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**Yogesh Kumar Gupta** India

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*Updates in Dentistry***



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# Editorial

Warm greetings to the readers!

We are living in a gadget prone world where everything is available at one finger click. Even our speciality is taking many steps ahead with these technologies. In this issue, I want to talk a few words about telemedicine.

**Telemedicine** also known as **telehealth or E medicine** is the use of telecommunication and information to provide clinical health care at a distance. It helps eliminate distance barriers and can improve access to medical services that would often not be consistently available in distant rural communities. Telemedicine can be beneficial to Indian population as 70% of our population is residing in remote areas, with this they can receive care from doctors or specialists far away without the patient having to travel to visit them. Other advantage of telemedicine is reduction of **white coat hypertension** and can eliminate the possible transmission of infectious diseases or parasites between patients and medical staff. The disadvantage of telemedicine is the cost of telecommunication, data management and poor patient care quality. First time interactive telemedicine system was developed in 1989 by an American company, MedPhone Corporation. Later on it had been developed and adopted by many countries in various medical fields. The first Ayurvedic telemedicine center was established in India in 2007 by Partap Chauhan, an Indian Ayurvedic doctor and the Director of Jiva Ayurveda in collaboration with nokia phones.

In one or another way, we are also using it in our profession on daily basis while doing consultation on phone, sharing experience or seeking consultation on facebook, what's app etc. In our profession, still it has a lot of scope. We are having many dental clinics in cities but there is deficient dentists in rural areas with little facility. Telemedicine can improve the patient care in future.

Hope this issue will be useful and valuable to the readers.

Happy reading!!



*Yogesh Kumar*

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*Department of Conservative and Endodontics*  
*Surendera Dental College & Research Institute*  
*Sriganganagar*

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**EVALUATION AND COMPARISON OF INTEGRITY OF THE BOND INTERFACE BETWEEN TWO DENTURE BASE RESINS AND TWO SOFT LINERS – AN IN VITRO STUDY**

Ramandeep Kaur, Kanta Mittal

**ABSTRACT**

**Aims:** Aim of the study was to evaluate and compare the bond interface between different denture base resin and soft liners, with varying liner thickness after three months of aging. **Material and Methods:** Two denture base resins Lucitone, Trevalon HI and two soft liners Permasoft, Mollosil were used to prepare the specimens. Total 112 heat cure resin and soft liner combination specimens were prepared. **Results:** After three months, both the liners showed significant increase in mean values of bond interface, indicating weakening of bond. **Conclusion:** After three months, Mollosilsoft liner (silicone-based) showed better dimensional stability than Permasoft (acrylic based liner).

**Keywords:** Bond interface, denture base (DB) resin, integrity, aging, soft liner.

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Source of support- Nil, Conflict of Interest- Nil

**INTRODUCTION**

The success of complete denture depends upon esthetics, comfort and function. A number of denture wearers suffer from chronic soreness due to high stress concentration during function, which limits the clinical use of complete dentures. A softer, porous material such as soft liner is used which provides more comfort for sensitive denture wearers.

Soft liners have viscoelastic properties. They act as shock absorbers. They reduce and distribute stresses on the denture bearing tissues. Soft liners allow sensitive tissues to return slowly to a proper state of health. They are beneficial in the treatment of the atrophic ridges, bone undercuts and muscosal pathological changes.

Various studies have shown that changes occur in soft liner with time and one of such change is debonding of the soft liner from denture base resin. Debonding of soft liner from a denture base is a common clinical occurrence and often causes functional failure of the prosthesis.<sup>1</sup> Debonding results in localized unhygienic conditions at the debonded regions such as bacterial, fungal growth, plaque and calculus accumulation.

Taking into consideration the importance of soft liners for the patients, who can not tolerate hard-based dentures, this an in vitro study was undertaken to evaluate and compare the integrity of bond interface between two heat cure denture base resins and two soft liners.

**AIMS AND OBJECTIVES**

The aims and objectives of the study are;

- 1) To evaluate and compare the integrity of bond interface

between different heat cure denture base resins and different soft liners.

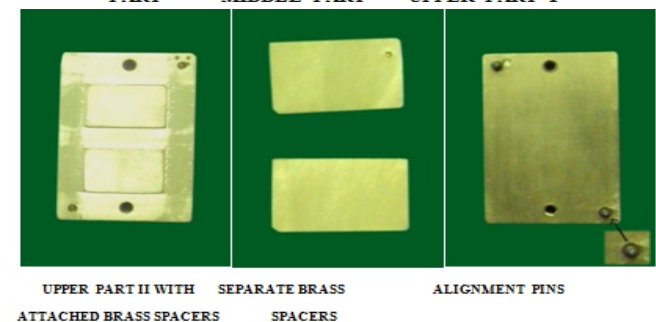
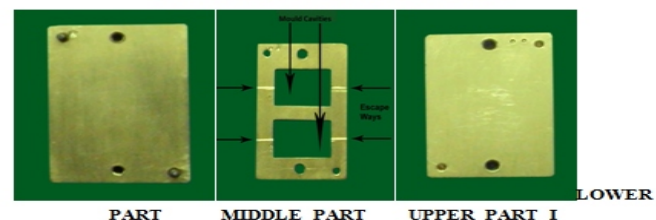
- 2) To compare the integrity of bond interface with different thickness of soft liner
  - a. 2 mm
  - b. 1 mm
- 3) To evaluate the integrity of bond interface between the heat cure denture base resin and a soft liner as influenced by aging.

**MATERIALS AND METHODS**

The present study was carried out to evaluate and compare the integrity of bond interface between the heat cure denture base resin and the soft liner. Total 112 specimens were prepared, using heat cure denture base resins (Lucitone and Trevalon HI) and soft liners (Mollosil and PermaSoft). In order to have the specimens of identical shape and size, special brass die was prepared



PHOTOGRAPH 1: SPECIAL BRASS DIE



SCREWS

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### **Photograph 2: Different Parts of The Special Brass Die**

#### **The Special Brass Die:**

A special Brass die, with three detachable parts (**photograph.-1, 2**) was used for the fabrication of specimens. The parts of the brass die were as:

1. Lower part: 76×50×9mm dimensions.
2. Middle part: The middle part was of 76x50x 4 mm dimensions, having two identical mould cavities of size 30x20x4 mm. Upper part: The upper part was of two types :  
Upper part I: The Upper part I was flat and of 76×50×9 mm dimensions.  
Upper part II: The upper part II of the brass die was of 76x50x9 mm dimensions with two separate brass spacers of dimensions 30x20x1mm, attached to the upper part II, at the sites corresponding to the mold cavities.
3. Brass Spacers:  
I. Two separate brass spacers of dimensions 30x20x2mm.  
II. Two separate brass spacers of dimensions 30x20x1mm attached to the upper part II.
4. Alignment pins: For exact assembling of three parts of the die, two alignment pin sat the two corners in the lower part of brass die were provided.
5. Screws: The three parts of the brass die assembly were tightened with the help of two screws.

#### **PREPARATION OF TEST SPECIMENS:**

The specimens were prepared in two steps;

- 1) Preparation of heat cure resin specimens.
- 2) Addition of soft liner.

#### **PREPARATION OF HEAT CURE RESIN SPECIMENS:**

For the purpose of measuring bond interface, the specimens of heat cure resin (Lucitone & Trevalon HI) were prepared using brass die.

**Lucitone Specimens:** The middle part of the brass die was placed on the top of the lower part and two brass spacers (30x20x2 mm) were inserted in the two mould cavities in the middle part of the brass die. Heat cure denture base resin Lucitone (powder and liquid) was mixed and packed into the mould cavities over the brass spacers. After curing, the die was bench cooled, and the specimens were removed from the brass die and any sharp edges of acrylic resin were trimmed off. Thus two heat cure resin

Lucitone specimens of size 30x20x2 mm were cured at one time. In the similar manner, 56 specimens of Lucitone were fabricated and designated as Group I. **Trevalon HI Specimens:** In the similar manner 56 specimens of Trevalon HI heat cure denture base resin were prepared by using the same brass die and designated as Group II.

#### **ADDITION OF SOFT LINER:**

**Group I** 56 Lucitone specimens were divided into four sub-groups, IA, IB, IC and ID, with 14 specimens in each sub-group and were numbered from 1-14.

**Mollosil specimens:** To the specimens of two sub-groups, IA and IB, soft liner Mollosil was added (2 mm and 1 mm thick respectively), on one side only, using the same brass die.

For addition of 2 mm thick soft liner Mollosil, first Mollosil adhesive was applied completely and uniformly on one side of two Lucitone specimens of sub-group IA and left to dry for 1 minute. The middle part of the brass die was placed on the lower part without brass spacers. These two Lucitone heat cure resin specimens were placed back into the mould cavities, in the middle part previously occupied by brass spacers. Soft liner Mollosil was mixed according to the manufacturer's instructions and packed into the 2mm space over the Lucitone heat cure resin specimens. The brass die was closed using upper part I of the brass die. The brass die was tightened with screws and kept for 30 minutes for curing. After curing, specimens were removed from the brass die. The excess material was trimmed off with BP knife.

Thus, two Lucitone and 2mm thick soft liner Mollosil combination specimens of dimensions 30x20x4mm were fabricated at one time. In this manner, 2mm thick Mollosil was attached to all the specimens of sub-group IA. For addition of 1mm thick Mollosil, same procedure was repeated as for addition of 2mm thick mollosil except that the brass die was closed using upper part II of the brass die.

**PermaSoft specimens:** To the specimens of two sub-groups, IC and ID, soft liner Perma Soft was added (2 mm and 1 mm thick respectively), on one side only, using the same brass die.

The soft liner Perma Soft was mixed in the ratio of 2.5:1 and packed. Curing was done according to the manufacturer's instructions. After curing, the brass die was bench cooled and specimens were removed. The excess material was trimmed off with BP knife.

In Group II 56 Trevalon HI specimens were divided into four sub-groups, II A, II B, II C and II D, with 14 specimens in each sub-

group and were numbered from 1-14.

To the specimens of two sub-groups, group II A and group II B, soft liner Mollosil was added (2 mm and 1 mm thick respectively), on one side only, using the same brass die.

Perma Soft specimens: To the specimens of two sub-groups, II C and II D, soft liner Perma Soft was added (2 mm and 1 mm thick respectively), on one side only, using the same brass die. .

Thus, a total of 112 heat cure resin and soft liner combination specimens were obtained in the following manner.

GROUP IA: Specimens of heat cure resin, Lucitone with 2mm thick autopolymerizing soft liner Mollosil.

GROUP IB: Specimens of heat cure resin, Lucitone with 1mm thick autopolymerizing soft liner Mollosil.

GROUP IC: Specimens of heat cure resin, Lucitone with 2mm thick autopolymerizing soft liner Perma soft.

GROUP ID: Specimens of heat cure resin, Lucitone with 1mm thick autopolymerizing soft liner Perma soft.

GROUP IIA: Specimens of heat cure resin, Trevalon HI with 2mm thick autopolymerizing soft liner Mollosil.

GROUP IIB: Specimens of heat cure resin, Trevalon HI with 1mm thick autopolymerizing soft liner Mollosil.

GROUP IIC: Specimens of heat cure resin, Trevalon HI with 2mm thick autopolymerizing soft liner Perma soft.

GROUP IID: Specimens of heat cure resin, Trevalon HI with 1mm thick autopolymerizing soft liner Perma soft.

After fabrication of the specimens, to study the bond interface between heat cure denture base resin and soft liner, all the specimens were viewed under optical microscope at 100x magnification.

After that, all the specimens were subjected to aging by alternately soaking completely in artificial saliva (wet mouth) for 16 hours and distilled water for 8 hours daily for a period of three months, to simulate clinical conditions of wearing removable prosthesis for 16 hours a day and keeping the prosthesis in water for 8 hours, to provide rest to oral mucosal tissues. After three months, all the

specimens were again viewed, under optical microscope at 100x magnification and the values were recorded. The data so obtained were tabulated, compiled and put to statistical analysis.

### OBSERVATIONS AND RESULTS

The present study was conducted to evaluate and compare the integrity of bond interface between the different heat cure denture base resins and different soft liners. Total 112 specimens were prepared, using heat cure denture base resins Lucitone (Group I) and Trevalon HI (Group II) and soft liners Mollosil and PermaSoft. The groups I and II have four subgroups IA, IB, IC and ID, IIA, IIB, IIC and IID. Bond interface was viewed under optical microscope at 100 x magnification.

Then the specimens were subjected to aging by alternately soaking completely in artificial saliva for 16 hours and distilled water for 8 hours daily for a period of 3 months. Bond interface was again viewed under optical microscope at 100 x magnification. The data so obtained were tabulated, compiled and put to statistical analysis. The mean, Standard Deviation, Standard error of mean for bond interface were calculated for all the sub-groups before and after immersion in artificial saliva and distilled water alternately for 3 months.

**Table 1**

Sub-groups		Mean (in microns)	Std. Deviation	Std. Error of Mean	p-Value
I A	Lucitone and 2mm thick Mollosil	8.34393	0.697786	0.186491	0.000
I B	Lucitone and 1mm thick Mollosil	8.56786	0.804419	0.214990	0.000
I C	Lucitone and 2mm thick PermaSoft	6.28607	0.875258	0.233922	0.000
I D	Lucitone and 1mm thick PermaSoft	7.32629	0.652969	0.174513	0.000
II A	Trevalon HI and 2mm thick Mollosil	8.43600	0.710739	0.189953	0.000
II B	Trevalon HI and 1mm thick Mollosil	8.88650	0.838377	0.224066	0.000
II C	Trevalon HI and 2mm thick PermaSoft	5.15307	0.776789	0.207606	0.000
II D	Trevalon HI and 1mm thick PermaSoft	6.52750	0.717422	0.191739	0.000

**Table-1 Shows the mean values of bond interface and standard deviation and standard error of mean of all the sub-groups before immersion.** The bond interface before immersion is lowest, 5.1530 for sub-group II C, followed by sub-group I C, II D, I D, IA, IIA, IB and II B. It is highest for sub-group II B.

**Table 2**

Sub-groups		Mean (in microns)	Std. Deviation	Std. Error of Mean	p-Value
I A	Lucitone and 2mm thick Mollosil	11.4158	0.66402	0.17747	0.000
I B	Lucitone and 1mm thick Mollosil	12.7316	0.88796	0.23732	0.000
I C	Lucitone and 2mm thick PermaSoft	16.9912	3.26273	0.87200	0.000
I D	Lucitone and 1mm thick PermaSoft	13.5586	1.20543	0.32217	0.000
II A	Trevalon HI and 2mm thick Mollosil	13.4294	1.26430	0.33790	0.000
II B	Trevalon HI and 1mm thick Mollosil	15.1771	1.91714	0.51238	0.000
II C	Trevalon HI and 2mm thick PermaSoft	17.0426	2.59587	0.69378	0.000
II D	Trevalon HI and 1mm thick PermaSoft	16.5715	2.39310	0.63958	0.000



**Table-2** Shows the mean values of bond interface and standard deviation and standard error of mean of all the sub-groups after immersion. The bond interface after immersion is lowest, 11.415 for sub-group IA, followed by sub-group IB, II A, I D, II B, II D, IC and II C. It is highest for sub-group II C.

**Table 3:** T-Test of same sub-groups before and after immersion in saliva and distilled water for 3 months.

Paired Samples Statistics						
Sub Groups			Mean	N	Std. Deviation	Std. Error of Mean
IA	Pair 1	Before immersion(microns)	8.3439	1	.697786	.186491
		After immersion (microns)	11.415	1	.66402	.17747
IB	Pair 1	Before immersion(microns)	8.5678	1	.804419	.214990
		After immersion(microns)	12.731	1	.88796	.23732
IC	Pair 1	Before immersion(microns)	6.2860	1	.875258	.233922
		After immersion (microns)	16.991	1	3.26273	.87200
ID	Pair 1	Before immersion(microns)	7.3262	1	.652969	.174513
		After immersion (microns)	13.558	1	1.20543	.32217
II A	Pair 1	Before immersion(microns)	8.4360	1	.710739	.189953
		After immersion (microns)	13.429	1	1.26430	.33790
II B	Pair 1	Before immersion(microns)	8.8865	1	.838377	.224066
		After immersion (microns)	15.177	1	1.91714	.51238
II C	Pair 1	Before immersion(microns)	5.1530	1	.776789	.207606
		After immersion (microns)	17.042	1	2.59587	.69378
II D	Pair 1	Before immersion(microns)	6.5275	1	.717422	.191739
		After immersion (microns)	16.571	1	2.39310	.63958

Table-3 shows the mean values of bond interface in a pair

**Table 4:**

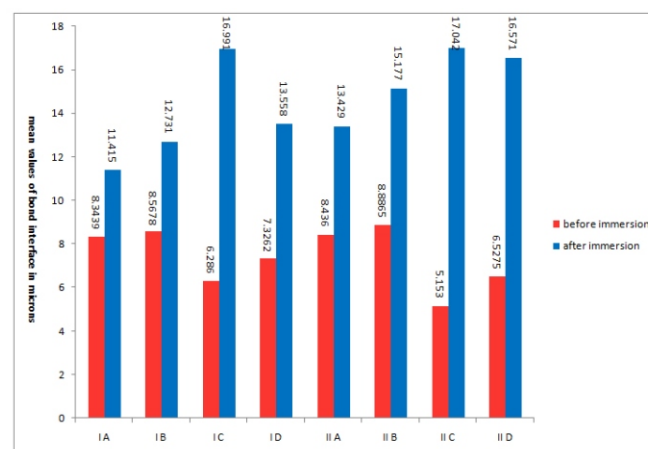
Sub-groups	Difference between mean values of bond interface before and after immersion	Std. Deviation	Std. Error of Mean	p- Value
I A	3.0719	0.69988	0.18705	0.000
I B	4.1638	1.36539	0.36492	0.000
I C	10.7051	3.72243	0.99486	0.000
I D	6.2324	1.45121	0.38785	0.000
II A	4.9934	1.38034	0.36891	0.000
II B	6.2906	2.45058	0.65494	0.000
II C	11.8896	2.85073	0.76189	0.000
II D	10.0440	2.07781	0.55532	0.000

Table-4Shows the difference between the mean values of all the sub-groups before and after

immersion. The difference is highest in sub-group II C followed by I C, II D, II B, I D, II A, I B and IA.

The data so obtained also plotted graphically. Bar graph showing the mean values of bond interface of all the sub-groups before and after immersion in saliva and distilled water alternately for 3 months (Table-5).

**Table-5:**Bar graph showing mean values of bond interface between all sub-groups



## DISCUSSION

The soft lining materials are used for patient comfort, for the treatment of the atrophic ridge, bone undercuts, bruxism, xerostomia and dentures opposing natural teeth.<sup>2</sup>

One of the first synthetic resins used as a resilient liner, a plasticized polyvinyl resin was developed in 1945. Silicone-based materials were introduced in 1958. Resilient liners can be categorized basically into Temporary soft liners and Permanent Soft liners.<sup>3</sup>

Soft reliners are divided into four groups based on chemical structure as plasticized acrylic resins (chemical or heat cured), vinyl resins, rubbers (polyurethane and phosphazine type) and silicone rubbers.<sup>4</sup>

Soft liners can be divided into two main types: plasticized acrylics and silicone elastomers. Both types are available in autopolymerizing and heat-curing forms, differing in the percentage of plasticizers, crosslinking agents, catalyst and fillers.<sup>5</sup> Acrylic based resilient liners are available as powder/ liquid systems. Powder consists of methylmethacrylate polymer and co polymer. Liquid consists of methacrylate monomer and plasticizer, (ethyl alcohol or phthalate).

Silicone based resilient liners are similar in composition to silicone type impression materials.

Disadvantages of soft lining materials are

- 1- Bonding failure
- 2- Loss of resiliency and softness
- 3- Debris accumulation and candida albicans growth
- 4- Weakening of the denture<sup>6</sup>

The present study was conducted to evaluate and compare the

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integrity of bond interface between the heat cure denture base resins (Lucitone and TrevalonHI) and the soft liners [Mollosil (silicone-based) and PermaSoft(acrylic-based)] before and after immersion in artificial saliva and distilled water alternately for 3 months.

For this purpose, 112 specimens of heat cure resin and soft liner combination were fabricated and viewed to study the integrity of bond interface under optical microscope at 100 x magnification.

In the present study, a paired 'T' test was carried out (Table-3).

Oneway ANOVA was also carried out to test the significance in difference in all the sub-groups before and after immersion of specimens in artificial saliva and distilled water alternately for 3 months.

A multiple comparison Post Hoc Test using Tukey HSD method was carried out to verify the significance of difference between the sub-groups.

After analyzing the results obtained, the following interpretations can be made.

#### **Before Immersion:**

The results of the present study have shown that the mean values of integrity of bond interface of all the sub-groups before immersion varies from (5.1530 - 8.8865). It is minimum for sub-group II C followed by I C, II D, I D, I A, II A, I B and II B. (Table-1) The results are statistically significant for all the sub-groups (Table-1).

#### **Type of Soft Liner:**

The results of the present study have shown that the mean values of integrity of bond interface before immersion are lower with PermaSoft soft liner(acrylic-based) than Mollosil soft liner (silicone-based). It indicates that PermaSoft soft liner bonds better than Mollosil soft liner before immersion (Table-2).

Gupta S. (2010)<sup>3</sup> stated that acrylic based soft denture liners form a chemical bond with the denture base resin. Hence, the adhesion of acrylic based soft liners to denture base resin is higher than the silicone based soft denture liners.

Minami H. et al (2004)<sup>7</sup> stated that since silicone soft denture liner does not adhere chemically to denture base resin, a proprietary bonding agent is supplied to achieve adhesion.

In this study, before immersion bonding of Perma Soft liner (acrylic-based) is better than the Mollosil soft liner (silicone-based) with the heat cure denture base resin. So, the results of the present study are similar to these studies.

#### **Thickness of Soft Liner:**

Safari A. et al (2013)<sup>8</sup> stated that softness is a desirable property of

resilient liners. Their optimum thickness has been reported to be approximately 2.5-3 mm to provide good shock absorption.

In the present study, Perma Soft and Mollosil soft liner thickness was 2 mm and 1 mm. The results of the present study, when compared between the sub-groups for the integrity of bond interface before immersion, the mean values of bond interface are lower with 2 mm thick soft liner both for Mollosil and Perma Soft than with 1 mm thick soft liner (Table-1).

The results are statistically significant for sub-groups I C and I D, II C and II D, which indicates that before immersion denture base resin bonds better with 2mm thick Perma Soft soft liner (acrylic-based) than with 1mm thick Perma Soft soft liner.

But the results are statistically non significant for sub-groups I A and I B, II A and II B which indicates that before immersion statistically no difference between bonding of 2mm and 1mm thick Mollosil soft liner (silicone-based) to the denture base resin.

#### **Type of Heat Cure Resin Used:**

In the present study, the heat cure resins used were Lucitone and Trevalon HI. The results of the present study when compared between the sub-groups for the integrity of bond interface before immersion are better with Lucitone - Mollosil combination and TrevalonHI-PermaSoft combination than with Lucitone-Perma Soft combination and Trevalon HI-Mollosil combination.

#### **After Immersion**

Aging for 3 months:

During clinical use, liners suffer from low tear strength, porosity, water absorption and frequent debonding from dentures, thus reducing the longevity of such prostheses<sup>3</sup>.

However, as the time elapses, in acrylic-based soft liners the plasticizers become soluble in an aqueous environment, compromising the viscoelasticity of the liner. Thus, weakens the bond with aging.

Kawano F. et al (1994)<sup>9</sup> found that the sorption and solubility may affect the long-term life expectancy of the soft denture liner.

In the present study, the integrity of bond interface after immersion, was again viewed. For this purpose, all the specimens were completely soaked in artificial saliva for 16 hours and distilled water for 8 hours alternately daily for 3 months.

The results are statistically highly significant for all the sub-groups (Table-2).

After 3 months of aging, in all the sub-groups, the mean values of bond interface are more than the mean values before 3 months (Table-3). This indicates weakening of bond in all the sub-groups

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after 3 months when exposed to aqueous environment.

Takahashi JMFK et al (2011)<sup>10</sup> stated that as the reliner ages, these compounds (plasticizer) become soluble in an aqueous environment, which can compromise the visco elasticity of the materials and increase stiffness.

Naik AV et al (2005)<sup>11</sup> stated that water may percolate directly into the bond site, leading to swelling and consequent increase in stress at the liner denture base interface and reduce the bond strength. The water may indirectly decrease the bond strength by causing the plasticizers from the body to leach out.

#### **Type of Soft Liner:**

The results of present study have shown that the mean values of integrity of bond interface after immersion for 3 months are lower with Mollosil soft liner (silicone-based) than with Perma Soft soft liner (acrylic-based) (Table-2).

Mean values for bond interface of sub-group IA (11.415) (Mollosil) are lower than sub-group I C (16.991) (PermaSoft) and for sub-group IB (12.731) (Mollosil) are lower than sub-group I D (13.558) (Perma Soft) (Table-2).

Mean values for bond interface of sub-group II A (13.429) (Mollosil) are lower than sub-group II C (17.042) (Perma Soft) and for sub-group II B (15.177) (Mollosil) are lower than sub-group II D (16.571) (PermaSoft) (Table-2).

The results are statistically significant between the sub-groups IA and I C, IIA and IIC

The results are statistically non significant between the sub-groups IB and ID, IIB and IID.

It indicates that bond with Mollosil (silicone-based) soft liner is more dimensionally stable than with Perma Soft (acrylic-based) soft liner.

So, the results are again in agreement with the other studies :

Demir H. et al (2011)<sup>12</sup> stated that the most successful materials for soft liner applications have been the silicone rubbers. These materials are not dependent on leachable plasticizer, contrary to the plasticized acrylics, and therefore retain their elastic properties for prolonged periods. In this study, mean values of bond interface after immersion are better with Mollosil soft liner (silicone-based) than with Perma Soft soft liner (acrylic-based). These results are statistically significant.

#### **Thickness of Soft Liner:**

In the present study, PermaSoft and Mollosil soft liner thickness was 2 mm and 1 mm. The results of the present study when compared between the sub-groups for the integrity of bond interface after immersion for 3 months are better with 2 mm thick

Mollosil soft liner (silicone-based) than with 1mm thick Mollosil soft liner and better with 1mm thick Permasoft soft liner (acrylic-based) than with 2mm thick PermaSoft soft liner (Table-2).

Mean values for bond interface of sub-group I A (11.4158) are lower than sub-group I B (12.731) and for sub-group I D (13.558) are lower than sub-group I C (16.991) (Table-2).

Mean values for bond interface of sub-group II A (13.429) are lower than sub-group II B (15.177) and for sub-group II D (16.571) are lower than sub-group II C (17.042) (Table-2).

The results are statistically non significant for all the sub-groups except I C and I D which are significant. It indicates that after 3 months, liner thickness did not show statistically significant difference in majority of sub-groups.

Muralidhar G. et al (2012)<sup>13</sup> concluded that the thickness of the liner did not show a statistically significant rate of failure on the integrity of the interface between the denture base resin and the soft liner.

So the results of the present study are almost comparable to this study.

#### **Type of Heat Cure Resin Used:**

In the present study, the heat cure resins Lucitone and Trevalon HI were used. The results of the present study when compared between the sub-groups for the integrity of bond interface after immersion are better when the denture base resin is Lucitone than Trevalon HI.

The results are statistically non significant for the sub-groups IA, IIA, IC and IIC.

The results are statistically significant for the sub-groups I B, IIB, ID and IID.

Statistically significant and non significant results indicate that there is no difference between Lucitone and Trevalon HI denture base resins.

Based on the results of the present study, it has been observed that the silicone-based soft liner (Mollosil) presented superior dimensional stability when compared with acrylic-based soft liner after aging for 3 months.

#### **CONCLUSIONS :**

Within the certain limitations of the study, It was concluded that:

1. After immersion in saliva and water for 3 months, both the liners show significant increase in mean values of bond interface, indicating weak bond after 3 months.
2. After 3 months, Mollosil soft liner (silicone-based) is more dimensionally stable than the Perma Soft soft liner

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(acrylic-based).

3. After 3 months, in majority of the sub-groups, the liner thickness did not show statistically significant difference on the integrity of bond interface.
4. After 3 months, type of heat cure denture base resin, whether Lucitone or Treval on HI, did not show statistically significant difference on the bond interface between denture base resin and soft liner.

The present study was an in-vitro study. All the intraoral conditions were not simulated in this study. But intraoral conditions may influence the integrity of bond interface, so further study is needed to check the integrity of bond interface in intraoral conditions.

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**ABSTRACT:**

**Introduction:** Periodontitis is an inflammatory disease that leads to alveolar bone loss. Severe osteoporosis could be suspected of being an aggravating factor in case of periodontal destruction. Use of panoramic- based indices can be reliable tools for osteoporosis screening.

**Aims:** To evaluate the relationship between chronic periodontitis and osteoporosis using different radiomorphometric indices; mandibular cortical index (MCI), mental index (MI), and panoramic mandibular index (PMI) in pre- and post- menopausal women. **Settings and Design:** Cross- sectional study **Materials and Method:** Eighty female patients with the age range of 33-62 years; visiting the Department of Periodontology, were selected and divided into two groups viz; group I (pre-menopausal group) and group II (post-menopausal group). Both the groups were further subdivided into sub group A (chronic periodontitis patients) and sub group B (periodontally healthy patients). Panoramic- based indices were measured, recorded and statistically analysed. **statistical analysis:** Student-t test was applied to compare mean values of MI and PMI. Intra and inter group comparison of MCI were made using chi-square test. Correlation of age and MI and PMI was found by Pearson's correlation coefficient. **Results:** Higher mean values for both MI and PMI were observed in pre-menopausal group with statistically significant differences than indices related to menopausal status. Lower mean values for PMI and MI were observed in chronic periodontitis patients in both the groups, but statistically significant relationship between MCI and chronic periodontitis in both pre and post- menopausal group. **Conclusion:** The results of the study suggested that positive co-relationship exist between osteoporosis and chronic periodontitis but is more evident in post menopausal women but it needs further long term evaluation on large sample size before reaching final conclusion.

**Key-words:** Chronic periodontitis, menopausal status osteoporosis, pantomography, panoramic-based indices.

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**INTRODUCTION :** Osteoporosis is the most common metabolic bone disease of the elderly, characterised by low bone mass and micro-architectural deterioration of the osseous scaffold that results in bone fragility and increased susceptibility to fracture.<sup>1</sup> Osteoporosis is defined by world health organization (WHO) as bone mineral density (BMD) greater than 2.5 standard deviations below that of the young adult BMD.<sup>2</sup> Periodontitis is an inflammatory disease that leads to alveolar bone loss and severe osteoporosis could be suspected of being an aggravating factor in case of periodontal destruction.<sup>3</sup> General osteoporosis status as well as its effect on bone mineral density (BMD) and residual ridge resorption (RRR) in the mandible has been studied. According to previous studies, general bone loss affects the speed of RRR in the first phase of alveolar resorption.<sup>4</sup> The earliest suggestion of an association between osteoporosis and oral bone loss was made by Greon in 1960.<sup>5</sup> Radiographic changes of the mandible could have a role in detection of osteoporosis.<sup>6</sup> Cortical indices of the mandible on panoramic radiographs, such as cortical width and cortical shape, are significantly associated with BMD of the general skeleton, and risk of osteoporotic fractures in postmenopausal women.<sup>7</sup> Thus the aim of the present study is to evaluate the relationship between periodontal disease and osteoporosis using different radiomorphometric indices, mandibular cortical index (MCI), mental index (MI), and panoramic mandibular index (PMI) in pre- and post-menopausal women.

**METHODS AND MATERIAL :** The present study was conducted on eighty female patients with age range of 33-62 years visiting the Outpatient department of Periodontology and Oral Implantology. Prior to the study, an informed consent was signed by the subjects and approved by institutional ethical committee and all the procedures followed were in accordance with the Helsinki Declaration of 1975 and as revised in 2000.

After taking detailed medical and menopausal history (if applicable) the following selection criteria were applied to the patients:

**Inclusion criteria:**

1. Patient's age between 33-62 years.
2. Females in natural menopause (defined as occurring after 12 months of amenorrhoea without any obvious pathologic cause).
3. Patients with chronic generalized periodontitis diagnosed with moderate to severe clinical attachment loss in >30% sites.[8]

**Exclusion criteria:**

1. Patients with history of systemic diseases or conditions affecting bone mineral density such as hyperparathyroidism, hypo/ hyperthyroidism, chronic renal failure, ankylosing spondylitis, rheumatoid arthritis, malnutrition/malabsorption etc.
2. Patients using medications having effects on bone metabolism such as corticosteroids, anticoagulants, anticonvulsants and bone active medications such as calcitonin, bisphosphonates, fluorides, hormone replacement therapy, calcium, vitamin D.
3. Patients with history of fracture, radiotherapy, implant placement or local bone destructive lesion in the mandible.
4. Patients with history of smoking and/or alcoholism.
5. Pregnant or lactating women.

Patients who fulfilled the selection criteria were divided into two groups of forty patients each-

- Group I (Premenopausal women)
- Group II (Postmenopausal women)

Each group was further subdivided into following subgroups based on periodontal and radiographic examination:

Subgroup A: Patients with chronic periodontitis

Subgroup B: Periodontally healthy patients

**Panoramic radiography :**

Panoramic radiographs of all the patients were taken with radiographic apparatus, Kodak Dry View 5800 laser imaging Panoramic and Cephalometric system. Exposure parameters used were 8 mA, 77 kV with an exposure time of 13.9 seconds. Exposed panoramic radiographs were digitally processed and viewed. One researcher evaluated each image according to patient positioning, head alignment and film density and contrast to avoid including radiographs with distortion.

**Quantitative and Qualitative indices :**

From each of the panoramic radiographs, right and left mental foramina and inferior cortex were traced on tracing paper using a 4B pencil by a single examiner. From these tracings, measurements were made in millimetres using a digital vernier calliper (Figure 1).

1. Mandibular cortical index (MCI): MCI was determined by observing the inferior cortex distal to the mental foramen on both sides of the mandible, using the criteria described by Klemetti et al (1997).<sup>9</sup>

• C1: The endosteal margin of the cortex sharp and even on both sides of the mandible (Figure 2).

• C2: The endosteal margin with semilunar defects (resorption cavities) and cortical residues one to three layers thick on one or both sides (Figure 3).

• C3: The endosteal margin appearing clearly porous with thick cortical residues (Figure 4).

2. Mental Index (MI): Mandibular cortical thickness measured on the line perpendicular to the bottom of the mandible at the center of the mental foramen.<sup>10</sup>

3. Panoramic Mandibular Index (PMI): Benson et al.<sup>11</sup> described the panoramic mandibular index (PMI) as a measure of mandibular osteoporosis. The PMI is the ratio of the thickness of the mandibular cortex to the distance between the mental foramen and the inferior mandibular cortex.

For each of these indices, the index score for a patient was determined by calculating the mean of right and left side scores. Microsoft excel and statistical package for social sciences SPSS 17.0 software package was used for data entry and analysis.

**RESULTS :** In this study, forty pre-menopausal (Group I) and forty post-menopausal women (Group II) were examined. Mean age for pre-menopausal women was 39.40±2.744 years and 53.28±6.081 years for post-menopausal women.

In pre-menopausal group, mean MI for chronic periodontitis patients was 4.554 with SD of 0.082 whereas, in periodontally healthy patients; mean MI was 4.959 with SD of 0.181. On comparison between both the subgroups using student's unpaired't test', the differences were found to be statistically highly significant (p<0.001) on both the sides (Table 1).

Similarly, mean PMI for chronic periodontitis patients in pre-menopausal group was 0.382 with SD of 0.009 whereas, in periodontally healthy patients; mean PMI was 0.417 with SD of 0.020. On comparison between both the subgroups using Student's unpaired't' test, the differences were found to be statistically highly significant (p<0.001) (Table 1).

Table 1: Intragroup analysis of PMI and MI in Group I (Pre-menopausal group)

	SUBGROUP A (CHRONIC PERIODONTITIS) (n = 11)	SUBGROUP B (PERIODONTALLY HEALTHY) (n = 29)	P-value
PMI (MEAN±SD)	0.382 ± 0.009	0.417 ± 0.020	<0.001**
MI (MEAN±SD)	4.554 ± 0.082	4.959 ± 0.181	<0.001**

In post-menopausal group, mean MI for chronic periodontitis patients was 4.275 with SD of 0.229 as compared to periodontally healthy patients in which mean MI was 4.569 with SD of 0.059. Using student's unpaired't' test, differences between both the subgroups were found to be statistically highly significant. (p<0.001) (Table 2).

Table 2: Intragroup analysis of PMI and MI in Group II (Post-menopausal group)

	SUBGROUP A (CHRONIC PERIODONTITIS) (n = 32)	SUBGROUP B (PERIODONTALLY HEALTHY) (n = 8)	P-value
PMI (MEAN±SD)	0.316 ± 0.024	0.369 ± 0.006	<0.001**
MI (MEAN±SD)	4.275 ± 0.229	4.569 ± 0.059	0.001*

Similarly, mean PMI for chronic periodontitis patients in post-menopausal group was 0.316 with SD of 0.024 as compared to periodontally healthy patients in which it was found to be 0.369 with SD of 0.006 respectively. On comparison, the differences in the values for both subgroups were found to be statistically highly significant. (p<0.001) (Table 2).

Statistically highly significant differences (p<0.001) were found

Table 3: Intergroup analysis of PMI and MI among Chronic periodontitis patients (subgroup A)

	SUBGROUP A (CHRONIC PERIODONTITIS)		P-value
	PREMENOPAUSAL GROUP (GROUP 1)	POST-MENOPAUSAL GROUP (GROUP 2)	
PMI (MEAN±SD)	0.382 ± 0.009	0.316 ± 0.024	<0.001**
MI (MEAN±SD)	4.554 ± 0.082	4.275 ± 0.229	<0.001**

Table 4: Intergroup analysis of PMI and MI among Periodontally healthy patients (subgroup B)

	SUBGROUP B (PERIODONTALLY HEALTHY)		P-value
	PREMENOPAUSAL GROUP (GROUP 1)	POST-MENOPAUSAL GROUP (GROUP 2)	
PMI (MEAN±SD)	0.417 ± 0.020	0.369 ± 0.006	<0.001**

Also, higher mean values for PMI and MI are seen in pre-menopausal group suggesting an association between these indices and menopausal status of the women.

MI and PMI were found to be correlated with age according to Pearson's correlation coefficient. Both the indices showed a negative correlation with age in group I and group II (Table 5).

Table 5: Correlation of PMI and MI with age in Pre-Menopausal group (Group I) and Post-Menopausal group (Group II)

Group	Correlation coefficient (r) PMI	Correlation coefficient (r) MI
Group 1	-0.986**	-0.973**
Group 2	-0.996**	-0.937**

MCI is a qualitative index. On intra group analysis with Chi-square test, a statistically significant association was found between periodontitis and MCI on both right and left sides in group I and group II (Table 6 and Table 7).

Table 6: Association of periodontitis and MCI in Pre-M group (intra-group analysis)

Periodontitis	Left side		Right side	
	C1	C2	C1	C2
Yes	6	5	6	5
No	28	1	28	1
	χ <sup>2</sup> = 11.037; df=1; p = 0.001*		χ <sup>2</sup> = 11.037; df=1; p = 0.001*	

Table 7: Association of periodontitis and MCI in Post-Menopausal group (intra-group analysis)

Periodontitis	Left side			Right side		
	C1	C2	C3	C1	C2	C3
Yes	-	24	8	-	24	8
No	2	6	-	3	5	-
	χ <sup>2</sup> = 10.00; df=2; p=0.007*			χ <sup>2</sup> = 14.138; df=2; p=0.001*		

## DISCUSSION

Women tend to lose BMD more rapidly than men, especially after the menopause. As a result osteoporosis is three times more common among women than men.<sup>12</sup> According to the World Health Organization (WHO), 33% of women above the age of 65 years are affected by osteoporosis.<sup>2</sup> Therefore, the choice of female population for this study was based on the fact that osteoporosis is most prevalent in this population and therefore more likely to show osteoporotic changes on radiographs.

The earliest suggestion of an association between osteoporosis and oral bone loss was made by Greon in 1960.<sup>3</sup> Evidences suggest that mandibular cortical indices at panoramic radiographs can be utilized as tools in the detection of low mineral bone density not for diagnosis purposes, but to identify the risk for bone mass loss and appropriately refer the patient for assessment by bone densitometry, allowing to prevent the development of the disease.<sup>13</sup> Klemetti and Kolmakow (1997) have validated the choice of morphology of mandibular cortex on panoramic radiograph in assessment of bone quality rather than the trabecular bone or alveolar process.<sup>14</sup>

The effect of general mineral loss of skeleton, on the jaw bones has been studied extensively with new radiologic methods, such as single- photon absorptiometry (SPA), dual-photon absorptiometry, single-energy x-ray absorptiometry (SXA), dual-energy x- ray absorptiometry (DXA or DEXA), radiographic absorptiometry (RA), quantitative ultrasound (QUS), ultra- sound densitometry (USD) and quantitative computed tomography (QCT), that measure bone mineral density (BMD), bone mineral content (BMC), or bone mass have developed rapidly during the last two decades.<sup>4,15,16,17</sup> The above mentioned methods are expensive to use and are often unavailable to ordinary practitioners.

Due to its feasibility and low exposure time, panoramic radiography is a widely used method in dentistry for the screening and overall evaluation of patients with oral diseases. Also, most of the post- menopausal women have more opportunities to visit dental clinic for the treatment of dental caries and periodontal disease than to visit a medical office for diagnosis of osteoporosis prior to fracture. Hence the panoramic radiograph plays a vital role in identifying post menopausal women with undetected osteoporosis.<sup>18,19</sup>

Bone mineral density (BMD) in the mandible has been shown, in a number of studies, to be positively co-related with that in lumbar spine, femoral neck and forearm, are the important sites in osteoporosis.<sup>20</sup> Identification of the signs of osteoporosis in dental panoramic radiographs is crucial in the diagnosis of this condition. Several panoramic radiographic measurements, also known as panoramic radiomorphometric indices, have been developed to assess cortical shape and width, either qualitatively<sup>9</sup> or quantitatively.<sup>10,11</sup>

The selection criteria in this study did not include any medical or radiographic evidence for osteoporosis. Based on medical history, patients on medications or suffering from systemic diseases affecting BMD were excluded from the study. Therefore, all the patients included in this study were undergoing normal physiologic bone changes with age who had undergone panoramic radiograph examination as a part of their routine dental treatment. PMI was first proposed by Benson et al (1991) as radio morphometric index of adult cortical bone mass.<sup>11</sup> The recent studies in the literature on PMI values have been performed mostly on women.<sup>14,7</sup> As an average, the results of these literatures reveal PMI values between 0.31–0.38 for women. In a study by Horner and Devlin (1998), the PMI values measured in females with osteoporosis on panoramic radiographs were compared with the mandibular bone values measured with DXA, and they found a significant relation between the two.<sup>20,7</sup>

Studies, measuring PMI values found that the values that decrease with increasing age are smaller among white individuals than black individuals and among women compared with men.<sup>21,22</sup> In this study, mean PMI values were higher in pre-menopausal group than in post-menopausal group showing a statistically significant association between PMI and menopausal status of the women. These results are similar to those reported by Mudda J A et al (2010).<sup>9,23</sup> Also, an age related decrease in PMI values has been

observed depicting a negative co-relation of PMI with age. Similar findings are seen in studies done by Parlani S et al (2014)<sup>24</sup> and Dhandapani K et al (2015).<sup>25</sup>

Measurement of the thickness of the mandibular cortical width (MCW) in panoramic radiographs has been suggested as a way to predict patients with low bone mineral density.<sup>26</sup> Various studies have shown significant relationships between the MCW and bone mineral density.<sup>27,28</sup> In the present study, MI values show a similar pattern to that of PMI values which has been previously described i.e. higher values in the pre-menopausal group showing its association with menopausal status and a negative correlation with age.

In this study, a statistically significant association between MI and PMI values and chronic periodontitis has been observed ( $p < 0.001$ ). Therefore, as these indices are predictors of low bone mineral density; the results of this study suggest an association between low bone mineral density and periodontitis.<sup>26</sup>

MCI is used for the qualitative evaluation of morphological structures of mandibular cortical layers. Various studies suggest that MCI classification based on panoramic radiographs may be a useful index for the diagnosis of osteoporosis.<sup>28,29</sup> In this study, MCI appearance was related to the menopausal status of the patients suggesting that onset of menopause leads to changes in mandibular cortical morphology. C1 cortical type was most common in pre menopausal group. Individuals with C2 cortical type were seen in post-menopausal group commonly and an age related increase in number of patients with C3 cortical type was also observed in post-menopausal, thus reflecting correlation of MCI with age. These results are in agreement with those given by Kalinowsky et al.<sup>30</sup> Hence, in this study, MCI appearance was related to the menopausal status and also the age of the patients. In addition, a statistically significant association between MCI and chronic periodontitis was observed. Similar results have been shown in the study done by Moeintaghavi et al (2014).<sup>31</sup> Therefore, MCI might be used as an indicator of mandibular bone loss in osteoporosis and chronic periodontitis, two diseases with connective tissue destruction.

Longitudinal studies of mandibular bone density may also be fruitful than cross-sectional studies in the evaluation of the role of dental radiography in assessing patients for osteoporosis. However there are newly proposed systems like kernel-based support vector machine (SVM) and an automatic approach utilizing a histogram based automatic clustering (HAC) algorithm with a support vector machine (SVM) to analyse dental panoramic radiographs which can be used.<sup>32,33</sup>

## CONCLUSION

Since, panoramic radiographs are routinely used for screening in dental practice, any association between radiomorphometric indices of mandible in periodontitis patients might be useful in predicting osteoporosis in patients being referred to dental clinics. In this study, an association between radiomorphometric indices, chronic periodontitis and menopausal status of the women was found, thereby, depicting an association between osteoporosis and chronic periodontitis and an increased risk of osteoporosis in post-menopausal women.

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**PERCEIVED SOURCE OF STRESS AMONG UNDERGRADUATES DENTAL STUDENTS IN SRIGANGANAGAR CITY RAJASTHAN.**

Vasudha Kak, C.L Dileep, Anmol Mathur, Manu Batra, Diljot Kaur Makkar

**ABSTRACT: Background:** The dental profession is the most stressful of all the health profession, and this is true for all stages of the dental career, i.e. for established dentists, young dentists and dental students. The aim of the study was to identify self-reported sources of the stress among the dental undergraduates students in a dental teaching institution in Rajasthan, India. **Materials and Method:** Modified dental environmental stress (DES) questionnaire having 32 items on a 4-point likert scale addressing 4 stressor domains were administered to the undergraduate students of the institution. Descriptive and bivariate analysis based on chisquare test were performed. **Results:** The most stress provoking factor was found to be 'Insufficient spacing between exam dates' followed by 'Examination and grades.' The least stress provoking factor was related to Personal issue such as relation with friends and seniors and discrimination due to race, social class or ethnic group. **Conclusion:** The result of the current study indicate that with the advent of newer teaching modalities, a more students friendly environment can be created so that detrimental consequences of stress can be reduced. Academic and non-academic perceived sources of stress should be considered in curriculum planning and in the working environment for dental education.

**KEY WORDS:** Dental students, dental education, stress, .

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**INTRODUCTION:**

The term “stress” refers to the effect of certain external factors (physical or mental) on individual's physical and psychological health.<sup>1</sup> It has been defined as a body's nonspecific response to demands made upon it, or to disturbing events in the environment.<sup>2</sup> It relates to the pressure of adaptation of the body to the everyday demands.<sup>3</sup> According to the 2008 report of the Global Congress on Dental Education, “dental education is regarded as a complex, demanding and often stressful pedagogical exposure. It involves an acquisition of required academic, clinical, and interpersonal skills during the course of learning” which also add to the stress perceived by the students.<sup>4</sup>

In India, the duration of Bachelor of Dental Surgery program is of 4 years, with examination at the end of each year, followed by 1 year rotatory internship in dental colleges, as directed by governing body.<sup>5</sup> Dental students are known to be subjected to considerable level of stress and anxiety during their training period and this has been demonstrated by various studies.<sup>6,7</sup> in several different countries (for example UK<sup>8</sup>, United States<sup>9</sup>, Singapore<sup>10</sup> and Australia<sup>11</sup>).

Stress perception is frequently influenced by the socio cultural factors. Hence the results of studies in one region cannot necessarily be generalized to the others. Also, the stress experienced by the students can exhibit variations between clinical and non clinical years as well as be influenced by the institutional policies, student-faculty relationship etc.<sup>12</sup> Undergraduate final year dental students in India, take up exams in 7 clinical subjects at the end of the year [Revised scheme2: Dental Council of India Guidelines] and is often perceived as the toughest year because the students have to cope with an increase in academics and clinical work load. Hence, it is important to identify the potential sources of stress for each undergraduate year among the students in the dental institution.

**METHODOLOGY**

This close ended questionnaire based descriptive cross sectional study was conducted among students perusing their bachelor of

dental surgery course at a private dental college setting during September 2014, in the North West part of India. This study was carried out in the middle of the academic year among first to fourth year students, and it discussed experiences of the preceding academic year of the enrolled student.

Students present on the respective day of survey in the class room setting were considered for the sample frame. The Proforma constituted of Dental Environmental Stress (DES) questionnaire along with demographic data. Participation was strictly voluntary, and all participants remained anonymous. Approximately fifteen minutes were required to complete the questionnaire. Demographic information obtained was regarding gender, age, year of undergraduate study and type of living accommodation. Ethical clearance was obtained from the Ethical Committee of the Institutional Review Board.

To investigate sources of stress, a modified version of the self-administered DES<sup>9</sup> questionnaire was used. The questionnaires were distributed to all undergraduate dental students belonging to the four undergraduate years respectively. The original DES question consists of 36 questions which are being further modified by Heath JR and Westerman GH<sup>8</sup> The modified version when tested in the pilot study made, the authors to make certain changes as required by the area settings.

The final questionnaire consisted of thirty-two items relating to possible sources of stress. Students were asked to rate these items on a 4 point likert scale ranging from 0 (not stressful) to 4 (severely stressful). To understand the impact of stress on the study population the DES scores were classified on the basis of four “stressor domains.” i.e. Academic performance pressure, Personal issues, Faculty relationship, Clinical responsibilities.<sup>13</sup> Scores for the Clinical factors were only computed for the clinical students (that is, 3<sup>rd</sup> and 4<sup>th</sup> year students).

For the statistical analysis the mean stress scores were dichotomised as stressful and non stressful and year of education as clinical and non clinical because clinical students comprise of the third and final year as they are exposed to patient settings. Descriptive and bivariate analysis based on chi square test were performed using SPSS v 20.0 statistical software.

**RESULTS**

A Total of 75% response rate was observed for the present study as out of the total population 37 students were absent on the day of survey, 42 students had submitted unfilled proformas, and 21 students had not returned their proformas participation was strictly voluntarily. So, a total of 300 proformas were returned and found to be satisfactorily complete.

TABLE 1: SAMPLE DESCRIPTION BY GENDER AND YEAR OF STUDY

S.no	YEAR OF STUDY	MALE N%	FEMALE N%	TOTAL	RESPONSE RATE
1	I YEAR	11(14.47)	65(85.52)	76	76%
2	II YEAR	29(34.52)	55(65.47)	84	84%
3	III YEAR	16(26.22)	45(73.77)	61	61%
4	IV YEAR	25(31.64)	54(68.35)	79	79%
	TOTAL	81(27%)	219(73%)	300	75%

(Table 1) show that a large number of females with 73% in relation to males with 27% responded in the present study suggestive of higher response rate for females. When tested for the stressor domains with the year of the education (Table 2), ANOVA comparing the mean scores for the four stressor domains across the years of the study, the difference was statistically significant only for the academic performance pressure domain. Comparison between gender by unpaired student t test revealed significant difference for all the domains except for academic performance pressure. The comparison between stressor domain with gender reveals that mean scores was highest among males in all the domains except in clinical responsibility.

TABLE 2: STRESSOR DOMAINS AND MEAN SCORE BY YEAR OF STUDY AND GENDER

S.no	STRESSOR DOMAIN	YEAR(p)	MEAN(SD)	p/T VALUE	
1	Academic performance pressure	1(76)	2.38(0.59)	p<.0001*	
		2(84)	2.28(0.44)		
		3(61)	2.35(.58)		
		4(79)	2.69(.59)		
		M(81)	2.481(.088)		#p=.0075*
		F(219)	2.407(.238)		
2	Personal issues	1(76)	2.06(.66)	P=0.0723	
		2(84)	2.02(.49)		
		3(61)	1.98(.49)		
		4(79)	2.22(.70)		
		M(81)	2.2(.094)		#p<.0001*
		F(219)	2.029(.080)		
3	Faculty relationship	1(76)	2.16(.83)	P=0.059	
		2(84)	2.13(.73)		
		3(61)	1.95(.73)		
		4(79)	2.32(.89)		
		M(81)	2.306(.124)		#p<.0001*
		F(219)	2.094(.069)		
4	Clinical responsibilities	1(76)	NA	P=0.0746	
		2(84)	NA		
		3(61)	1.89(.63)		
		4(79)	2.09(.72)		
		M	1.911(.054)		#p<.0001*
		F	2.035(.084)		

Among the all stressor domains, (Table 3) for 71.33% of students,

relationship with friends and seniors was the most non stressful factor while with 93.33% students reported that insufficient spacing between examination was highly stressful for them.

TABLE 3: PERCENTAGE DISTRIBUTION OF RESPONSES

S.no	QUESTIONS	STRESS				STRESSFUL (2+3+4)%
		NO	MILD	MODERATE	SEVERE	
1	Amount of assigned class work	19.00	44	26	10.33	81.00
2	Difficulties regarding class work	21.67	45	27	6.33	78.33
3	Examination and grades	7.33	28	34	31.00	92.67
4	Completing graduation requirements	17.00	36	30	17.00	83.00
5	Fear of failing course or year	15.67	26	19	39.33	84.33
6	Lack of time to do assigned class work	14.33	37	33	15.33	85.67
7	Discrimination due to race, social class status or ethnic group	65.33	19	8	7.00	34.67
8	Fear of being unable to catch up if behind	26.67	44	19	10.67	73.33
9	Attendance and success in medical subjects	19.67	36	27	16.67	80.33
10	Insufficient spacing between exam dates	6.67	23	33	38.00	93.33
11	Competition for grades among batch mates	28.00	39	22	11.00	72.00
12	Relations with friends and seniors	71.33	17	7	4.67	28.67
13	Lack of confidence to be a successful dental student	36.67	35	17	10.67	63.33
14	Lack of confidence to be a successful dentist	34.33	32	20	13.67	65.67
15	Lack of time for relaxation	21.00	33	24	22.00	79.00
16	Lack of supportive atmosphere in living quarters	37.67	30	18	15.00	62.33
17	Your expectations of dental college and what in reality it is like	18.00	32	26	23.33	82.00
18	Insecurity concerning professional future	20.33	37	26	17.00	79.67
19	Financial responsibilities and repaying education loans	38.33	28	21	12.00	61.67
20	Approachability and communicability with teachers	40.00	39	16	5.33	60.00
21	Personal physical health	41.67	30	14	14.33	58.33
22	Cultural difference, Local language	55.00	30	6	8.33	45.00
23	Atmosphere created by faculty	40.00	27	19	13.33	60.00
24	Receiving criticism about work	30.67	43	16	10.33	69.33
25	Rules and regulations of the college	38.00	28	19	14.67	62.00
26	Lack of input in the decision making process of the college	25.33	33	20	21.33	74.67
27	Lack of cooperation by patients in their home care	20.33	17	6	2.67	26.00
28	Responsibilities regarding patient management	18.00	13	10	4.67	28.33
29	Patients being late or not showing for their appointments	10.67	22	11	2.00	35.67
30	Difficulty in learning clinical procedures and protocols	20.00	14	11	1.67	26.33
31	Difficulty in learning precision manual skills	16.33	17	10	3.67	30.00
32	Working on patient with poor oral hygiene	12.00	18	12	4.00	34.33

Among academic performance pressure domain responses, 34.67% reported the discrimination due to race, social class status or ethnic group as a least affecting stress factor.

Among Personal issues domain, expectations of students with dental college was reported as highest stressful (82%) and relationship with friends and seniors as least stressful (28.67%) factors. Clinical responsibilities comprised of six factors in which highest and lowest stress reported were perceived due to patients being late or not showing for their appointments(35.67%) and lack of cooperation by patients in their home care(26%) respectively.

TABLE 4- MEAN SCORES BY DIFFERENT YEAR OF THE STUDY ALONG WITH CLINICAL AND NON CLINICAL SETTINGS IN RELATION TO STRESSORS

S.no	QUESTIONS	YEAR				NON CLINICAL	CLINICAL
		1	2	3	4		
ACADEMIC PERFORMANCE PRESSURE							
1	Amount of assigned class work*	2.13(0.81)	2.06(0.87)	2.2(0.85)	2.72(0.88)	2.095	2.46
2	Difficulties regarding class work*	1.96(0.82)	2.05(0.71)	2.28(0.93)	2.47(0.84)	2.005	2.37
3	Examination and grades	2.74(0.88)	2.71(0.95)	2.93(1)	3.18(0.84)	2.725	3.06
4	Completing graduation requirements	2.26(0.98)	2.35(0.83)	2.49(0.96)	2.8(1.02)	2.305	2.64
5	Fear of failing course or year	2.96(1.03)	2.71(0.95)	2.82(1.28)	2.78(1.24)	2.835	2.8
6	Lack of time to do assigned class work	2.2(0.85)	2.2(0.74)	2.54(0.96)	3.06(0.87)	2.2	2.8
7	Discrimination due to race, social class status or ethnic group*	1.7(0.89)	1.64(0.98)	1.36(0.75)	1.53(0.96)	1.67	1.45
8	Fear of being unable to catch up if behind*	2.24(0.99)	1.92(0.76)	1.87(0.72)	2.48(1.06)	2.08	2.17
9	Attendance and success in medical subjects	2.33(0.91)	2.45(0.92)	2.18(1.15)	2.62(0.95)	2.39	2.4
10	Insufficient spacing between exam dates	3.29(0.78)	2.73(0.88)	2.84(1.05)	3.22(0.93)	3.01	3.03
PERSONAL ISSUES							
11	Competition for grades among batch mates	.43(0.94)	2.12(0.9)	2(0.95)	2.08(1.01)	2.275	2.04
12	Relations with friends and seniors*	1.5(0.82)	1.42(0.73)	1.38(0.8)	1.48(0.9)	1.46	1.43
13	Lack of confidence to be a successful dental student	1.97(0.97)	2.01(0.88)	1.95(1.07)	2.13(1.04)	1.99	2.04
14	Lack of confidence to be a successful dentist	1.97(1.05)	2.15(0.91)	2.16(1.16)	2.22(1.06)	2.06	2.19
15	Lack of time for relaxation	2.45(1.1)	2.25(0.9)	2.38(1.08)	2.81(1.08)	2.35	2.59
16	Lack of supportive atmosphere in living quarters	2.17(1.12)	2.12(1.11)	2.02(0.96)	2.08(1.07)	2.145	2.05
17	Your expectations of dental college and what in reality it is like	2.39(0.98)	2.71(1.06)	2.2(1.06)	2.8(0.97)	2.55	2.5
18	Insecurity concerning professional future	2.32(1.02)	2.33(1.06)	2.1(0.93)	2.76(0.85)	2.325	2.43
19	Financial responsibilities and repaying education loans	2.09(1.04)	1.99(0.92)	2.07(1.13)	2.14(1.11)	2.04	2.1
20	Approachable and communicability with teachers*	1.75(0.8)	1.67(0.68)	1.84(0.88)	2.22(1.01)	1.71	2.03
21	Personal physical health	1.99(1.14)	1.74(0.84)	2.02(0.99)	2.3(1.19)	1.865	2.16
22	Cultural difference, Local language*	1.68(0.94)	1.74(0.92)	1.64(0.71)	1.65(1.05)	1.71	1.64
FACULTY RELATIONSHIP							
23	Atmosphere created by faculty	1.87(0.94)	2.06(1.05)	1.84(0.95)	2.42(1.18)	1.965	2.13
24	Receiving criticism about work*	2.12(0.97)	2.01(0.92)	2(0.8)	2.11(1.04)	2.065	2.06
25	Rules and regulations of the college	2.21(1.14)	1.79(0.93)	2.05(1.06)	2.38(1.09)	2	2.21
26	Lack of input in the decision making process of the college	2.45(1.08)	2.64(1.13)	1.92(0.84)	2.38(1.11)	2.545	2.15
CLINICAL RESPONSIBILITIES							
27	Lack of cooperation by patients in their home care	NA	NA	1.72(0.8)	1.88(0.94)	NA	1.8
28	Responsibilities regarding patient management	NA	NA	1.84(1)	2.19(0.99)	NA	2.01
29	Patients being late or not showing for their appointments	NA	NA	1.89(0.73)	2.27(0.82)	NA	2.08
30	Difficulty in learning clinical procedures and protocols	NA	NA	1.77(0.82)	1.95(0.94)	NA	1.86
31	Difficulty in learning precision manual skills	NA	NA	1.97(0.89)	2.05(0.98)	NA	2.01
32	Working on patient with poor oral hygiene	NA	NA	2.13(0.85)	2.22(0.98)	NA	2.17
	Overall mean DES score	2.01(1.67)	1.84(1.39)	2.18(1.52)	2.51(1.73)	3.85	4.69

NOTE: NA- Not Applicable

Table 4: reveals that there was a trend of an increasing overall mean DES score for each of the four years with a spike for final year. Among clinical years, insufficient spacing between the exam dates was having highest mean scores. Among the non clinical years, highest and lowest mean scores were reported for fear of failing the course or year and relationship with friends and seniors respectively.

## DISCUSSION

The total study population in the current study was 300 dental students which was nearly equal to the study conducted by Peker et al<sup>14</sup> while highest was reported in study conducted by Pau et al<sup>15</sup> and least by Dean et al.<sup>16</sup> Majority of students in the present study were hostilities coming from various ethnic and religious backgrounds, similar trend was reported by Harikiran et al.<sup>17</sup>

More females responded (73 %) among all the academic years, similar results were reported in various other studies conducted in India<sup>17,18</sup> and Malasia.<sup>15</sup> The evident reason behind this distribution

seems to be that there has been an increase in the number of women taking up dentistry. This kind of distribution has also been reported by Tandon S.<sup>18</sup>

Stress can have detrimental effects on dental students. The results revealed a predilection in perception of stress among female students. Female students tends to have higher stress levels, similar gender differences in perception of stress is also reported by previous studies in Japan and Australia.<sup>19,20</sup> These differences might be related to the higher tendency of females to express and report their emotions in comparison to males.

In the present study the DES scores are discussed under four domains, considering academic performance pressure domain, Insufficient spacing between the examination dates was perceived as highly stressful factor in the present study (93.33%). This is an agreement with the studies reported from India<sup>(21,22, 23)</sup> and other countries<sup>(24,25)</sup>

Among Clinical responsibilities highest stress was perceived due to patients being late or not showing for their appointments (35.67%), similar finding was reported by Telang et al<sup>13</sup> The most stress provoking factor among third year was insufficient spacing between exam dates but a study conducted by Telang et al<sup>13</sup> reported fear of failing the course as highest stressful. Although the final year students had the highest mean DES scores, it was indicated that students in third year had higher levels of stress in comparison to those in non clinical years. This replicates results from previous research in which students in the transition from preclinical to clinical training tended to report high levels of psychological distress.<sup>14,26</sup> Study suggests that stress levels vary a lot among dental students depending on their year of study. Overall, 1st year students reported lowest levels of stress and 4th year students had the highest peak which is in accordance with the study conducted by Elani et al<sup>27</sup> but contradictory result were by Naidu et al in 2002.<sup>28</sup>

For the clinical students, the overall mean DES scores ranged from 2.18 to 2.51 i.e. of third and final year respectively. This increase in student stress levels during their clinical curriculum may reflect a cumulative effect or, alternatively, suggest that progressive year of training becomes more difficult and stressful. These reasons are also reported by Sanders et al.<sup>29</sup>

## CONCLUSION :

Dental education has been infamous for provoking considerable amount of stress. The findings of this study support the widely held belief that dental students experience high stress levels. The current study reveals that as the dental students move ahead from first year to the higher academic year, the stress level is increased. The transition from non clinical to clinical years has also been documented as critical point. It is the responsibility of educators and administrators to come up with effective student support services (such as academic advising, counselling, and stress management courses). These programs must be readily accessible and aimed at enhancing the dental student's overall psychosocial well-being. Establishing dental student well-being is an important block in the foundation for sustaining the well-being of practicing dentists as well.

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**ABSTRACT:**

This study was conducted on edentulous patients to evaluate the relationship between dimensional changes in complete maxillary acrylic dentures and palatal configuration. Palatal configuration was calculated by utilizing criteria suggested by Mehmet<sup>4</sup> et al. The results of this study showed that there was negligible correlation between dimensional changes in acrylic dentures and palatal configuration (PHR).

**Keyword:** Palatal Height Ratio (PHR), Palatal Configuration, Dimensional Changes

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**Source of support-** Nil, **Conflict of Interest-** Nil

**INTRODUCTION:**

Dimensional changes<sup>1,2,3</sup> in acrylic resin dentures during processing attract our attention as these changes affect fit of denture and occlusal scheme established at the final try in stage. These dimensional changes take place inspite of meticulous considerations given to various clinical and laboratory procedures.

Previous studies showed that number of anatomical and technical factors influence these changes. Palatal height had been considered as one of very important anatomical factor that influence these changes in acrylic resin dentures. In some of the studies palatal height was determined by measuring palatal vault distance. But palatal height alone may not be sufficient to give an insight view of the hard palate. On the basis of palatal height alone one cannot categorize the edentulous maxillae.

McCartney<sup>4</sup> determined palatal width and height on master cast and calculated numeric expression to represent relationship of palatal height to arch width and termed it as palatal slope index (PSI). Later on Mehmet<sup>5</sup> suggested a dimension less criteria of palatal height ratio (PHR), which is ratio of arch width to palatal vault height at a specific point. Mehmet included Antero-Posterior Dimensions, arch width and height in this criteria for categorizing edentulous maxillae.

In this study, criteria suggested by Mehmet was utilized to evaluate the overall dimensions of the palate i.e. palatal configuration. An attempt was made to relate this criteria with dimensional changes in acrylic dentures.

**MATERIAL AND METHOD**

This study was conducted on twenty five edentulous cases. Master casts were prepared according to standard procedures. Palatal configurations (PHR) were measured with specially designed instrument.

This instrument (figure I and II) is a modified compass with tips bent ( $X X_1$ ) to measure the width of maxillary cast. A central beam scale (c) is fitted with this instrument to measure the antero-posterior dimension of maxillary cast. The beam scale carries a movable point (y) to be adjusted at incisive papilla and a vertical sliding vernier scale (z) to measure depth of maxillary cast. All measuring points of compass are adjusted at same level to measure exact dimensions of maxillary cast.

**MEASUREMENT OF PALATAL CONFIGURATION (PHR)**

Three points were marked on each maxillary cast, one at incisive papilla and two at both tuberosities as A, B, C respectively. The instrument points  $X X_1$  were adjusted at both tuberosities and 'y' at incisive papilla. The vertical scale was lowered till it made contact

with palate. Depth was recorded on scale and this point was marked as D (figure III). After removing the instrument, a line was drawn from A to D and divided into six equal segments. Horizontal lines were drawn from these reference points to crest of ridge. Width and height of the palate was recorded at three reference points by adjusting the instrument over them. These three reference points were  $BDC$ ,  $B_1D_1C_1$ ,  $B_2D_2C_2$  (Figure IV). The width was divided by corresponding height to obtain Palatal height ratio. Mean of the three readings was taken as final palatal configuration (PHR) for each maxillary cast.

**MEASUREMENT OF DIMENSIONAL CHANGES:**

Maxillary and Mandibular trial denture bases were prepared according to standard procedures. In each maxillary trial denture base, four stainless steel pins (3 mm long) were fixed. Two pins were fixed in the central fossae of first molars and two were fixed at disto-buccal flanges opposite to second molars on both sides. Molar-to-Molar and flange-to-flange distances were measured with vernier caliper. Trial denture bases along with pins were processed in acrylic resin. Immediately after decasting, distances from molar-to-molar and flange-to-flange were measured and recorded (Figure V & VI).

Linear dimensional changes in maxillary acrylic dentures were measured by comparing molar-to-molar and flange-to-flange distances before processing with those after processing. The measurements so obtained were recorded.

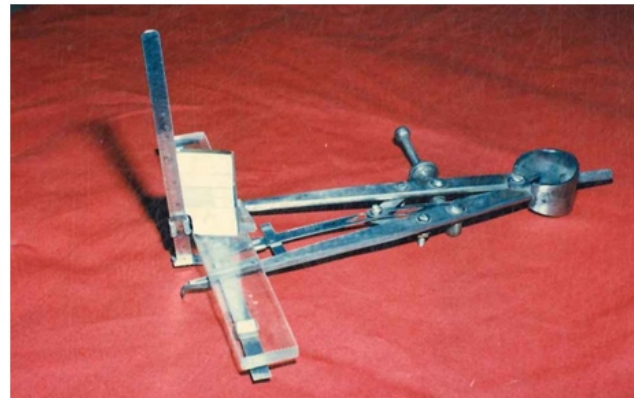


Figure - I

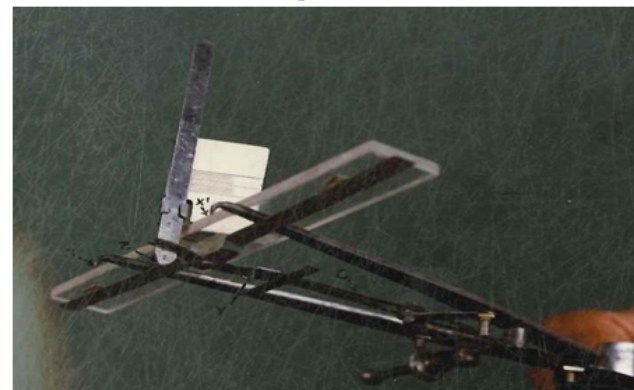


Figure - II

Figure I & II: Instrument to measure palatal depth, width and antero-posterior dimensions of maxillary cast.

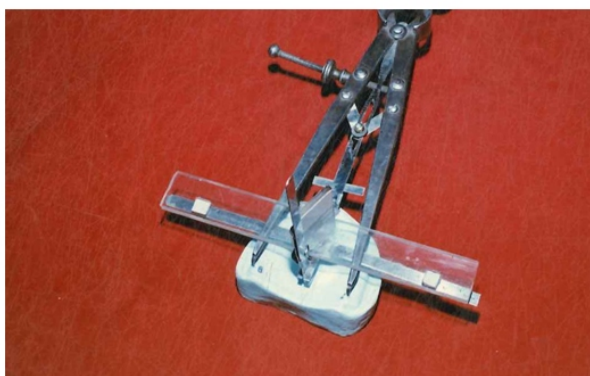


Figure – III: Showing Instrument points X, X<sub>1</sub>, Y adjusted at points A, B and C



Figure – IV: Showing horizontal lines drawn from reference points.

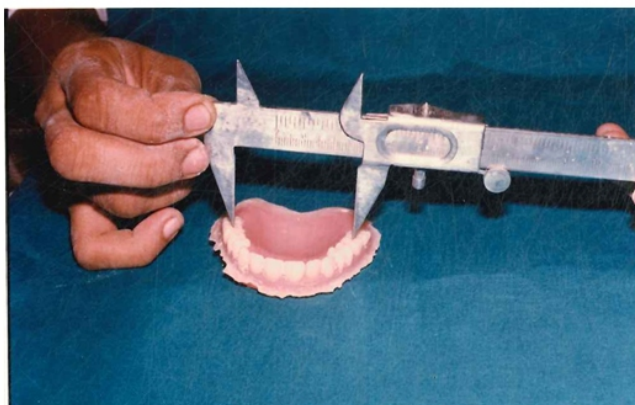


Figure – V: Showing measurement of Molar-to-Molar distance

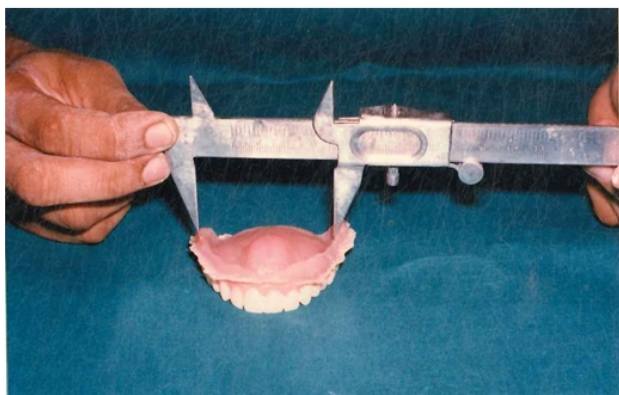


Figure – VI: Showing measurement of flange-to-flange distance

## OBSERVATIONS AND RESULTS

The results of this study revealed that palatal configuration (PHR) ranged from 2.48 to 4.45 with mean value of 3.48. The dimensional changes in maxillary acrylic dentures from molar-to-molar region measurements ranged from 0 to 0.75 mm with mean value of 0.164 and dimensional changes from flange-to-flange region measurements ranged from -0.15 to 0.75 mm with mean value of 0.18 mm (Table I). The linear dimensional changes in both molar-to-molar and flange-to-flange region were less than 1%. All the readings were statistically analysed by 't' test and coefficient co-relation was found between dimensional changes and palatal configuration.

't' value showed that dimensional changes are statistically significant (Table II) but these changes have no significance clinically as all the dentures were wellfitting. 't' value for coefficient correlation showed that there was negligible correlation between dimensional changes and palatal configuration (Table III).

TABLE I

Showing Range and Mean Values of calculated data

	Range	Mean	95% confidence interval
Palatal height Ratio (PHR)	2.48 – 4.45	3.48	3.48±0.21
Molar-to-Molar Distortion (M-M) in Millimetres	0 – 0.75	0.164	0.164±0.78
Flange-to-Flange Distortion (F-F) in Millimeters	-0.15 – 0.75	0.18	0.18±0.90

Table II

Showing Dimensional Changes Results of Statistical Analysis (t Test)

	No. of Patients	Range	Mean	S.D.	t	Level of Significance
Molar-to-Molar Distortion in mm (M-M)	25	0-0.75	0.164	0.19	4.31*	P>0.05
Flange-to-Flange distortion in mm (F-F)	25	-0.15-0.75	0.18	0.22	3.93*	P>0.05

\* Denotes Significance

Tables III

Showing Coefficient Co-Relation Results of Statistical Analysis (t Test)

	No. of Patients	Coefficient of Co-relation	t	Level of Significance
Palatal Height ratio and Molar-to-Molar Distortion	25	0.004	0.023**	P>0.05
Palatal Height Ratio and Flange-to-Flange Distortion	25	0.181	0.885**	P>0.05

\*\* Denotes Not Significant

## DISCUSSION:

Findings clearly indicate that there is negligible correlation between palatal configuration (PHR) and linear dimensional changes in acrylic dentures. These results are in agreement with McCartney's<sup>4</sup> study. However direct comparison cannot be made between results of present study and those of McCartney because of different methodology used by latter. McCartney<sup>4</sup> used the criteria of palatal slops index (PSI) to calculate palatal base distortion space (PBDS). Glazier<sup>6</sup> et al reported that palatal base distortion at posterior border increases with an increase in palatal height. In this study, palatal base distortion was not measured.

Molligoda Abuzar<sup>7</sup> found that in dentures constructed on casts with low palatal form index (PFI), molar to molar and pre-molar to pre-molar distances across the arch reduced after deflasking whereas the distances increased in case of high palatal form index (PFI). Molligoda reported different outcome which may be the result of different methodology.

From the above results, it may be concluded that dimensional changes though significant, have no clinical significance as all the dentures were well fitting. It may be concluded from statistical analysis and graphs (Figure VII & VIII) that dimensional changes have negligible co-relation with palatal configuration (PHR). The dimensional changes occurring during processing might be due to

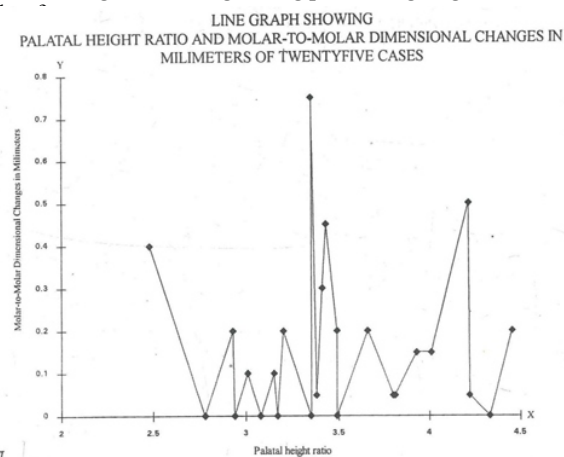


FIGURE VII

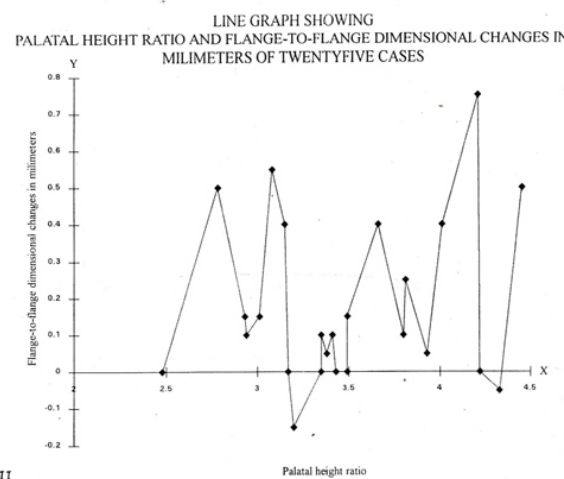


FIGURE VIII

### CONCLUSION:

The linear dimensional changes in maxillary acrylic dentures are significant but these changes have negligible co-relation with palatal configuration (PHR). It indicates that there are some other factors which might contribute to dimensional changes in maxillary acrylic dentures during processing though palatal height ratio may be one of the factors.

It may be concluded that even by knowing palatal height ratio, it is not possible to predict with any degree of accuracy, the dimensional changes that would occur in acrylic resin dentures.

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**ABSTRACT :** One of the most controversial area still remaining in the treatment of cleft lip and palate has to do with the use of pre-surgical orthopedic treatment (PSOT) as a supposedly viable and beneficial concept and whether it is superior to conservative non-orthopedic treatment. Pre-surgical orthopedics was first described by Kerr McNeil in Glassgow who used special obturator with stimulation pads in cleft children. Proponents of PSOT claim that it helps in reducing size of cleft, tongue behavior modification, improved speech, decreased ear infections, expansion of collapsed maxillary segments; and support to parents at a difficult time. Opponents of PSOT claim that cleft reduces in size without pre-surgical treatment, feeding of cleft patients can be done without obturation etc.

**Key Words:** Cleft patients, pre-surgical orthopedics  
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**Source of Support:** Nil, **Conflict of Interest:** Nil

**INTRODUCTION :** PRE-SURGICAL ORTHOPEDICS includes primarily, the active movement of maxillary segments prior to surgical repair of cleft lip in infants with complete cleft lip and palate. Secondly, the passive obturation of a palatal cleft which encourages the normal growth of palatal shelves resulting in narrowing of palatal cleft.

#### HISTORY

16<sup>th</sup> century -Franco developed head cup for extraoral appliance to reduce cleft gap

17<sup>th</sup> century –Huffman<sup>1</sup> developed head cap with facial extensions that pressed back on pre-maxilla

18<sup>th</sup> century –There was use of bandages over pro-labium to stimulate muscle retraction and compression of pre-maxilla

19<sup>th</sup> century –There was use of compression bandages, elastic bands

20<sup>th</sup> century –Brophy<sup>2</sup> tightened wires across the clefts

21<sup>st</sup> century -Modern presurgical orthopedics was started by McNeil

#### PROponents OF PRE-SURGICAL ORTHOPEDICS

•McNeil and Burston recommended PSOT to align palatal segments and stimulate palatal development while delaying palatal closure until 5 to 9 years of age.

•Robenstein and Jacobson used acrylic obturator which allowed passive molding of segments as growth developed

•Latham described pin retained appliance for unilateral and bilateral cleft patients

#### CLAIMED BENEFITS OF PRE-SURGICAL ORTHOPEDICS

1. The cleft reduces in size which simplifies the primary surgery and by implication, affects the quality of the repair.

2. Partial obturation of the cleft helps in feeding. An orthopedic appliance restores the normal anatomy of the palate and helps in suckling.

3. Tongue behavior modification – improved speech. Orthopedic appliance prevents the tongue from entering the nasal cavity which restricts the normal growth of the maxilla.

4. Decrease in the number of ear infection. An orthopedic appliance prevents milk and mucous from entering the Eustachian tube and prevents infection and hear loss.

5.Expansion of the collapsed maxillary segment. Expanding the maxilla during the deciduous dentition state can thin out the lip and compromise esthetics. The best way to treat is to expand the maxilla with orthopedic appliance prior to lip closure.

6.Constriction of the expanded anterior part of the maxilla. The segments are expanded and allows for unrestricted lateral, posterior and superior rotation of the segments. Orthopedic segment can improve the situation.

7.Support is given to parents at a difficult time

#### PROCEDURES FOR PRE-SURGICAL ORTHOPEDICS

• **LATHAM APPLIANCE**, developed by RALPH LATHAM:

1.The Unilateral Latham Appliance

It is used in patients with unilateral cleft palate and cleft lip. The appliance is pinned into place using four surgical steel pins. The larger segment and smaller segment are attached together by way of a bar with two hinged riveted bars that are attached to the alveolar segments by way of two acrylic base plates. A screw is attached to the smaller segment which is turned clockwise once a day. This rotates the two segments together to reduce the space to less than 1 mm.

2.The Bilateral Latham Appliance

The bilateral Latham appliance (Elastic Chain Premaxillary Repositioning Appliance [ECPR] ). The bilateral appliance widens the two posterior segments and an elastic chain pulls the anterior segment posteriorly until the three segments are close together. This movement allows for closure of the lip and the ridges in one surgery, and 6 months later the closure of the palatal defect is performed.

• **PRE SURGICAL NASOALVEOLAR MOLDING**, developed by GRAYSON, SANTIAGO<sup>3</sup>:

1.Unilateral cleft lip and palate

The goal is to align and approximate alveolar segments, correct the position of nasal cartilages, philtrum and columella. The corrections are achieved using acrylic intraoral molding plate with nasal stent rising from labial vestibular flange. The major advantage is repositioning of columella and septum from oblique to upright position and more midline orientation leading to improved nasal tip projection and alar cartilage symmetry

2.Bilateral cleft lip and palate

The goal is to lengthen the columella, reposition the apex of alar cartilage, align alveolar segments and pre-maxilla to form normal maxillary arch. Soft tissue and cartilaginous correction is accomplished through use of nasal stents based on border of conventional oral molding plate. Nasal stents also stretch the nasal lining allowing the domes of lower lateral cartilages to approximate under minimal tension

#### OPponents OF PRESURGICAL ORTHOPEDICS

•A second contrarian school of thought that arose in the 1950s did not favor presurgical orthopedic treatment. It was led by Pruzansky<sup>4</sup>, this school included Aduss<sup>5</sup>, Subtelny, Berkowitz<sup>5</sup>, Graber, Olin and Bishara, Narula and Ross<sup>6</sup>, Friede<sup>7</sup>, Mazahari Bergland and Vargervik. They believed it was best to reestablish lip muscle continuity soon after birth which would allow natural muscle palatal-molding forces to normalize the distorted oral and pharyngeal skeletal architecture. Palatal cleft closure was to be



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performed between the second and fourth years of age, which allowed for an increase in palatal size at the expense of the prevailing cleft space. Shaw and Fish<sup>7</sup> suggest that in unilateral clefts the greater and the lesser segments rotate towards each other reducing the size of the cleft. Huddart<sup>8</sup> attributes the reduction in the cleft width to the limitation of the lateral separation of the growing segment. Inclination of the palatal shelves change once the influence of the tongue is removed and this also plays a part in narrowing the cleft. Robertson, Shaw and Volp<sup>9</sup> suggest that in bilateral cleft the prominence of the pre-maxilla appears to be reduced by growth restraint and this allows the remaining face to catch up.

#### **OPPONENTS CLAIM:**

- Cleft always reduces in size without pre surgical treatment.
- Good surgical technique makes pre surgical treatment unnecessary.
- The cleft invariably reduces in size following primary surgery.
- All cleft babies can be fed satisfactorily without obturation of the palatal cleft.
- Growth of the maxilla can be inhibited by the use of lip strapping and greater incidence of cross bite.

#### **CONCLUSION :**

- The controversy that has traditionally been associated with pre surgical orthopedics may at this time begin to be resolved. Presurgical nasoalveolar molding can help in correcting the deformities prior to primary surgical repair the ultimate aim of cleft teams is to render optimal care and to improve the quality of life of their patients.

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## FRICITION FREE SPACE CLOSURE WITH LOOPS

Dr. Sukhpal Kaur, Dr. Sanjeev Soni

**ABSTRACT :** Space closure procedure in orthodontics involves two types of mechanics that are sliding or frictional mechanics and frictionless mechanics. Sliding mechanics uses elastomeric chains, closed coil springs and elastic module with ligature. In frictionless mechanics loops and springs are used. In this article various type of loops used in frictionless mechanics are discussed.

**Key-words:** Friction less, moment force ratio, space closure.

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**Source of Support:** Nil, **Conflict of Interest:** Nil

**INTRODUCTION :** Frictionless mechanics involves a variety of loops, both simple and complex loop design to achieve better moment to force ratio and constant delivery of force.<sup>1,2</sup> Material used for making loops also changed from stiff stainless wires to more flexible beta titanium wires<sup>3</sup> and more newer materials like Connecticut arch wires, these flexible wires reduce force levels and making treatment more effective. The control of orthodontic tooth movement depends on quantification and manipulation of force system that is amount of force and moment to force ratio. Oppenheim<sup>4</sup> and Burstone<sup>5</sup> suggested the use of light and continuous forces. The constancy of force depends on load/deflection ratio which must be low. Loops with low load/deflection ratio release lighter, more constant and controlled forces.<sup>6</sup> Moment to force ratio also depends on various factors like vertical height of loop, horizontal length of loop, position of loop, extent of activation and properties of wire.<sup>7,8,9</sup>

### PG spring :

Designed by Poul Gjessing,<sup>10</sup> it can be used for canine retraction as well as incisor retraction. It is constructed from 0.016" X 0.022" stainless steel wire (Figure 1). The predominant active element is the ovoid double helix loop extending 10 mm apically. This design incorporate more wire and reduce the load / deflection of the spring. The smaller loop occlusally is incorporated to lower the level of activation on insertion in the bracket of canine and it is formed in such a way that activation is in same direction as it is originally wound. So activation further closes the loops. The mesial and distal extensions of spring angulated both in the vertical and in the horizontal plane.

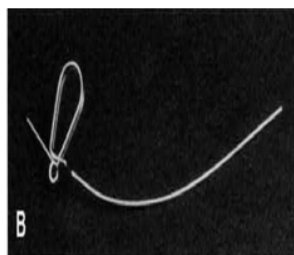


Figure 1

**Activation :** The spring is activated by pulling the posterior extension distally until the wires of ovoid double helix loop separate slightly and wire is secured with a gingival bend distal to molar tube. This produces force of 100 gm spring is reactivated every 4 to 6 weeks.

### Tloop

This was developed by Charles Burstone in 1962. T-loop is made of 0.017" X 0.025" Titanium molybdenum alloy (TMA) (Figure 2). This wire has low modulus of elasticity; generate low force and high range of action. It is used for segmental and en-masse space closure, anterior retraction, symmetric space closure and posterior protraction. Desired tooth movement can be achieved by Changing the angulation of the preactivation bend, altering the

dimensions of the spring, changing the position of the T-loop.<sup>11</sup> Andrew and Burstone concluded that acentered T-loop produces equal and opposite moments with negligible vertical forces. This position is used in type B anchorage cases. More posterior positioning produces an increased beta moment and used in type A anchorage cases. More anterior positioning produces an increased alpha moment and used in type C anchorage cases. So a standard shaped T-loop can be used for differential anchorage requirements by altering mesial-distal position of the loop.<sup>12</sup>

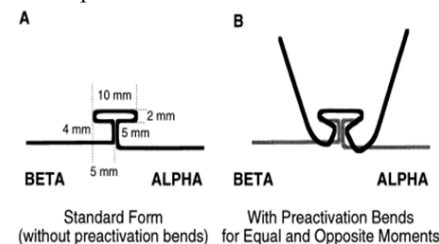


Figure 2

**Activation of loop:** Loop should not be reactivated too soon, if reactivated too frequently, the teeth will undergo only controlled tipping. In order to produce translation, the M/F ratio must be allowed to increase.<sup>13</sup>

### Tear drop shaped loop

In 1983, R.G. Alexander<sup>14</sup> used teardrop shaped loops in his vari-simplex discipline (Figure 3). The loops are placed distal to lateral incisor bracket and archwire extends through the first molar tube. Before placing the archwire in the mouth, the portion of the archwire distal to the loops is reduced in the anodic polisher, so that part of the wire can slide through the brackets easily during activation. It is activated by placing a #442 plier on the archwire distal to the molar tube, pulling it distally 1 to 2 mm to open the closing loop, and bending the end 45 degrees gingivally to produce a stop.



Figure 3

### Opus Loop<sup>15,16</sup>

In 1997, Raymond L. Siatkowski put forth a design process using castigliano's theorem to derive equations for M/F ratio in terms of loop geometry (Figure 4). The equations are used to optimize M/F ratio to produce translation tooth movement. This loop was designed to deliver inherent moment-to force [M/F] sufficient for en mass space closure via translation for teeth of average dimensions. Loop design includes; apical horizontal leg of 10 mm, ascending legs at an angle of 70 degrees to the plane of the bracket, apical helix is on the leg ascending from the anterior teeth and the ascent must begin within 1.5 mm posterior the most distal bracket of the anterior segment. Spacing between the ascending leg and the apical loop legs must be 1 mm or less.

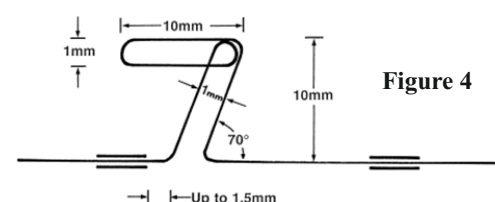


Figure 4

### K-SIR Arch

It was designed by V Kalra (Figure 5). It is used for both retraction and intrusion of anterior teeth. It is constructed from .019X.025 TMA wire. The design of the archwire and the material properties of TMA combine to produce relatively low forces, a low load-deflection rate, and a range of activation. To obtain bodily movement and prevent tipping of the teeth into the extraction spaces, a 90° V-bend is placed in the archwire at the level of each U-loop. A 60° V-bend located posterior to the center of the inter bracket distance produces an increased clockwise moment on the first molar, which augments molar anchorage as well as the intrusion of the anterior teeth. To prevent the buccal segments from rolling mesiolingually due to the force produced by the loop activation, a 20° antirotation bend is placed in the arch wire just distal to each U-loop. It exerts force of 125g which is effective for intrusion of the anterior teeth, while the reactive extrusive force distributed between the two buccal segments and is countered by the forces of occlusion and mastication. Another way to reduce the effects of the reactive force is to add teeth to the anchorage unit.<sup>17</sup>

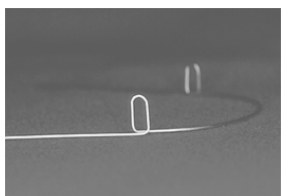


Figure 5

### Mushroom shaped loop

It was designed by R Nanda. It is similar to T loop except that its apical area is curved (Figure 6). The problem with T loop is its large horizontal part which always digging into tissue, so to eliminate this problem, its shape is modified into mushroom shape. This loop is bio mechanically better as it has archial shape.<sup>18,19</sup>



Figure 6

### Compound loops

Compound loops are designed by combining a series of wire lengths and loop designs (Figure 7). Hereby increasing the amount of wire, the force is reduced and the duration of activation is increased. In addition, the compression of the wire during the activation of loop further enhances its action and prolongs its effectiver<sup>20</sup>

		Length of wire in compound loops	Force per mm of activation
Vertical Closed Helix Loop		24mm	120 gms/mm
Double Delta Closing Loop		36mm	100 gms/mm
Double Vertical Crossed "T" Closing Loop		40mm	80 gms/mm
Double Vertical Helical Closing Loop		60mm	75 gms/mm
Double Closed Extended Helical		70mm	50 gms/mm

Figure 7

### CONCLUSION

Retraction with frictionless mechanics offers friction free and more controlled tooth movement. Prefabricated calibrated springs provide relatively constant and defined force system, resulting in predictable tooth movement. Good understanding of mechanics is required when using retraction loops or springs, because minor errors in mechanics can result in major errors in tooth movement. Also more wire bending skill and chairside time is required.

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## BIO-ESTHETICS: A NOVEL APPROACH IN PEDIATRIC DENTISTRY

Rupali Sachdeva, Aparna Singh Shaktawat, Purshottam Jasuja, Kanika Gupta Verma, Metashi Singla

**ABSTRACT :** Bio esthetics is the quintessence of biology, biomechanics and esthetics. It aims to be more conservative and ethical solution to a myriad of esthetic deficiencies. A more attractive smile, improved dental esthetics and durable results have been for long intimately linked to ceramic restorations such as veneers and crowns and remain strongly anchored in patients and dental professional minds. Despite the availability of a wide range of restorative materials, none could match the properties of natural tooth structure like translucency, wear resistance, and color stability. This rationale has been the foundation of a new concept named 'bio-esthetics', giving priority to additive, minimally or micro invasive procedures to preserve tooth biology and biomechanics. The aim of this review article is to discuss the various bio-esthetic treatment approaches.

**Key-words-** Bio esthetic dentistry, biological restoration, esthetics

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**INTRODUCTION :** Lee coined the term "Bio esthetic dentistry" in 1982.<sup>1</sup> Bio esthetic dentistry is a conservative approach to restore teeth to their natural form and function. This concept requires a complete evaluation of not only the intraoral area and the dentition, but also the patient's mouth, lips, smile, and the entire face as a single collective structure rather than individual units. Dental bio esthetics also examines the inter-relationship of the three complexes—dental, dentofacial, and facial—to transform any functional and esthetic oral defects into a naturally functioning and esthetic whole. Only "extreme" conditions such as minor aesthetic form and color corrections or extensive decays in non-vital teeth, lead to evident solutions (direct and respectively indirect restorations), while the majority of other cases lie in a "gray zone" which actually makes a pertinent choice more intricate.<sup>2</sup> A simple yet effective approach to this dilemma lies on a sound bio-mechanical analysis of the teeth, potentially involved in the treatment status, combined to the usual functional and aesthetic analysis. The "Bio-esthetic" philosophy actually gives priority to chemical color improvements, associated to direct composite restorations and bonded ceramic restorations for more extensive decays, limiting the use of traditional full crowns to existing restoration replacement and a few conditions of extreme tooth fragilization.<sup>1,2</sup>

### Goals of Bioesthetics<sup>3</sup>

- To maximize the anterior guidance and "verticalize" the posterior segment, with the condyles in uppermost stable position (USCP) against the articulat or disc in the glenoid fossae.
- Bio esthetic achieves proper anterior guidance using natural, unworn anterior forms. Anterior guidance allows the maintenance of more natural posterior crown forms without eccentric occlusal interferences.
- To restore proper function ability and harmony between all aspects of oral anatomy.
- It achieves the smile line with the maintenance of golden proportion.
- To form a successful Coronoplasty that would preserve the best possible natural like tooth forms.

### Factors to be considered during Bio-esthetics<sup>3</sup>

- Time spend on the dental chair
- Total cost of the treatment
- Possibility for the need for repair

- Acceptability by the patient and parents.

### Bioesthetics in Pediatric Dentistry

#### 1. Biological restorations<sup>3,4</sup>

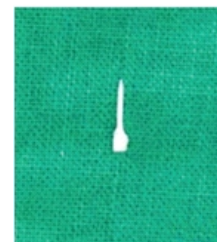
• Fracture reattachment using natural teeth provides excellent results regarding surface smoothness, esthetics and the maintenance of incisal guide in the dental structures. Fragments obtained may be used as a safe and reliable alternative to restore dental anatomy and function with excellent biomechanical properties.

• Biological restoration of carious posterior teeth requires the evaluation of extend of carious lesion both radiographically and clinically. The carious lesion is removed, impression is taken and stone cast is prepared. Mesio- distal, cervico-occlusal and bucco-lingual measurements of the stone cast cavity are obtained, in order to select the extracted tooth from the tooth bank for restoration. The fragment is obtained from selected extracted tooth, and bonded to the cavity with the help of light cure composite resin.

#### 2. Biological post<sup>5</sup>

The biological crown and post restoration is proved to be a cost-effective alternative, making it possible to recycle precious biological tissues. No commercially available pre manufactured post meets all ideal biological and mechanical properties. The use of biological post made from natural, extracted teeth represents a feasible option for the strengthening of the root canal (Figure no.1), thus presenting the potential advantages:

- a) Do not promote dentin stress.
- b) Preserve the internal dentin walls of the root canal.
- c) Present total bio compatibility and adapt to conduct configuration, favoring greater tooth strength and greater retention of these posts as compared to pre manufactured posts.
- d) Present resilience comparable to the original tooth.
- e) Offer excellent adhesion to the tooth structure and composite resin and at a low cost.



**Figure 1:-** Biological Post

#### 1. Biological crown<sup>6</sup>

Biological crowns return excellent esthetic and functional results to the fractured teeth (such as the smoothness and shine of the surface, anatomical contour, natural color, hardness, and resistance to wear). Using the whole crown part of posterior tooth to restore gross carious tooth with biological crown is a good option. Thus, it may be concluded that biological restoration has a practical clinical applicability and is a viable, cost-effective restorative procedure for teeth with severely damaged crowns.

#### 2. Biological post and crown<sup>7</sup>

A biological post and crown meets the esthetic and structural standards of natural teeth. They provide natural fit into the endodontically treated root stumps and replace the coronal portion

esthetically. It provides excellent results regarding surface smoothness, esthetics, and the maintenance of the incisal guide in dental structures that cause physiological wear. The preparation of biological restoration is achieved by selecting teeth from the tooth bank which is reshaped with a crown preparation kit and the roots are shaped to function as posts (Figure no.2) The shaped tooth is then tried for fit in the prepared root canal and readjusted for a snug fit. The finally prepared crown and root are cemented with dual cure resin modified GIC to function as bio esthetic post and crown.



**Figure 2:-**Biological Post and Crown

1. **Biological space maintainer**<sup>8</sup>- Natural crowns and roots, obtained from a tooth bank, have been used as biological space maintainer. They have been used for space maintenance in children and as biologic restorations for posterior and anterior primary teeth. The technique is effective, reestablishes function, and represents an alternative to prosthodontic restoration in children. The natural crowns offer outstanding anatomy and aesthetics as well as preservation of natural tooth color. The natural enamel has physiologic wear, offers surface smoothness and cervical adaptation is compatible with those of the surrounding teeth (Figure 3).



**Figure 3:-**Biological esthetic space maintainer

**DISCUSSION :** Bio esthetics provides an excellent mode of restoration with high patient acceptances that not only mimics the missing part of the oral structures, but is also bio functional having similar modulus of elasticity with fractured tooth. The donor teeth for bio-esthetic dentistry are obtained from tooth banks, where they are sterilized using ethylene oxide gamma radiation.<sup>9</sup> During procedure, the tooth required is obtained from tooth bank based on its morphology, shade matching. A crown obtained from an extracted human tooth is used to re-establish the shape and function of a root canal treated tooth.<sup>10</sup> This technique allows natural results in terms of anatomic shape, surface shine, smoothness and translucence of the enamel; it also enables improvement of the chewing function and physiological wear of the tooth structure. Thus, the 'bio-esthetic concept' is then a simple and effective approach in creating highly aesthetic tooth forms which has become a reference in the field of paediatric dentistry.<sup>11</sup>

**CONCLUSION :** The technique for biological restoration is simple, less time consuming, allows the preservation of sound tooth structure and provides natural look as compared to composite resins and stainless steel crowns, especially regarding

translucency. It offers excellent esthetics, functional and psychosocial results, which justify the use of this technique to achieve the morph functional recovery of extensively damaged teeth. Biological restoration serves as an effective treatment alternative in pediatric restorative dentistry, as it fulfills all three FDI criteria for evaluation of restoration i.e., aesthetic, functional and biological aspects.

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## PROSTHETIC REHABILITATION OF A VELOPHARYNGEAL DEFECT: A CASE REPORT

Paras Arora, Rupali Sachdeva, Sapna Gupta

**ABSTRACT :** Rehabilitation of a patient with partial resection of soft palate is a prosthodontic challenge. Surgery is the preferred treatment for speech correction in patients affected by velopharyngeal dysfunction which may not be feasible in many clinical situations. Prosthetic treatment combined with speech therapy is the treatment of choice in such patients who cannot be managed with surgical treatment. In velopharyngeal dysfunction, hypernasality and regurgitation of food and liquids is common if defect is not obturated. This case report describes rehabilitation of a patient with soft palate defect and subsequent velopharyngeal insufficiency by a velo-pharyngeal prosthesis.

**Key-words:** Soft palate obturator, speech aid, velopharyngeal obturator

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**INTRODUCTION :** The vicissitudes of morphogenesis expresses never so cruelly as in case of oro-facial clefts. Patients with cleft palate have many problems like, impaired articulation, problem in deglutition and seepage of nasal secretions into oral cavity. The complexity of these problems requires numerous health care professionals co-operating to provide the specialized knowledge and skill necessary for comprehensive care. Diverse clinical and technical problems. A correctly designed obturator prosthesis helps to restore normal aesthetics, phonetics and function. The defects created after surgical excision of oral tumours vary depending on the size, location, and potential behavior of the tumour. An obturator prosthesis is used to restore masticatory function and improve speech, deglutition and cosmetics for patients with maxillary defects. Construction of a hollow bulb obturator reduces the weight of the prosthesis, making it more comfortable and efficient. In normal palatopharyngeal function, at rest the soft palate drapes from the posterior border of the hard palate, leaving an opening from the back of the oral cavity. During normal nasal breathing and humming with the mouth closed, the respiratory airflow and vocalized sound are directed through this passage way. Causes of velopharyngeal incompetence, Cleft palate, Traumatic injuries to neuromotor system and/or the peripheral efferent cranial nerves

\_ Cerebrovascular accident

\_ Brain stem tumours and

\_ Neuromuscular diseases such as multiple sclerosis and cerebral palsy

**Case Report :** A 60-year-old female patient came to the department of prosthodontics and maxillofacial prosthetics, Dasmesh college of Dental Sciences and Research Institute with complaint of missing teeth. Teeth were lost 28 years back due to periodontitis. No significant past medical history recorded and history of previous denture wears. Intra-oral examination revealed completely edentulous upper and lower arches, cleft of soft palate (Veau's classification<sup>5</sup> - group I) with Velopharyngeal incompetence (**Figure 1 & 2**). Nasal regurgitation and nasal in twang was observed. Treatment planning: surgical treatment option was eliminated considering age, systemic health and economic status of the patient. Prosthodontic treatment was decided with complete denture with hollow pharyngeal bulb prosthesis.

### Procedure

Upper and lower perforated stock trays were selected. Upper tray was modified with wax extension into the defect to record the defect. Then upper and lower preliminary impressions were made

with irreversible hydrocolloid. The upper impression also records the defect. Impressions were poured with dental stone to make diagnostic casts. Next step is the fabrication of special tray for border molding. Lower special tray is fabricated in conventional manner using autopolymerising acrylic resin. But during the fabrication of upper tray following factors were kept in mind. Keeping in mind all these criteria upper special tray was fabricated with autopolymerising acrylic resin having pharyngeal extension. Border molding was accomplished by recording all the functional movements of the soft palate, i.e., by asking the patient to tilt her head side-to-side and front-back when sitting upright. Impression of the defect area was made with impression compound. Lower Border molding was done in conventional manner.

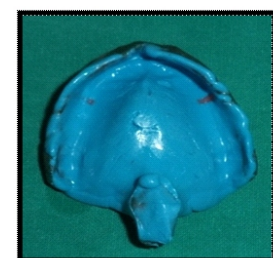


**Figure 1: MAXILLARY RIDGE WITH SOFT PALATE CLEFT**



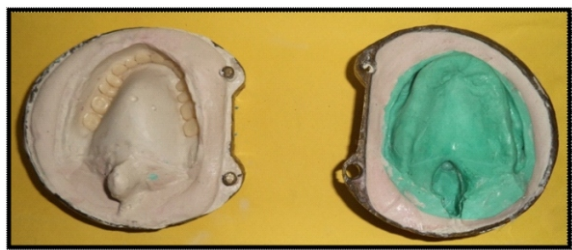
**Figure 2: MANDIBULAR ARCH VELOPHARYNGEAL DEFECT**

Upper final impression was made with medium body polyvinyl siloxane (**Figure 3 A&B**) and lower with ZoE. Beading and boxing was done and impressions were poured with die stone to fabricate master casts. Autopolymerising acrylic resin record bases were made. In case of upper record base did not include the pharyngeal extension. Occlusal rims were made. Jaw relations and try in was done in accordance with conventional complete denture fabrication procedures. After try in was over, all the undercuts of the defect area were blocked with wax. Flasking and dewaxing was done.

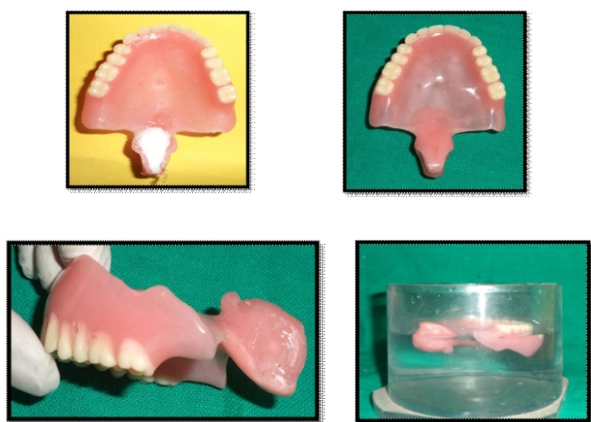


**Figure 3 A&B: UPPER PRIMARY AND FINAL IMPRESSION**

Then dentures were processed with heat cure acrylic resin (**Figure 3**). Lid for the bulb was processed separately with heat curing acrylic resin and was attached to the completed denture with autopolymerising acrylic resin. (**Figure 4**)



**Figure 3: FLASKING AND DEWAXING**



**Figure 4: MAXILLARY DENTURE WITH HOLLOW SPEECH BULB PROSTHESIS**

Upper and lower dentures were finished and polished followed by insertion (Figure 5, 6).



**Figure 5,6: INSERTION OF PROSTHESIS**

Patient was instructed in the use of the denture. Patient found drastic improvement in speech and nasal regurgitation was reduced. Patient was advised to continue her referral to speech therapist.

**DISCUSSION :** Velopharyngeal function is required for normal oronasal respiration control.<sup>2</sup> It also aids in other activities such as swallowing, blowing, sucking, whistling, and sneezing.<sup>6</sup> Surgical correction in cases of VP insufficiency may be contraindicated due to local or systemic reasons. Patients for whom surgical intervention is contraindicated are referred for prosthetic treatment.<sup>3</sup> A multidisciplinary approach to the treatment of VP insufficiency is often required. A speech pathologist should examine these cases to test articulation errors and inappropriate oro-nasal resonance balance.<sup>4</sup> Traditionally, various types of

speech-aid prostheses have been used: hinge type,<sup>8</sup> meatus-type obturator, palatal lift prosthesis devices<sup>5</sup> palatal stimulators, and fixed-type obturator known as a speech bulb.<sup>10</sup> Prosthetic management using speech bulb is an effective, physiologic, and versatile treatment modality. The objectives of obturator are to provide the capability for the control of nasal emission and inappropriate nasal resonance during speech and to prevent the leakage of material into the nasal passage during deglutition.<sup>6</sup> The degree of the defect can affect the functioning of the prosthesis. If the defect includes both soft and hard palate resections, the discomfort in the usage of obturator increases. Individuals with a history of radiation therapy have less satisfaction with obturator function due to salivary gland dysfunction<sup>7</sup> but if constructed properly, speech-aid prosthesis will allow an acceptable pharyngeal and oral comfort without any interference with oral articulation. Also, most of the patients have a concern over gag reflex. The various causes of the reflex and ways to control it should be carefully explained to the patient.<sup>8</sup> Due to increased muscular activity in this region, periodic adjustments of the size of the bulb would also be required.

**CONCLUSION :** The prosthetic correction of the cleft palate defects involves mixed emotions. A great tragedy occurs in the life of parents when a child with cleft palate born to them. Unlike some of the discipline involved in the treatment of cleft palate patient, the prosthodontist have an application from birth to death. Prosthodontic care never ends. Once surgical care and speech therapy have been completed, the need for follow-up care is needed unless specific problems manifest. Preventive care is imperative if long-term preservation of the supporting structures is desired.

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**SUCCESSFUL MANAGEMENT OF KCOT BY SURGICAL RESECTION AND SECONDARY RECONSTRUCTION. A CASE REPORT**

*Yuvraj Gupta , Dinesh Kumar Verma, Shallu Bansal, Rajat Pareek*

**ABSTRACT :** Keratocystic Odontogenic tumour (KCOT) is a benign neoplasm defined by the World Health Organization as a benign uni or multicystic, intra osseous tumour of odontogenic origin with a characteristic lining of parakeratinised stratified squamous epithelium and a potential for aggressive and infiltrative behavior (the ability to expand through bony walls and invade deeper structures); with high recurrence rate (0 to 62%). The posterior body and ramus are the most commonly involved sites in the mandible. Treatment of KCOT is still controversial due to difference in opinion among different surgeons as some prefer conservative treatment but the rate of recurrence was higher whereas others prefer surgical resection as it reported to have very low recurrence. The following paper features the diagnosis and successful management of KCOT by surgical resection and secondary reconstruction.

**Keywords:** Benign neoplasm, keratocystic odontogenic tumour, recurrence, secondary reconstruction, surgical resection

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**Source of Support :** Nil, **Conflict of Interest :** Nil

**INTRODUCTION :** Odontogenic keratocyst (OKC) was first described in 1956 by Phillipsen.<sup>1</sup> The etiology is probably closely related to the development of dental lamina and in particular in remnants after this organ has served its purpose.<sup>2</sup> The rate of recurrence probably depends on the mode of treatment used.<sup>3</sup> Unfortunately, there are only a few reliable studies available from which meaningful conclusions can be drawn with regard to the best possible treatment.<sup>2</sup> Various treatment methods for OKC's have been reported ranging from conservative to radical surgery, because of its nature and high recurrence rate, the treatment goal of OKC is the prevention of recurrence which may be achieved by more aggressive resective surgery. Different treatment options are available regarding the reconstruction of residual defect related to OKC such as enucleation with bone graft, resection with bone graft or secondary bony reconstruction.

The present case report describes the diagnosis and successful management of large OKC with surgical resection and secondary reconstruction.

**CASE REPORT :** A 32 year male patient reported in the Department of Oral and Maxillofacial Surgery with a complaint of swelling on the left side of face and lower back tooth region since 5 years. Swelling started insidiously and grew slowly to attain the present size. Pus discharge was associated with the swelling since 1 year. Patient was otherwise healthy systemically and periodontally. Past dental history revealed history of extraction of tooth # 26 2-3 years back and history of root canal treatment of #37 2-3 months back. Upon extra oral examination, facial asymmetry was evident (Figure 1).



**Figure 1-Extraoral View**

A solitary diffuse swelling 2.5cm x 2 cm in size was evident over the left mandibular posterior region, extending from left side of ala tragus line to lower border of mandible supero-inferiorly and from commissure of lip to near pinna of ear antero posteriorly. On palpation, ill defined, non-tender, non-reducible, non-compressible swelling in relation to left side of face without local rise in temperature with an ipsilateral solitary, non-tender; approximately 3-4mm in size sub-mandibular lymph nodes were present.

On intraoral examination, solitary, diffused swelling of 1.5x1.5cm with vestibular obliteration was evident with respect to (w.r.t) 34 – 37; egg shell crackling was felt on palpation of buccal cortical plate of 37 and rest of areas were firm in consistency (Figure 2).



**Figure 2-Intraoral View**

Investigations included OPG revealed multilocular, oval shaped, homogenous radiolucency with well-defined corticated borders extending from mesial root of 46 to the medial surface of root of 33. A radiolucency in radiolucency was seen w.r.t 36, 37 which suggested erosion of cortical plate with impacted 43 which has transmigrated in 32 - 33 region & root resorption w.r.t 45-32 (Figure 3);



**Figure 3-OPG**

incisional biopsy revealed 4-6 cell layer thick epithelium. The basal layer was hyper chromatic and was arranged in palisaded manner. The connective tissue was fibrous (Figure 4).



**Figure 4-Incisional Biopsy**

The clinical and histopathological findings were suggestive of keratocystic odontogenic tumour or OKC. After Obtaining patient signed consent, surgical resection with immediate reconstruction with reconstruction plate was carried out as shown in (Figure 5-7).



**Figure 5-**After intubation & standardized painting & draping, marking was done for submandibular incision.



**Figure 6-**After raising the skin, platysma, superficial fascia, masseter muscle full thickness mucoperiosteal flap was raised to expose the infected area with preservation of marginal mandibular nerve.



**Figure 7-**Reconstruction was done with reconstruction plate Two layer suture was done with 3.0 vicryl & 3.0 silk both extraorally and intraorally and drain was secured.

After one year patient reported with a chief complaint of pain with the history of trauma on the operated site few days back. OPG of operated site showed fractured reconstruction plate(Figure 8).



**Figure 8-**Fractured Reconstruction Plate

Therefore, secondary reconstruction with iliac crest bone graft was planned and performed under general anesthesia (Figure 9-11).



**Figure 9-**Osteotomy Done at iliac crest



**Figure 10-**Graft was stabilized with reconstruction plate



**Figure-11** Two layer suture was done with 3.0 vicryl & 3.0 silk

Uptill 9 months follow-up nothing significant reported.

**DISCUSSION:** The nature of keratocyst and the possible histologic subtypes were fully described in 1960s.<sup>5</sup> KCOT is a cystic lesion of odontogenic origin that demonstrates the behavioral characteristics of a benign neoplasm and has a tendency to recur.

KCOT clinical features include uni/multilocular cyst in the posterior maxilla or angle and ascending ramus of mandible,<sup>2</sup> patient may complain of pain, swelling, or discharge and occasionally they experience paraesthesia of the lower lip or teeth. It more frequently reported in the second and third decades; observed more frequently in mandible than maxilla which ranges from 69% to 83%, approximately one half of all KCOT occur at the angle of the mandible and extend for varying distances into the ascending ramus and forward into the body<sup>6</sup>; similar findings were observed in the present case.

The various treatment options include decompression and marsupialization, enucleation and curettage, enucleation and peripheral osteotomy, enucleation and treatment of the bony defect with carnoy solution, osseous resection without (rim ostectomy/marginal resection) or with (segmental resection) continuity defect etc have been reported for the management of KCOT<sup>7</sup>but because to high recurrence rate 0-62.5%<sup>7</sup>, its ability to expand through bony walls and invade deeper structures, including cranial base<sup>7</sup>; as the present lesion was large and invade both buccal and lingual plates as well as soft tissue. Therefore, extensive segmental resection extending its margins by 1 cm all around the lesion was performed to prevent recurrence as reported by Ghali GE et al,<sup>7</sup> and the loss of continuity is corrected by reconstruction plate followed by secondary reconstruction with iliac crest bone graft. No recurrence was reported after total 1yr 9 months. The results of present case report is an accordance with the report of Ghali GE et al.<sup>7</sup>

**CONCLUSION :** Extensive surgical resection with secondary reconstruction is effective cosmetic and functional treatment modality for the management of large KCOT when invades both the hard and soft tissue.

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## MESIODENS IN PRIMARY DENTITION- REPORT OF TWO CASES.

Metashi Singla, Aparna Singh Shaktawat, Purshottam Jasuja, Kanika Gupta Verma

**ABSTRACT :** Supernumerary tooth is a developmental anomaly and has been argued to arise from multiple etiologies. Supernumerary teeth occur frequently in the permanent dentition, but they are rare in the primary dentition. Mesiodens is a supernumerary tooth located in the anterior maxilla, placed palatally or in between the maxillary central incisors. Incidence of mesiodens in children varies from 0.15 - 0.38%. It may be single or paired, erupted or impacted and at times even inverted. Morphologically, mesiodens may be of three types: the most commonly seen is conical, while tuberculate and supplemental types are less common.

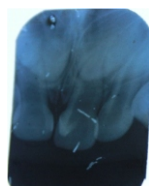
**Key Words-** Mesiodens, primary dentition, supernumerary teeth.

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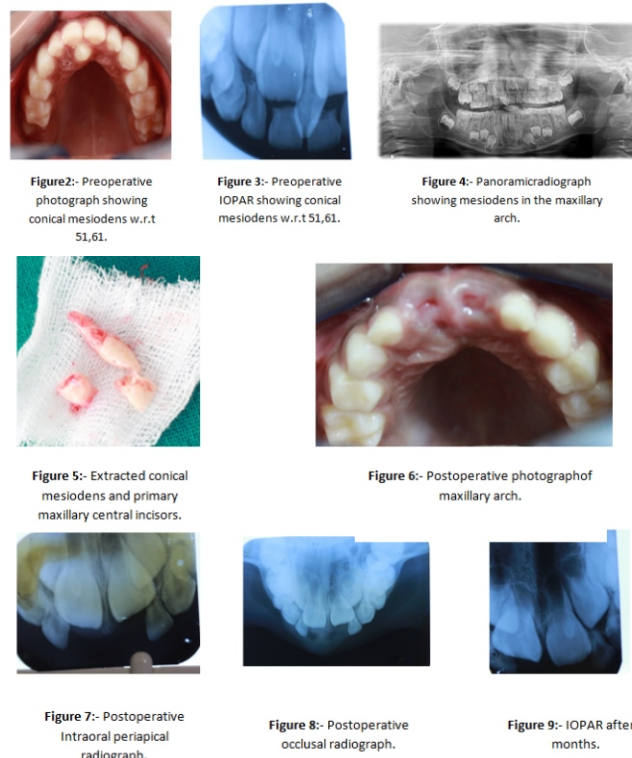
**INTRODUCTION:** Mesiodens is defined as an extra tooth between the maxillary central incisors. The occurrence of mesiodens in the primary dentition is very rare when compared to the permanent dentition. The incidence of mesiodens in permanent dentition ranges from 0.15 to 3.8%, whereas in primary dentition it ranges from 0 to 1.9%.<sup>1</sup> They are twice more common in boys, while no significant sex distribution is noted in primary supernumerary teeth. Mesiodens may at times erupt normally or then stay impacted or follow an abnormal path of eruption.<sup>2</sup> Mesiodens or mesiodentes may produce a variety of complications, for example, crowding, delayed eruption, diastema, rotations, cystic lesions, and resorption of adjacent teeth, etc., to the developing dentition / occlusion of a child. Supernumerary teeth of the pre-maxillary region may appear in a variety of shapes though the most common type is conical or peg shaped (61%). The other two commonly present are tuberculate and supplemental (adjacent tooth like).<sup>3</sup> Various theories have been put forward to explain the etiology of supernumerary teeth which includes phylogenetic reversion (atavistic theory), split in tooth bud (dichotomy theory), locally conditioned hyperactivity of the dental lamina (dental lamina theory), and a combination of genetic and environmental factors (unified etiologic explanation).<sup>4</sup> As the incidence of mesiodens in primary dentition is very less, hereby presenting two case reports of a patient with mesiodens in primary dentition, who reported to out department.

**CASE REPORT 1:** A one and half years old female patient with her guardians reported to the Department of Paediatric and Preventive Dentistry, Surendera Dental College and Research Institute, Sri ganganagar, Rajasthan, with a chief complaint of eruption of a sharp tooth in her upper front tooth region. Her medical and family history was not relevant. No deleterious habits were found. Intraoral examination revealed a conical shaped supernumerary tooth placed palatally to the left primary maxillary central incisor. Intra-oral periapical radiograph revealed a conical shaped mesiodens w.r.t the left maxillary central incisors with no other abnormality (Figure 1). Considering the age of the patient and as the tooth was asymptomatic, the extraction of mesiodens was delayed. The regular follow-up was advised to access the development of the mesiodens.



**Figure 1:-** Intraoral Periapical Radiograph showing palatally placed conical mesiodens w.r.t the left central incisor.

**CASE REPORT 2:** A seven years old male patient reported to the Department, with a chief complaint of irregularly placed tooth in the upper front teeth region since one month. The medical and family history was not relevant. Intra-oral examination revealed presence of a palatally placed erupted conical shaped supernumerary tooth between the primary maxillary central incisors (Figure 2). Intraoral periapical radiographic examination revealed an erupted conical shaped mesiodens present w.r.t 51 and 61 (Figure 3). Panoramic radiograph revealed no other abnormality in the arch (Figure no. 4). The treatment plan was the extraction of primary maxillary central incisors and an erupted mesiodens (Figure 5). The post-operative photographs, IOPA and occlusal radiographs were taken (Figure 6,7,8). The patient was advised for regular follow up to access the eruption of permanent maxillary central incisors (Figure 9).



**DISCUSSION :** Mesiodens account for a 45-67% of all supernumerary teeth.<sup>5</sup> Balk in 1967 defined mesiodens as the most common supernumerary tooth, located mesial to both central incisors, appearing peg shaped in a normal position or inverted position.<sup>6</sup> Very few supernumerary teeth have been reported in the primary dentition. The present case reports are quite unusual, as reported mesiodentes were present in primary dentition.<sup>5</sup> Supernumerary teeth are classified according to their shape, size (morphology) and location. Here, both the case reports are with conical shaped mesiodentes present in maxillary arch. Various clinical problems have been associated with mesiodens like development of malocclusion, ectopic eruption of adjacent teeth, cystic changes in the follicle etc. Detection of mesiodens or supernumerary teeth is best achieved by clinical and radiographic examination (IOPA, Occlusal, Orthopantomogram).<sup>7</sup> The mesiodens is therefore a fairly common, though usually unperturbing but interesting dental anomaly that a dental practitioner chances upon. Delayed, ectopic or asymmetric eruption of the central incisors should alert the clinician to the possibility of a mesiodens. Awareness of its incidence and behavior is therefore significant.<sup>5</sup>

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## MANAGEMENT OF EXTRAORAL SINUS WITH NON-SURGICAL ENDODONTIC RETREATMENT – A CASE REPORT

Sonam Mahajan, Saransh Tuli, Harleen, Shina Ghai

**ABSTRACT :** Cutaneous sinus tracts of dental origin are uncommon and often initially misinterpreted and inappropriately treated because of their uncommon occurrence and the absence of symptoms. The microbiologically induced inflammation or infection follows the path of least resistance by penetrating the alveolar bone. They usually cause the soft tissue to swell or form an intra-oral fistula. However, the infection can break through the skin making it look like a bad pimple. These conditions are often misdiagnosed as other non-pulpal pathologies, which may lead to unnecessary invasive treatment of skin lesions. The present case report deals with the successful non-surgical endodontic treatment which led to healing of extra-oral lesion and closure of sinus tract.

**Key Words :** Cutaneous sinus tract, large periapical lesion, non-surgical treatment.

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**INTRODUCTION :** A sinus tract can be well defined as a channel leading from an enclosed area of inflammation to an epithelial surface which can be intra-oral or extra-oral. Cutaneous sinus tracts of dental origin have been well documented in the medical literature, dental literature and dermatological literature.<sup>1</sup> Cutaneous sinus tracts of dental origin continue to be a diagnostic dilemma and is the most common among the many types of sinus tracts that are formed on the face and neck. Because these lesions are often diagnosed incorrectly, they are also treated ineffectively.

The odontogenic cutaneous sinus tract on the facial and cervical skin is known to develop as a result of dental pulp necrosis and chronic periapical periodontitis.<sup>3</sup> We as clinicians should recognize that a cutaneous sinus tract is a sequel to pathosis, while the associated non-vital tooth, with its peri radicular pathology, is the primary cause.<sup>4</sup> The most common cause of a cutaneous sinus tract is a Chronic peri radicular abscess. These abscesses arise from bacterial invasion, chemical irritation or trauma. The most common initiating factor of the peri radicular abscess is carious exposure and subsequent bacterial invasion of the tooth pulp.<sup>5</sup> The inflammatory process begins in a necrotic pulp and spreads into the surrounding periodontal ligament and bone. The first pathological change is apical periodontitis. The inflammatory and immunological processes then induce bone resorption, and the marrow spaces are involved, resulting in the formation of a localised abscess – the suppurative osteitis. The inflammation then spreads peripherally until the cortex of the bone is destroyed and a sub-periosteal abscess is formed.<sup>6</sup> The periosteum is pierced, and depending on factors such as gravity, virulence of microorganisms or most importantly, anatomical arrangement of adjacent muscles and fasciae, either a cutaneous sinus or an intraoral sinus will form.<sup>7</sup>

The microorganisms along with their by-products present in the necrotic and infected pulp spread beyond the confines of the tooth into the peri radicular area might perforate the cortical plate through inflammatory and immunological processes with the infection draining onto the intra-oral mucosa or cutaneous surface resulting in pimple of skin.<sup>8</sup>

The remoteness of the cutaneous sinus tract from its site of origin within the oral cavity often leads to misdiagnosis and needless cutaneous surgery<sup>9</sup> that leads to destructive treatment of the local skin lesions that is not curative, and is often mutilating. Even skin biopsy may further compromise the beauty of face by unnecessary scarring and dimpling. On the other hand, the correct

identification of this entity leads to simple and effective treatment consisting of removal of the infected pulp canal tissue, resulting in minimal cutaneous scarring.<sup>5</sup>

Presenting here a case report of extra-oral cutaneous odontogenic sinus tract to the chin (submental region) in relation to mandibular incisors that underwent complete resolution following correct diagnosis & conservative non-surgical endodontic therapeutic approach.

**CASE REPORT:** A 36-year old female patient reported to the Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences & Research, Ferozepur (Punjab) with the chief complaint of pain in lower front tooth region since 3 days. Patient gave history of trauma two years back which resulted in pus discharge inside the mouth with persistence of mild symptoms for which she had undergone endodontic treatment at a local dental clinic. No relevant medical history was recorded. The dental history revealed mild discomfort in mandibular right lateral and both central incisors for the past 3 months. Extra-oral examination revealed a cutaneous opening of size 5 mm x 10 mm in the mental region with a purulent discharge and an accompanying swelling of the chin (**Figure 1**). Swelling was tender on palpation, had raised temperature and was hard in consistency. Intra-oral examination revealed no vestibular swelling although the labial vestibule was tender on palpation. Teeth # 31, 41, and 42 showed faulty coronal restoration & were slightly tender on percussion. A Gutta-Percha cone was inserted through the extra-oral lesion to track the path of sinus followed by a periapical radiograph which confirmed the offending tooth. No signs of mobility or periodontal pockets were present in relation to the same teeth. An intra-oral periapical radiograph revealed faulty endodontic treatment and a well-circumscribed peri-radicular radiolucency associated with 31, 41 and 42 (**Figure 2**). Thus, the diagnosis of chronic periapical abscess causing extra-oral draining sinus in sub-mental region was made.



**Figure 1:** Cutaneous sinus tract in the sub-mental region before treatment.



**Figure 2:** Preoperative intraoral periapical radiograph showing poor obturation & periapical radiolucency associated with tooth no. 31, 41 and 42.

Root canal retreatment was initiated for the offending teeth (31, 41, and 42) after local anesthesia and rubber dam placement. The Gutta-Percha was removed using H-files and a Gutta-percha solvent. After complete removal of Gutta-percha from all the canals (**Figure 3**), working length was determined with Root ZX electronic apex locator (J Morita, Kyoto, Japan) and confirmed with an intra-oral periapical radiograph. Bio-mechanical preparation was done with hand instrumentation using stainless steel K-files & step back technique. Irrigation was done with chlorhexidine solution and final apical preparation was performed upto size #35 K-file. Canals were dried using paper points. The canals were obturated using lateral compaction technique with #35 gutta percha as the master cone. The quality of obturation was confirmed radiographically (**Figure 4**). A week later, PFM crowns were given with respect to 31, 41 and 42. The patient was asked to report for follow up on 15th day, 1 month and 3 months. Apparent resolution of the extra-oral sinus was evident after 1 month (**Figure 5**) and the patient was comfortable without any symptoms. 3 months follow-up radiograph showed progressive healing of bone (**Figure 6**).



**Figure 3:** Intraoral periapical radiograph showing removal of gutta percha from #31, 41 and 42 for retreatment.



**Figure 4:** Intraoral periapical radiograph showing completed endodontic retreatment wrt #31, 41 and 42.



**Figure 5:** Healing of extraoral sinus without scar formation (1 month follow-up).



**Figure 6:** Intraoral periapical radiograph showing progressive healing at 3 months follow-up.

**DISCUSSION :** The evaluation of a cutaneous sinus tract must begin with a thorough medical history and awareness that any cutaneous lesion of the face and neck could be of dental origin.<sup>1,2</sup> The patient's history may include complaints of dental problems. However, patients may not remember any history of an acute or painful onset. There may also be complaints of episodic bleeding or drainage from the cutaneous site with persistence of the cutaneous lesion.

Palpation of the involved area often reveals a cord-like tract attached to the underlying alveolar bone (maxilla or mandible) in the area of the suspected tooth,<sup>10</sup> if the sinus tract is patent, a lacrimal probe or gutta-percha cone can be introduced into the sinus opening and passed through the sinus until it meets the area of the tooth. An intra-oral periapical radiograph should then be carried out with the probe in situ pointing to the origin of the pathosis (this is usually a non-vital tooth, but in edentulous patients could be a retained tooth fragment, an impacted tooth or an odontogenic cyst).<sup>10</sup>

Pulpal and periradicular diagnostic testing should be performed on the suspected tooth and adjacent teeth. More than one tooth may be shown sign of pulp involved and associated with the cutaneous odontogenic sinus tract.<sup>2</sup>

The differential diagnosis should include traumatic lesions, fungal and bacterial infections, neoplasms,<sup>2</sup> presence of a foreign body, local skin infection,<sup>2</sup> pyogenic granuloma, chronic tuberculosis lesion,<sup>1</sup> osteomyelitis,<sup>4</sup> actinomycosis,<sup>1</sup> and gumma of tertiary syphilis.<sup>2</sup>

Rare entities to be included in the differential diagnosis are developmental defects of thyroglossal duct origin or branchial cleft, salivary gland and duct fistula, and suppurative lymphadenitis.<sup>1, 2</sup> In the present case tracking of the sinus tract with gutta-percha confirmed that the cutaneous lesion was of dental origin.

Root-canal therapy is the treatment of choice if the tooth is restorable. Extraction is indicated for non-restorable teeth. Once the primary odontogenic aetiology has been properly eliminated, the sinus tract and cutaneous lesion usually resolve within a few weeks without treatment, which includes no antibiotic therapy.<sup>1</sup>

A cutaneous odontogenic sinus tract is a localized entity and is not an indication for antibiotics. Systemic antibiotic administration is neither necessary nor recommended in patients with a cutaneous odontogenic sinus tracts who have an intact immune system, no sign or symptoms of systemic involvement, and no other systemic condition that requires prophylactic antibiotic cover. These patients are usually healthy. The sinus tract prevents swelling or pain from pressure build-up because it provides drainage of the odontogenic primary site. Thus, the draining sinus tract maintains a localized condition and prevents systemic involvement.<sup>4</sup> Therefore; no antibiotics were administered to the patient in the present case.

Histologically, these tracts are composed of fragments of granulation tissue, which are often focally lined by stratified squamous epithelium. Healing occurs by secondary intention in most cases.<sup>1</sup> Cosmetic surgical treatment may be required later if the area heals with a residual tract that results in cutaneous retraction or dimpling.<sup>1,2,4</sup> However in the present case healing occurred without leaving behind any prominent scar.

**CONCLUSION :** Recognition of the true nature of the lesion facilitates prompt treatment, minimizes patient discomfort and esthetic problems, and reduces the possibility of further complications greatly. Elimination of primary cause of infection of extra-oral sinus is mandatory for complete healing of cutaneous

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lesion without the need of surgical intervention. The present case report demonstrates complete endodontic treatment resulting in proper healing and repair of cutaneous sinus tract without any surgical intervention.

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## CORRECTION OF SKELETAL DEEPBITE USING A “SURGERY FIRST” APPROACH: A CASE REPORT.

Sanjay Jasuja, Sachin Ahuja, Seema Gupta, Eenal Bhambri

**ABSTRACT:** This case report describes the treatment of a 16 years old female who had a skeletal class I with anterior vertical maxillary excess and canting of occlusal plane on left side with dental class I malocclusion, increased overbite and reduced overjet. Treatment was performed with a modified surgery first approach, which included a short pre-surgical alignment phase segmentally, so that anterior step can be maintained followed by maxillary anterior subapical osteotomy and the use of the inherent increased bone turnover in the post-surgical phase (RAP) helped to reduce the total orthodontic treatment time. Pleasing esthetic results and good functional occlusion were achieved.

**Key Words:** Increased bone turnover, skeletal deep bite, surgery first

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**INTRODUCTION :** Pre-surgical orthodontic treatment has been found to be the most time-consuming stage for patients undergoing orthognathic surgery. This phase can vary widely from 7 to 47 months. A long period of pre-surgical orthodontic movement usually does not help the patient's chief complaint, which often is a facial deformity. Pre-surgical orthodontic treatment accentuates the skeletal deformity and further antagonizes the patient, who desires his or her facial esthetics to be normal. Recently, there has been much interest in shortening the total treatment time for patients undergoing combined orthodontic and orthognathic surgical treatment.<sup>1</sup>

The surgery-first approach can be used to treat a variety of malocclusions with different degrees of complexity. Certain criteria, such as mildly crowded anterior teeth, a flat to mildly accentuated curve of Spee, normal to slightly proclined or retroclined incisors, and minimal transverse discrepancies, are ideal for a surgery-first approach.<sup>2</sup>

The surgery-first approach changes the facial appearance at the beginning but also increases the risk of relapse because of the lack of a relatively stable occlusion. Considering these advantages and disadvantages, minimal pre-surgical orthodontics (0-6 months) has been proposed to eliminate the post-surgical occlusive interference and to produce a relatively stable post-operative occlusion.<sup>3</sup>

**CASE REPORT :** A 16 year old female was referred from Department of Endodontics to Department of Orthodontics and Dentofacial Orthopaedics with the chief complaint of anterior traumatic bite, in relation to upper left incisors and canine. Her medical history was non contributory, and the patient underwent endodontic treatment of upper left anterior teeth. The pretreatment facial examination showed a convex soft tissue profile, the ratio of mid facial height is more as compared to lower anterior facial height and the gingival exposure is more while smiling. Intra oral examination revealed dental class I malocclusion was found with increased overbite of 9mm and reduced overjet of 1mm, with downward canting of upper left anterior segment(Figure 1).



**Figure 1.** Pretreatment extra-oral and intra-oral photographs.

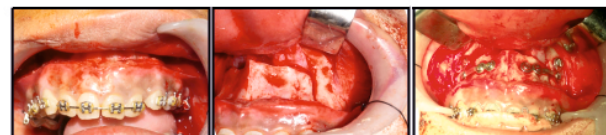
The cephalometric analysis showed a skeletal class I (ANB 2°, Wits appraisal 1mm), and skeletal deep bite. The overall treatment objectives for this patient were to relieve the traumatic bite, improve the maxillary and mandibular incisor inclinations, and to reduce gumminess of smile.

After the initial appointment for records, active orthodontic treatment was started by banding and bonding of upper arch, 0.016" NiTi wire was placed segmentally in the anterior and posterior segments, so that anterior step can be maintained. This segmental alignment was done up to the level of 0.019" × 0.025" stainless steel wire (Figure 2). The initial preparation time was 6 months.



**Figure 2.** Presurgical phase

After finishing the phase I, the patient was referred to Department of Oral Surgery for anterior maxillary osteotomy to reduce the overbite by 4mm and to correct the skeletal cant (Figure 3).



**Figure 3.** Anterior maxillary osteotomy

At the postsurgical follow up appointment, as planned the three piece intrusion and retraction arch was given to correct the remaining overbite (Figure 4).



**Figure 4.** Three piece intrusion and retraction arch

Presently patient is in finishing stages which requires correction of zeniths in anterior segment and finer adjustment of occlusion(Figure 5).



**Figure 5.** Finishing wires

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**DISCUSSION:** Close cooperation and joint agreement between Orthodontists and Oral and maxillofacial surgeons is believed to be a key factor in successful orthognathic surgery. A general guideline for contemporary orthognathic treatment is that each patient requires a variable length of preoperative orthodontic preparation, followed by a relatively constant period of postoperative orthodontic treatment to obtain the final occlusion.<sup>4</sup> The most challenging step in preparation for the surgery-first approach in orthognathic surgery is predicting the final occlusion based on the current position of the teeth. Liou<sup>2</sup> used the term “transitional occlusion” to describe the occlusion that will be used to fabricate the surgical splint. The transitional occlusion must be stable enough to allow a splint fabrication and a predictable skeletal correction. In this patient, because of the retroclined maxillary incisors, it was impossible to establish a stable transitional occlusion, making it necessary to perform the initial alignment.

After the pre-surgical phase, patient was referred to Department of Oral and maxillofacial surgery for anterior maxillary osteotomy to reduce the overbite. Liou<sup>3</sup> demonstrated that 3 to 4 months after the orthognathic surgery there is increased mobility of the teeth, which has been attributed to the regional acceleratory phenomenon (RAP).<sup>6</sup> Meanwhile, histologic evaluations indicated demineralization and remineralization in alveolar bone; osteoclasts and osteoblasts increased by local multicellular mediator mechanisms containing precursors, supporting cells, blood capillaries and lymphatic tissue.<sup>7,8</sup>

Furthermore, during the post-surgical phase maxillary anteriors were retracted and intruded simultaneously with three piece intrusion and retraction arch. The patient was satisfied with the dramatic functional improvement and esthetic change achieved in such a short period of wearing fixed appliances.

**CONCLUSION:** The “surgery first” approach can be used to address skeletal deepbite, as shown in this case. Treatment time can be substantially reduced by reducing the pre-surgical phase and taking advantage of increased bone turnover, which in turn can accelerate tooth movement.

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## SURGICAL MANAGEMENT OF PALATAL FIBROMA-A CASE REPORT

Aparna Singh Shaktawat, PurshottamJasuja, Kanika Gupta Verma, Gaurav Singh Rajawat

**ABSTRACT :** The present case report describes the case of palatal fibroma in a 2.5years old boy. The clinical, radiographic, histologic characteristics and differential diagnosis are discussed. The surgical excision of pathology was planned and regular follow up was given to the patient.

**Keywords-** Fibroma, palate, surgical excision

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**Source of Support:** Nil, **Conflict of Interest:** Nil

**INTRODUCTION :** The fibroma is the most common benign soft tissue tumour found in the oral cavity. It is characteristically a dome-shaped lesion with a sessile base and a smooth surface that usually follows the color of surrounding mucosa. It may vary from a firm to flaccid in texture, and most commonly occurs in sites predisposed to irritation or trauma, such as the buccal mucosa, lip, tongue, gingiva and hard palate.<sup>1</sup> Projecting above the surface, this benign tumour sometimes becomes irritated and inflated and may even show superficial ulceration. It is nearly always a well-defined, slowly growing lesion that occurs infrequently in the first and second decade of life. It is generally considered to be caused by chronic irritation.<sup>2</sup> The prevalence of fibroma is in the age group of 9-20 years, mostly in females and most common site of occurrence is maxillary arch.<sup>3</sup>

Histologically, the fibroma consists of bundles of interlacing collagenous fibres inter-spread with varying numbers of fibroblasts or fibrocytes and small blood vessels. The surface of the lesion is covered by a layer of stratified squamous epithelium, which frequently appears stretched, and shows shortening and flattening of rete pegs. If trauma to the tissue has occurred; vasodilation, edema and inflammatory cell infiltration are variably present.<sup>4</sup>

The treatment of fibroma is a conservative surgical excision and the lesion does not recur normally.<sup>2</sup> The present case report is presented in a 2.5 years old male patient in maxillary arch.

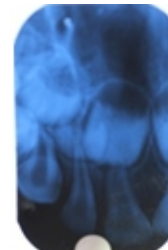
**Case Report :** A healthy 2.5years old boy reported to the Department of Pediatric and Preventive Dentistry, Surendera Dental College and Research Institute, Sriganaganagar with a chief complaint of a growth behind his upper front teeth. According to the patient's mother, the growth is reddish-purple in color and had been present since approximately 2 months and it had just recently become visible between the upper front teeth. The growth was interfering on biting, chewing and patient was feeling uncomfortable.

Clinical examination revealed an asymptomatic, soft, pedunculated elevation of the mucosa present palatally with an irregular surface, measuring approximately 10 x 8 x 5 mm in dimension (Figure 1). The medical and family history was not relevant. There was no history of trauma or deleterious oral habits. The lesion was painless and non-blanching on palpation.



**Figure 1:-** Pathology present on the anterior two-third of hard palate w.r.t #51,52.

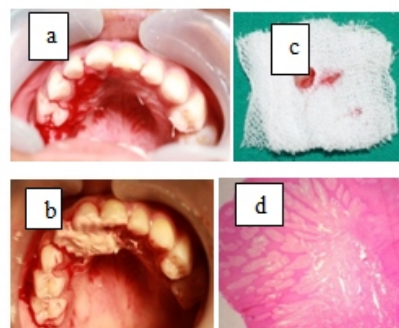
Intraoral periapical radiograph revealed no pathologic bony changes (Figure 2). The surgical excision of the palatal overgrowth was planned.



**Figure 2:-** Intraoral periapical radiograph showing no pathologic bony changes.

Under local anaesthesia, the palatal growth was excised completely using a scalpel and blade no.12 (Figure 3 a). Bleeding was controlled and site was covered with coe-pack (Figure 3 b). The excised tissue (Figure 3 c) was then sent to the Department of Oral Pathology for histopathological investigation. The histopathological findings revealed dense collagen with areas of hyalinization and a paucity of blood vessels, with the covering of stratified squamous epithelium (Figure 3d).

A final diagnosis of fibroma was made based on the clinical and histopathological findings. Post operative instructions and medication was prescribed to the patient. Patient was given follow up after 7 days.



**Figure 3:-** a) surgical excision of the pathology; b) Coe-pack given at the operative site c) excised tissue d) H & E section of tissue micrograph showing dense collagen mass and stratified squamous epithelium.

At the follow up of 2 weeks, complete healing of operative site was observed, with no recurrence of lesion (Figure 4).



**Figure 4 :-** Post operative photograph showing complete healing after 2 weeks.

**DISCUSSION :** The fibroma is the most common non-odontogenic tumor in children and adolescents and is primarily found on gingival, buccal mucosa, lip and tongue. Nevertheless, fibromas on the palate, the true neoplasm of connective tissue, has seldom been reported.<sup>5,6</sup> The palatal overgrowth such as in our case report can impose a difficult diagnostic dilemma for the clinician.

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Differential diagnosis of the palatal mass includes palatal abscesses, benign and malignant tumours, benign neural tumours, and traumatic or irritation fibromas.<sup>7,8</sup> Furthermore, it could be microscopically similar to the condition known as inflammatory hyperplasia (or traumatic fibroma), where the mass may appear clinically more obscure and indistinguishable. However, in the present case, the lack of any history of trauma or irritation was the key to define the final diagnosis as true fibroma. In few situations, the distinction between hyperplasia and true neoplasia is as poorly defined as it was here in the present case. Hyperplastic tissues sometimes, but not inevitably, regress after removal of the stimulus or irritant.<sup>9,10</sup> In this case, no such regression was noticed and the lesion had been growing since 2 months. Thus diagnosing the case to be a true neoplasm, although the distinction between hyperplasia and neoplasia is not clear, we had to depend on the required history to determine how to manage the lesion. It is commonly believed, however, that a great number of the lesions of the oral cavity diagnosed as fibromas are in reality, simply the examples of focal or localized hyperplasia, resulting from inflammation, and that the true fibroma is much rarer than is presently reported.<sup>2</sup>

The treatment is surgical intervention, whether the lesion is true neoplasm or not. It was decided to perform an excisional biopsy to avoid the possibility of secondary surgery. Thus the biopsy of the palatal mass was necessary to render a definite diagnosis and determine the optimal treatment and management of the patient.

**CONCLUSION:** The fibroma is the most common benign soft tissue tumour found in the oral cavity. The present case report revealed palatal overgrowth, diagnosed as fibroma, based on case history, clinical, radiographical and histo-pathological investigation. The surgical excision was done with uneventful healing of the palatal tissue.

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## RESTORATION OF LOST TOOTH STRUCTURE OF ENDODONTICALLY TREATED MOLAR WITH HORIZONTAL GLASS FIBRE POST: A CASE REPORT.

FatinderJeet Singh, Yogesh Kumar, Neetu Jindal, Renu Aggarwal

**ABSTRACT :** Endodontically treated teeth (ETT) have a higher risk of biomechanical failure than teeth with vital pulps. This is actually related to the loss of structural integrity associated with the access preparation that results in increased cuspal deflection during function, which leads to a higher occurrence of fractures. After root canal treatment, restoration and reinforcement of remaining tooth structure is of high importance. Therefore, this case report highlights the reinforcement of endodontically treated teeth with wide mesioclusaldistal cavity with the help of placement of fiber post horizontally followed by composite resin restoration without any subsequent crown with a follow up of six months.

**Keywords:** Fiber post, fracture strength, reinforcement, root canal treatment.

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**INTRODUCTION:** Endodontically treated teeth (ETT) have a higher risk of biomechanical failure than teeth with vital pulps. This is actually related to the loss of structural integrity associated with the access preparation that results in increased cuspal deflection during function, which leads to a higher occurrence of fractures. The prognosis of ETT is influenced by different parameters such as amount of hard tissue loss, presence of a minimum of 1.5–2.0 mm ferrule height preparation and post and core material used during restoration and reinforcement.<sup>2</sup> After root canal treatment is performed, restoration of lost tooth structure along with reinforcement of remaining tooth structure is highly desirable in case of wide access cavities. Therefore, different treatment modalities include direct resin composites or amalgam fillings, using a post and core and partial or full coverage crowns have been suggested.<sup>2,3</sup> Placement of post is indicated when coronal structure is insufficient to support a core buildup which are placed vertically into the root canal that leads to the further preparation of a tooth which might weaken the tooth as well.<sup>4</sup>

The substantial loss of ETT structures during preparation might worsen the situation when endodontic treatment is associated with mesioclusaldistal (MOD) cavities. From this point, adhesive restorations, with the potential to reinforce weakened tooth structure seem to have an advantage over crowns, because the preparation of a crown might weaken the tooth as well.<sup>5</sup> A horizontal fiber reinforcement of the ETT might enhance the fracture resistance of these teeth.

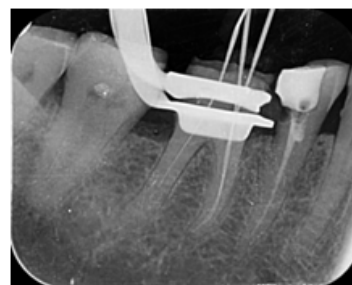
**CASE REPORT :** A 55 years old female patient reported to the Department of Conservative Dentistry and Endodontics, Surendera Dental College and Research Institute, Sri Ganganagar, Rajasthan with the chief complaint of food lodgment and pain on chewing in his right lower back tooth region since 5 months. The pain was moderate in nature and lasted for few minutes and was initiated by mastication and relieved on removal of the stimulus. Extra oral examination revealed no gross facial asymmetry and bilateral lymphadenopathy. Intra oral examination revealed deep class VI caries w.r.t 46 which was tender on percussion and class II caries w.r.t 47.

On vitality test tooth 46 gave a delayed response to thermal tests and higher amount of current was required to elicit a response to electric pulp tests. IOPA w.r.t 46 revealed caries involving the pulpal space w.r.t 46 with apical periodontal space widening and w.r.t 47 showed proximal caries involving dentin (Figure 1).



**Figure 1:** Preoperative IOPA

The final diagnosis established was acute (vital) apical periodontitis wrt 46. The treatment plan decided was root canal treatment followed by the restoration and reinforcement of remaining tooth structure with the placement of fiber post horizontally followed by core build up with composite resin without any subsequent prosthetic crown w.r.t 46. After obtaining the patient's consent, the treatment was started. First of all, the tooth was isolated under rubber dam. Access preparation was done with an Endo Access bur (Dentsply). After de-roofing, three canal orifices were identified. Initial negotiation of the root canals was performed with a K-file ISO no. 10 for all canals. Working length measurement was determined using apex locator and confirmed by digital radiographic method (Figure 2).



**Figure 2:** Working Length Determination

All the canals were prepared in crown – down method using hand protaper files till no. Protaper F2 file (Dentsply, Maillefer). During canal preparation, root canals were irrigated with 2.5% sodium hypochlorite, hydrogen peroxide solution and normal saline. Master cone selection was done with gutta percha corresponding to the size of master apical files (Figure 3) and single cone obturation was done using zinc oxide eugenol sealer (Figure 4).



**Figure 3:** Master cone selection      **Figure 4:** Obturation wrt 46

After root canal treatment, a wide MOD cavity was planned to restore with help of novel treatment modality by placing fiber

post horizontally followed by core build up with composite resin without any subsequent crown (**Figure 5**).



**Figure 5:** MOD cavity preparation

The perforations were made at the most prominent point on the buccal and lingual walls at the middle space between mesial and distal surfaces with no. 4 round bur. Extremities of post were cut with straight fissure bur and it was tried in the cavity for proper fit. The wall of MOD cavity was etched by using 37% phosphoric acid for 15 seconds, rinsed with water spray, and air dried. Then, MOD cavity was bonded by using dentin bonding agent (SwissTEC) according to the manufacturer's instructions. The fibre post was luted with GIC luting cement in the areas of perforation (**Figure 6**).



**Figure 6:** Fiber post inserted **Figure 7:** Composite buildup done

Then resin composite (FiltekZ250 XT; 3M/Espe) was applied and polymerized following the incremental technique procedure for 30 seconds using light emitting diode. It was then finished and polished using Super-snap rainbow discs (Shofu) (**Figure 7**). Patient is still under follow up and since then no fracture of tooth and restoration is observed (**Figure 8**).



**Figure 8:** Six months follow up

## DISCUSSION

Following root canal treatment, the restoration of lost tooth structure is mandatory in order to restore the form and function of the diseased tooth. Marzouk explained the criteria for the restoration of endodontically treated teeth. According to which, if the pulp chamber has 2 mm or more dimensions in 3 directions, has dimensions amounting to one-fifth the amount of lost tooth structure or has at least two intact opposing walls to accommodate restoration to a depth of 4 mm.<sup>6</sup> Then, amalgam/composite

restoration can act as foundation followed by cast restoration. But if the above conditions are not fulfilled then, use of vertical post is mandatory to support the core build up followed by crown in order to prevent the core or tooth fracture under masticatory forces.<sup>6</sup>

But there are several disadvantages associated with the placement of vertical posts like thinning of radicular dentin, decrease in fracture strength of remaining tooth structure, increasing the susceptibility of tooth to undergo fracture, root perforations, extra no. of clinical visits and crowns are mandatory in order to preserve the core build-up.<sup>7</sup>

Thus, fracture resistance of the roots is one of the most important factors when restoring ETT that have lost a considerable amount of their crown tissue. Therefore, several studies suggested that placement of vertical posts do more harm to the already weakened tooth structure rather than reinforcing it.<sup>7</sup>

In this case report, a glass fiber post was placed horizontally followed by composite build up rather than placing any vertical posts to restore and reinforce the weakened tooth structure without any subsequent prosthetic crown.

Glass fiber post is selected because of its low elastic modulus similar to dentin so they can distribute the load forces evenly along the root. Further more, these types of post systems have the advantages of superior esthetics, ease of retrievability, and simple application technique, allowing the clinician to complete the procedure in the same visit.<sup>8</sup> Prefabricated fiber posts and composite resin buildup area viable restoring technique for ETT. A study by Grandini et al reported that restoration of ETT with fiber posts and resin composite is a treatment option that in the short-term conserves remaining tooth structure.<sup>9</sup>

Also, a study by Karzoun et al reported that horizontal fiber post when inserted in maxillary premolars show a mean fracture resistance of 961.3 N, which is similar to unrestored premolars 994.5 N. This can be explained by the fact that the presence of a horizontal glass fiber post reinforced the residual tooth structure in the coronal part. Because the modulus of elasticity of a glass fiber post is similar to that of dentin and the resin composite, the compressive load will be redistributed and prevented from discharging on the crown or in the cervical third of root. Therefore, the stress released was limited to middle and apical thirds of root. It has been suggested that glass fiber posts show reduced stress transmission to the root because of similar elasticity compared with dentine.<sup>10</sup>

**CONCLUSION :** Finally, it can be concluded that it is a conservative option in the restoration of MOD cavity after endodontic treatment along with reinforcement of remaining tooth structure with the help of composite resin and horizontal glass fiber post which can help in recovering the resistance of the tooth against the fracture load to a good extent. It is an aesthetic, time saving and economical option for the patient.

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**Case reports:** New, interesting and rare cases can be reported. They should be unique, describing a great diagnostic or therapeutic challenge and providing a learning point for the readers. Cases with clinical significance or implications will be given priority. These communications could be of up to 1000 words (excluding abstracts and references) and should have the following headings: Abstract (unstructured), keywords, introduction, case reports, discussion, reference and tables and legends in that order.

The manuscript could be of up to 1,000 words (excluding references and abstract) and could be supported with up to 10 references. Case reports could be authored by up to four authors.

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