMOLARIS WITH POST-ENDODONTIC RESTORATION WITH ENDOCROWN

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\*\*\* Dr. Kunjal Mistry

\*\*\*\* Dr. Nirav Parmar

\*\*\*\* Dr. Aastha Buch

\*\*\*\*\* Dr. Tulsi Sujal Patel

## ABSTRACT

Mandibular molars may have an additional root located either buccally or lingually. Thus, an accurate diagnosis and thorough understanding of variation in root canal anatomy is essential for treatment success. Endodontically Treated Teeth (ETT) are at higher risk of biomechanical failure than vital teeth. With the development of adhesive systems, endocrowns have been used as an alternative to the conventional post-core and fixed partial dentures.

**Key words:** *Permanent mandibular first molar, Radix entomolaris, Additional third root, Root canal anatomy, Endo-crown*

## INTRODUCTION

Clinicians must have an in-depth knowledge of the morphology of root canal systems and its variations that may complicate the procedure. The majority of mandibular first molars have two roots, mesial and distal with two mesial and one distal canal<sup>1,2</sup>. (*Fabra-Campos*) (1985-1989) reported the presence of three mesial canals while *Stroner* reported three distal canals (1984)<sup>3,4</sup>. A major variant is the presence of three roots in mandibular first molar, first mentioned in the literature by *Carabelli* (1844) known as *Radix entomolaris* (RE) located in distolingual

position<sup>5</sup>. When located on mesiobuccal surface, the anomaly is known as *Radix paramolaris*. RE has a frequency of less than 5% in white Caucasian, African, Eurasian and Indian populations while it appears to be commonly present in races of Mongoloid traits such as the Chinese, Eskimos, and Native American populations with a frequency of 5-30%.<sup>5</sup> Radiographic diagnosis plays a pivotal role in successful endodontic treatment of tooth. One of the main reasons for failure of endodontic treatment is incomplete removal of pulp tissue and microorganisms from all the root canals.<sup>6</sup>

---

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After endodontic treatment, molars lost their mechanical characteristics. In fact, they became fragile and that is in relation with the removal of pulp and surrounding dentin tissues.<sup>7,8</sup> Moreover, the limitations to the use of intraradicular posts, such as calcified root canals, narrow canals, or a fracture of an instrument, have led dentists to think of other alternatives, such as endocrowns. It was proposed in 1999 by *Bindl and Mörmann*<sup>9,10</sup>. “Endocrown” is a one-piece ceramic construction. This crown would be fixed to the internal walls of the pulp chamber and on the cavity margins to improve macro mechanical retention and the use of adhesive cementation would also improve microretention<sup>11</sup>. Endocrown offers advantages for the restoration of root canal treated molar tooth, as they promote adequate function and esthetics, and also maintain the biomechanical integrity of the compromised structure of non-vital posterior teeth.<sup>12</sup>

## CASE REPORT

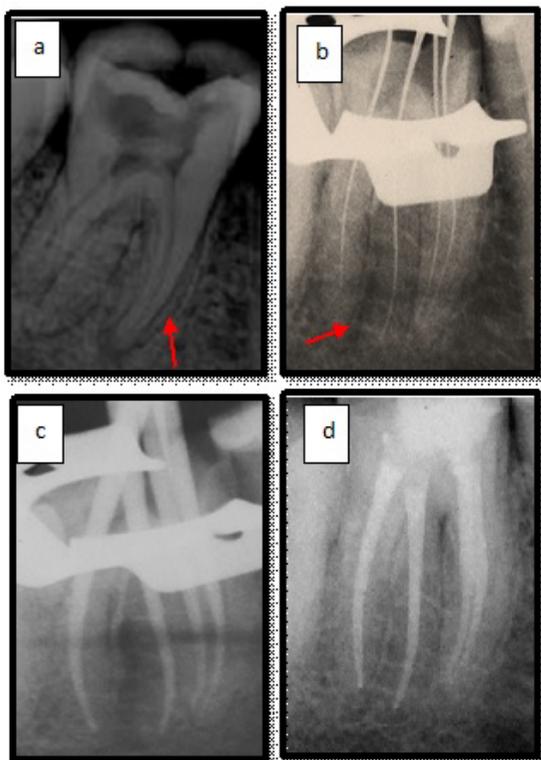
A 30-year-old male patient reported to the Department of Conservative Dentistry and Endodontics Dharmsinh Desai University, Nadiad, with a chief complaint of pain in the lower left back tooth for past five days. History revealed intermittent pain for five days. On clinical examination, the presence of decay in the mandibular left first molar was observed. Tooth was tender on percussion. Mobility Test and Pulp Vitality Test were negative. The Intraoral Periapical Radiograph (IOPA)(*Illustration-1a*) showed occlusal radiolucency with pulpal involvement and periodontal space widening relative to the mesial and distal roots with an additional disto-lingual root. According to all clinical

signs and symptoms and radiographic features diagnosis of symptomatic apical periodontitis with pulpal necrosis was made.

## MANAGEMENT

In the first appointment caries excavation was done and access opening was carried out using no. 2 round bur. Pulp was extirpated and working length was determined using 10 No. stainless steel K – file (Mani,Japan), which was confirmed radiographically(*Illustration-1b*). The radiograph shows three separate roots one mesial and two distal and extra distolingual root is called RE. In the next appointment biomechanical preparation was done using stainless steel hand K – file till No. 25 followed by Protaper hand file system (Dentsply,Mailleer). Patency was kept with an 8 no. size Kfile (Dentsply,Maillefer) between every instrument. Cleaning and shaping of all four canals were completed using 3% sodium hypochlorite (Neelkanth) and saline (AcuLIFE)along with 17% EDTA (Avue Prep) as an irrigation. Shaping in all canals mesiobuccal, mesiolinual, distobuccal, distolingual was completed with protaper till F1.Care was taken to prepare the extra root (RE) so that no biofilm or smear layer remains in the canal. In the next appointment mastercone radiograph was taken (*Illustration-1c*). Obturation was done using F1 gutta percha (Meta Biomed) points in all the canals. (*Illustration. -1d*). An endocrown restoration was planned because of the amount of remaining tooth structure and the thickness of the walls. Following obturation, access cavity was cleaned to remove residual sealer and debris from the walls. Fine grit diamond wheel bur was used to reduce occlusal surface. Axial preparation was done by dome shaped

diamond bur, removal of any undercuts was done, and all walls of pulp chamber were prepared parallel to each other and long axis of tooth to receive an impression material without any obstruction (*Illustration-2a*).



*Illustration-1: a) Pre-operative radiograph showing three roots in 46. b) Working length radiograph. c) Mastercone radiograph d) Obturation radiograph*

The impression was taken with putty wash technique by addition silicon (*Illustration. - 2b*) and sent to the laboratory. In the next appointment Endocrown was cemented using dual cure resin cement. First the pulp chamber was etched with 37% phosphoric acid for 15seconds. Afterward, the tooth was washed with abundant water, and an air jet was applied for 20 seconds; the preparation

was dried. Bonding agent is applied on both the inner surface of endo crown and in pulp chamber. Then luting is done using base and catalyst paste of dual cure resin cement (Calibra).

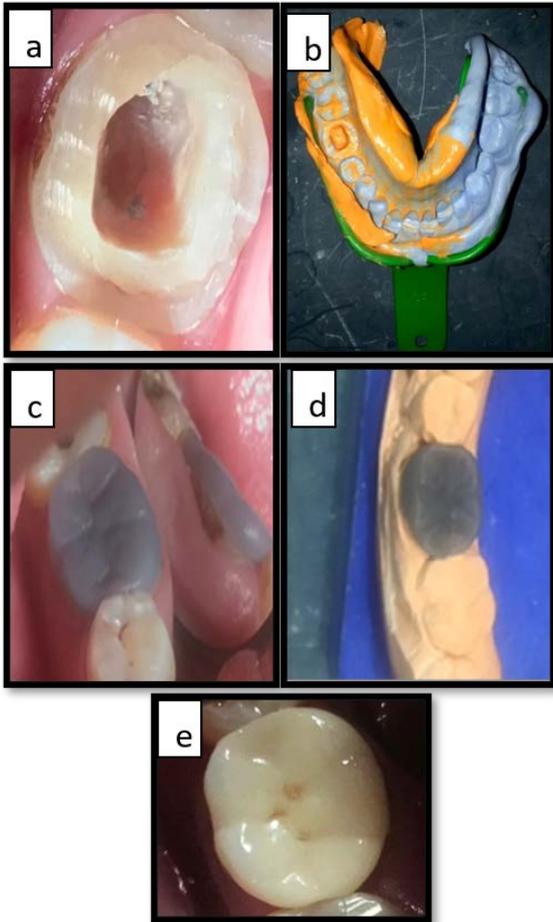
## DISCUSSION

Bilateral occurrence for RE have been reported to range from 37.14-67%.<sup>5</sup> Classification: *Carlsen & Alexandersen* (1990) classified RE into four different types based on the location of its cervical part:<sup>5</sup>

1. Type A: the RE is located lingually to the distal root complex which has two cone-shaped macrostructures.
2. Type B: the RE is located lingually to the distal root complex which has one cone-shaped macrostructures.
3. Type C: the RE is located lingually to the mesial root complex.
4. Type AC: the RE is located lingually between the mesial and distal root complexes.

*DeMoor et al.* (2004) classified RE based on the curvature of the root or root canal:<sup>6</sup>

1. Type 1: a straight root or root canal.
2. Type 2: a curved coronal third which becomes straighter in the middle and apical third.
3. Type 3: an initial curve in the coronal third with a second buccally oriented curve which begins in the middle or apical third.



*Illustration-2 a) Tooth Preparation. b) Impression of Mandibular arch. c,d) Wax Pattern Try-in. e) Endocrown cementation*

Song JS et al. (2010) further added two more newly defined variants of RE<sup>12,13</sup>:

1. Small type: length shorter than half of the length of the distobuccal root.
2. Conical type: smaller than the small type and having no root canal within it.

With the advent of newer technologies and recent concept on access preparation, it is very easy to locate the aberrant canals. The project of the restorative treatment of molars with a large coronal destruction, a clinical challenge, requires careful planning. The endocrown is convenient for all molars, particularly those with clinically low

crowns.<sup>15,16</sup>It facilitates the steps of impression taking and protects the periodontium. The objective of the preparation is to get a wide and stable surface resisting the compressive stresses that are frequent in molars. The stress levels in teeth with endocrowns were lower than in teeth with prosthetic crowns.<sup>17</sup> The compressive stresses are reduced, being distributed over the cervical butt joint and the walls of the pulp chamber. Due to the development of adhesive cementation systems, the need for macro retentive preparation for crowns has decreased. The pulpal chamber cavity provides also retention and stability.<sup>18,19</sup>

## CONCLUSION

Proper angulation when acquiring radiographic images proves helpful in locating canals. A thorough understanding of the prevalence of RE, its anatomical variations as well as radiographic and clinical diagnosis will provide the clinician with a better understanding of its complexity in order to ensure successful treatment outcomes

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# MANAGEMENT OF SEPARATED INSTRUMENT BY FILE BY-PASS TECHNIQUE

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\*\*\*\*Dr. Nirav Parmar

\*\*Dr. Barkha Idnani,

\*\*\*\*Dr. Aastha Buch

\*\*\*Dr. Kunjal Mistry

\*\*\*\*\*Dr. Huma Shaikh

**Abstract:** Instrument separation is one of the most common procedural errors that may occur during endodontic treatment. A separated instrument can create an obstruction in the root canal which can hinder the cleaning and shaping procedures. Removal of the separated instrument is often advised but factors like poor access and visibility to the separated instrument makes it difficult and also the amount of dentin to be removed is more. As an alternative to removal, bypassing technique is very effective and conservative. This case report describes management of separated instrument in lower right first molar.

**Keywords:** *Separated instrument, by-passing, Neoendo hand file, lateral condensation, obturation.*

## INTRODUCTION

There are several unwanted procedural errors that clinicians may face during endodontic practice.<sup>1</sup> These include strip perforations, ledging of the root canal walls, and separation of various endodontic instruments. The separation of instruments during endodontic therapy is a troublesome incident. Its incidence range varied from 2 to 6% of the cases investigated.<sup>2</sup> The most common causes for file separation are improper use, limitations in physical properties, inadequate access, root canal anatomy, and possibly manufacturing defects.<sup>3</sup>

The presence of a separated instrument in the root canal leads to failure of root canal treatment. Instrument separation commonly occurs at the middle or apical third of the mesial canals of mandibular molars, and at the same location in the mesiobuccal roots of maxillary molars due to their root curvatures.<sup>4</sup>

The prognosis depends on the degree of contamination of canal at the moment of instrument separation. Proper assessment should be made whether the canal can be instrumented even in the presence of fractured instrument.<sup>5,6</sup> If the canal cannot be instrumented decision should be made to remove the separated instrument.

**\*Professor and Head of Department**

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**\*\*\*Reader**

**\*\*\*\*Lecturer**

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An alternative technique that does not require direct visibility to the fragment is “bypass”, where a fine file is inserted between the fragment and root canal wall and thereby negotiating the canal to full working length and enable thorough instrumentation and obturation with the fragment remaining in situ.<sup>7</sup>

## CASE REPORT

A 45-year-old male patient came to the Department of Conservative Dentistry and Endodontics, Dharmsinh Desai University Nadiad, with chief complain of dull aching pain in lower right tooth for two weeks. History revealed intermittent pain in the same tooth since past one month. Patient gave a dental history of incomplete root canal treatment which was done one month before, elsewhere. On clinical examination mandibular lower right molar (46) was carious and temporary filling was done. Tooth was tender on vertical percussion. Radiographic examination revealed file separation in mesial canal in apical third (as shown in *Illustration 1a*). From clinical and radiographic findings diagnosis of chronic symptomatic apical periodontitis was made.

Access opening was modified and on negotiation, it was found that there was file separation in mesio-lingual canal. A radiograph was taken to confirm the position of separated instrument and file bypass technique was applied as follows. After establishing proper glide path, the fragment was bypassed with Neo Endo Neoprobe (Orikam Healthcare PVT LTD) 1% taper hand file. 8# K file (Mani, INC) was then inserted slowly and carefully into canal and trial was made to negotiate the file past the segment in between dentinal wall and broken fragment. After searching for sticky point the file was not removed

and short push pull motion was done with proper irrigation with 17% EDTA (Nagraj Enterprise). After a few tries, it was able to get the Neo-Endo file past the instrument. Working length was confirmed by intraoral periapical radiograph (as shown in *Illustration 1b*). Patency was kept with 8# K file between every instrument.

During the shaping of canals, copious irrigation with 2.5 % sodium hypochlorite (Neelkanth Ortho Dent(P) LTD) and saline was performed. Shaping of mesio-lingual canal was done up to 25 # K file and for mesio-buccal and distal it was completed with Protaper Universal file (Dentsply Maillefer, Ballaigues, Switzerland) till size F1 in both canals. After cleaning and shaping, calcium hydroxide (Calcigel, Prevest Den Pro) as intracanal medicament with temporary restoration was given and patient was recalled after one week. After one-week patient was asymptomatic and canal was irrigated with saline and dried with paper point. After which it was obturated with 2% taper Gutta Percha using lateral condensation technique in mesio-lingual canal and using Protaper F1 Gutta Percha in mesio-buccal and distal canal. (as shown in *Illustration 1c*)

Post obturation restoration was done and radiograph was taken. Recall after 1 month and 3 months showed no signs and symptoms of pain, which revealed the success of root canal treatment.

## DISCUSSION

Intracanal separation of instruments usually compromise the outcome of endodontic treatment and reduce the chances of successful retreatment.<sup>4,8</sup>

When an instrument gets separated in a canal, the clinician has got two options,

either to retrieve the separated instrument or to bypass it.<sup>7</sup>

To retrieve the fragment, better visibility of the separated instrument is needed. Making a separated instrument visible require straight line access to it.<sup>7</sup>But when the fragment is located inside or beyond the root canal's curvature, visibility requires straightening of the root canal to a different extent which may lead to removing excessive amount of dentin and root weakening or even perforation.<sup>6,7,9</sup>

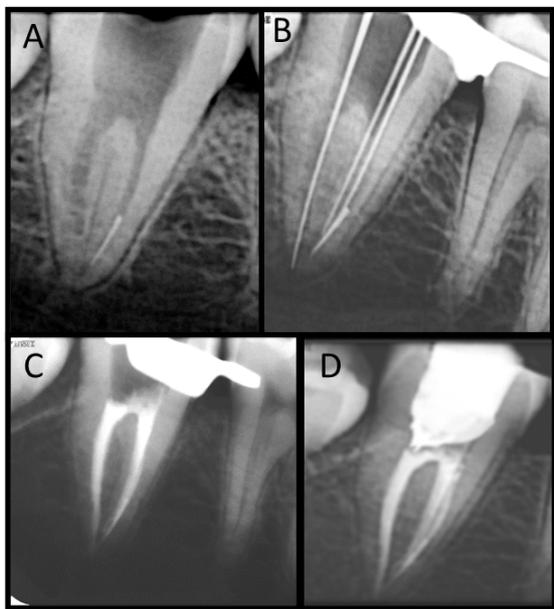


Illustration1: a) Preoperative radiograph showing separated instrument. b) Working length radiograph with bypassed instrument. c) Post obturation radiograph. d) Post obturation restoration radiograph

An alternative technique that does not require direct visibility to the fragment is the so called “bypass”, where a fine file is inserted between the fragment and root canal wall and thereby negotiating the canal to full working length and enable thorough instrumentation and obturation.<sup>6,10</sup>

Type of teeth, location of the fragment in the canal, degree of curvature, length of fragment, and type of fractured instrument are factors affecting the rate of success.<sup>11</sup>

Proper coronal access should be made before bypassing a separated instrument. Different techniques may be employed in flaring the canal coronal to an intra-canal obstruction. However, the predictable and safe way is sequential use of initially hand files, followed by Gates Glidden (GG) drills sizes 1 to 3.<sup>12,13</sup>

In the case mentioned in this article, we used the auxiliary shaping file Protaper Universal file (Dentsply Maillefer, Ballaigues, Switzerland) SX to get proper coronal access.

## CONCLUSION

The best method for managing separated instruments in the root canal is prevention of such incidences.

Thorough knowledge regarding root canal anatomy and various instruments used, following proven concepts and applying safe and modern techniques can prevent such an incidence. Even if a practitioner follows correct treatment protocol, instrument separation can happen. Decision should be made whether to bypass it or to retrieve the separated instrument and it depends on various factors. From the case mentioned in this article we were able to reach to a conclusion that if the separated instrument is able to be bypassed, it is more conservative than retrieving the separated instrument.

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# MANAGEMENT OF C-SHAPED CANAL CONFIGURATION IN MANDIBULAR SECOND MOLAR: A CASE REPORT

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## ABSTRACT

One of the most challenging root canal configurations is the C-shaped root canal, commonly present in mandibular second molar. These canals are most challenging to treat because of transverse anastomosis, lateral and accessory canals and apical deltas. This case report presents successful management of C-shaped canal in mandibular second molar.

**Keywords:** *C-shaped canal, Mandibular second molar, Thermoplasticized guttapercha.*

## INTRODUCTION:

A thorough knowledge of the root canal anatomy and its variants is required for achieving success in root canal therapy along with diagnosis, treatment planning and clinical expertise. One such variation of the root canal system is C-shaped canal configuration. The C-shaped canal was first documented in endodontic literature by *Cooke and Cox* in 1979.<sup>1</sup> The C-shaped canals are mostly present in the mandibular second molar and especially in Asian population this type of configuration is seen.<sup>2-5</sup> The C-shaped canal configuration results from the failure of the Hertwig's

epithelial sheath to fuse or its inadequate development during the root embryologic stage.<sup>6</sup> Failure of the Hertwig's epithelial root sheath to fuse on the lingual or buccal root surface is the main cause of C-shaped roots, which always contain a C-shaped canal.<sup>7</sup> This results in a conical or prism shaped root with a thin interradicular ribbon-shaped isthmus connecting them.<sup>8-10</sup> *Manning* attributed the formation of C-shaped roots to age changes like deposition of cementum.<sup>9</sup> This theory was however contested since separate canals in roots with C-shaped anatomy were observed even in patients under 40 years of age.<sup>9</sup>

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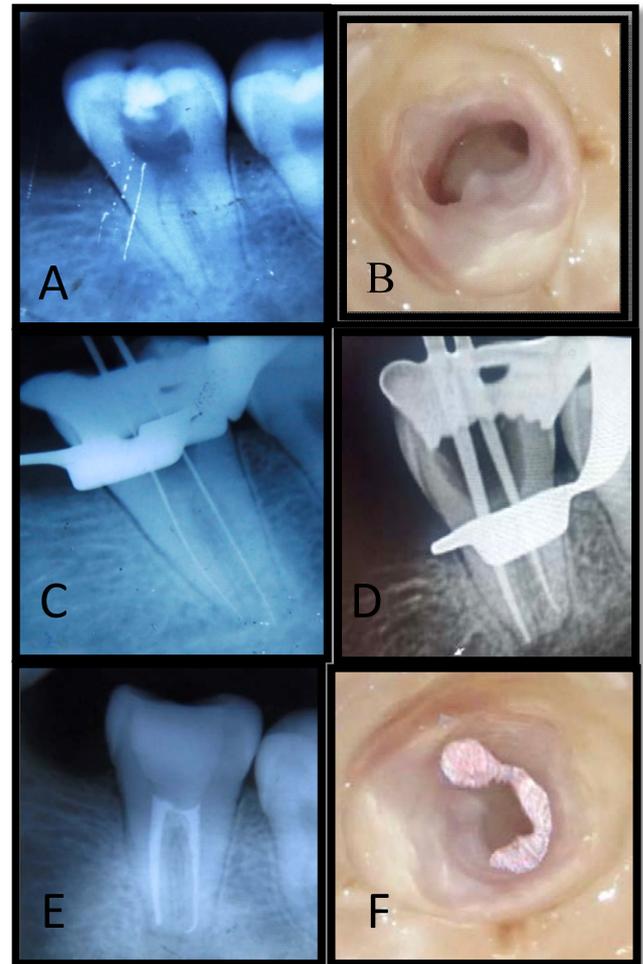
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The C-shaped canal configuration has a significant racial predilection.<sup>10</sup> Higher incidence is present in countries belonging to the Asian continent like Chinese (31.5%), Koreans (44.5%)<sup>11</sup> and for Central India (9.7%).<sup>12</sup>

### CASE REPORT:

A 30-year-old female patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in lower right back tooth for 15-20 days. Intraoral examination revealed dental caries in tooth 47. Medical history of the patient was noncontributory. Clinical examination revealed deep carious lesion in tooth 47. Tooth was tender on percussion. Electric pulp test was performed which gave delayed response in tooth 47. Radiographic examination revealed a large coronal radiolucency involving enamel, dentin and closely approximating the pulp spaces, without any periapical pathology. [Illustration: 1a] The patient was diagnosed with chronic irreversible pulpitis with 47. After administration of local anesthesia containing 2% Lidocaine with adrenaline (ICPA Health Products LTD), rubber dam (GDC Fine Crafted Dental Pvt. Ltd.) isolation was performed and access cavity was prepared. After debriding the pulp chamber using 2.5% sodium hypochlorite (Neelkanth Ortho Dent (P) LTD), the pulpal floor showed a continuous C-shaped canal. [Illustration: 1b] Working length was determined using an intraoral periapical radiograph and was confirmed using an electronic apex locator (Root ZX Mini, J. Morita CO, Tustin, CA). [Illustration: 1c] Cleaning and shaping was done using hybrid techniques with hand files and rotary pro-taper gold files (Dentsply Maillefer, Ballaigues, Switzerland) till size F3 in both

the canals. (J Morita Tri-Auto Mini Endo Motor)



*Illustrations:* a. Pre-operative radiograph b. access opening c. working length radiograph d. master cone radiograph e. obturation radiograph f. obturation photograph

### DISCUSSION:

Various classifications of C-shaped canals have been proposed so that the diagnosis and treatment planning get easier. *Melton et al*<sup>8</sup> proposed a classification based on the cross-sectional shape of the canal viz; continuous C shaped (C1), semicolon (C2) and separate canals (C3). *Fan et al*<sup>13</sup> modified *Melton's* classification and considered that this type of canal system had to exhibit all of the following three features: (i) Fused roots, (ii) a longitudinal

groove on the lingual or buccal surface of the root, and (iii) at least one cross-section of the canal belonging to the C1, C2, or C3 configuration. *Fan et al* also classified C-shaped roots according to their radiographic appearance.<sup>14</sup>The prevalence of C-shaped configuration is highest in mandibular second molar with the bilateral occurrence approximately 70%. Treatment of C-shaped requires additional measures for complete debridement and thorough cleaning of the complex root canal system. Modification in the access cavity may be required to locate and negotiate the entire root canal system. Modification in the cleaning and shaping will required with newer file systems. Circumferential filing should be done to ensure maximum tissue removal and care should be taken to avoid strip perforation. Calcifications in the pulp chamber should be negotiated with ultrasonic tips to reveal the canal anatomy completely. It is important that cleaning of the C-shaped canal system with rotary instruments should be assisted by ultrasonic irrigation.<sup>15</sup> Besides the use of sonication and ultrasonication, the use of chemical agents for disinfection cannot be over emphasized in the treatment of C-shaped root canal system.<sup>16</sup>Copious irrigation with 5.25 % NaOCl (Neelkanth Ortho Dent (P) LTD) should be done to debride the C-shaped canal. Ultrasonic activation of irrigant can be done for better cleaning of the root canal spaces.<sup>15</sup>One of the most challenging things is to obtain a three-dimensional obturation of the C-shaped canals due to its complex configuration. Obtaining a three-dimensional seal of a C-shaped canal might be a problem due to the various intricacies present within the root canal system. Both lateral condensation with warm vertical compaction and thermoplasticized gutta percha technique

are suitable for these conditions.<sup>17-18</sup> If a cold condensation technique is used for obturation, deeper penetration of condensation instruments in several sites will be necessary.<sup>18</sup>To ensure proper placement of the master cones in C-shaped canals, *Barnett*<sup>19</sup> recommended placing a large diameter file in the most distal portion of the canal, before seating the master cone in the mesial canal. The file is then withdrawn and the master cone of the distal canal is seated, followed by placement of accessory cones in the middle portion of the C-shaped canal.

## CONCLUSION:

The considerable care should be taken during biomechanical preparation and obturation of C-shaped canals for good long-term prognosis. This case report shows management of a C-shaped canal configuration successfully using lateral condensation technique for obturation. It also highlights the other treatment options for the management of this type of root canal anatomy.

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# LASERS IN ENDODONTICS: A PUBMED RESEARCH BASED REVIEW

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## ABSTRACT

Since the development of the ruby laser by Maiman in 1960 and the application of the laser for endodontics by Weichman in 1971, a variety of papers on potential applications for lasers in endodontics have been published. The purpose of this paper is to summarize laser applications in endodontics, including their use in pulp diagnosis, dentinal hypersensitivity, pulp capping and pulpotomy, sterilization of root canals, root canal shaping and obturation and apicectomy. The effects of laser on root canal walls and periodontal tissues are also reviewed. The essential question is whether a laser can provide equal or improved treatment over conventional care. Secondary issues include treatment duration and cost/benefit ratio. This article reviews the role of lasers in endodontics since the early 1970s, summarizes many research reports from the last decade, and surmises what the future may hold for lasers in endodontics. With the potential availability of many new laser wavelengths and modes, much interest is developing in this promising field.

**Key words:** *Laser, Pulpal diagnosis, Pulp capping and Pulpotomy, Cleaning and Shaping, Endodontic Surgeries.*

## INTRODUCTION

The use of lasers in dentistry has increased over the past few years. The first laser was introduced into the fields of medicine and dentistry during the 1960s (*Goldman et al., 1964*). Since then, this science has progressed rapidly. Because of their many advantages, lasers are indicated for a wide variety of procedures (*Frentzen and Koort, 1990; Aoki et al., 1994; Pelagalli et al., 1997; Walsh, 2003*). Conventional methods

of cavity preparation with low- and high-speed handpieces involve noise, uncomfortable vibrations and stress for patients. Although pain may be reduced by local anesthesia, fear of the needle and of noise and vibration of mechanical preparation remains causes of discomfort. These disadvantages have led to a search for new techniques as potential alternatives for dental hard tissue removal. The aim of this review is to describe the application of lasers in dental hard tissue procedures.<sup>1,2</sup>

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## HISTORICAL DEVELOPMENT

The first experiment with lasers in dentistry was reported in a study about the effects of a pulsed ruby laser on human caries (*Goldman et al., 1964*). The results of that study showed that the effects varied from small 2-mm deep holes to complete disappearance of the carious tissue, with some whitening of the surrounding rim of enamel, indicating extensive destruction of carious areas along with crater formation and melting of dentine. Further work in the 1970's focused on the effects of neodymium (Nd) and carbon dioxide (CO<sub>2</sub>) lasers on dental hard tissues. Early researchers found that CO<sub>2</sub> lasers produced cracking and disruption of enamel rods, incineration of dentinal tubule contents, excessive loss of tooth structure, carbonization and fissuring and increased mineralization caused by the removal of organic contents (*Gimbel, 2000*). It was also reported that the use of the CO<sub>2</sub> laser was unfavorable because of the loss of the odontoblastic layer (*Wigdor et al., 1993*). Therefore, it was concluded that, unless heat-related structural changes and damage to dentinal tissues could be reduced, laser technology could not replace the conventional dental drill. Further advances in laser technology however, have identified acceptable biologic interactions. For example, the Er: YAG laser was tested for its ability to ablate (or vapourise) dental hard tissues (*Gimbel, 2000*). Enamel and dentine cavities were successfully prepared using the Er: YAG laser. Since then, this laser has been used for caries removal and cavity preparation, soft tissue minor surgery and scaling (*Aoki and Watanabe et al., 1998*).<sup>2</sup>

## LASER DEVICE COMPONENTS

1. A laser medium, which can be a solid, liquid or gas and determines the wavelength

of emitted light from the laser. This medium determines the name of the laser CO<sub>2</sub> laser.

2. An optical cavity or laser tube having two mirrors, one fully reflective and the other partially transmissive which are located at either end of the optical cavity.

3. An external mechanical, chemical or optical power source which excites or 'pumps' the atoms in the laser medium to a higher energy level. Atoms in the excited state emit photons of which continue to bounce back and forth between the two mirrors in the laser tube striking other atoms and causing more stimulated emission. Photons of energy of same wavelength and frequency escape through the transmissive mirror and form the laser beam

## LASER PHYSICS

Laser is a device that converts electrical or chemical energy into light energy. In contrast to ordinary light that is emitted spontaneously by excited atoms or molecules, the light emitted by the laser occurs when an atom or molecule retains excess energy until it is stimulated to emit it. The radiation emitted by lasers including both visible and invisible light is more generally termed as electromagnetic radiation. Albert Einstein first proposed the concept of stimulated emission of light in 1917. He described three processes (*110 Online J Med Med Sci Recourse*)

❖ Absorption: When an atom is struck by a photon (quanta of light), there is an energy transfer causing increase in energy of the atom. This process is termed as absorption.

❖ Emission: The photon then ceases to exist, and an electron within the atom pumps to a higher energy level. The atom is

thus pumped up to an excited state from the ground state. In the excited state, the atom is unstable and will soon spontaneously decay back to the ground state, releasing the stored energy in the form of an emitted photon. This process is called spontaneous emission.

❖ **Stimulated emission:** If an atom in the excited state is struck by a photon of identical energy as the photon to be emitted, the emission could be stimulated to occur earlier than it would occur spontaneously. This stimulated interaction causes two photons that are identical in frequency and wavelength to leave the atom. This is a process of stimulated emission<sup>3</sup>.

## **CLASSIFICATION OF LASERS**

### **I. Based on the wavelength**

- The UV laser (ultraviolet spectrum, approx. 140-400nm)
- The Visible laser (visible spectrum, approx. 400-700nm)
- The laser (infrared spectrum, approx. 700nm to the microwave spectrum)

### **II. Based on the lasing medium**

- Solid e.g. Nd: YAG, Diode.
- Liquid e.g. Dye (toluidine blue).
- Gas e.g. CO<sub>2</sub>, Argon, Nitrogen

### **III. Depending upon energy levels**

- a. Soft lasers - They are low in energy
- b. Hard lasers – They are high in energy

### **IV. Based on operation**

- Continuous wave lasers, Pulsed laser, gated, free running<sup>4</sup>

**Clinical applications** in endodontics include Pulpal diagnosis, Pulp capping,

Pulpotomy, Biomechanical preparation of root canal system and endodontic surgery

**Pulp diagnosis:** Laser Doppler flowmetry, which was developed to assess blood flow in microvascular systems, also can be used for diagnosis of blood flow in the dental pulp<sup>5,6</sup>. This technique uses helium-neon and diode lasers at a low power of one or two MW<sup>7</sup>. The laser beam is directed through the crown of the tooth to the blood vessels within the pulp. Moving red blood cells causes the frequency of the laser beam to be Doppler shifted and some of the light to be backscattered out of the tooth<sup>6</sup>. The reflected light is detected by a photocell on the tooth surface and its output is proportional to the number and velocity of the blood cells<sup>8,9</sup>.

The main advantage of this technique, in comparison with electric pulp testing or other vitality tests, is that it does not rely on the occurrence of a painful sensation to determine the vitality of a tooth. Moreover, teeth that have experienced recent trauma or are located in part of the jaw that may be affected following orthognathic surgery, can lose sensibility while intact blood supply and pulp vitality are maintained<sup>6</sup>. It was reported that 21% of teeth in patients that did not respond to electrical stimulation following Le Fort I operations showed an intact blood supply when tested with laser Doppler flowmetry<sup>10</sup>. Diagnosis of the vitality of these pulps based mainly on electric pulp testing would have resulted in needless endodontic therapy. Laser Doppler flowmetry has some limitations. It may be difficult to obtain laser reflection from certain teeth. Molars, with their

thicker enamel and dentin and the variability in the position of the pulp within the tooth, may cause variations in pulpal blood flow<sup>5,7</sup>. Furthermore, differences in sensor output and inadequate calibration by the manufacturer may dictate the use of multiple probes for accurate assessment<sup>11</sup>. Laser Doppler flowmetry assures objective measurement of pulpal vitality. When equipment costs decrease and clinical application improves, this technology could be used for patients who have difficulties in communicating or for young children whose responses may not be reliable<sup>6</sup>.

**Pulp capping and pulpotomy:** Pulp capping, as defined by the American Association of Endodontists, is a procedure in which “a dental material is placed over an exposed or nearly exposed pulp to encourage the formation of irritation dentin at the site of injury.” Pulpotomy entails surgical removal of a small portion of vital pulp as a means of preserving the remaining coronal and radicular pulp tissues. Pulp capping is recommended when the exposure is very small, 1.0 mm or less<sup>12,13</sup> and the patients are young; pulpotomy is recommended when the young pulp already is exposed to caries and the roots are not yet fully formed (open apices).

The traditionally used pulp-capping agent is calcium hydroxide<sup>14,15</sup>; however, when it is applied to pulp tissue, a necrotic layer is produced and a dentin bridge is formed. The same may occur when the pulpotomy procedure is applied. A recently introduced material, mineral trioxide aggregate, shows favorable results when applied to exposed pulp. It produces more dentinal bridging in a shorter period of time, with significantly less inflammation; however, three to four hours are necessary for complete setting of

the mineral trioxide aggregate<sup>16,17,18</sup>. The success rate of pulp capping, whether direct or indirect, ranges from 44% to 97%. In pulpotomy, the same agents are used until root formation has been completed. It is debatable whether full root canal treatment should then be initiated<sup>19,20</sup>. Since the introduction of lasers to dentistry, several studies have shown the effect of different laser devices on dentin and pulpal tissue. Although ruby lasers caused pulpal damage, *Melcer et al*<sup>21</sup> showed that the CO<sub>2</sub> laser produced new mineralized dentin formation without cellular modification of pulpal tissue when tooth cavities were irradiated in beagles and primates.

Shoji et al<sup>22</sup> applied CO<sub>2</sub> laser energy to the exposed pulps of dogs using a focused and defocused laser mode and a wide range of energy levels. Charring, coagulation necrosis, and degeneration of the odontoblastic layer occurred, although no damage was detected in the radicular portion of the pulp. *Jukic et al*<sup>23</sup> used CO<sub>2</sub> and Nd:YAG lasers with energy densities of 4 J/cm<sup>2</sup> and 6.3 J/cm<sup>2</sup>, respectively, on exposed pulp tissue. In both experimental groups, carbonization, necrosis, an inflammatory response, edema, and hemorrhage were observed in the pulp tissue. In some specimens, a dentinal bridge was formed. *Moritz et al*<sup>24</sup> used a CO<sub>2</sub> laser in patients in whom direct pulp capping. Treatment was indicated. An energy level of 1 W at 0.1-second exposure time with 1-second pulse intervals was applied until the exposed pulps were completely sealed. They were then dressed with calcium hydroxide (*Kerr Life; Kerr Corp., Orange, California*). In the control group, the pulps were capped with calcium hydroxide only. Symptoms and vitality were examined after 1 week and monthly for 1 year: 89% of the

experimental group had no symptoms and responded normally to vitality tests versus only 68% of the control group.

In cases of deep and hypersensitive cavities, indirect pulp capping should be considered. A reduction in the permeability of the dentin, achieved by sealing the dentinal tubules, is of paramount importance. Nd:YAG and 9.6- $\mu$ m CO<sub>2</sub> lasers can be used for this purpose. The 9.6- $\mu$ m CO<sub>2</sub> laser energy is well absorbed by the hydroxyapatite of enamel and dentin, causing tissue ablation, melting, and resolidification<sup>25</sup>. The use of 9.6- $\mu$ m CO<sub>2</sub> laser did not cause any noticeable damage to the pulpal tissue in dogs<sup>26</sup>. The effect of Nd:YAG laser energy on intra pulpal temperature was investigated by White et al<sup>27</sup>. They found that the use of a pulsed Nd:YAG laser with an energy level of below 1 W, a 10-Hz repetition rate, and an overall 10-second exposure time did not significantly elevate the intra pulpal temperature. According to their results, these parameters may be considered safety parameters because the remaining dentinal thickness in cavity preparations cannot be measured in vivo. It is therefore recommended that clinicians choose laser parameters lower than these safety limits.

**Cleaning and shaping of the root canal system:** Periradicular periodontitis following pulp necrosis is caused by microorganisms and their products emanating from the root canal system<sup>28,29,30</sup>.

Successful endodontic therapy, which mainly depends on the elimination of microorganisms from the root canal system, is accomplished by means of biomechanical instrumentation of the root

canal. Studies have shown, however, that complete removal of microorganisms from the root canal system is virtually impossible<sup>31,32</sup> and a smear layer covering the instrumented walls of the root canal is formed<sup>33,34,35</sup>. The smear layer consists of a superficial layer on the surface of the root canal wall approximately 1 to 2  $\mu$ m thick and a deeper layer packed into the dentinal tubules to a depth of up to 40  $\mu$ m<sup>35</sup>. It contains inorganic and organic substances that also include microorganisms and necrotic debris<sup>36</sup>. In addition to the possibility that the smear layer itself may be infected, it also can protect the bacteria already present in the dentinal tubules by preventing the application of successful intracanal disinfection agents<sup>37</sup>. Pashley<sup>38</sup> considered that a smear layer containing bacteria or bacterial products might provide a reservoir of irritants. Thus, complete removal of the smear layer would be consistent with the elimination of irritants from the root canal system<sup>39</sup>.

According to *Oguntebi*<sup>40</sup>, the most currently used intracanal medicaments have a limited antibacterial spectrum and some of them have a limited ability to diffuse into the dentinal tubules. In his review, he suggested that newer treatment strategies designed to eliminate microorganisms from the root canal system must include agents that can penetrate the dentinal tubules and destroy the microorganisms because they are located in an area beyond the host defense mechanisms where they cannot be reached by systemically administered antibacterial agents. It also was clearly demonstrated that more than 35% of the canals' surface area remained unchanged following instrumentation of the root canal using four nickel-titanium preparation techniques<sup>41</sup>. In various laser systems used

in dentistry, the emitted energy can be delivered into the root canal system by a thin optical fiber (Nd:YAG, erbium,chromium:yttrium-scandium-gallium-garnet [Er,Cr:YSGG], argon, and diode) or by a hollow tube (CO<sub>2</sub> and Er:YAG). Thus, the potential bactericidal effect of laser irradiation can be used effectively for additional cleansing of the root canal system following biomechanical instrumentation. This effect was studied extensively using lasers such as CO<sub>2</sub><sup>42,43</sup>, Nd:YAG<sup>44-47</sup>, excimer<sup>48,49</sup>, diode<sup>50</sup>, and Er:YAG<sup>51-53</sup>. The apparent consensus is that laser irradiation emitted from laser systems used in dentistry has the potential to kill microorganisms. In most cases, the effect is directly related to the amount of irradiation and to its energy level. It also has been documented in numerous studies that CO<sub>2</sub><sup>54</sup>, Nd:YAG<sup>54,55,56</sup>, argon<sup>54,57</sup>, Er,Cr:YSGG<sup>58</sup>, and Er:YAG<sup>59,60</sup> laser irradiation has the ability to remove debris and the smear layer from the root canal walls following biomechanical instrumentation. There are several limitations that may be associated with the intracanal use of lasers that cannot be overlooked<sup>61</sup>. The emission of laser energy from the tip of the optical fiber or the laser guide is directed along the root canal and not necessary laterally to the root canal walls<sup>62</sup>. Thus, it is almost impossible to obtain uniform coverage of the canal surface using a laser<sup>61,62</sup>. Another limitation is the safety of such a procedure because thermal damage to the periapical tissues potentially is possible<sup>5,61</sup>. Direct emission of laser irradiation from the tip of the optical fiber in the vicinity of the apical foramen of a tooth may result in transmission of the irradiation beyond the foramen. This transmission of irradiation, in turn, may affect the supporting tissues of

the tooth adversely and can be hazardous in teeth with close proximity to the mental foramen or to the mandibular nerve<sup>62</sup>. In their review, Matsumoto and colleagues<sup>5</sup> also emphasized the possible limitations of the use of lasers in the root canal system. They suggested that “removal of smear layer and debris by laser is possible, however it is difficult to clean all root canal walls, because the laser is emitted straight ahead, making it almost impossible to irradiate the lateral canal walls.” These investigators strongly recommended improving the endodontic tip to enable irradiation of all areas of the root canal walls. Stabholz and colleagues<sup>62,63</sup> recently reported the development of a new endodontic tip that can be used with an Er:YAG laser system. The Er:YAG laser has gained increasing popularity among clinicians following its approval by the Food and Drug Administration for use on hard dental tissues<sup>64</sup>. The beam of the Er:YAG laser is delivered through a hollow tube, making it possible to develop an endodontic tip that allows lateral emission of the irradiation (side-firing), rather than direct emission through a single opening at its far end. This new endodontic side-firing spiral tip (RCLase; Lumenis, Opus Dent, Israel) was designed to fit the shape and the volume of root canals prepared by nickel-titanium rotary instrumentation. It emits the Er:YAG laser irradiation laterally to the walls of the root canal through a spiral slit located all along the tip. The tip is sealed at its far end, preventing the transmission of irradiation to and through the apical foramen of the tooth. The dentinal tubules in the root run a relatively straight course between the pulp and the periphery, in contrast to the typical S-shaped contours of the tubules in the tooth crown<sup>36</sup>. Studies have shown that bacteria and their by-

products, present in infected root canals, may invade the dentinal tubules. The presence of bacteria in the dentinal tubules of infected teeth at approximately half the distance between the root canal walls and the cementodentinal junction also was reported<sup>62, 66</sup>. These findings justify the rationale and need for developing effective means of removing the smear layer from root canal walls following biomechanical instrumentation. This removal would allow disinfectants and laser irradiation to reach and destroy microorganisms in the dentinal tubules. A recently completed pilot study<sup>62</sup> examined the efficacy of the endodontic side-firing spiral tip in removing debris and smear layer from distal and palatal root canals of freshly extracted human molars that were instrumented using nickel-titanium (*ProTaper; Dentsply, Tulsa Dental, Tulsa Oklahoma*) files to size F3. Following root canal preparation, the pulp chamber and the root canals of the prepared teeth were filled with 17% EDTA and irradiated with Er:YAG laser (*Opus 20, Lumenis, Opus Dent, Israel*), using 500 mJ per pulse at a frequency of 12 Hz for four cycles of 15 seconds each. The RCLase Side-Firing Spiral Tip was used for the irradiation. The lased roots were removed, split longitudinally, and submitted for SEM evaluation.

It appears that an efficient cleansing of the root canal system can be achieved by using the Er:YAG laser with the RCLase Side-firing Spiral Tip after biomechanical preparation of the root canal with nickel-titanium (*ProTaper*) files.

**Endodontic surgery:** Surgical endodontic therapy is the treatment of choice when teeth have responded poorly to conventional treatment or when they cannot

be treated appropriately by nonsurgical means. The goal of all endodontic surgery is to eliminate the disease and to prevent it from recurring<sup>67</sup>. The surgical option should be considered only when a better result cannot be achieved by nonsurgical treatment<sup>68,69</sup>.

Egress of irritants from the root canal system into the periapical tissues is considered the main cause of failure following apicoectomy and retrograde filling<sup>70</sup>. It is assumed that the irritants penetrate mainly through a gap present between the retrograde filling and the dentin. Consequently, many efforts have been made to improve the adaptation of retro filling material to the dentin. Mineral trioxide aggregate was evaluated to find the optimal material for this purpose<sup>71-76</sup>. A second possible pathway for irritants to invade the periapical tissues is through the dentin of the cut root surface after apicoectomy and retrograde filling. It was shown that the dentin of apically resected roots is more permeable to fluids than the dentin of non-resected roots<sup>77</sup>. There are large numbers of exposed dentinal tubules on the cut root surface; the coronal margin of an apical bevel, near the cementodentinal junction, has approximately 13,000 dentinal tubules per square millimeter<sup>78</sup>.

The pattern of this leakage also was investigated and it was suggested that the angle on the bevel of the root surface should be kept to a minimum and the retrograde root filling should extend to the most coronal aspect of the bevel. The importance of the sealing and the coverage of the apical foramen and that of the exposed dentin surfaces was emphasized<sup>77-80</sup>. Reducing or eliminating the permeability of resected apical dentin would seem advantageous in

apical endodontic procedures<sup>2</sup>. Apical dye penetration is reduced by using dentin bonding material in the root-end preparation and covering the bevel<sup>81,82</sup>. *Weichman and Johnson*<sup>83</sup>, who attempted to seal the apical foramen of freshly extracted teeth in which the pulp had been removed from the root canal, were the first to use lasers in endodontics. High-power (CO<sub>2</sub>) laser energy was used to irradiate the apices of the teeth *Miserendino*<sup>84</sup> applied CO<sub>2</sub> laser energy to the apices of freshly extracted human teeth and demonstrated recrystallization of apical root dentin. The recrystallized structure was smooth and suitable for placement of retrograde filling material. He suggested that the rationale for laser use in endodontic periapical surgery should include the following: improved hemostasis and concurrent visualization of the operative field, potential sterilization of the contaminated root apex, potential reduction of the permeability of the root surface dentin, a reduction in postoperative pain, and a reduced risk of surgical site contamination by eliminating the use of aerosol producing air turbine handpieces for apicoectomy. Despite its potential to lower dentin permeability, the conclusions of an in vivo study were that the use of CO<sub>2</sub> laser in apical surgery on dogs did not improve the success rate following surgery<sup>85</sup>. A prospective study of two retrograde endodontic apical preparations with and without CO<sub>2</sub> laser, in which 320 cases were evaluated, did not show that CO<sub>2</sub> laser improved the healing process<sup>86</sup>.

In vitro studies<sup>87-88</sup> using the Nd:YAG laser have shown a reduction in the penetration of dye or bacteria through resected roots. It was suggested that the reduced permeability in the lased specimens probably was the result of

structural changes in the dentin following laser application. Although SEM examination showed melting, solidification, and recrystallization of the hard tissue, the structural changes were not uniform and the melted areas appeared connected by areas that looked like those in the nonlased specimens. It was postulated that this was the reason why the permeability of the dentin was reduced but not completely prevented. It is reasonable to assume that homogeneously glazed surfaces would be less permeable than partially glazed ones. *Ebihara et al*<sup>89</sup> used Er:YAG laser for retrograde cavity preparations of extracted teeth. They found no significant difference in dye penetration between the laser-treated groups and those in which ultrasonic tools were applied. As mentioned earlier, the Er:YAG laser does not melt or seal the dentinal tubules; therefore, these investigators did not observe any reduction in dentin permeability. The main contribution of laser technology to surgical endodontics (apicoectomy and so forth) is to convert the apical dentin and cementum structure into a uniformly glazed area that does not allow egress of microorganisms through dentinal tubules and other openings in the apex of the tooth. Hemostasis and sterilization of the contaminated root apex also have a significant input.

#### Disadvantages of Dental Lasers

- 1) High cost of equipment
- 2) Laser beam could injure the patient, doctor or staff by direct beam or the reflected light causing retinal burn.
- 3) Laser exposure to the surface of the teeth, whether accidental or intentional causes irreversible pulpal damage.

- 4) All lasers used at wrong settings and time frames can cause damage to dental structures.
- 5) Nd:YAG and Argon lasers suffer from dragibility when cutting tissue.
- 6) In laser surgery, epithelial regeneration is delayed and the wound takes a longer time to re-epithelize than following conventional surgery.
- 7) Removal of soft tissue overlying the bone can damage the underlying bone and caused delayed healing and sequestration of bone fragments.
- 8) Not available in all hospitals.
- 9) Special trained persons needed for operation.

## CONCLUSION

The combination of classical root canal treatment in adjunct with laser has advantages such as such as bloodless operative and postoperative course, no suturing usually required, minimal to absent postoperative pain, and high patient acceptance help make lasers a highly advantageous alternative to conventional treatment modalities such as scalpel or electrosurgery.

As more clinicians and researchers are discovering the advantages lasers have to offer, the presence of lasers in the dental office will become increasingly common. Dental lasers today are small, lightweight, highly portable and increasingly affordable.

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# HEMISECTION AS A TREATMENT OPTION: A CASE REPORT

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## ABSTRACT

Hemisection (i.e. tooth resection) procedures are useful solutions for a variety of clinical problems. These procedures are often indicated in the treatment of periodontally involved molars in which significant bone loss exists around a root or in the furcation. Occasionally, teeth with pathosis of apparaent endodontic origin actually have a lesion of periodontal cause.

*Key Words: Hemisection, Mandibular molar*

## INTRODUCTION

Hemisection implies that the tooth is cut in half. In practical usage, one of the halves is usually removed, but this is not essential if the most common indication for these techniques is the treatment of periodontal defects, they are useful for a variety of problems encountered in endodontic practice. Perhaps the most common endodontic indication is the removal of a root with a vertical fracture or a long lateral strip perforation. Creative endodontic treatment planning, however, can make root removal a

useful approach in the treatment of a tooth with deep localized caries, an irretrievable separated instrument, a severe coronal fracture, or a strip perforation that might include periodontal bone loss. For the purpose of this discussion, both root amputation and hemisection will be referred to as root resection, because the principles of diagnosis and technique apply equally to both types of outcome.<sup>10</sup>

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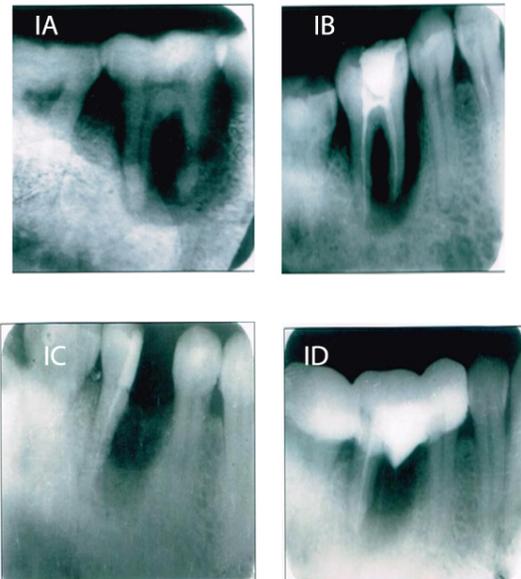
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Grossman has referred to root amputation as a dental proof of the old age that “half a loaf is better than none”<sup>1</sup>. Root amputation and hemisection procedures were reported in literature over 100 years ago. Classic papers by Hiatt and by Amen listed the indication and described the techniques for root amputations. Root amputation procedures is a logical way to eliminate a weak, diseased rot to allow the stronger to survive, whereas if retained together, they would collectively fail? Selected root removal allows improved access for home care and lack control with resultant bone formation and reduced pocket depth.<sup>2,3</sup>



## CASE REPORT

A 30 years old female reported with the complaint of pain in left mandibular posterior region. On examination, the tooth right mandibular first molar 46 was sensitive to percussion. On Radiographic appearance radiolucency was noticed at apex of both the roots and furcation involvement was seen. (Illustration- IA)

After access opening, routine root canal therapy was performed. Due to furcation involvement and severe bone loss in mesial root border the mesial root was decided to be removed by hemisection. (Illustration-IB)

Under local anesthesia, amputation of mesial root was done with vertical cut method. A long shank tapered fissure carbide bur was used to make vertical cut toward the bifurcation area. A fine probe was passed through the cut to ensure separation. The mesial root was extracted and the socket was irrigated adequately with sterile saline to remove bony chips. The furcation area was trimmed to ensure that no spicules were present to cause further

*Illustration-1: a) Pre-operative radiograph showing radiolucency at apex of both the roots and furcation involvement in 46. b) Root Canal therapy in 46. c) Amputation of mesial root d) fixed bridge involving retained distal half and mandibular second molar.*

periodontal irritation. The extraction site was irrigated and debrided and the flap was then repositioned and sutured with 3/0 black silk sutures. The occlusal table was minimized to redirect the forces along the long axis of the distal root. (Illustration- IC)

After healing of the tissues, fixed bridge involving retained distal half and mandibular second molar with sanitary pontic was given. (Illustration-ID)

## DISCUSSION

Proper case selection is needed for success of root resection (hemisection). It is important to consider the following factors before deciding to plan a respective procedure.<sup>4</sup> Advanced bone loss around one root with

acceptable level of bone around the remaining roots.<sup>9</sup>

Angulation and position of the tooth in the arch. A molar that is buccally, lingually, mesially or distally titled, cannot be resected. Divergence of the roots-teeth with divergent roots are easier to resect. Closely approximated or fused roots are poor candidates. Length and curvature of roots – long and straight roots are more favorable for resection than short, conical roots. Feasibility of endodontics and restorative dentistry in the root/roots to be retained.

Endodontic and periodontal indications for root resection (hemisection) are as follows.

- Existence of periodontal bone loss to the extent that periodontal therapy and home care would not sufficiently improve the condition.
- Destruction of a root through resorptive process, caries or perforation.
- Untreatable roots that are calcified contain broken instruments or are grossly curved.
- Fracture of one root that does not involve the entire tooth.
- Technically feasible conditions to perform surgery that would ensure reasonable prognosis.

Hemisection has been used successfully to retain teeth with furcation involvement. However, there are few disadvantages associated with it.

As with any surgical procedure, it can cause pain and anxiety. Root surfaces that are reshaped by grinding in the furcation or at the site of hemisection are more susceptible to caries. Often a favorable result may be negated by decay after treatment.<sup>6</sup> Failure of endodontic therapy due to any reason will cause failure of the procedure. In addition, when the tooth has lost part of its root support, it will require a restoration to permit it to function independently or to serve as an abutment for a splint or bridge.<sup>5</sup>

Unfortunately, a restoration can contribute to periodontal destruction, if the margins are defective or if non – occlusal surfaces do not have physiologic form. Also, an improperly shaped occlusal contact area may convert acceptable forces into destructive forces and predispose the tooth to trauma from occlusion and ultimate failure of hemisection.<sup>7</sup>

In the case reported, because of the large radio lucency in relation to mesial root and furcation area the tooth could not be treated non surgically, hemisection was done with removal of distal root and crown. The remaining tooth was restored as a premolar which will help in reduction of masticatory load on remaining teeth.

## CONCLUSION

The prognosis for hemisection is the same as for routine endodontic procedures provided that case selection has been correct, the endodontics has been performed adequately and the restoration is of an acceptable design relative to the occlusal and periodontal needs of the patient.

Root resection and hemisection should be considered as a option to retain and not remove the natural teeth. With recent advances in endodontics, periodontics and restorative dentistry, hemisection has received acceptance as a conservative and dependable treatment.<sup>8</sup>

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# PLEOMORPHIC ADENOMA OF PAROTID GLAND: A CASE REPORT AND REVIEW OF LITERATURE

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## ABSTRACT

Pleomorphic adenoma, the most common salivary gland tumor, also known as benign mixed tumor, because of its dual origin from epithelial and myoepithelial components along with mesenchymal stroma. Parotid gland is affected from 80 to 90% of cases. The tumor has female predilection between 30-50 years of age. Here we describe a case report of pleomorphic adenoma of parotid gland in 45 years old male patient.

*Keywords: Pleomorphic adenoma, parotid gland, myoepithelial cells*

## INTRODUCTION

Salivary gland tumors are uncommon and comprise only 1-4% of head and neck tumors. Majority of the salivary gland tumors occur in parotid gland with more than 70% of cases.<sup>1</sup> Pleomorphic adenoma or benign mixed tumor is the most common salivary gland neoplasm and involve 53-77% of parotid tumors.<sup>2</sup> The histopathologic features of pleomorphic adenoma is pathognomic. The term pleomorphic adenoma is because of its morphologic diversity exists among the

tumor between individuals and glands and even within the same tumor.<sup>3</sup>

## CASE REPORT

A 45year old male reported the hospital with the complaint of slow growing swelling of right side of face, for 4 months. Swelling was initially small then reached to present size. On examination, 2x3 cm solitary, oval swelling was present in the preauricular area (*Illustration 1*).

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*Illustration 1. Clinical – Lateral view*

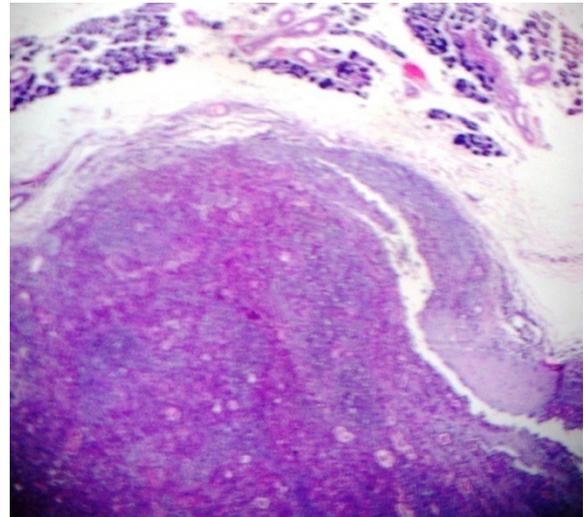
It was firm, movable, nontender, not associated with any lymphadenopathy. On general examination, all vital parameter were in normal range. In USG finding, it was well defined hypoechoic area of 2.3x2.2x2cm. FNAC was performed and was suggestive of benign salivary gland tumor. Excisional biopsy was done. Grossly specimen was 2.5x3x1.5 cm, solid and soft in consistency (*Illustration 2*).



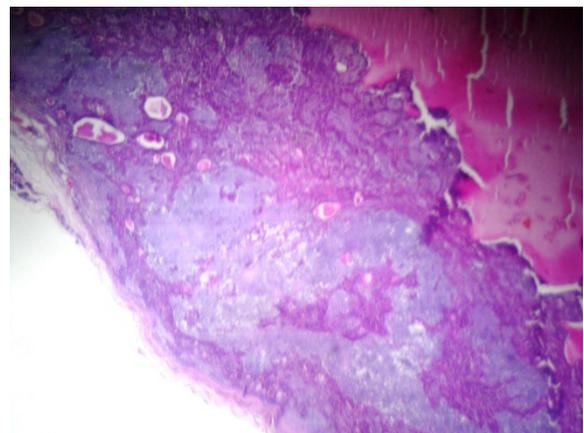
*Illustration 2: Gross specimen*

Cut surface was creamish white and semitranslucent. Histopathological examination revealed that tumor is partially encapsulated and composed of epithelial and myoepithelial cells arranged in ducts, sheets

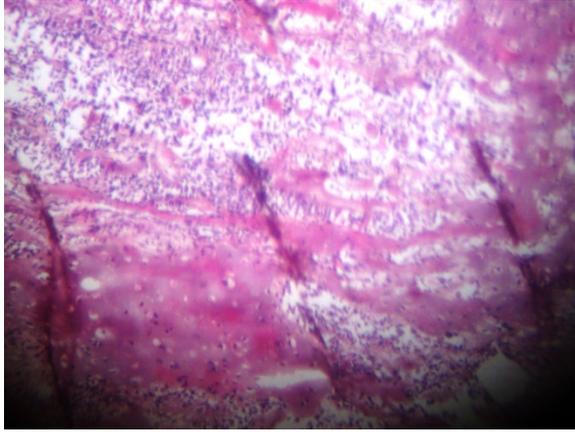
and cords along with hyalinised, chondroid and chondromyxoid areas. (*Illustration 3,4,5,6*).



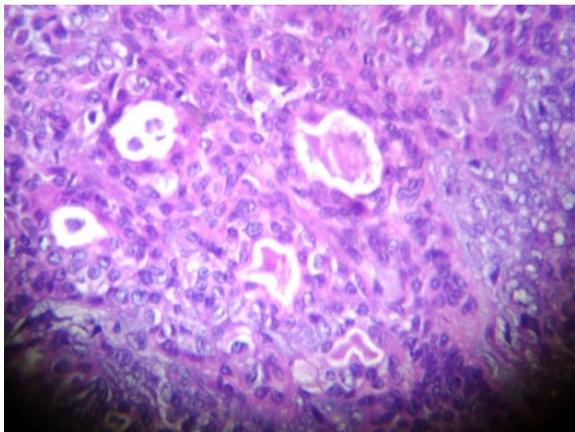
*Illustration 3. Photomicrograph showing partially encapsulated tumor.*



*Illustration 4: Photomicrograph showing hyalinised, myxoid area with ductal pattern*



*Illustration 5: Photomicrograph showing chondromyxoid area*



*Illustration 6: Photomicrograph showing ductal pattern with eosinophilic material*

Final diagnosis of pleomorphic adenoma of parotid gland was given because of characteristic features of chondromyxoid foci and glanduloductal differentiation confirmed the diagnosis of pleomorphic adenoma. Patient was followed up for a period of 1.5 years during which there was no recurrence of the tumor.

## **DISCUSSION**

Salivary gland tumors comprise only 1-4% of head and neck tumors and most commonly affect parotid gland. It is a benign tumor

consists of epithelial and myoepithelial cells along with mesenchymal tissue having chondroid, myxoid and osseous areas.<sup>4</sup> Myoepithelial cells or ductal reserve cells are responsible for such pleomorphic extracellular matrix production. Histologic variants of pleomorphic adenoma includes pleomorphic adenoma with lipomatous change, myxolipomatous pleomorphic adenoma, pleomorphic adenoma with squamous differentiation and benign metastasizing mixed tumor.<sup>5</sup>

The pleomorphic adenoma microscopically is characterized by variable diverse structural pattern. It consists of glandular epithelium and mesenchymal like tissue. Tumor has 4 histological subtypes: (a) principally myxoid, (b) myxoid and cellular in equal proportion, (c) predominantly cellular and (d) extremely cellular.<sup>6</sup>

The pleomorphic adenoma can occur at any age, but most common in young and middle age adults, between 30 to 50 years and women are commonly affected. Most reported pleomorphic adenoma of parotid gland occurs in superficial lobe and presented as a swelling in pre auricular area. The tumor is usually an irregular nodular lesion, firm in consistency, although area of cystic degeneration may be palpated if superficial and does not show fixation.<sup>7</sup> In the present case also, superficial lobe of right parotid gland with the tumor mass was excised with utmost care to preserve the facial nerve.

Rarely, tumor involve facial nerve and usually they are asymptomatic except the swelling part, but if neglected, pleomorphic adenoma can grow to grotesque proportion. About 10% of the reported PA develop with in the deep lobe of the gland beneath the

facial nerve. Pleomorphic adenoma of minor salivary gland commonly occurring palate (50%) , upper lips(27%) and buccal mucosa(17%).<sup>2</sup>

The epithelial component from ducts and small cysts containing eosinophilic coagulum. They also form the small cellular rests, sheets, cords and foci of keratinizing squamous, mucous and spindle shape cells. The myoepithelial cells have variable morphologies like angular or spindle shape, rounded with eccentric nuclei and hyalinized eosinophilic cytoplasm resembling plasma cells (hyaline cells). Myxoid, cartilaginous, hyaline, or osseous differentiation is appreciated in stromal component. Vacuolar degeneration results in cartilaginous appearance. When highly cellular, it is referred to as 'cellular adenoma'. When myoepithelial cells predominate, it is referred to as 'myoepithelioma'.<sup>2,4,7</sup> Myoepithelioma may be considered as a variant of pleomorphic adenoma but lacking typical glandulo ductal and chondromyxoid differentiation.<sup>8</sup> Histopathological features in the current case showed salient features of pleomorphic adenoma. It shows Partially encapsulated mass of sheets and ducts of epithelial and myoepithelial cells, along with hyalinised and chondromyxoid background. The treatment of pleomorphic adenoma is surgical excision. For pleomorphic adenoma of superficial lobe of parotid gland, superficial parotidectomy with preservation of facial nerve is preferred. For tumor of deep lobe, total parotidectomy is necessary. Intraoral lesions can be treated more conservatively by extracapsular excision. Prognosis is excellent with a cure rate of 95%. Tumor is radioresistant so radiotherapy

is not indicated. Frey syndrome is one of rare complication after parotidectomy. Malignant transformation, though rare, has been reported in 5% of cases.<sup>9</sup> The patient in current case was thoroughly followed up for period of 1.5 year and no sign of recurrence were observed during follow up.

## CONCLUSION

Pleomorphic adenoma needs to be managed diligently as they have tendency for recurrence and malignant transformation. Pleomorphic adenoma, though a benign tumor of salivary gland, should be diagnosed at early stage and surgically excised. When involving parotid gland, precaution should be taken to preserve facial nerve.

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# TUBERCULOUS LYMPHADENITIS-A REPORT OF AN UNUSUAL CASE

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## ABSTRACT

The neck is an anatomical site to which a variety of pathologic conditions of various origins can develop de novo or during the course of a systemic disease. Neck masses in general, can be divided into 3 major categories: of infectious origin, of neoplastic origin, and of congenital origin. Neck swellings are usually painful, and the patient's history reveals an episode of fever complemented with other signs and symptoms suspicious for an infectious condition either odontogenic or nonodontogenic in origin. In this article we report a case of a 47-year-old female patient with an intermittent painful swelling in her left submandibular region.

**Keywords:** *Lateral neck swellings, Submandibular, primary tuberculous lymphadenitis, tuberculosis, anti-tuberculosis therapy, giant cells.*

## INTRODUCTION

The neck is the site of occurrence for many diseases both benign and malignant in nature. From the benign group of tumors, lipomas are frequently encountered in the neck.<sup>1</sup>

Although superficial lipomas are easily diagnosed by palpation, deep seated lipomas are more difficult to assess clinically. Lymphangiomas are usually diagnosed and treated during infancy so very rarely is an undiagnosed lymphangioma seen during adulthood. Lymphangiomas or cystic hygromas present as diffuse, soft, multicystic

compressible masses.<sup>2</sup> Hemangiomas and arteriovenous malformations of the neck are also mainly diagnosed during childhood. Clinical examination will reveal a pulsating tumorous mass, making tentative clinical diagnosis easier. Neurofibromas in the neck may occur as solitary tumors or as part of neurofibromatosis (von Recklinghausen's disease). The differentiation of schwannomas from solitary neurofibromas is clinically not feasible.<sup>3</sup>

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The 2 tumors have a similar clinical picture; they may both produce dysesthesia during palpation, and the sole difference is that in neurofibromas the nerve enters the tumor centrally, whereas in schwannomas, the tumor is eccentric relative to the nerve. Both lesions occur more frequently in the posterior cervical triangle.<sup>3</sup>The same site is the site of origin of the group of desmoid tumors of the neck. Desmoplastic fibromas originate in the neck from roots of the first or second cervical nerves and clinically present as hard, fixed lesions in the lateraloposterior region of the neck. Paragangliomas usually arise from the carotid body or from the vagal ganglia. Glomusjugul are tumors typically located in the bifurcation of the carotid artery.<sup>4</sup>

The internal and external carotid arteries can be clinically found to be displaced by a solid and fixed tumor. Ectopic thyroid tissue is not uncommon. Most often, it is located in the region of the hyoid bone and is asymptomatic. The diagnosis of ectopic thyroid tissue is important since papillary thyroid carcinoma may arise from this tissue. Ectopic thymic tissue in the neck is a rare condition. Foreign bodies in the neck may produce a foreign body granuloma, but a preexisting history of trauma or surgery will help the examining clinician to establish diagnosis. Malignant tumors of the neck are usually regional or distant metastases in the lymphatic system of the neck or represent signs of a hematologic malignancy.<sup>5</sup>

TB has been a worldwide health problem for centuries and it is a chronic infectious granulomatous disease caused by Mycobacterium complex. It is acquired by inhaling droplets contaminated by Mycobacterium tuberculosis; however, M. avium, M. bovis, M. kansasii, and M.

scrofulaceum have also been implicated as causes.<sup>6</sup>

Initial lesions are usually pulmonary, although an increase in extrapulmonary TB has been reported in recent years. These frequently involve the head and neck, with the unusual presentation being a mass in the cervical region. It has also been shown that the presence of M. tuberculosis in oral samples is almost universal in patients with tuberculosis.<sup>6,7</sup>

## CASE REPORT

A 47years-old female presented with a history of pain and persistent swelling in left submandibular region since a year which was small initially and gradually increased in size. She also underwent extractions of teeth in the third quadrant. Her pain and swelling were still persistent because of which she visited our department for further treatment.



*Illustration 01: front profile*

On general examination, patient's general condition was good and her nutrition was adequate. No history of fever, cough, or weight loss symptoms. On extraoral examination, a single swelling with ill-defined borders of approximately 1.5 × 1.5 cm was encountered in the left submandibular region. The overlying skin was free and normal. (Illustration 01& 02)



*Illustration 02: lateral profile*

On palpation, a mass was felt in the left submandibular region, which was firm in consistency, tender, nonfluctuant, noncompressible, mobile, and showed no signs of matting. Other Lymph nodes were nonpalpable.



*Illustration 03: Preoperative OPG*

It showed no signs of matting. With this information in hand, the provisional diagnosis can be-

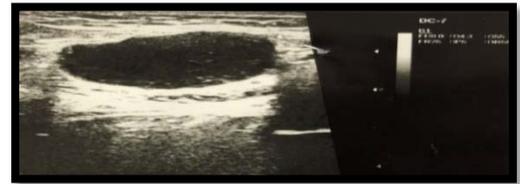
- Periapical infection
- Sialolithiasis
- Sebaceous cyst
- Lipoma

Panoramic and occlusal radiograph showed no odontogenic origin in relation to the swelling (Illustration 03& 04) that ruled out periapical pathology.



*Illustration 04: Preoperative Occlusal radiograph*

USG of the site was done later which was suggestive of a cystic lesion in the left submandibular region. (Illustration 05) To confirm the existence of cystic lesion in the region, aspiration was done which was negative, ruling out the presence of a cystic lesion.



*Illustration 05: Ultrasonography of site*

Next investigation done was the CT scan which was stating presence of hyper vascular lymph node with benign hyper vascular growth measuring about 27x 17mm approximately. (Illustration 06) Chest radiograph was also done that turned out to be normal (figure 06). After getting all the preoperative investigations done and ruling out any malignancy, excision of the benign lesion was planned. Submandibular incision (Risdon's incision) was placed and subplatysmal dissection was done to expose the lesion. The encapsulated node like lesion was excised in toto.



*Illustration 06: CT Scan*

Layer wise closure was done with the help of vicryl and ethilon sutures after achieving haemostasis. (Illustration 8-11) Lesion was sent to the laboratory for histopathological examination.



*Illustration07: normal chest x-ray*

Histopathological report was suggestive of Tuberculous Lymphadenitis. Physician was consulted again and the patient was prescribed anti tubercular drugs for the period of 6 months and strictly told to regularly turn up on follow ups. (Illustration 12)

## **DISCUSSION**

TB is a major reason of unpleasant health and mortality globally. The risk of infection however is a lot more amongst communities in lower socioeconomic groups. Approximately 2.2 million individuals acquire TB in India of which approximately 0.87 million are infectious cases and responsible for about more than

330,000 annually. TB is considered as the most usual opportunistic infection where HIV infection is rampant.<sup>8</sup>



*Illustration 08: Incision*

The focus organ of mycobacterium TB is bronchopulmonary apparatus, and those in the head and neck region are commonly secondary (extrapulmonary).<sup>9,10</sup> Primary orofacial TB customarily comprises the gingival, mucobuccal folds and inflammatory foci neighboring the extraction sites or teeth.<sup>11</sup>

Secondary oral TB can arise at any age but is most usual in mid and older age. It emerges from a mended primary focus or owing to endogenous extension of the infection. Secondary TB is mostly persistent in nature and can cause significant damage to the tissue with caseation (scrofula), fibrosis and cavity formation.<sup>12</sup>

Orofacial lesions may show various presentations such as nodules, fissures, ulcers or granulomas.<sup>13</sup> It is difficult to differentiate oral cavity TB from additional conditions on the core of clinical signs and symptoms only. When evaluating such cases, clinicians should consider both infectious processes, such as primary syphilis, fungal diseases, and non-infectious processes such as chronic traumatic ulcer and squamous cell carcinoma.



*Illustration09: exposure of the lesion*

If there is no systemic attachment, an excisional biopsy is suggested to determine a complete diagnosis.<sup>14</sup>

The basic principles for the treatment of pulmonary TB apply to extra-pulmonary TB as well. For TB at any site, a 6-9 months course of treatment regimen is recommended.<sup>15</sup>



*Illustration10: lesion excised in toto*

The diagnosis of primary TB in our patient was an enigma because prior to the development of a visible swelling of the jaw, the patient complained of toothache and was treated with antibiotics and eventually tooth extraction with no presenting oral signs. Hence, the responsibility of the clinician is to ruminare TB lymphadenitis as a differential diagnosis in such cases and do the needful. Specific tests should be done whenever in dilemma which are as follows.



*Illustration 11: closure*

### **An outline of tests used for identification of Mycobacteria**

Mycobacteria are classified as category three pathogens and should be processed in biological safety cabinets (class I or II) with a class III containment facility. The techniques currently utilized for the detection of mycobacterial diseases are<sup>16</sup>:

- Direct methods
- Microscopy or culture- e.g., ZiehlNeelsen stain
- Mycobacterial speciation by biochemical assays
- Mycobacterial antigen detection by monoclonal sera –e.g., QuantiFERON-TB Gold (QFT), interferon-gamma (IFN- $\gamma$ ) release assay (IGRA), Gas chromatography
- Analysis of lipid composition by chromatography
- Detection of DNA or RNA of mycobacterial origin –e.g., GeneXpert, PCR
- Indirect methods
- Detection of IgG or IgM antibodies against mycobacteria-e.g., ELISA
- Cellular immunity via skin tests. (TST or Mantoux)

Nature of specimen	Left submandibular swelling.
Gross Examination	Nodal tissue 2.5x2x1cms. Cut surface is solid.
No of Sections.	Total = 2
Microscopic Examination	Nodal parenchyma is studied with caseating granulomas featuring epithelioid cells and langhan's type giant cells.
Diagnosis	Tuberculous lymphadenitis.

*Illustration 12:histopathological examination*

The diagnosis was confirmed by excisional biopsy because the clinical features were non-specific and radiographic features of the lesions were negative for pulmonary involvement. USG and FNAC can also give us false positive results that makes it a challenge for us to establish a correct diagnosis. Histopathology of the lesion demonstrated nodal parenchyma studded with caseating granulomas featuring epithelioid cells and Langhan's type giant cells. Ultrasound examination done on cervical lymph nodes exhibited the size of the expanded lymph nodes. An anti-tubercular therapeutic schedule was administered for 6 months divided in to 4 months of initial loading phase followed by maintenance phase and it was noted that the patient was responding to treatment. Akt-4 Kit is an antibacterial medicine which is composed of four active ingredients namely, Pyrazinamide (750 MG), Isoniazid (300 MG), Rifampicin (450 MG) and Ethambutol (800 MG).

## CONCLUSION

Extrapulmonary TB though not very common, still remains an imperative clinical subsistence, which should be kept in mind, especially in developing countries. TB affecting primarily cervical lymph nodes is uncommon. At instances like the current case, where there is the

absence of systemic signs and symptoms, swift identification of TB can become challenging. Awareness by the clinician of such atypical presentations would make identification of TB uncomplicated. Initial diagnosis of the ailment would be beneficial not only to provide early treatment to the patient, but also averting the spread of the disease to others. TB is a recognized occupational risk for dentists, as they work in close proximity to the nasal and oral cavities of patients, with the possible generation of potentially infectious sprays during routine operative procedures.

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# MANAGEMENT OF BILATERAL PARASYMPHYSIS FRACTURE IN AN EPILEPTIC PATIENT: A CASE REPORT

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## ABSTRACT

The risk for skeletal fractures in patients with epilepsy is greater than general population. Many antiepileptic drugs increase the risk of bone fractures, minimal trauma may result in fractures during an epileptic seizure. The present case report describes the management of bilateral parasymphysis fracture in an epileptic patient.

*Key words: antiepileptic drugs, parasymphysis, epilepsy, fracture*

## INTRODUCTION

Epilepsy is a neurological disorder characterized by repeated unprovoked seizures in the absence of a toxic metabolic or febrile condition.<sup>1</sup> A seizure is classified as “partial” when the electrical discharge responsible for it occurs in a specific area of the brain or “generalized” when the discharge affects the entire brain cortex. When there is loss of awareness, seizures are termed complex. Based on the cause, it can be symptomatic, idiopathic or cryptogenic.<sup>2</sup> Patients with epilepsy are at

increased risk of accidental injuries, due to loss of muscle tone and self-protective reflexes to minimize the trauma during a fall. The most common examples are bone fractures and head injuries. Fractures are two to six times more prone to occur in epileptic patients than in the general population.<sup>3</sup> Muscular forces generated during a seizure may lead to fracture and dislocation of the jaw.<sup>4</sup> Therefore, the present case report describes the management of bilateral parasymphysis fracture in an epileptic patient.

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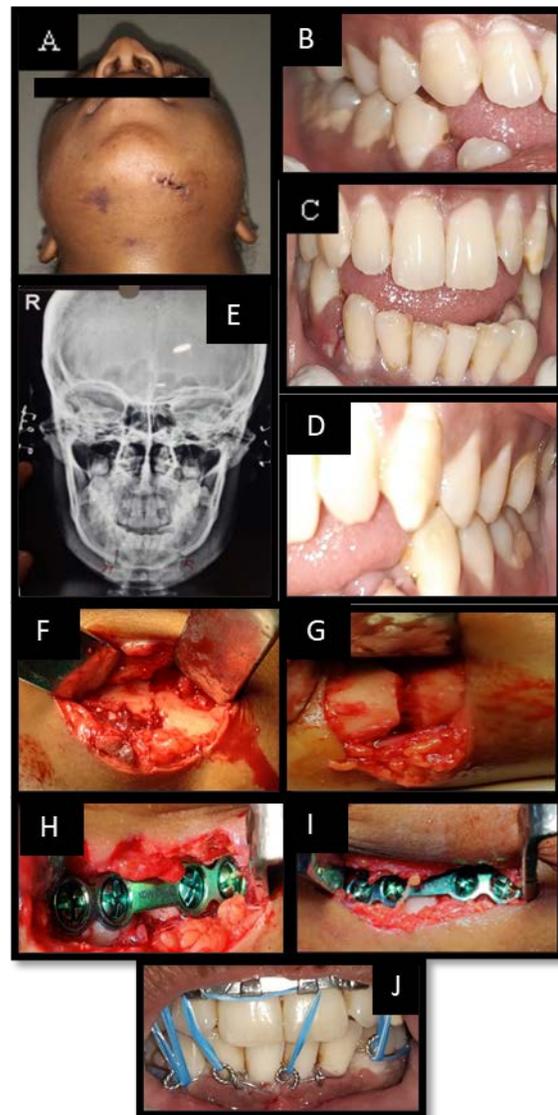
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## CASE REPORT

17 years old female patient reported to the department of oral and maxillofacial surgery with the chief complaint of pain in lower front region of teeth, following trauma on chin as a result of fall due to dizziness before 4 days. Extraoral examination revealed edema & sutured lacerations on lower chin region [Illustration:1A], step deformity on lower border of mandible at parasymphysis region on both the sides which was tender on palpation and paresthesia of lower lip. Intraoral examination revealed segmental mobility between lower left & right canine region with disturbed occlusion, [Illustration:1B-D] and sublingual hematoma. Radiographic examination revealed bilateral parasymphysis fracture with the fracture line passing between canine and first premolar on both the sides. [Illustration:1E] Patient's medical history included epilepsy since last 4 years and she was taking medication for the same. As the provisional diagnosis was displaced bilateral parasymphysis fracture, open reduction and internal fixation techniques were chosen to manage the fracture. After getting physician's fitness and preoperative anesthetic clearance surgery was planned under general anesthesia. Intermaxillary fixation was done to achieve occlusion and two submandibular approaches at bilateral parasymphysis region were chosen and the fracture sites were fixed with 2.5 mm 4-holes with gap titanium plate and 2.5x10mm four titanium screws without damaging the mental nerves on both the side. (Illustration:1F-I) After fixation of the fracture site

intermaxillary fixation was released and occlusion was checked. (Illustration:1J) Patient was kept under observation postoperatively for 48 hours.



*Illustrations:1 A-D Preoperative clinical photographs E. Pre-operative radiograph F-I: Intraoperative photographs J. Postoperative occlusion*

## DISCUSSION

It is well known that epileptic seizures may be associated with trauma and dislocations which leads to fracture. The International League Against Epilepsy has classified seizures based on the clinical manifestation. Two main categories are (1) partial and (2) generalized. Partial seizures can be further divided into three categories: 1. Simple partial seizure 2. Complex partial seizure 3. Partial seizures evolving to secondarily generalized seizures. Generalized seizures are classified into six major categories: 1. Absence seizures 2. Tonic seizures 3. Clonic seizures 4. Myoclonic seizures 5. Primary generalized tonic-clonic seizures 6. Atonic seizures.<sup>5</sup> Tongue biting is mentioned in most standard texts as a reliable sign for the diagnosis of epileptic seizures. For the diagnosis electroencephalography, magnetic resonance imaging, routine blood tests, lumbar puncture, & electrocardiography can be used. Magnetic resonance spectroscopy measures the concentrations of a variety of neurochemicals in different brain regions and can sometimes assist in localizing a seizure focus. Magnetic resonance imaging (MRI) is more sensitive than computed tomography (CT) and is therefore preferred, especially for the detection of cortical malformation, dysgenesis, or hippocampal sclerosis.<sup>5</sup> Electroencephalography (EEG) records waves generated by the brain cortex that allow the differentiation of normal from abnormal electrical discharges and provide information about localization. EEG amplifies the waves and transfers them to a computer for interpretation. A wearable surface electromyographic monitoring device may help to detect generalized tonic-clonic

seizures.<sup>5</sup> Various antiepileptic drugs are used to treat the epilepsy, amongst which Phenobarbital, Carbamazepine, Phenytoin, Lamotrigine, Valproate or valproic acid are most commonly used drugs. Carbamazepine appears to act by reducing polysynaptic responses and blocking post-tetanic potentiation. Phenytoin inhibits the spread of seizure activity by promoting sodium efflux from neurons, stabilize the threshold against hyperexcitability caused by excessive stimulation or environmental changes. Valproic acid has been effective in partial and generalized seizures and may be related to increased brain concentrations of gamma-Aminobutyric acid (GABA).<sup>2</sup> Different studies have suggested that patients with epilepsy treated with antiepileptic drugs may be at an increased risk for bone disease including changes in bone turnover, osteoporosis, alterations in bone quality, and most importantly fracture.<sup>1-3</sup> Patients with uncontrolled seizures are at greater risk of accidents. In addition, it is documented that antiepileptic drugs may increase fracture risk.<sup>4</sup> These drugs can induce hepatic microsomal enzymes and increase the catabolic clearance of a number of vitamin D metabolites.<sup>6</sup>

If the patient develops epileptic attacks during the dental procedures, the procedure should be stopped immediately & all instruments should be removed from the oral cavity. The chair should be placed in the supine position, low to the ground, patient should be stabilized to prevent injury during the seizure. Basic life support should begin immediately which include placement of vital-sign monitors, such as electrocardiogram, pulse oximeter, and blood

pressure cuff. For most seizures, basic life support is adequate. However, if the seizure lasts longer than 5 minutes, more advanced techniques should be employed. In this scenario, basic life support should be continued while venipuncture is performed, once intravenous access has been gained, administration of anticonvulsant medication is highly effective in terminating seizures. Benzodiazepines are the drugs of choice for emergency treatment of seizures<sup>7</sup> There is a little risk of seizures due to general anesthetic agents which inhibits the firing neurons. Benzodiazepine, midazolam are the safest drugs during general anesthesia due to pro- and anticonvulsant properties which minimize the risk of seizure activity in the intra- and postoperative.<sup>8</sup>

From recent studies, the most common types of injury following an epileptic seizure are fractures, head injuries, burns, and dental injuries.<sup>8</sup> Although mandible fracture is very rare during epileptic seizure, it is important not to underestimate the fracture risk. For this reason, the seizure evaluation must be performed after the patient has fully recovered from the postictal period. Pain, ecchymosis, and crepitus should aid in the identification of a maxillofacial fracture after a seizure. Radiographs are must for careful evaluation of fractures.<sup>7</sup>

Mandibular parasymphiseal fractures lead to lack of occlusion with step deformity formation. Forces of compression which are acting on the inferior border and forces of tension acting on the superior border of mandible tend to pull the segments apart creating the gap or step. Bilateral parasymphysis fractures lead to tongue fall,

this occurs due to loss of muscle attachments to the symphysis and parasymphysis region which are attached to the anterior 1/3<sup>rd</sup> of the tongue and keep the tongue from falling back.<sup>7</sup> When treating a patient who has little or no control over their seizures, and when dealing with maxillofacial fractures, it is crucial to make sure that the patient's airway is not blocked. When operating on maxillomandibular fractures, open reduction and fixation should be preferred and bimaxillary fixation should be avoided. As the chances of choking of airway is more if IMF was given to the patient during an epileptic attack due to aspiration of gastric contents due to vomiting. It is very important to maintain tongue position in patients with bilateral parasymphysis fracture, and also muscle attachments should be restored for normal tongue movements and function postoperatively.<sup>7</sup>

## CONCLUSION

Management of maxillofacial fractures should take into consideration, the need for access to the airway, especially in patients with poorly controlled seizures. Consideration should be given to open reduction and rigid fixation of mandibular and maxillary fractures and MMF should be avoided. Postoperatively, AED levels should once again be evaluated prior to discharge to prevent further seizure-related injuries. Consultation of the treating neurologist or physician should be obtained throughout management of the patient.

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# ALVEOLAR RIDGE AUGMENTATION USING CHIN BLOCK GRAFT- A CASE REPORT

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## ABSTRACT

Severely resorbed alveolar ridge in esthetic zone of maxilla can compromise the successful implant placement and esthetic outcome. In clinical practice, though patients often demand osseointegrated implants to replace their missing teeth; the deficiency of bone volume is the primary reason for avoiding such treatment options. Despite recent advances in bone grafts and bone-substitute technology, the use of autogenous bone grafts continues to represent the “gold standard” in implant site reconstructive surgery. The mandibular symphysis (chin bone in interforaminal region) is a favorable donor site as it has an excellent risk-benefit ratio. This study reports a case of severely deficient maxillary alveolar ridge being only 2.45 mm of bone width and implant site requires a hard tissue base foundation: To fulfill this requirement, mandibular symphysis block bone is used to improve bone width.

*Keywords: Resorbed alveolar ridge, Chin block graft, Implant.*

## INTRODUCTION

The success of osseointegrated dental implants depends on whether there is sufficient volume of healthy bone at the recipient site at the time of implant placement. The placement of an implant at a site with a thin buccal crestal ridge (e.g., post-extraction ridge) mostly is followed by a significant buccal resorption.<sup>1</sup>

In addition to the biomechanical and functional needs of prosthesis, there are often esthetic considerations. Bone grafting is often necessary to place the implant in the proper location for an ideal esthetic result. The soft tissue covering often needs amplification in the esthetic zone. The bone foundation sets the base for the soft tissue drape.

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Esthetic desires, a primary diagnostic consideration for implant prostheses is the available bone in the edentulous span. The placement of endosteal dental implants requires adequate bone volume at the desired locations for ideal prosthetic support. If inadequate bone exists, several techniques may be used to reconstruct the deficient ridge for implant placement. The number of key factors present and the size of a bony defect are important considerations in the selection of a modality for ridge augmentation.<sup>2</sup>The fewer the number of remaining bony walls, the greater the need for osteopromotive techniques. Although allografts and guided bone regeneration techniques have been used predictably in slight-to-moderate bone regeneration, these methods have limitations and have been found to produce less favorable results in the treatment of larger bone deficiencies. Autologous cortical/trabecular bone grafts may be considered the gold standard in the repair of moderate to severe alveolar atrophy and bone defects.<sup>3</sup>

Rule of 5's Misch in 1992 Proposed a safe surgical technique to harvest a bone block graft from symphysis which helps to prevent injury to neuro-vascular components of mandibular symphysis region. All the bone cuts should be perpendicular to the cortex in a right angle to the vestibular plain of the symphysis. The superior cut should be 5 mm below root apices to prevent injury to tooth roots. The inferior cut should be 5 mm above the lower border. Vertical cuts should be at least 5 mm away from the mental foramen. Depth of the cut should be at least through the outer cortex and to the opposite

cortical plate to obtained monocortical graft. Lingual cortex should not be perforated.<sup>4</sup>

## CASE REPORT

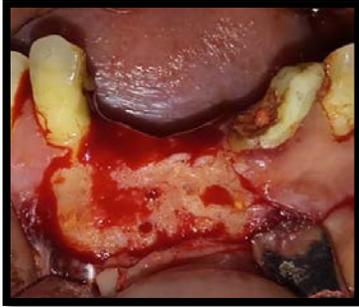
The surgical procedure was performed under local anesthesia for deficient bone width in axillary anterior ridge (*Illustration 1*). Patient was asked to rinse with 0.12% chlorhexidine before the surgery. Surgical access was through a mid-crestal incision, maximizing the keratinized mucosa on each side of the incision, and a crevicular buccal incision at the adjacent teeth including vestibular oblique releasing incisions. Full-thickness flaps were reflected to expose the alveolar bone. All fibrous tissue was removed from the recipient site, and perforations into the marrow space were produced using surgical burs to improve vascularization and incorporation of the graft from mandibular symphysis (*Illustration 2*).



*Illustration 1: -Pre-operative clinical picture*

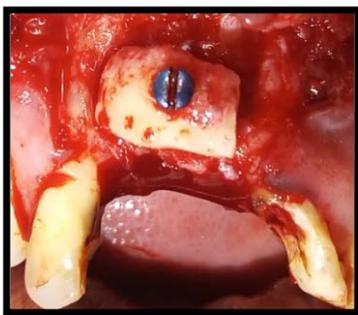
For harvesting mandibular symphysis block graft, the incision begins in the sulcus from second bicuspid to second bicuspid in mandible. An oblique releasing incision is made at the distal buccal line angle of these teeth and continues into the depth of the buccal vestibule. A full thickness mucoperiosteal flap is reflected to the inferior

border, which results in a degloving of the anterior mandible and allows for good visualization of the entire symphysis, including both mental neurovascular bundles.



*Illustration 2: - Preparing recipient site for grafting*

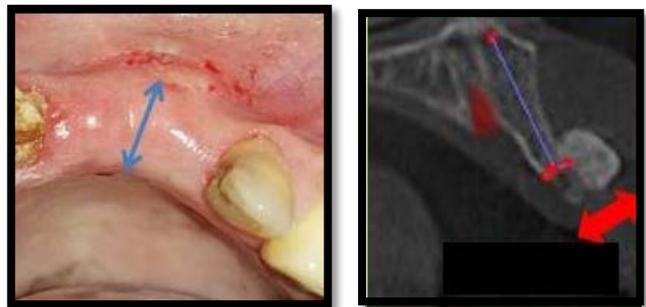
A 702L tapered fissure bur in a straight handpiece is used to penetrate the symphysis cortex via a series of holes that outline the graft. It is important not to encroach within 5 mm of the apices of the incisor and canine teeth and the mental neurovascular foramina. The inferior osteotomy is made no closer than 5 mm from the inferior border. All holes are connected to a depth of at least the full extent of the bur flutes (7 mm), and the graft is harvested using bone spreaders and straight and curved osteotomes.



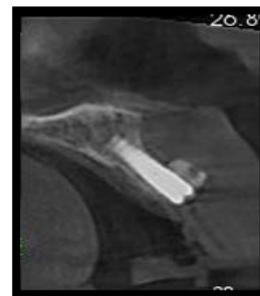
*Illustration 3: - Fixation of graft using titanium screw grafting*

The graft is placed in normal saline before contouring and fixation. Fixation of graft was

done using titanium screw (*Illustration 3*). Closure of the site is performed with 4-0 Vicryl sutures. After 4 months soft and hard tissue were evaluated clinically and radiographically (*Illustration 4*). The screw which was used to stabilize the graft was removed by placing a semilunar incision over the grafted site. After retrieval of the screw there was significant increase in width of ridge, and implantation was planned. Full thickness flap was raised and implant was placed in upper left central incisor (*Illustration 5*). Primary closure of the site was done using 4-0 silk suture. CBCT was taken after the implant was placed prosthetic rehabilitation was done after 4 months.



*Illustration 4: - After 4 months increase in bone width is noticed*



*Illustration 5: - Implant placed within the bony contour*

## DISCUSSION

Bone deficiency in the anterior maxilla prevents primary implant stability or results in an inappropriate implant position with compromised esthetics or function. Therefore, horizontal ridge augmentation is a prerequisite before or during implant placement. The anterior maxilla is the most challenging area regarding esthetics in implant dentistry. Many, if not most, cases in anterior maxilla require horizontal ridge augmentation due to partial or complete ridge loss of facial bone plate following tooth extraction or tooth loss. Additionally, in order to attain some homogeneity, surgical approach used to improve alveolar ridge width was narrowed down to horizontal bone augmentation, thus excluding other surgical procedure like immediate implant placement with socket grafting or implant placement after ridge expansion, ridge splitting or distraction osteogenesis.<sup>5</sup>

The ideal bone graft should be osteoinductive and conductive, biomechanically stable, disease free and contain minimal antigenic factors. All these features are found in autograft bone. The disadvantages of autografts incorporate the need for a separate incision for harvesting, increased operational time, and possibility of donor site complications.<sup>5</sup>

Block bone grafts harvested from the symphysis can be used for predictable bone augmentation up to 6 mm in horizontal and vertical dimensions. The range of this cortical cancellous graft thickness is 3 to 11 mm, with most sites providing 5 to 8 mm. The density of the grafts is D-1 or D-2, and up to a three-tooth edentulous site can be grafted.<sup>6</sup>

The main inclusion criterion was the presence of insufficient amount of residual bone (<4 mm in width) to place one to two implants in the correct prosthetic position in the maxilla.<sup>7</sup> Main exclusion criteria are local infections, uncontrolled diabetes (glycosylated hemoglobin level >7 mg%), a history of radiation therapy in the head or neck region for past 6 months, immunosuppression and poor oral hygiene and motivation.<sup>8</sup>

Mandibular ramus block bone can also be used.<sup>5</sup> Bone augmentation can also be performed using bone spreading or ridge splitting technique while it is a predictable procedure but it has a mechanical limitation in cases having ridge width less than 3 mm. In this case, it was not possible to split the cortices because the bone width existing at implant site is only 2.45 mm.<sup>9</sup>

Guided bone regeneration can also be used to augment deficient ridge width but it is difficult to maintain the required space beneath the barrier membrane without the support of bony wall throughout the healing period. Despite the success, complications such as soft tissue dehiscence with membrane exposure and infection impair the outcome of therapy.<sup>10</sup>

In our case the pre-operative width was 2.45 mm so ridge augmentation was planned. Mandibular symphysis graft was allowed to get integrated for 4 months prior to implant placement. There was no evidence of complication meanwhile. While placing implant full thickness flap was reflected and the implant was placed with primary stability of 40Ncm.

## CONCLUSION

The intramembranous grafts like mandibular symphysis are a convenient source and provide a dense quality graft. The thick cortical layer of the transplant prevents or reduces resorption and the cancellous part help to fasten the regeneration. It does not produce immune reactions and are incorporated by osteoclastic resorption with a shorter healing period compared with other methods of osseous repair. Proper case selection and accurate surgical planning is the prerequisite for successful graft harvesting. Applying the new safety recommendations and proper patient selection in chin bone harvesting could reduce the risk of post-operative complication.

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# ANTIBIOTIC PRESCRIBING PRACTICES IN DHARMSINH DESAI UNIVERSITY: A PRELIMINARY SURVEY

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## ABSTRACT

**Background:** Dental practitioners regularly prescribe antibiotics for therapeutic or prophylactic purposes to manage oral and dental infections. It has been observed that contribution towards the problem of antibiotic resistance by dentists can be substantial as dentists prescribe 10% of all common antibiotics. **Aim:** The present study was conducted to evaluate the knowledge and attitude of Undergraduate and Postgraduate students and Dental practitioners regarding antibiotic prescription in Dharmsinh Desai University Faculty of Dental Science. **Material and Method:** A validated self-designed questionnaire consisting of 10 multiple choice questions was designed and distributed among undergraduate and postgraduate students and faculty members of Dharmsinh Desai University to collect demographic data regarding prescription patterns of antibiotics among the three groups. Chi square test was performed and the results were evaluated for significance. **Results:** When comparing the responses of Under Graduate students, Post Graduate students and Faculty members for antibiotics prescribed for commonly encountered oral conditions, the significant difference was found while there was no significant difference in antibiotic prescription for systemic conditions. Most of the students and practitioners chose to prescribe amoxicillin + Clavulanic acid and the duration of antibiotic was mostly for 3-5 days. A large proportion of students and faculty members were familiar with the concept of antibiotic resistance but contrary to this the discrepancy regarding the awareness of antibiotic prescription guidelines and antibiotic prophylaxis was found. **Conclusion:** The study concludes that dental students may prescribe antibiotics inappropriately for various conditions even when it is not needed. This may indicate defect in interpretation of education and knowledge of students with regards to current antibiotic guidelines. **Key words:** Dental practitioners, antibiotics, prophylactic purposes, knowledge and attitude.

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## INTRODUCTION

The primary function of antibiotics is the eradication of bacterial infections either by killing or slowing down bacterial growth.<sup>[1]</sup> One of the perhaps unforeseen challenges that clinicians faced after antibiotics had radicalized medicine was the evolutionary measures by which bacteria were able to become resistant to these agents.<sup>[2]</sup> Alexander Fleming, who along with Howard Florey and Ernst Chain shared the Nobel Prize in 1945 in Physiology and Medicine, addressed in his lecture: "It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body."<sup>[3]</sup>

Dental practitioners regularly prescribe antibiotics for therapeutic or prophylactic purposes to manage oral and dental infections.<sup>[4]</sup> It has been observed that contribution towards the problem of antibiotic resistance by dentists can be substantial as dentists prescribe 10% of all common antibiotics.<sup>[5]</sup> We have now entered an era where some bacterial species are resistant to full range of antibiotics presently available, with the methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant *Staphylococcus aureus* being the most widely known example of the extensive resistance.<sup>[6]</sup>

The most common use of antibiotics in field of dentistry is after routine dental extractions and endodontic treatment. However, the use of antibiotics in such situation is not always warranted. Recent research shows that most dental infections can be managed with only local interventions to eliminate or to relieve the source of infection, such as incision and drainage, root canal treatment, and tooth extractions, without need of antibiotic therapy.<sup>[2]</sup> National Center for Disease Control and Prevention found that almost one-third of all outpatient antibiotic preparations are unnecessary.<sup>[7]</sup> Many studies have been conducted in UK, India and Iran assessing the knowledge of dentists and dental

students regarding the prescription and indications of antibiotics, and although the amount of evidence of mounting antimicrobial resistance in medical literature is increasing, studies show that dental community lacks adequate knowledge in this area. <sup>[8-11]</sup>

Keeping in the mind the results obtained from the previous studies, we took up the present study to investigate antibiotic prescribing practices of all three groups.

## AIM

The aim of the present study was to evaluate the knowledge and attitude of Undergraduate and Postgraduate students and Dental practitioners regarding antibiotic prescription in Dharmsinh Desai University Faculty of Dental Science, Nadiad.

## OBJECTIVES

1. To evaluate the percentage of Undergraduate students, Postgraduate students and practitioners in Dharmsinh Desai University prescribing antibiotics after routine dental procedure.
2. To evaluate the percentage of dental students and practitioners being concerned about the risks of antibiotic resistance.

## NULL HYPOTHESIS

There is no difference in prescription pattern of antibiotics among Under Graduate, Post Graduate and Practicing faculty members of Dharmsinh Desai University.

## MATERIALS AND METHODOLOGY

A study was conducted in Dharmsinh Desai University wherein a validated self-designed questionnaire was used as per 'Annexure 1' to collect demographic data and information regarding the prescription patterns of antibiotics among Under Graduate students, Post Graduate students and practicing faculty in Dharmsinh Desai University.

The questionnaire contains 10 multiple choice questions which aided in collecting the following information from study participants: Demographic details, qualification, number of patients treated, commonly prescribed antibiotics, duration of prescribing antibiotics, clinical conditions for which antibiotics were prescribed, awareness about antibiotic prophylaxis and awareness about antibiotic resistance.

The study took into consideration the sample size of 300 participants.

#### Inclusion Criteria:

1. Undergraduate students which will include final year students and interns of Dharmsinh Desai University.
2. Postgraduate students of Dharmsinh Desai University.
3. Practicing faculty members of Dharmsinh Desai University.

#### Exclusion Criteria:

1. 1<sup>st</sup> year 2<sup>nd</sup> year and 3<sup>rd</sup> year undergraduate students.
2. Dental Practitioners outside Dharmsinh Desai University.

The study was a cross-sectional survey. A Questionnaire constructed in Microsoft office word 2007 was printed and distributed randomly to Undergraduate, Postgraduate students and dental faculty members of Dharmsinh Desai University. For the comparison of data among Undergraduate, postgraduate and Faculty the Chi-square test was used. The responses given by the participants regarding antibiotic prescriptions for commonly encountered oral condition and systemic conditions are compiled and presented as in Table 1, and the responses regarding commonly prescribed antibiotics, duration of antibiotics and awareness of prescription guidelines; awareness of antibiotic prophylaxis guidelines and antibiotic resistance are contemplated and presented as in table 2a, 2b and 2c.

## RESULTS

A total of 228 dental students and practitioners of Dharmsinh Desai University responded to this survey, 165 of whom were Under Graduate students of 4<sup>th</sup> year and internship; 39 were Post Graduate students and 24 were dental faculty members. The responses given by participants regarding antibiotic prescriptions for commonly encountered oral and systemic conditions are presented in [Table 1](#).

When comparing Under Graduate students, Post Graduate students and Practitioners it was found that there was significant difference in antibiotic prescription for oral and systemic condition between the three groups. When questioned with regards to specific conditions, such as reversible pulpitis, intraoral draining sinus tract and pediatric periodontal disease the results were highly significant ( $p= 0.0001$ ,  $p= 0.0009$ , and  $p=0.0006$  respectively). While for conditions like extraoral draining sinus tract, acute facial swelling, simple extractions, extraction by open method, periapical abscess and dry socket the results were considerably significant ( $p= 0.001$ ,  $p=0.04$ ,  $p=0.001$ ,  $p=0.03$ ,  $p=0.008$  and  $p=0.07$  respectively). However, there was no significant difference in prescription for systemic conditions.

From the present study it was found that the most commonly prescribed antibiotic was Amoxicillin + Clavulanic acid among the three groups. The results for the prescription of amoxicillin, cephalosporin and clindamycin were significant ( $p=0.003$ ,  $p=0.0001$  and  $p=0.0002$  respectively) of these the clindamycin was the least prescribed antibiotic with no Under Graduate students and Post Graduate students prescribing it ([Table 2a](#)).

There was significant difference in duration of antibiotic prescription among Under Graduate students, Post Graduate students and Practitioners ( $p=0.05$ ) as shown in [Table 2b](#). The antibiotics were most commonly prescribed for 5 days amongst Under Graduate students (66%) and Post Graduate students (58.9%) while it was prescribed for 3 days

amongst Practitioners (45.8%) and was not prescribed for 10 days by any group.

Large proportion of Under Graduate students (97.5%), Post Graduate students (97.4%) and Practitioners (100%) were familiar with the concept of antibiotic resistance. However, there was significant difference among the three groups in awareness of guidelines for antibiotic prescription and antibiotic prophylaxis and majority of Post Graduate students and Practitioners were aware of it as compared to Under Graduate students ( $p=0.0002$  and  $p=0.0001$  respectively) as shown in [Table 2c](#).

## DISCUSSION

To evaluate the knowledge and attitude of dental students and practitioners towards antibiotic prescription, a study was conducted at Faculty of Dental Science, Dharmsinh Desai University with a sample size of 300 participants, among which 165 Under Graduate students, 39 Post Graduate students and 24 faculty members responded, making a total of 228 responses. A similar study was conducted at Riyadh, Saudi Arabia. In contrast to our study, this study included juniors and seniors from five different universities of Riyadh with 312 responses.<sup>[12]</sup>

Oral conditions that present to dental clinics are mostly inflammatory in nature that require operative interventions rather than infectious processes that would benefit from antibiotics.<sup>[13]</sup> Antibiotics should be reserved for the condition that manifests with signs of systemic involvement like fever, lymphadenopathy and trismus.<sup>[14]</sup>

A significant finding of our study was that most of the participants prescribed antibiotics for conditions that could be managed by operative interventions alone as per the guidelines.<sup>[15]</sup> For instance, antibiotics were prescribed for reversible pulpitis which can be managed by restorative procedures wherein the benefits of antibiotics remain unclear.<sup>[16]</sup> Similarly, participants chose to prescribe antibiotics for draining abscess of dental origin wherein root canal treatment stands as gold standard and antibiotics as

intra canal medicaments could be used for adjunctive care. Long term use of systemic antibiotics may make these micro-organisms more resistant to conventional endodontics.<sup>[17]</sup> In the present study, results have been significant for antibiotic prescription post dental extractions but studies have shown that the use of antibiotics for the same has shown limited benefits and has been reported to be associated with gastro-intestinal side effects.<sup>[18]</sup>

As for dry socket, which is the most commonly encountered post-extraction complication, results of this study have shown to be highly significant. However, it has been suggested that the use of antibiotics in situations like such should be reserved for those with history of multiple dry sockets and immuno-compromised patients.<sup>[19]</sup> Antibiotics were also prescribed for periapical abscesses which is not warranted in all situation according to a study by T. Kuriyama.<sup>[20]</sup> Furthermore, participants of this study routinely prescribed antibiotics to handle periodontal conditions, the standard treatment plan of which is directed towards microbial removal or elimination in the form of plaque removal and maintenance of oral hygiene by the patient unless there is a local spreading infection whereby mechanical means such as drainage or debridement are not possible. Without satisfactory plaque control, treatment is doomed to failure and inadequate oral hygiene in itself must be a contraindication to the use of antimicrobials.<sup>[21]</sup>

The results our study encountered that antibiotics were not prescribed for systemic conditions like viral infections, juvenile diabetes, respiratory disorders and blood dyscrasias by a majority which is in association with guidelines by American Association of Endodontists 2017.<sup>[16]</sup> Prescription of antibiotics for prophylaxis in patients with congenital cardiac abnormalities and subacute endocarditis undergoing invasive dental procedures was found to be a common practice among the respondents which suits the guidelines of American Heart Association

(AHA) and American College of Cardiology (ACC).<sup>[22]</sup>

The current study showed that the most prescribed antibiotic was amoxicillin plus Clavulanic acid which is comparable with a study conducted in Saudi Arabia.<sup>[23]</sup> In contrast to this, some studies have shown Amoxicillin to be the most prescribed antibiotic.<sup>[24-26]</sup>

It was found that a great majority of undergraduate and post-graduate students would prescribe antibiotics for a duration of 5 days whereas most of the practicing faculty preferred an antibiotic course for 3 days. Prior studies have shown that patients improved significantly after two or three days of antibiotic therapy, thus proving that prolonged courses may not confer additional benefits.<sup>[27-30]</sup>

In the present study, majority of participants were aware about the concept of antibiotic resistance, conversely majority of undergraduate students were not familiar with the guidelines of antibiotic

prophylaxis and prescription<sup>[15]</sup> as compared to post graduate students and practicing faculty of Dharmsinh Desai University.

## **CONCLUSION**

The findings from the present study conclude that dental students may prescribe antibiotics for various conditions even when not needed which can lead to serious issues of antibiotic resistance. Moreover, there is inadequacy in interpretation of gained education and knowledge of students with regard to antibiotic guidelines. As dental problems are mostly related to local factors, hence mere removal of etiology reduces the need for antibiotic prescription, a fact that should be taught and acknowledged in student's education. The prescribing practices of students can be improved by emphasizing on the recommended guidelines in dental schools' curriculum and clinical manuals. However, further studies are required to clearly explain the differences in patterns of antibiotic prescription.

Questions	Response	UGs (n=165)	PGs (n=39)	Faculty members(n=24)	X <sup>2</sup> value	P value
Reversible pulpitis	Yes	16	6	3	18.8	0.0001
	No	149	33	21		
Irreversible pulpitis	Yes	105	21	13	1.79	0.4
	No	60	18	11		
Intraoral draining sinus tract	Yes	152	35	16	13.9	0.0009
	No	13	4	8		
Extraoral draining sinus tract	Yes	160	35	19	12.9	0.001
	No	5	4	5		
Localized intraoral swelling	Yes	137	32	17	2.08	0.35
	No	28	7	7		
Acute facial swelling	Yes	157	33	21	6.06	0.04
	No	8	6	3		
Dental Trauma	Yes	123	31	17	0.65	0.71
	No	42	8	7		
Pediatric periodontal diseases	Yes	38	20	11	15.01	0.0006
	No	127	19	13		
Pericoronitis	Yes	140	32	17	2.92	0.23
	No	25	7	7		
Simple extractions	Yes	26	18	7	13.54	0.001
	No	119	21	17		
Extraction by open method	Yes	160	34	22	6.57	0.03
	No	5	5	2		
Periapical abscess	Yes	160	38	20	9.66	0.008
	No	5	1	4		
Apical periodontitis	Yes	117	25	13	3.02	0.22
	No	48	14	11		
Dry socket	Yes	108	23	10	5.18	0.07
	No	57	16	14		
Viral infections	Yes	58	18	5	4.19	0.12
	No	107	21	19		
Juvenile diabetes	Yes	72	17	8	0.93	0.62
	No	93	22	16		
Blood dyscrasias	Yes	79	18	8	1.78	0.409
	No	86	21	16		
Respiratory disorders	Yes	81	15	8	3.06	0.21
	No	84	24	16		
Congenital cardiac abnormalities	Yes	127	28	20	1.12	0.57
	No	38	11	4		
Subacute bacterial endocarditis	Yes	155	35	23	1.15	0.56
	No	10	4	1		

Table 1: Comparison between responses of undergraduate students (UGs), post graduate students (PGs) and dental faculty members of Dharmsinh Desai University for various oral and systemic conditions.

Routinely prescribed antibiotics	Undergraduate		Postgraduate		Faculty		X2 value	P value
	N	%	N	%	N	%		
Amoxicillin	107	64.8	14	35.9	12	50	11.64	0.003
Amoxicillin + clavulanic acid	126	76.3	27	69.2	19	79.1	1.06	0.58
Amoxicillin + Metronidazole	23	13.9	10	25.6	5	20.8	3.44	0.178
Erythromycin	9	5.4	1	2.6	1	4.1	0.599	0.741
Azithromycin	16	9.6	6	15.4	1	4.1	2.16	0.33
Ornidazole + Ofloxacin	1	0.6	8	20.5	7	29.1	39.32	0.0001
Cephalosporins	37	22.4	8	20.5	11	45.8	6.61	0.03
Clindamycin	0	0	0	0	2	8.3	17.15	0.0002
Others	10	6	1	2.6	2	8.3	1.06	0.58

Table 2a: Prescription pattern of the most commonly prescribed antibiotics

Duration of antibiotic course	Undergraduate		Postgraduate		Faculty		X2 value	P value
	N	%	N	%	N	%		
3 days	31	18.8	10	25.6	11	45.8	9.106	0.05
5 days	109	66	23	58.9	10	41.6		
7 days	25	15.1	5	12.8	3	12.5		
10 days	0	0	0	0	0	0		

Table 2b: Duration of antibiotic course

Awareness	Undergraduate		Postgraduate		Faculty		X2 value	P value
	n	%	N	%	N	%		
Awareness of guidelines for antibiotic prescription	92	55.7	32	82	21	87.5	17.32	0.0002
Awareness on antibiotic resistance	161	97.5	38	97.4	24	100	0.6	0.73
Awareness on antibiotic prophylaxis prescription	110	66.6	37	94.8	23	95.8	19.62	0.0001

Table 2c: Awareness of prescription guidelines and antibiotic resistance

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**ANNEXURE 1:**  
**ANTIBIOTIC PRESCRIBING PRACTICES IN**  
**DHARMSINH DESAI UNIVERSITY:**  
**A Preliminary Survey**

NAME:

GENDER: Male / Female

DESIGNATION: 4<sup>th</sup> year / Intern / PG student / Practitioner

This questionnaire is a part of a survey to evaluate the % of dental students/dentists prescribing antibiotics after routine dental procedures in Dharamsinh Desai University.

Kindly mark (✓) the suitable option/(s).

**Questionnaire:**

1. Approximate number of patients treated.  
 <30       30-60       60-100       >100
2. Are you aware about the recent guidelines for 'antibiotic prescription'?  
 Yes       No
3. Are you aware about the guidelines for 'antibiotic prophylaxis' and do you follow the same?  
 Yes       No
4. Which antibiotics do you prescribe routinely?  
 Amoxicillin       Amoxicillin + Clavulanic acid  
 Ornidazole + Ofloxacin       Amoxicillin + Metronidazole  
 Clindamycin       Erythromycin  
 Azithromycin       Cephalosporins  
 Others
5. Minimum number of days for prescribing antibiotics?  
 3       5       7       10
6. Choice of antibiotics is based on  
 CDE programs       Recommendations from seniors / other dentists  
 Advertisements / Internet       Others
7. Do you routinely prescribe antibiotics for the following situations?

Pulpitis:

- Reversible pulpitis Yes/No
- Irreversible pulpitis Yes/No

Draining sinus tract

- Intraoral Yes/No
- Extraoral Yes/No

Localized intraoral swelling Yes/No

Acute facial swelling Yes/No

Dental trauma Yes/No

Pediatric periodontal disease Yes/No

Pericoronitis Yes/No

Simple extraction Yes/No

Extraction by open method Yes/No

Periapical abscess Yes/No

Apical periodontitis Yes/No

Dry socket Yes/No

8. Do you prescribe antibiotics for the following systemic conditions?

Viral infections Yes/No

Juvenile diabetes Yes/No

Blood dyscrasias Yes/No

Respiratory disorders Yes/No

Congenital cardiac abnormalities Yes/No

Subacute bacterial endocarditis Yes/No

9. Do you inquire from your patient about whether he/she has taken a course of antibiotics in the past 1 week before prescribing antibiotics?

- Yes       No

10. Do you believe that antibiotic resistance is of growing concern?

- Yes       No       Maybe

# SURGICAL MANAGEMENT OF SKELETAL CLASS III MALOCCLUSION: A CASE REPORT

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## ABSTRACT

This case report describes a successful orthognathic treatment of a skeletal Class III malocclusion with maxillary retrognathism and mandibular prognathism in an adult individual. The patient with Class III malocclusion, having maxillary deficiency and mandibular excess in sagittal plane was treated with orthodontics, Le fort 1 osteotomy advancement and bilateral sagittal split osteotomy.

The surgical-orthodontic combination therapy has resulted in near-normal skeletal, dental and soft tissue relationship, with marked improvement in the facial esthetics which in turn, has helped the patient to improve the self-confidence level. The interdisciplinary approach is the treatment of choice in most of the skeletal malocclusions.

**Keywords:** *Class III malocclusion, Decompensation, Orthognathic Surgery, Le Fort1 osteotomy advancement, Bilateral sagittal split osteotomy, Retrognathism, Prognathism, surgical orthodontic treatment.*

## INTRODUCTION

The Skeletal Class III malocclusion is characterized by mandibular prognathism, maxillary deficiency or both. Clinically, these patients exhibit a concave facial profile, a retrusive nasomaxillary area and a prominent lower third of the face. The lower lip is often protruded relative to the upper lip. The upper arch is usually narrower than the lower, and the over jet and overbite can range from reduced to reverse.

The effect of environmental factors and oral function on the etiological factors of a Class III malocclusion is not completely understood. However, there is a definite familial and racial tendency to mandibular prognathism. For many Class III malocclusions, surgical treatment can be the best alternative. Depending on the amount of skeletal discrepancy, surgical correction may consist of mandibular setback, maxillary advancement or a combination of mandibular and maxillary procedures.

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After surgical correction of the skeletal discrepancy, the occlusion is usually finished orthodontically to a Class I relationship. However, if surgical treatment is not performed, and the final molar relationship is Class III or Class I, there are challenges specific to the static and functional Class III occlusion that must be considered. Sometimes a Class III relationship is caused by a forward shift of the mandible to avoid incisal interferences. This is a pseudo-Class III malocclusion. In these cases, it is important to establish the inter-occlusal relationship with the teeth in the retruded contact position.

In this case report, the surgical orthodontic treatment of a young adult patient with a Class III malocclusion is illustrated.

In skeletal Class III cases, it may be difficult to achieve an excellent occlusal outcome only with orthodontic treatment and to maintain a stable occlusion<sup>1</sup>. There are three main treatment options for skeletal Class III malocclusion: growth modification, dentoalveolar compensation, and orthognathic surgery. Growth modification should be initiated before the pubertal growth spurt; afterwards, only two

options are possible<sup>2</sup>. Thus, treatment of skeletal Class III malocclusion in an adult requires orthognathic surgery combined with conventional orthodontic treatment aiming to improve self-esteem and achieve normal occlusion and improvement of facial esthetics<sup>3,4</sup>. Proffit et al.<sup>5</sup> found that psychological rather than morphologic characteristics probably were the major reason on whether or not an individual decided to accept surgery. Bell et al.<sup>6</sup> also pointed out that the decision of surgery was mainly related to patients' self-perception.

## DIAGNOSIS

A 21-year-old male patient came to the department of orthodontics with the chief complaint of forwardly placed lower front teeth. Clinical and radiographic examination revealed a concave profile, incompetent lips, class III molar and canine relation, proclined upper and lower anteriors, horizontal growth pattern and skeletal class III jaw bases. The patient was diagnosed as Angles class III malocclusion on class III skeletal bases with horizontal growth pattern.



*Illustration 1: Pre-treatment extra oral photographs*



*Illustration 2: Pre-treatment intra oral photographs*

### **TREATMENT OBJECTIVE**

1. To achieve an aesthetically pleasing profile
2. To relieve crowding in lower anterior region
3. To achieve normal overjet and overbite
4. To achieve normal inclination of upper and lower incisors.
5. To achieve Class I canine & Molar Relationship.
6. To Correct Anterior & Posterior Crossbite.

### **TREATMENT PLAN**

The treatment plan decided was Bilateral Sagittal Split Osteotomy and Le Fort I Osteotomy Advancement with presurgical and postsurgical orthodontics was planned to achieve esthetically acceptable and functionally optimum occlusion with straight facial profile.

### **Treatment Progress**

Preoperative orthodontic preparation was conducted with preadjusted Roth 0.022 × 0.028-inch fixed appliances. After levelling and alignment, 0.019 × 0.025-inch stainless steel rectangular arch wires were placed in the maxillary and mandibular arches in preparation for surgery.

Presurgical orthodontics included closure of spaces in the upper anteriors to achieve normal inclination and slenderization of premolars to relieve mandibular crowding. Mandibular third molars were extracted six months prior to the orthognathic surgery. Short crimpable hooks were placed on the 0.019 × 0.025 stainless steel wire between two teeth in both arches to allow placement of 1/4-inch intermaxillary elastics after surgery. The presurgical orthodontic phase lasted 8 months.

Before Orthognathic surgery, the surgical splints were prepared with mock surgery. In this the maxillary and mandibular casts were articulated in a semi adjustable Hanau's articulator to simulate the patients jaw relation with a facebow

transfer. As it was a bi-jaw surgery 2 splints were prepared, one for maxillary advancement and the other for mandibular setback. In this case , a maxillary advancement of 7mm and mandibular setback of 6mm was planned.

Using the splints, Le fort 1 osteotomy advancement and bilateral sagittal split osteotomy for mandibular setback was performed. Intermaxillary elastics were placed on braces for 14 days in the immediate postoperative phase. The patient was followed closely after the procedure and was guided to perform opening and lateral movements. Orthodontic treatment was resumed 6 weeks after surgery.

After orthognathic surgery, orthodontic finishing was performed in order to obtain

better teeth interdigitation. The patient was instructed to wear vertical intermaxillary elastics for 20 hours a day during 45 days and then gradually reduce the wear time. Occlusal equilibration was performed after appliance removal to refine the interocclusal contacts. A maxillary Hawley retainer and a fixed canine to canine mandibular retainer were placed. Total treatment time was 20 months.

The facial posttreatment photographs show improvement in the facial profile. The patient was satisfied with his teeth, profile, and smile line. The final occlusion shows Class I canine relationship on both sides and normal overjet and overbite.



*Illustration 3: Post treatment extra oral photographs*



*Illustration 4: Post treatment intra oral photographs*

## DISCUSSION

A bi-jaw surgery with Le Fort I advancement & mandibular setback was preferred to a bilateral sagittal split osteotomy as the patient presented with a mid-face deficiency along with mandibular prognathism. Due to the presence of spacing in the upper anterior region, decompensation in the upper arch was done using this space to bring the incisors to normal inclination. As the molars were already in class III relation no further extraction of premolars was required. Mild crowding in the lower anterior region was relieved by slenderization of the premolars. In this case, the posterior cross bite was left uncorrected intentionally to facilitate normal occlusion in the transverse plane. If corrected a maxillary advancement and a mandibular set back would leave us with a scissor bite post surgically as the narrow portion of the mandible will occlude with the broader portion of the maxilla.

Finally, the overjet presurgically was achieved at -9 mm which was sufficient as a mandibular setback of 6mm and a maxillary advancement of 7mm would leave us with an overjet of 4mm post surgically. This would also take into account any relapse due to the masticatory muscles and leave us with a positive overjet.

According to the literature, maxillary advancement is the second surgical procedure more associated with relapses in maxillofacial surgery, so that the possibility of relapses of 2 to 4 mm which occurs is 20% or less. An acceptable stability in combined maxillary and mandibular surgical procedures is obtained when rigid

internal fixation is used. Three surgical procedures are susceptible to relapses of 2 to 4 mm in 40 to 50% of the cases: the setback of the mandible, the inferior maxillary repositioning, and the maxillary expansion. The movement direction of the surgical procedures, the type of fixation, and the surgical technique can affect the stability of orthognathic surgery<sup>7</sup>. Stability has improved with the use of stable internal fixation, once it accelerates bone repair, allows immediate mandibular functions, avoids complications from maxillomandibular lock, and facilitates oral hygiene and feeding<sup>8</sup>.

Immediately after orthognathic surgery, vertical intermaxillary elastics were introduced to obtain better teeth interdigitation. The patient was instructed to wear the elastics for 20 hours a day during 45 days and then gradually reduce the wear time.

The combined surgical-orthodontic treatment of this case led to a significant facial, dental, and functional improvement. The dental relationship achieved was good. Facially, vertical balance and harmony were obtained and this is perhaps the most important goal achieved, because it was the patient's chief concern.

VARIABLE	PRE TREATMENT	POST TREATMENT	NORMAL
SNA	84	90	82° ± 3
SNB	90	86	79° ± 3
ANB	-6	4	3° ± 1
Wits appraisal	BO ahead AO 9 mm.	AO ahead BO 2mm	0 mm
N ⊥ Pt A	+ 4 mm	1mm	0±2 mm
N ⊥ Pog	+16mm	-5mm	0 to -4mm
Angle of inclination	85	90	85
Go-Gn to SN	27	27	32
Eff. Max. Length	89 mm	96	100.9 ± 3.9
Eff. Mandi. Length	125 mm	120	131.1 ± 4.6
Y- Axis	61	62	66
Facial axis	+8	5	0
Upper incisor – NA	12 mm	6mm	4mm
Upper incisor – NA	41	32	22
Upper incisor – SN	126	120	102 ± 2
Upper incisor to maxillary plane angle	46	122	108° ± 5
Lower incisor to mandibular plane angle	99	105	92° ± 5
Lower incisor to NB	10 mm	10mm	4mm
Lower incisor to NB	36	37	25
Interincisal angle	108	115	133° ± 10
Maxillary mandibular plane angle	19	26	27° ± 5
Lower anterior face height	67 mm	58	55%
Face height ratio	69.2 %	67.8%	62-65%
Lower incisor to APo line	15mm	6mm	0-2 mm
Lower lip to Ricketts E Plane			-2 mm

Table 1: Composite Analysis

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# ORAL HYGIENE AWARENESS AMONG ORTHODONTIC TREATMENT SEEKING INDIVIDUALS

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## ABSTRACT

**Introduction:** Good oral hygiene is a key factor required to facilitate uninterrupted orthodontic treatment. The present survey was conducted to assess the oral hygiene awareness and knowledge regarding brushing, awareness of periodontal health, knowledge about periodontal disease and their attitude towards oral hygiene. **Materials and method:** The sample consisted of 80 orthodontic patients from the Department of Orthodontics, Faculty of Dental Sciences, DDU, Nadiad. A questionnaire consisting of 24 questions regarding awareness and knowledge of periodontal health amongst orthodontic patients; and their attitude towards oral hygiene awareness and orthodontic treatment was prepared. The data was collected and compiled and statistical analysis was done using Chi square test. **Results:** 90% of patients showed < 1 TO 2 minutes of brushing and 10% of patients showed 3 TO 5 minutes of brushing per day. 61% showed the use of ortho brush for brushing. 91.3% patient use extra auxiliary aids for maintaining oral hygiene with either dental floss, mouth wash and interdental brush. About 65 to 70% individuals did not have knowledge about periodontal health. 25-30% of patients showed awareness for gingival irritation, bad breath, gingival bleeding, plaque, calculus and stains. Around 76% of patients think that fixed orthodontic treatment causes gingival inflammation. Around 96% patients think that fixed orthodontic appliance makes brushing more difficult and cause pain. 80% of them think that straight teeth are easier to clean and 68% think that it is important to follow instructions given by dentist. **Conclusion:** The knowledge and awareness of periodontal health amongst orthodontic patients varied from poor to moderate, which was affected by their attitude, number of teeth with gingival disease, duration of treatment and age. Also, orthodontic patients showed a positive attitude towards periodontal health. This survey would serve as a valuable tool in formulating dental screening programs and providing information regarding the oral hygiene in orthodontic patients.

**Key words:** oral hygiene, periodontal health, attitude towards oral hygiene, orthodontic patients

## INTRODUCTION

The most common oral diseases, dental caries and periodontal disease, are considered to be behavioural diseases because adoption of healthy oral habits is

crucial in controlling them. To a great extent, their prevention and control depend on a person's lifestyle and behaviour<sup>1</sup>

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Orthodontic treatment is widely acknowledged and accepted in everyday dental practice due to the positive effects it has on the dentofacial complex. With fixed orthodontic appliances, clinicians can offer patients the establishment of functional occlusion, improvement of oral health, and aesthetic improvement of the dentofacial complex. Anomalies in the development of the face and jaws as well as orthodontic treatment can influence oral health. Deviations from an ideal arrangement and position of teeth (lack of space, tooth rotation or open bite, a deep bite, and cross-bite) facilitate dental plaque accumulation. It has to be pointed out that malocclusion is not a primary etiological factor but an auxiliary factor, which facilitates dental plaque accumulation. The main principle of orthodontic therapy is to correct tooth and jaw position and, thus, indirectly improve the health of the periodontium and durability of teeth.<sup>2</sup> Good oral hygiene is a key factor required to facilitate uninterrupted orthodontic treatment. Numerous studies show a significant increase in the quantity of dental plaque as well as the occurrence of gingivitis in patients with fixed orthodontic appliances because they make removal of dental plaque difficult.<sup>3</sup> The fixed orthodontic appliances such as braces, arches, and rings increase the number of retention places for dental plaque accumulation. All these factors make it even more difficult to maintain oral hygiene.<sup>4</sup> Self-cleansing is also more difficult because of the reduced effect of mechanical chewing and cleansing effect of saliva on food residues. The lack of good oral health can lead to plaque accumulation, gingivitis, tooth decay, and periodontitis, which can prolong or may lead to discontinuation of orthodontic treatment.

Information should be provided about oral hygiene techniques and this has to be strictly followed by the patients. Awareness alone is not enough to achieve good oral health unless the target population practices it meticulously. Although imparting oral health education begins from the footsteps of awareness, evaluation of its implementation is an important indicator of the success of the education imparted. Adequate devices (equipment), accurate technique, regular tooth brushing, and sufficient length of brushing every single tooth are necessary for adequate oral hygiene. Individual preventive programs should be implemented for patients with fixed orthodontic appliances and they should, apart from health education, include education about the importance of regular and correct oral hygiene maintenance and check-ups. The patients need to be demonstrated the correct technique and frequency of tooth brushing. They also need to learn about the right toothbrushes, interdental and orthodontic brushes as well as about auxiliary devices for oral hygiene maintenance (adequate toothpaste and mouthwash).<sup>5</sup> Active cooperation of the orthodontic patient is essential over prolonged treatment duration and involves keeping appointments and the maintenance of an adequate level of oral hygiene and refraining from hard and sticky foods.<sup>[6]</sup> The information gathered across various socioeconomic groups would be vital in providing information regarding the oral hygiene in orthodontic patients.

#### **AIMS AND OBJECTIVES**

- To evaluate the oral hygiene awareness amongst orthodontic treatment seeking individuals.

- To evaluate the awareness of periodontal health amongst orthodontic treatment seeking individuals.
- To evaluate the knowledge and attitude of patients towards oral hygiene maintenance.

## **MATERIALS AND METHODS**

- A questionnaire composed of 24 questions (**Annexure 1**) regarding the awareness of periodontal health, their knowledge about periodontal health, and their attitude towards oral hygiene awareness and orthodontic treatment was prepared.
- The sample size selected was of 80. The questionnaire was randomly distributed among the patients undergoing orthodontic treatment in the department of orthodontics and dentofacial orthopaedics, Faculty of Dental Sciences, Dharmsinh Desai University, Nadiad.
- The data collected was then compiled in table form and statistical analysis was carried out.  
Pearson's chi square test was done to check the level of significance.

## **RESULTS**

The study was conducted to assess the oral hygiene awareness among 80 orthodontic patients from the Department of Orthodontics, Faculty of Dental Sciences, DDU, Nadiad. Table 1 to 24 show the orthodontic patient's knowledge regarding the frequency of brushing, duration of brushing, type of brush used, awareness of periodontal health, knowledge about periodontal disease and their attitude towards oral hygiene.

52.5% of the patients showed 1 TO 2 times brushing per day.66.3% of the patients showed 3 to 5 minutes of brushing per day.

76.3% showed the use of ortho brush for brushing.91.3% of the patients used extra auxiliary aids for maintaining oral hygiene, amongst which 6.3% patients used dental floss, 63.8% patients used mouth wash and 30% patients used interdental brush.

About 33.8% individuals did not have knowledge about periodontal health. 48.8% of patients showed awareness for gingival irritation, bad breath, gingival bleeding, plaque, calculus and stains.

Around 76.3% of patients thought that fixed orthodontic treatment causes gingival inflammation.95% patients thought that fixed orthodontic appliance makes brushing more difficult and cause severe pain. 81.3% of them thought that straight teeth are easier to clean and 68.8% think that it is important to follow instructions given by dentist.

## **DISCUSSION**

This study presented a comprehensive overview of the oral health behaviour, knowledge, attitude and awareness of orthodontic patients toward their periodontal health. This finding reflects the fact that females are more concerned with their aesthetics, so they demonstrated better attendance to have their dentition maintained and checked, and thus were more represented in the sample. Sharma <sup>7</sup> found that females seeking orthodontic treatment were approximately twice the males.

Oral hygiene behaviour of orthodontic subjects in this study was good. The majority of subjects reported brushing frequently, while only 1.3% admitted no brushing. This was expected since adequate oral hygiene level is requested before receiving any orthodontic treatment. Davies et al <sup>8</sup> concluded that regular visits to the orthodontist are the most likely reason for improvement in oral hygiene and gingival

health. However, Atassi and Awartani <sup>9</sup> evaluated the oral hygiene status of patients with fixed orthodontic appliances and reported that 40% had fair oral hygiene and 60% had poor oral hygiene. The difference in the reported percentages may be due to variability of culture, availability of oral care services and different population. Oral hygiene behaviour of orthodontic subjects in this study was similar to that reported by Baheti and Toshniwal.<sup>10</sup>

Despite the fact that the present study sample reported a good oral hygiene behavior, clinical examination revealed that they had developed generalized moderate gingivitis. This was in agreement with Zachrisson and Alnaes<sup>11</sup> who demonstrated that, in spite of good cleaning with low plaque index scores, most children developed generalized moderate hyperplastic gingivitis within one to two months after the placement of the appliances. However, other studies showed lower plaque and gingival index scores among patients with orthodontic treatment.<sup>12</sup>

Females had less plaque accumulation than males. This was in agreement with Kumar and Shristi,<sup>13</sup> who reported that the females were more aware and had a better knowledge about dental health issues and more engaged in dental behaviour than the male patients. However, the small sample size and the male/female ratio in this study makes this finding inconclusive.

Periodontal pocket depth was greater in subjects who used fixed appliance for more than 18 months. The plaque-retentive nature of orthodontic appliances increases plaque accumulation at the gingival margins, contributing to gingival inflammation and periodontal pockets. This was in agreement with Moosa et al,<sup>14</sup> who showed that patients undergoing

orthodontic treatment have increased plaque accumulation and probing depth, resulting in periodontal tissue destruction. Teeth with gingival recession were more reported in adults' group. This was in agreement with most studies<sup>14,15,16</sup> that investigated gingival recessions and reported that periodontal tissue in younger patients has a more favourable response to orthodontic treatment than in older adolescents and adults. The pathogenesis of gingival recession may include brushing trauma; thin gingival tissue and underlying alveolar bone; and apical migration of the gingival margin, which location is determined by the axial inclination and alignment of the tooth. Joss-Vassalli et al<sup>17</sup> suggested that treatment duration, age, gender or race did not have an influence on the development of recessions during treatment.

Generally, public awareness of gum disease and particularly the role of dental plaque in relation to periodontal disease is poor, presumably due to inadequate health education concerning these conditions. Majority of orthodontic patients did not know what plaque is and what does it cause. This was in agreement with Azodo and Umoh,<sup>18</sup> who reported that only 12.6% of the participants knew dental plaque as soft debris on teeth. Likewise, the majority of Jordanian adults<sup>18</sup> who incorrectly defined the meaning of dental plaque, did not know the harmful effect of plaque and its role in the etiology of gingival disease. However, most of the study participants had a good level of knowledge regarding the role of oral hygiene in preventing gum disease, a finding that was reported in other studies.<sup>19, 20</sup>

The majority of subjects in this study identified bleeding gum as a sign of periodontal disease. This was in agreement

with Taani and Abu Alhaija, <sup>21</sup> who suggested that gingival bleeding and enlargement were the two most common manifestations of periodontal disease that participants were aware of.

Most of orthodontic patients in this study had a moderate level of awareness of their periodontal health. They were aware of having dental calculus and dental stain, but not aware of having dental plaque. This may be due to the easy identification of stains and calculus on teeth. The identification of dental plaque is more difficult, since they do not know how it looks. Ajayi and Azodo <sup>22</sup> assessed knowledge of oral health among Nigerian patients with fixed orthodontic appliances and reported that 93.5% of the subjects showed good oral health awareness. Baheti and Toshniwal <sup>10</sup> showed that nearly 50% of the Indian patients were unaware about periodontal health.

In the present study, the majority of orthodontic patients had a negative attitude towards fixed orthodontic treatment in respect of periodontal health. This was in agreement with Baheti and Toshniwal, <sup>10</sup> who reported that the attitude toward practice of oral hygiene among orthodontic patients was poor. However, most of them reported on the importance of oral hygiene measures and the need to follow these instructions. The negative attitude of orthodontic patients was increased by the longer duration of orthodontic treatment and age of the patients. This negative attitude may be caused by feeling tired and bored by the appliances, due to the increased duration of orthodontic treatment. Orthodontic patients' awareness of their periodontal health during fixed orthodontic treatment demonstrated a significant association with their attitude, number of teeth with gingival recession, duration of

treatment and age. This may be explained by the fact that subjects with negative attitude will not show interest to learn about periodontal health.

The results of this study indicated a poor knowledge, a moderate level of periodontal health awareness and a negative attitude among orthodontic subjects. This emphasizes the need to improve oral health education among orthodontic patients. Orthodontists through their long-term treatment procedure have opportunity and responsibility to educate their patients about periodontal health and to promote proper oral health behaviour with emphasis on the prevention of periodontal disease. However, self-directed educational material such as a leaflet is an inexpensive and practical way of targeting large sections of the population to consider health change.<sup>21</sup>

Periodontal health knowledge among orthodontic patients, awareness of their periodontal health and their attitude toward periodontal health vary among different populations. Cultural differences, socio-economic status, educational background and availability of orthodontic services may explain these variations.<sup>21</sup>

Limitations of this study include small sample size with different female to male ratio, included subjects had different malocclusion with varying severities, and the subjects were recruited from a single orthodontic practice.

## CONCLUSION

- Periodontal health knowledge among orthodontic patients was poor.
- Periodontal health awareness among orthodontic patients was moderate.
- Orthodontic patients' awareness of their periodontal health during fixed orthodontic

treatment was affected by their attitude, number of teeth with gingival recession, duration of treatment and age.

•Orthodontic patients showed a positive attitude toward periodontal health. Patients positively reported the need for regular dental visits during orthodontic treatment, the need for improvement of teeth brushing during fixed orthodontic treatment and the importance of following oral health advice. This study provides the idea about oral hygiene awareness amongst orthodontic treatment seeking individuals. The present study could help the orthodontists to know

the level of awareness amongst patients and could act as a guide to motivate the patients for maintaining oral hygiene. This questionnaire could be used to assess attitude and awareness of treatment seeking individuals and the survey can further be carried out with a larger sample size and/or with different populations. Such information would be valuable in formulating dental screening programs aimed at decreasing the incidence and prevention of dental issues in the general population.

<b>Table 1: FREQUENCY OF BRUSHING</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO BRUSHING	1	1.3	1.3	<0.001
< 1	29	36.3	37.5	
< 1 TO 2	42	52.5	90.0	
> 2	8	10.0	100.0	
Total	80	100.0		

<b>Table 2: DURATION OF BRUSHING IN MINUTES</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
<3	18	22.5	22.5	<0.001
3 TO 5	53	66.3	88.8	
>5	9	11.3	100.0	
Total	80	100.0		

<b>Table 3: TYPE OF TOOTHBRUSH USED</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
ORTHO BRUSH	61	76.3	76.3	<0.001
ORDINARY BRUSH	19	23.8	100.0	
Total	80	100.0		

<b>Table 4: OTHER AUXILLARY AIDS USED?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	5	6.3	6.3	<0.001
YES	73	91.3	97.5	
DON'T KNOW	2	2.5	100.0	
Total	80	100.0		

<b>Table 5: TYPE OF AUXILIARY AIDS USED</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
DENTAL FLOSS	5	6.3	6.3	<0.001
MOUTHWASH	51	63.8	70.0	
INTERDENTAL BRUSH	24	30.0	100.0	
Total	80	100.0		

<b>Table 6: DO U HAVE PLAQUE ON YOUR TEETH SURFACE?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	19	23.8	23.8	<0.001
YES	10	12.5	36.3	
DON'T KNOW	51	63.8	100.0	
Total	80	100.0		

<b>Table 7: DO YOU HAVE DENTAL CALCULUS ON YOUR TEETH SURFACE?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	18	22.5	22.5	<0.001
YES	9	11.3	33.8	
DON'T KNOW	53	66.3	100.0	
Total	80	100.0		

<b>Table 8: DO YOU HAVE STAINS ON YOUR TEETH?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	19	23.8	23.8	<0.001
YES	6	7.5	31.3	
DON'T KNOW	55	68.8	100.0	
Total	80	100.0		

<b>Table 9: DO YOU HAVE BAD BREATH?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	24	30.0	30.0	<0.001
YES	5	6.3	36.3	
DON'T KNOW	51	63.8	100.0	
Total	80	100.0		

<b>Table 10: DO YOU HAVE GINGIVAL IRRITATION?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	18	22.5	22.5	<0.001
YES	9	11.3	33.8	
DON'T KNOW	53	66.3	100.0	
Total	80	100.0		

<b>Table 11: DO YOU FEEL GINGIVAL PAIN?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	20	25.0	25.0	<0.001
YES	8	10.0	35.0	
DON'T KNOW	52	65.0	100.0	
Total	80	100.0		

<b>Table 12: DO YOU HAVE GINGIVAL ENLARGEMENT?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	21	26.3	26.3	0.256
YES	26	32.5	58.8	
DON'T KNOW	33	41.3	100.0	
Total	80	100.0		

<b>Table 13: DO YOU HAVE GINGIVAL BLEEDING?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	26	32.5	32.5	0.047
YES	36	45.0	77.5	
DON'T KNOW	18	22.5	100.0	
Total	80	100.0		

<b>Table 14: DO YOU HAVE KNOWLWDGE AND INFORMATION ABOUT ORAL AND PERIODONTAL HEALTH?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	27	33.8	33.8	0.003
YES	39	48.8	82.5	
DON'T KNOW	14	17.5	100.0	
Total	80	100.0		

<b>Table 15: WHAT IS DENTAL PLAQUE?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
SOFT DEPOSITES ON TEETH	25	31.3	31.3	0.112
HARD DEPOSITES ON TEETH	20	25.0	56.3	
DON'T KNOW	35	43.8	100.0	
Total	80	100.0		

<b>Table 16: WHAT CAN DENTAL PLAQUE CAUSE?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
MALFORMATION OF TEETH	9	11.3	11.3	<0.001
DISCOLORATION OF TEETH	13	16.3	27.5	
DON'T KNOW	58	72.5	100.0	
Total	80	100.0		

<b>Table 17: WHAT BLEEDING GUMS INDICATE?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
HEALTHY GUMS	11	13.8	13.8	<0.001
INFLAMMED GUMS	16	20.0	33.8	
DON'T KNOW	53	66.3	100.0	
Total	80	100.0		

<b>Table 18: HOW CAN YOU PREVENT GUM DISEASE?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
BY BRUSHING AND FLOSSING	35	43.8	43.8	0.130
BY HAVING SOFT DIET	21	26.3	70.0	
DON'T KNOW	24	30.0	100.0	
Total	80	100.0		

<b>Table 19: FIXED ORTHODONTIC APPLIANCE INITIATE/CAUSE PERIODONTAL PROBLEM?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	38	47.5	47.5	0.655
YES	42	52.5	100.0	
Total	80	100.0		

<b>Table 20: FIXED ORTHODONTIC APPLIANCE INCREASES GINGIVAL INFLAMMATION?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	19	23.8	23.8	<0.001
YES	61	76.3	100.0	
Total	80	100.0		

<b>Table 21: FIXED ORTHODONTIC APPLIANCE MAKES BRUSHING MORE DIFFICULT?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	4	5.0	5.0	<0.001
YES	76	95.0	100.0	
Total	80	100.0		

<b>Table 22: FIXED ORTHODONTIC APPLIANCE CAUSE SEVERE PAIN?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	3	3.8	3.8	<0.001
YES	77	96.3	100.0	
Total	80	100.0		

<b>Table 23: STRAIGHT TEETH ARE EASIER TO CLEAN?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	15	18.8	18.8	<0.001
YES	65	81.3	100.0	
Total	80	100.0		

<b>Table 24: IS IT IMPORTANT TO FOLLOW ORAL HYGEINE INSTRUCTIONS GIVEN BY DENTIST?</b>				
	Frequency	Percent	Cumulative Percent	P VALUE
NO	25	31.3	31.3	0.001
YES	55	68.8	100.0	
Total	80	100.0		

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## **Annexure 1: Questionnaire**

NAME OF PATIENT: \_\_\_\_\_

CASE NO: \_\_\_\_\_

1. FREQUENCY OF TOOTH BRUSHING

NO BRUSHING       <1       1 TO 2       > 2

2. DURATION OF TOOTH BRUSHING (MINUTES)

< 3       3 TO 5       > 5

3. TYPE OF TOOTH BRUSH

ORTHO BRUSH       ORDINARY BRUSH

4. USING OF AUXILLARY AIDS?

NO       YES

5. TYPE OF AUXILLARY AIDS

DENTAL FLOSS       MOUTHWASH       INTERDENTAL  
BRUSH

**→AWAREENESS OF PERIODONTAL HEALTH**

6. DO U HAVE PLAQUE ON YOUR TEETH SURFACE?  
( ) NO ( ) YES ( ) DON'T KNOW
7. DO YOU HAVE DENTAL CALCULUS ON YOUR TEETH SURFACE?  
( ) NO ( ) YES ( ) DON'T KNOW
8. DO YOUHAVE STAINS ON YOUR TEETH?  
( ) NO ( ) YES ( ) DON'T KNOW
9. DO YOU HAVE BAD BREATHE?  
( ) NO ( ) YES ( ) DON'T KNOW
10. DO YOU HAVE GINGIVAL IRRITATION?  
( ) NO ( ) YES ( ) DON'T KNOW
11. DO YOU FEEL GINGIVAL PAIN?  
( ) NO ( ) YES ( ) DON'T KNOW
12. DO YOU HAVE GINGIVAL ENLARGEMENT?  
( ) NO ( ) YES ( ) DON'T KNOW
13. DO YOU HAVE GINGIVAL BLEEDING?  
( ) NO ( ) YES ( ) DON'T KNOW

**→KNOWLWDGE**

14. DO YOU HAVE KNOWLWDGE AND INFORMATION ABOUT ORAL AND PERIODONTAL HEALTH?  
( ) NO ( ) YES
15. WHAT IS DENTAL PLAQUE?  
( ) SOFT DEPOSITES ON TEETH ( ) HARD DEPOSITES ON TEETH  
( ) DON'T KNOW
16. WHAT CAN DENTAL PLAQUE CAUSE?  
( ) MALFORMATION OF TEETH ( ) DISCOLORATION OF TEETH  
( ) DON'T KNOW
17. WHAT BLEEDING GUMS INDICATE?  
( ) HEALTHY GUMS ( ) INFLAMMED GUMS  
( ) DON'T KNOW
18. HOW CAN YOU PREVENT GUM DISEASE?  
( ) BY BRUSHING AND FLOSSING ( ) BY HAVING SOFT DIET  
( ) DON'T KNOW

**→ATTITUDE**

19. FIXED ORTHODONTIC APPLIANCE INITIATE/CAUSE PERIODONTAL PROBLEM?  
( ) NO ( ) YES
20. FIXED ORTHODONTIC APPLIANCE INCREASES GINGIVAL INFLAMMATION?  
( ) NO ( ) YES
21. FIXED ORTHODONTIC APPLIANCE MAKES BRUSHING MORE DIFFICULT?  
( ) NO ( ) YES
22. FIXED ORTHODONTIC APPLIANCE CAUSE SEVERE PAIN?  
( ) NO ( ) YES
23. STRAIGHT TEETH ARE EASIER TO CLEAN?  
( ) NO ( ) YES
24. IS IT IMPORTANT TO FOLLOW ORAL HYGEINE INSTRUCTIONS GIVEN BY DENTIST?  
( ) NO ( ) YES

# CHANGES IN SOFT TISSUE MORPHOLOGY FOUND IN GUJARATI POPULATION FROM 8 TO 20 YEARS, HAVING CLASS-I DENTO-SKELETAL RELATIONSHIP-(A CEPHALOMETRIC STUDY)

\*Dr. Pratik Pandya

\*\*\*\*Dr. Amish Mehta

\*\* Dr. Sameer Uppal

\*\*\*\*\*Dr. Vishal Patel

\*\*\*Dr. Aakash Shah

\*\*\*\*\*Dr. Kinal Shah

## ABSTRACT

Aim of present study was early diagnosis of varying areas of the dento facial skeleton between age 8-10 years to 18-20 years in Gujarati children for their timely management to give the individual better aesthetics. Study was conducted on 100 patients 25 male and 25 females from age group between 8-10 and 25 male and 25 females from age group between 18-20.

The result showed there is no significant difference in soft tissue at younger age but in females with increase age it suggests that upper and lower anterior height in soft tissue region, soft tissue facial convexity is reducing; and in males that upper and lower anterior facial height in soft tissue region are increasing, soft tissue facial convexity is reducing; upper lip, lower lip, nose are growing. Conclusion of study was 1 out of 13 soft tissue parameters to differ in male was nasolabial fold with age and in female increase in chin thickness with age.

**KEYWORDS** - *Dentofacial skeleton, nasolabial fold, S line, H line*

## INTRODUCTION

The fact highlighted as early as 1834 reveals that the position of teeth and supporting jaws have a significant effect on an individual's facial appearance. It is also well known that the supporting jaws undergo great variation in their size and position during the growing phase

particularly between the age 8 years to 20 years which have great influence on individual's facial form and acceptance. Any kind of abnormality in form of any part of dento-facial skeleton will have adverse effect on facial aesthetics of an individual. Different areas of the dento

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facial skeleton show either variation or remains constant in their relative position to one another with increase in age. All above may be desirable or undesirable for future appearance of an individuals. Any kind of undesirable changes adversely affecting the facial aesthetics of an individual, if recognised, diagnosed and corrected at the earlier stage is beneficial to the person.

### **AIM**

Early diagnosis of varying areas of the dento facial skeleton between age 8-10 years to 18-20 years in gujarati children for their timely management to give the individual better aesthetics.

### **OBJECTIVES**

- To understand soft tissue morphology of face in young & adult gujarati girls, having normal occlusion & pleasing profile.
- To understand soft tissue morphology of face in young & adult gujarati boys, having normal occlusion & pleasing profile.
- To compare soft tissue morphology of face of young gujarati girls with young gujarati boys, having normal occlusion & pleasing profile.
- To understand soft tissue morphology of dento facial skeleton & soft tissue covering face of adult gujarati boys with adult gujarati girls, having normal occlusion & pleasing profile.

### **MATERIAL & METHOD**

Total sample of 100, in which 25 males and 25 females of younger group (8-10 years) & 25 males and 25 females of adult group (18-20 years) were collected as per selection criteria as described below.

### **SELECTION CRITERIA**

Each subject must have normal occlusion clinically, by a panel of 3 orthodontists.

Each subject's facial profile must be graded as normal , by a panel of 3 orthodontists.

The permanent central incisors and 1st molar must be clinically fully erupted in oral cavity in younger age group.

The permanent teeth up to 2nd molar must be clinically fully erupted in oral cavity in adult age.

No history of trauma or injury to the facial structures.

No previous history of orthodontic treatment taken for any reason.

No history of any kind of oro-facial habits, affecting dento-facial structures.

In both the groups, no disturbances found in the movement of jaws during various functional activities.

No obvious systemic problems associated with generalized growth and development of child was observed.

The subjects selected for study , his/her parents & grand parents must belong to Gujarati community.

### **METHOD OF OBTAINING DATA**

A good quality lateral cephalograms of all samples were taken in natural head position (NHP) with cephalostat machine giving true size image, which is installed in department of oral diagnosis, oral medicine and radiology department of our institution. The cephalostat machine, which was used for the study: - CARE STREAM DENTAL A DIVISION OF CARE STREAM HEALTH, INC 150 VERONA, NY 14680 USA CS 8000C

The tracings were done on acetate sheets with extra smooth finish '4H' pencil for hard tissue landmarks and finish 'H' pencil for soft tissue landmarks with lead of 0.3

mm diameter and angular and linear measurements were taken to the nearest 0.5° or 0.5 mm respectively.

A single operator had performed the tracings in a standardized manner to avoid errors due to inter-operator variations.



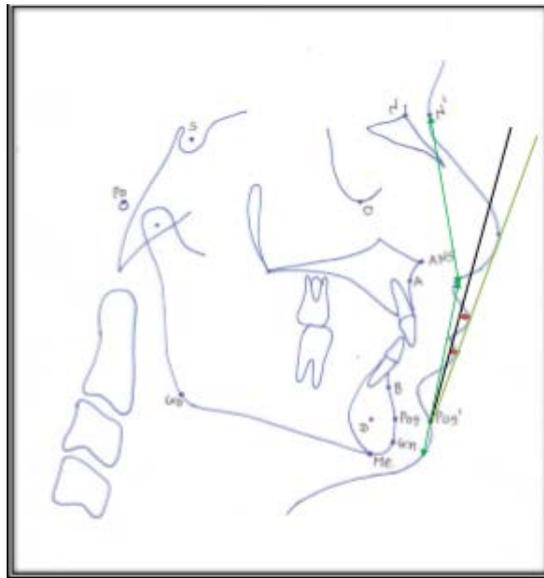
*ILLUSTRATION 1: Armamentarium used for lateral cephalogram tracing*



*ILLUSTRATION 2: lateral cephalogram of gujarati subject*

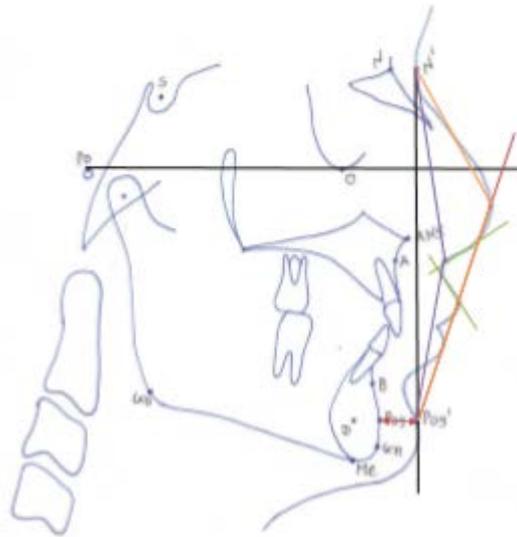


*ILLUSTRATION 3: Class I molar relationship on both sides, with normal overjet and overbite with no or minimal crowding or spacing.*



*ILLUSTRATION 4: Soft tissue parameters used in the study*

- \* S line to U lip
- \* S line to L lip
- \* Nose tip to H line
- \* L lip to H line
- \* N'-ANS'
- \* ANS'-Me'
- \* N'-ANS'/ANS'-Me' ratio



*ILLUSTRATION 5: Soft tissue parameters used in the study*

\* **Soft tissue facial angle**

\* **H line angle**

\* **Nasolabial angle**

\* **N'-Sn-Pog'**

\* **N'-Nose-Pog'**

\* **Chin thickness**

## **RESULTS**

Mean and standard deviation of each variable were calculated for all the groups. Unpaired student t- test was used to analysed the data. All statistical values were analyzed. Table 1,2, 3,4,5,6,7,8,9,10,11 and 12 represent results.

## **DISCUSSION**

The present study is carried out to assess the changes taking place in the underlying skeletal and dento-alveolar supporting structures forming the face of an individual, who were belonging to local Gujarati population between age group of 8-10 and 18-20 years.

During this period, most of the patients are seeking orthodontic advice. During this period, different areas of dento-facial skeleton has grown and matured up to

certain level and are still growing and changing the facial form and appearance.

We know that the malocclusions are of different types and for various reasons (aetiology), some children who are appearing normal at the age around 8-10 years may develop problems due to altered growth and development by they reach to 18-20 years of age.

Further, the period between age group of 8-10 and 18-20 is important for orthodontist; as during this age, a child may undergo rapid and accelerating changes due to growth spurt. The changes taking place during this period does not affect and alter all the part of dento-facial skeleton, dental arches and soft tissue to an equal extent. Great variation is found and as a result; changes in the dento-facial skeleton and the positioning of teeth lead to alteration in soft tissue facial contour of a child, converting earlier good and favourable structures into

unacceptable and poor form or even otherwise.

However, since skeletal, dental and soft tissue structures exhibit different pattern for different races, it has become relevant to define different normal cephalometric values for various ethnic groups of population for successful diagnosis and treatment planning.

India is a land of diversified race of people and hence many research workers in India have initiated to undertake racial studies. Kotak VB<sup>8</sup>, Nanda<sup>10</sup>, Sidhu<sup>11</sup>

Valiathan<sup>11,12,18,21</sup> Patel H M<sup>13</sup> and many other eminent professionals have contributed for various cephalometric studies on various ethnic groups.

Hence it is important for an orthodontist to understand physiological natural changes which are going to occur in dento-facial skeletal and the soft tissue framework of an individual, so that on examination of patient at younger age, he/she can have some idea to point out the doubtful structures which may require higher and specific attention in near future where the child is kept under periodic observation or is been treated with some kind of orthodontic appliance.

Ideally such studies should be carried out on long term bases from young age till adulthood but due to shorter time limit, similar attempt is made in this cross-sectional study taking 25 males & 25 females (total 50 subjects) of young age group of 8-10 years and 25 males & 25 females (total 50 subjects) of adult group of 18-20 years, belonging to a single particular race and religion located in same geographic areas as described in material and method. Observations were tabulated and necessary conclusions were derived utilizing required statistical analyses

## **SOFT TISSUE PARAMETERS**

Table 1 and Table 2 give mean and S.D values for 13 soft tissue parameters for males and females of younger age group. When comparison was carried out between males and females of younger age groups in regards to their soft tissue values by unpaired-t test shown in Table 3, no significant difference was found at any level which suggests that till this age, the underlying soft tissue frame work of facial skeleton had similar architecture in males and females.

Table 4 and Table 5 give mean and S.D values for 13 soft tissue

Parameters for males and females of adult age group. When comparison was carried out between males and females of adult age groups in regards to their soft tissue values by unpaired-t test shown in Table 6, significant differences were found in 3 linear parameters; N'-ANS' showing the highest value for "t" and next to it were S line to U lip and nose tip to H line.

Looking to Table 3 and Table 6, it was clear that with advancement in the age of a child, out of 13 parameters in the younger age group between males and females which were showing no difference, in adult group 3 became significant. This suggests that out of various soft tissue of the face all do not show similar or equal amount of growth between the males and females. The parameter N'-ANS' showing the highest value for "t" and next to it were S line to U-lip and nose tip to H line.

When we see observations for various soft tissue parameters in young males and adult males, from Table 7 and Table 8 it was found that the highest t-values was for the parameter ANS'-Me' which was showing significant increase by 16.7% with the age. Next to it in descending order were N'-

ANS' (increased by 11.4%), S line to U-lip (decreased by 80.4%), N'-nose-Pog' (decreased by 2.3%), soft tissue facial angle (increased by 2.3%), S line to L-lip (decreased by 58%), nose tip to H line (increased by 85.2%), H line angle (decreased by 12.4%) and naso-labial angle (decreased by 6.2%).

When we see observations for various soft tissue parameters in young females and adult females, from Table-9 and Table-10, it was found that the highest t-values was for the parameter N'-ANS' which was showing significant increase by 20.2% with age and next to it in descending order, parameters were ANS'-ME' (increased by 19%), S line to U lip (decreased by 175%), chin thickness (increased by 23.7%), N'-Sn-Pog' (decreased by 1%), nose tip to H line (increased by 85.7%), S line to L lip (decreased by 78.6%), H line angle (decreased by 21%), soft tissue facial angle.(increased by 1.9%). Thus out of total 13 parameters, 9 parameters showed significant changes with increase in age in females.

The most noticeable feature in both males and female subject was slightly protrusive upper lip. These were indicated by an increased in measurement of upper and lower lip to S-line. This mild protrusive lip is also supported by H line angle and Nose tip to H-line. This is supported by studies done by Valiathan A<sup>11,12,18,21</sup> and Thomas M<sup>22</sup>, Bishara<sup>19</sup>.

Summarising the significant observations as shown in Table 11, Table-12 ; it gives us the important information regarding the extent to which, there are chances for a particular parameter to alter or change in a growing child patient from age 8-10 years to 18-20 years. Knowledge of these facts will help the orthodontist in proper diagnosis and treatment planning and

assessing prognosis for a growing child patient and accordingly he/she can choose his/her line of treatment and appliance most suitable for achieving need of the patient. Accordingly, the orthodontist should plan his treatment modality and keep a vigilant eye on these areas of dento facial skeleton before it becomes too late or goes out of his control.

## CONCLUSION

In the present study; 13 soft tissue parameters for 25 males and 25 females in the age group of 8-10 years & 25 males and 25 females in the age group of 18-20 years belonging to local Gujarati population were measured & studied to assess the difference between males and females in the similar age group and in males and females with the advancement of age.

Following conclusions were derived:

**1. At the younger age, between males and females:** - The soft tissue outlines of the face showed no significant difference

**2. In males, with increase in age,** out of 13 soft tissue parameters; 9 parameters showed significant change (7 were Antero-posterior & 2 were vertical). These were nose tip to H line, soft tissue facial angle, nasolabial angle, N'-nose-Pog', S line to U lip and S line to L lip, H line angle, N'ANS', ANS'-Me'. It suggests that upper and lower anterior facial height in soft tissue region are increasing, soft tissue facial convexity is reducing; upper lip, lower lip, nose are growing with age in males. The maximum percentile difference was found in nose tip to H line (Increased by 85.2%) and minimum in soft tissue facial angle (Increased by 2.3%) and N'-nose Pog' (Decreased by 2.3%).

**3. In females, with increase in age,** out of 13 soft tissue parameters; 9 parameters

showed significant change. (7 were Antero-posterior & 2 were vertical). These were nose tip to H line, soft tissue facial angle, chin thickness, N'-nose-Pog', S line to U lip and S line to L lip, H line angle, N'-ANS', ANS'-Me'. It suggests that upper and lower anterior height in soft tissue region is increasing, soft tissue facial convexity is reducing; upper lip, lower lip, chin thickness are increasing with age in females. The maximum percentile difference was found in nose tip to H line (Increased by 85.7%) and minimum in N'-nose-Pog' (Decreased by 1.0%).

4.. Amongst 13 soft tissue parameters, there was only one parameter which showed significant change in males but not in females with increase in age was nasolabial angle.

5. Amongst 13 soft tissue parameters, there was only one parameter which showed significant change in females but not in males with increase in age was chin thickness.

SR NO	PARAMETERS	MEAN	SD
1	SOFT TISSUE FACIAL ANGLE	88	3.5
2	H LINE ANGLE	17.5	3
3	NASOLABIAL ANGLE	101.5	10.6
4	N'-Sn-Pog'	157	21.6
5	N'-NOSE-Pog'	137	4
6	S LINE TO U LIP	1.8	1.4
7	S LINE TO L LIP	2	1.6
8	NOSE TIP TO H LINE	2.2	2.3
9	L LIP TO H LINE	0.7	1.1
10	CHIN THICKNESS	10.1	1.1
11	N'-ANS'	43.4	2.4
12	ANS'-ME'	51.4	3.5
13	N'-ANS'/ANS'-ME' RATIO	84.4	7.3

TABLE-1 Mean and SD of various soft tissue parameters in males of younger age group

SR NO	PARAMETERS	MEAN	SD
1	SOFT TISSUE FACIAL ANGLE	89.1	1.7
2	H LINE ANGLE	17.2	4.4
3	NASOLABIAL ANGLE	98.7	12.3
4	N'-Sn-Pog'	161	4.5
5	N'-NOSE-Pog'	135.4	3.2
6	S LINE TO U LIP	1.1	1.7
7	S LINE TO L LIP	2	1.9
8	NOSE TIP TO H LINE	3.5	3.6
9	L LIP TO H LINE	0.7	1.2
10	CHIN THICKNESS	9.6	1.4
11	N'-ANS'	43.4	3.5
12	ANS'-ME'	51.6	5.8
13	N'-ANS'/ANS'-ME' RATIO	83.8	9.5

TABLE-2 Mean and SD of various soft tissue parameters in females of younger age group

SR NO	PARAMETERS	YOUNG					
		MALES		FEMALES		t value	Probability
		MEAN	SD	MEAN	SD		
1	SOFT TISSUE FACIAL ANGLE	88	3.5	89.1	1.7	-0.3	0.17
2	H LINE ANGLE	17.5	3	17.2	4.4	1.4	0.76
3	NASOLABIAL ANGLE	101.5	10.6	98.7	12.3	6	0.4
4	N'-Sn-Pog'	157	21.6	161	4.5	0.4	0.37
5	N'-NOSE-Pog'	137	4	135.4	3.2	2.6	0.13
6	S LINE TO U LIP	1.8	1.4	1.1	1.7	1.1	0.15
7	S LINE TO L LIP	2	1.6	2	1.9	0.5	0.94
8	NOSE TIP TO H LINE	2.2	2.3	3.5	3.6	-0.5	0.12
9	L LIP TO H LINE	0.7	1.1	0.7	1.2	0.3	0.95
10	CHIN THICKNESS	10.1	1.1	9.6	1.4	0.9	0.18
11	N'-ANS'	43.4	2.4	43.4	3.5	0.9	1
12	ANS'-ME'	51.4	3.5	51.6	5.8	1.2	0.88
13	N'-ANS'/ANS'-ME' RATIO	84.4	7.3	83.8	9.5	3	0.81

TABLE-3 Comparison of various soft tissue parameters in males and females of younger age group

SR NO	PARAMETERS	MEAN	SD
1	SOFT TISSUE FACIAL ANGLE	90	2.5
2	H LINE ANGLE	15.3	4
3	NASOLABIAL ANGLE	95.2	10.4
4	N'-Sn-Pog'	163.5	4.4
5	N'-NOSE-Pog'	133.8	4.6
6	S LINE TO U LIP	0.3	1.2
7	S LINE TO L LIP	0.8	2
8	NOSE TIP TO H LINE	4	3.2
9	L LIP TO H LINE	0.9	1.2
10	CHIN THICKNESS	10.7	2.6
11	N'-ANS'	48.3	3.5
12	ANS'-ME'	60	5.1
13	N'-ANS'/ANS'-ME' RATIO	81.7	5.9

TABLE- 4 Mean and sd of various soft tissue parameters in males of adult age group

SR NO	PARAMETERS	MEAN	SD
1	SOFT TISSUE FACIAL ANGLE	90.8	2.4
2	H LINE ANGLE	13.6	4
3	NASOLABIAL ANGLE	95.7	7.5
4	N'-Sn-Pog'	165.7	5.2
5	N'-NOSE-Pog'	134	3.8
6	S LINE TO U LIP	-0.8	1.5
7	S LINE TO L LIP	0.4	1.7
8	NOSE TIP TO H LINE	6.5	2.9
9	L LIP TO H LINE	0.5	1.3
10	CHIN THICKNESS	11.9	2.3
11	N'-ANS'	52.1	4
12	ANS'-ME'	61.4	6.2
13	N'-ANS'/ANS'-ME' RATIO	85.2	6.7

TABLE-5 Mean and sd of various soft tissue parameters in females of adult age group

SR NO	SOFT TISSUE PARAMETERS	ADULT					
		MALES		FEMALES		t value	Probability
		MEAN	SD	MEAN	SD		
1	SOFT TISSUE FACIAL ANGLE	90	2.5	90.8	2.4	0	0.31
2	H LINE ANGLE	15.3	4	13.6	4	2.9	0.13
3	NASOLABIAL ANGLE	95.2	10.4	95.7	7.5	2.1	0.85
4	N'-Sn-Pog'	163.5	4.4	165.7	5.2	-0.8	0.11
5	N'-NOSE-Pog'	133.8	4.6	134	3.8	0.9	0.83
6	S LINE TO U LIP	0.3	1.2	-0.8	1.5	1.6	0.003
7	S LINE TO L LIP	0.8	2	0.4	1.7	0.9	0.43
8	NOSE TIP TO H LINE	4	3.2	6.5	2.9	-1.6	0.006
9	L LIP TO H LINE	0.9	1.2	0.5	1.3	0.7	0.29
10	CHIN THICKNESS	10.7	2.6	11.9	2.3	-0.5	0.09
11	N'-ANS'	48.3	3.5	52.1	4	-2.8	0
12	ANS'-ME'	60	5.1	61.4	6.2	0.2	0.38
13	N'-ANS'/ANS'-ME' RATIO	81.7	5.9	85.2	6.7	-1.7	0.056

TABLE-6 Comparison of various soft tissue parameters in males and females of adult age group

SR NO	PARAMETERS	MALES					
		YOUNG		ADULT		t value	Probability
		MEAN	SD	MEAN	SD		
1	SOFT TISSUE FACIAL ANGLE	88	3.5	90	2.5	-2.4	0.02
2	H LINE ANGLE	17.5	3	15.3	4	2.2	0.03
3	NASOLABIAL ANGLE	101.5	10.6	95.2	10.4	2.1	0.04
4	N'-Sn-Pog'	157	21.6	163.5	4.4	-1.5	0.15
5	N'-NOSE-Pog'	137	4	133.8	4.6	2.6	0.01
6	S LINE TO U LIP	1.8	1.4	0.3	1.2	3.9	0
7	S LINE TO L LIP	2	1.6	0.8	2	2.3	0.03
8	NOSE TIP TO H LINE	2.2	2.3	4	3.2	-2.3	0.02
9	L LIP TO H LINE	0.7	1.1	0.9	1.2	-0.5	0.62
10	CHIN THICKNESS	10.1	1.1	10.7	2.6	-1	0.31
11	N'-ANS'	43.4	2.4	48.3	3.5	-5.9	0
12	ANS'-ME'	51.4	3.5	60	5.1	-6.9	0
13	N'-ANS'/ANS'-ME' RATIO	84.4	7.3	81.7	5.9	1.4	0.16

TABLE-7 Comparison between young and adult males for various soft tissue parameters

SR NO	PARAMETERS	PERCENTILE CHANGE IN MALES
1	NOSE TIP TO H LINE	85.2
2	L LIP TO H LINE	21.6
3	ANS'-ME'	16.7
4	N'-ANS'	11.4
5	CHIN THICKNESS	5.7
6	N'-Sn-Pog'	4.1
7	SOFT TISSUE FACIAL ANGLE	2.3

TABLE-8 A AND Percentile increase in various soft tissue parameters in males with age advancement

SR NO	PARAMETERS	PERCENTILE CHANGE IN MALES
1	N'-NOSE-Pog'	2.3
2	N'-ANS'/ANS'-ME' RATIO	3.2
3	NASOLABIAL ANGLE	6.2
4	H LINE ANGLE	12.4
5	S LINE TO L LIP	58
6	S LINE TO U LIP	80.7

TABLE-8 B Percentile decrease in various soft tissue parameters in males with age advancement

SR NO	PARAMETERS	FEMALES					
		YOUNG		ADULT		t value	Probability
		MEAN	SD	MEAN	SD		
1	SOFT TISSUE FACIAL ANGLE	89.1	1.7	90.8	2.4	-2.91	0
2	H LINE ANGLE	17.2	4.4	13.6	4	3.03	0
3	NASOLABIAL ANGLE	98.7	12.3	95.7	7.5	1.06	0.3
4	N'-Sn-Pog'	161	4.5	165.7	5.2	-3.38	0
5	N'-NOSE-Pog'	135.4	3.2	134	3.8	1.32	0.19
6	S LINE TO U LIP	1.1	1.7	-0.8	1.5	4.4	0
7	S LINE TO L LIP	2	1.9	0.4	1.7	3.05	0
8	NOSE TIP TO H LINE	3.5	3.6	6.5	2.9	-3.24	0
9	L LIP TO H LINE	0.7	1.2	0.5	1.3	0.56	0.58
10	CHIN THICKNESS	9.6	1.4	11.9	2.3	-4.14	0
11	N'-ANS'	43.4	3.5	52.1	4	-8.29	0
12	ANS'-ME'	51.6	5.8	61.4	6.2	-5.78	0
13	N'-ANS'/ANS'-ME' RATIO	83.8	9.5	85.2	6.7	-0.6	0.55

TABLE-9 Comparison between young and adult females for various soft tissue parameters

SR NO	PARAMETERS	PERCENTILE CHANGE IN FEMALES
1	NOSE TIP TO H LINE	85.7
2	CHIN THICKNESS	23.7
3	N'-ANS'	20.2
4	ANS'-ME'	19
5	N'-Sn-Pog'	2.9
6	SOFT TISSUE FACIAL ANGLE	1.9
7	N'-ANS'/ANS'-ME' RATIO	1.7

TABLE-10 A Percentile increase in various soft tissue parameters in females with age advancement

SR NO	PARAMETERS	PERCENTILE CHANGE IN FEMALES
1	N'-NOSE-Pog'	1
2	NASOLABIAL ANGLE	3.1
3	H LINE ANGLE	21
4	L LIP TO H LINE	27.8
5	S LINE TO L LIP	78.6
6	S LINE TO U LIP	175

TABLE 10 B - Percentile decrease in various soft tissue parameters in females with age advancement

SR NO	PARAMETERS	PERCENTILE CHANGE IN MALES	PERCENTILE CHANGE IN FEMALES
1	SNB	3.8	-
2	ANB	-44.8	-
3	SND	4.8	2.3
4	DOWN'S FACIAL ANGLE	3	-
5	ANGLE OF CONVEXITY	-97.3	-64.5
6	SL	21.2	16.5
7	N PER TO POINT A	-	364
8	GoGn-SN	-20.2	-14.5
9	FMA	-18.3	-
10	DOWN'S Y-AXIS	-	9.5
11	N-ANS	12.9	24.1
12	ANS-ME	16.2	20.4
13	N-ANS/ANS-ME RATIO	-	6.9
14	N-Me	14.4	19.5
15	S-Go	27.4	24.5
16	JARABACK RATIO	8.7	-

TABLE-11 Significantly differing skeletal parameters with their percentile change in males and females with age advancement

SR NO	PARAMETERS	PERCENTILE CHANGE IN MALES	PERCENTILE CHANGE IN FEMALES
1	SOFT TISSUE FACIAL ANGLE	2.3	1.9
2	H LINE ANGLE	-12.4	-21
3	NASOLABIAL ANGLE	-6.2	-
4	N'-NOSE-Pog'	-2.3	-1
5	S LINE TO U LIP	-80.7	-175
6	S LINE TO L LIP	-58	-78.6
7	NOSE TIP TO H LINE	85.2	85.7
8	CHIN THICKNESS	-	23.7
9	N'-ANS'	11.4	20.2
10	ANS'-ME'	16.7	19

TABLE-12 Significantly differing soft tissue parameters with their percentile change in males and females with age advancement

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# MANAGEMENT OF DENTOALVEOLAR TRAUMATIC INJURIES IN PRIMARY DENTITION: A CASE REPORT

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## ABSTRACT

Traumatic injuries to primary dentition and surrounding structure are very common in children. Dental trauma in pediatric population is a significant problem that may have serious medical, esthetic, and psychological consequences on children and their parents. Especially dentoalveolar trauma is particularly complicated by the developing jaws, the presence of tooth germs and the eruption of permanent teeth. Immediate dental treatment is necessary in such cases along with long term follow-up. The present report describes the management and 6-month follow up of dentoalveolar injuries in a primary dentition in a 4-year-old patient.

**Keywords:** *Dentoalveolar fracture, pediatric patient, composite resin splint*

## INTRODUCTION

Oral injuries comprise of 5% of all bodily injuries.<sup>1</sup> Traumatic dental injuries in primary dentition occur more frequently than in permanent dentition.<sup>2,3</sup> Also, primary dentition is subjected more commonly to displacement injuries as the surrounding bone is less dense and less mineralized.<sup>4</sup> The treatment of children presenting dental trauma in the primary dentition requires a different approach from that used in the permanent dentition.<sup>5</sup> Fractures of alveolar process are often

associated with dental and soft-tissue injuries. Dentoalveolar fractures to the mandibular region in primary dentition are especially important to understand because of the potential complications related to close relation to permanent tooth bud and its eruption, alveolar development, and occlusion, as well as facial and psychological factors specifically related to childhood.<sup>6</sup> This paper describes the treatment and 6 months follow up of traumatic injuries affecting mandibular anterior dentoalveolar segment involving primary incisors in a 4-year-old boy.

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## CASE REPORT

A 4-year-old male patient reported to the Department of Pedodontics and Preventive Dentistry, Faculty of dental science, Dharmsinh Desai University, Nadiad, with complaint of displaced lower front teeth and pain in the same region. Patient had history of falling down while playing one day ago. He was taken to a general hospital as he was bleeding, where primary first aid and tetanus injection was given. There was no history of vomiting or loss of consciousness.

Clinical Intra-oral examination revealed lingually displaced dentoalveolar segment involving primary mandibular right central and lateral incisor (81,82) and primary mandibular left central incisor (71) (Illustration 1). There was presence of laceration on labial attached gingiva extending up to the mucosa in relation to displaced alveolar segment (Illustration 2). Palpation revealed slight mobility of involved segment. There were no signs of mandibular fracture. Swelling, hematoma, pus discharge and bleeding were absent. On extra-oral examination normal mouth opening without any pain or deviation of jaw and presence of minor abrasion on chin was noticed.

Because the child was extremely apprehensive during taking of periapical radiographs, a proper IOPA could not be obtained but an OPG was taken with some form of behavior modification which didn't reveal any significant findings suggestive of mandibular fracture or any other deformity (Illustration 3).

On the basis of clinical examination and radiographic investigation, a diagnosis of dentoalveolar fracture involving mandibular anterior teeth (81, 82 and 71) was made. After discussing the treatment plan with the parents, treatment was commenced on the same day. Local anesthesia (2% Lignocaine with 1:80000

Adrenaline) was administered on buccal and lingual side. The fractured dentoalveolar segment with primary incisors was gently repositioned using slight digital pressure and stabilized by placing interdental light cure composite resin from lower right primary canine (83) up to lower left lateral incisor (72) (Illustration 4). Antibiotics and analgesics (Amoxicillin and Ibuprofen) were prescribed according to weight of the patient and parents were advised to maintain good oral hygiene and asked for regular follow-up visit at every 7 days (Illustration 5).

Soft-tissue healing was observed at the second-week recall without any dislodgement of the splint material (Illustration 6). After 4 weeks composite splint was removed (Illustration 7). There was absence of mobility or tenderness in 81, 82 and 71 regions. Patient was called for follow up after 6 months where no clinical or radiographical abnormalities were detected (Illustration 8 and 9). Parents were again counselled regarding possible sequel of this injury and importance of follow up visits and asked for regular visit at every 6 months.



*Illustration 1: Pre-operative picture-1*



*Illustration 2: Pre-operative picture-2*



*Illustration 6: Follow-up (14 Days)*



*Illustration 3: Pre-operative OPG*



*Illustration 7: Post splint removal (After 4 weeks)*



*Illustration 4: After splinting with interdental composite resin*



*Illustration 8: 6 Months follow-up*



*Illustration 5: Follow-up (7 Days)*



*Illustration 9: 6 Months follow-up IOPA*

## DISCUSSION

Oro-facial trauma is more common in children due to many reasons. Perhaps, poor motor co-ordination and child's inability to evaluate risks are few of them. Dentoalveolar fracture comprises of 7% of dental injuries to primary dentition. Management of fracture of dentoalveolar process involves reduction and immobilization/ splinting of fractured segment for 2 to 4 weeks.<sup>7,8</sup> Different types of splinting methods has been used in the literature ranging from suture splint, arch bar splint, flexible wire-composite rigid wire-composite splint, interdental composite splint, orthodontic splint, to recently introduced Titanium trauma splint (TTS).<sup>8</sup> Ideally an optimal splint should fulfil the requirements like direct intraoral application, easy to construct with materials available in dental practice, does not increase periodontal injuries or promote caries, does not irritate oral soft tissues, passive in nature, does not exert any orthodontic force on teeth, easy to remove and causes minimal or no permanent damage to the dentition, hygienic and esthetic. Here in our case, we have used rigid interdental composite splint for 4 weeks due to its advantages based on patient's age and cooperation level. Interdental composite wire splints are easy to construct with direct application, does not affect the adjacent tissues, easy to maintain and esthetic in appearance and renders accurate repositioning of the fracture fragment. Subsequently, soft diet and oral hygiene maintenance is mandatory. Also, a long-term follow-up is necessary in this type of cases to rule out further complications or insult to permanent successors. Unfavourable outcomes in primary dentition following trauma includes pulp necrosis, pulp canal obliteration and internal and external root resorption.<sup>7</sup> The consequences of primary

dentition injury to the permanent successors depends on the age of the child at the time of injury, the grade of root resorption of the traumatized deciduous tooth, the type and extension of the injury, and the developmental stage of the successor at the time of injury.<sup>9,10,11</sup> The complications arising due to this type of injuries include enamel hypoplasia, root dilacerations, ectopic/delayed eruption of permanent teeth.<sup>10,11</sup> In our case parents were informed regarding this complications and asked for regular follow up visit to the institute.

## CONCLUSION

Traumatic injuries are very much common in children and its acute management is imperative. The treatment strategy in paediatric patients should be such that it safeguards the development of permanent dentition and refrains from inducing dental fear and anxiety in children.

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# A SURVEY ON THE USE OF ANTIBIOTICS AMONG THE DENTISTS IN GUJARAT

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## ABSTRACT

**Objectives:** The purpose of the present study was to determine the pattern of antibiotic prescription among dentists of Gujarat and assess their attitude toward growing antibiotic resistance.

**Methods:** An electronic version of the questionnaire of cross-sectional survey regarding antibiotic use and attitude towards growing antibiotic resistance was constructed using google forms that was e-mailed to dental surgeons of Gujarat.

**Results:** The survey included 500 dental surgeons, out of which 397 dental surgeons completed the survey, thereby achieving a response rate of 79.4%. Majority of the respondents (45%) chose amoxicillin + metronidazole in nonallergic patients. Average minimum duration of antibiotic therapy was 5 days (47%). The drug of first choice for patients with an allergy to penicillin was azithromycin. The prime determinant of antibiotic use was facial swelling (82%). The prime determinant to select a particular brand of antibiotics was popularity of that brand (35%). Almost all (98%) dental surgeons were aware of antibiotic resistance being a growing concern. As per their views, there was over prescription of antibiotics in few conditions.

**Keywords:** *Antibiotics, Abuse, Resistance.*

## INTRODUCTION

Odontogenic and Periodontal infections are commonly encountered by dentists for which antibiotics are frequently prescribed. Although a boon, antibiotics can be called as a double-edged sword as its injudicious usage might cause complications. Although

considered as an adjunct to definitive treatment, antibiotics are usually prescribed for shorter periods by dentists as a substitute for the definitive treatment. The term “antibiotic” has been derived from combination of two words: Anti meaning “against” and biosis meaning “life.”

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Proper use of antibiotics along with surgical therapy is the most appropriate method to treat various odontogenic and periodontal infections. Alexander Fleming, who along with Howard Florey and Ernst Chain shared the Nobel Prize in 1945 in Physiology and Medicine, addressed in his lecture: "It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body."<sup>1</sup> Prescribing antibiotics by dental practitioners has become an important aspect of day-today dental practice. This is the reason why antibiotics account for a huge majority of medicines being prescribed by dentists. It has been observed that contribution towards the problem of antibiotic resistance by dentists can be substantial as dentists prescribe 10% of all common antibiotics.<sup>2</sup> Yingling et al<sup>3</sup> concluded from findings of his study among members of the American Association of Endodontists (AAE) that they were prescribing antibiotics inappropriately. On the contrary, the National Center for Disease Control and Prevention found that almost one-third of all outpatient antibiotic prescriptions are unnecessary.<sup>4</sup> We have now entered an era where some bacterial species are resistant to the full range of antibiotics presently available, with the methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant *Staphylococcus aureus* being the most widely known example of extensive resistance.<sup>5</sup> Keeping in mind the results obtained from previous studies, we took up the present study to investigate antibiotic prescribing practices of dentists. The aim of the present study was to determine

the pattern of antibiotic prescription among dental surgeons of Gujarat and assess their attitude towards growing antibiotic resistance.

## **MATERIALS AND METHODS**

The present study was designed as a descriptive cross-sectional study performed among the DCI registered dentists of Gujarat conducted by Department of Periodontology, Dharmsinh Desai University, Faculty of dental science, Nadiad. The study had a sample size of 500 dentists (Table 1). Inclusion criteria were any dental practitioner of Gujarat holding the Bachelor of Dental Surgery (BDS) and Master of Dental Surgery (MDS). The exclusion criteria included dentists practicing outside Gujarat and dental students. An electronic version of pretested and prevalidated questionnaire consisting of both open-ended and close-ended questions of the cross-sectional survey regarding antibiotic use and resistance was constructed using an internet online survey tool (google forms). A link was generated that was e-mailed to dentists of Gujarat. Study was conducted over a period of 2 months. Data was collected and descriptive analysis was done.

## **RESULTS**

Present survey link was e-mailed to 500 dentists of Gujarat out of which 397 dentists completed the survey, thereby achieving a response rate of 79.4%. Responders of present survey included 35% males and 65% females with 21% respondents being <30 years of age; 84% respondents had run a practice of >5 years. Majority of the respondents were specialists, while a lesser

number were general practitioners (45% BDS and 55% MDS). The main source of updated information regarding the use of antibiotics was found to be the scientifically published literature (42%). Most of the respondents (44%) chose amoxicillin + metronidazole combination in nonallergic patients. Amoxicillin was prescribed as the first-choice antibiotic by 33% of respondents, which is appropriate for oral infection, while 12%, 7% and 4% chose amoxicillin/clavulanic acid, ofloxacin + ornidazole and others respectively. If patient was found to be allergic to penicillin, drug of first choice in that case was azithromycin (44%), followed by erythromycin (38%) and clindamycin (16%). As per the results of the current study, the minimum duration of antibiotic therapy was 5 days for majority (47%), while 10% respondents prescribed antibiotics for a minimum of 3 days. Principal determinant for prescribing antibiotics was facial swelling (82%). Necrotizing ulcerative gingivitis (95%) and Aggressive Periodontitis (81%) cases were the periodontal conditions for which antibiotics were mostly prescribed. Over prescription was found with pain relief (31%), unavailable appointment for several days (19%) and rheumatoid arthritis (26%). Popularity of that particular brand (35%) was the factor that was primarily considered while prescribing a particular brand. However considerable number of respondents considered affordability as a prescribing factor. Almost everyone (98%) among the respondents believed that antibiotic resistance is of growing concern. Being aware of the fact that there was emerging problem of drug resistance, there

was judicious prescription of antibiotics by majority of the dentists. Result table, graph, pie charts and questionnaire have been attached.

## DISCUSSION

The decision to use an antimicrobial/antibiotic agent in managing an odontogenic and periodontal infection is based on several factors. Clinician must first diagnose the cause of the infection and then determine the appropriate dental treatment that may include multiple modalities, including initiation of endodontic therapy and pulpectomy, mechanical or surgical disruption of that infectious environment. Before coming to a decision whether we require adjunctive antibiotic therapy, various factors, including host defense mechanisms, severity of the infection, magnitude of the extension of the infection, and expected pathogen, have to be taken into consideration. The present study evaluated the antibiotic prescribing practices among the dental surgeons of Gujarat and their attitude towards growing concern of antibiotic resistance. In the present study, the questions were based on those in previous surveys developed in the USA<sup>3</sup> and Spain.<sup>6,7</sup> The overall response rate was 79.4%, which was more compared to the response rates found in other published surveys.<sup>8,9</sup> Prolonged courses of antibiotics destroy the commensal flora, thereby abolishing colonization resistance. The prescribing of systemic antibiotics hence needs to be justified. Prescription of systemic antibiotic therapy in periodontics should be based upon scientific data and not upon personal biases. Empirical antibiotic therapy may be used for periodontal diseases with

known microbial causes, such as acute necrotizing ulcerative gingivitis, which is caused by anaerobic organisms and can be cured by metronidazole,<sup>10</sup> and Aggressive periodontitis, mostly involving *A. actinomycetemcomitans*, which can be controlled or eradicated by systemic metronidazole-amoxicillin combination therapy.<sup>11,12</sup> However, even most careful clinical examination cannot delineate the likely microbial pathogens in most cases of periodontitis, and since the group of periodontal pathogens exhibits diverse antimicrobial susceptibility,<sup>13</sup> microbiological analysis is sometimes necessary for proper selection of antibiotic therapy. This study found that the most frequently prescribed antibiotic for nonpenicillin-allergic patients was a combination of amoxicillin and metronidazole (44%). Combined drug prescription in dental practice is becoming more important as now a days the doctor encounters resistant or mixed infections. In recent years, the antibiotic therapy most widely documented in clinical reports has been the combination of metronidazole and amoxicillin<sup>14,15,16</sup> for Aggressive Periodontitis as well as Chronic Periodontitis cases. On the contrary, as per the survey conducted in Spain, the leading antibiotic was amoxicillin plus clavulanic acid, followed by amoxicillin alone.<sup>17</sup> Amoxicillin has also been found to be the most commonly prescribed antibiotic in European countries.<sup>18</sup> Which was the second most commonly prescribed antibiotic (33%) in the present study. In our study, the drug of first choice in patients with an allergy to penicillins was found to be azithromycin (44%). In contrast

to the results of the present study, clindamycin was the most prescribed drug in penicillin-allergic patients in the USA (21.6 and 57.03%)<sup>3,19</sup> and Spain (63.2 and 65.4%).<sup>6,7</sup> Other antibiotics prescribed for patients with an allergy to penicillins were erythromycin (38%) and clindamycin (16%). Azithromycin does not find any role in oral infection because about 82% of oral streptococci develop resistance to macrolides after a single course.<sup>20</sup> Clindamycin is a good choice if the patient is allergic to penicillin, although clindamycin has a low, but serious, risk of pseudomembranous colitis.<sup>21</sup> Metronidazole has been found to be very effective against obligate anaerobes, but not against facultative anaerobic bacteria. Hence, it becomes necessary for it to be used in conjunction with other agents. Moreover, if within 48 hours the patient is not responding to penicillin alone, one can consider adding metronidazole to the existing drug regimen. Inadequate duration of the therapy or overdosing of the antibiotics has resulted in damaging the host response, thereby producing toxic effects.<sup>3</sup> Treatment of most odontogenic infections requires an average of 5 to 7 days of therapy; however, treatment of severe infections or immunocompromised patients, therapy can be of longer duration owing to reduced immunity. A rule of thumb when prescribing is that the antibiotic should last for 3 days after the patient's symptoms have been resolved.<sup>3</sup> In the present study, many respondents (47%) responded that they will give antibiotics for a minimum of 5 days. Patient compliance also plays a major role in effective treatment. Most of the patients stop the drug therapy as and when initial symptoms are resolved. Popularity of brand

(35%) was considered main factor while prescribing a particular brand, followed by availability (33%) and affordability (32%) of the drugs which was considerably the same. The drug may be too expensive or not covered by a third-party payer and the prescription remains unfilled. An alternative to this can be prescribing generic drugs. Dosing frequency may be complicated. The compliance issue most often observed is missed doses after clinical symptoms have subsided. Another challenge to compliance is the untoward or unexpected side effects that can occur when taking antibiotics. In all these cases, there is a chance for mutated microbes to flourish and thereby causing serious consequences. Chronic generalized gingivitis, Chronic generalized periodontitis and Apical periodontitis do not warrant antibiotic coverage, which has been considerably agreed by majority of dentists in our present study. In this current study only 7% respondents prescribed antibiotics prior to beginning of treatment. This finding is lesser than those reported in previous studies.<sup>3,22-23</sup>. In the present study, this outcome suggests that the scientific basis for prescribing antibiotics was not ignored by the majority of the dental surgeons. Majority of dental surgeons have a thorough understanding of the clinical indications for antibiotic prescription in order to prevent the abuse of these drugs. It is their duty towards society to help in prevention of resistance problem which is now accepted as a challenge worldwide.

## **STUDY LIMITATIONS**

We need to consider the results of this study in light of some study limitations. Since the survey was self-administered, responses may have been subject to response bias.

The dentists who participated may not be the representative of dentists of Gujarat. Although a few trends were evident, the sample size was small and thus inferences were difficult. Despite all these limitations, this study has several strengths, including being the first in the region to our knowledge to report on this topic of importance and clinical relevance. The study results provide preliminary data regarding extent to which professionals were adhering to professional guidelines. The data also included patterns among not only general dentists but also all specialties. The present study sets the stage for further research.

## **CONCLUSION**

Dental surgeons in Gujarat were found to prescribe antibiotics judiciously. Most of the respondents of this survey were experienced dentists which could have led to judicious use of antibiotics. However, there is an urgent need to raise public and professional awareness regarding the risks of injudicious use of antibiotics in dentistry.

<b>Variable</b>	<b>Number of dentists (%)</b>
<b>Sex</b>	
Male	35%
Female	65%
<b>Age</b>	
Less than 30 years	21%
More than 30 years	79%
<b>Years since practicing dentistry</b>	
<5	16%
5-10	27%
10-15	47%
>15	10%
<b>Education qualification</b>	
BDS	45%
MDS	55%
<b>Practice type</b>	
Private practice	78%
Academic institution	23%
Hospital dentistry	10%
Health center/any trust	6%

**Table 1: Demographic characteristics**

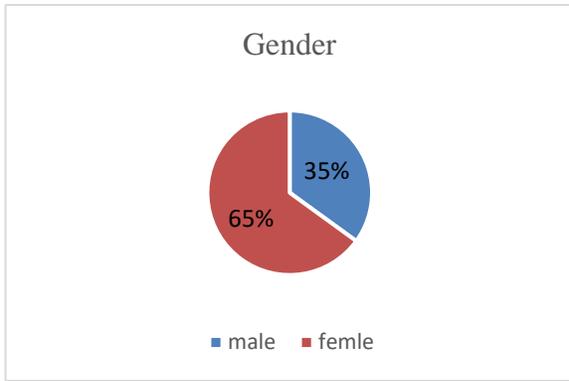


Chart 1: Gender

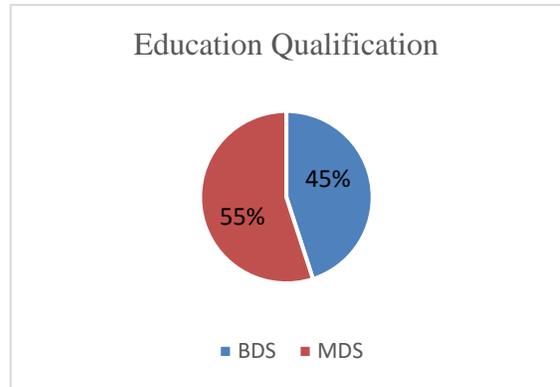


Chart 2: Education Qualification

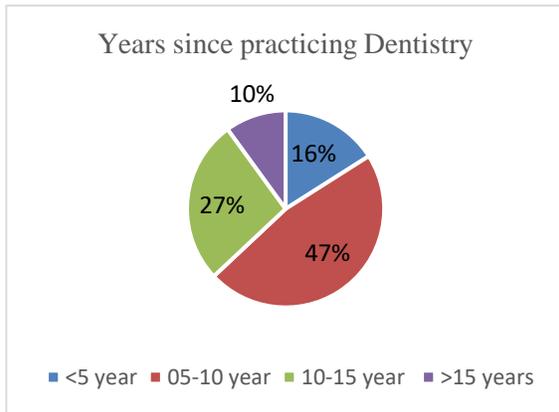


Chart 3: Years since practicing Dentistry

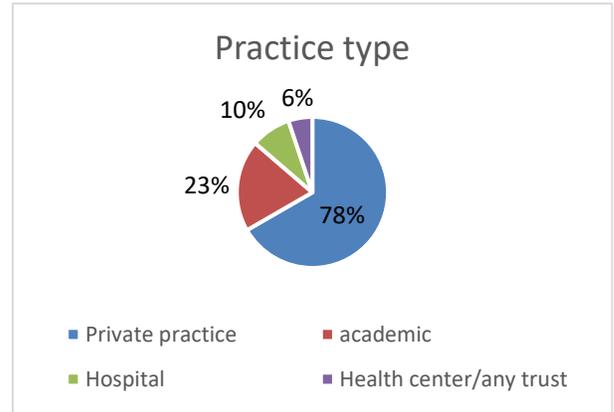


Chart 4: Practice type

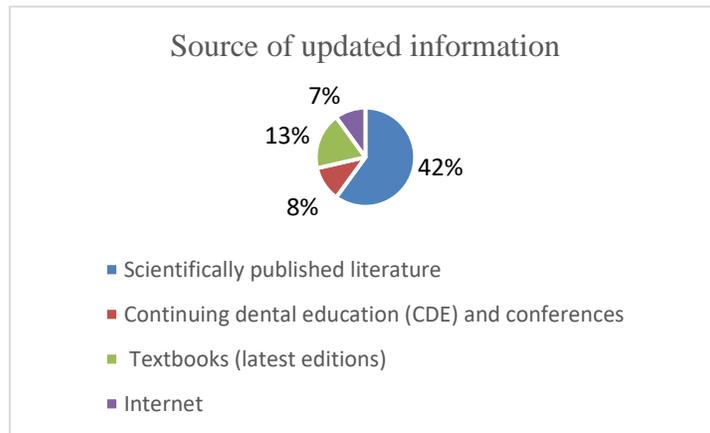


Chart 5: Source of updated information

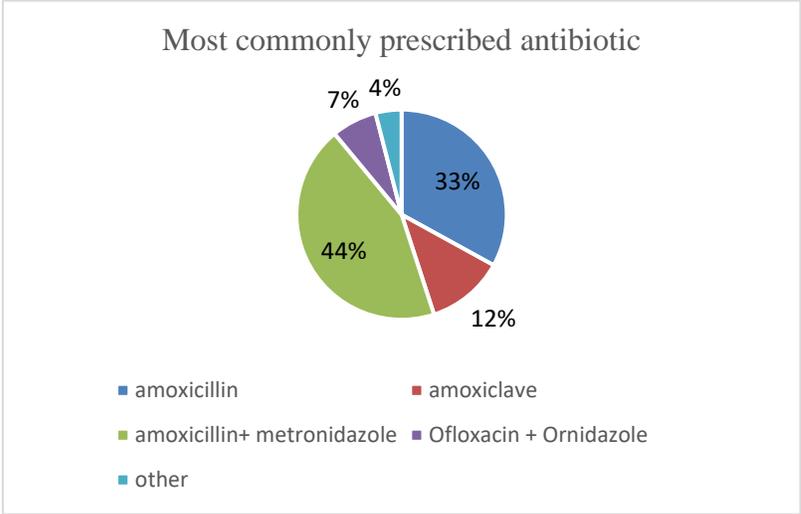


Chart 6: Most commonly prescribed antibiotic

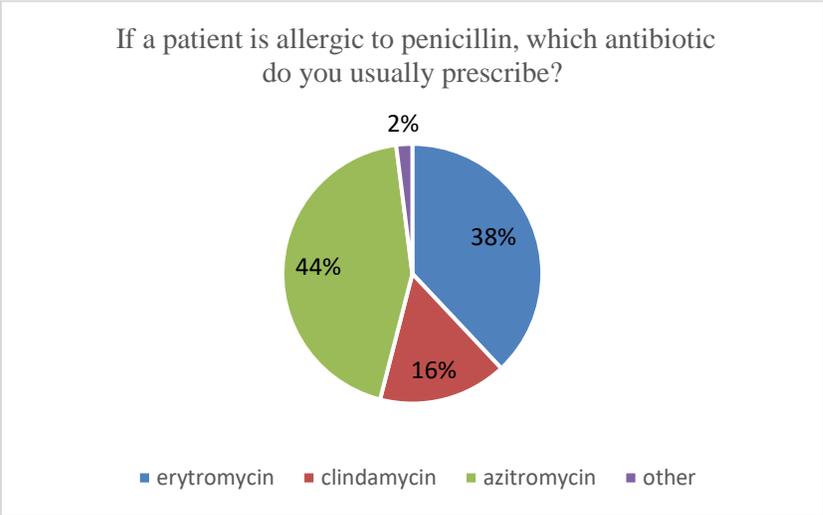


Chart 7: If a patient is allergic to penicillin, which antibiotic do you usually prescribe?

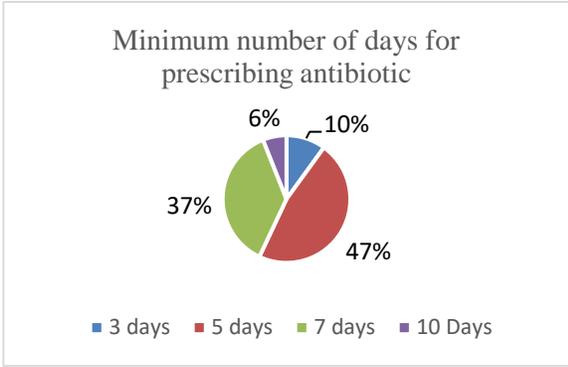


Chart 8: Minimum number of days for prescribing antibiotic

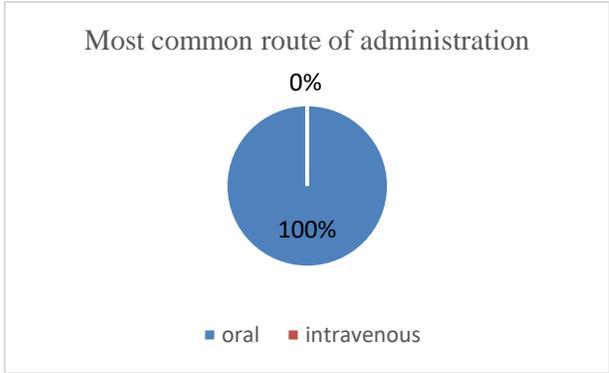


Chart 9: Most common route of administration

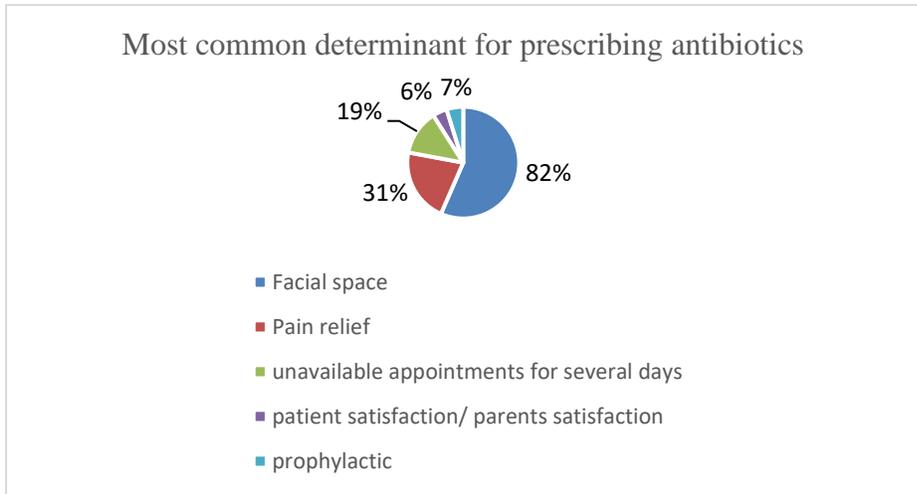


Chart 10: Most common determinant for prescribing antibiotics

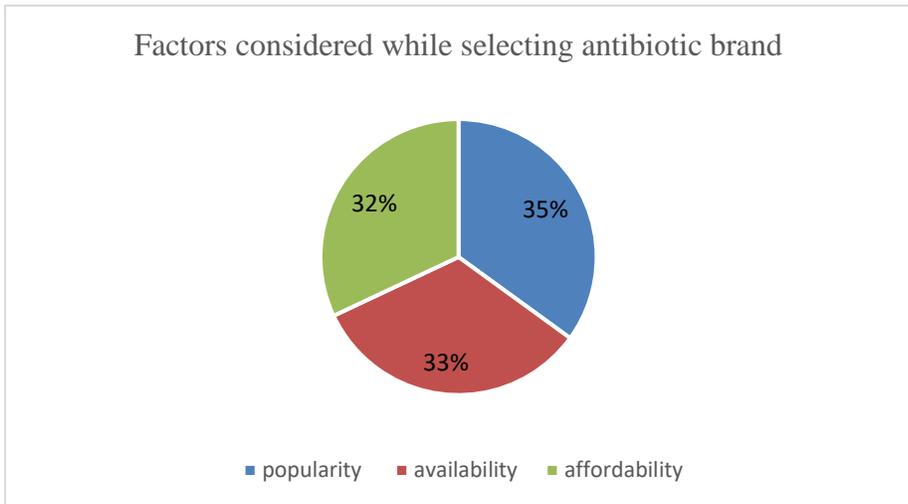
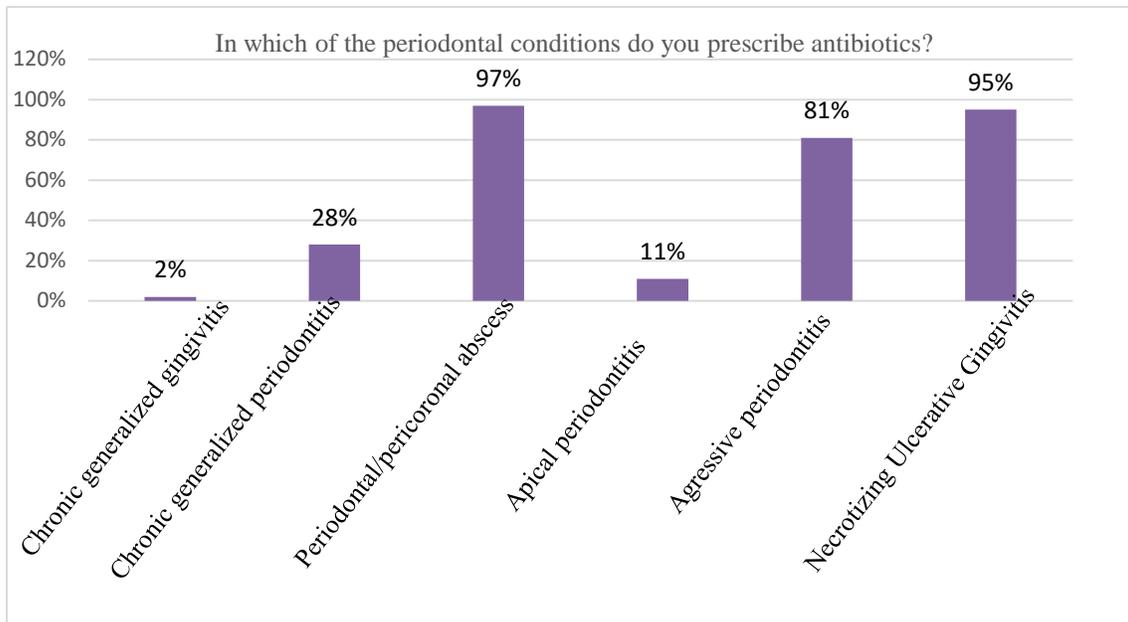


Chart 11: Factors considered while selecting antibiotic brand



Graph 1: In which of the periodontal conditions do you prescribe antibiotics?

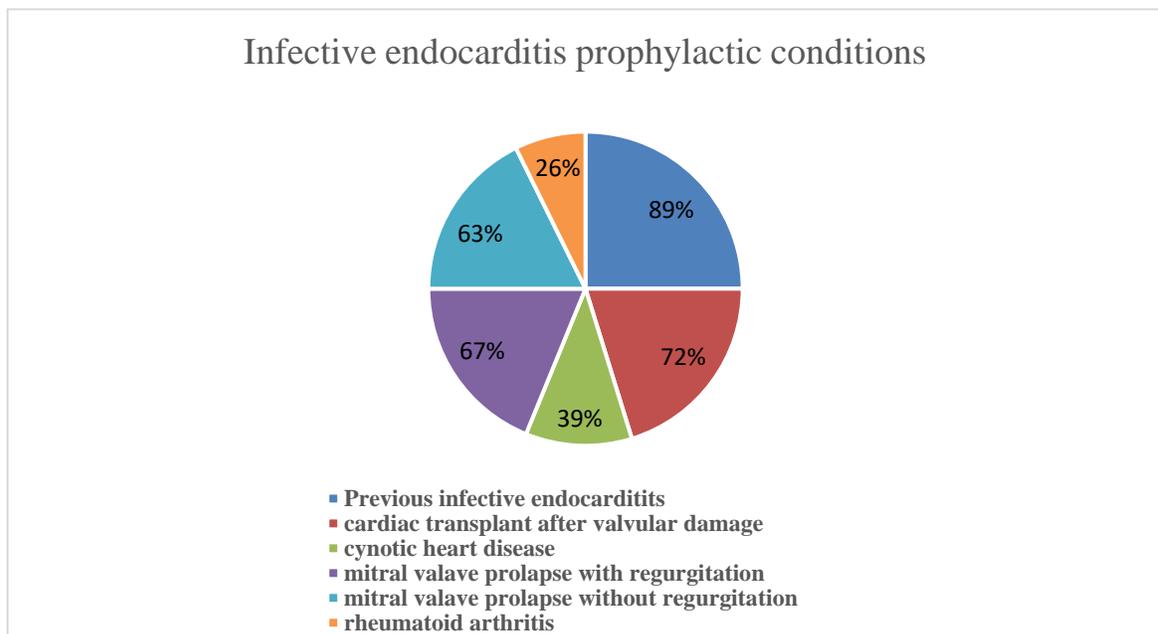


Chart 12: Infective endocarditis prophylactic conditions

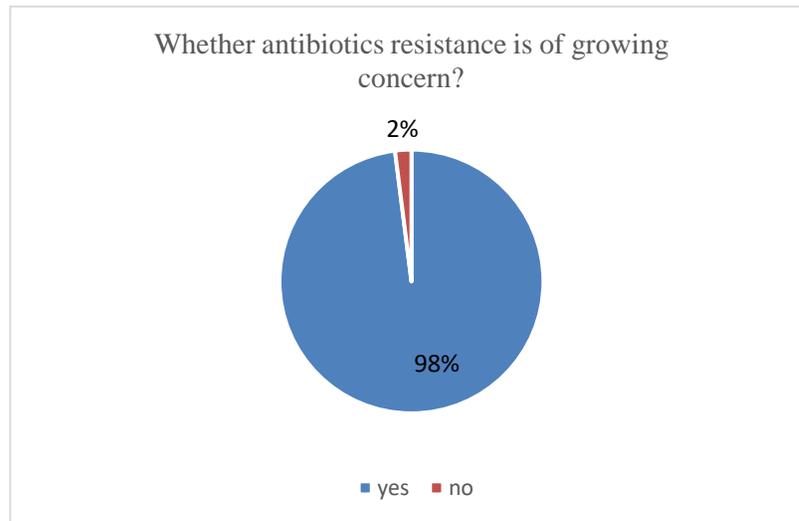


Chart 13: Whether antibiotics resistance is of growing concern?

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**DEPARTMENT OF PERIODONTOLOGY AND ORAL  
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FACULTY OF DENTAL SCIENCE  
DHARMSINH DESAI UNIVERSITY, NADIAD.**

**Survey: - "A Survey on the Use of Antibiotics among the Dentists in Gujarat"**

**Questionnaire for survey: -**

Date:

1. Name:

2. Age:

3. Gender:

4. Education Qualification:

BDS

MDS

Speciality: \_\_\_\_\_

5. Years since practicing Dentistry:

< 5

5 - 10

10 - 15

>15

6. Practice type:

(Multiple answers can be given\*)

Private practice

Academic Institution

Hospital dentistry

Health center/any trust

7. What is your primary source of updated information about antibiotics?

Scientifically published literature

Continuing dental education

(CDE) and conferences

Textbooks (latest editions)

Internet

8. Most commonly prescribed antibiotic:

Amoxicillin

Amoxiclav

Amoxicillin + Metronidazole

Ofloxacin + Ornidazole

Other: \_\_\_\_\_

9. If a patient is allergic to penicillin, which antibiotic do you usually prescribe?

Erythromycin

Clindamycin

Azithromycin

Other: \_\_\_\_\_

10. Most common route of administration:

Oral

Intravenous

11. Minimum number of days for prescribing antibiotic:

3

5

7

10

12. Most common determinant for prescribing antibiotics:

(Multiple answers can be given\*)

Fascial space infections

Pain relief

- Unavailable appointment for several weeks
- Patient satisfaction/parent satisfaction (pedo patients)
- Prophylactic (before extraction & scaling)

13. Which of the following factors do you consider primarily while prescribing particular brand of antibiotics?

- Popularity of the brand
- Availability of the brand
- Affordability of the brand

14. In which of the periodontal conditions do you prescribe antibiotics?

(Multiple answers can be given\*)

- Chronic Generalized Gingivitis
- Chronic Generalized Periodontitis
- Periodontal/Gingival / Pericoronal Abscess
- Apical Periodontitis
- Aggressive Periodontitis
- Necrotizing Ulcerative Gingivitis

15. Mention the conditions under which you give infective endocarditis prophylaxis:

(Multiple answers can be given\*)

- Previous infective endocarditis
- Cardiac transplant after valvular damage
- Cyanotic heart disease

- Mitral valve prolapse with regurgitation
- Mitral valve prolapse without regurgitation
- Rheumatoid arthritis

16. Whether antibiotics resistance is of growing concern?

- Yes
- No

# Role of Low- Level Laser Therapy in Periodontal and Peri-implant Healing

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\*\*\*\*Dr. Hiral Purani

## Abstract:

Laser irradiation has numerous favorable characteristics, such as ablation or vaporization, hemostasis, bio stimulation (photo biomodulation), microbial inhibition and destruction, which induce various beneficial therapeutic effects and biological responses. Low- level laser therapy promotes periodontal as well as peri-implant healing by various mechanisms. With increasing evidences of benefits, low-level laser therapies play an important role in wound healing/tissue regeneration and these evidences have been summarized in the present review.

**Key words:** *low-level laser therapy, bio stimulation, healing, tissue regeneration*

## Introduction:

LASER is an acronym for light amplification by stimulated emission of radiation. Laser light is monochromatic, coherent and collimated beam. Low-level laser treatment, also called 'Soft Laser Therapy' has been used for more than five decades in the health system. It was first introduced by Mester and his colleagues.<sup>1</sup> They pointed out that laser application with  $1\text{J}/\text{cm}^2$  would result in lesion repair in mice.<sup>2</sup> Low-level laser is a visible red light or near infrared light whose wave length has a low absorption power in water and is capable of penetrating into soft and hard tissues in a depth of 3mm-15mm. Low level

laser therapy (LLLT) is also known as laser phototherapy (LPT), bio stimulative therapy (BT), Low- intensity laser therapy (LILT).

## Lasers - widely used for Low level laser therapy

The first commercialized bio stimulative laser was a helium-neon (HeNe) laser of <1 mW. The use of HeNe laser for biostimulation is limited by the need for an optic fiber, the size of the machine and the still rather low power option, now typically in the range 5-25 mW. It has generally been replaced by the indium-gallium-arsenide: phosphorous laser, a diode producing red laser in the range 600-700 nm and able to deliver as much as 500 mW.

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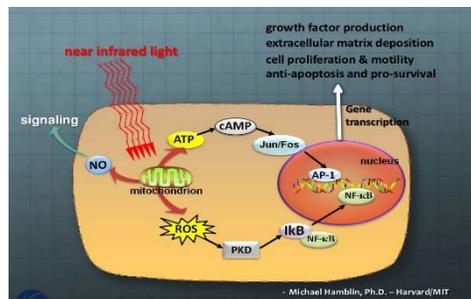
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Semiconductor diode lasers are generally variants of either Aluminium:Gallium:Arсениde (AlGaAs) which emit in the near infrared spectrum (wavelength 700-940nm), or Indium: Gallium: Arсениde: Phosphorous (InGaAs) devices which emit in the red portion of the visible spectrum range (wavelength 600-680nm) can be included in this category. The most frequently used laser for LLLT in dentistry is the gallium-aluminum-arsenide laser. It often operates in the spectrum between 780 and 830 nm. The output is typically between 10 and 500 mW.<sup>3,4,5</sup> An advantage of the diode lasers is the small size and option for battery operation, making them rather handy and portable. These lasers are work in continuous mode, but can be mechanically or electronically pulsed. The Beam profile from a typical diode laser is rectangular, with a high divergence on the long axis and low divergence on short axis. Laser units used for LLLT are generally classified as Class 3 and 3b in terms of the optical hazards which they pose to staff and patients.

### Mechanism of Low- level laser therapy (LLLT)

Low-level laser application mechanism is complex; however, the most important absorption parameter of red light or infrared light is in the sub-cellular photo-receptors, especially the electron transfer in the respiratory chain of the mitochondria membrane.<sup>4,5</sup>



**Illustration: 1,** Mechanism of Low- level laser therapy

Cytochrome-c oxidase is the photo-receptor and last enzyme in the respiratory electron transport chain of cells located in the membrane of mitochondria. Cytochrome-c oxidase translocate protons across the membrane, increasing the transmembrane difference of proton electrochemical potential which the ATP synthase then uses to synthesize ATP. ATP is the end product of Krebs cycle, where the photon acceptor enzyme cytochrome c oxidase is inhibited by nitric oxide (NO). Laser light will dissociate the binding between NO and cytochrome-c oxidase, allowing it to resume ATP production. ATP is the fuel of the cell, which increases healing potential of the cell. This basic mechanism initiates a cascade of cell signaling, leading to an optimization of body functions.

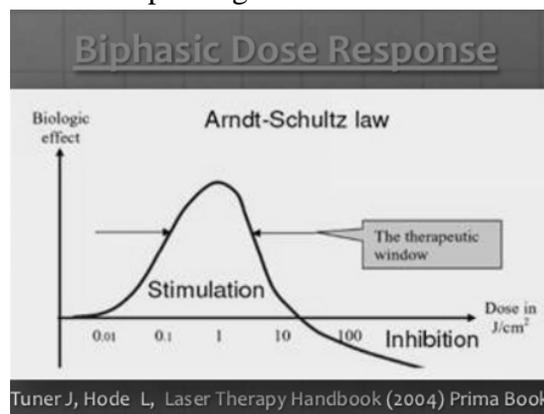
### Low-level Laser therapy Dosage

The most difficult part of LLLT is to find optimal dosage. The tissue dosage is expressed in fluence, or energy density, measured in joules per square centimeter (J/cm<sup>2</sup>). Multiplying the output power of the laser in milliwatts by the time of exposure in seconds equals the produced energy; for example, 50mW×40seconds = 2000 millijoules (mJ), or 2.0J. Irradiation with

2.0J over an area of 2 cm<sup>2</sup>, 2/2= a fluence, or energy density = 1J/ cm<sup>2</sup>. It varies with the spot size of laser light, depth of target tissue and type of target tissue with presence of chromophores.

### **Low-level laser therapy Stimulation/Inhibition**

LLLT follows the Arndt-Shulz law: too small a stimulus does not trigger any effect, an optimal dose will increase physiologic processes, and strong stimuli will inhibit physiological activity. The quest for optimal dosage still not solved, but much is known about “therapeutic windows.” In some patients the goal is inhibition rather than stimulation, especially for pain management. High doses of laser light will inhibit the pain signals.<sup>6</sup>



**Illustration: 2,** Arndt-Shulz law: for biologic effect of LLLT.

### **Anti-inflammatory effect of Low- level laser therapy (LLLT) after non-surgical periodontal treatment**

Low-level laser therapy (LLLT) has been widely applied in reducing inflammatory reactions, and research indicates that LLLT induces an anti-inflammatory effect that may enhance periodontal disease therapy.<sup>7</sup> LLLT might inhibit LPS-induced

inflammation in human periodontal ligament cells (hPDLs) through cAMP/NF-κB regulation. It has been reported that LPT is able to reduce gingival inflammation and metalloproteinase 8 expression when applied after scaling and root planning.<sup>8,9</sup> Diode laser does have a clinical advantage over the mechanical instrumentation with a curette. LLLT also effectively inhibits PGE2 synthesis.<sup>10</sup> LLLT can modulate the periodontal inflammatory process, especially through reducing PGE<sub>2</sub> release.<sup>11</sup>

### **Low- level laser therapy (LLLT) and healing**

Laser biostimulation normalizes cell function and promotes healing and repair. Secondary effects include increased lymphatic flow, production of endorphins, increased microcirculation, increased collagen formation and stimulation of fibroblasts, osteoblasts and odontoblasts. This stimulates the immune response, pain relief and wound healing. Ozawa et al.<sup>12</sup> showed that LLLT significantly inhibits the increase in plasminogen activity induced in human periodontal ligament cells in response to mechanical tensile force. Plasminogen activity is capable of activating latent collagenase, the enzyme responsible for cleaving collagen fibers. LLLT (Laser Periodontal therapy) has also been shown to cause vasodilation, with increased local blood flow. This vasoactive effect is of relevance to the treatment of joint inflammation. LLLT causes the relaxation of smooth muscle associated with endothelium. This vasodilation brings in oxygen and also allows for greater traffic of

immune cells into tissue. These two effects contribute to accelerated healing.<sup>13</sup>

Several in vitro studies have shown that LLLT at certain wavelengths may stimulate fibroblast proliferation when certain combinations of exposure parameters and power densities are used.<sup>14-19</sup> The range of radiation doses at which stimulation of fibroblast proliferation has been observed is wide (0.45 -60 J/cm<sup>2</sup>). LLLT effects on macrophages include increased ability to act as phagocytes, and greater secretion of basic fibroblast growth factor. Macrophages resorb fibrin as part of the demolition phase of wound healing more quickly with LLLT, because of their enhanced phagocytic activity during the initial phases of the repair response. More rapid demolition of the wound establishes conditions necessary for the proliferative phase of the healing response to begin.<sup>20</sup>

#### **Low- level laser therapy (LLLT) after gingivectomy**

Amorim JC et al.<sup>21</sup> done a Clinical study of the gingiva healing after gingivectomy and low-level laser therapy. Twenty patients with periodontal disease were selected, and treatment was planned for gingivectomy to bilateral maxillary and mandibular premolar teeth. After surgery, one side was submitted to LLLT using a 685-nm wavelength, output power of 50 mW, and energy density of 4 J/cm<sup>2</sup>. The other side was used as the control and did not receive laser irradiation. Healing was evaluated, clinically and biometrically, immediately post-surgery and at days 3, 7, 14, 21, 28, and 35. Biometrical evaluation indicated a significant improvement in healing for the laser group at 21 and 28 days. Clinical evaluation showed better repair for

the laser group, mainly after the third day. It was concluded that LLLT was an effective adjunctive treatment, appeared to promote healing following gingivectomy.

#### **Low- level laser therapy (LLLT) after Modified Widman Flap surgery (MWF)**

Pain and tissue response following modified widmanflap surgery (MWF) in humans performed by Sanz-Moliner<sup>22</sup> et al. Aluminium-Gallium-Zinc-Arsenide diode laser with 810nm was used at power 1W in continuous mode for 10 seconds then stopped for 30 seconds. And again, used in same manner at power of 0.1W. The switched-off laser was used to target area in control group after MWF for placebo effect. Between two surgeries the time span was 3 weeks. The same person performed all surgeries. Patient were prescribed Ibuprofen (200mg) for pain relief every 8 hrs after the operations. Based on modified visual analogue scale from 0-10, patient was asked to note their pain level for a week every night & also number of sedative tablets taken was noted. Considering color and tissue edema tissue response was also documented as a secondary variable in physical examination. Between the two groups for tissue edema (P<0.041), dose of sedative drug taken (P<0.001), post-op pain (P<0.001) significant difference was found. But for tissue color (P=0.98) there was no difference. Therefor the application of diode laser 810 nm along with MWF results into pain reduction and post-op edema. Therefor author concluded laser application is useful alongwith modified Widman flap surgery.

#### **Low- level laser therapy (LLLT) after free gingival graft**

In split mouth randomized clinical trial a

study on utilization of low-intensity laser during healing of free gingival grafts was conducted by Almeida et al.<sup>23</sup> In one month 10 patients underwent double-sided gingival graft in the mandible done by the same surgeon. Application of Diode-Aluminum-Gallium-Arsenide laser with a wavelength of 660nm (RED) for fast repair effect and with a wavelength of 780 nm (Infrared) for anti-pain effect following graft in the test group were done. The laser was used twice with a power of 40mW and energy dose of 10j/cm<sup>2</sup>, continuously emitted mode onto each side after surgery and 48 hrs. post-op. To make them believe switched off laser was used in control group following free gingival graft. At 7-, 15-, 30- & 60-days post-op photographs were produced that was studied based on morphology, texture and shade by 5 skillful periodontists. Based on visual analogue scale from 0-10. Patients were asked to record their pain level for 3 hrs, 24 hrs and 7 days post-op. Between two groups no difference were found. So, from this study, low-level laser would not be useful in pain reduction and wound healing was concluded. A Split mouth randomized clinical trial a study on "Evaluation of effect of 660nm low power laser on pain and healing in palatal donor site conducted by Moslemi et al.<sup>24</sup> In that 12 patients participated. Diode laser with 660 nm and power of 200mW was applied for 32 seconds to target site on 1,2,4,7 post-op following free gingival graft procedure in the test group. Switched -off laser was used in the control group in the same way. Photographic images were used to evaluate amount of epithelialization. To assess pain scale, sedative drugs taken were recorded.

Palatal group in laser -applied group was significantly better healed than control group regarding clinical repair and epithelization in day 14. Epithelization amount was better in laser-applied group than control group in day 21. Therefore author finally concluded low-level laser may heal wound in palatal graft site.

### **Low- level laser therapy (LLLT) and LED after implant insertion**

LLLT biostimulation of bone tissue attachment to implant surfaces has also been reported. It has been shown that LLLT influences the expression of osteoprotegerin. Mohajerani et al.<sup>25</sup> showed effect of LLLT and LED, 20 mins/ Day for 10 days after ( Ti implants , Zimmer USA) implant insertion in 58 patients. In G<sub>1</sub> Test group, Diode 830nm 10mW, 0.0015J/cm<sup>2</sup> along with 632nm LED 10mW/ cm<sup>2</sup> , for 20 mins every day for 10 days, 4 points around the implants were applied. ISQ ( Implant Stability Quotient) was measured at 0,10,21,42,63 days after implant placement. In G<sub>1</sub> group increased ISQ at 0,10,21,42,63 days, but in G<sub>2</sub> control group increased ISQ after 42 and 63 days were noted. So, as per conclusion, LLLT and LED, increase the stability of implants earlier. Yanaguizawa et al.<sup>26</sup> placed mini-implants, in 10 human volunteers. Diode laser 660nm application had been done at 40 mW for 60 sec(2.4J), Light intensity 0.07 W/ cm<sup>2</sup> on the gingival surface and an energy density of 4 J/ cm<sup>2</sup> per irradiation( 12 J / cm<sup>2</sup> total treatment). Peri-implant crevicular fluid (PGF) was evaluated for IL-6 and IL-8 levels. PGF around nonirradiated mini-implants showed higher level of IL-8 and IL-6 level 24 h after

insertion of mini screws. LLLT modulates the initial inflammation after the insertion of mini-implants, possibly increasing mini-implant success and decreasing patient's discomfort.

### **Future Recommendations:**

Till date, the evidence-based conclusions for LLLT are lacking because of, no specific treatment protocol, great variation in irradiation parameters and different study designs. So, future studies require precise randomized clinical trials, effective evaluation criteria, longer follow up periods with similar inclusion criteria and treatment protocols.

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## PERIPHERAL OSSIFYING FIBROMA – A CASE REPORT

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### ABSTRACT

Peripheral ossifying fibroma (POF) is a reactive inflammatory gingival hyperplasia which shows area of calcification or ossification. It is a non-neoplastic entity of gingiva. The etiology and pathogenesis of POF are yet not clear, but hypothesized as a proliferative reaction originating from the periodontal ligament, as a result of irritating agents such as dental plaque, calculus, orthodontic appliances, and overhanging restorations. This case report presents a case of 50 years old female patient with a complain of gingival overgrowth on upper front teeth region.

**Keywords:** *Ossifying fibroma, gingival hyperplasia, calcifications*

### INTRODUCTION

Peripheral ossifying fibroma (POF) is a non-neoplastic entity, which occurs on the gingiva in response to trauma or irritation. It is a reactive lesion of connective tissue and is not the soft-tissue counterpart of central ossifying fibroma. Localized reactive lesions seen on the gingiva includes focal fibrous hyperplasia, pyogenic granuloma, peripheral giant cell granuloma, peripheral cementifying fibroma and peripheral ossifying fibroma.<sup>1</sup> POF was first reported by Shepherd in 1844 as alveolar exostosis.<sup>1</sup> Eversol and Robin in 1972, later coined the term peripheral ossifying fibroma.<sup>1</sup> It occurs in the younger age group with a

female preponderance. It has a predilection for maxillary arch and most of them occur in the incisor-cuspid region and presents as a painless mass on gingiva or alveolar mucosa measuring not more than 3 cm which can be pedunculated or sessile. Earlier lesions appear irregular, red and older lesions have a smooth pink surface and surface ulceration may be present.<sup>2</sup> Incidences of recurrence have been reported to be 7–45%. The possible reasons for high recurrence rate is incomplete surgical excision of lesion, incomplete removal of plaque, calculus, and difficulty in access during surgical manipulation due to intricate location of POF being present usually at interdental areas.<sup>3</sup>

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## CASE REPORT

A 50 years old female patient visited the Department of Periodontology, Faculty of Dental Science, Nadiad with complain of gingival overgrowth on upper front teeth region for 6 months that had gradually increased over time. She had no history of previous swelling in the oral cavity.



*Illustration 1: Intra oral picture showing gingival mass with respect to 21 and 22.*

Past dental, medical and family history was non-contributory. Intra oral examination revealed a solitary, pedunculated mass involving interdental papilla and attached gingiva covering two third of the crown structure in relation to 21 and 22. Mass was pink in color with a smooth surface, measuring approximately 18 × 14 mm in size. Provisional diagnosis of epulis in relation to 21 and 22 regions was given, differential diagnosis included pyogenic granuloma, peripheral ossifying fibroma and peripheral giant cell tumor. Intraoral periapical radiograph revealed thickening of lamina dura and widening of PDL space in cervical one third of root on distal aspect of 21 and mesial aspect of 22.

Thorough scaling and root planning were performed to eliminate the irritating factors

and after a week, complete surgical excision of the lesion was performed under local anesthesia and gingival curettage was done. Periodontal dressing was given followed by oral hygiene maintenance instructions to the patient.



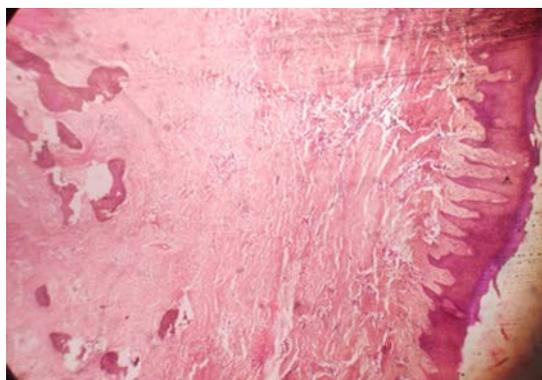
*Illustration 2: IOPA showing thickening of lamina dura and widening of PDL space on distal aspect of cervical 1/3<sup>rd</sup> of root in relation to 21 and mesial aspect of cervical 1/3<sup>rd</sup> of root in relation to 22.*

Histopathology report revealed presence of parakeratinised stratified squamous epithelium and connective tissue appeared hypercellular with osteoid area. Based on histopathologic examination and clinical presentation, final diagnosis of peripheral ossifying fibroma in relation to 21 and 22 regions was given.

## DISCUSSION

Most of the localised growth in oral cavity are seen on gingiva which may range from inflammatory or reactive to neoplastic in nature. Peripheral ossifying fibroma is one

such reactive, non-neoplastic entity. It is a focal reactive hyperplasia of connective tissue that occurs exclusively on gingiva. It accounts for 9.6% of gingival lesions.<sup>4,5,6</sup> POF is well demarcated mass of tissue, located on the gingiva, having a sessile or pedunculated base, and being the same color as normal mucosa or slightly reddened.<sup>7</sup>



*Illustration 3: Histopathologic section showing parakeratinised squamous epithelium and connective tissue appears hypercellular with osteoid area.*

Synonyms of POF are peripheral cementifying fibroma, ossifying fibroepithelial polyp, peripheral odontogenic fibroma with cementogenesis, peripheral fibroma with osteogenesis, peripheral fibroma with cementogenesis, peripheral fibroma with calcification, calcifying or ossifying fibroid epulis, calcifying fibroblastic granuloma, mineralizing ossifying pyogenic granuloma.<sup>8</sup>

Clinically POF presents as smooth lobulated pink mass on a pedunculated or sessile base. It has an increasing incidence in second decade and declining incidence after third decade.<sup>9</sup> Only 0.5% cases are reported in older age group. It has marked predilection in younger age group because loss of

periodontium occurs with tooth loss as age advances.<sup>1</sup> There is a female predilection for the lesion due to the hormonal influences. Exposure of inflamed gingiva to progesterone and oestrogen from saliva and blood stream is thought to be a contributory factor.<sup>10</sup> An average age of occurrence is 34.76 years. The lesion is seen more commonly in maxillary arch than in mandible and incisors-cuspids are involved often.<sup>11</sup> Kfir et al. reported that the size of the POF is usually smaller than 1.5 cm in diameter. A case of giant POF of 9 cm is also reported.<sup>12</sup>

Multicentric POF can also occur in oral and maxillofacial region and is observed in genetic conditions like Nevoid basal cell carcinoma syndrome, Multiple endocrine neoplasia–type II, Gardner syndrome and Neurofibromatosis.<sup>9</sup>

Bone involvement is not significant in most of the cases, some alterations like superficial erosion of bone, foci of calcifications, widening of the periodontal ligament space and thickened lamina dura, migration of teeth with interdental bone loss is noted.<sup>2,13</sup>



*Illustration 4: Post-operative view at 2 months follow up.*

Histogenesis remains controversial and there are two schools of thought proposed to understand the histogenesis of POF.

1. POF may initially develop as pyogenic granuloma that undergoes subsequent fibrous maturation and calcification. It represents the progressive stage of the same spectrum of pathosis.<sup>14</sup>

2. POF is due to inflammatory hyperplasia of cells of periodontal ligament/periosteum. Metaplasia of the connective tissue leads to dystrophic calcification and bone formation.<sup>13</sup>

Histologically, the POF consists of intact or ulcerated stratified squamous epithelium, cell rich connective tissue stroma containing proliferating fibroblasts intermingled with fibrillar tissue, mineralized components, chronic inflammatory cells, sparse to profuse endothelial proliferation. Mineralized components often present, vary both in constitution and amount. Mineralized tissue observed in POF are – woven bone trabeculae, lamellar bone trabeculae, circumscribed amorphous, appears as droplets of calcified material closely resembling acellular cementum or cementum-like droplets, and granular foci of mineralization (dystrophic calcifications) appears as conglomerate of very small basophilic granules, tiny globules, and small, solid, irregular masses. The ulcerative lesion showed presence of dystrophic calcification.<sup>15,16</sup>

POF has to be differentiated from other reactive lesions of gingiva, such as pyogenic granuloma, peripheral giant cell granuloma (PGCG) and peripheral odontogenic fibroma. Pyogenic granuloma shows red mass with surface ulceration clinically and microscopically exhibit vascular proliferation resembling granulation tissue.

PGCG shows scattered giant cells in a fibrous stroma. Peripheral odontogenic fibroma contains prominent islands of odontogenic epithelium.<sup>13</sup>

Treatment of POF includes thorough oral prophylaxis, root planning of adjacent teeth and removal of other sources of irritants. Surgical intervention of POF should ensure deep incision of lesion including periosteum. Due to increased recurrence rates regular follow-up is essential. Incomplete excision of lesion and/or due to perseverance of local factors is the possible reason for recurrence. Recurrence rates have been reported from 7% to 45%.<sup>16,17</sup>

## CONCLUSION

Peripheral ossifying fibroma is a pathological entity whose histogenesis is yet to be delineated. It shares a varied clinico-pathological presentation. Clinico-pathological characteristics may vary and on the contrary to the usual presentation, as this case presented occurrence of peripheral ossifying fibroma in older age patient. Surgical excision is considered curative and may present a high recurrence rate compared with other reactive lesions. Identification of any reactive lesions requires the formulation of differential diagnosis, radiological and histopathological examination for confirmation of diagnosis to enable accurate patient evaluation and management.

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# A QUESTIONNAIRE STUDY ON ORAL PROPHYLAXIS IN PERIODONTICS – MYTH AND TRUTH IN PATIENT VISITING DEPARTMENT OF PERIODONTOLOGY, FACULTY OF DENTAL SCIENCE, NADIAD, GUJARAT

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## ABSTRACT

**Aim:** The aim of the study was to determine the prevalence of myths related to dentistry in the rural population of Nadiad District.

**Materials and methods:** A cross-sectional survey was conducted in patients who visited Department of Periodontology, Faculty of Dental Science in Nadiad district in a sample of 500 individuals. A self-designed questionnaire consisting of 15 questions were given to all the subjects and they were questioned about dental myths, tobacco habits, and oral hygiene methods.

**Results:** The results were compartmentalized under two sections: 'Yes' or 'No' and the percentage calculation was done for each question out of 500 respondents.

**Key words:** *Myths, Dentistry, Rural population.*

## INTRODUCTION

Oral health is critical but an overlooked component of overall health and well-being among children and adults. Oral health problems, such as dental caries, periodontitis and oral cancer are global health problems.<sup>1</sup>They are found in different populations belonging to developed and developing countries. There are reports suggesting that the oral diseases are showing an increasing trend in developing countries in the past few decades.<sup>1</sup>Majority of population in India live in rural areas and have limited health

and oral healthcare services available to them.<sup>2</sup>Despite remarkable worldwide progress in the field of diagnostics, preventive and curative health, there are people still living in isolation in natural and unpolluted surroundings faraway from civilization with their traditional values, customs, beliefs and myths intact.<sup>2,3</sup>Cultural forces bind people and also profoundly shape their lives. Culture has its own influence on health and sickness and that is greatly depicted by the values, beliefs, knowledge and practices shared by the people.

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Oral health is not an exception. Alike all health problems, dental and oral diseases are a product of economic, social, cultural, environmental and behavioral factors.<sup>4</sup> Myths may arise as either truthful depictions or overelaborated accounts of historical events, as allegory or personification of natural phenomena, or as an explanation of ritual. They are used to convey religious or idealized experience, to establish behavioral models, and to teach. Dental myths usually emerge from false traditional beliefs and nonscientific knowledge. This is embedded in the psyche of future generations over a period of time and thus, creates hindrance in the recognition of scientific and contemporary dental treatment.<sup>8</sup> Lack of education along with traditional beliefs and sociocultural factors leads to development of false perceptions and myths. Actions are preceded by perceptions generally in people. Perception is a process through which an individual becomes conscious about and interpret information regarding the situation, but the course of a perception is essentially subjective in nature because it is not a precise reflection of the situation. Hence, a situation may be the same for two individuals but the interpretation of that situation by both of them may be immensely different.<sup>8</sup>

## **METHOD**

A cross sectional study was conducted during the academic year 2018 in Department of Periodontology in Dharmsinh Desai University, Nadiad. 500 patients were enrolled in the study. A self-designed questionnaire was used for collection of data. The questionnaire was prepared in English language first and later translated to Gujarati (local language).

## **RESULTS**

A descriptive cross-sectional survey using a specially prepared questionnaire consisting of 15 questions conducted in a sample of 500 patients. The data so collected from the subjects was systematically compiled and multiple tables were generated.

### **Myths related to oral hygiene.**

About 81% of the subjects consider that brushing once a day is more than enough, whereas 80% are of the opinion that brushing alone can keep all their teeth clean. 39% believe in myth that when the gums bleed it is better not to brush the teeth. The 20% of the study population believes that finger with charcoal and 22% considers that powdered salt can clean the teeth better. On being of the total respondents, 77% are of the myth that the longer you brush and 76% are of the opinion that harder you brush, and you can get the teeth cleaner. 11% of the study population believe in myth that Tooth brushes can be shared between members of the same family (Graph I).

### **Myths related to tobacco.**

When tobacco use was questioned, 25% are of the opinion that chewing betel-quad helps in removing foul odor from the mouth.

### **Miscellaneous myths.**

Majority of the subject (63%) are of the opinion that cleaning of teeth by a dentist causes loosening of teeth. 64% of the subjects believe in the myth that cleaning of teeth by a dentist causes sensitivity (Graph II).

Results have been shown in the table I

## **DISCUSSION**

The latter part of the twentieth century saw a transformation in both general health and oral health unmatched in history. The millions of people worldwide have been excluded from the benefits of

socioeconomic development and the scientific advances that have improved healthcare and quality of life. Inequalities in oral health persist worldwide, with mainly affected being the deprived population.<sup>1</sup> India has a low budget to meet the general populations oral health treatment needs, a high disease burden and a low literacy rate.<sup>1</sup> All these factors predispose the general population to poor oral healthcare, false treatment need assumptions and false beliefs. This also increases the tendency to discover other measures in the form of home remedies rather than consulting a professional dentist. The present study showed that 20% subjects still believed that using finger with charcoal to clean the teeth is better than using a toothbrush with toothpaste. It is in accordance with the findings of VivekS et al<sup>2</sup>, which revealed that indigenous tooth cleaning systems (charcoal) are still most commonly used practices among the Paniyan tribes of Kerala. Charcoal powder is coarse and it could abrade the enamel and damage periodontal ligament. A prominent percentage 80% of respondents perceived that brushing alone can keep the teeth clean and using finger to clean the teeth is better than using toothpaste and toothbrush. A poor level of oral hygiene practices would not have been observed if oral health education, promotion and preventive programs had been carried out in communities that lack access to care. To overcome this problem, education should be provided at all age levels, which helps in rising of internal consciousness, empowerment and also alters unhealthy behavior and practices. In the present study, 63% of respondents agreed with the statement that cleaning of teeth by a dentist causes loosening of teeth, which is in concordance as a myth in

Hispanics/Latinos found by Vazquez et al.<sup>9</sup> Keeping these perspectives in view, the aim should be to counsel the community members, where myths are prevalent among 83% of study population. This can be achieved through ‘reorientation of health services’, in which every healthcare professional should take active role to educate not only at an individual level but also at the mass level. The results of the present study showed that a targeted program to spread scientific dental practices to them is required.

The best means to counter the myths is to base our suggestions on the best available evidence. Evidence-based dentistry advances the use of research evidence effectively in dental practice and improves the dental health professionals’ knowledge regarding patient counseling and aids in clearing misconceptions toward various oral health issues. Hence, a true evidence-based picture would hold more solid ground for the masses to recognize their false perceptions and beliefs and the need to modify them according to the truthful information attained. The onus is on the dental community and the administrative machinery to strive for the following dental awareness programs specially targeting the rural population.

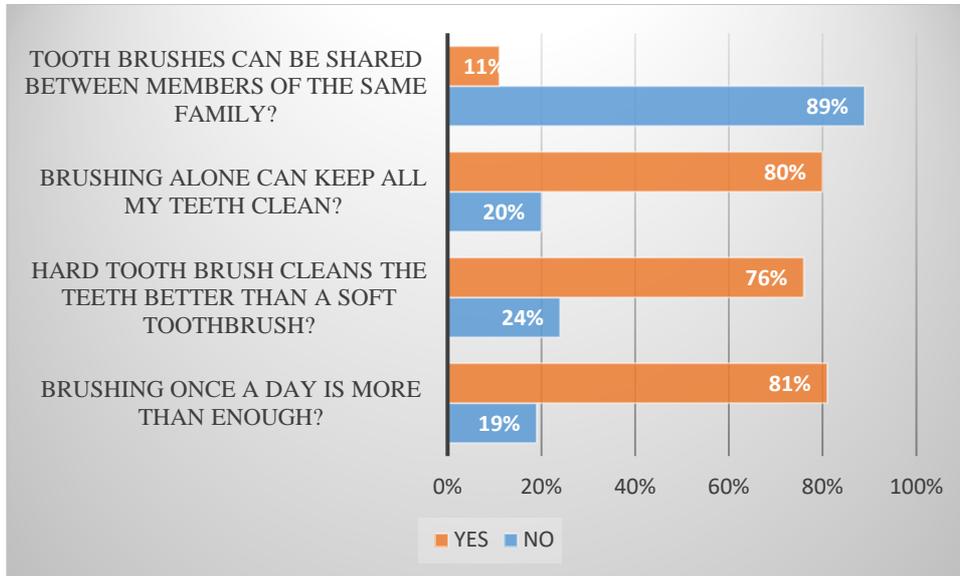
Dental camp, setting up subsidized dental care facilities close to rural population, mobile dental clinics and dental insurance can play a crucial role in uplifting the oral health of the rural masses. Future studies could benefit by focusing on a more qualitative interpretation of what the rural population understands about the basic concepts of oral health, disease and hygiene and by experimenting the methods of improving their attitude towards oral health.<sup>10</sup>

## **CONCLUSION**

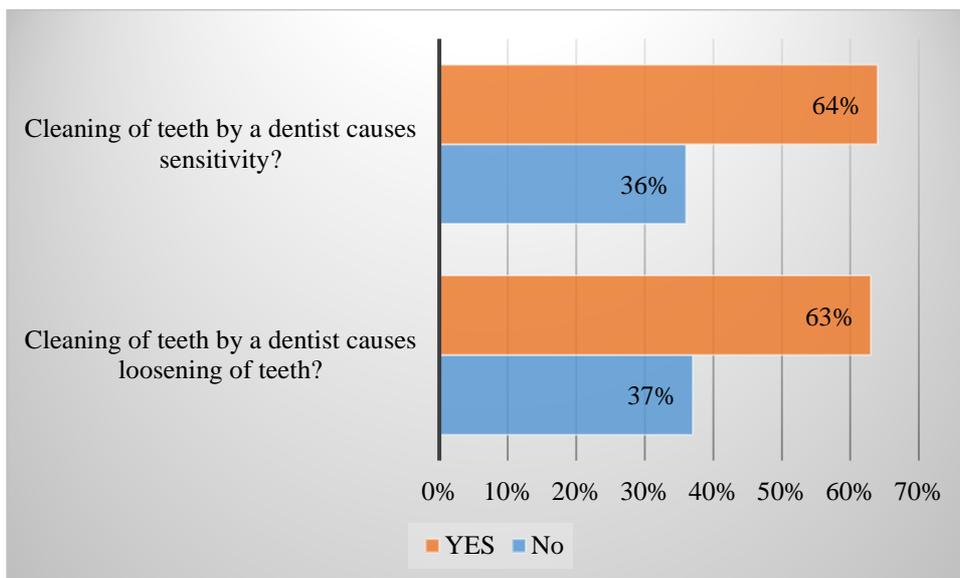
The results showed that the rural population is deprived of oral hygiene awareness and a targeted program to spread scientific dental practices to them is necessary. Good level of oral hygiene can be achieved through developing personal skills and raising the awareness level of the individual and society through the concerted efforts of healthcare professionals. Healthcare providers and policy makers are to be upraised in this connection by generating sufficient evidence.

<b>Q.NO</b>	<b>QUESTION</b>	<b>YES</b>	<b>NO</b>
1	Brushing once a day is more than enough?	81%	19%
2	Hard tooth brush cleans the teeth better than a soft toothbrush?	76%	24%
3	Brushing alone can keep all my teeth clean?	80%	20%
4	Using fingers with charcoal to clean the teeth is better than using toothbrush and toothpaste?	20%	80%
5	Powdered salt can clean the teeth better than paste?	22%	78%
6	Brushing of teeth should be done only before breakfast?	69%	31%
7	Flossing of teeth harms the gums?	68%	32%
8	Tooth brushes can be shared between members of the same family?	11%	89%
9	Chewing betel-quid helps in removing foul odor from the mouth?	25%	75%
10	When the gums bleed it is better not to brush the teeth?	39%	61%
11	Foul odor in the mouth is only because of poor cleanliness of teeth?	78%	22%
12	Longer you brush, more clean teeth get?	77%	23%
13	Harder you brush your teeth, more clean they get?	76%	24%
14	Cleaning of teeth by a dentist causes loosening of teeth?	63%	37%
15	Cleaning of teeth by a dentist causes sensitivity?	64%	36%

**Table I: Answers given by study population in percentage.**



**Graph I: Myths related to oral hygiene.**



**Graph II: Miscellaneous myths.**

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# A QUESTIONNAIRE STUDY ON KNOWLEDGE ABOUT ORAL HYGIENE AIDS AMONG DENTAL STUDENTS IN DHARMSINH DESAI UNIVERSITY

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## ABSTRACT

**Objectives:** The purpose of the study was to determine the knowledge about oral hygiene aids among dental students.

**Methods:** A questionnaire survey which consists of self-administered validated, structured, 15 close-end multiple choice questions about oral hygiene aids were circulated among 413 undergraduate dental students from Dharmsinh Desai University. The data extracted was tabulated, statistically analyzed and results obtained.

**Results:** According to this survey, toothbrush with toothpaste was the most common oral hygiene tool used for cleaning teeth but the use of interdental aids and chemical plaque control agents are not very popular among the dental students. 68% students know the contents of the toothpaste. According to this study, 95 % of students know the proper brushing technique but only 33% of students brush with the correct vertical motion.

**Conclusion:** Dental students has excellent knowledge about oral hygiene aids, irrespective being students working in preclinic or clinics. Interns has good knowledge about oral hygiene aids, which will help them in their clinical practice. The attitude and behavior toward oral health maintenance of the dental professionals reflect their understanding of the preventive oral health measures, and this is very important for the improvement of their patient's oral health.

**Key words:** *Knowledge, Oral hygiene aids, Dental student.*

## INTRODUCTION

Dentists play an important role in the improvement of the public's oral health education. Therefore, acquiring knowledge and attitudes related to dental health and the prevention of oral diseases is very important during the future dentists'

training period. One of the main objectives of dental education is to train students who can motivate patients to adopt good oral hygiene practices. They are more likely to be able to do this if they themselves are motivated. Moreover, dental students should be able to apply this knowledge and attitude to their own dental care.

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Oral hygiene is important for dental wellbeing in which we keep our teeth clean by brushing and flossing in order to avoid deposition of dental plaque and calculus and periodontal diseases. Maintaining good oral hygiene is compulsory for each of the individual for overall health and for having better quality of life.<sup>1</sup> One of the methods that can be used for maintaining good individual oral hygiene is by practicing oral care. There are various oral hygiene measures for maintenance such as various brushing techniques, dental floss, mouth wash, fluoridated tooth pastes and various other dental instruments.<sup>2</sup>

One of the factors that is responsible for someone's attitude and behavior is knowledge. Knowledge can be described as level of understanding of an individual towards facts, information, skills and many more.<sup>3</sup> Therefore, knowledge that is associated to dental health during training period is important especially for the future dentists.<sup>4</sup>

Dental students have major role in promoting and executing oral hygiene maintenance thereby rendering optimal oral health. They are also the role model for the population. The purpose of the study was to assess the knowledge of undergraduates towards their self-oral hygiene maintenance as this will have a direct impact on the efficacy on their clinical practice.<sup>5</sup>

## **METHOD**

A cross sectional study was conducted during the academic year 2018 among the undergraduate dental students of Dharmsinh Desai University, Nadiad. Total 413 undergraduate students; 76 students from 1st year, 74 students from 2nd year, 66 students from 3rd year, and 98 students from 4th year, and 98 interns of undergraduate dental course were enrolled in the study. All students in the study

voluntarily completed a validated self-administered questionnaire consisting of 15 closed ended questions. The questions in the questionnaire were designed to assess their knowledge, awareness, attitude and practices regarding oral hygiene maintenance. Data was collected, statistical analysis was done and results were obtained.

## **RESULTS**

Total 413 undergraduate dental students participated voluntarily in this study. Each individual gave the answer according to their knowledge and awareness. 94% students got oral hygiene information from the books. Answers of all questions have been shown in the table I to III.

According to this study more than 50% students working in clinics and preclinic use soft toothbrush, whereas 10% students use hard toothbrush. More than 70% students change their tooth brush once in three months. 76% of 3<sup>rd</sup> year students change their tooth brush once in three months which is recommended by American Dental Association.<sup>6</sup> Majority (45%) of final year students change their tooth brush once in a month. 95% students know the proper tooth brushing technique, most of the students (47%) brush in circular motion, 33% students brush in vertical motion, while 20% students are brushing in horizontal motion. More than 50% students use fluoridated tooth paste and taste and brand are the major consideration for choosing the toothpaste (41% and 22% respectively). Most of them (68%) were knowing the contents of toothpaste. Less than 21% students use interdental aids. 34% 1st year, 35% 2nd year, 33% 3rd year, 35% 4th year students and 35% interns, were using chemical plaque control agents. 86% students would like to prescribe chlorhexidine gluconate as chemical plaque

control agent to their patients. According to this survey, 95% 1st year, 95% 2nd year, 94% 3rd year, 93% 4th year students, 94% interns acquired the knowledge about the oral hygiene aids from the books.

Result table, graph and questionnaire has been attached.

## DISCUSSION

This paper focuses on oral hygiene knowledge and practices among under graduate dental students of Dharmsinh Desai University. Majority of students had adequate level of knowledge on oral hygiene aids.

According to similar study done for oral health knowledge, attitude and behavior of first and final year dental students of Udaipur city, Rajasthan, found that the students had good knowledge, attitude and practice towards oral hygiene maintenance and concluded that they may need more knowledge on preventive methods.<sup>7</sup>In their study final year dental students had better knowledge than first year students. In a study by *Daya et al* clinical students had better knowledge than preclinical students.<sup>8</sup>But in our study preclinical students also had excellent knowledge, same as study done by *Dagli et al*, which showed that there was no significant difference in knowledge levels between clinical and pre-clinical students.<sup>9</sup>

*Ahamed et al.* have reported that knowledge increases from 1st to final year and final year students have good oral hygiene maintenance practices and positive attitudes towards oral health when compared to 1st year students.<sup>10</sup>Results of our study are in contrast to this study.

*Kocovski et. al.* in their study on oral hygiene level maintenance among medicine students found 52% had plaque index of 0.6 to 1.9 which meant that they maintained good oral hygiene.<sup>11</sup> In a study, which

assessed dental knowledge and awareness of oral hygiene among medical undergraduates at a Tertiary Care Hospital, reported that medical students had a moderate level of dental knowledge and exhibited good oral hygiene habits.<sup>12</sup>

In the study done by *Mumtazet. al.*, which compared the oral hygiene practices in dental and pharmacy students, it was found that toothbrush with toothpaste was the most common oral hygiene tool used for cleaning teeth by 423 (92%) students while only 7 students (1.6%) used traditional methods of miswak, dandasa, rock salt, etc.<sup>13</sup> In our study more than 50% students are using toothbrush with soft bristles and fluoridated toothpaste. As being dental students 68% students know the contents of toothpaste.

This study revealed all of the respondents were using a toothbrush and toothpaste to clean their teeth. This result reflects on the homogeneity of the study group with the current lifestyle (hostel, campus, and access to dental care) influences overpowering the varying cultural backgrounds from which the students come.

However, the use of interdental aids is still not very popular among the dental students as only 21% students are using interdental aids-dental floss which is in accordance with the study done by *Gopikrishnaet. al.* in which he concluded that 11.5% of secondary school students are using dental floss.<sup>14</sup> This was in contrast with the finding of study done by *Walsh et. al.* in San Francisco where 75% of the 12–14 years old students used dental floss at least once per day.<sup>15</sup>

In the current study, 35% students use chemical plaque control agents, this also could be attributed to the lack of oral health education and other cost of such aids.

In this study, 65% of the students brushed their teeth at least twice a day, which was

more than the figure (44.4%) reported by WHO.<sup>16</sup> In our study, most of the students had satisfactory knowledge on tooth brushing practices. It was encouraging to note that all participants reported to brush their teeth at least once a day although they did not know how to brush systematically.

Knowledge about oral health has an important role in maintaining oral hygiene and reducing the level of plaque and decayed teeth among dental students. As knowledge and awareness levels increase, their oral health improves. The attitude and behaviour toward oral health maintenance of the dental professionals reflect their understanding of the preventive oral health measures, and this is very important for the improvement of their patient's oral health.<sup>17</sup>

## **CONCLUSION**

Dental students have excellent knowledge about oral hygiene aids, irrespective of preclinical students or clinical students. Interns has the good knowledge about oral hygiene aids, which will help them in their clinical practice. Undergraduate students are being well educated to increase their knowledge about oral hygiene aids.

Table I: Answers given by students in percentage.

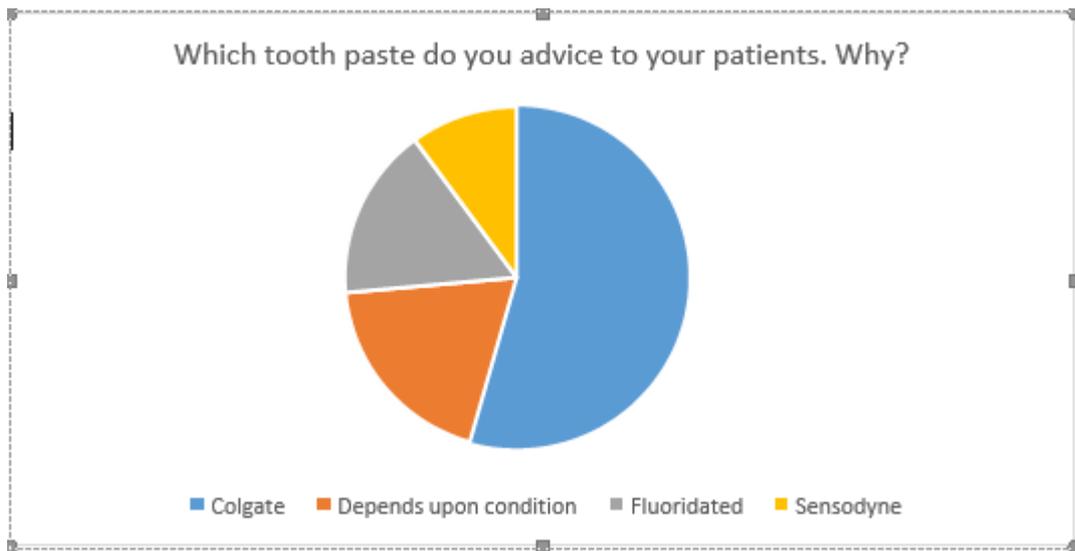
	ANSWER	Which tooth paste do you use?	What is your consideration when choosing tooth paste	Do you know the contents of tooth paste?	Which kind of tooth brush do you use?	How often do you change your toothbrush?	How many times do you brush your teeth?
1ST YEAR	A	16%	75%	63%	10%	29%	29%
	B	30%	14%	37%	37%	71%	71%
	C	25%	0%	-	53%	0%	0%
	D	15%	11%	-	-	-	-
	E	14%	-	-	-	-	-
2ND YEAR	A	34%	70%	66%	11%	28%	28%
	B	26%	23%	34%	36%	72%	72%
	C	20%	0%	-	53%	0%	0%
	D	9%	7%	-	-	-	-
	E	11%	-	-	-	-	-
3RD YEAR	A	95%	74%	61%	8%	24%	24%
	B	3%	14%	39%	45%	76%	76%
	C	2%	0%	-	47%	0%	0%
	D	0%	12%	-	-	-	-
	E	0%	-	-	-	-	-
4TH YEAR	A	91%	76%	83%	11%	45%	45%
	B	1%	15%	17%	33%	39%	39%
	C	2%	0%	-	56%	16%	16%
	D	2%	9%	-	-	-	-
	E	4%	-	-	-	-	-
INTERN	A	29%	74%	67%	12%	33%	33%
	B	20%	14%	33%	33%	67%	67%
	C	21%	0%	-	55%	0%	0%
	D	15%	12%	-	-	-	-
	E	15%	-	-	-	-	-

Table II: Answers given by students in percentage.

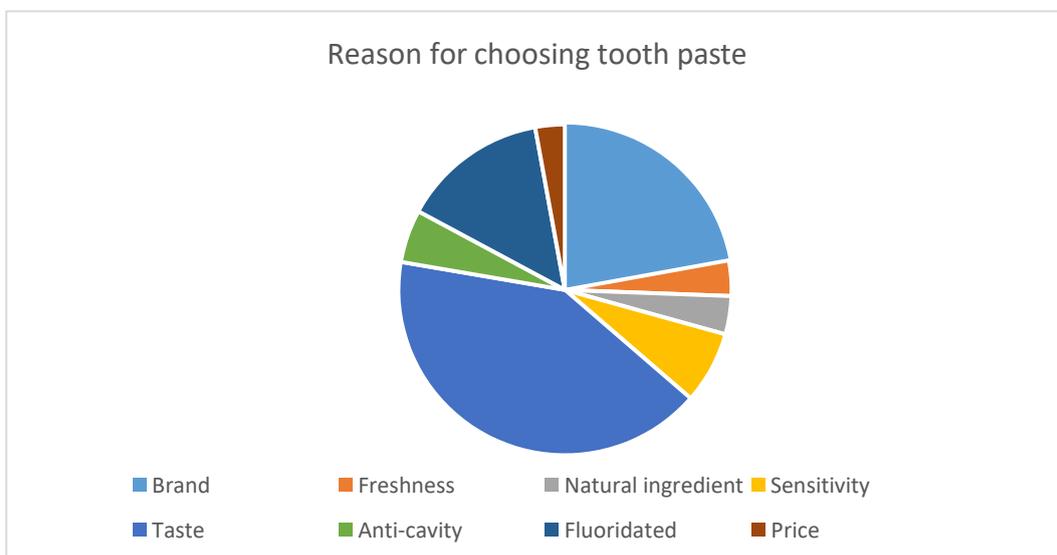
	ANSWER	Do you know proper brushing technique?	Which is the technique you use to brush your teeth?	How long do you take to brush your teeth?	Do you use chemical plaque control agent?	Do you use interdental aids?	From where did you get the information about dentifrices?
1ST YEAR	A	95%	30%	5%	34%	21%	95%
	B	5%	21%	8%	66%	79%	0%
	C	-	49%	83%	-	-	0%
	D	-	-	4%	-	-	5%
	E	-	-	-	-	-	-
2ND YEAR	A	95%	30%	5%	35%	20%	95%
	B	5%	21%	8%	65%	80%	0%
	C	-	49%	82%	-	-	0%
	D	-	-	5%	-	-	5%
	E	-	-	-	-	-	-
3RD YEAR	A	95%	43%	5%	33%	20%	94%
	B	5%	12%	18%	67%	80%	3%
	C	-	45%	72%	-	-	0%
	D	-	-	5%	-	-	3%
	E	-	-	-	-	-	-
4TH YEAR	A	98%	28%	7%	35%	23%	93%
	B	2%	26%	7%	65%	77%	0%
	C	-	46%	81%	-	-	0%
	D	-	-	5%	-	-	7%
	E	-	-	-	-	-	-
INTERN	A	94%	32%	6%	35%	22%	94%
	B	6%	22%	8%	65%	78%	0%
	C	-	46%	83%	-	-	0%
	D	-	-	3%	-	-	6%
	E	-	-	-	-	-	-

Table III: Answers given by students in percentage

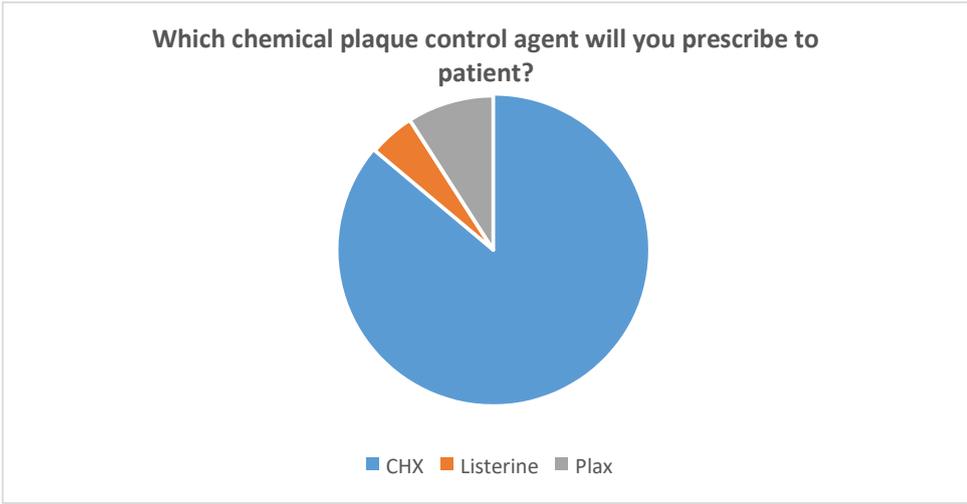
<b>Which tooth paste do you advice to your patients?</b>	<b>1st Year</b>	<b>2nd Year</b>	<b>3rd year</b>	<b>4th Year</b>	<b>Interns</b>	<b>Total</b>
Colgate	54%	54%	59%	49%	55%	54%
Fluoridated	17%	16%	17%	17%	15%	19%
Sensodyne	11%	11%	12%	7%	9%	17%
Other	18%	19%	12%	27%	21%	10%
<b>Reason for choosing tooth paste</b>	<b>1st Year</b>	<b>2nd Year</b>	<b>3rd Year</b>	<b>4th Year</b>	<b>Interns</b>	<b>Total</b>
Brand	21%	24%	19%	28%	18%	22%
Freshness	4%	5%	5%	1%	2%	3%
Natural ingredient	0%	11%	5%	2%	2%	4%
Sensitivity	9%	8%	2%	7%	9%	7%
Taste	66%	52%	16%	4%	69%	41%
Anti-cavity	0%	0%	26%	0%	0%	5%
Fluoridated	0%	0%	27%	44%	0%	14%
Price	0%	0%	0%	14%	0%	3%
<b>Which chemical plaque control agent will you prescribe to patient?</b>	<b>1st Year</b>	<b>2nd Year</b>	<b>3rd Year</b>	<b>4th Year</b>	<b>Interns</b>	<b>Total</b>
CHX	88%	88%	78%	88%	89%	86%
Listerine	4%	4%	8%	5%	3%	5%
Plax	8%	8%	14%	7%	8%	9%



Graph.1 The average answer was given by students has shown in the pie chart. 54% students have answered Colgate, 19% answered depends upon condition, 17% answered fluoridated, 10% answered sensodyne.



Graph.2 41% student's consideration was taste, brand was reason for 22% students, 3% students answered freshness, 4% students said natural ingredient, 7% students answered sensitivity, 5% students answered anticavity, 14% students answered Fluoridated, 3% students answered Price.



Graph 3. 86% students answered chlorhexidine, 9% students answered Plax, and 5% students answered Listerine.

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**DEPARTMENT OF PERIODONTOLOGY AND ORAL IMPLANTOLOGY  
FACULTY OF DENTAL SCIENCE  
DHARMSINH DESAI UNIVERSITY, NADIAD.**

Survey: - “Knowledge about oral hygiene aids among dental students.”

Name of student:

Date:

Age:

In which year:

Questionnaire for survey: -

1. Which toothpaste do you use?
  - a. Fluoridated
  - b. Non-fluoridated
  - c. Medicated
  - d. Non-medicated
  - e. Desensitizing

Name of toothpaste:

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2. Reason for choosing this toothpaste.
- 
- 

3. What is your consideration when choosing toothpaste?
  - a. Brand
  - b. Design
  - c. Price
  - d. Prescribed by doctor

4. Do you know the contents of toothpaste?
  - a. Yes
  - b. No

If yes what are they?

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5. Which toothpaste will you advice to patients? Why?

- 
- 
6. Which kind of toothbrush do you use?
- a. Hard bristles
  - b. Medium bristles
  - c. Soft bristles
7. How often do you change your toothbrush?
- a. Once in a month
  - b. Once in a three months
  - c. Once in 6 months
8. How many times do you brush your teeth?
- a. Once a day
  - b. Twice a day
  - c. More than twice a day
9. Do you know proper brushing technique?
- a. Yes
  - b. No
10. Which is the technique you use to brush your teeth?
- a. Vertical motion
  - b. Horizontal motion
  - c. Circular motion
11. How long do you take to brush your teeth?
- a. About half a minute
  - b. About one minute
  - c. About two minutes
  - d. More than 5 minutes
12. Do you use chemical plaque control agent?
- a. Yes
  - b. No

If yes, name

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13. Do you use interdental aids?

**a.** Yes

**b.** No

If yes, name

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14. Which chemical plaque control agent will you prescribe to patient?

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15. From where did you get the information about dentifrices?

**a.** Books

**b.** Internet

**c.** Flyers

**d.** Other

# IMPLANT SUPPORTED MANDIBULAR OVERDENTURE – A CASE REPORT

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\*\*\*Dr. Snehal Upadhyay

\*\*\*Dr. Nidhi Jathal

## ABSTRACT

Implant supported overdentures have proved to be one of the best alternative options in prosthetic rehabilitation of various cases of edentulism. They satisfy the patient's expectations, improve quality of life with their long-term serviceability and predictable outcomes. Over the years, significant advancements have taken place in the implant systems and the methods of attachments. This paper describes a case report in which a completely edentulous patient was rehabilitated with an implant supported overdenture in mandible and a complete denture in the maxilla.

**Keywords:** *Overdenture, complete denture, locator attachment.*

## INTRODUCTION

Tooth loss occurs due to trauma, caries, periodontal disease, congenital defects or iatrogenic causes. It is multifactorial and often complex interaction of multiple comorbidities, which, if left unresolved, may progress to complete edentulism.<sup>1</sup> Loss of tooth can cause negative impact mainly on masticatory function and esthetics.

In conventional complete dentures, continuous residual ridge resorption causes many problems including reduced retention, instability of dentures and soreness in the supporting mucosa owing to reduced

denture-bearing area. The masticatory muscles in edentulous patients have diminished electromyographic activity and atrophy, which leads to weakened masticatory functional forces and reduced chewing. The maximum biting force of complete denture wearers is reduced to approximately 20% of dentate patients' biting forces. The reduced biting force alters masticatory functions because of inferior retention and stability of complete dentures. This will eventually lead to poor chewing ability in edentulous subjects.

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Implant-supported overdentures have many advantages in comparison with the conventional dentures, including good stability, good retention, reduced residual ridge resorption, improved function, and esthetics. Another advantage is the easier surgical procedure and reduced number of the implants.<sup>2</sup> In recent years, various attachments systems have been successfully used with removable implant overdentures. All available attachment systems are designed to intercept the vertical movement of the denture and used as a standalone attachment mounted directly to the implant or attached to a bar system. The choice of the attachment is dependent upon the retention required; jaw morphology, anatomy, mucosal ridge, oral function, and patient compliance for recall.<sup>3</sup>

## CASE REPORT

A 62-year-old female patient visited Department of Prosthodontics, Crown & Bridgework and Oral Implantology, Faculty of Dental Science, Dharmsinh Desai University, Nadiad with a complain of difficulty in chewing with conventional complete denture and loose lower denture. Patient had history of wearing removable complete denture for 7 years. Patient had medical history of hypertension since last 3 years and was on medication for same. Intraoral examination revealed high well rounded (Class-1) maxillary edentulous ridge and knife edge (Class-4) mandibular ridge. Radio-opaque markers were placed in patient previous denture and Cone beam computed tomographic scan was recorded with denture in position (Illustration 1).



*Illustration 1- Cast with previous denture and radio-opaque markings.*

A cast was fabricated with the help of patient previous mandibular denture and markings were transferred on it with the help of Cone beam computed tomography (Illustration 2).



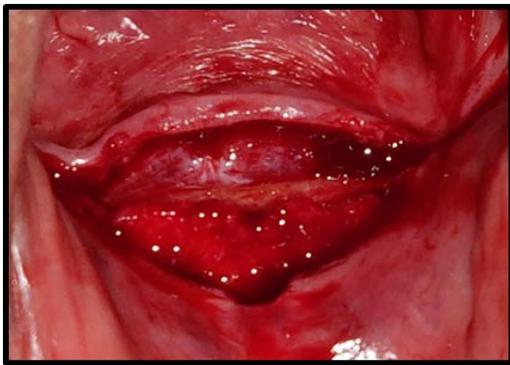
*Illustration 2- Surgical stent*

According to SAC Assessment Tool<sup>4</sup> this case is surgically advanced case and prosthetically straightforward case. Clear autopolymerising resin (Dentsply Sirona Inc., USA) was used to fabricate surgical stent on patient's previous mandibular denture cast for marking of implant placement sites. At the surgical appointment, following the administration of local anesthetic, surgical stent was placed intraorally (Illustration 3) and implant sites were marked with pilot drill. After which a mid-crestal incision was

performed and a full-thickness flap was reflected (Illustration 4).



*Illustration 3- Intraoral surgical stent placement.*



*Illustration 4- Full thickness flap reflected*

Knife edge mandibular ridge was trimmed to create a flat platform for implant placement (Illustration 5). Three Nobel Biocare Replace Select implants of size 4.3x10 mm were placed in B, C, and D positions, which are the canine region on both the right and left sides and a mid-symphysis region. The implants were torqued to 35 N, and a cover screw was put and tightened.

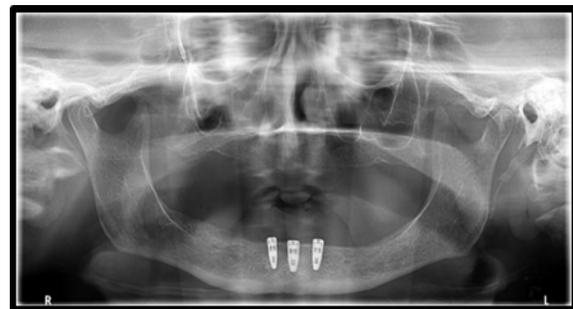


*Illustration – 5 Implant placements*

Following this flap was sutured with 3.0 silk suture (Illustration 6) and (Illustration 7) post-operative OPG was taken.

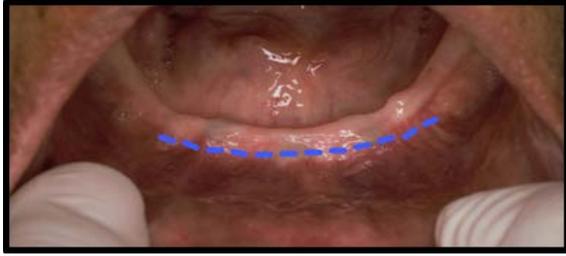


*Illustration 6- Suture placed*



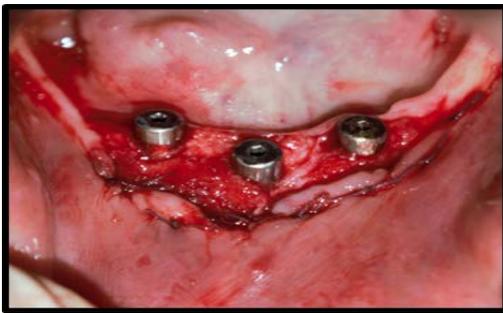
*Illustration 7- Post-operative OPG*

Sutures were removed after 1 week and the patient was kept on follow-up for 3 months during the healing period. (Illustration 8)

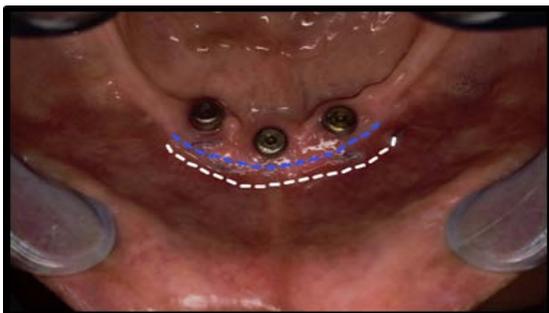


*Illustration 8-Width of attached gingiva at 3 months follow up*

At 3 months follow up, on examination width of attached gingiva was less and vestibuloplasty was carried out with secondary epithelisation procedure and healing abutment were placed (Illustration 9) and 4.0 vicryl suture were taken.



*Illustration 9- Vestibuloplasty performed and healing abutment placed*



*Illustration 10- Increase in width of attached gingiva*

(Illustration 10) At 15 day follow up marked increase in width of attached gingiva was noticed and prosthetic phase was started

for fabrication of implant supported overdenture. Primary impression for maxillary arch was made with high fusing impression compound (MDM Corporation, New Delhi) (Illustration 11) and for mandibular arch with irreversible hydrocolloid impression material (Dental products of India, Mumbai) (Illustration 12).



*Illustration 11- Maxillary primary impression*



*Illustration 12- Mandibular primary impression*

Final impression for maxillary arch was made with selective pressure impression technique (Illustration 13) and zinc oxide eugenol impression paste (Dental products of India, Mumbai).



*Illustration 13- Maxillary final impression*



*Illustration 15- Open tray impression coping attached*



*Illustration 14- Custom tray for mandibular final impression*



*Illustration 16- Mandibular final impression*

(Illustration 14) Custom tray was fabricated for final impression of mandibular arch and border moulding was done with low fusing impression compound (Dental products of India, Mumbai). (Illustration 15) Open tray impression coping were attached, and (Illustration 16) impression was made with medium body addition silicone impression material (Dentsply Sirona Inc., USA) (Illustration 17).



*Illustration 17- Mandibular master cast with locater attachment*

Master cast was fabricated with die stone and locater of 1mm in size were selected and attached to it and denture base was made. (Illustration 18)



*Illustration 18- Facebow transfer*

Facebow transfer was done and cast was articulated on semi-adjustable articulator and jaw relation was recorded (Illustration 19).



*Illustration 19- Jaw relation*

Cobalt chromium metal framework was fabricated for mandibular denture and try in of that framework was carried out (Illustration 20).



*Illustration 20- Metal framework trial*

Teeth set of A2shade (IvoclarVivadent AG, Liechtenstein) was selected and arranged and final trial of denture was carried out. Trial denture was acrylised with conventional compression technique using heat polymerising acrylic resin (Dentsply Sirona Inc., USA) (Illustration 21).



*Illustration 21- Grey color ring inserted for retention*

Out of different color ring available for retention of denture with locater attachment, grey color ring with zero retention was selected and placed in denture and final insertion was carried out (Illustration 22).



*Illustration 22- Final denture insertion*

**DISCUSSION:**

Most of the edentulous patients have problem in adapting to conventional mandibular denture. Overdenture both tooth and implant supported proves to be a better treatment option because of proprioception,

preservation of residual ridge, increased retention, stability and reversibility as it can be converted to conventional complete denture at any time.<sup>5</sup> Implant supported attachment retained overdenture is another best treatment option for those who are completely edentulous. Various types of attachments used are stud attachment, bar attachment, locator attachment, magnetic attachment and telescopic attachment. Attachments should be selected based on the number of implants, distance between ridges, type of prosthesis, degree of retention, patient expectation and cost factors.<sup>6</sup> The locator attachment (Zest Anchors, Inc., homepage, Escondido, CA, USA) which initiated in 2001 is a new system, which do not use the splinting of implants. This extension is self-aligning and has dual retention and in different colours with different retention values.<sup>7</sup> Locator attachments are available at different vertical heights, they are resilient, retentive, and durable and have some built-in angulation compensation. In addition, repair and replacement are fast and easy. Easy to insert and remove from patients, locator attachments designed with customizable levels of confinement and low vertical profile.<sup>8</sup> Most important, is its innovative capability to pivot, which increases the attachment's flexibility and tolerance. The high mastication forces an attachment must withstand, allows it to repay for the path of insertion with up to 40° of dissimilarity between implants, and provides exceptional durability. This patented pivoting action, along with the attachment's self-aligning design, also provides ease of seating the denture by the patient. Evtimovska et al<sup>9</sup> in his study proved that the locator can be used

in cases with less interridge distance, it has got dual retention with various degree of retention caps, self-aligning property and resilient connection with prosthesis. Locator attachment retentive caps come in various colours and has different retentive values. Extended range attachments are available and can be used to correct angulated implant up to 20°. Corado et al<sup>10</sup> in his study compared two retention systems locator and bar and found same patient satisfaction with both and less of soft tissue interaction with locator attachment than bar attachment. Decreased vertical height makes it a good treatment option than ball attachment for cases with less inter ridge distance.<sup>11</sup> Mohammed et al conducted a finite element study compared stress distribution of two attachment designs under implant supported overdenture found that the stress induced by locator and ball attachment on bone were found to be almost the same, but locator attachment was found to be superior to ball and socket attachment as the interval between maintenance sessions can be reduced with locator.<sup>12</sup>

## CONCLUSION

This case report described the management of an edentulous patient with implant supported overdenture retained using locator attachment. This satisfied and increased the patient comfort and confidence in using the mandibular denture because of improved retention, stability and mastication. Various factors like number of implants, interridge distance, type of prosthesis, amount of retention, patient expectation and cost factor is to be considered while selecting attachment for the success of the prosthesis.

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# RESTORATION OF DISCOLORED & MALALIGNED TOOTH WITH FULL COVERAGE CROWN AND CLOSURE OF MIDLINE DIASTEMA WITH INDIRECT VENEER

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## ABSTRACT

Management of traumatic injuries to teeth is a challenge to dental practice. The maxillary central incisor crown fractures are the most common variant of trauma, because of the anterior and protrusive positioning. Among the reasons why patients may decline orthodontic treatment to close diastemas are time constraints, desire for immediate esthetic results, or the perceived stigma associated with their age and wearing braces. Indirect veneer restorations provide a valid conservative alternative for the same. This case report describes esthetic rehabilitation of closure of midline diastema and correction of discolored and mal-aligned central incisor.

**Keywords:** *Indirect veneer, full coverage crown, discolored tooth, midline diastema, fractured tooth*

## INTRODUCTION

The concept of esthetics is a judgment about beauty. The smile constitutes an important component in the presentation of a human being. A non-harmonic smile decreases the beauty of the face and it can cause discomfort in the social setting, as it is one of the most important facial expressions that demonstrates friendship, pleasant sensation and appreciation.<sup>1</sup> Mal-alignment of teeth not only causes difficulty in maintenance of oral hygiene but also affects the esthetics. The presence of diastemas is a common patient

complaint that may affect self-esteem, leading patients to seek esthetic treatment. Maxillary midline diastema can be defined as a space greater than 0.5 mm between the proximal surfaces of the two central incisors.<sup>2</sup> Among several possible treatments available, one of the preferred options for esthetic treatment of a diastema is laminate veneers due to esthetic resolution, color stability, mechanical properties, and biocompatibility, which may be indicated when there is appropriate remaining sound dental structure.<sup>3</sup>

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Traumatic injuries of teeth are the main cause of emergency treatment in dental practice. Usually, four types of healing sequelae are given: Repair with calcified tissue, giving union across the fracture. 2. Healing with connective tissue. 3. Healing with calcified tissue and connective tissue. 4. Healing with granulation tissue. The last mode of healing, with granulation tissue, is a sign of pulp necrosis and an indication that endodontic treatment of the coronal portion of the tooth is necessary.<sup>4</sup> this case report describes the clinical management of a discolored maxillary central incisor and midline diastema.

## CASE REPORT

A 38 years old male patient was referred from the department of endodontics and conservative dentistry to the department of Prosthodontics, crown and bridgework and oral implantology, Faculty of Dental Science, Dharmsinh Desai University after endodontic treatment of left maxillary central incisor and composite build up with the same. Patient reported with the history of fracture of anterior tooth due to trauma in childhood. Clinical examination revealed that the endodontically treated left central incisor was discolored and mal-aligned and there was a presence of midline diastema. (Illustration 1 & 2)



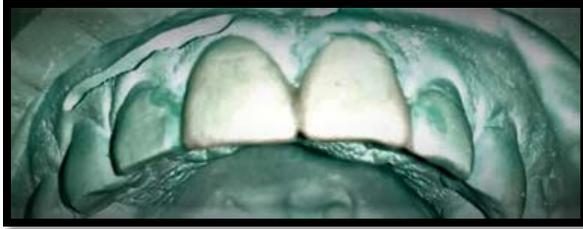
*Illustration 1: Pre-operative intraoral presentation*



*Illustration 2: pre-operative extraoral presentation*

Treatment options given to the patient were (i) closure of the midline diastema and mal-alignment with orthodontic treatment or (ii) internal bleaching with left central incisor and recontouring with direct composite or (iii) direct composite veneer or (iv) indirect veneer with right central incisor and full coverage crown with left central incisor. The patient opted for indirect veneer and crown for the given short duration of treatment. After getting informed consent, the treatment protocols were started.

The diagnostic impressions were taken using addition silicone putty and light body impression material (Aquasil, DentsplyInt), poured with a Type IV dental stone (Kalrock, Kalabhai& sons). Study model was used for a mock-up of the central incisors after mock preparation with left central incisor. (Illustration 3) Before tooth preparation, the color shade was selected of maxillary right central incisor using a Vitapan Classical shade guide (Vita Zahnfabrik, Bad Säckingen, Germany).



*Illustration 3: mock-up on diagnostic cast*

Margins of the veneer preparation of right central incisor was established using a long, tapered, and medium-grit diamond. The preparation design needed to permit a thickness of 0.4 mm at the gingival margin, 0.6 mm in the midbody, and 0.6 in the incisal third to prevent dentin shine through and to conceal the margins of the preparation under the porcelain. The incisal edges were reduced 1 mm, 30° toward lingual surfaces. The distal contact was kept intact of the right central incisor. The crown preparation for all ceramic crown was carried out with left central incisor. More preparation was done on labial surface to correct the mal-alignment which was verified with the help of index that was prepared on the mock-up of diagnostic cast. The preparation design required 1mm thickness at the gingival margins and incisal reduction of about 2 mm for all ceramic crown. (Illustration 4 & 5)



*Illustration 4: Tooth preparation for veneer with 11 and crown with 21-labial aspect.*



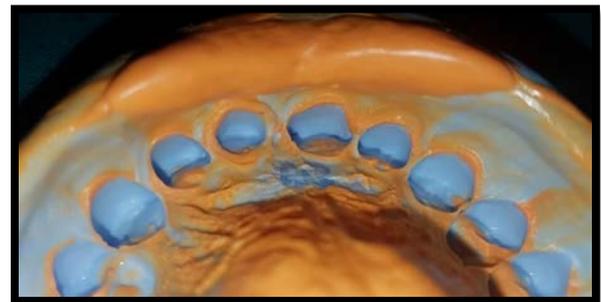
*Illustration 5: tooth preparation for veneer with 11 and crown with 21-occlusal aspect*

Gingival retraction was carried out with 000 impregnated knitted gingival retraction cord with the help of cord packing instrument. (Illustration 6)



*Illustration 6: Gingival retraction*

A final impression was made using a one-step addition silicon technique with putty and light body impression material (Aquasil, DensplyInt) (Illustration 7)



*Illustration 7: Final impression*

Provisional restoration was fabricated with the direct technique using the index and cool temp (Coltene Whaledent) temporization material. The veneer and crown temporary

prosthesis were fabricated as one prosthesis (Illustration 8)



*Illustration 8: Temporary prosthesis*

The temporary prosthesis was luted with temporary cement (Freegenol, GC) (Illustration 9)



*Illustration 9: Post cementation of temporary prosthesis*

Pressable lithium disilicate glass-ceramic (IPS e.max Press) was used for the fabrication of the veneer and layered Zirconia was used for fabrication of crown. Bisque trial of the final prosthesis was done for the verification of the contours and shade of the prosthesis (Illustration 10)



*Illustration 10: Bisque trial phase*

After glazing, the intaglio surface of the veneer was etched with 9.6% hydrofluoric acid (Condicionador de porcelana, Angelus) for 2 mins and silanized with a silane coupling agent. (Bisco, Inc) No treatment was required with the Zirconia crown. (illustration 11,12 & 13)



*Illustration 11: Etching of intaglio surface of veneer*



*Illustration 12: Application of silane coupling agent*



*Illustration 13: Crown with 21*

Intraorally acid etching was done of both the teeth with 35% phosphoric acid (Etch, d-tech Dental Technologies) and rinsed after 15 seconds (Illustration 14) and air-dried.



*Illustration 14: Etching tooth surfaces*

Bonding agent (Calibra, Dentsply Sirona) was applied on tooth surface and final cementation was done using dual cure resin cement (Calibra, Dentsply Sirona) as per manufacturer's instructions (Illustration 15)



*Illustration 15: Final cementation*

Restorations were checked for any occlusal interference. There was a significant and satisfactory improvement in the patient esthetics (Illustration 16 & 17). The patient was given oral hygiene instructions. At one-year follow-up, both the prosthesis was functional without any complications.

## **DISCUSSION**

Many pulpal and periodontal responses after dental trauma, such as resorption, calcification, and ankylosis, are discussed in the literature.



*Illustration 16: post-operative clinical presentation*



*Illustration 17: Post- operative extraoral presentation*

Ellis class IV fracture is defined as 'the traumatized teeth that become nonvital with or without loss of crown structure. The maxillary incisors are the most frequently injured teeth in the primary and permanent dentition and malocclusion are more prone for injuries because of the proclined incisors.<sup>7</sup> Majority of the traumatic injuries occurs before root formation and results in inflammation and necrosis.<sup>8</sup>

A diastema or anterior spacing, is an esthetic problem that presents a higher prevalence in the maxilla than in the mandible and has a multifactorial etiology.<sup>1,5</sup> One possible treatment modality was orthodontic appliance. Even though this was a viable

option, the patient in the present case declined orthodontic treatment. What usually determines the treatment plan for esthetic rehabilitation of a midline diastema is the width-to-length ratio of the central incisors. The amount of distal proximal reduction, how many teeth will be treated, and the placement of full veneers or not are all decisions made according to that ratio.<sup>6</sup> Restorative and prosthodontic solutions are most amenable to treat diastemas based on tooth-size discrepancy. The restorative closure of diastema can be achieved by using any of the techniques mentioned; direct composite veneers, indirect composite veneers, porcelain laminate veneers, all ceramic crowns, metal ceramic crowns and composite crowns. Porcelain laminate veneers (PLVs) have become the alternative to composite restorations ceramic crowns and the traditional porcelain-fused-to-metal.<sup>10</sup> Composite resin is easy to use, requires fewer appointments, and is economic but offers less wear resistance and surface staining, which makes it inferior to dental porcelain.

Smiles can be transformed painlessly, conservatively and quickly with dramatic, long-lasting results with the successful use of the porcelain laminate veneer. Tissue response is excellent, and the finished surface is very similar to the natural tooth. Veneers exhibit natural fluorescence and absorb, reflect, and transmit light exactly as does the natural tooth structure. The subsequent introduction of special acid etching techniques improved the long-term retention of veneers.<sup>11</sup> Calamia demonstrated that the bond strength of hydrofluoric acid-etched and silanated veneer to the luting resin composite is generally greater than the bond

strength of the same luting resin to the etched enamel surface.<sup>12</sup> The estimated survival probability of porcelain laminate veneers over a period of 10 years is 91%<sup>13,14</sup>

The presented case report justifies the choice of diastema closure using indirect veneer and a crown, because the patient had difficulty in social interaction due to poor appearance and requested for immediate results. The restoration of function and esthetics of a patient having maxillary diastema with indirect veneer allowed excellent results with conservative preparations. Detailed planning, correct selection of dental materials, and quality communication with the laboratory technician contributed to a harmonious smile and the evident satisfaction of both patient and professionals.

## CONCLUSION

An organized and systematic approach is required to evaluate, diagnose and resolve esthetic problems predictably. The treatment sequence may change during the treatment, as some conditions may need to be reviewed or certain additional procedures may become necessary to get the desired result. The practitioner must strive to merge function and beauty with the values and needs of each individual patient. Ultimately a well-designed smile is a product of consolidated efforts accomplished by accurate diagnosis, methodical treatment planning, use of advanced materials and contemporary techniques rendered by the dentist.

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