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Editorial

Albert Einstein once said, why would you expect to repeat the same procedure and expect a different outcome? This quotation in fact encourages experimentation by trying different things. Our science is evidence based science and for that we need to experiment new things and same thing again and again to find out the best case orientated approach as all patients will have unique requirements, aspirations, expectations and outcome.

We have applied the same approach in our issue. We have adopted a problem solving approach for coverage of all the subjects with the hope that this will have real clinical relevance that will be of continuing practical use for the reader. I'm indebted to the editorial team for raising the standard of the issue and giving a chance to every author to write up things which can benefit greater number of population with higher level of efficacy.



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COMPARATIVE EVALUATION OF EFFECT OF DIFFERENT ENAMEL PREPARATIONS ON FRACTURE RESISTANCE OF COMPOSITE RESIN BUILDUP OF FRACTURES INVOLVING DENTIN IN ANTERIOR HUMAN TEETH: AN IN VITRO STUDY

Rubal Khetan, Yogesh Kumar, Neetu Jindal, Renu Aggarwal, Kanika

ABSTRACT :

Aim: To evaluate the effect of different enamel preparations on fracture resistance of composite resin buildup of fractures involving dentin in anterior teeth. **Material and Methods:** Forty sound extracted human permanent incisors were selected. Samples were randomly and equally divided in one untreated (control) group and three experimental groups (Bevel, Chamfer and newly introduced Stair-step Chamfer preparation group) to evaluate the effect of enamel preparations on the fracture resistance of composite resin. According to the group, the teeth were prepared and restored with corresponding designs of enamel preparations with similar composite resin. The teeth were subjected to compression bending test under Instron Testing Machine. The observational values obtained were subjected to statistical analysis. **Results:** Significant difference was found between all groups preparations except between chamfer & stair step-chamfer ($p > 0.05$). **Conclusions:** The highest fracture resistance was about 50% of intact teeth. Composite restorations showed maximum resistance to fracture when chamfer preparation was used.

Keywords: Bevel, Chamfer, Fracture Resistance, Stair-Step Chamfer, Universal Testing Machine

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INTRODUCTION: Crown fractures comprise the most frequent injuries in permanent dentition. Coronal fractures of permanent incisors represent 18-22% of all traumas to dental hard tissues. Out of these, 96% involve maxillary incisors (80% central incisors and 16% lateral incisors).¹

The usual cause of a crown fracture is a frontal impact, the energy of which exceeds the shear strength of enamel and dentin. The tooth is thereby fractured in a horizontal pattern, following the course of the enamel rods. Fracture resistance of a material is a measure of its ability to retard crack initiation and propagation. High fracture resistance of restorative materials is required in clinical situations where high impact stresses are experienced. Restoration of incisal edge fractures in anterior teeth are one of the demanding situation.²

A fractured or missing anterior tooth has a negative effect on a person's physical attractiveness that can affect the person's self-esteem.³ The number of restorative techniques developed to manage such fractures. Methods of enhancing retention of tooth colored restorative materials are sought from various designs of enamel preparations prior to acid etching.

Besides efforts to enhance retention and expose reactive enamel, preparation techniques of enamel have also evolved to achieve high degree of esthetics. That's why different enamel preparation designs namely bevel, chamfer and stair-step chamfer were evaluated and compared for their effect on fracture resistance of composite resin restorations.⁴

MATERIAL AND METHODS: Forty human, non-carious permanent maxillary central incisors were collected. All teeth were properly cleaned with Ultrasonic Scaler to remove soft tissue, debris, blood and then were stored in normal saline until testing. (Figure 1)



Figure 1: Total Number of Samples

PREPARATION OF SAMPLES

Forty sound extracted human permanent incisors were selected based on inclusion criteria for the study. (Inclusion Criteria- Non-carious teeth, atraumatically extracted teeth, teeth without cracks, teeth without restoration.)

Out of these ten teeth were maintained as a control group. Remaining thirty teeth were divided equally and randomly into 3 groups (n=10) based on different preparations. Forty nearly equal sized and shaped anterior incisors were measured mesio-distally at incisal edge. Average 7 mm width of incisal edge was kept for testing. The teeth were reduced 2 mm from the incisal edge towards the cervical area with the help of diamond cutting disc.

All samples were mounted in self-curing acrylic resin in such a way that the long axis of the tooth was aligned with the central axis of the custom made rectangular block. Different enamel preparations like bevel, chamfer and stair step chamfer was done for thirty samples and ten samples were kept unprepared as control group.

GROUP-I (CONTROL GROUP)

GROUP-II (BEVEL PREPARATION)

A bevel with 45 degree inclination was prepared on the cavosurface margins of samples around the entire enamel periphery, extending 2mm cervically as recommended by Black.^{5,6} The bevel included entire thickness of enamel & extended from Dento-Enamel Junction (DEJ) to enamel surface. (Figure 2)

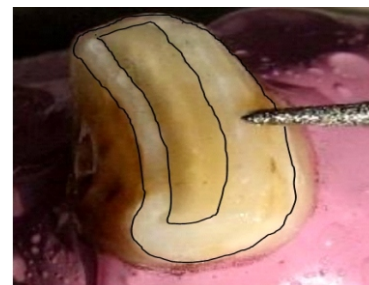


Figure 2: Bevel Preparation

GROUP-III (CHAMFER PREPARATION)

Chamfer preparation was prepared around the entire enamel periphery and extended cervically approximately 2 mm beyond the edge of the fractured enamel and involved half of the enamel thickness in depth as recommended by Jordan.⁷ (Figure 3)



Figure 3: Chamfer Preparation

GROUP-IV (STAIR-STEP CHAMFER PREPARATION)

Stair-step chamfer was produced in accordance to the technique described by Harry F. Albers^{5,6} where in two gradually merging vertical and horizontal chamfers were placed alternatively to achieve enamel preparation design resembling stair steps. (Figure 4)

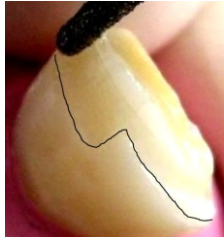


Figure 4 : Stair Step Chamfer

After different enamel preparations all samples were conditioned with 37% phosphoric acid for 15 sec. Then rinsed with water for 10 sec and dried. Bonding agent (Ivoclar Vivadent) was applied for 15-20 sec over the conditioned and moist surfaces and then light cured in accordance with the manufacturer's instructions. Then composite (Ivoclar Vivadent) was polymerized for 40-60 sec by using light curing unit on each surface. After curing, finishing and polishing of the built incisal edges was done with superfine aluminum oxide flexible abrasive disks (Soflex- 3M ESPE, USA).

Then samples were aged for 24 hrs in distilled water at 37°C in an incubator. After the incubator storage, all the samples were thermocycled in between ± 5°C and ± 55°C for 150 cycles. Then all samples were subjected to test in an Instron Universal Testing Machine (Instron Corp. Canton, USA series). (Figure 5)



Figure 5: Force application on the lingual side of sample

A loading force was applied along the predetermined standardized spot on lingual aspect of the samples by custom made stainless steel chisel at a constant crosshead speed of 0.5 mm/minute until the composite resin build-up was dislodged or fractured. The force (in Newton) at which the tooth fractured was recorded and fracture resistance was calculated in MegaPascals by dividing force with the surface area.

STATISTICAL ANALYSIS AND RESULTS : Chamfer Preparation showed higher values of fracture load as compared to other experimental groups. (Table 1).

GROUPS	Number of samples	MEAN (Newton)	SD	STD. ERROR
Group I (CONTROL)	10	449.30	6.7338	2.1294
GROUP II (BEVEL)	10	227.10	5.3635	1.6961
GROUP III (CHAMFER)	10	302.90	2.6013	0.8226
GROUP IV (STAIR-STEP CHAMFER)	10	297.40	2.2706	0.7180

Table 1- Descriptive statistics of peak failure load (Newton) for various groups by using One-way ANOVA Test

TUKEY test.

Mean peak failure load values of control and the experimental enamel preparation groups individually revealed significant differences. A non-significant difference was observed between mean peak failure load values of Chamfer preparation and Stair-Step Chamfer preparation groups. (Table 2)

BETWEEN GROUPS	Tukey HSD Q statistic	Tukey HSD p-value	Tukey HSD inference
CONTROL v/s BEVEL	151.5098	0.0010053	** p<0.01
CONTROL v/s CHAMFER	99.8246	0.0010053	** p<0.01
CONTROL v/s STAIR-STEP CHAMFER	103.5749	0.0010053	** p<0.01
BEVEL v/s CHAMFER	51.6852	0.0010053	** p<0.01
BEVEL v/s STAIR-STEP CHAMFER	47.9349	0.0010053	** p<0.01
CHAMFER v/s STAIR-STEP CHAMFER	3.7502	0.0549706	non significant

Table 2: Inter group comparison between various groups using Tukey Test

DISCUSSION : Composite resin is the material of choice for most of the dentist worldwide when considering options to restore aesthetically demanding fractures in anterior teeth. Unprepared enamel surfaces may be highly resistant to acid etching because of the presence of fluorosed or prism-less enamel in the superficial layers and if we might have restored unprepared enamel surface with composite those results in over-contoured restoration, which may be aesthetically objectionable.

Numerous enamel preparations have been developed for the reconstruction of fractured anterior teeth. Reasons cited for definitive preparations of enamel are provision of strength to the bond between enamel and the composite resin because there is more enamel surface to bond, there by exposing the enamel prisms in the ideal end-on relationship for etching and bonding,⁸ adding to the bulk of the restoration and reducing the polymerization shrinkage.⁹

That's why; most clinicians prefer to give different enamel preparations namely bevel, chamfer and stair-step chamfer because of their conservative approach especially towards traumatized teeth and to provide a gradient of the color change from tooth to restoring material.

The enamel preparations design employed in the present study were based on previous studies by J B Black et al^{5,6}, Jordan et al⁷, Albers et al, Simonsen et al¹⁰ & HEid and GE White⁶.

In present study, chamfer preparation showed higher mean failure load values as compared to bevel and stair step chamfer preparations because Chamfer preparation effectively removes the acid resistant superficial enamel surface and exposes the more reactive subsurface enamel to the effect of acid etching, it provides a well-defined marginal periphery to which the composite resin material may be exactly finished. It also provides a resin lap-joint which affords marginal bulk of restorative material, thus effectively makes the abrupt resin enamel interface and enhances the effects of acid etching by ensuring that the ends of enamel prisms rather than their longitudinal axes are exposed to the effects of acid. The results of present study were in accordance with the study of Donly KJ and Browning.¹¹

The possible rationalization for observing slightly less failure load values for stair-step chamfer as compared to chamfer preparation could be due to less exposure of enamel rods for bonding since stair-step chamfer technique involved sacrificing less amount of natural enamel around the fractured edge.

CONCLUSION : Within the limitations of this study, none of the

technique provides fracture resistance similar to that found with the intact teeth (control group). The highest fracture resistance in different enamel preparations was about 50% of intact teeth. Composite restorations having chamfer enamel preparation showed maximum resistance to fracture. Stair step chamfer preparation is an aesthetically acceptable technique as since it involved removal of less amount of natural enamel.

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CORRELATION BETWEEN FIVE PARAMETERS FOR THE ASSESSMENT OF SAGITTAL SKELETAL INTERMAXILLARY RELIATIONSHIP

Harsharanjeet Kaur, Sachin Ahuja, Seema Gupta, Eenal Bhambri, Gurpeet Singh, Raj Abhay Singh, Nikita Garg

ABSTRACT:

Aim: The present study was undertaken to evaluate the reliability of sagittal parameters utilizing FABA, AB plane angle, ANB angle, AF-BF and Wits appraisal from randomly selected subjects. **Materials and Method:** Thirty pre-treatment lateral cephalometric radiographs of 10-25 years old individuals were randomly selected from the orthodontic record files of Department of Orthodontics and Dentofacial Orthopedics, Surendera Dental College and Research Institute, Sri Ganganagar, Rajasthan. Minimum and maximum value, range, mean and standard deviation were calculated for each subject. Mean and standard deviation of each parameter was done by one way analysis of variance (ANOVA). Coefficients of Variability of all parameters was calculated. A correlation coefficient analysis (Pearson's coefficient of correlation) was done to assess the significance of association between the variables. The reproducibility was calculated by paired measurement comparisons with *t*-test. The level of statistical significance was set at $p \geq 0.05$. **Results:** The measurement with the most homogenous distribution was FABA angle (c.v-7.83), followed by AB plane angle (c.v- 53.81), AF-BF (c.v-53.87), ANB angle (c.v- 64.25) and the least homogenous was the Wits occlusal plane (c.v- 122.76). Despite varying strengths of association all the parameters used in the study shared statistically significant correlation amongst themselves. The results of the present study showed perfect positive correlation between angle ANB and AF-BF ($r=0.826$) and perfect negative correlation between angle ANB and A-B plane angle ($r=-0.817$) and angle FABA and AF-BF ($r=-8.69$). **Conclusion:** Clinical implications of the study showed that FABA angle, AB plane angle and AF-BF were statistically significant to assess the sagittal jaw relationship between maxilla and mandible and may be used to predict the skeletal class in addition to the established ANB angle. Instead of relying on one single parameter, others also should be checked and should be correlated with clinical findings. No single parameter or one approach can be used to give an accurate picture for the jaw relationship.

Keywords: Cephalometric analysis, Sagittal dysplasia, malocclusion.

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

INTRODUCTION: Cephalometric radiograph is a tool in orthodontic diagnosis and treatment planning.¹ History is evident that correct assessment of Sagittal jaw relationship has always remained the perennial problem in orthodontics. In orthodontics, discrepancies are commonly described in three planes namely, transverse, sagittal and vertical. Of these, the sagittal discrepancies are more commonly encountered in day to day practice. Angular and linear measurements have been incorporated into various cephalometric analysis to help the clinician for diagnosing these antero-posterior discrepancies. To determine the sagittal denture base relationship, AB plane angle² was introduced. A few years later ANB³ angle was introduced. More recently, it has been claimed that the ANB angle is affected by several environmental factors and thus a diagnosis based on this angle may give false

result^{4,8}. To eliminate the influence of anatomic variations in nasion on the sagittal relationship of the jaws, Wits appraisal^{9,10} was presented. A number of angular measurements have been developed to determine the actual sagittal skeletal discrepancy such as FABA¹¹ and Beta angles¹². Also linear measurements such as AF-BF¹³ were introduced to overcome the shortcomings of angular measurements. All the above mentioned analyses used reference planes in the cranial references or dental occlusion. Each one of the reference planes had their own limitations. The present study was undertaken to evaluate the reliability of sagittal methods utilizing FABA, AB plane angle, ANB angle, AF-BF and Wits appraisal from randomly selected subjects.

MATERIAL AND METHODS: Thirty pre-treatment lateral cephalometric radiographs of 10-25 years old individuals who are undergoing orthodontic treatment at Department of Orthodontics and Dentofacial Orthopedics of Surendera Dental College and Research Institute Sri Ganganagar, Rajasthan were collected randomly. The radiographs were exposed with the patient seated in an upright position with Frankfort horizontal plane parallel to the floor, teeth in centric relation and lips relaxed. The radiographs were obtained with KODAK 8000C Digital Panoramic & Cephalometric system with an output of 90 KV, 10 Ma. All cephalograms were recorded with same exposure parameters.

The inclusion Criteria-

1. Subjects exhibiting varying degree of skeletal and /or dentoalveolar malocclusions.
2. Individuals who had never received orthodontic treatment or undergone orthognathic surgery.
3. Subjects with no gross facial asymmetry.

Exclusion Criteria-

Subjects with congenital abnormalities or syndromes.

Method: The selected pre-treatment lateral cephalograms were traced manually on an acetate paper with 0.3 mm lead pencil. Cephalometric measurements used in the study were of two categories-

1. **Angular measurements-** ANB angle, A-B Plane angle, angle FABA.
2. **Linear measurements-** Wits Occlusal plane and AF-BF



Figure 1: Hard tissue landmarks. 1. Sella (S); 2. Nasion (N); 3. TMJ (TM); 4. Anterior Nasal Spine (ANS); 5. Subspinale (A); 6. Supramentale (B); 7. Pogonion (Pg); 8. Prognathion (PGN) and 9. Centre of condyle (C).

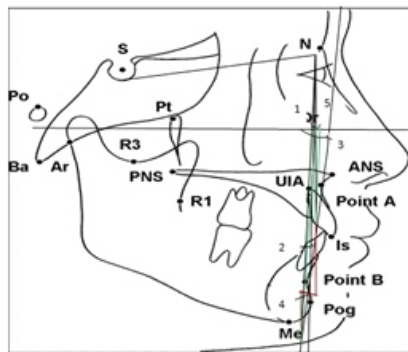


Figure 2: Angular and linear measurements. 1.Angle ANB; 2. AB Plane angle; 3.Angle FABa; 4.Wits occlusal plane; 5.AF-BF.

RESULTS : The mean, standard deviation (SD) and standard error (SE) of the difference between the repeated measurements for each method and between the two methods were calculated. The reliability was determined using Pearson's correlation coefficient (r^2). These levels were used to determine the strength of the correlation: $r^2 > 0.8$ = Perfect positive; $0.5 \leq r^2 \leq 0.8$ = Partial positive/negative; $r^2 < 0.5$ = Perfect negative. The reproducibility was calculated by paired measurement comparisons with *t*-test. The level of statistical significance was set at $p < 0.05$.

Table I : The range of measurements of five parameters

	Mean	N	Std Deviation	Std Error Mean	Mean Difference	P Value	%CV
Angle ANB	4.63	30	2.98	0.543			64.25
Angle FABa	78.27	30	6.13	1.119	-73.63	<0.0001	7.83
Angle ANB	4.63	30	2.98	0.543	13.83	<0.0001	64.25
A-B plane Angle	-9.20	30	4.95	0.904			53.81
Angle ANB	4.63	30	2.98	0.543			64.25
Wits Occlusal Plane	2.88	30	3.54	0.646	1.75	<0.0001	122.76
Angle ANB	4.63	30	2.98	0.543			64.25
AF-BF	7.67	30	4.13	0.754	-3.03	<0.0001	53.87
Angle FABa	78.27	30	6.13	1.119	87.47	<0.0001	7.83
A-B plane Angle	-9.20	30	4.95	0.904			53.81
Angle FABa	78.27	30	6.13	1.119	75.38	<0.0001	7.83
Wits Occlusal Plane	2.88	30	3.54	0.646			122.76
Angle FABa	78.27	30	6.13	1.119	70.60	<0.0001	7.83
AF-BF	7.67	30	4.13	0.754			53.87
A-B plane Angle	-9.20	30	4.95	0.904	-12.08	<0.0001	53.81
Wits Occlusal Plane	2.88	30	3.54	0.646			122.76
A-B plane Angle	-9.20	30	4.95	0.904	-16.87	<0.0001	53.81
AF-BF	7.67	30	4.13	0.754			53.87
Wits Occlusal Plane	2.88	30	3.54	0.646			122.76
AF-BF	7.67	30	4.13	0.754	-4.78	<0.0001	53.87

Table II : Correlation matrix for five parameters(r correlation coefficient ; p -value)

Karl Pearson Correlations				
	N	Correlation	P Value	Results
Angle ANB & Angle FABa	30	-0.794	<0.0001	Partial Negative Correlation
Angle ANB & A-B plane Angle	30	-0.817	<0.0001	Perfect Negative Correlation
Angle ANB & Wits Occlusal Plane	30	0.750	<0.0001	Partial Positive Correlation
Angle ANB & AF-BF	30	0.826	<0.0001	Perfect Positive Correlation
Angle FABa & A-B plane Angle	30	0.737	<0.0001	Partial Positive Correlation
Angle FABa & Wits Occlusal Plane	30	-0.753	<0.0001	Partial Negative Correlation
Angle FABa & AF-BF	30	-0.869	<0.0001	Perfect Negative Correlation
A-B plane Angle & Wits Occlusal Plane	30	-0.633	<0.0001	Partial Negative Correlation
A-B plane Angle & AF-BF	30	-0.681	<0.0001	Partial Negative Correlation
Wits Occlusal Plane & AF-BF	30	0.733	<0.0001	Partial Positive Correlation

The coefficients of variability of the five parameters used in the assessment of sagittal jaw relationship was quite different from each other (Table I). According to these coefficients, the measurement with the most homogenous distribution was FABa (c.v-7.83) and least homogenous was the Wits appraisal (c.v-122.76). Statistically significant correlations were found among five sagittal parameters. (Table II) with p -value < 0.001 . The correlation was very strong between AXB and AF-BF distance ($r=0.826$). Angle ANB and Wits occlusal plane ($r=0.750$), Angle FABa and A-B plane angle ($r=0.737$) and Wits occlusal plane and AF-BF ($r=0.733$) showed moderate level of correlations. No

statistically significant differences ($p > 0.05$ Table II) were found between the measurements.

DISCUSSION : Dentofacial balance and harmony and growth and development have been studied by many investigators in four dimensions using lateral cephalometric radiographs.¹⁴ Most orthodontic problems occur in the anteroposterior and vertical plane, so the lateral cephalographs provide the most useful information. Many studies have been published on ANB angle^{4,5,7,8} and Wits appraisal^{15,16,17} methods and some on the A-B plane, AXB angle and AF-BF distance^{18,19,20,21} but none exist on the FABa. The results of this study showed the difference in coefficients of variability of the five parameters used. However, the greatest coefficient of variability of the Wits appraisal (122.76) may be attributed in part due to difficulties or inaccuracies in identifying the occlusal plane and/or variations in it.^{4,9,13} In addition, it can be easily affected by the vertical dimensions of the jaws and the occlusal plane inclination.¹⁵ Oktay²⁰ also showed more variation in the Wits appraisal than the ANB, AF-BF distance and Anteroposterior Dysplasia Indicator (APDI) measurements, similar to the present results. The measurement with the most homogenous distribution in this study was FABa. Similar result was found by Yang¹². The results of this study showed statistically significant correlation (p -value < 0.001) among seven sagittal parameters. However, the strength of association (correlation coefficient, r) varied between different pairs. In this study, perfect positive correlation was found between AF-BF and ANB angle ($r = 0.826$). Angle ANB and Wits occlusal plane ($r = 0.750$), Angle FABa and A-B plane angle ($r = 0.737$) and Wits occlusal plane and AF-BF ($r = 0.733$) showed moderate level of correlations. Nikolic²² found highly significant correlation between ANB angle and Kirchner and William also found statistically significant correlation (p -value < 0.05) between the Wits and ANB angle but stated that 'in clinical terms one parameter is only very slightly dependent on the other'.

CONCLUSION : It was observed that the least variable and the most reliable measurement was FABa (7.83), AB plane angle (53.81), AF-BF (53.87) and the least homogenous was the Wits occlusal plane (122.76). Despite varying strengths of association, statistically significant correlations were found among five methods for assessing sagittal jaw relationship. The strongest correlation in this study was found between angles ANB and AF-BF distance ($r=0.826$). Wits appraisal showed the greatest coefficient of variability. Based on the present results, it appeared that A-B plane and FABa be used to predict the skeletal class in addition to the established ANB angle, as these correlated well with each other and other parameters used in this study including ANB.

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Original Article

EVALUATION OF MARGINAL SEAL BETWEEN MTA (ANGELUS), GLASS IONOMER CEMENT AND BIODENTINE AS THE ROOT END FILLING MATERIAL, USING 1% METHYLENE BLUE AS TRACER – AN IN VITRO STEREOMICROSCOPIC STUDY.

Amulya Vanti, Hemant Vagarali, Madhu Pujar, Veerendra Uppin, Pallavi Gopeshetti, Vinay Kumar Masamatti

ABSTRACT

Aim : The purpose of this study is to evaluate and compare the micro leakage of three root end filling material, MTA (angelus), Glass ionomer cement and Biodentine using the method of 1% methylene blue dye penetration under stereomicroscope. **Materials and methods :** 30 single rooted human teeth were used in this study. Teeth were decoronated and root canal were instrumented with protaper F₂ files (Dentsply) and obturated with gutta percha point (Meta Biomed co.ltd). Teeth were stored in saline. Following which, root end were resected at 3mm from apical foramen with high speed diamond disc at an angle 90° to long axis of teeth in order to prevent over exposure of dentinal tubules and then the root end cavities were prepared with ultrasonic root end preparation tips (Satelec acetone). The samples were then coated with two to three layer of varnish, except at root end preparations and then immersed in 1% methylene blue dye for 72h. Samples were longitudinally sectioned and evaluated for Microleakage Under Stereomicroscope. Statistical Analysis of Values Was Done Using Kruskal Wallis, Anova and Mann Whitney U Test. **Results & Conclusion :** All Three Root End Materials Showed Microleakage In Some Amount But Biodentine Showed The Least Among GIC and Biodentine.

Keywords: Apical marginal seal, Biodentine, Glass ionomer cement, MTA (angelus), Root end material.

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INTRODUCTION : One of the most important objectives of endodontic treatment is to reduce the bacterial insult to minimum, allowing host's defence system to take over and provide a favourable environment for healing.¹ A favourable outcome of the endodontic treatment depends on effective control of the root canal infection.² In cases, when healing process in peri-radicular tissues does not occur after conventional endodontic treatment or it is impossible to carry out re-treatment, apicoectomy is needed.^{3,4} The main goal of apical surgery is to complete three dimensional sealing of the root canal system in order to achieve fluid tight seal following root-end resection.³ A major step in apical surgery is to identify possible leakage areas at the cut root face and subsequently to ensure adequate root-end filling. Only a tight and persistent apical obturation will allow periapical healing with good long-term prognosis.⁵ Surgical approach is commonly indicated in situations such as persistence of periapical pathology, overfilled canals, ledges, canal obstructions, separated instruments, apical transportations and perforations.⁶

An integral component of apicoectomy procedure is the placement of a root end filling material.⁸ There are different type of root end filling material used since decades such as amalgam, glass ionomers, composite resins, zinc oxide eugenol cement, cavit, intermediate restorative material (IRM), super ethoxy-benzoic acid (EBA), and mineral trioxide aggregate (MTA).^{7,8} the major drawback of GIC as root end filling materials is lack of Sealing ability which is adversely affected when the root end cavities were contaminated with moisture at the time of placement of cement.¹² However, MTA has been proved to be material of choice and still the most frequently used one because it has the

ability of induction of hard tissue. It is the first restorative material that consistently allows for the overgrowth of cementum, and it may facilitate the regeneration of the periodontal ligament.⁹ A possible disadvantage that prevents MTA from being acceptable as "the ideal root-end filling material" is a long setting time (2h 45 m) that may lead to dislodgment or deformation from root end preparation.⁸ which has led to search of an alternative material.¹¹ Newer calcium-silicate materials that appear in recent years are trying to compensate for MTA disadvantages. One of these materials is Biodentine (Septodont, France).⁵ It has a reduced curing time (12-15 min) and better handling properties. since manufactures claim biodentine has superior physical and biologic properties,TM could be an efficient alternative to MTA and GIC to be used in a variety of clinical applications.

METHODS : 30 single rooted human extracted teeth were used in this study. Teeth were decoronated and root canal were instrumented with protaper F₂ files (Dentsply) and obturated with gutta percha point 6% (Meta biomed co.ltd) using AH plus sealer (Dentsply) by lateral compaction technique. Teeth were stored in saline. following which, root end were resected at 3mm from apical foramen with high speed diamond disc at an angle 90° to long axis of teeth in order to prevent over exposure of dentinal tubules which lead to higher chances of reinfection. The root end cavities were prepared with ultrasonic root end preparation tips (Satelec acetone). At completion cavity is thoroughly irrigated with sterile saline, dried and finally examined under magnification for remaining gutta percha points. Root end materials were mixed according to manufacturer's instructions and cavities were filled using MTA carrier and compacted using micro pluggers. Specimens were stored at 37°C with 100% humidity for 48 h. The samples were then coated with two to three layer of varnish, except at root end preparation and then immersed in 1% methylene blue dye for 72h. samples were longitudinally sectioned with diamond disc. Tooth-root end filling material interface was observed and evaluated for microleakage under stereomicroscope. The depth of dye penetration was measured by scoring criteria.



30 SINGLE ROOTED HUMAN TEETH WERE USED IN THIS STUDY

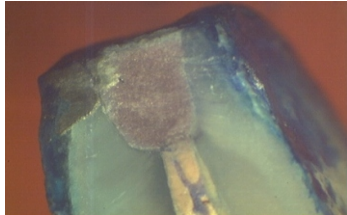


TEETH WERE DECORONATED

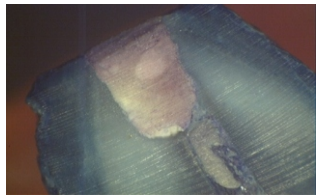
Scoring criteria

- Score 0= No penetration
- Score 1= 1.5 mm penetration
- Score 2 = 3mm penetration.

Stereomicroscopic images



1. Group I: GIC[Figure 1]



2. Group II: MTA(angelus) [Figure 2]



3. Group III: Biodentine [Figure 3]

RESULTS :

Higher mean microleakage according to scoring criteria was recorded in GIC followed by MTA(angelus) compared to Biodentine and the difference between them was statistically significant ($P < 0.05$) as shown in Table 1.

Table 1

Microleakage	MTA	%	Biodentine	%	GIC	%	Total
No leakage	0	0.00	5	50.00	0	0.00	5
1.5mm penetration of dye	8	80.00	5	50.00	1	10.00	14
>1.5mm penetration of dye	2	20.00	0	0.00	9	90.00	11
Total	10	100.00	10	100.00	10	100.00	30

Chi-square=27.4684, p=0.00002*

Graph 1

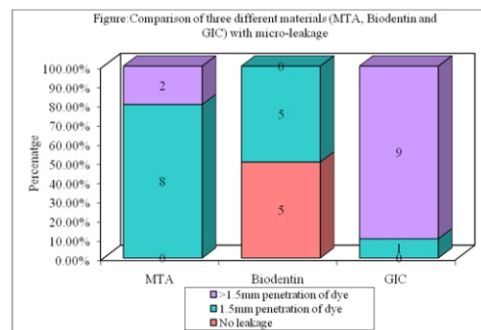


Table: Comparison of three different materials (MTA, Biodentine and GIC) with micro-leakage by Kruskal Wallis ANOVA

Materials	Mean	SD	Median	Sum of ranks
MTA	1.2	0.4	1.0	150.0
Biodentine	0.5	0.5	0.5	77.5
GIC	1.9	0.3	2.0	237.5
H-value	19.5940			
P-value	0.0001*			

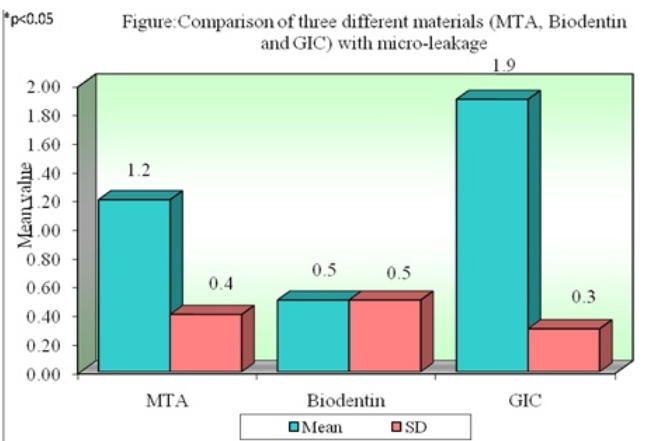


Table: Pair wise comparison of three different materials MTA, Biodentine and GIC) with micro-leakage by Mann-Whitney U test

Materials	Mean	SD	Median	Sum of ranks	U-value	Z-value	P-value
MTA	1.2	0.4	1.0	135.0	20.0	-2.2678	0.0233*
Biodentine	0.5	0.5	0.5	75.0			
MTA	1.2	0.4	1.0	70.0	15.0	-2.6458	0.0082*
GIC	1.9	0.3	2.0	140.0			
Biodentine	0.5	0.5	0.5	57.5	2.5	-3.5907	0.0003*
GIC	1.9	0.3	2.0	152.5			

*p<0.05

DISCUSSION:

Failure of most periapical surgeries are due to poor hermetic seal, this hermetic seal is achieved by the type of apical resection done ,technique of root end preparation and root end filling material used.apical resection plays an important component in success of endodontic surgery as it will aid in eliminating anatomical variations, resorptive defects, ledges, perforation defects, canal obstructions, and separated instruments that may be present in this area of the root. It has been reported that resection of the apical 3 mm of the root apex will eliminate 98% of the apical ramifications and 93% of the lateral canals which could contain material that would contribute to the periradicular disease.⁶ there are different planes at which we can resect the apex 90°,45°. 90° angulation to long axis of the tooth is ideal since the exposure of dentinal tubules is minimal and prevents reinfection, 90° angulation has therefore proved to be acceptable in earlier studies.^{6,12,13}

Traditionally root end cavity were prepared with diamond points but major disadvantage is cavity was not in the centre ,root beveling has to be given which in turn expose more dentinal tubules leading to reinfection. newer method in root end preparation is ultrasonic where the cavity is centered ,no beveling required, access to the surgical field is enhanced, producing a cleaner, conservative, smooth, deep cavity.^{6,14,15} but the major drawback of ultrasonics is cracks at the tooth due to vibration¹⁸. hence in this study, resection was performed at 3mm from root apex at 90° angulation and root end cavity prepared with ultrasonic. selection of ideal root end filling material plays an important role in the success of surgical endodontics.^{6,16} A wide range of materials used as root end filling such as amalgam, glass ionomers, composite resins, zinc oxide eugenol cement, cavit, intermediate restorative material (IRM), super ethoxy-benzoic acid (EBA), and mineral trioxide aggregate (MTA).^{7,8} but no material has fulfilled the requirement of an ideal root end filling material. Properties like root end materials well tolerated by periapical tissues, adhere to tooth surface, dimensionally stable, resistant to dissolution, promote cementogenesis, bactericidal and bacteriostatic, Noncorrosive easy to handle, adequate working time then set quickly, be radioopaque.

Glass ionomer cement also know as man made dentine introduced in 1972 by Wilson and kent has universal properties as a filling material but lack of Sealing ability which is adversely affected when the root end cavities were contaminated with moisture and blood during the initial setting time, resulting in increased solubility and decreased bond strength.^{24 25 12} MTA was developed by Torabinejad at Loma Linda University in 1993. MTA has been proved to be material of choice and still the most frequently used one because it has the ability of induction of hard tissue. It is the first restorative material that consistently allows for the overgrowth of cementum, and it may facilitate the regeneration of the periodontal ligament.⁹ A possible disadvantage that prevents MTA from being acceptable as "the ideal root-end filling material" is a long setting time (2h 45 m) that may lead to dislodgment or deformation from root end preparation.⁸ Biodentine, known as "dentine in a capsule", a biocompatible and bioactive dentine substitute composition contains **Powder:** Tri-calcium silicate, Dicalcium silicate, Calcium carbonate & oxide- it acts as a filler, Iron oxide-it acts as a colouring agent. ,Zirconium oxide- it acts as a radioopacifier. **Liquid** Calcium chloride- it acts as an accelerator. Hydrosoluble polymer- it is a water reducing agent.^{21,25} Biodentine induces mineralization after its application. Mineralization occurs in the form of osteodentine by expressing markers of odontoblasts & increases TGF-Beta1 secretion from pulpal cells enabling early mineralization. During the setting of the cement Calcium hydroxide is formed. Due to its high pH, Calcium hydroxide causes irritation at the area of exposure. This zone of coagulation necrosis has been suggested to cause division and migration of precursor cells to substrate surface; addition and cytodifferentiation into odontoblast like cells.¹⁹ Thereby Biodentine induces apposition of reactionary dentine by odontoblast stimulation and reparative dentin by cell differentiation, Because of its high alkalinity it has inhibitory effects on microorganism.¹⁹

In current study we have established that The average microleakage for Gic beyond 1.5mm penetration was 90%, till 1.5mm penetration 10% and no leakage is 0.

The average microleakage for MTA beyond 1.5 mm penetration of dye is 20%, 1.5 mm penetration or less is 80% and no leakage is 0.

The average microleakage for biodentine beyond 1.5mm is 0, 1.5mm or less is 50% and no leakage is 50%.

The difference was not statistically significant (table 1 and fig. 6) as in this case $p > 0.05$ despite the higher difference estimated in mathematical value for MTA.

CONCLUSION :

The result of this study showed that all materials showed microleakage but there was significantly less microleakage in **Biodentine** when compared to MTA and GIC. The biodentine has better biocompatibility, handling properties ,excellent sealing ability then GIC and MTA. it can be considered as material of choice for root end filling.

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ROLE OF DENTAL PROFESSIONALS IN DISASTER MANAGEMENT

Anuradha. P, Pallavi Dube, Jayant Marya, Gunjan Dube

ABSTRACT : In recent years there is a phenomenal upsurge of knowledge and research on disaster management across wide range of disciplines and subjects. Natural or manmade catastrophic events place great manpower demands on communities and their health care and public health systems. This calls for ever preparedness on the part of the health care workers. Dentists are not perceived as much of help in case of any disaster event. Although the first responders are primarily looked upon for in case of any disaster response; if called upon dentists can be a source of vital support in medical surge events. Dentists and dental auxiliaries can augment the existing medical professionals, in responding to a declared medical emergency. Dentists are exposed to information in many general medical areas during their pre-doctoral education that can be useful in disaster response situations. Dentists have the clinical skills and medical knowledge that are invaluable assets in a mass casualty event. Dentists can be given the opportunity with additional targeted training to become more effective responders to natural disasters and other catastrophic events. Inculcating disaster training in the undergraduate and post graduate curriculum will better prepare the dentist for any surge event. The present article explores the various duties which dental professionals can play in a major public health disaster.

Keywords: Dental Professionals, Disaster Management

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

ROLE OF DENTAL PROFESSIONALS IN DISASTER MANAGEMENT.

INTRODUCTION : Disasters are as old as human history but the dramatic increase and the damage caused by them in the recent past have become a cause of national and international concern. Over the past decade, the number of natural and manmade disasters has climbed inexorably.¹

Disaster management as an identifiable profession is relatively new. The tasks of a disaster manager, however, have been around for a long time.

By understanding this as an identifiable role, we can describe a coherent and cohesive direction for people who are involved in the field of disasters. This, of course, includes the spectrum of activities from administration to project implementation; from disaster prevention to disaster mitigation to disaster preparedness to disaster response.²

The term "disaster manager" is applied to a person who has responsibility for planning and managing pre- and or post-disaster activities.

Dentists are exposed to information in many general medical areas during their predoctoral education that can be useful in disaster response situations.

This particular article describes how dentists can help respond to disasters.

Defining the scope of a disaster

The field of public health is in itself, an interdisciplinary field. Contributions from sociology, psychology and other behavioural sciences combine with the clinical perspectives from medicine, nursing and dentistry³

Disaster managers will assess the speed and success of the disaster response. Economists will measure physical loss to houses and buildings and loss of production. Politicians will assess political damage from a poor response by state agencies. Health workers will consider the resources required to contain an outbreak of any disease⁴

To think seriously about a disaster means we must consider all affected and their losses both in the immediate and the longer term.

Role of dental community in managing disasters

Health care workers including dentists are a critical first line of defense against and in response to such events.

Dentists are well prepared to play an important role in response to catastrophic events as they are⁵

Experts in barrier techniques and infection control

b) Trained and skilled in administering drugs by injection

c) Skilled in placing sutures and controlling bleeding

d) Able to participate in interdisciplinary professional groups.

Dental professionals can prove to be helpful during a major public health disaster in the following ways:

Medical care augmentation:

Dentists and their dental auxiliaries can augment the existing medical professionals, in responding to a declared medical emergency. When the local medical resources are unable to cope adequately with huge number of victims, dentist can be recruited to provide certain services that will allow physicians to do things only they can do⁶

Dental surveillance

Dentists can contribute to bioterrorism surveillance by being alert to clues that might indicate a bioterrorist attack. They have relatively indistinguishable beginnings and ends and unpredictable effects on a population. Because of the variable incubation periods of infectious agents, the time of exposure can be estimated only after the resultant disease has manifested.⁷ Dentists can be part of an effective surveillance network because they are scattered throughout a community.

Observation of intra oral or cutaneous lesions or both when they are present and the notification of public health authorities about these observations may facilitate the early detection of a bioterrorism attack or spread of a pandemic infection.

Dental offices acting as medical sites

Dental offices are equipped with potentially useful equipment and supplies and should be prepared to serve as decentralized auxiliary hospitals in case the need arises. Further dental offices are equipped with air and suction lines, x ray unit can be used as an alternate medical site if hospitals are under attack or are unsafe because of widespread infection associated with biological weapons.⁸

Diagnosis and monitoring

Dentists can collect salivary samples, nasal swabs, or other specimens when appropriate for laboratory processing that may yield valuable diagnostics information or indication of the progress of the treatment, including the status of the patients' infectiousness.

Triage

In the effective response to any mass casualty event a system must be established to prioritize treatment among casualties. Dentists are able to assist in this important function with relatively little additional training. This assistance allows physicians to provide definitive care for patients most urgently in need rather than screening casualties. Dental offices could serve as triage centers if needed.⁹

Definitive Treatment

Dentists have training and experienced in many areas that may be a part of casualty care in mass casualty events. Oral and maxillofacial (OMS) practitioners are qualified trauma surgeons who can provide first aid, including endotracheal intubation and cardiopulmonary resuscitation, and they are especially experienced in treating dentoalveolar injuries and facial fractures.¹⁰ An OMS team is capable of administering anaesthetic and surgical services to patients with many types of injuries.

Immunization

To limit the spread of infectious agents, rapid immunization of great numbers of individual may be required in a short amount of time. Dentists can participate in mass immunization programs with minimum of additional training and may be critical factor in the success of urgent programs.¹¹ Dental offices can be used as immunization sites to minimize the concentration of potentially infected persons.

Forensic odontology

Forensic dentistry plays a major role in victim identification. Forensic odontology is the application of the art and science of dentistry to resolve matters pertaining to the law. Some of the diverse facets of this unique discipline can range from the identification of human remains to mass disaster management, from the assessment of bite marks and patterned skin injuries to the use of dental materials in the examination of evidence. The durability of teeth is a feature that makes forensic dentists regular participants in forensic investigation. Teeth can survive most post-mortem events that can disrupt or change other body tissues.¹²

Emergency preparedness curriculum

The current increased threats of terrorism clearly support the need to incorporate terrorism preparedness and response material into the curricula for every dental school. A program called as the 'National Disaster Life Support' (NDLS) training program can also be developed to better prepare health care professionals and emergency response personnel for mass casualty events.¹³

CONCLUSION : In the coming times, the challenges which humankind has to face can be unprecedented. Whether it is a natural disaster or a bioterrorism attack the response of the community to overcome that will be collective using the talents of all the health care workers to the limits. Dentists, forming an important part of the health care community will be looked upon to perform potential service to the society in event of any mishap.

Inculcating emergency response to a disaster in the dental undergraduate curriculum and continuing educational programs for practitioners can prepare us well in advance in the wake of any unforeseen circumstance.

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ABSTRACT: Herbs are one of remedial agents which God has created for afflicted humans. Herbal extracts have been used in traditional medicine since the human existence. A herb, botanically speaking, is any plant that lacks the woody tissue which is characteristic of shrubs or trees. More specifically, herbs are plants which are used medicinally or for their flavour or scent. Herbs with medicinal properties are a useful and an effective source of treatment for various disease processes. Herbal extracts have been successfully used in dentistry as tooth cleaning and antimicrobial plaque agents. The use of herbal medicines continues to expand rapidly across the world. Many people take herbal medicines or herbal products now for their health care in different national healthcare programmes. Herbal extracts have been used in dentistry for reducing inflammation, as antimicrobial plaque agents, for preventing release of histamine and as antiseptics, antioxidants, antimicrobials, antifungals, antibacterials, antivirals and analgesics. They also aid in healing and are effective in controlling microbial plaque in gingivitis and periodontitis, thereby improving immunity, oral & general health as well.

Keywords - Herbal extracts, Alternative Dentistry, Naturopathy, Irrigation, Propolis, German chamomile, tea tree oil.

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INTRODUCTION: Herbal products have been used since ancient times in folk medicine, involving both eastern and western medicinal traditions. Many plants with biological and antimicrobial properties have been studied since there has been a relevant increase in the incidence of antibiotic overuse and misuse. In dentistry Phytomedicines has been used as anti-inflammatory, antibiotic, analgesic and sedative agents. In endodontics because of the cytotoxic reactions of the most of the commercial intracanal medicaments used and their inability to eliminate bacteria from dentinal tubules, trend of recent medicine attends to use biologic medication extracted from natural plants.¹

Even though chemo-mechanical preparation of root canal is able to reduce the number of bacteria, the intracanal medicament with antibacterial action is required to maximize the disinfection of root canal system. Ayurveda is one of the oldest systems of medicine from India. It is more than 5000 years old. Ayurvedic herbs have nature's own power of medicinal miracles. This paper reviews the role of various herbal products in the treatment of pulpal disease which may have origin from pulpal tissue or periapical tissue.

According to the World Health Organization (WHO), as many as 80% of the world's people depend on traditional medicine (herbal) for their primary healthcare needs, although there may be regional variations. The development of indigenous medicines and the use of medicinal plants carry considerable economic benefits in the treatment of various diseases. In the developed countries, 25% of the medical drugs are based on herbs and their derivatives.²

The herbal products are also being increasingly used as sedatives, or plaque reduction and healthy gums.

1. Phytotherapeutic substances are generally classified into three groups³:-

- a) Plant products
- b) Animal products

c) Mineral origin.

2. In dentistry, they are used as:-

- a) Antimicrobial agents
- b) Anti-inflammatory agents
- c) Sedative and anxiolytics.

3. Miscellaneous endodontic irrigants, medicaments and endodontic retreatment.

Various herbs which can be used as irrigants during endodontic therapy irrespective of pulpal/ periapical origin/ endo-perio lesions are:-

1) *Melaleuca alternifolia* (Maiden and Betche) Cheel (Tea Tree Oil)

Tea tree oil's major active component is terpinen-4-ol (typically 30-40%)^{4,5}. In order to avoid the undesirable effects of NaOCl, a scanning electron microscopy study was conducted using two medicinal plants that is German chamomile extract and tea tree oil which might disinfect the root canal system with less toxicity when used as irrigants. It was concluded that the efficacy of chamomile to remove the smear layer was superior to NaOCl alone, but less than NaOCl combined with ethylene di-amine tetra acetic acid.⁶

2. *Curcuma longa* Linn. (Haridra - Turmeric)

The active constituents of turmeric are the flavonoid curcumin (diferuloylmethane) and various volatile oils, including tumerone, atlantone, and zingiberone. It possess good antioxidant, hepatoprotective, antimicrobial, and anticancer activity. Massing the aching teeth with ground turmeric eliminates pain and swelling.⁷

3. Carvacrol

Carvacrol (thymol isomer) is present in the essential oil of *Origanum vulgare*, which is edible plant oil used in food products. It has an antibacterial effect against Enterobacteriaceae family including *Escherichia coli*, *Salmonella enteritidis* and *Salmonella* essen. Antibacterial effect of carvacrol and its isomer thymol against six ATCC standard bacterial strains including *E. faecalis* has been proved. Carvacrol also has anti-inflammatory effects. It can restrain neutrophilic elastase enzyme and suppress prostaglandin production.⁸ It also helps in repair of periapical tissues. This property is due to the presence of phenolic component, which stimulates pulpal fibers, phenomenon known as hormesis.^{9,10}

4. Aloe Vera gel:

Aloe leaves contain clear gel and green part of the leaf that surrounds the gel is used to produce juice or dried substance. It contains aloins and barbadoins as main chemical constituents. Aloe Vera gel has inhibitory effects on *S. pyogenes* and *E. faecalis* because of anthraquinone.¹⁵ Its bactericidal activity is found to be less than $\text{Ca}(\text{OH})_2$.¹¹

5. *Morinda Citrifolia* (noni):

Morinda Citrifolia also known as Indian mulberry has a wide range of uses due to its biocompatibility, and anti bacterial, anti inflammatory, anti viral, anti oxidant and analgesic effects. It is one of the first herbal alternatives given for an intra canal irrigant.

In a study conducted by Prabhakar AR et al, *Morinda citrifolia* was compared with Chlorhexidine as anti microbial endodontic irrigants. From this study, *Morinda Citrifolia* was found to have significant anti bacterial activity which is attributed due to its contents alizarin, scopoletin, aucubin and asperuloside. However it was lower than 0.2% Chlorhexidine.

6. *Salvadora persica* solution (Miswak-Siwak) :

Its chewing sticks contain trimethyl amine, salvadorime chloride and fluoride in large amounts.¹² Fifteen percent alcoholic extracts of it has maximum antimicrobial action. It can be used as a substitute for sodium hypochlorite and chlorhexidine as root canal irrigant.¹³

7. *Azadirachta indica* (Neem):

Neem's anti viral, anti fungal anti bacterial and anti carcinogenic activity makes it a potential agent for root canal irrigation. Neem leaf extract is also used to treat dental plaque and gingivitis. Being a bio-compatible anti oxidant, use of neem is advantageous as it is not likely to cause the severe harms to patients that might occur through sodium hypochlorite accidents. Naiyak Arathi et al observed that ethanolic extract of neem had significant anti microbial activity against *E. faecalis*. In another study by Hannah Rosaline et al, the effects of herbal extracts such as *Morinda Citrifolia*, *Azadirachta indica* and green tea were studied. The most to least effective irrigants were: *Azadirachta indica*, sodium hypochlorite, green tea, *Morinda citrifolia* and saline. Thus, it is an effective herbal alternative to the more commonly used irrigant sodium hypochlorite.¹⁴

8. Propolis:

Propolis, a natural antibiotic is a resinous substance that honey bees collect from trees of poplars and conifers. It possesses anti bacterial activities against streptococcus sobrinus & streptococcus mutans. It also possesses good anti oxidant and anti inflammatory activities. It has been used as a pulp capping agent, cariostatic agent, as a mouth rinse and in the treatment of periodontitis. Ethanolic extract of propolis can promote bone regeneration and induce formation of hard tissue bridge in pulpotomies or pulp capping.¹⁵

9. *Allium sativum* Linn. (Rason -.Garlic)

Garlic contains sulfur containing compound allin, which is converted to active ingredient "allicin" when the garlic bulb is crushed. This compound has an inhibitory effect upon the key enzymes involved in cholesterol biosynthesis, such as 3-hydroxy-3-methyl-glutaryl-CoA reductase. Garlic helps to prevent lipid implantation on the arterial wall. Allicin destroys cell wall and cell membrane of root canal bacteria. This is used as irrigant alternative to NaOCl.

10. *Psidium guajava*:

The fruits and leaves of this shrub contain essential oil rich in cineol, tannins, triptenes and flavinoids. Ethanol extracts of it has higher antimicrobial activity, especially against *E. faecalis*.

11. Orange oil:

It is oil produced by glands inside the rind of an orange fruit. This is composed mostly of dlimonene. It also has long chain aliphatic hydrocarbon alcohols, aldehydes like octanal and octanal. It is suggested as an alternative to chloroform or xylene for gutta-percha softening and also in dissolving endodontic sealers.

12. *Acacia nilotica* (Babool):

Acacia nilotica also known as the gum Arabic tree, possesses good anti microbial, anti oxidant, anti fungal, anti viral and antibiotic

activity. It has been shown by Rosina Khan et al that this tree possesses anti bacterial activity against streptococcus mutans and *E. faecalis*. In another study by Dhanya Kumar et al, extracts of liquorice, clove, cinnamon, babool were investigated for their anti microbial activity. It was shown that babool at a concentration of 50% had the highest activity against *E. faecalis*.¹⁶

Drug (Phytotherapeutic) interaction

There is little available information regarding drug interactions between herbal products and the conventional drugs.

G. chamomile	Potentiates anticoagulation effects of warfarin
Garlic	Interacts with anti-platelets & hypo-glycemic drugs
Green tea	Reduces bio-availability of anti-cancer drugs

Adverse Effects:

Herbal products are normally considered safe. The literature has revealed few reports concerning the adverse effects of these natural products commonly used in endodontics

Aloe Vera	Abdominal cramps, diarrhea
Garlic	Bowel irritation, mouth ulceration, halitosis & prevention of blood clotting
Orange Oil	GI irritation
Chamomile tea	Allergic conjunctivitis
Green tea	Irritability, anxiety
Tea tree oil	Allergic contact dermatitis

Toxicity

Herbal medicines are believed to be benign and to not cause severe toxicity. This, coupled with lower costs as compared to those of conventional medications, is the major attraction of these treatments. Despite the general belief, use of herbal medicines can cause severe toxicity and even death.

Toxicity	Herbal Medicine
Seizure	<i>Cimifunga racemosa</i> , <i>Cicuta douglasii</i> , <i>Acrostaphylos uva-ursi</i> , <i>Herba ephedra</i> , <i>Piper Mysticum</i> .
Cardiovascular Toxicity	
Ventricular Tachycardia	<i>Aconitine</i> -containing Herbs, <i>Ma huang</i> , Angel trumpet poisoning, <i>Triptevgium wilfordii</i> poisoning.
Ventricular Fibrillation	<i>Aconitine</i> -containing Herbs
Complete A-V block	Cardiac glycoside poisoning, <i>Nerium oleander</i> poisoning
Bradycardia	<i>Jin bu huan</i> poisoning, <i>Triptevgium wilfordii</i> poisoning.
Shock and Hypotension	<i>Triptevgium wilfordii</i>
Pulmonary Toxicities	
Anaphylaxis	<i>Peumus boldus</i> , Willow bark-containing dietary supplement.
Interstitial pneumonitis	<i>Ouren-gedoku-to</i> , <i>Saiboku-to</i> , <i>Sairei-to</i> , <i>Shosaiko-to</i>
Non-Cardiogenic pulmonary edema	<i>Kamishoyo-san</i> , <i>Otsuji-to</i> , <i>Sairei-to</i> , <i>Shosaiko-to</i> .
Pulmonary infiltrates with eosinophilic	<i>Shosaiko-to</i> , <i>Shoseiryu-to</i> .

Discussion : Herbal medicines have been used for many years. Their history can be rooted from ancient civilization, where their roles as a primary source of medication have been evident. There are various plants which are used as chewing sticks in different parts of the world. Several studies have reported on the antimicrobial effects of chewing sticks on oral bacteria and it was found that a 50% concentration of Kikar (*Acacia arabica*) and Arak (*Salvadora persica*) produced an antimicrobial effect on *Streptococcus fecali*. The herbal mouth rinse compared favourably, particularly in inhibiting the growth of *Actinomyces* species, the periodontal pathogens, *E. nodatum*, *Prevotella intermedia*, *Prevotella melaninogenica*, *Prevotella nigrescens*, *T. forsythia* and the dental caries pathogen, *S. mutans*. The effectiveness of the herbal mouth rinse, most likely, was due to its antimicrobial effect. Goldenseal had antimicrobial properties against oral pathogens such as *S. mutans* and *Fusobacterium nucleatum*

Herbal extracts have been successfully used in dentistry as tooth

cleansing and antimicrobial plaque agents. The barberry (*Berberis vulgaris*) dental gel has been shown to effectively control gingivitis and microbial plaque formation in children.¹⁷ Barberry juice contains a large amount of Vitamin C and so it increases the activity of immune system, stimulates to absorb iron and avoids scurvy. Herbal extracts are a matter of scientific interest in efforts which are being made to inhibit plaque accumulation on teeth. The ability of the herbal extract, German chamomile, in mouthwashes to reduce gingival inflammation and plaque formation and for use as an irrigant to disinfect the root canal with less toxicity, has been well documented.¹⁸

CONCLUSION : The use of herbal medicines continues to expand rapidly across the world. Many people take herbal medicines or herbal products now for their health care in different national healthcare settings. Herbal extracts aid in healing and are effective in controlling microbial plaque in gingivitis and periodontitis and thereby improving immunity. They have been used in dentistry for reducing inflammation, as antimicrobial plaque agents, for preventing release of histamine and as antiseptics, antioxidants, antimicrobials, antifungals, antibacterials, antivirals and analgesics.

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FIBROUS DYSPLASIA

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ABSTRACT : Fibrous dysplasia is a developmental benign bone lesion characterized by the replacement of normal bone by excessive proliferation of cellular fibrous connective tissue which is slowly replaced by bone, osteoid or cementum like material. It causes bone pain, deformities and pathological fractures. It may either be monostotic or polyostotic. It has now become evident that fibrous dysplasia is a genetic disease caused by somatic activating mutation of the Gs subunit of G protein-coupled receptor resulting in up regulation of cAMP. This leads to defects in differentiation of osteoblast with subsequent production of abnormal bone in an abundant fibrous stroma. Fibrous dysplasia can affect any bone in the body. The most common sites are the bones in the skull and face, femur, tibia, humerus, pelvis, and ribs. The disease may occur alone, or as part of a condition known as the McCune- Albright syndrome. which is characterized by fibrous dysplasia and other symptoms such as patches of pigmented skin and endocrine problems such as early puberty , hyperthyroidism , excess growth hormone), excess cortisol etc. **Keywords** - Monostotic, polyostotic, fibrous dysplasia, craniofacial form.

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INTRODUCTION : “Fibrous dysplasia is a developmental tumor like condition that is characterized by replacement of normal bone by an excessive proliferation of cellular fibrous connective tissue intermixed with irregular bony trabeculae.¹ “Fibrous dysplasia is actually a dysplastic process and not considered as true neoplasm because it is self limiting. It begins as a fibro - osseous replacement of the medullary bone, which in turn gradually replaced by metaplastic woven bone that eventually matures into dense lamellar bone”²

ETIOLOGY: There is no general agreement as to the etiology of the lesion. It appears to have no familial, hereditary or congenital basis, While Jaffe & Lichtenstein considered it as a developmental anomaly caused by aberrant activity in the bone forming mesenchymal tissue. Most theories favor it as a developmental anomaly because the disease begins in early life and is active during the growth period. Sternberg and Joseph considered complex endocrine disturbance with local tissue susceptibility as the cause.³Fibrous dysplasia is a sporadic condition that results from a post zygotic mutation in the GNAS 1 (guanine nucleotide binding protein, α stimulating activity polypeptide). The clinical severity of the condition presumably depends on the point in time during fetal or postnatal life that the mutation of GNAS 1 occurs. There is a over expression of c-fos a proto-oncogene which plays a role in growth and differentiation of osteoblast leading to fibrous dysplasia.⁴

- Other causative factors may be Liver Damage, Infections, Glandular dysfunction, Lipid Granulomatosis, Trauma and abnormal osteoclastic maturation of bone forming mesenchyme^{5,6}

CLASSIFICATION-

By Phillips and Eversole-

MONOSTOTIC

- Juvenile

- Juvenile aggressive
- Adult

POLYOSTOTIC

- Craniofacial
- Mc cune –Albright syndrome

Jaffe syndrome

- PATHOGENESIS

The molecular mechanism responsible for fibrous dysplasia, McCune Albright Syndrome is a post zygotic activating mn of the adenyl cyclase enzyme and overproduction of 3' 5'- cyclic adenosine monophosphate. The most common GNAS1 gene mutations are a replacement of argenine by either cysteine or histidine at codon 201 (R 201C or R 201H) but other mutations are also identified. The severity depends on the time of mutation during embryogenesis. If mutation occurs during the formation of the inner cell mass, all three germ layers will be affected and the phenotype will be MAS. If it occurs later in the development, only 1 or 2 germ layer will be affected and phenotype is less severe. Fibrous dysplasia is considered a disease of cells of the Mesenchymal stem cell/ osteoblastic lineage in which excess cyclic adenosine monophosphate impairs the ability of stem cells to differentiate into mature functioning osteoblast^{7,8}

TYPES- Mainly two subtypes are seen-

- 1) monostotic fibrous dysplasia
- 2) Polyostotic fibrous dysplasia
 - a) Jaffes type
 - b) Albright syndrome⁹

CLINICAL FEATURES :

Monostotic fibrous Dysplasia: Monostotic fibrous dysplasia involves only one bone and presents no extraskelatal effects other than occasional pigmented skin lesions. The clinical term "Leontiasis Ossea" has often been applied to cases of fibrous dysplasia which affect the maxilla or facial bones and give the patient a “leonine appearance”(Virchow 1864) This type accounts for 80 to 85% of all cases⁵ Only one bone is involved. Most frequent sites are ribs, femur, tibia, maxilla & mandible. Maxilla is involved twice as often as mandible, stated by Sherman and Glauser in 1958. Shoulder bones, bones of pelvic girdle are also involved. When maxilla is affected, adjacent bones such as zygoma, sphenoid occiput may also be involved and the disease is then not strictly Monostotic. However since the disease is restricted to contiguous bones within defined anatomical area the pattern is not that typically associated with polyostotic disease for this reason, the suggested term is craniofacial dysplasia. Teeth involved in the lesion usually remains firm but may be displace by bony mass^{2,3} Most commonly occurs at age of 20 -30 years. Even though they are equally distributed among male and female, it has been suggested that they are 2 to 3 times more common in females than in males¹⁰

Swelling of the affected bone is the most common and constant feature causing gradually increasing facial asymmetry.⁷ There is a painless swelling or bulging of the jaw. The swelling often involves labial or buccal plate¹¹

In mandible it causes a protuberant excrescence of the inferior border & increase in the depth of jaw.¹² Another condition associated with fibrous dysplasia is mazabraud syndrome. It is actually a intramuscular myxoma which is a tumour of adult life. About two-third patients are females. Most cases of fibrous dysplasia are asymptomatic but some may present with pain, skeletal deformities and pathological fracture.¹³

Polyostotic fibrous dysplasia

In this form of dysplasia more than one bone is involved.

It is of two types:-

- i. Jaffe's type
- ii. McCune Albright Syndrome²

Jaffe's Polyostotic Fibrous Dysplasia
The disease usually manifests itself in early life before 10 years of age. Females are affected more often than males in the ratio of 3:1. Polyostotic fibrous dysplasia is characterized by skeletal changes, such as bowing or thickening of the bones, asymmetry of facial bone or skull and skin pigmentation.¹⁴

The onset of the disease is insidious although recurrent bone pain is the most common presenting skeletal symptom. The skeletal lesions may be unilateral in distribution or may involve nearly every bone in the body. The bones of the face and skull are frequently involved resulting in obvious facial asymmetry.³ The skin lesion consists of irregularly pigmented light brown melanotic spots, described as 'café-au-lait' spots. The most common sites for pigmentation are the back, buttocks, thighs, shoulders, chest, neck and face in order.¹⁴ The oral manifestations of polyostotic fibrous dysplasia are related to expansion and deformity of the jaw. The eruption pattern of the teeth is disturbed because of the loss of support of the developing teeth. Intra-oral pigmentation has also been reported but is rare.³ The margins of the 'café au lait' spots are typically very irregular in contrast with café au lait spots of neurofibromatosis which are quite regular.²

ii. Albright's syndrome: The triad of polyostotic fibrous dysplasia, skin lesions and endocrinopathies is known as McCune's Albright syndrome. The bone involvement is characterized by polyostotic fibrous dysplasia. The long bones are more frequently affected. The skin lesions consist of 'café-au lait' spots. The endocrine disorder leads to-Sexual precocity in females where menarche starts in the first year of life, in some cases vaginal bleeding has been noted earlier than one year of life, Secondary sex characteristics such as pubic and auxiliary hair, development of breast etc. is evident by the age of 5 years. Precocious puberty in boys is rare. It manifests itself with gynaecomastia. This skeletal precocity as seen in girls, where skeletal maturation occurs earlier than usual leading to short stature when they reach adulthood.¹⁵ Other endocrine disorders involve the pituitary gland, thyroid gland and parathyroid glands. Insulin resistant diabetes mellitus has also been reported. Pregnancy sometimes stimulates the growth of fibrous dysplasia which usually arrests its progress when the child's development is completed. Endocrinal disorder is complied by Warrick in 1973.⁶

Sub-clinical Fibrous dysplasia

Many a times an unsuspected lesion of fibrous dysplasia comes to light accidentally on routine radiographic examination without any clinical evidence of suspected disease. Such examples are termed as Sub clinical Fibrous Dysplasia.³

Radiographic appearance: The radiological features are diverse and depend upon proportion of mineralized bone to fibrous tissue in the lesion. Early lesions are ill defined or well defined and may be unilocular or multilocular. As the lesions mature, bony defects acquire mixed radiolucent radio opaque appearance and established cases

exhibits mottled radio opaque patterns resembling ground glass, orange peel or fingerprints with ill defined borders blending into normal adjacent bone¹⁶

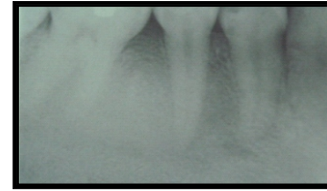


Fig.1 Periapical radiograph showing a diffuse "ground glass" radiographic appearance

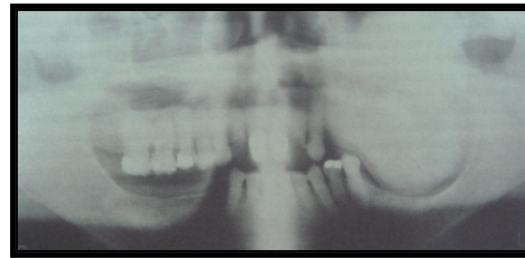


Fig. 2 Panoramic radiograph showing "ground-glass" appearance

HISTOLOGICAL FEATURES-

The lesion consists of fibrous tissue that replaces the normal bone and gives rise to osseous trabeculae by metaplasia. Fibrous dysplasia shows rather uniform appearance with a constant ratio between bone and fibrous tissues throughout the entire lesion. There is considerable variation in cases of monostotic fibrous dysplasia of the jaw which shows proliferation of fibroblast in a compact stroma of interlacing collagen fibers. Irregular trabeculae of the bone are scattered throughout the lesion with no definite pattern of arrangement. The trabeculae are 'C' shaped described as Chinese character shape.¹⁷ The trabeculae are usually coarse woven bone but may be lamellar. There may be permanent arrest in the woven bone stage. The trabeculae of the bone may be devoid of osteoblastic rimming thereby appearing to be formed by fibroblastic osseous metaplastic tissue. There may be occasional reteform arrangement of trabeculae, ovoid calcification referred as cementicles or ossicles. Multinucleated giant cells are also described in fibrous dysplasia. They are scattered and usually present along the surface of trabeculae.⁵

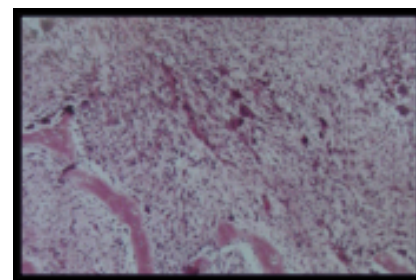


Fig.3 Histological cross section showing osteogenic mesenchyme comprising bundles of spindle cells and discrete bone formation.

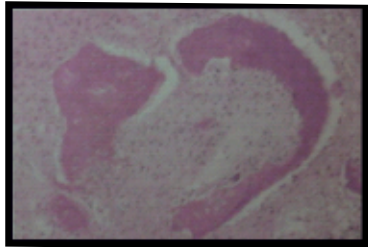


Fig. 4 Histological section showing moderately cellular fibrous tissue with irregular, curved spicules of woven bone develop without discernible appositional osteoblast activity.

MANAGEMENT : Mild cases of polyostotic fibrous dysplasia of the bone may be treated surgically. The severe forms are impossible to treat in this manner, particularly, since they tend to be progressive. Many small lesions are static and asymptomatic. Marked or progressive deformity, pain or interference with the function suggests the need for therapy. Recon touring of the affected part of bone that is debulking of the bone is advised, if the lesion is small. Complete removal of the involved area is the treatment of choice but this often results in considerable functional and cosmetic defects, demanding extensive reconstruction.¹⁸ A diagnosis of fibrous dysplasia of the jaws can only confidently be made after careful correlation of the clinical, histopathological and radiographic features of a case. Serum calcium, phosphorous, alkaline phosphates and parathyroid hormone values should be obtained in order to rule out other forms of the osseous dysplasia.⁷ Jaw lesions which interfere with the dentition causing malocclusion or which are associated with jaw bone expansion and/or facial disfigurement are usually treated surgically. It has been suggested that surgery in children should be delayed until skeletal maturity has been reached, but each case must be treated on its own merits. In some cases X-ray radiation has been used with some success but radiation therapy is hazardous because of possibility of subsequent development of radiation Sarcomas.¹³

REOCCURENCE : These lesions show recurrence period ranging from 2 months to 4 years. One case of JOF shows three recurrences every year. But overall it has been seen that such lesions had normally expanded again within 2 or 3 yrs after surgical intervention.¹⁹

PROGNOSIS : Generally the active period ceases in adult life. If growth still continues the rate of activity is markedly reduced. However calcification of the fibrous tissue may continue for years. Occasionally the lesions may remain inactive for several years for some unknown reason, it renews its activity. Malignant transformation of monostotic & polyostotic fibrous dysplasia to osteogenic sarcoma or fibro sarcoma if reported then prognosis becomes poor.³

MALIGNANT POTENTIAL : Malignant changes of fibrous dysplasia deserve consideration. The incidence is difficult to determine but it is not great. Most reported instances have developed in patients who received previous radiation therapy for the fibrous dysplasia. It is clear that radiation treatment of fibrous dysplasia is of no value and is potentially dangerous. Although radiation if not used sometimes spontaneous malignant transformation may result. These are most common in polyostotic fibrous dysplasia. Occasionally patient will die

as a direct result of fibrous dysplasia.^{20,21}

Sarcomatous transformation is rare in non-irradiated fibrous dysplasia. Nevertheless the incidence is reportedly slightly higher in craniofacial region in the polyostotic cases (Present et al 1986). These features highlight the need even in the absence of treatment for long term follow up of patient with craniofacial fibrous dysplasia. Radiography is contraindication due to its association with Sarcomatous transformation (Mork & Resend 1986). Occasionally inactive form of fibrous dysplasia in adults may reactivate and this growth can occur as those occurring in Pregnancy.

Radiation of the lesion is contraindicated because malignant changes may occur. However, malignant changes may occur without prior radiotherapy. An approximate incidence of malignant transformation in fibrous dysplasia is estimated at 1%. Therefore in this case strict follow-up will be mandatory.²²

CONCLUSION : The fibrous dysplasia is significant for the dentists because it may affect the facial, cranial and jaw bones leading to many deformities and dysfunctions. The cells of fibrous dysplasia are committed osteogenic cells with impaired capacity to form normal bone. The mutated protein not only affects osteoblast but can also affect various hormone receptors leading to endocrinopathies and café aulait spots. Malignant transformation occurs infrequently with reported frequencies ranging from 0.4-4%. . Bisphosphonates can provide some relief of bone pain, but the development of mechanism-based therapies to treat neuropathic bone pain or the bone disease itself is needed to improve the management of FD patients.²³

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BIO-MIMETIC MATERIALS IN RESTORATIVE DENTISTRY

Supriya Malik, Madhu Pujar, Hemant Vajarali, Virendera Uppin, Vinay Kumar

ABSTRACT:

Bio-mimetic Dentistry the art and science of restoring damaged teeth with restorations that mimic natural teeth in appearance, function, and strength.

Bio-mimetic means what is life-like. Nature has given our natural tooth, the most ideal properties. Bio-mimetic dentistry return the tooth to its original form and function in strong and conservative way. **BIO** mean-life like, **MIMETIC** mean copy. The goal of bio-mimetic in restorative dentistry is to return all the prepared dental tissues to full function by the creation of a hard-tissue bond that allows functional stresses to pass through the tooth, drawing the entire crown into the final functional biologic and esthetic result. Bio-mimetic materials may help bio-mimetic dentistry in achieving its goals.

Keywords : Bio-mimetic materials, Restorative Dentistry

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INTRODUCTION : The term "Bio-mimetic" was coined by Otto Schmitt in the 1950. Bio-mimetic is defined as the study of formation, structure, or function of biologically produced substances and materials and biological mechanisms and processes especially for the purpose of synthesizing similar products by artificial mechanisms which mimic natural ones. A material that is fabricated by technique based on natural process present in biological systems is called a bio-mimetic material¹ (Kottoor, 2013).

There are two aspects In Bio-mimetic dentistry .

1. One, in which the missing dental tissue is restored .
2. Or the material used, causes regeneration, replication of the missing dental tissue.

A bio-mimetic material should match the part of the tooth that it's replacing in several ways, including the modulus of elasticity and function of the respective areas (e.g., pulp, dentin, enamel , dentino-enamel junction).

CLASSIFICATION OF BIOMIMETIC MATERIALS

Bio-mimetic materials are divided into 2 groups:²

Class A: Osteopductive Materials

In these materials the bioactive surface is colonized by osteogenic stem cells. Eg: 45S5 Bio-glass. These materials are both osteopductive and osteo-conductive.

Class B: Osteoconductive Materials

These materials simply provide a biocompatible interface along which bone migrates. Eg: Synthetic hydroxyapatite (HA).

ADVANTAGES OF BIOMIMETIC MATERIALS

1. Closely adapt to tooth surfaces.
2. More conservative.
3. Delays the root canal treatment of tooth.

VARIOUS BIOMIMETIC MATERIALS

Calcium hydroxide, Glass ionomer cements, Nanocomposite, Mineral Trioxide Aggregate, Biodentine, Bioaggregate, Bioactive glass , Calcium enriched mixture, Casein phosphopeptide-amorphous calcium phosphate [CPP-ACP], Octacalcium phosphate, calcium phosphate material, Platelet rich fibrin , Emdogain, Generex, Capasio, Quickset.

GLASS IONOMER CEMENT : It is bio-mimetic material , man-made dentin, bonds chemically to tooth structure. It releases fluorides and decrease secondary caries .It has coefficient of thermal expansion near to natural tooth.

SELF-HEALING COMPOSITES : Scientists and researchers

are inspired by nature to develop materials which can repair by themselves. For example ,natural bone heal after a major fracture. Self healing composite contain resin filled microcapsules. If a crack occurs in the epoxy composite material, the microcapsules rupture near the crack and release the resin. The resin fills the crack and reacts with a Grubbs catalyst dispersed in the epoxy composite, resulting in a polymerization of the resin and crack repair.³

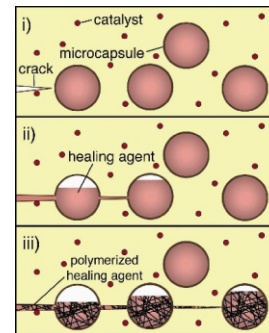


Fig 1. Basic method of the microcapsule approach.

CALCIUM HYDROXIDE : Introduced to dentistry by Hermann . It has a pH of approximately 12.5. It has antibacterial properties and the ability to induce tertiary dentin formation⁴

Disadvantages Of Calcium Hydroxide

- A. Poor adhesion to dentin.
- B. High solubility.
- C. The porosities ("tunnel defects") of the new formed hard tissue may act as a portal of entry for microorganisms.
- D. Poor mechanical properties.

MTA : It is a calcium silicate based hydrophilic material developed by Torabinejad . It has ph value range 10-12.5 and forms calcium hydroxide and hydroxy- apatite like crystals on setting in presence of phosphate containing solution . It causes periodontal ligament attachment, cementum growth , and dentinal bridge formation.. it show good adhesion to dentin. .It has low solubility than calcium hydroxide and no tunnel defects are seen when used in vital pulp therapy.^{4,5}

Disadvantages

Discoloration potential due to Iron and manganese when used in esthetic areas.

- A. Difficult handling characteristic.
- B. Long setting time..
- C. High material cost .

THERACAL : It is a light cured resin material having calcium silicate filler particles .As compared to ProRoot MTA and Dycal, it has low solubility and high calcium release.

NANO-WMTA : Introduced by Saghir et al. It has small particle size than MTA and has zeolite and strontium, di-sodium hydrogen phosphate in its composition .It shows less solubility in acidic ph and high push out bond strength as compared to WMTA.⁶

CERAMICRETE : It is a new generation calcium based material ,which has hydroxyl-apatite in powder and cerium oxide radio-opaque fillers. It is biocompatible and radio-opaque and release calcium and phosphate ions during setting. Its sealing ability is higher compared to a Super EBA and Pro-Root MTA when used as root end filling material. Immersion of the set ceramicrete material in a Phosphate containing fluid (PCF), lead to formation of Di-calcium phosphate dihydrate (DPCD) or hydroxyl-apatite on the surface. Ceramicrete shows bioactivity. Setting time-150

min. It has immediate pH 2.2 which increases with time. Radio-opacity-3.2 mm of Al. Compressive strength -6.6 MPa.^{7,11}

GENEREX A : It is a calcium silicate based material, used for root end filling. It has good handling properties compared to WMTA in acidic form it has superior washout resistance than WMTA. It has 17 mm flow. Working time-9.5 min. Film thickness is 83 micron. It can be rolled into rope like intermediate restorative material. Radio-opacity-7mm of Al. Setting time-75 min. Ph-10.8. Compressive strength-38.9MPa.^{8,9,11}

GENEREX B : It is new calcium silicate based material used as root canal sealer. It has flow of 29mm, that allows it enter into complex root canal system. Working time-65 min. It has film thickness of 32 micron. Radio-opacity-6mm of Al.^{8,9,11}

CAPASIO : It is a new calcium silicate based material composed of bismuth oxide, dental glass, polyvinyl acetate, calcium- alumino silicate. It is used for root end filling in endodontics and penetrate dental tubule. It forms calcium hydroxide and hydroxyapatite on setting. Setting time-150min. Ph 10.3. Radio-opacity-4.2mm of Al. Compressive strength-30MPa.^{10,11}

QUICK-SET : It is refined form of capasio which has no cationic surfactant in liquid gel.^{10,11}

BIODENTINE : It is a tricalcium-silicate-based cement. It may be used as a permanent dentine substitute as its mechanical properties are similar to dentin. When used as base, composite placement should be delayed for more than 2 weeks to allow complete maturation of material. It shows micromechanical adhesion to dentin and form calcium hydroxide and hydroxyl apatite on surface on setting. Compared to others calcium silicate based material it has: i) a faster setting time of about 12 minutes and ii) higher mechanical properties.^{12,13}

BIOAGGREGATE : It is a Calcium silicate cements lacking aluminum and containing phosphate. It is available in powder liquid system. It has no calcium sulphate and bismuth oxide in its composition and has tantalum oxide as radio-opacifier. It has high level of phosphate as compared to MTA and forms less calcium hydroxide as compared to MTA. Its sealing ability, biocompatibility, antimicrobial properties are similar to MTA. It has setting time 4-72hrs. Its disadvantages are long setting time and low compressive strength as compared to MTA.

IROOT : It is similar to bio-aggregate but available as single component system. Its setting time is 168 hrs. As nano-hydroxyapatite is used in manufacturing, particles size allows its penetration into dentin tubules. It has antibacterial activity against *Enterococcus faecalis*. iRoot SP is premixed ready to use, moldable paste.

DOXADENT : It is calcium- aluminate based cement which react with water containing lithium salts to forms katoite and gibbsite. It is inorganic and nonmetallic in nature. It is available as powder liquid component. And has alkaline pH. It is a hard material with low wear resistance. It is as strong as GIC but less than composite. It can be used in class 1,2,5 restoration. It has 0.2% setting expansion.^{14,15}

CERAMIR : It is also a calcium aluminate based material, used for permanent cementation of FPD, gold inlay, onlay, all zirconia, all alumina crown. It forms hydroxyapatite when comes in contact with inorganic phosphate of saliva and shows good gingival response when used as luting agent.^{14,15}

HYDROXYAPETITE : It is non resorbable calcium phosphate material. It is osteoconductive in nature and has composition similar to bone. It bond to bone. As, it has low mechanical properties so not used in load bearing area. It is used in bone grafting, as a filler in composite resins. Hydroxyapatite has been for endodontic treatment including pulp capping, repair of perforation, apical barrier formation, and repair of periapical defects. Jean et al. suggested that the degree of mineralization of reparative dentin formation obtained with tricalcium-phosphate-hydroxyapatite was quicker and thicker when compared with that produced by calcium hydroxide.¹⁵

CALCIUM PHOSPHATE CEMENT : It is moldable, viscous, self setting material discovered by Brown and Chowin in 1980. It forms hydroxyapatite on setting and has alkaline pH [12]. It has setting time of 20 min. It has compressive strength comparable to trabecular bone [11-12MPa]. It is inexpensive and has good handling properties.¹⁵

ACP TECHNOLOGY [ENAMELON, ENAMEL CARE] : The ACP technology was developed by Dr. Ming S. Tung. In 1999. It is a two-phase delivery system consisting of calcium sulfate and di-potassium phosphate. When two salts are mixed, ACP forms which dissolve in saliva and help in remineralisation of tooth. Eg. Enamelon, Enamel Care toothpaste.¹⁸

TRICALCIUM PHOSPHATE : Tri-calcium phosphate materials act as osteo-conductive materials, permits growth of bone on their surface or into pores, it is biocompatible material and useful for inducing hard tissue formation. It has been used as capping agent, cleft-palate, apical barrier, apexification, vertical bone defect, and implants coating. It also has been used as tooth remineralising agent. It has poor mechanical properties and shows fast and uncontrollable rate of resorption.¹⁵

CPP-ACP NANOCOMPLEXES: A PROTEIN TECHNOLOGY : Technology was developed by Eric Reynolds. It combine specific phosphor-proteins from bovine milk with forming nano-particles of amorphous calcium phosphate (ACP). The precise ratio is 144 calcium ions plus 96 phosphate ions and 6 peptides of CPP. The nano-complexes form over a pH range from 5.0 to 9.0. Under neutral and alkaline conditions, the casein phosphor-peptides stabilize calcium and phosphate ions, forming metastable solutions that are supersaturated with respect to the basic calcium phosphate phases. The amount of calcium and phosphate bound by CPP increases as pH rises, reaching the point where the CPP have bound their equivalent weights of calcium and phosphate. CPP-ACP has been used as remineralising agent in early carious lesion, and in management of dentin hypersensitivity.¹⁶

BIOACTIVE GLASS : It was first developed by Hench in 1969. These glasses are able to bind with bone and tissue and induce osteogenesis. These have different families and different composition. These can be used as bone graft and in management of dentin hypersensitivity and implant coating. Eg 45S5,

EMDOGAIN : It is enamel matrix derivative containing product. Enamel matrix derivative protein are secreted by Hertwig epithelial root sheath and induces the periodontal tissue formation. Emdogain mimic these processes of tooth development. Emdogain also contain non collagen proteins like ameloblastin, tuftsin, enamelin and growth factor, bone morphogenic protein. It is used in replantation cases to decrease external root resorption. It has been used for pulpotomy, vital pulp therapy as it induces reparative dentin formation.¹⁷

PLATELET RICH FIBRIN MEMBRANE : It is flexible, elastic membrane first developed by Choukaron et al in France. It contain platelets, growth factors and fibrin which enhances the wound

healing.¹⁹

Comparison of mechanical properties of various bio-mimetic materials -Table 1.

Properties	Calcium hydroxide	Glass-ionomer cement	Mineral trioxide aggregate	Biodentine
Mixing time	10-15 sec	10-45 sec	30sec	30 sec
S.T	2-3 min	3-9 min	2hrs 45 min	10-12min
Working time	1-2 min	3-5 min	5-8 min	6min
C.S[MPa]	6-20	90-180	40-67	297
T.S[MPa]	1-2	12-15	-	-
Ph	11-12	1.7-5.9	10-12.5	12.5
Hardness	-	59 VHN	-	60 VHN
Flexural strength[MPa]	-	15-182	-	34

Comparison of properties of MTA and BIODENTINE-Table 2.

Properties	MTA	BIODENTINE
Push out bond strength	less	More
Radio-opacity [mm of Al]	7	3.5
Density [g/cm ³]	1.8	2.2
Porosity%	22.6	6.8
D.T.S[MPa]	9.5	16

Clinical application of various bio-mimetic materials-Table 3.

Clinical applications	Enamel remineralisation	Dentinogenesis	Cementogenesis	Apexification	Perforation repair	Resorption repair	Bony defect repair
Calcium phosphate cement	✓	---	✓	---	✓	---	✓
Beta tricalcium phosphate	✓	---	✓	---	✓	---	✓
Bioactive glass	✓	---	✓	---	---	---	---
Hydroxy-apetite	✓	---	---	---	---	---	✓
Calcium hydroxide	---	✓	✓	✓	✓	✓	---
MTA	---	✓	✓	✓	✓	✓	✓
Biodentine	✓	✓	✓	✓	✓	✓	---

CONCLUSION: Currently the technique of today is to restore diseased and lost tooth structure by bio-mimetic approach. Bio-mimetic material help bio-mimetic dentistry in achieving its goal, but each of these material has their own limitations and drawbacks. Regeneration of the lost tooth structure rather than replacement will ensure better prognosis and high success rate. Hence the future dentistry would involve the use of materials which could successfully replace lost enamel, dentin, cementum

and even the pulp tissue.

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Case Report

EMINECTOMY FOR THE CHRONIC RECURRENT TEMPOROMANDIBULAR JOINT DISLOCATION

Paramjit Singh, DK Verma, Shallu Bansal, Saurabh Kumar

ABSTRACT: Mandibular dislocation is an acute painful condition that causes severe functional limitation. Manual reduction, with or without pharmacological assistance, is the treatment of choice and should be performed as early as possible. In rare situations mandibular dislocation may not be perceived by the patient and remain undiagnosed or misdiagnosed for a long period and may include severe illness, neurological diseases and prolonged intensive care hospitalization with oral intubation and sedation. Morphological changes of the joint and associated structures will prevent successful manual reduction even with the patient under general anesthesia. Many types of surgeries have been used for the management of chronic recurrent dislocations like condylectomy and condylotomy, eminectomy, kostecka's osteotomy, sub-condylar osteotomy with coronoidectomy, coronoidectomy, mandibular ramus L-inverted osteotomy, modified sub sigmoid vertical osteotomy, temporal myotomy, fink's method, traction with wires of the mandibular angle (surgical approach), meniscectomy. A successful management of a case report of a patient with chronic recurrent bilateral dislocation of the mandible by bilateral eminectomies is presented here.

Keywords: Mandibular dislocation, Eminectomy, Temporomandibular joint surgery, TMJ Dislocation, Chronic recurrent dislocation.

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INTRODUCTION : Temporomandibular joint (TMJ) dislocation is defined as the displacement of the condyle beyond the glenoid fossa without the ability to reduce itself. It appears mainly in young adults and presents clinically as the inability to close the mouth. This occurs most frequently in people who have a weakness in the ligament, joint capsule, with condylar erosion or flattening of the articular eminence¹, other possible factors may include trauma, abnormal masticatory movements, and masticatory muscle disorders etc. In acute cases, manual reduction generally solves the problem, whereas in other cases this situation is repetitive, with monthly and even daily episodes becoming recurrent and most commonly known as chronic recurrent TMJ dislocation. Different techniques have been applied to treat recurrent mandibular dislocations like condylectomy and condylotomy, eminectomy, kostecka's osteotomy, subcondylar osteotomy with coronoidectomy, coronoidectomy, mandibular ramus L-inverted osteotomy, modified subsigmoid vertical osteotomy, temporal myotomy, fink's method, traction with wires of the mandibular angle (surgical approach), meniscectomy, with the aim of enabling the free movement of the condyle or limiting condylar movement exclusively to the glenoid cavity.² The eminectomy technique was proposed by Myrhaug in 1951 and was designed to remove the articular eminence and allow free movement of the condyle and Myrhaug also described the surgical procedure to remove the articular eminence in cases of recurrent mandibular dislocations.^{1,2} Here we present a case of bilateral chronic recurrent TMJ dislocation treated by eminectomy.

CASE REPORT : A 35 year-old male complaining of chronic recurrent dislocation of the bilateral mandibular condyle was referred to the Oral Surgery department for treatment. During the previous four months, he had experienced repeated bilateral dislocations of the mandibular condyle. Patient was asymptomatic

4 months back when suddenly at night after yawning, he was unable to close his mouth. He was taken to some hospital where the dislocation was reduced. 25 days later the same problem was faced by the patient when he yawned and failed to close his mouth. The patient visited a local practitioner where the reduction was done. The third episode of dislocation occurred 30 days later and the patient was referred to the department of oral surgery of Surendera Dental College & Research Institute. Manual reduction was done and the patient was advised for bilateral eminectomy under general anesthesia for the recurrent TMJ dislocations after discussing in detail the advantages & disadvantages of procedure. Patient submitted his duly signed written informed consent for the same.

SURGICAL PROCEDURE : After standard painting and draping, Alkayat-Bramley¹ incision markings were marked. (Figure 1) and a large incision in question mark shape like was made in the temporal area and extended in the preauricular area. This approach gives excellent visibility with a safety to the zygomatic arch and joint. The skin incision is a question mark shaped and begins about a pinna's length away from the ear, antero-posteriorly just within the hair line, curves backward and downward well posterior to the main branches of the temporal vessels, till it meets the upper attachment of the ear and a 45° incision was given on the superficial layer of deep temporal fascia from the root of the zygomatic arch and the eminence was exposed by sub-periosteal dissection. Bilaterally skin flaps were raised (Figure 2). Bilateral eminectomies were done with oscillating saw with the blade angled caudally and bone filling was done (Figure 3). Mandibular movements were checked intra-operatively and layered suturing was done with 3.0 vicryl and 3.0 silk sutures. TMJ physiotherapy was begun from 3rd post-operative day, which continued for one month and patient was followed up till 6 months. TMJ physiotherapy consisted of active and passive mouth opening exercises followed by isometric exercises for jaw opening and closing muscles. The patient did not complain of any dislocation and there was no deviation of mandible on mouth opening. Patient was free from pain and his inter-incisal opening was 42mm after 6 months.



Figure 1: Markings for Alkayat-Bramley incision



Figure 2: Reflection of flap and exposure of articular eminence



Figure 3: Articular fossa after eminectomy

DISCUSSION : Temporomandibular joint dysfunctions appear in different forms and with different symptoms.³ In some cases, as conservative management is an ineffective and inefficient option, so surgery being necessary in such cases. Eminectomy has proven to be a versatile technique in the management of different types of patients, with different complexities and with no age limit. Mayer L⁴ presented 2 cases of recurrent dislocation, these being a 62-year-old woman with mandibular dislocation with some weeks of duration due to repeated vomiting and a 74-year-old patient with a mandibular dislocation of 57 days of duration that was treated with an eminectomy with no painful sequelae or recurrences of dislocation and did not show any changes in the joint movements preoperatively or postoperatively; the extreme translocation that might be expected from not presenting the eminence was not observed in the patients, indicating as a probable cause for the presence of a fibrous scar in the anterior sector of the capsule that would prevent excessive movement. In terms of complications, the series of 14 patients by Weinberg S⁵ showed that the complications were observed in 3 cases, these being fracture of the condylar head, persistence of the mandibular dislocation, and osteoarthritis of the TMJ. Surgical access is not observed as a complication in the postoperative aesthetics or possible damage to the facial nerve; in fact, nowadays preauricular or endaural access is considered routine procedure. Horizontal access, on the zygomatic arch, investigated initially so as not to damage the facial nerve, did not present any differences when compared with preauricular access. In our case, motor complications of the facial nerve, functional alterations, and recurrent dislocation were not observed. Sato et al⁶ conducted a comparative study of patients treated with eminectomy by means of Myrhaug's procedure and with eminoplasty by means of the arthroscopic technique. They identified a dislocation recurrence close to 25% in both groups, concluding that the arthroscopic technique can be just as efficient at reducing mandibular dislocation and is a less invasive procedure, with less bleeding and a shorter surgical time. Another more radical modification was reported by Stassen et.al and O'Halloran et.al^{7, 8}, who presented a retrospective series of 9 patients who underwent an eminectomy with local anesthesia and conscious sedation, establishing a functional procedure of TMJ surgery. Here, the eminectomy was performed to treat case of bilateral recurrent TMJ dislocation resistant to non-surgical treatment using in distocation free episodes at 6 month follow up.

CONCLUSION : In conclusion, the bilateral eminectomy applied to case of recurrent mandibular dislocations is a completely viable option.

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Case Report

GINGIVAL DEPIGMENTATION UTILIZING SCALPEL AND ELECTROCAUTERY TECHNIQUE: A COMPARATIVE CLINICO-HISTOPATHOLOGICAL EVALUATION OF A CASE REPORT

Shilpa Kamra, Sanjeev Kumar Salaria, VishavJyoti, Garima Sharma

ABSTRACT : Gingival hyperpigmentation due to melanin deposition is seen as genetic trait in most of the population irrespective of age and gender, hence termed as physiologic or racial gingival pigmentation. Personality of an individual is not only influenced by the outlook but also by the smile he/she carries. As smile expresses a feeling of pleasure, sensuality, care and confidence. The harmony of smile is not only determined by color, position and shape of teeth, but also by color of gingiva. Number of techniques was advised in the literature to obtain pleasing gingival color. In the present case report gingival de-pigmentation was carried out utilizing surgical stripping and electrocautery. Pre and post operative clinical and histopathological evaluation was carried out upto 6 months. Report of the case dictated that both the techniques are simple, effective and provided satisfactory outcomes at 6 months post-operatively but surgical stripping technique dictates to be simple and highly effective in all terms except bleeding and required periodontal dressing post-operatively.

Keywords: Gingival hyperpigmentation, melanin, depigmentation, surgical stripping, electrocautery.

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

INTRODUCTION : Gingival health and appearance are essential components of an attractive smile. The color of gingiva depends on vascular supply, thickness, degree of keratinization of the epithelium and the presence of melanocytes which are responsible for the formation of non-hemoglobin derived endogenous brown pigment known as melanin which is situated in the basal and spinous layer of the oral epithelium.¹ Several physiologic and/or pathologic factors can cause gingival hyperpigmentation (Table I).² It is generally agreed that pigmented areas are present only when melanin granules are transferred to the keratinocytes. This close relationship between melanocytes and keratinocytes was labeled by Fitzpatrick and Breathnach in 1963 as the epidermal-melanin unit.³ There has been a rise in the number of patients who are disgruntled with the pigmentation of their gingiva, finding it unappealing and detracting from their smile. Therefore, gingival depigmentation procedures have become a boon for such patients. Electro surgery, cryosurgery, scalpel, lasers, etc are known techniques adopted for gingival depigmentation.⁴ The following case report illustrates a clinical histopathological comparative evaluation of gingival depigmentation with scalpel and electrocautery.

Table 1: Etiology of gingival hyperpigmentation. Physiologic Oral Pigmentation:- Melanin is normally produced by melanocytes. **Endogenous Factors (diseases that increase melanin pigmentation)** **Exogenous Factors**

- Addison's disease Atmospheric irritants (coal and metal dust)
- Peutz-Jeghers syndrome Coloring agents in food or lozenges
- Albright syndrome (polyostotic fibrous dysplasia) and von Recklinghausen disease (neurofibromatosis) Tobacco
- Bile pigments can stain skin and mucous membranes Amalgam tattoo
- Drugs Antimalarial drugs

CASE REPORT : A 25 year old systemically and periodontally healthy male patient reported to the Department of Periodontology & Oral Implantology, of Surendera Dental College and Research Institute with a chief complaint of "blackish gums" which interfered with his smile. On clinical evaluation, Dummet's oral pigmentation score 3 and 2 was observed in maxillary and mandibular arch respectively (Figure-1).⁵



Fig 1: Maxillary dummet's grade III hyperpigmentation and mandibular dummet's grade II hyperpigmentation

Patient undergone oral prophylaxis followed by incisional biopsy of gingival melanin pigmentation size 4 x 4mm obtained from attached gingiva distal to 23 and 43 region and sent for histopathological evaluation and patient recalled after 3 weeks. Biopsy sample stained with H and E stain, microscopically viewed at 40x magnification dictates grade 3 and 2 melanin pigmentation in maxillary and mandibular region respectively (Figure- 2A and 2B).

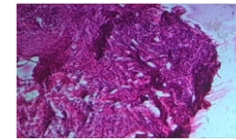


Fig 2 A:- Histopathological evaluation showing dummet's maxillary grade III hyperpigmentation Fig 2 B:- Histopathological evaluation showing dummet's mandibular grade II melanin hyperpigmentation in mandible

After discussing the various treatment modalities (with pros and cons) the patient opted for surgical scalpel technique utilizing partial thickness flap for maxillary 13 to 23 region and electrocautery assisted depigmentation for mandibular 43 to 33 region and written informed consent was taken. For the scalpel technique, local anesthetic solution 2% adrenaline with solution was administered which was followed by elevation of a split thickness flap, with the help of surgical blade no. 15 with the Bard Parker handle no. 3 followed by scraping the remnants of hyperpigmentation site (Figure-3A and 3B).



Fig 3A After surgical scrapping Fig 3B Excised hyperpigmented epithelium

Bleeding was controlled using pressure pack with sterile gauze. Care was taken to avoid any bone exposure. The surgical area was covered with a periodontal pack and postoperative instructions were given. Similarly, epithelial excision was done in the lower quadrant with the electrocautery unit using the loop electrode, set at coagulation mode 3 and cutting mode 2 with light feather strokes (Figure-4).



Fig 4 Depigmentation procedure with electrocautery

Patient was advised to use 0.2% Chlorhexidine mouth rinse twice daily. The healing was uneventful without any postsurgical complications after 1 week. 6 months post operatively clinically no sign of repigmentation was observed in both the operated site but histopathologically grade 0 signs of melanin repigmentation were observed in maxillary where as grade 1 repigmentation was observed in mandibular operated site respectively (Figure-5a,5b,5c)



Fig 5 A Clinical picture after 6 months follow up

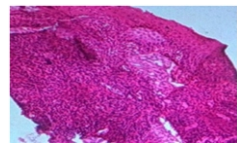


Fig 5B Histopathological picture of 6 month follow up of maxillary gingival tissue

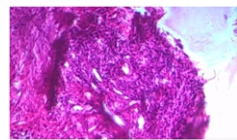


Fig 5c Histopathological picture of 6 month follow up of mandibular gingival tissue.

Patient was satisfied with the esthetic outcome.

DISCUSSION : Gingival pigmentation depends upon the vascular supply to the gingiva, keratinization, exogenous and endogenous pigments etc. The difference in the oral pigmentation in males and females has been shown to be insignificant based on the studies conducted.¹ Dummett suggested oral pigmentation index (DOPI): for intensity of pigmentation⁵ :-

- 0-Pink tissue (No clinical pigmentation)
- 1-Mild light brown tissue (Mild clinical pigmentation)
- 2-Medium brown or mixed brown and pink tissue (Moderate clinical pigmentation)
- 3-Deep brown/blue-black tissue (Heavy clinical pigmentation)

Grades for Histological assessment⁶ has been formulated on the basis of microscopically viewing of density of melanin granules. The grading was done by using the scale as follows:

- 0. Absence of melanin granules (No pigmentation)
- 1. Rare and scattered melanin granules (Mild pigmentation)
- 2. Dense but not aggregated melanin granules (Moderate pigmentation)
- 3. Dense and aggregated melanin granules (Heavy pigmentation).

These melanin hyperpigmentation grading criteria's prove to be a

helpful tool in measuring the treatment outcomes of various depigmentation techniques. Numerous techniques have been employed to treat gingival hyperpigmentation. In the present case report scalpel surgery and Electrocautery assisted sites shown reduction intensity of melanin pigmentation clinically from grade 3 to 0 and 2 to 0 respectively; similarly, histopathologically shown reduction of density of melanin pigmentation from 3 to 0 and grade 2 to 1 respectively. Surgical treated site dictates excellent outcome in terms of reduction of intensity and density of melanin pigmentation, esthetics which is in accordance with the report of Preeti Upadhyay⁷ and the reason being is that scalpel technique was precise, definite, under control offered advantage of tactile sensation as well as it eradicate the pigment containing cells in the deeper layer of Connective tissue immediately and left least room for residual pigments.⁶ Electrocautery uses electric energy to cause molecular disintegration of melanin cells of operated and surrounding sites, as explained by Olinger's "Exploding cell theory".⁸ Contact of the electrode with periosteum and vital teeth may cause damage to the tissues; hence it is technique sensitive and requires expertise. Though the initial result of the depigmentation surgery was profoundly encouraging, repigmentation is a common problem.

CONCLUSION : It was concluded that scalpel technique to be better than electrocautery in terms of reduction of intensity and density of melanin pigmentation, esthetics, patient acceptance and it is simple and economical as well.

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Case Report

MANAGING A PARTIAL MAXILLECTOMY DEFECT WITH AN OBTURATOR: A CASE REPORT

Saurabh Bansal, Shashikala Jain, Sandeep Kumar, Rajnish Aggarwal

ABSTRACT: Maxillary obturator prosthesis is the most frequent treatment option for management of partial or total maxillectomy following tumor, trauma or congenital deformation and poses a challenge to prosthodontists, particularly when the use of an implant cannot be considered. This case report describes a simple method for the fabrication of an obturator following partial maxillectomy.

Keywords: Obturator, Maxillectomy, Oro-antral communication.

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INTRODUCTION: A considerable number of people acquire oral defects as a result of malignant disease, trauma and congenital deformity. Maxillary resective surgery often creates a defect that may affect speech, swallowing, mastication, and facial appearance. Prosthetic rehabilitation after total or partial maxillectomy has historically involved the use of maxillary obturator prosthesis.¹ Resection of the hard palate establishes communication between the oral and nasal cavities and often the maxillary sinus.²

A maxillary obturator prosthesis can re-establish physical separation of the oral cavity from nasal cavity. Obturator constructed for maxillectomy patients are grouped according to their stage of use. The surgical obturator is fabricated prior to surgery; the interim obturator prosthesis is constructed after the removal of the surgical obturator and packing, while the definitive obturator prosthesis is provided for the patient 6 to 12 month after surgery.^{3,4}

Interim obturator prosthesis is normally placed after 7 to 10 days after surgery.⁵ As healing progresses, interim obturator prosthesis is fabricated and extended further into the defect, with subsequent additions to improve the seal and retention.⁶ Artificial replacement of the teeth and palate aids in speech, mastication, esthetics and morale.^{6,7} However, the prosthodontist should not rush to provide artificial teeth for the interim obturator prosthesis. The friability of tissue after radiation therapy, if it has been used, usually allows use of only the simplest type of prosthesis.⁷ Also posterior teeth should not be added to interim obturator prosthesis since they may impose excessive stress on the wound and delay the healing process.⁶

Maxillary obturator prosthesis is more frequent treatment modality than surgical reconstruction due to ease of fabrication and maintenance.^{8,9} The prosthesis recreates a partition between oro and naso-pharynx and facilitates improvement in mastication, deglutition and speech intelligibility.

CASE REPORT : A sixty three year old man was surgically operated for the diabetic osteomyelitis of the maxilla and was referred for the prosthodontic rehabilitation. Medical and dental history revealed surgical resection of the anterior maxilla 9 months ago. Intraoral examination revealed well healed surgical defect in the anterior maxilla creating an oro-antral communication (Figure 1)



Figure 1: Intraoral Maxillary Defect

All the remaining maxillary teeth and complete mandibular dentition were examined clinically as well as radiographically and found to be caries-free with no significant gingival/periodontal problems except left maxillary lateral incisor which was Grade II mobile. Patient was advised for the extraction of the same, which he denied. Masticatory and phonetic functions of the patient were severely affected due to missing maxillary structures.

Various modalities of prosthetic reconstruction were discussed with the patient and patient indicated a desire for an economic solution. Hence, a heat-polymerizing acrylic resin obturator was planned, and the expectations of this prosthesis were explained to the patient.

The impression of the defect was obtained with irreversible hydrocolloid (Figure 2).



Figure 2: Alginite Impression of the Maxillary and Mandibular Arch

The impression was removed and poured in type III dental stone. Maxillomandibular jaw relations were obtained, prosthesis was waxed to the desired shape and the wax prosthesis was verified at the trial insertion appointment (Figure 3a & 3b).

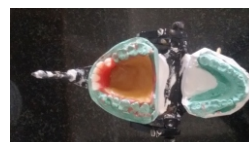


Figure 3a: Teeth Arrangement



Figure 3b: Try-In

The wax prosthesis was invested and the wax was eliminated. A mold was prepared and packed using three sections of a denture flask. The prosthesis was obtained, finished, polished and inserted into the defect (Figure 4).



Figure 4: Final Prosthesis in situ

Patient was instructed on home care and prosthesis maintenance. To sanitize the wound, patient was instructed to gently remove any exudates with a wet cotton tip soaked in 5% Betadine solution and to clean the intaglio surface of the prosthesis once in a day¹⁰. The patient was scheduled for first post-insertion adjustment 24 hours after the insertion. At the first post-insertion appointment, surgical wound was observed to ensure the health of the tissue, to relieve the prosthesis for pressure areas on the tissue, to compensate for

processing changes and to emphasize hygiene and home care. The patient was placed on 3-month recall for observation.

CONCLUSION: Heat-polymerized acrylic resin based obturators offer a simple technique for the reconstruction of maxillary defects, can be used by most prosthodontists in normal routine and offer a treatment alternative for patients who may not be able to receive conventional implants. This obturator improves pronunciation, deglutition, mastication, ability to be relined if required and long-term serviceability of this prosthesis makes it the treatment of choice for patients with maxillary defects.

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Case Report

RECONSTRUCTION OF A NONVITAL TOOTH WITH DIRECT FIBER-REINFORCED COMPOSITE RESINS: A CASE REPORT

Surinder S Chahal, Yogesh Kumar, Neetu Jindal, Renu Aggarwal

ABSTRACT: A large number of endodontically treated teeth with minimal remaining tooth structure require the placement of post to restore normal form and function. The use a fiber-reinforced post system is gaining popularity among clinicians because enlargement of the root canal space is not required and it eliminates the risk of perforation. This article presents a clinical technique to reconstruct a severely damaged root canal treated posterior tooth using direct fiber reinforced post systems (Ribbond).

Key words: Adhesive system, Composite resin, Fiber post.

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Source of support- Nil, Conflict of Interest- Nil

INTRODUCTION: A large number of endodontically treated teeth with minimal remaining tooth structure require the placement of post to restore normal form and function. The use of prefabricated & custom made post and core followed by crown placement is quite common, but in these procedures there is considerable amount of coronal and radicular sound tooth structure loss with increasing risk of root perforation or fracture.¹ Moreover, these treatment options are time consuming and costly. The improvement in the physical and mechanical properties of resin bonded composites (RBC) & development of new adhesive systems are responsible for a revolution in restorative dentistry.²

These adhesive restorations with minimally invasive preparations allow clinicians to conserve the sound tooth structure. Patients demand for esthetic restorations, their desire to save remaining sound tooth structure and their inability to afford the ideal indirect restoration in terms of time and money are pushing dentists to use direct RBC restorations in their clinical practice and encouraged them to abandon amalgam.³ Recently, fiber reinforcement systems have been introduced to boost RBC durability and damage tolerance. Ultra High Molecular Weight Polyethylene (UHMWPE) fiber reinforcement systems having various clinical applications are gaining recognition. They can be used to build up endodontic post and cores, due to their adaptability to the root canal walls without enlargement of the root canal space after endodontic treatment. These fibers have a modulus of elasticity similar to that of dentin and are believed to create a monoblock dentin-post-core complex, able to better transfer forces along the root⁴ and there is no need of full coverage crowns to reinforce the composite core.⁵ The purpose of the present case report is to demonstrate a clinical approach to reconstruct severely damaged root canal treated mandibular premolar teeth using Ribbond Fiber and Composite Resin.

CASE REPORT: A 46-year-old male patient presented to Department of Conservative Dentistry and Endodontics, Surendera Dental College and Research Institute, Sriganganagar, Rajasthan with fractured restoration w.r.t. left mandibular premolar (35).

The restoration was fractured one month back and patient gave a history of root canal treatment of the same tooth four months back.

Clinical examination revealed fractured post-endodontic restoration with the tooth no. 35, and whole of distal wall was lost. (Figure 1)



Fig.1. Pre-operative picture

IOPA FINDINGS: IOPA i.r.t. 35 revealed an appropriately root canal treated tooth having a Weine type IV canal pattern with fractured post-endodontic restoration. (Figure 2)

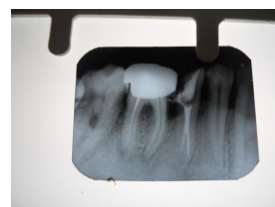


Fig.2. Pre-operative I.O.P.A.

The different treatment options were explained to the patient which include: custom made post & core followed by crown, direct fiber-reinforced post & core or extraction. The patient expressed the desire to save his tooth (35) and gave consent to restore it with a direct fiber-reinforced post & core, due to the lower cost compared to an indirect restoration.

Fractured restoration was completely removed. It was observed that the margins of the tooth were sub gingival on the distal side. Electrocautery was done to expose the distal cavosurface margin. Rubber-dam was placed by using split dam technique i.r.t. 35 (Figure 3).

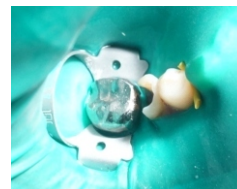


Fig.3. Rubber dam placement

A 3 to 4 mm of gutta-percha was removed from the root canal w.r.t. 35 to expose dentin and increase micro-retention when using enamel dentin adhesive systems (Figure 4).

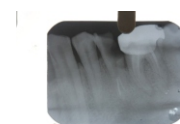


Fig.4. IOPA after GP removal from the coronal portion of the root canal

A tofflemire retainer with matrix was placed around the tooth and tightened to establish the proper contour of the distal wall. Interproximal matrix adaptation was secured using wooden wedges. Prepared cavity was etched for 15 sec using 37% phosphoric acid (d-tech). The etchant was removed with water spray and the cavity was air dried.

A fifth generation Nanofilled acetone-based adhesive system (Tetric N Bond, Ivoclar Vivident) was applied, and light cured for 20 seconds from the occlusal surface using a LED curing light (Woodpecker) with the intensity of 800mW/cm². The microhybrid composite (Filtex X-350) was condensed and sculptured against the cavosurface margins and tofflemire matrix, and each increment was pulse cured for 20 seconds at 1200mW/cm² (Figure 5).



Fig 5: The peripheral enamel skeleton was built with composite

A Polyethylene fiber reinforced posts PFR (Ribbond Triaxial, Ribbond, Seattle, WA, USA) was selected. Triaxial fibers were wetted with an unfilled resin (Figure 6),

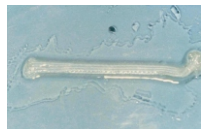


Fig 6: A piece of Ribbond ribbon was cut and wet with unfilled resin

excess resin was removed by squeezing and fibers were completely covered with light-cured flowable composite resin and pushed in the canal using a thin composite spatula (Figure 7).

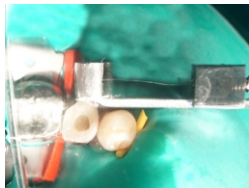


Fig 7: The Ribbond fiber was inserted

Flowable composite resin was used to fill any composite void, then a polymerization cycle of both the fiber-resin complex and composite resin was started at 1200mW/cm² for 40 seconds to assure complete polymerization of the fiber resin composite complex down into the canal. Subsequently, wedges and Rubberdam was removed, occlusion was checked and the restoration was finished using composite finishing kit (Shofu) (Figure 8 & 9)

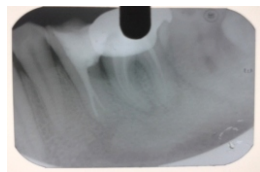
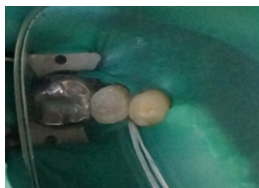


Fig8: Post-operative picture Fig 9: Post-operative IOPA

. The same restoration was evaluated at 6 months recall

(Figure 10).



Fig 10: 6 Months follow up

DISCUSSION :

Cusp fracture is very common in endodontically treated teeth. To avoid it cuspal coverage is necessary either in the form of onlays or full coverage crowns. These indirect restorations require multiple sittings and a considerable amount of sound tooth structure is also lost in this procedure.

Endodontically treated teeth that are structurally compromised may require the placement of posts. Christensen GJ reported that posts do not strengthen endodontically treated teeth and they are used only to withholding of coronal restoration.⁶

To place a post additional enlargement of the coronal portion of root canal is required. Post space preparation may be responsible for the destruction of sound tooth structure and tooth perforation may also occur during this procedure. Post cementation may not be required if an adhesive restorations is used in a teeth with sufficient amount of remaining coronal tooth structure.⁹

Ausiello P have verified that use of newly invented adhesive systems with Resin Bonded Composite can further strengthen residual tooth structure.⁷

This case presents the durability of resin-composite in the mandibular premolar tooth region. At 6 months follow up, no marginal discoloration, recurrent decay, chipping or composite clefts were seen thus, making the clinical performance of Filtex X-350 microhybrid composite satisfactory as a posterior restorative material.

Karbhari and Wang reported that the use of triaxial fibres increases the flexural characteristic of resin composites and provides a high level of fatigue resistance by isolating and arresting cracks. They also depicted that the maximum flexural stress of dentin was around 60% higher than that of unreinforced resin composite and the same braided resin composite provided more than 70% enhancement in maximum stress level.⁸

Polyethylene fibers post may represent a good substitute for posts to enhance the strength and retention of the composite buildup. However, the post-and-core buildup using woven fibers is a technique-sensitive procedure.^{9,10}

Direct RBC restorations is a single-appointment procedure compared to indirect laboratory-processed restorations, on the other hand higher cost of indirect restorations, patient's desire to conserve remaining sound tooth structure, and unfavorable anatomical conditions may make these direct restorations the first choice in many clinical situations.

CONCLUSION: The continuous improvement of adhesive systems, composite resin and curing techniques may make the use of direct Resin Bonded Composite in reconstructing severely damaged endodontically treated tooth. Being single appointment procedure, it reduces valuable chair side time, is less invasive and very cost effective.

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Case Report

SUCCESSFUL MANAGEMENT OF ATYPICAL PRESENTATION OF EAGLES SYNDROME ASSOCIATED WITH CHRONIC SIALADENITIS OF SUBMANDIBULAR GLAND.

Niharika Bishnoi ,Dinesh Verma, Shallu Bansal

ABSTRACT Eagle's syndrome is a disease caused by an elongated styloid process or calcified stylohyoid ligament. Eagle defined the disorder in 1937 by describing clinical findings related to an elongated styloid process, which is one of the numerous causes of pain in the craniofacial and cervical region.. Eagle's syndrome is usually characterized by neck, throat, or ear pain; pharyngeal foreign body sensation; dysphagia; pain upon head movement; and headache. Patients with increased symptom severity require surgical excision of the styloid process. Here, we report an atypical presentation of Eagles syndrome due to chronic sialadenitis of submandibular gland

Keywords: Eagle's syndrome; Elongated styloid process ;Neck Pain

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INTRODUCTION : An abnormally long styloid process or stylohyoid chain ossification producing cluster of symptoms give rise to "Eagle's syndrome"(ES) or " Stylohyoid syndrome", which is characterized by craniofacial or cervical pain.^{1,2}The symptoms were first described by W. Eagle in 1937. The syndrome was occurred more frequently in women then in men and usually with bilateral calcification. Only a small percentage of 4% of the population is believed to have an elongated styloid process and a calcified stylohyoid ligaments manifests the symptoms. The average length of styloid process in patients with Eagle's syndrome is 2.5 cm. Patients with ES may present with a sore throat, ear pain, or even with foreign body symptoms³ in the pharynx secondary to pharyngeal and cervical nerve interactions. The differential diagnosis of Eagle's syndrome may include s TMJ disease; Trigeminal, Sphenopalatine , and glossopharyngeal neuralgias; myofascial pain ; mastoiditis; otitis; temporal arteritis; dental pain; chronic tonsillitis or pharyngitis; submandibular sialdenitis or sialithiais;esopharyngealdiverticulosis;benign or malignant neoplastic disease; and pharyngeal foreign bodies.⁴ Diagnosis can usually be made on physical examination by digital palpation of the styloid process in the tonsillar fossa, moreover OPG and USG can assist in diagnosis. Treatment options includes non-surgical and surgical means. This casre report presents diagnosis and successful management of Eagle's syndrome associated with chronic sialadenitis.

CASE REPORT : A 70-year-old male patient presented to the department with a complaint of pain and swelling in right upper neck region of 4 months duration. The pain was insidious in origin, electric current like, dull to moderate in intensity and intermittent in nature. The intensity of pain was exacerbated by movements such as looking up and turning face to left side. The pain was radiating towards right side of forehead. The pain was followed by swelling which was gradual in onset. Patient also repeated on increase in pain and swelling during meals. The patient was under medication for the same he got relieved from swelling for some time but suffer from repeated episodes of pain and swelling .In addition ,patient also gives history of Herpes infection one and half year back.

Extra-oral physical examination revealed a tender firm swelling over right submandibular region, ovoid in shape, approximately

2cm in diameter. In addition, the patient presented with tenderness on palpation of right paratonsillar fossa On intraoral examination reduced salivary flow was associated with right submandibular gland. In the present case local anesthesia was given as a diagnostic block in the paratonsillar area , with relief of pain.

Orthopantogram (Fig.1)



Fig 1: Preoperative Orthopantogram

and USG Neck demonstrated elongated styloid process on the right side in comparison to left. A small calcified foci was seen in right submandibular gland. The condition was diagnosed as ES may be associated with Chronic sialadenitis of right submandibular gland. Non surgical and surgical treatment options were discussed in detail with the patient with their pros and cons;but patient choose to undergo surgical treatmentand submitted a duly signed informed consent

Under all aseptic conditions left nasal intubation was done, right submandibular incision was given (Fig.2)



Fig2: Submandibular incision subplatysmal dissection was carried out(Fig.3),



Fig 3: Subplatysmal dissection with blunt dissection along stylohyoid ligament; styloid process was identified (Fig.4)



Fig 4: identification of elongated styloid process

and excised. Digastric bellies were identified followed by isolation of submandibular gland, submandibular duct was located and ligated and gland was excised(Fig.5).



Fig 5: Excision of submandibular gland

closed suction drain was placed for 3 days .layered suturing was done with 3-0 Viryl and 3-0 silk suture(Fig.6).



Fig 6: Suturing

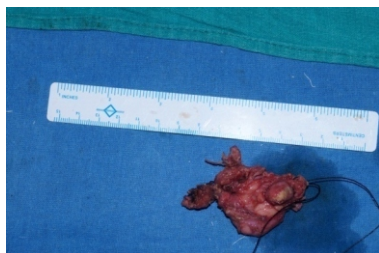


Fig 7: Excised gland

patient was discharged on 3rd day. Postsurgical healing was uneventful. Patient was kept on evaluation and the patient was asymptomatic at follow-up at 10 months .

DISCUSSION : The styloid process is derived from the second branchial arch of Reichert's cartilage. This cartilage consists of four components: 1) the tympanohyal 2) the stylohyal 3) the ceratohyal 4) the hypohyal. The styloid process is an elongated tapered projection that originates in the petrous portion of the temporal bone, lying medially and anteriorly to the stylomastoid foramen, between the internal and external carotid arteries, and laterally to the tonsillar fossa³. Eagle's syndrome comprises a constellation from facial pain to a foreign body sensation in the throat, same findings were observed in present case report.

The incidence of elongated styloid process was estimated at 3.3% out of which 55% bilateral cases in panoramic radiographs and male/female ratio was 1/9 in the radiograph. Rizzatti⁵ found a greater tendency in patients between 60-79 years of age. Balcioglu⁶ stated that Eagle's syndrome occurs more frequently in women, but in the present case report unilateral styloid process was present in 70 year male patient.

Langlais *et al.* classified elongated styloid process and mineralised styloid complexes based on the radiographic appearance and structures as follows: *Type I*: The elongated type pattern represents an interrupted process; *Type II*: Characterized by a single pseudo articulation that seems to be an articulated

elongated styloid process; *Type III*: Represents an interrupted process that gives the appearance of multiple pseudo-articulations within the ligament. This type can be nodular or completely calcified⁷. The present case appears to be Type I.

Eagle syndrome is a symptom complex and may present with a variety of symptoms, none of which is pathognomic. The commonest symptoms are throat and neck pain, and the sensation of a foreign body in throat. Less frequent symptoms are referredotalgia, headache, carotidynia, dizziness, and dysphagia. A range of cranial nerve palsies may occur. Pain is often unilateral and more than one symptom is usual⁸.

The present case presentation was complicated due to co-existent submandibular gland sialadenitis, with most prominent features of sialadenitis. However, neck pain, and foreign body sensation in pharynx were suggestive of Eagle's syndrome.

Differential diagnosis may include laryngopharyngeal dysesthesia, facial neuralgia dental malocclusion, neuralgia of sphenopalatine ganglia, temporomandibular arthritis, glossopharyngeal and trigeminal neuralgia, chronic tonsillo-pharyngitis, hyoid bursitis, Sluder's syndrome, histamine cephalgia, cluster type headache, esophageal diverticula, temporal arteritis, cervical vertebral arthritis, benign or malignant neoplasms and migraine type headache^{9,10} or sometimes even as impacted molar teeth.

The present case was Diagnosed by the clinical history and physical and radiographic examinations. The physical examination consists of palpation of the tonsillar fossa and local infiltration anesthesia.

Eagle's syndrome can be treated nonsurgically and surgically. The present was treated with surgical approach and on 10 months follow up no recurrence was seen.

CONCLUSION: Eagle syndrome can be effectively managed by surgical method but before reaching to the final conclusion long term studies with long term follow up should be carried out.

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THE NEUTRAL ZONE TECHNIQUE IN COMPLETE DENTURES FOR ATROPHIC MANDIBLE: A CASE REPORT

Robin Garg, Shashikala Jain, Sandeep Kumar, Sunita Choudhary

ABSTRACT : Severe alveolar ridge resorption is a complicating factor in the construction of complete dentures that determines both stability and retention of the dentures. The Neutral Zone technique is an alternative approach in constructing stable complete denture in case of a highly atrophic mandible. The neutral zone is the area where the displacing forces of the lips, cheeks and tongue are in balance. The Neutral Zone technique aims to construct denture in harmony with surrounding oral muscles, so that the denture does not get displaced during their activity. The clinical case report presented here describes the successful insertion complete denture utilizing neutral zone technique in a severely resorbed mandibular alveolar ridge.

Keywords : Atrophic mandible, Complete denture, Neutral zone, Neutral Zone technique.

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

INTRODUCTION : Complete dentures are primarily mechanical devices, but since they function in the oral cavity, they must be fashioned so that they are in harmony with normal neuromuscular function. All oral functions, such as speech, mastication, swallowing, smiling and laughing, involve the synergistic actions of the tongue, lips, cheeks and floor of the mouth.¹ Therefore, the coordination of complete dentures with neuromuscular function is the foundation of successful, stable dentures. In cases of atrophic mandible, the option of dental implants helps in providing a more stabilized mandibular complete denture, but in cases where it is not possible to provide implants due to medical risks and economic limitations, an alternative procedure must be thought.² The Neutral Zone Technique is an alternative approach in such cases. The neutral zone is that area in the potential denture space where the forces of the tongue pressing outward are neutralized by forces of the cheeks and lips pressing inward.³

Over the past years many authors have touched the Neutral Zone approach but very few have implemented it. Wilford Fish⁴ and Russell Tench⁵ were among those who contributed to the concept of Neutral Zone. Many others⁶⁻⁸ have helped to advance and develop both the theoretical basis and the practical procedures.

There are many materials that have been used and suggested for shaping up the Neutral Zone. These include modeling plastic impression compound⁹, soft wax⁸, a polymer of dimethyl siloxane filled with calcium silicate¹⁰, silicone and even tissue conditioners and resilient lining materials. Artificial teeth when positioned in the neutral zone help us to achieve two objectives; first, the teeth will not interfere with the normal muscle function and second, the forces exerted by the musculature against the denture are more favorable for stability and retention.

The purpose of this clinical report is to describe a simplified procedure for the fabrication of a mandibular complete denture in the neutral zone using impression compound material.

CASE REPORT: A 69 year old female patient reported to Department of Prosthodontics, at Surendera Dental College and Research Institute, Sri Ganganagar, with the chief complaint of previous unstable mandibular complete denture. Intraoral examination revealed edentulous maxillary and mandibular arch.

Severe resorption was present i.r.t mandible (**Figure 1a & 1b**).

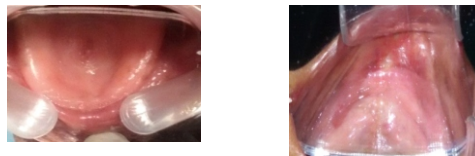


Figure 1a & 1b: Intraoral view of both maxillary and mandibular arches.

The patient was advised to get a new denture fabricated using the neutral zone technique as other treatment options like implant supported complete denture were not feasible due to the systemic diseases and economic factors.

Procedure:

A detailed examination was done and her old dentures were reviewed for retention and stability. The mandibular denture was unstable and the mandibular ridge was resorbed whereas the maxillary ridge was fine.

- The primary impression was made using alginate with perforated edentulous stock tray.
- Closely fitting stock tray was fabricated and border molding was performed using the low fusing Type I impression compound (green stick) to represent the muscle activity, recording the functional depth and width of the sulcus.
- The final impressions were made using the low viscosity mucostatic zinc oxide eugenol paste and the master cast was poured in dental stone (**Figure 2a & 2b**).

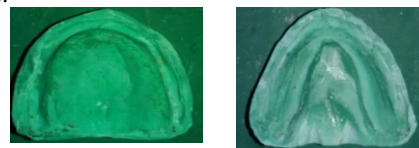


Figure 2a & 2b: Master cast of both maxillary and mandibular arches.

- The wax occlusal rims were then fabricated on the maxillary and mandibular cast (**Figure 3a & 3b**).

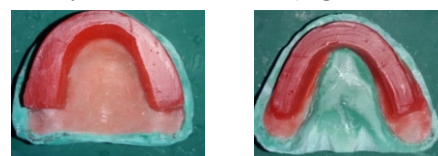


Figure 3a & 3b: Occlusal rims were fabricated on both maxillary and mandibular casts.

- Jaw relation was carried out in the conventional method to establish the vertical and the centric relation. Casts were then articulated on the articulator.
- Another baseplate with struts one anteriorly in the incisors region and two posteriorly on premolar region,

was fabricated on the mandibular cast, maintaining the same vertical dimensions. Onto which the compound rim was fabricated (**Figure 4A & 4B**).



Figure 4A & 4B: Molded impression compound rim

- Patient was made to sit in the comfortable upright position with the head unsupported. The mandibular compound rim was softened in hot water and then inserted into the patient's mouth. The patient was then asked to perform a series of actions designed to simulate the physiological functioning like smiling, grinning, lip pursuing etc (**Figure-5**).



Figure 5 : Molded impression compound rim placed in putty indices

- Notches were made on the mandibular cast, The putty indices were made around the molded impression compound rim (**Figure-6**).



Figure 6: Mandibular baseplate with struts one anteriorly in the incisors region and two posteriorly on premolar region

- Then the molded impression compound rims were removed from the base plate and the index was replaced. The indices preserve the space of the neutral zone (**Figure-7**).



Figure 7: Wax was poured on the base plate in the putty indices.

- Wax was then poured into the space giving an exact representation of the neutral zone (**Figure-8**).



Figure 8: Mandibular occlusal rim after functional movements.

- Teeth arrangement was done exactly following the indices. During the setting of the teeth their position was checked by putting the indices together around the wax try-in.
- Trimming of the artificial posterior teeth has to be done so as to accommodate them in the narrow space of neutral zone.
- Wax try-in was done.

- Dentures were processed and finished in a routine manner. Polishing was done lightly so as to preserve the contour of the flanges.
- Dentures were finally inspected and the clinical remounting was done to eliminate the minor occlusal errors.
- Finally the polished dentures were delivered to the patient (**Figure-9**).



Figure 9: Intraoral view of the complete dentures

DISCUSSION : The ultimate aim of the prosthodontics is to restore form, function and esthetics realizing the importance of the forces generated by various oral structures on the teeth, polished surfaces of the complete dentures and effect on the stability of complete dentures shed light on the Neutral Zone Technique. It has been shown that compromised retention, poor stability, phonetic problem, inadequate facial support, insufficient tongue posture/function increased gagging are all associated with functionally inappropriate arrangement of denture teeth and physiologically inadequate contours or volume of the denture base .

Several studies have compared denture fabricated by using neutral zone and conventional techniques, and it has been observed that neutral zone dentures are functionally more stable than conventional dentures, increase patient comfort and function, and experience minimum postinsertion problems¹¹. However according to Fahmy and Kharat,¹⁴ comfort and speech performance were better with neutral zone dentures than with the conventional dentures, which showed better mastication results. Raja et al¹⁵ showed that in those with longer periods of edentulism, neutral zone dentures had better assessment results and success. These dentures have the advantages of improved stability and retention , sufficient tongue space, reduced food trapping adjacent to the molar teeth, and good esthetics due to facial support¹⁶.

CONCLUSION : Neutral Zone concept is considered a exceptionally important when considering treatment options for patients complaining from unstable lower complete denture particularly if implant treatment is not feasible it aims to place lower complete denture where forces generated by lips , cheeks and tongue have a stabilizing rather than dislodging forces. Neutral zone technique is one of the best alternative techniques in case of highly atrophied mandibular residual ridge, but it is rarely used because of the extra clinical step involved. Thus the neutral zone must be evaluated as an important factor before one rates any changes in arch form or alignment of teeth.

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Case Report

FRENECTOMY BY Z- PLASTY- A CASE REPORT

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ABSTRACT : The frenum is a mucous membrane fold that attaches the lip and the cheek to the alveolar mucosa, the gingiva, and the underlying periosteum. The frena may jeopardize the gingival health when they are attached too closely to the gingival margin, either due to interference in the plaque control or due to a muscle pull. In addition to this, the maxillary frenum may present aesthetic problems or compromise the orthodontic result in the midline diastema cases, thus causing a recurrence after the treatment. This case report demonstrates the removal of the abnormal labial frenum attachment in a 38 year old female through the technique of Z-plasty.

Key Words: Midline diastema, Abnormal frenum, Z-plasty

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INTRODUCTION : Aesthetic concerns have led to an increasing importance in seeking dental treatment, with the purpose of achieving perfect smile.¹The continuing presence of a diastema between the maxillary central incisors in adults, has often been considered as an aesthetic problem. Keene (1963) described midline diastema as anterior midline spacing greater than 0.5 mm between the proximal surfaces of adjacent teeth.² Aberrant frenum considered one of the aetiological factors for the persistence of a midline diastema. So the focus on the frenum has become essential.

The labial frenal attachments have been classified as mucosal, gingival, papillary and papilla penetrating, by Placek et al (1974).¹The frena may also jeopardize the gingival health by causing a gingival recession when they are attached too closely to the gingival margin, either because of an interference with the proper placement of a toothbrush or through the opening of the gingival crevice because of a muscle pull. Frenectomy is a complete removal of frenum, including its attachment to the underlying bone, and may be required in the correction of an abnormal diastema between the maxillary central incisors. In the present case, Z-plasty assisted frenectomy was carried out, to improve the functional and cosmetic appearance of scars.

CASE REPORT : A 38 year old female reported to the Department of Periodontics and Oral Implantology of Surendera Dental College & Research Institute with the chief complaint of difficulty in toothbrushing in the upper front teeth. In intra-oral examination; Tension test revealed presence of abnormal (Papilla penetrating) frenal attachment. [Figure 1].



Figure 1 (Tension test)

Patient was healthy otherwise both systemically and orally. Patient was told in details about different frenectomy procedures with their risk and benefits but patient opted for Z-plasty assisted frenectomy and submitted duly signed written informed consent. All the blood investigations were within normal limits. Before surgery the length of frenal band was measured with the periodontal probe (Figure 2).



Figure 2(Measuring the length of frenum)

Frenectomy was carried out under local anaesthesia using Bard Parker blade No. 15. First of all outline of Z-plasty was marked with inedible pencil.(Figure 3),

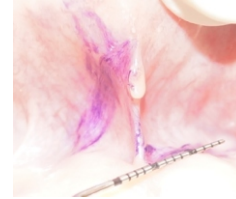


Figure 3 (Marking the outline of Z-plasty)

then central incision was given (Figure 4)

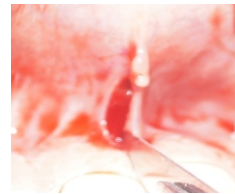


Figure 4 (Central incision)

followed by two lateral incisions at an angle of 45 degree and parallel to each other, creating two triangular flaps of equal size and shape. Adequate undermining of surrounding tissues was performed to dissect the attachments for free mobilization of both the flaps. Flaps were then transposed to the opposite side of apex of each flap (Figure 5)



Figure 5 (Transpositioning of flaps)

and secured by interrupted suture (Figure-6).



Figure 6 (interrupted sutured applied)

Analgesic was advised SOS, and routine oral hygiene instructions given. Sutures were removed 10 days operatively (Figure-7).



Figure 7(wound healing 10 days Postoperatively)

At 3 months postoperatively wound was free from tension.



Figure 8(wound site free from tension 3months Postoperatively)

DISCUSSION : The frenum is characterized as pathogenic when it is unusually wide or when there is no apparent zone of the attached gingiva along the midline or the interdental papilla shifts; when the frenum is extended. Clinically, papillary and papilla penetrating frena are considered as pathological and have been found to be associated with loss of papilla, recession, diastema, difficulty in brushing,¹ similar findings of papillary penetrating type with difficulty in brushing were reported in our case. The aberrant frenum can be accomplished either by the routine scalpel technique which could either be by classical^{1,3} or by Z-plasty technique⁴, electrosurgery^{1,5,6} or by using lasers.⁷ The conventional technique of frenectomy leads to scar formation. Electrocautery procedure is associated with mild bleeding; however due to certain complications such as production of surgical smoke, possibility of tissue damage or necroses, cost of the entire unit is high, cannot be used in patients on pacemakers, and can't be used near inflammable gases etc.⁶ Laser has been reported as a safe and effective procedure with the advantages of a shorter duration of the surgery, produces coagulation effect, has antibacterial influence, however over contact can necrotize the tissue, potential bone damage always is a concern in using laser and it needs a trained operator.^{7,8} So considering the entire conditions patient opted for the surgical therapy with the Z-plasty technique which has various advantages over other procedures such as:

1-It is possible to redirect a scar into better alignment with a natural skin fold or the lines of least skin tension⁴

2- Transposition of the flaps result in redistribution of tension on the wound and changes central limb direction⁴; similar outcomes have been observed in the present case report.

However this procedure is little time consuming, results in bleeding and postoperative swelling but less expensive.

CONCLUSION : Z-Plasty technique assisted frenectomy which lead to a more functional and an aesthetic outcome.

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CASE REPORT

RESTORATION OF A MUTILATED ENDODONTICALLY TREATED TOOTH WITH RICHMOND CROWN : A CASE REPORT

Harshdeep Kaur, Shashikala Jain, Sandeep Kumar, Rajnish Aggrawal

ABSTRACT: Pulpless teeth have proved to be very useful members of the dental arch. However, because an endodontically treated tooth is brittle and subject to fracture, it requires reinforcement of a special nature in order to function effectively. It becomes the prosthodontist's concern to restore the crown and reinstate the tooth as permanent, functional and esthetic member of the masticatory apparatus. This article describes the prosthodontic management of an endodontically treated tooth having very less coronal structure with Richmond Crown.

Keywords: Richmond Crown, post & core, endodontically treated teeth

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INTRODUCTION: Successful treatment of a badly broken tooth with pulpal disease depends not only on good endodontic therapy but also on good prosthetic reconstruction of the tooth after the endodontic therapy is complete. Prosthetic dentistry brings both the function and esthetics of the tooth back. Integrity of pulpless teeth should be carefully evaluated before the prosthetic treatment. But it becomes a challenge when the endodontically treated tooth presents with inadequate coronal structure. This compromises the retention and resistance for crown restoration.

Pulpless teeth which are mutilated have common characteristics⁵:

- They are brittle
- They possess little or no coronal tooth structure.

In such cases post and core becomes necessary to increase retention and resistance form^{6,7}. Posts can be post-crown and the post-core. The post-crown is a one piece casting and is used as a single unit in which the post is an integral part of the complete veneer. The post-core is a one piece casting over which a full veneer is separately placed⁸. As early as 1700s Fauchard inserted wooden dowels in canals of teeth to aid in crown retention but root fractures were very common. Over time the wood would expand in the moist environment to enhance retention of the dowel. In 19th century versions of dowels also used wooden "pivots" but some dentists reported the use of metal posts favored by Black(1869). In the late 19th century, the "Richmond crown", a single piece post retained crown with a porcelain facing was engineered to function as a bridge retainer. And during 1930s, the custom cast post and core was developed to replace the one piece post crowns. This improved marginal adaptation and allowed for a variation in the path of insertion of the crown.

CASE REPORT: A 28 year old male patient reported to the Department of Prosthodontics, SDC & RI, Sri Ganganagar with endodontically treated badly broken tooth (fig 1)

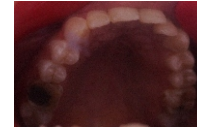


Figure 1: Edodontically treated 26 having reduced coronal structure.

and wanted to get it restored. On examination it was found that tooth 26 had undergone root canal treatment 9 -10 months ago. The clinical crown was less than 2 mm and there was decreased occlusal clearance. The radiographic examination revealed root canals with well condensed gutta-percha filling extending 0.5 mm short of radiographic apex. No periapical changes were noted in relation to tooth 26. After treatment planning it was decided to restore the badly broken tooth with Richmond crown. Since the post & core with a crown cannot be given due to inadequate occlusal clearance.

TREATMENT PROCEDURE:

Firstly all the unsupported tooth structure was removed. The palatal canal was chosen to place the post.

Post space preparation: Gutta percha was removed from palatal canal with gates glidden drill. The apical seal was not disturbed. Post space preparation was done with peso reamer till size 05. Undercuts within the canal were blocked with glass ionomer cement. And the post space finishing was done.

Tooth preparation: it was carried out as conservatively as possible. Tooth was prepared circumferentially for metal ceramic Richmond crown with shoulder finish line (sub-gingival) buccally and chamfer finish line palatally.

Post and core fabrication: Direct method was used. Petroleum jelly was applied all over. Impression of the post space was made with self cure acrylic resin. And additional resin was added occlusally to serve as the crown portion like wax pattern for metal coping of metal ceramic crown [fig. 2 (a) and (b)]

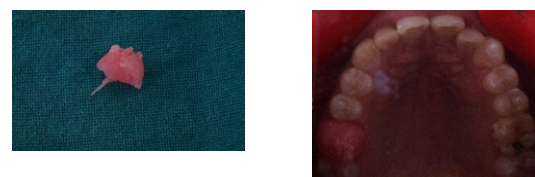


Figure 2: (a) acrylic resin pattern (b) acrylic resin pattern intraorally

Impression procedure: After coating the palatal canal with light body, the acrylic pattern was inserted and final impression was made with irreversible hydrocolloid (alginate). Fig 3.



Figure 3: Impression of the maxillary arch with pattern in place
Impression was poured with type IV gypsum.

Stone cast model was prepared and the acrylic resin pattern was retrieved.

Crown fabrication: prepared acrylic pattern was casted in base metal alloy. After finishing metal trial was done to check the marginal fit. Ceramic build up was carried out and final prosthesis was checked for fit and occlusion. The Richmond crown was then cemented with glass ionomer cement used in luting consistency (fig.4.).



Figure 4: Cemented Richmond crown

DISCUSSION: Endodontically treated molar teeth should receive cuspal coverage but in most cases they do not require a post. When a post is required as a result of extensive loss of natural tooth substance as in the case discussed above, it should be placed in the largest and straightest canal to avoid weakening the root during post space preparation and root perforation in curved canals. Distal root of mandibular molar and palatal root of maxillary molar is preferred. While preparing the post space care must be taken that the shape of the post should follow the anatomic contour of the root canal as closely as possible. This eliminates the danger of perforation.

Richmond crown is not post and core system but it is customized, castable post and crown system as both are single unit and casted together. Few indications of Richmond crown are grossly decayed or badly broken single tooth where remaining crown height is very less and in cases with steep incisal guidance. Single unit post crown is advantageous over its multiunit counterparts. When the post and core are two separate entities, flexion of the post under functional stresses the post-core interface, resulting in separation of the core due to permanent deformation of post. The combined effects of thermal cycling, fatigue loading and aqueous environment test the bond between materials and cause breakdown of the materials over a period of time. Use of single unit restoration reduces the number of interfaces between the components.

Major technical drawback of this design is excessive cutting in making two different axis parallel which results in weakening of tooth and also the design increases stresses at post apex causing root fracture.

SUMMARY AND CONCLUSION: Today a clinician can choose from a variety of post and core systems for different restorative requirements. However no single system provides the perfect restorative solution for every given clinical situation. There are situations in which Richmond crown should or should not be used. Each circumstance requires an individual evaluation. Richmond crown can be used as a treatment option for the badly broken endodontically treated tooth with less occlusal clearance but it should be used judiciously.

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Case Report

A COMBINED APPROACH TO RESTORE A FRACTURED TOOTH: REATTACHMENT AND COMPOSITE VENEERING

Preet Kanwal Kaur Atwal, Renu Aggarwal, Neetu Jindal, Yogesh Kumar Gupta

ABSTRACT: Traumatic dental injuries are a common occurrence. Numerous treatment options are available for restoring such a tooth. Careful examination of tooth, tooth fragments and fracture line are important aspects before finalising treatment plan. Meticulous and scientific approach can sometimes guide you to an innovative treatment plan. This paper is an attempt to report one such case. An adult with trauma to his central incisor, reported with coronal fracture. Fracture lead to three fragments; two palatal and one facial. Patient had preserved only the palatal fracture fragments. A treatment option was selected which gave the patient natural palatal aspect and artificial facial aspect. The treatment selected was based on the fact that fracture line was favourable. Also, natural contour, texture and wear rate could be maintained for the palatal aspect. The facial side was cut like a veneer preparation and restored with composite. This gave an advantage of natural mesial, distal contour and perfect matching aesthetic composite on facial aspect. Patient was pleased with the aesthetic result and emotionally benefited from the fact that his natural tooth fragments were used.

Keywords : Composite Veneering, Traumatic Tooth Injury, Reattachment

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INTRODUCTION: Dental trauma is a prevalent condition and coronal fracture of anterior teeth being the most common (1). It is not only a cause of discomfort to patient but also effect patient's confidence. Periodontal, endodontic, coronal and occlusal assessment of such a case is vital for treatment planning (2). With no or minimal biological width violation and fractured fragment in good condition, fragment reattachment is a good treatment choice (3). Especially with advancements in bonding agents, this simple and low cost technique is currently preferred. Fractured fragment reattachment with facial veneering is a better option to a complete composite restoration, providing advantages like natural wear, contour, texture and better masticatory function on occluding side.

CASE REPORT: A male patient aged 47 years reported to the Department of Conservative Dentistry and Endodontic, Surendera Dental College and Research Institute, Sri Ganganagar, Rajasthan, India with the chief complaint of broken upper front tooth. History revealed that the tooth fractured 5 days back when the patient, who is a factory worker, was trying to open some tool with his teeth. He did not avail any dental treatment after the episode.

Clinical examination revealed fractured upper left central incisor (Figure 1, 2).



Figure (1): Preoperative photograph showing fractured 21.

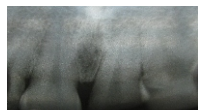


Figure (2): Preoperative radiograph.

There was no clinical exposure of pulp (Figure 3).



Figure (3): Palatal view of 21.

Fracture line extended from incisofacial to gingivopalatal direction. Patient had two palatal fragments of teeth with him, wrapped in a piece of paper (Figure 4).



Figure (4): Palatal fragments.

On examination of fractured fragments three observations were made. The first observation was that the fragments adapted well with each other and to the remaining tooth structure. Secondly, that the colour of the fragments did not match with the remaining crown structure. And thirdly, a small fractured fragment was missing from the facial aspect.

Patient complained of sensitivity to cold since the day of trauma. Pain was transient and relieved immediately after removal of stimulus. Thermal test was conducted on fractured and contra lateral tooth. It revealed early response in 21 as compared to 11. Electric pulp test showed similar results. Patient was explained all treatment options. Considering patients inclination for reattachment of fractured fragment, informed consent for the treatment was taken.

The fractured fragments were rehydrated by immersing in normal physiological saline solution. The two palatal fragments were then etched using 37% phosphoric acid for 15 seconds and washed for 30 seconds (Figure 5).

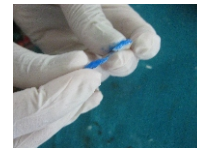


Figure (5): Acid etching of palatal fragments.

Bonding agent Tetric N Bond (Ivoclar Vivadent) was applied on both the fragments, rubbed for 10 seconds, gently air thinned and light cured for 10 seconds. The two fractured fragments were then united using flowable composite Tetric N Flow (Ivoclar Vivadent), which was light cured for 20 seconds. Excess material which could hinder adaptation of the united fragment to remaining tooth structure was meticulously removed using diamond bur.

The fused palatal fragments were then checked for adaptation to remaining tooth (Figure 6).



Figure (6): Fused palatal fragments.

Thereafter, the united palatal fragments and the remaining tooth structure were bonded using the same method as mentioned above. After reattachment, facial aspect was prepared like a veneer preparation (Figure 7).



Figure (7): Facial veneer preparation.

A Light cured composite shade A2 (Z-100,3M ESPE) was used to restore the facial aspect (Figure 8).



Figure (8): Postoperative photograph 21. Composite veneer was finished using Sof-lex discs (3M ESPE). After restoration, occlusion was checked to avoid any premature contact. Patient was recalled after 4 weeks. Tooth was functional and asymptomatic (Figure 9).



Figure (9): Palatal View of 21. Electric pulp testing and thermal test gave normal results.

DISCUSSION : Various treatment options are available with the dentist for treating a case of coronal fracture. These include; fracture reattachment, composite buildup or a full coverage crown. The treatment approach adopted depends upon location of fracture, extent of fracture and adaptability of fractured fragments. Finally, it is also the choice made by the patient after considering all pros and cons.

In this case, patient opted for fractured fragment reattachment with facial veneering. Patient had two palatal fractured fragments which adapted well with each other and to the remaining tooth structure. The fragments revealed shallow knife edged subgingival fracture margin which minimally invaded biological width and did not require any special intervention (4). When adapted to the tooth, these fragments reproduced palatal contour of the tooth beautifully.

From the facial aspect, a small fracture fragment was missing. Also, there was lack of colour match between remaining tooth and fractured fragments. Composite veneering was planned for the facial aspect. Facial veneering not only served the purpose of aesthetics, but it also increased the resistance to shear stresses at the fracture line (1) (Figure 10).

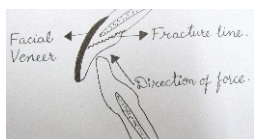


Figure (10): Diagrammatic representation of treatment.

Other features like bevelling and chamfer preparation have also been proposed for enhancing resistance to fracture reattachment (5).

The palatal side had reattached palatal fragments. This provided natural wear as compared to composite restoration (6) and maintained incisal guide in tooth structure. Reattachment also established natural contour, texture and positive psychological response (7). It is a simple and conservative approach which is especially recommended for young patients.

Reports and clinical experience indicate that the reattachment has a successful medium term outcome (8, 9). Patients should be

informed about the interim nature of the treatment and that it is an alternative to a more invasive prosthetic treatment (10).

CONCLUSION : The Present report came to conclusion that the restoration of a fractured crown using the adhesive re-attachment is the optimal treatment for an enamel-dentin fracture when the tooth fragment is available, intact and well preserved. The clinical results appeared to be positive and they show that this technique is more conservative, easy to perform and standardize, inexpensive, and that it allows both functional and aesthetic recovery.

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Instructions to Author for Manuscript Submission

About the Journal

The journal of updates in dentistry is official publication of Surendra Dental College and Research Institute. This journal publishes research papers, clinical studies, reviews and case reports or series related to all the specialties in the field of dentistry. The journal will be published in the month of January and July.

Editorial Process

The manuscript will be reviewed for possible publication with the understanding that it is being submitted to journal of updates in dentistry alone at that point in time and has not been published anywhere, simultaneously submitted or already accepted for publication elsewhere. The journal expects that authors would authorize one of them to correspond with the journal for all matters related to the manuscript. All manuscripts received are duly acknowledged.

Manuscripts accepted for publication are copy edited for grammar, punctuation, print style and format. Page proofs are sent to the corresponding author. The corresponding authors are expected to return the corrected proofs within two days. It may not be possible to incorporate corrections received after that period. The whole process of submission of the manuscript to final decision and sending and receiving proofs is completed through e-mail.

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The manuscript should be typed, double-spaced on standard-sized paper (8.5" x 11") with 1" margins on all sides. Times New Roman font 12 pt should be used. The fonts used in the text as well as graphics should be restricted to Times New Roman, Symbol.

Abstract and Keywords: Should be structured and limited to 250 words. A brief summary of the research should be given under the subheadings, introductions, methods, results and conclusion. Not more than six keywords are needed. It should not contain abbreviations, footnotes or references.

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