



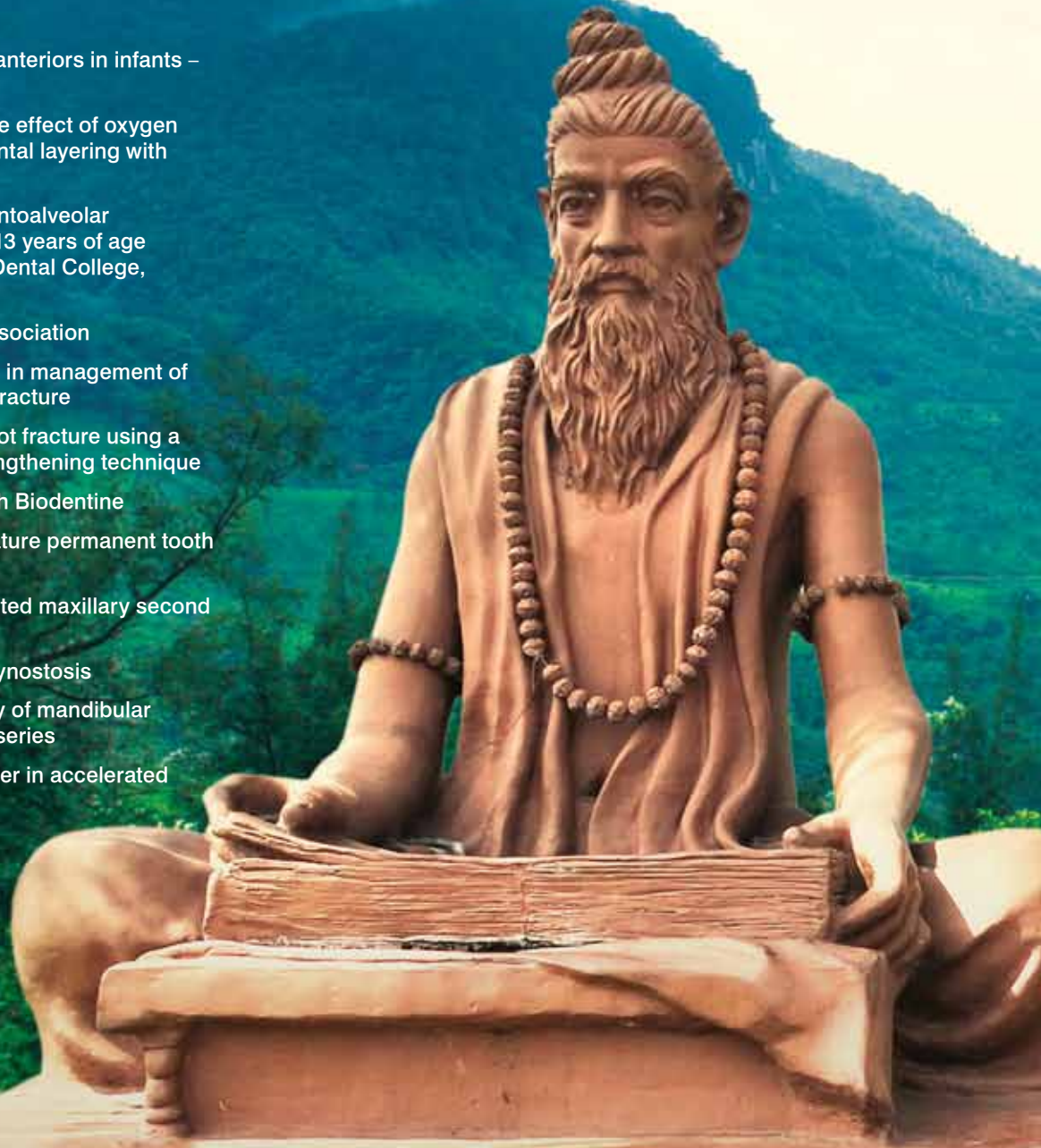
# KDJ

Kerala Dental Journal

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- Emergence of deciduous anteriors in infants – a prospective study
- An in vitro evaluation of the effect of oxygen inhibited layer on incremental layering with composite resin
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- Variant root canal anatomy of mandibular second molars: A clinical series
- Piezocision – A new frontier in accelerated orthodontic treatment



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## CHARAKA

The term Charaka is a label said to apply to "wandering physicians". According to Charaka's translations, health and disease are not predetermined and life may be prolonged by human effort and attention to lifestyle. As per Indian heritage and science of Ayurvedic system, prevention of all types of diseases have a more prominent place than treatment, including restructuring of lifestyle to align with the course of nature and four seasons, which will guarantee complete wellness.

He seems to have been an early proponent of prevention is better than cure doctrine. The following statement is attributed to Acharya Charaka:

"A physician who fails to enter the body of a patient with the lamp of knowledge and understanding can never treat diseases. He should first study all the factors, including environment, which influence a patient's disease, and then prescribe treatment. It is more important to prevent the occurrence of disease than to seek a cure."

According to his translations of the Vedas, a body functions because it contains three dosha or principles, namely movement (vata), transformation (pitta) and lubrication and stability (kapha). Further, he stressed, illness is caused when the balance among the three dosha in a human body is disturbed. To restore the balance he prescribed medicinal drugs. Although he was aware of germs in the body, he did not give them any importance.

Charaka studied the anatomy of the human body and various organs. He gave 360 as the total number of bones, including teeth, present in the human body. He claimed that the heart was connected to the entire body through 13 main channels. Apart from these channels, there were countless other ones of varying sizes which supplied not only nutrients to various tissues but also provided passage to waste products. He also claimed that any obstruction in the main channels led to a disease or deformity in the body. Sixty five oral diseases were described.

Agnivesa, under the guidance of the ancient physician Atreya, had written an encyclopedic treatise in the 8th century B.C. However, it was only when Charaka revised this treatise that it gained popularity and came to be known as Charaka Samhita. For two millennia it remained a standard work on the subject and was translated into many foreign languages, including Arabic and Latin.



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# President's Message



**Dr. Nizaro Siyo**

Dear friends,

This summer has been extremely hot through out the nation both in terms of weather and the political climate. I hope you all have, exercised your franchise and your responsibility. Meanwhile a Vishu and Ester celebrations have passed and I wish you all on the occasion.

A new culture among us now is holidaying at various destinations within or abroad during the summer. Surely it helps us to unwind, energize and recharge for hectic practice for the whole year ahead. It is indeed encouraging when groups among ourselves embark on such activities that strengthens bonds within IDA.

Once again I wish to emphasize the need for stronger organizational support for our profession to face the challenges up ahead be it the new clinical establishment bill or the electricity tariffs where we are targeted. Our efforts are to prevent our profession being targeted and at the same time be part of the panel that gives recommendations on all areas that concern us. We are working on all aspects for effective planning and execution of CDE programme, community service projects and beneficial schemes for members which in tern will help us increase our membership strength and thereby better interaction amongst us. The IDA Hope membership strength is showing steady growth and it is encouraging. We are living in a world where changes occur with rapid pace. Dentistry is no exception. It is quite necessary that we move along with the tide or else we will be out of the track. IDA being the professional body working for uplifting dentistry is conducting quite a number of academic activities. Do attend such programmes which will also help you gain necessary credit points for the renewal of your registration.

Majority of the interns who pass out find it very difficult to decide about their next step. I would suggest them to think in a wider angle to incorporate their inborn passions to the educational talents there by creating a new possibility to excel in the profession.

It is easy to find faults with the system we all are into. To find solutions is energy consuming process which needs a strong positive will and effort. My request is to not let us down. Give positive inputs so that all of us can benefit. All suggestions are welcome as it is for a larger cause - the betterment the association.

Journal is an important source of knowledge, to get latest information's in the profession. I am extremely happy to congratulate our editor Prof. (Dr.) K. Nandakumar for the effort he has taken in publishing our well appreciated journal which has received numerous awards. I also appreciate the sincere works of all my team members in keeping the IDA vibrant.

Wishing best, both in personal and professional life and thanking you all once again for the opportunity given to me.

With regards

**Dr. Nizaro Siyo**  
President, IDA Kerala State.



Dr. O.V. Sanal

Dear colleagues,

Time is very fast. First three months of this IDA year got over in a fraction of minute. The new President Dr. Nizaro Siyo and team of office bearers took charge on 19<sup>th</sup> January 2014. We had hectic activities after that. The installation ceremony of different branches got over after the conference only. President, Secretary, and President elect attended the programmes.

All the branch activities of Kerala State is going on very smoothly. The first list of membership send to head office with in stipulated time. Branch secretaries helped me a lot for that. That main programme "Acquire 2014", president and secretaries workshop held at Kannur. All the office bearers of different branches attended. National Jaycee trainer and retired deputy labour commissioner Sri. P. C Vijayarajan conducted the session in a fantastic way. President, Secretary, CDE and CDH detailed their plans to conduct their programmes in coming year. I thank the host branch, IDA North Malabar and coordinator Dr. Salim for their extraordinary work done for the success of the programme.

The first state level CDE programme conducted at Kottayam on 16<sup>th</sup> March and it was hosted by IDA Central Kerala branch. On March 6<sup>th</sup> IDA Kerala State conducted Dentists day celebration at Trivandrum in association with IDA Attingal branch. It was a well appreciated public programme. Congratulation to Attingal branch and coordinator Dr. Biju A. Nair

Forthcoming programmes includes second state level CDE programme at Kannur on 11<sup>th</sup> May. First phase of cricket tournament is going on at different branches. Final will be on 18<sup>th</sup> May. Congratulation to Dr. Abhilash G.S., coordinator.

Dentistry is fast growing profession. Each dental surgeon can approach the heights by hard work. The price of success is hard work, dedication to the job at hand, and the determination that whether we win or lose, we have applied the best of ourselves to the take at hand.

Thanking you

Jai IDA

**Dr. O.V. Sanal**

Hon. Secretary, IDA Kerala State



Dr. K. Nandakumar

## Why should we fool anyone?

Not all the news items interest the common man. But the news which is going to be mentioned below should be of interest to anyone living in this state and has a concern about his health. A few medical colleges were started last year with much fanfare and in the Manjeri medical college, admissions are denied this year by the Medical Council of India. The MCI inspectors have observed that there is no adequate staff in that college to teach the students. On the second day of the inspection, few teachers were appointed on an express order which everyone knows that it will be cancelled within the span of a day. The question is why the government should stoop to such malpractices. We all have appreciated the attempt to start both medical and dental colleges under the government sector because that is the only way a bright student of a middle class family can get into the medical profession. The government does not seem to realize that fact. Medical colleges are started as a political gimmick to harness votes in the election year. If the government is willing to start a medical or dental college, it should be prepared to provide teachers and adequate infra structure. Appointing teachers for a day is a blatant attempt to hood wink both the council and the public. If the teachers of the existing colleges are not prepared to go there and work, direct recruitment has to be implemented or even retired teachers can be appointed. The present teachers should be reminded that they enjoy exemplary working conditions up to the age of 60 years. We do not consider that alcohol consumption below two star facility is the only health hazard. A poorly trained medical professional can cause health disaster in our society. The political leadership has lost its sensitivity and concern on the health and life of the people. Otherwise why no stringent action is taken on the negligent criminals who keep the abandoned bore wells open and putting an end to the lives of innumerable number of innocent children. The decision makers should think that one day destiny will push them to the care of such bad doctors who were poorly trained and the responsibility of such a bad training, they cannot shirk off. The question is, are we fooling ourselves or fooling each other?

**Dr. K. Nandakumar**  
Editor, KDJ

# Emergence of deciduous anteriors in infants – a prospective study

\* Deepak D. Kammath, \*\* Sheela Sreedharan

## Abstract

Emergence of deciduous teeth, their exfoliation followed by the eruption of succedaneous permanent dentition is an orderly, sequential, and age-specific event. Most parents are anxious about the timing of tooth eruption which is considered as an important milestone during a child's development. Dental age is generally based on the formation or eruption of the teeth, which has been assessed on the basis of the number of teeth at each chronological age. The primary dentition can affect the development of future neurobehavioral mechanisms, including jaw movements and mastication which may be highly dependent on the type and number of teeth present. A deviation from the standards in the number of tooth erupted will give a clue in the delay or premature eruption of teeth. Since very few studies on deciduous tooth emergence has been conducted in the Kerala population; this study was aimed to record total number of teeth erupted in the oral cavity, from birth to 15 months of age in newborns from SAT Hospital, Government Medical College, Thiruvananthapuram.

**Key words:** deciduous tooth emergence, primary tooth eruption, longitudinal study.

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## Introduction

Historically, the term 'eruption' was used to denote the tooth's emergence through the gingiva, but then it became more completely defined to mean continuous tooth movement from the dental bud to occlusal contact. Emergence of deciduous teeth, their exfoliation followed by the eruption of succedaneous permanent dentition is an orderly, sequential, and age-specific event. Most parents are

anxious about the timing of tooth eruption which is considered as an important milestone during a child's development. Primary teeth have shown wide variations in their eruption pattern and time as well between different populations, ethnic and racial groups.<sup>1-4</sup>

Calcification of the primary teeth begins in utero from 13 to 16 weeks postfertilization. By 18 to 20 weeks, all the primary teeth have begun to calcify. Primary tooth

crown formation takes only some 2 to 3 years from initial calcification to root completion.<sup>5</sup> At about 8 (6 to 10) months of age, the mandibular central incisors emerge through the alveolar gingiva, followed by the other anterior teeth, so that by about 13 to 16 months, all eight primary incisors will be present.<sup>6</sup>

Dental age is generally based on the formation or eruption of the teeth, which has been assessed on the basis of the number of teeth at each chronological age or on stages of the formation of crowns and roots of the teeth. It can reflect an assessment of physiological age comparable to age based on skeletal development, weight, or height. Dental age is also the key factor for implementation of caries prevention programs such as topical fluoride application. Knowledge of the development of the teeth and their emergence into the oral cavity is applicable to clinical practice, anthropology, demography, forensics, and paleontology.<sup>7</sup>

The emergence of the primary dentition through the alveolar mucous membrane is an important time for the development of oral motor behavior and the acquisition of masticator skills.<sup>8</sup> The presence of "teething" problems suggests how the primary dentition can

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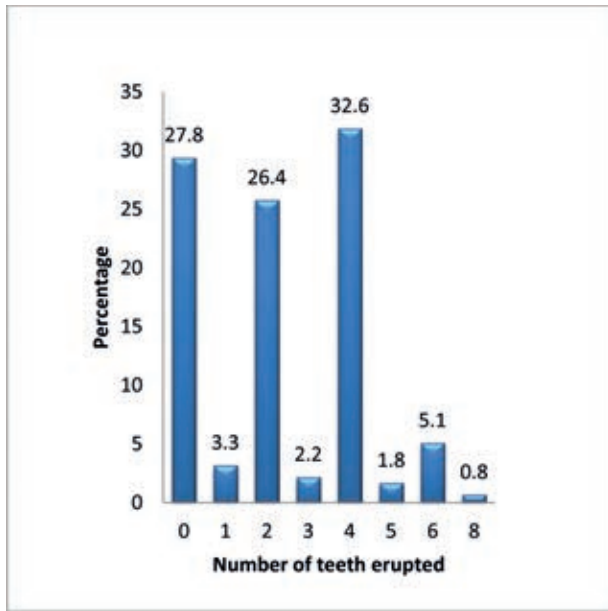


Fig. 1 Bar diagram showing the distribution of Total number of teeth at 12 months of age

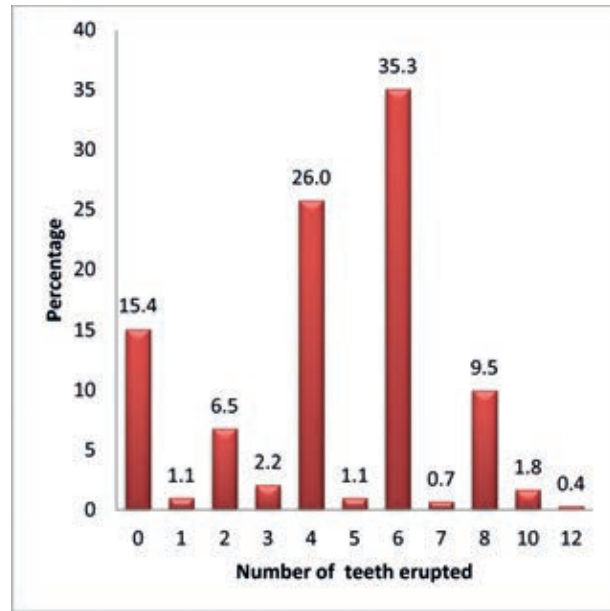


Fig. 2 Bar diagram showing the Distribution of Total number of teeth at 15 months of age

affect the development of future neurobehavioral mechanisms, including jaw movements and mastication which may be highly dependent on the type and number of teeth present.

Events in the formation of human dentition are based primarily on data from studies of dissected prenatal anatomic material and from radiographic imaging of the teeth of the same subjects over time (longitudinal data) or of different subjects of different ages seen once (cross-sectional data). Subjects surveyed in most studies of dental development are essentially of European derivation, and population differences can only be established by studies that share methodology and information on tooth formation in populations of nonwhite/non- European derived populations.<sup>7</sup>

A deviation from the standards in the eruption of tooth will give a clue in the delay or premature eruption of teeth. Variation in the chronology of eruption has been studied extensively. The growth and development patterns cannot be universally applied owing to ethnic variations. The standards for tooth eruption patterns derived for a western population cannot be extrapolated to an Indian scenario. Hence there is a need for a study that will generate local data. A thorough search on the internet and the past published journals revealed that only a very few studies on deciduous tooth emergence in the Indian population. Hence in this study, it was aimed to record total number of teeth erupted in the infants oral cavity till 15 months of age.

## Methodology

For the present longitudinal study, permission was granted by the Institutional Ethical Committee, Govt. Dental College, Thiruvananthapuram. Informed consent was also obtained from the parents of the newborns in the preferred language of the parent participating in the study. A total of 300 randomly selected fullterm and healthy newborns from SAT Hospital, Medical College, Thiruvananthapuram were from uncomplicated pregnancies and deliveries; weighed 2500 grams or more at birth and where parents were of Kerala ethnicity.

After 27 missing responses, there were 273 study subjects till the end of the study period. Permission for follow up of the study was sought from the authorities of the Child Development Center and Immunization Clinic, Govt. Medical College, Trivandrum.

Each subject was examined at every three month interval till 6 months, there after every month till 15 months of age. Parents were instructed to frequently examine the infant's mouth and record the date of tooth eruption on a special dental record given by the investigator. A tooth was considered to be erupted when any part of its crown had penetrated the gingiva and visible in the oral cavity. Parents used specially-designed dental charts to record the times at which each primary teeth appears. Parents' recordings were checked for accuracy by carrying out clinical



Table 1 Showing Distribution of number of teeth at 12 months of age

Total number of teeth	At 12 months of age	
	Frequency	Percentage
0	76	27.8
1-2	81	29.7
3-6	114	41.7
>6	2	0.8
<b>Total</b>	<b>273</b>	<b>100.00</b>

Table 2 Showing Distribution of number of teeth at 15 months of age

Total number of teeth	At 15 months of age	
	Frequency	Percentage
0	42	15.4
1-4	98	35.9
5-8	127	46.5
9-12	6	2.2
<b>Total</b>	<b>273</b>	<b>100.00</b>

Table 3 Mean number and distribution of total teeth present (Lysell L et al. 1962)

Age	Mean number present of teeth	Distribution in number of teeth
6 months	----	1-3, 33%
9 months	3	1-6, 80%
12 months	6	4-8, 50%
18 months	12	9-16, 85%

examinations during the next follow up. The study was confined to the eruption status of the primary incisors and was registered according to the chronological age of the child. Also, the eruption status of all deciduous teeth was recorded specifically at 12 months and 15 months of age for comparing with the study conducted by Lysell L et al.<sup>9</sup>

## Results

The data was analyzed using the Statistical Package for Social Sciences (SPSS) Version 16 software. Among the final 273 cases, in 42 (15.4%) cases no tooth erupted during the study period. The total number of teeth erupted till 1 year is explained in detail in *Figure 1*.

In this study, it was found that by the end of first year in 89 (32.65) infants maximum number of teeth erupted was 4. Also it was noticed that in 114 (41.7%) infants an average of 3-6 teeth erupted and in 81(29.7%) infants 1-2 teeth erupted. But only in 2 (0.8%) infants more than 6 teeth erupted with maximum number of 8. Also it was remarkably noticed in 76 (27.8%) babies no tooth erupted at the end of 12 months of age as explained in the *Table 1*.

At the end of the study; after 15 months, in 42 (15.4%) babies did not have any tooth erupted, but in

96 (35.3%) babies had maximum of 6 teeth erupted. Also it was noticed that only in 0.4 % cases 12 teeth marked the maximum number of erupted teeth and rest infants had 1-5 erupted teeth. *Table 2* shows, in 127 (46.5%) infants 5-8 teeth had erupted and only in 6 (2.2%) infants with maximum of 9-12 teeth had erupted at the end of 15 months. The total number of teeth erupted till 15 months of age is explained in detail in *Figure 2*.

## Discussion

The age of eruption of the deciduous teeth has long been of interest for biological and physical anthropological studies. The existing eruption schedule for deciduous and permanent dentition have been based on studies in Caucasian populations. Since Indians differ from these populations racially, genetically and environmentally, such studies fail to provide relevant guidelines on eruption timings.

Prospective longitudinal studies provide information on the ages of eruption of individual teeth, along with their variations and most frequent order of tooth eruption. However, they have disadvantages of taking longer time, require frequent examinations and have a risk of loss of study material. Here in this study we had 27 missed response noted.

A broad range of variation exists in the normal eruption times of primary and permanent teeth in humans. However, normality is usually associated with bilateral symmetry. Furthermore, cases where eruption time is grossly beyond the extremes of normalcy may be considered to represent a pathological state. A rough rule of thumb is that the age in months minus six gives the average number of teeth, up to age 2 years.<sup>10</sup>

In a study by Lawoyinet al<sup>11</sup> the number of erupted teeth was related to infant age as well as infant weight. Viscardiet al<sup>12</sup> noted that the number of deciduous

Table 4 Comparison of Mean number and distribution of total teeth present between study by Lysell L et al. ( 1962 ) and the present study

Age	Mean number of teeth present		Distribution in number of teeth	
	Lysell L et al.	Present study	Lysell L et al.	Present study
6 months	---	1	1-3 (33%)	0-2 (1.7%)
9 months	3	2	1-6 (80%)	1-3 (39.7%)
12 months	6	4	4-8 (50%)	3-6 (41.7%)
18 months	12	6 (at 15 months)	9-16 (85%)	5-8 (46.5%) (at 15 months)

teeth erupted were less in low birth weight infants and in premature infants. The study by Fadavi et al<sup>13</sup> on low birth weight (LBW) and very LBW infants showed that premature infants had fewer erupted teeth than those of the term infants.

According to a study by Lysell L et al in 1962, the mean age of eruption to yield a mean order of eruption was found to occur only in small percentage of the study subjects. The mean number of teeth present and its distribution according to Lysell et al<sup>9</sup> is illustrated in *Table-3*, which is considered as the 'norm' and is being taught and followed globally including India. The study by Lysell L et al. discussed that, at the end of 12 months 50% of the study subjects had 4 to 8 teeth the mean being 6 teeth. From this study (*Table 4*), at the end of 12 months, it was found that in 41.7% cases had their total teeth erupted within the range 3-6 teeth with a mean of 4 teeth

At the end of 15 months, only in 46.5 % cases had their tooth erupted in the range 5-8 with maximum number 6 (35.3%) teeth. It was also noted that only in 2.2 % cases had their total teeth erupted in the range 9-12 with maximum number of 12 teeth (0.4%).

As the period of study was limited to 15 months, the complete primary dentition eruption status could not be recorded. Hence further large scale prospective studies have to be conducted to the study the pattern of eruption for complete dentition.

## Conclusion

The findings of this study will have a significant role for optimal use in preventive approaches to caries, clinical, academic, anthropological, research and forensic applications. Since this study observed a change in pattern of eruption of deciduous incisors in the study population, there may be variations in the

eruption pattern of other teeth. The current findings will provide Pediatric dentists and Pediatricians in Kerala with contemporary deciduous tooth emergence timings, which can be used for assessing dental growth and development.

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# An in vitro evaluation of the effect of oxygen inhibited layer on incremental layering with composite resin

\* Jothish Ravi

## Abstract

**Objective:** Incremental build-up is done during composite resin restoration and the bond strength between the layers is significant for the success and longevity of the restoration. Aim is to check the effect of oxygen inhibited layer on bonding between the substrate and increment layer.

**Methods and Material:** 30 Specimens of specific dimensions were prepared with two different types of composites (Group I & Group II). Each of these groups were divided into 3 subgroups, each depending on the way the increment layers were cured-in open air (A), in a glove box filled with nitrogen (B) and through a mylar strip(C). After the preparation the specimens were mounted on jigs and loaded to failure using a universal testing machine.

**Results:** Analysis shows that the bond strength values are comparable with in the groups and between the subgroups

**Conclusions:** Bond strength values of both groups reveal that presence of oxygen inhibited layer neither strengthens nor weakens the bonding between the substrate and the increment layer. Bond strength value of specimens cured in nitrogen was numerically higher but was not of any statistical significance, indicating that even the absence of oxygen inhibited layer failed to improve the bonding.

**Key-words:** Composite resin, incremental build-up, oxygen inhibited layer, bond strength

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of bis-GMA by Dr Ray L Bowen in 1962. Bis-GMA is copolymerized with other dimethacrylates, TEGDMA and UDMA. Fillers are incorporated into the resin matrix and organosilane is added to improve the bond between the resin matrix and the fillers. The paste also contains the photo initiator camphorquinone and amine activator dimethyl aminoethyl methacrylate (DMAEMA). When exposed to visible light in the blue region (468 nm), camphorquinone is excited and it interacts with the amine activator to form free radicals that initiate the addition polymerization. Degree of conversion is a measure of the carbon-carbon double bonds that are converted to single bonds during polymerization. Incremental build up is often adopted while using composites because of the limited depth of curing and to minimize the polymerization shrinkage<sup>2</sup>.

Under normal curing resins exhibit polymerization to the extent of about 50-70% as evident from the Micro Raman Spectroscopy. But the degree of conversion falls further below, to almost 11% in the presence of free radical scavengers like oxygen<sup>3</sup>. Interaction with oxygen oxidizes free radicals to

## Introduction

Modern world places lot of importance on aesthetics. Attractive smile, confident body language and youthful exuberance are considered pre-requisites to success in all walks of life. Public awareness has increased the demand for aesthetic

dental procedures and technological advances in the field of material science and equipments have made them immensely successful and popular<sup>1</sup>.

Light cure composite resins have become the main stay in aesthetic dentistry ever since the introduction

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Table-1: Multiple comparison of mean Shear Bond Strength (MPa) between different groups

Groups	Composition of Sample	Shear Bond Strength (MPa) (MEAN±SD)
<b>Group-IA</b>	Nano composite, Ceram*x mono +Cured in open air	10.85±0.76
<b>Group-IB</b>	Nano composite, Ceram*x mono+Cured inside a glove box filled with nitrogen	11.72±0.65
<b>Group-IC</b>	Nano composite, Ceram*x mono+Cured through a mylar strip.	9.97±0.80
<b>Group-IIA</b>	Filtek Z250 + Cured in open air	9.45±0.63*
<b>Group-IIB</b>	Filtek Z250 +Cured inside a glove box filled with nitrogen	9.53±0.51
<b>Group-IIC</b>	Filtek Z250 +Cured through a mylar strip.	10.33±0.49

(\*P>0.05 significant difference compared group-IB with Group-IIA)

stable peroxides. Peroxides have low affinity towards monomer resulting in the formation of an inhibition zone on the surface of freshly polymerized resin. This soft, sticky superficial layer referred to as oxygen inhibited layer, thus pre-terminate polymerization, presenting an area of relatively poor bonding<sup>4</sup>. Measurement of degree of conversion could quantify this inhibition. But a more clinically significant parameter is bond strength since weak bonding between incremental layers could be directly correlated to poor degree of conversion<sup>3</sup>.

There have been contradicting and inconsistent studies on the effect of oxygen inhibited layer. The past perception was that oxygen inhibited layer improves the bond between succeeding increments of composite resin<sup>4</sup>. According to the principle of molecular interaction, oxygen inhibited layer is primarily composed of unreacted monomers and oligomers. This layer increases the contact area and readily adapts to the subsequent increment, allowing the materials on both sides to cross the interface and blend together to form an interdiffused zone where copolymerization can take place to produce a chemical bond. But studies show that during incremental build up, composite resin bond even in the absence of oxygen inhibited layer<sup>5</sup>. This study aimed to measure and analyze the effect of oxygen inhibited layer on shear bond strength during incremental build up with composite resins.

## Methods and Materials:

### Materials and equipment used:

Ceram\*x TM mono (Dentsply DeTrey GmbH, Germany)

Filtek Z250 (3M ESPE)

Light cure unit (Hilux plus; 500mW/cm<sup>2</sup>)

Silicon rings (diameter: 4mm; height: 8mm)

### Sample Preparation

The methodology involved preparation of 60 samples of specific dimension, 4 mm in diameter and 8mm in height, divided into 2 groups.

Group I: 30 samples made with Ceram\*x mono (M2 shade)

Group II: 30 samples made with Filtek Z 250(A2 shade)

Precisely cut silicon rings were used to make the specimen. Each sample was made as two separate layers of 4 mm each, henceforth they would be called the substrate and increment respectively. Composite resin was packed into the silicon ring to make the substrates first (4mm diameter; 4mm in height). Light curing was done from all directions for 20 seconds. Each group was divided into three subgroups of 10 samples each, depending on the atmosphere in which the curing (20s) took place during the addition of the second layer, ie, the increment.

Subgroup A: Samples cured in open air, in the presence of oxygen while adding the increment

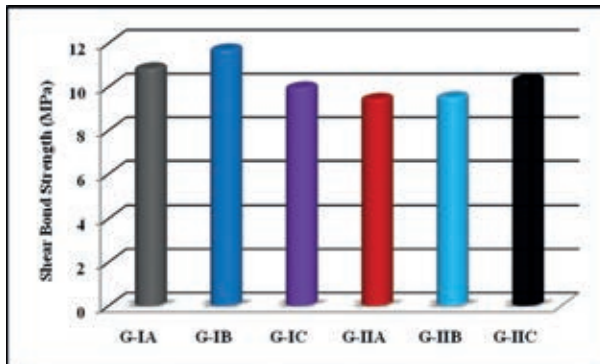
Subgroup B: Samples cured inside a glove box filled with nitrogen gas while adding the increment.

Subgroup C: Samples cured with a mylar strip between the substrate and the increment.

After light curing the entire specimen were stored in deionized water at 37°C for 24 hours.



Graph-I: Multiple comparison of mean Shear Bond Strength (MPa) between different groups



### Bond strength measurement

The bond strength between the substrate and increment was measured using the Universal Testing Machine (Lloyd Instruments, UK). The specimens were mounted using specially designed jigs. Shear load was applied to the interface at a crosshead speed of 1mm/min till fracture. The shear bond strength is calculated by the equation:

Shear Bond Strength =  $F/A$ , where

$F$  = Shear force at break point

$A$  =  $\pi r^2$  (cross sectional area of the interface)

$r$  = radius of the sample (2mm)

The results were expressed in MPa and were subjected to statistical analysis.

### Results

The Shear Bond Strength values are expressed in mean and standard deviation. For multiple group comparison, data is analyzed by using SPSS (16.0) version software. ANOVA Post hoc test followed by Sheffes test applied to find statistical significant between the groups (Table I and Graph I). P value less than 0.05 ( $P < 0.05$ ) considered statistically significant at 95% confidence interval

### Discussion:

Composite resins have set the benchmark in providing aesthetic dental treatments of high standard. Being technique sensitive, the treatment outcome is often decided by the skillful handling of the material. Two disadvantages of composite resin cited usually are the depth of curing and polymerization shrinkage. Both are almost completely overcome by incremental layering technique.

Incremental layering technique has an inherent problem, the challenge posed by the oxygen inhibited

layer. Oxygen inhibited layer is a soft, thin, superficial layer of liquid-like consistency, rich in monomer found on the surface of resin polymerized in the presence of oxygen. Monomer remains unconsumed as the affinity of free radicals to oxygen is higher. The common perception is that this monomer rich layer is instrumental in ensuring bonding between consecutive increments<sup>6</sup>. At least three studies in the past highlighted the positive correlation between bond strength and oxygen inhibited layer<sup>3,7,8</sup>.

As mentioned the studies on oxygen inhibited layer have been anything but consistent. Several studies propose that this layer could induce brittleness due to inadequate polymerization<sup>9</sup>. Another study found out that poor bond strength could indicate the low level of camphorquinone and amine activator in the oxygen inhibited layer. In other words it is not this layer in itself but its low level of camphorquinone that compromises the bond. It also means that a long curing time may negatively impact the ability of oxygen inhibited layer to be post cured<sup>10</sup>. Two articles reported that oxygen inhibited layer had no significant impact on bond strength<sup>11,12</sup>.

In the present study, Ceram\*x mono and Filtek Z250 were selected as they are both optimal for fast and easy restorations of posterior or anterior teeth. Shade M2 and A2 had similar translucencies according to the manufacturers and hence eliminated the effect of colorants. A micro-hybrid filled (Filtek Z250) and a nano-filled (Ceram\*x mono) resins were chosen intentionally as a past study has shown that interfacial bond strength decreases as the fillers change from nano-filled to micro-filled<sup>13</sup>. This is evident in the result as Group I (Ceram\*x mono) except subgroup C show higher bond strength than Group II ( Filtek Z250). Studies show that larger filler particles obstruct oxygen diffusion. Thus oxygen gets absorbed on the surface and provokes a decrease in the degree of conversion when uncured resin is added later on the surface. This confirms the fact that fillers may have some influence on bond strength<sup>14</sup>.

Silicon rings of 4 mm diameter and 8 mm height were used to prepare the specimens. Samples in subgroup A were cured in the presence of air to produce the resin with the superficial oxygen inhibited layer. Samples in subgroup B were cured under nitrogen gas since it was found that it eliminates the presence of oxygen and improves the degree of conversion and shear bond strength when curing is carried out in an atmosphere of gases like argon or nitrogen<sup>15</sup>. Samples in subgroup C were cured through mylar strips to

simulate the clinical conditions as curing through the strips ruled out the formation of oxygen inhibited layer.

Multiple group comparisons showed (Graph I) that the presence of oxygen inhibited layer as in subgroup A do not compromise bond strength in either Group I or II. Observation of fractured surfaces revealed that most of the fractures are cohesive. They occurred either within the substrate layer or within the increment layer; never at the substrate-increment interface, which would have been the case if oxygen inhibited layer had a negative effect. This contradicts those studies that showed presence of oxygen layer inhibits polymerization and compromises the bonding between the succeeding layers<sup>9,10,15</sup>. Shear bond strength values of subgroup B and C also contradicts those studies which proposed that oxygen inhibited layer is indispensable for bonding between the substrate and the increment layer<sup>3,7,8</sup>. Bond strength values of subgroup B and subgroup C are comparative, but statistically insignificant to subgroup A in both the groups. Subgroup B and C also show cohesive fracture thus revealing the fact that bond formed was strong even without the oxygen inhibited layer at the interface.

The result of the present study clearly shows that oxygen inhibited layer is neither necessary nor detrimental to bonding. Studies need to be undertaken to check the level of camphorquinone in the oxygen inhibited layer and whether that has any bearing on the degree of conversion and subsequently on bond strength. The result may not be conclusive since the shear bond strength was tested under static loading using a universal testing machine. The intra-oral forces are more dynamic and complicated to be comprehended. Thermo-mechanical cycling loading would have made the result a bit more accurate.

## Conclusion

Within the limitation of this study, oxygen inhibited layer seems to be neither contributory nor detrimental

to bonding between layers of resin while performing incremental layering during composite resin restorations.

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# Etiology and pattern of dentoalveolar injuries in children below 13 years of age reporting to Government Dental College, Thiruvananthapuram

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## Abstract

Traumatic dental injuries are a common but often neglected dental emergency in all populations. Trauma to the anterior teeth often hampers the physical and psychological well being of the victim. Majority of the population is still unaware of the impact of dentoalveolar trauma in their child's well being. Kerala is a state where children usually perform outdoor activities without any precautionary measures and are prone to traumatic dental injuries. This study aims at assessing the etiology and pattern of dentoalveolar trauma in children below 13 years of age who presented to the Government Dental College, Thiruvananthapuram, which provides definitive care for such injuries. Majority of the victims report to this institution either initially or as referral at some point of their treatment for traumatic dental injuries.

**Key words:** Dentoalveolar trauma, etiology, pattern.

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of Pediatric Dentistry, Government Dental College, Thiruvananthapuram during the period from January 2012 to June 2013.

Identifying the etiological factors make it possible to establish preventive measures aimed at avoiding future injuries. Government Dental College, Thiruvananthapuram is a reputed tertiary health center where people from Thiruvananthapuram and nearby districts of South Kerala have access to receive a definitive care following traumatic dental injuries. Most of the victims of dentoalveolar trauma approach this institution either initially or as referral at some stage of their treatment for such injuries.

## Introduction

Dentoalveolar trauma has the potential for profound and far-reaching consequences, both for the child and the parent. The psychological upset should be considered along with the physical defect that results from the damage and disfigurement of the child's dentition<sup>1</sup>.

Dentoalveolar injuries are so common in the pediatric population that up to 40% of boys and 30% of girls experience dental traumatic injuries within 5 years of age<sup>2</sup>. Falls

clearly prevail as the leading cause of injury in children; other leading causes are impacts with a person or object, bicycle accidents, motor vehicle accidents, sporting activities and intentional injuries, including parental abuse.

The study was conducted in order to determine the various etiologies of dentoalveolar injuries and their different patterns of presentation in a population which comprised of children below 13 years of age attending the dental OPD in the Department

## Methodology

The present descriptive study determined various etiologies and patterns of dentoalveolar injuries in children below 13 years of age, and was conducted in the Department of Pediatric dentistry, Government Dental College, Thiruvananthapuram from January 2012 to June 2013. Permission was granted from the Institutional Ethics Committee prior to the study.

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Table 1: Showing the frequencies of different etiologies of dentoalveolar trauma

Etiology	Frequency	Percentage
RTA	10	6.7%
Violence	2	1.3%
Hit on/by objects	45	30%
Fall	82	54.7%
Fight	9	6%
Others	2	1.3%
<b>Total</b>	<b>150</b>	<b>100</b>

A total of 150 children were included in the study. The data were collected from the caregivers of the children with the help of an interviewer based questionnaire after obtaining informed consent. Details about the child's age, address, parents' educational status and occupation, etiology and pattern of the dentoalveolar injuries were sought.

The data were analysed using SPSS software version 16.

## Results

The most common etiology for dentoalveolar injuries were unspecified falls (54.7%) followed by hit on or by objects (30%), followed by RTA (6.7%), fights (6%) and violence (1.3%) A hit with stick from mother and bite on a toy were the other etiologies (1.3%). The commonest type of injury was uncomplicated crown fractures without pulp exposure (28%) followed by complicated crown fractures (25.3%), and combination of injuries (24.5%). The least reported injuries to the permanent teeth were alveolar fracture, extrusive and intrusive luxation which occurred in one case each. Children of 10-13 years age group were reported to have sustained dentoalveolar injuries more than other age grouped children (49.3%) followed by 6-9 years age group (38%) and 2-5 years age group was the least affected (12.7%). Boys tend to injure their teeth more frequently than girls by a ratio of 2.06:1. Out of the 150 children reported, 67.3% were boys and 32.7% were girls.

69.3% of the children belonged to rural areas and 30.7% from urban limits, showing a high frequency of TDIs in the children from rural areas. 50% of children suffered TDI to a single tooth only, 38.7% injured 2 teeth, 7.3% injured 3 teeth and a case where 7 teeth were injured following a single traumatic event in which both primary and permanent teeth were injured.

Table 2: Showing the frequency of different types of dentoalveolar injuries

Type of injury	Frequency	Percentage
Avulsion	8	5.3%
Extrusion	1	0.7%
Intrusion	1	0.7%
Alveolar fracture	1	0.7%
Root fracture	3	2%
Primary teeth injuries	18	12%
Complicated crown fractures	38	25.3%
Uncomplicated crown fractures	42	28%
Subluxation	3	2%
Combination of injuries	35	24.5%
<b>Total</b>	<b>150</b>	<b>100%</b>

Maxillary dentition was affected more following dentoalveolar trauma in both dentitions. Maxillary permanent central incisors were the most commonly injured teeth (82.9%) followed by maxillary lateral incisors (9.5%). Maxillary central incisors of both quadrants were affected with almost the same frequency.

In primary dentition, maxillary central incisors were affected the most followed by maxillary lateral incisors as seen in permanent dentition. Uncomplicated crown fractures were the most common injury to the permanent dentition, whereas luxation injuries predominated in the primary dentition.

There was a significant relationship between age group and type of injuries in this study. Avulsion, crown fractures, combination injuries and root fractures occurred with maximum frequency in the children of 10-13 years age group and majority of injuries affected only a single tooth (43%).

## Discussion

Dentoalveolar trauma, though common in Kerala, is the least reviewed health problem. In this new era, falls and collisions, which were the most common etiologies in the past studies often mask intentional TDIs as physical abuse, assaults and torture in almost all age groups and all over different regions. An underestimated etiology in this period is violence, which has increased considerably in the past few decades<sup>3</sup>.



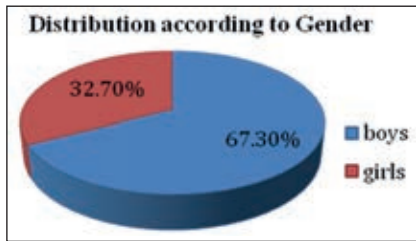


Fig. 1 Pie diagram showing the distribution of dentoalveolar injuries in both genders.

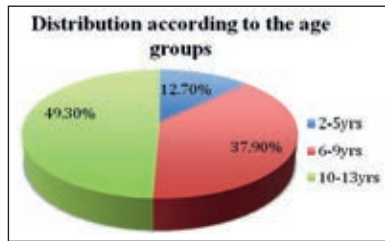


Fig. 2 Pie diagram showing the distribution of dentoalveolar injuries in different age groups.

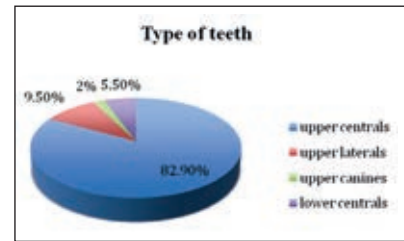


Fig. 3 Pie diagram showing the proportion of dentoalveolar injuries in different types of permanent teeth.

Several etiologies can be sorted out for dentoalveolar trauma, which often varies with age, gender, physical activity, and many other variables. Falls might be the most common etiology in some areas whereas RTA or sporting activities can be the etiology elsewhere. Therefore generalizing a common etiology is very difficult and mostly not universally accepted.

Unspecified falls were identified as the most common etiology for dentoalveolar trauma in this study (54.7%), which was agreeing with other literature reviews<sup>4</sup>, whereas in some studies sporting injuries were the leading cause<sup>5</sup>, especially in boys<sup>6</sup>. Road traffic incidents also contributed for dentoalveolar trauma in many studies<sup>7</sup>. This difference with the possible etiologies varied with geographic locations. In most of the Western studies sports proved to be an important etiology of dentoalveolar trauma, whereas in a population like here, the sporting activities of children were not so pronounced and not comparable with the Western countries. Falls during playing, bicycling were all included in this category. Sporting injuries were absent in contrast with the Western studies, because of limited sporting activities in children comprising this population. There was a case of physical abuse where mother struck with a stick on the child's face for disobedience.

Violence was a more common etiology for dentoalveolar trauma in children residing in the urban areas than those in the rural areas<sup>3</sup>. In this study 2 cases of violence occurred in children belonging to urban areas which is in agreement with the literature. All other etiologies were more frequent in the children belonging to the rural areas as falls 62 (75.6%), hit on or by objects 28 (62.2%), RTA 6 (60%) and fights 7 (77.8%). This can be attributed to the fact that children from the rural areas get involved in games, fights etc. without protective measures.

In primary dentition luxation injuries were the most common in contrary to the crown fractures in permanent dentition<sup>8</sup>. Root fractures are often a rare

injury comprising approximately 0.5-7% of all injuries to teeth. Avulsion comprised 0.5-3% of all dental injuries in the permanent dentition. In the present study, uncomplicated crown fractures accounted for the majority of injuries (28%), which was in agreement with most of the literature reviews. Complicated crown fractures were the second most common injury (25.3%), followed by combination of injuries (24.5%), primary teeth injuries (12%), avulsion (5.3%), subluxation (2%), root fractures (2%), extrusion (0.7%), intrusion (0.7%) and alveolar fracture (0.7%). Among primary teeth injuries luxation injuries were common. Uncomplicated and complicated crown fractures occurred with a greater frequency in boys.

Boys were 2.06 times more affected by traumatic injuries than girls in this study which was going in favour with most of the literature reviews. Garcia Godoy et al<sup>9</sup> founded the boy: girl ratio as 0.9:1 which was in contrary with the majority of literature reviews.

In the present study boys were traumatized maximum in the 10-13 years age group (53.5%), whereas girls were traumatized mostly in their 6-9 years (42.9%). In this study 87.5% of children with avulsion, 57.9% with complicated crown fractures, 54.8% with uncomplicated crown fractures and 54.3% with combination of injuries belonged to the 10-13 years age group.

The frequency of dentoalveolar trauma steadily increased with age in children below 13 years of age which was in agreement with many literature studies. This can be attributed to the fact that children are exposed to many risk factors for dentoalveolar trauma as they grow up.

Dentoalveolar trauma was more frequent among children coming from rural areas 104 (69.3%). This higher occurrence of TDI can be attributed to the increased playtime for children in the rural areas than those in the urban limits as the children are more engaged in their academics.

Majority of the children injured a single tooth 50% (75) as in many studies<sup>10</sup>, 38.7% injured 2 teeth, 7.3% injured 3 teeth, 3.3% injured 4 teeth and a single case with 7 teeth injured. This finding went in agreement with most of the literature studies.

The most common teeth to be traumatised were the maxillary centrals in majority of the reviews<sup>11</sup> and maxillary right central incisor in particular<sup>5,7</sup> Permanent anterior teeth in maxillary arch were the most common teeth to be traumatized (82.9%) following traumatic events in this study, and there were no children with their lower lateral incisors and lower canines traumatized. Upper central incisors of both quadrants were almost equally affected. 9.5% got their upper laterals injured, 5.5% injured their mandibular central incisors, and 2% injured their maxillary canines.

Similar studies need to be conducted in other tertiary health centres like Government Dental College, Calicut and Kottayam as it covers the vast majority of population belonging to central and north Kerala. The results can be compiled to evaluate a state wise burden of these injuries.

## Conclusion

The most common etiology of dentoalveolar trauma were unspecified falls (54.7%) followed by hit on or by objects (30%) and the commonest type of injury were uncomplicated crown fractures (28%) followed by complicated crown fractures (25.3%). Boys were the majority who underwent traumatic dental injuries than girls by a proportion of 2.06:1. 10-13 years age grouped children were injured the most following traumatic events as children's risk taking increased as they get older.

Oral health promotion policies should aim at creating an appropriate and safe environment in parks, playgrounds and schools. The community should be sentient of the hazards at home and streets, and reduce unsafe activities with closer supervision of children.

Educational programs should be given to parents and teachers aiming at prevention and underlining the benefits of immediate treatment in case of any traumatic dental injuries.

Future studies should be conducted to obtain baseline information on this common but often neglected dental emergency to help policy makers in planning preventive strategies.

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# Periodontal respiratory association

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## Abstract

**Aims and objectives:** To evaluate the potential association between periodontal disease and respiratory diseases.

**Methodology:** A group of 27 patients (with respiratory diseases) and a group of 27 age, sex and race matched controls (with normal pulmonary function) were selected from Yenepoya dental and medical college. Lung disease was confirmed by spirometry. Clinical parameters such as gingival index, plaque index, community periodontal index and loss of attachment was assessed and compared between cases and controls. The data was collected and statistical analysis was done.

**Results:** Patients with respiratory diseases exhibited significantly poor periodontal health, gingival inflammation, deeper pockets and greater loss of attachment when compared to control group with normal pulmonary function.

**Conclusion:** The findings of the present analysis support an association between periodontal disease and respiratory diseases.

**Keywords:** periodontal disease, bacteria, pathogens, COPD, respiratory

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Respiratory diseases are responsible for a significant number of deaths and considerable suffering in humans. These diseases are widely prevalent. For example lower respiratory infections were the third commonest cause of mortality world wide in 1990 (causing 4.3 million deaths) and chronic obstructive pulmonary disease (COPD) was the sixth leading cause of mortality (2.2 million deaths); was the fourth leading cause of death in United states in 1996.<sup>1</sup>

A relationship between poor periodontal health and respiratory disease, especially in high-risk subjects, has been suggested by a number of recent microbiologic and epidemiologic studies. Several reports suggested that potential respiratory pathogens, which cause COPD, colonize the mouth of high-risk subjects. The results from preliminary trials demonstrated that alteration to oral hygiene significantly reduces the rate of lower respiratory tract infection in institutionalized subjects.<sup>2</sup> Studies

by Scannapieco et al have also suggested an association between poor oral health and COPD, after controlling for other confounding variables such as smoking, gender, age and sex.<sup>3,4</sup>

Periodontitis is a chronic inflammatory reaction to bacterial infections that results in the destruction of the supporting connective tissue and the alveolar bone. Oral pathogens and inflammatory cytokines from periodontal lesions induce systemic inflammation, which may contribute to the pathogenesis of COPD.<sup>5</sup>

Recent reports have implicated that periodontitis is associated with several other diseases including Type 2 diabetes mellitus, cardiovascular diseases and respiratory diseases.<sup>6,7</sup> Severe periodontal diseases significantly increased the risk of COPD in subjects who were current smokers.<sup>8</sup>

The respiratory patients appear to have poor periodontal health status than controls with normal pulmonary function. Respiratory infections involve aspiration of bacteria from the oropharynx into lower respiratory tract. Therefore promotion of good oral hygiene and periodontal health could play an important role in prevention and treatment of pulmonary diseases. This study was carried out to investigate whether there is an association between periodontal health and respiratory diseases.

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Table I: Comparison of the age groups

Group	N	Minimum	Maximum	Mean	Std. Deviation	Median	t value	p value
Cases	27	19	64	45.56	13.549	48.00	1.659	.103
Controls	27	23	63	40.11	10.356	40.00		NS
Total	54	19	64	42.83	12.256	42.50		

Table II: Gender distribution

		Groups		Total
		Cases	Controls	
Sex	F	6 22.2%	8 29.6%	14 25.9%
	M	21 77.8%	19 70.4%	40 74.1%
Total		27 100.0%	27 100.0%	54 100.0%

## Methodology

Subjects for this study were selected from both inpatient and, outpatients of Department of General medicine, Yenepoya medical college & outpatients of Department of Periodontics, Yenepoya dental College Hospital, Mangalore, who gave informed consent to participate in this study. A total of 54 patients were selected for the study. The test group consisted of 27 patients with respiratory diseases and control group consisted of 27 patients with normal pulmonary function.

The patients of age group from 16 to 64 years, who had more than 15 teeth were included in the study. The patients, with the history of any other systemic diseases, who has undergone antibiotic therapy in the past 3 months, who has undergone periodontal treatment in the past six months were excluded from the study.

The ethical committee of Yenepoya university approved the study.

## Procedure

The following clinical parameters were evaluated.

- Gingival index (Loe modification -Loe and Silness., 1967)
- Plaque index ((Loe modification - Silness and Loe., 1967)
- Community periodontal index (WHO., 1982)

Measuring Probing Pocket depth and Loss of Attachment were performed using WHO probe.

Lung function was measured using spirometry. The

spirometric measurements were conducted by trained and certified technicians.

## Statistical analysis

Data were analysed using t-test and Chi –square test. P value of less than 0.05 was considered to be statistically significant.

## Results

The mean age of respiratory patients was 45.56 and that of control patients was 40.11. The mean of all the patients was 42.83. (Table I)

There were 19 males and 8 females in case group, 21 males and 6 females in the control group. The females constituted 25.9 % of the total sample size, whereas males constituted 74.1%. (Table II)

The gingival status was assessed using gingival index scores. The comparison of the gingival index scores was performed and the mean values were 1.613 for cases and 1.426 for controls. The p value was found to be 0.029 (less than 0.05), which is statistically significant. It was seen that respiratory patients were having higher gingival index scores when compared to the subjects with normal pulmonary function. (Table III).

The plaque index scores were compared between both the groups and the mean value of cases and controls were found to be 1.959 and 1.563 respectively. The results were found to be statistically highly significant (p value 0.000). The plaque scores of respiratory patients were significantly high when compared to the non -respiratory group. (Table IV).

The periodontal status was assessed using Community Periodontal index (CPI). The mean value of cases and controls were 2.26 and 2.11 respectively. The p value was 0.501, which showed that the result is statistically insignificant. Even though there was no statistical significance, the mean CPI scores were high in the respiratory group when compared to the control group. (Table V).

The comparison of Loss of attachment scores were done to assess the amount of periodontal destruction among cases and the controls. The CPI- Loss of attachment scores were statistically analysed. The mean values of cases and controls were found to be 1.52



Table III: Comparison of gingival index to assess the gingival status

**GI**

Group	N	Minimum	Maximum	Mean	Std. Deviation	Median	t value	p value
Cases	27	1.12	2.85	1.6130	.38365	1.5500	2.241	.029
Controls	27	1.14	2.13	1.4263	.20025	1.4000		sig
Total	54	1.12	2.85	1.5196	.31742	1.4550		

Table IV: Comparison of Plaque Index

**PI**

Group	N	Minimum	Maximum	Mean	Std. Deviation	Median	t value	p value
Cases	27	1.32	2.70	1.9593	.38782	1.9100	4.426	.000
Controls	27	1.08	1.96	1.5633	.25619	1.5500		HS
Total	54	1.08	2.70	1.7613	.38198	1.7650		

Table V: Comparison of CPI scores

**CIP**

Group	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mann-Whitney Test Z value	p value
Cases	27	1	4	2.26	.656	2.00	.673	.501
Controls	27	1	4	2.11	.751	2.00		NS
Total	54	1	4	2.19	.702	2.00		

Table VI: Comparison of Loss of attachment scores

**LOA**

Group	N	Minimum	Maximum	Mean	Std. Deviation	Median	Mann-Whitney Test Z value	p value
Cases	27	0	4	1.52	1.122	1.00	1.555	.120
Controls	27	0	3	1.04	.980	1.00		NS
Total	54	0	4	1.28	1.071	1.00		

and 1.04 respectively. The p value (0.120) was greater than 0.05, which made it statistically non-significant. Here also, the mean CPI-LOA scores were high in cases when they were compared with the control group with normal pulmonary function. The high CPI-LOA scores in respiratory patients showed more periodontal destruction with respect to that group, when compared to the non-respiratory group. (Table VI)

The smoking status also showed significance. The subjects were divided into non smokers, current smokers and past smokers. The non smokers in the cases and controls were 13 and 17 respectively, which accounted to the 55.5% of the total sample size. The current smokers were 4 in case group and 9 in control group.

The past smokers were 10 and 1 in cases and controls respectively. Here the p value was found to be 0.007, which is statistically highly significant. (Table VII)

## Discussion

The purpose of this study was to compare the periodontal status of healthy patients with that of respiratory patients. Several possible mechanisms have been proposed to explain the potential link between periodontal disease and respiratory function.

Respiratory infections involve aspiration of bacteria from the oropharynx into lower respiratory tract, leading to the progression and exacerbation of respiratory disease. The results obtained in the study

Table VII: Comparison of the smoking status.

		Groups		Total
		Cases	Controls	
Smoker	No	13 48.1%	17 63.0%	30 55.6%
	Past smoker	10 30.0%	1 3.7%	11 20.4%
	smoker	4 14.8%	9 33.3%	13 24.1%
Total		27 100.0%	27 100.0%	54 100.0%

showed that there is an association between periodontal disease and respiratory diseases.

Several mechanisms can be envisioned to help explain how oral bacteria can participate in the pathogenesis of respiratory infection

1: oral pathogens may be aspirated into the lungs to cause infection.

2: Periodontal disease associated enzymes in saliva may modify mucosal surfaces to promote adhesion and colonization by respiratory pathogens.

3: Periodontal disease associated enzymes may destroy salivary pellicles on pathogenic bacteria.

4: cytokines originating in the periodontal tissue may alter the respiratory epithelium to promote infection by the respiratory pathogens.<sup>1</sup>

Data obtained from a longitudinal study of more than 1100 men revealed that alveolar bone loss was associated with the risk of COPD. Over a 25 year period, 23% of the subjects were diagnosed with COPD. Subjects who had severe bone loss at the baseline dental examination had a significantly increased risk of subsequently developing COPD when compared to subjects with less bone loss.<sup>9,10</sup>

The findings of the present study is in accordance with the study conducted by Sharma et al (2011). The study showed that respiratory patients had poor periodontal health showing higher plaque and gingival Index scores along with deeper pockets and greater value for Loss of attachment.<sup>11</sup>

The study also showed similar results with that of Wang et al<sup>12</sup> study which showed that poor periodontal health, dental care and oral health were significantly associated with an increased risk of COPD. Wang et al in their study indicated the importance of promoting dental care and oral health knowledge that can be integrated into the prevention and treatment of COPD.

The study by Kowalski et al also showed the positive relationship between dental plaque index, probing depth and COPD.<sup>13</sup>

The present study results were also in accordance with Scannapieco et al study<sup>4</sup> which was a cross sectional retrospective study of NHANES with a study population of 13792 subjects where a trend was noted that lung function appeared to diminish with increasing periodontal attachment loss.

Higher plaque index scores were obtained in the present study which showed close agreement to Mojon et al<sup>14</sup> study which showed that the dentate subjects with a history of respiratory tract infection (RTI) had higher plaque score ( $p = 0.02$ ).

Cigarette smoking has been identified as an effect modifier for both periodontal diseases and COPD.<sup>15</sup>

It is an independent risk factor for the medical conditions that have been linked to the periodontal disease including Coronary heart disease, COPD, stroke, and low birth weight.<sup>16-20</sup>

The role of smoking in a possible relationship between periodontal disease and COPD was surveyed in the Third National Health and Nutrition Examination Survey. (NHANES III). The results suggested that smoking may be a co-factor in the relationship between periodontal disease and COPD.<sup>15</sup>

Tobacco smoking suppresses the production of protective immunoglobulin G2 antibodies and blocks phagocytosis and the killing of bacteria by neutrophils.<sup>21</sup> Tobacco smoking also paralyzes the ciliary action and hampers lung clearance, enhancing the risk for respiratory disease by over four-fold. Hujoel et al<sup>22</sup> suggested that the periodontitis and systemic relationship should be studied among healthy never-smokers. It is recommended to carry out future studies of periodontal and systemic diseases including a separate analysis of never smokers to confirm its significance.

In light of the complexity and multifactorial nature of respiratory disease, a demonstration of a dose effect for the association between periodontitis and respiratory disease is unlikely. Hence, plaque accumulation or periodontal disease does not directly cause respiratory or other systemic diseases. They may, in fact, aggravate these systemic diseases in susceptible and high-risk individuals. The need for rigorous plaque control and treatment of oral infections, particularly in these risk groups, is highly justified.<sup>8</sup>

## Conclusion

The findings of the present analysis substantiates a potential association between periodontal disease and respiratory disease, indicating a positive correlation between poor periodontal health and the risk of developing respiratory disease. But, it is not argued that poor oral health alone is responsible for respiratory diseases. Rather poor oral health may work in concert with other factors (such as continued smoking, environmental pollutants, viral infections allergy and/genetic factors) to promote the progression and exacerbation of respiratory diseases. Further investigations would establish the role of poor oral health in development of respiratory diseases. It is conceivable that improved oral health may prevent the progression of the disease.

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# Interdisciplinary approach in management of teeth with horizontal root fracture

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## Introduction

Traumatic injuries to teeth occur unexpectedly and can lead to psychological trauma to the patient. Horizontal root fractures accounts to around 0.5-7% of trauma to permanent dentition and most commonly affects Maxillary Central Incisors.<sup>1</sup> Root fractures involve pulp, dentin, cementum and periodontal ligament making their treatment clinically challenging. Hence interdisciplinary and/or multidisciplinary approaches are required for the functional and aesthetic rehabilitation of the tooth following such fractures.

## Case Report

A thirty year old female patient reported to the Department of Conservative Dentistry and Endodontics, Government Dental College, Thiruvananthapuram with the chief complaint of mobility of her upper front teeth. She noticed the mobility after having a soft snack and could not recollect any previous history of trauma. Her medical history was non contributory. But past dental history revealed orthodontic therapy at around the age of 15 years.

On clinical examination there was mobility of both maxillary central incisors which were tender on percussion and showed a

## Abstract

Diagnosis and management of root fractures pose a unique challenge for the clinician. These form of traumatic injury to tooth that can lead to mobility or even loss of tooth. This can hence result in a psychological trauma to the patient. Thus an emergency management to restore the tooth to normalcy at the earliest is very much essential in our routine clinical practice.

This case report is on management of horizontal root fracture of both maxillary central incisors where the patient presented with mobility of 11 and 21. Radiographic evaluation revealed horizontal root fracture, bone loss and obliteration of root canals which is most difficult to treat. Root canal treatment of the tooth was carried out. Surgical exposure of the site followed by intraradicular stabilization with glass fibre post and external reinforcement with GIC was done. This multidisciplinary approach helped quicker functional and aesthetic rehabilitation of the tooth in a most conservative and successful manner.

**Keywords:** Horizontal root fracture, glass fibre post

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negative response to electric pulp testing. She had deep bite and attrition of lower anteriors. (Fig. 1, 2). There was a probing depth of 5mm in relation to mesial aspects of 11 and 21 buccally.

Radiographic examination revealed horizontal root fracture of 11 and 21, Widening of periodontal ligament space around 11, Obliteration of root canals and horizontal bone loss in the maxillary anterior region. (Fig.3)

Hence considering age of the patient, amount of bone remaining, compliance and with team decision from Department of Periodontics, Government Dental College, Thiruvananthapuram, it was decided on stabilization of tooth with splint followed by curettage of the site and reinforcement with Fiber Post.

## Management

After the treatment plan and

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Fig. 1 Pre operative-Labial view



Fig. 2 Pre operative- attrition of lower anteriors

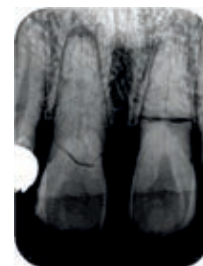


Fig. 3 Pre operative IOPA



Fig. 4 Rigid wire composite splinting

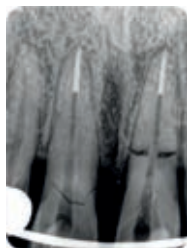


Fig. 5 Sectional obturation done

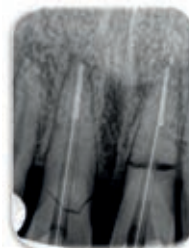


Fig. 6 Glass fiber post tried

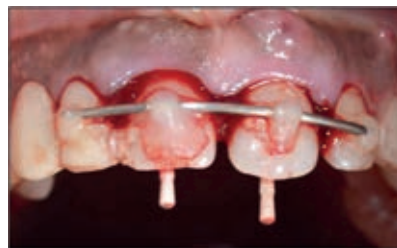


Fig. 7 Horizontal crevicular incision made

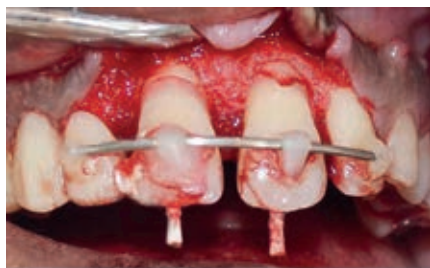


Fig. 8 After curettage



Fig. 9 Fracture site sealed with GIC



Fig. 10. Site sutured

diagnosis was established a rigid wire composite splinting with a 20 gauge wire was done (Fig.4). Access cavity was prepared under local anaesthesia. Canals were negotiated using 10size K-file (*DENTSPLY*) and EDTA gel. Working length was established using radiographic method and biomechanical preparation to a Master apical size 60 was done under copious irrigation with 5.25% sodium hypochlorite. Sectional obturation was done with Guttapercha using a stainless steel finger plugger.(Fig.5) The post space was then refined using the corresponding post drill and a glass fibre post (*Reforpost-angelus*) was tried in and conformational radiograph was taken.(Fig.6) After routine blood examinations patient was posted for periodontal flap surgery and simultaneous post placement.

A horizontal crevicular incision was made using No.11 Bard-parker stainless steel surgical blade and an envelop flap was raised under local anaesthesia.(Fig7) The reflected site was then curetted using 2R\2L universal curette.(Fig8) The fracture site was then sealed using Glass Ionomer Cement(*GC Fuji II™*) (Fig.9).

After the cement was set the canals were irrigated using normal saline and dried using paper points. Glass fiber post was then luted using dual cure resin cement (*Calibra-Dentsply*). Excess length of post was cut using a rotor and access cavity closed with restorative GIC. Flap was then sutured back in place using 3-0 silk (Fig.10) and a periodontal dressing with *COE PAK (non eugenol surgical dressing)* was given. A week later patient was reviewed and sutures were removed.

On review patient was asymptomatic and there was adequate healing of the site.(Fig.11, 12) Temporary splinting with composite resin was replaced with a permanent lingual resin fiber reinforced splint (Fig.13). 1 month and 3 months postoperative assessment showed adequate healing both clinically and radiographically. (Fig.14, 15, 16)

## Discussion

Treatment of root fractures depends on a number of factors such as, position of fracture line, mobility of tooth and pulpal status. Thus clinicians must have thorough knowledge and adequate clinical experience



Fig. 11 Post operative- labial view



Fig. 12 Post operative-lingual view



Fig. 13 Lingual resin splint placed



Fig. 14 Immediate Post op

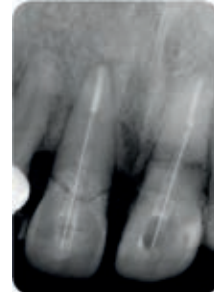


Fig. 15 After 1 Month

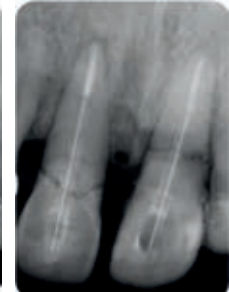


Fig. 16 After 6 Months

to treat them properly. Treating such cases is restorative challenge to the clinician. Root fractures are commonly classified as simple or multiple, displaced or non-displaced, partial or total and apical, middle or cervical.

A sectional obturation or Chicago technique<sup>2</sup> was used to obturate the canal so as to prevent displacement of coronal fragment. Although MTA has a lot of favourable properties, its long setting time of around 3hrs<sup>3</sup> and poor handling properties is the reason for using GIC to seal the site externally in this case.

Studies have shown glass fibre posts to offer favourable optical properties in restoring teeth<sup>4</sup> and have elastic property similar to that of dentin which help in equal distribution of stresses.<sup>5</sup> Some of the factors that affect the prognosis of root fracture are age, gender, periodontal status, position and mobility of coronal segment after trauma, status of the pulp, position of the fracture line, treatment time, communication with the oral environment etc.<sup>6</sup>

Intra-alveolar horizontal root fractures usually heal by formation of calcified union between the fractured segments which is more important, bone and connective tissue healing.<sup>7</sup> These fractures can also result in various sequelae like pulp canal obliteration, internal resorption, external resorption or loss of crestal bone.<sup>8</sup>

Other treatment alternatives for similar case are orthodontic or surgical extrusion which is not feasible here due to poor bone support, periodontal condition and unfavourable crown root ratio. Extraction followed

by prosthetic replacement is a non conservative technique and often the last resort.

## Conclusion

Conservative treatment options that help to retain natural aesthetics in the minimum time frame in an inexpensive way should always be opted to extraction and prosthetic replacement. Successful treatment outcome can be guaranteed from proper oral hygiene practice and regular follow-up.

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# Rehabilitation of crown-root fracture using a multidisciplinary crown lengthening technique

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## Abstract

Dental trauma in patients with oral and maxillofacial injuries is a frequent finding and the consequent effect on aesthetics can be extremely distressing. A crown-root fracture with subgingival extension is one among them and it requires a multidisciplinary approach for management. Crown lengthening technique based on the principle of maintaining biological width can be employed for rehabilitation of such cases. This case report describes the management of subgingival crown root fractures using a combination of crown lengthening techniques which included forced tooth eruption followed by gingivectomy for functional and aesthetic restoration of anterior teeth.

**Keywords:** Dental fracture; tooth fracture; orthodontic extrusion; gingivectomy; subgingival fracture

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## Introduction

Traumatic injuries of teeth usually result in damage to both dental and periradicular components. Subgingival fracture or fracture of a tooth below the alveolar crest level is one among them that presents considerable challenge to the clinician, particularly when it occurs in an aesthetic area. Such teeth can either be restored conservatively using crown lengthening techniques after endodontic treatment or may be extracted followed by prosthetic implant placement. Crown lengthening can be accomplished

utilizing surgical techniques or by applying orthodontic method, to increase the supracrestal tooth structure to facilitate post endodontic restoration (1, 2). The present case report demonstrates the combined application of the above crown lengthening techniques to achieve aesthetically desirable results for the conservative management of subgingival crown root fracture.

## Case Report

A 22 year old male patient reported to the Department of Conservative Dentistry and

Endodontics, Government Dental College, Thiruvananthapuram, with fractured upper front teeth following a road traffic accident one month earlier. The patient reported mild pain associated with the fractured teeth. He had undergone root canal treatment for these three fractured teeth and a crown was placed in one of them. The patient was not satisfied with the aesthetic outcome of the treatment and reported to our institution for its correction and further management.

Clinical examination, revealed a crown-root fracture on 21 and 22 (Fig. 1). The fracture was extending subgingivally in the palatal region on both teeth. There was an oversized porcelain-fused-to-metal (PFM) crown on 11, which was ground on the palatal side exposing the metal, possibly to adjust the occlusion.

An intraoral periapical radiograph showed root canal treated 11, 21 and 22. The root canal obturation of 22 was substantially short of the apex. The radiograph revealed a custom made cast post in 11. (Fig.2). There were no associated periapical changes. The root lengths of all the involved teeth were adequate and had no further extension of fracture

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Fig. 1 Preoperative image of fractured teeth

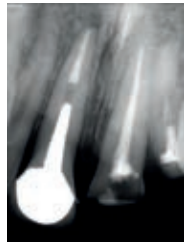


Fig. 2 Preoperative radiograph

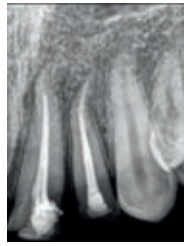


Fig. 3 Retreatment of 22



Fig. 4 J-hook luted to 21 and 22



Fig. 5 Orthodontic extrusion of 21 and 22



Fig. 6 Gingivectomy done and fibre post luted to 21 and 22



Fig. 7 Removal of crown from 11 and crown preparation of 11, 21 and 22

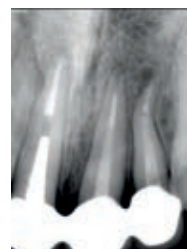


Fig. 8 Post operative radiograph



Fig. 9 Post-operative image

vertically or horizontally. Another clinical finding was a retained deciduous maxillary right canine. A review of the occlusal relation of teeth showed presence of deep bite.

After discussion with the patient, the following treatment plan was finalized, with informed consent:

- i. Retreatment of 22 to replace the defective root canal filling.
- ii. Crown lengthening of 21 and 22 using forced tooth eruption and gingivectomy.
- iii. Fibre post with composite core built up of 21 and 22.
- iv. Removal of crown placed on 11 and correction of the tooth preparation.
- v. Placement of PFM crowns on 11, 21 and 22 considering the limited clearance between the two arches.

Retreatment was initiated by removing gutta percha from 22 by thermosoftening. The canal was negotiated to full working length and prepared using K-files. Obturation was done using lateral condensation technique which was followed by placement of temporary restoration (Fig. 3). In the next appointment, gutta percha was removed upto the middle third of the canals of 21 and 22. A J-hook made from stainless steel wire was cemented in the canal of both teeth using zinc phosphate cement. A 22 gauge stainless steel

orthodontic wire was bent and adapted to the arch form of the maxillary teeth. The wire was attached to the teeth using composite resin and elastics were applied between the J-hook and the arch wire to generate axial erupting force on the fractured teeth (Fig. 4,5). The elastics were replaced every two weeks. An extrusion of approximately three millimeters was obtained in three weeks and the erupted teeth were retained passively in this position to prevent relapse for two weeks. Periodontal treatment was initiated following the retention period. The arch wire and J-hook were detached from the teeth. Gingivectomy was done to expose the margins in the proximal and palatal regions of the teeth (Fig. 6). Supracrestal fibres were incised to release the tension and prevent relapse and a periodontal pack was adapted. In the next appointment, post space preparation was done in 21 and 22 using peeso reamers. Fibre posts were attached in the canals using dual cure resin cement (Fig. 6). The core was built around the fibre post using composite material. High speed handpiece and burs were used to cut the excess of fibre post and prepare the margins in the core structure.

The crown present on 11 was sectioned and removed. A custom-made metal cast post and core was present under the crown. The overall crown preparation of the core was modified, considering that the patient was having deep bite and limited clearance



between the opposing arches. The preparation margins were refined to achieve an aesthetic emergence profile in the cervical region (Fig. 7). A gingival retraction cord was applied and an impression was taken using elastomeric impression material. Temporary crowns made from acrylic were placed on the prepared teeth. Since the palatal clearance was inadequate, a three unit PFM crown with a labial facing was fabricated for the teeth and was luted using glass ionomer cement (Fig. 8,9)

## Discussion

Subgingival crown-root fractures of anterior teeth in young patients pose a significant challenge to clinicians. The primary concern during treatment of a subgingival fracture is preservation of natural teeth with maintenance of periodontal architecture<sup>3,4</sup>. The treatment objective in this case was focussed on the retention of the post endodontic restoration, proper placement of restorative margins without violating biological width and to restore aesthetics. The important considerations included the appropriate ratio of length of crown versus root; thickness, position and contour of gingival tissue structure and topography of the surrounding alveolar bone<sup>1,5</sup>.

Orthodontic forced tooth eruption is a method to extrude the tooth by applying traction forces along the long axis of tooth. Forces exerted ranges from 15-60 g which depends upon the type of extrusion required, rapid or slow. The forces are adjusted based on the clinical evaluation of the eruption speed, as the forces applied cannot be measured. Slow extrusion occurs at a rate of 1 mm or less per week. Orthodontic extrusion results in formation of 'red patch' which is actually a band of non-keratinized tissue due to eversion of sulcular epithelium. It becomes keratinized in 28-42 days. Surgical contouring and fiberotomy is required following completion of extrusion, considering the adjacent gingival tissue levels and to decrease the tension<sup>2</sup>.

Surgical crown lengthening is used to manage cases with subgingival caries, subgingival tooth fracture, uneven gingival margins and excessive gingival display. Various techniques of surgical crown lengthening are suggested in the literature. These include gingivectomy, apically repositioned flaps (with or without the resective

osseous surgery) and surgical extrusion<sup>6</sup>. In this case, gingivectomy was used following orthodontic treatment to increase the crown length as well as to shape and contour the interproximal gingiva which was affected due to subgingival tooth fracture of multiple teeth.

Maintenance of biological width and dentogingival integrity is the most important factor in achieving successful outcome in such cases. A combination of orthodontic tooth extrusion and surgical technique for crown lengthening helps us in attaining a proper crown to root ratio. Orthodontic extrusion helps in achieving increased clinical crown length as well as the contour of affected gingival tissues which can further be modified during the procedure of gingivectomy. This method eliminates the requirement for resective osseous treatment on multiple teeth and gives enhanced aesthetic results.

## Conclusion

A harmonious relationship exists between dental hard and soft tissues. The present case report elaborates that a multidisciplinary treatment approach following this principle can help us save and efficiently restore a traumatized tooth with complicated crown-root fracture in anterior aesthetic areas.

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# One step apexification with Biodentine

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## Introduction

Dental caries and trauma are the most common challenges to the integrity of a tooth as it matures. Both insults can render the pulp non vital. If this occurs prior to complete root formation and apical closure, normal root development is halted<sup>1</sup> and results in incomplete development of the dentinal walls and root apices. These teeth present wide dentinal tubules that allow the penetration of bacteria and their irritants. The biggest endodontic challenge while treating teeth with associated open apices is obtaining an apical seal. To overcome this problem, apexification procedure is indicated.

Apexification is a method of inducing apical closure through the formation of mineralized tissue in the apical pulp region of a nonvital tooth with an incompletely formed root. The mineralized tissue can be composed of osteocementum, osteodentin, or bone or some combination of the three.<sup>2</sup>

Currently, various methods of treating a tooth with necrotic pulp and open apex are reported in literature. These includes placement of a large gutta-percha filling or customized gutta-percha cone with sealer at the apex, placement of gutta-percha with sealer or zinc-oxide eugenol short of the apex, peri-apical surgery, placement of calcium hydroxide to induce a mineralized apical barrier and placement of a biocompatible material such as dentinal chips against which a root-filling could be placed<sup>3</sup>

The most recent development in the treatment of teeth with a necrotic pulp and an open apex is to condense nonsurgically a biocompatible material into the apical end of the root canal. The rationale is to establish an apical stop that would then enable the root canal to be filled immediately. This technique has been called a one-visit apexification.<sup>2</sup>

In conventional apexification procedures, the most advocated medicament is calcium hydroxide. This apexification procedure uses long term calcium hydroxide dressings to promote the formation of a calcified barrier that an obturation material can be placed against. In recent times, synthetic apical barriers have been popularized as alternatives to the traditional calcium hydroxide apexification method. Mineral Trioxide Aggregate (MTA) is one such material that has been researched extensively in this regard. MTA creates an apical plug that helps to prevent the extrusion of the obturating materials. A novel material biodentine has been introduced recently which is similar to MTA in basic composition and can serve as a substitute. The following case report demonstrates the successful usage of biodentine in creating an artificial apical barrier.

## Case report

A 17 year old female patient reported to our Department of Conservative Dentistry and Endodontics with chief complaints of broken and discolored upper front tooth. The patient gave a

history of trauma 6 years back. On clinical examination, discoloration and Elli's Class II fracture was noted for maxillary right central incisor. The tooth was asymptomatic and the pre operative radiograph revealed incomplete root formation with an open apex (Fig 1). Thermal and electric pulp tests provided a negative response. Apexification with biodentine was planned for the tooth. In the first visit, after proper isolation, adequate access cavity was prepared for the tooth 11 and working length was determined using radiographic method. Followed by this, biomechanical preparation of the canal was carried out using 80 size k file in circumferential manner under copious irrigation with 2.5% sodium hypochlorite and normal saline. Calcium hydroxide was placed as an intracanal medicament followed by temporary restoration of the access cavity with zinc oxide eugenol cement. Patient was recalled after a week. In the second visit, the canal was thoroughly cleaned and irrigated with 2.5 % sodium hypochlorite and normal saline. Paper points were then used to dry the canal. Biodentine was mixed according to manufacturer's instructions and introduced into the apical third of the canal to form an apical plug of 4mm thickness. The material was allowed to set and after 20 minutes the root canal was obturated with Gutta percha using lateral condensation technique (fig 2). The access cavity was then sealed with composite restoration. The patient was recalled after 1 month

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Fig. 1 pre-operative radiograph showing open apex

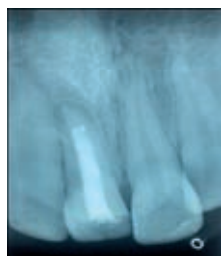


Fig. 2 Post obturation radiograph with biodentine apical plug

and the tooth was found to be completely asymptomatic. The tooth was then restored with metal ceramic crown.

## Discussion

The goal of apexification is to obtain an apical barrier to prevent the passage of toxins and bacteria into periapical tissues from root canal.<sup>4</sup> The barrier provides a matrix against which the root filling material can be packed to provide a more adequate apical seal. It also reduces the surface area of the root filling which is in contact with the periapical tissues.<sup>5</sup> Calcium hydroxide has been shown to be the most reliable and most widely used medicament for this procedure.<sup>5</sup> Because of its enhanced success rate, easy availability for clinician and affordability for patients it gained widest acceptance in literature.

Despite higher success rate of apical barrier formation using calcium hydroxide long term follow-up is essential. Induction of apical healing with calcium hydroxide, takes 5-20 months and requires multiple appointments.<sup>6</sup> Chances of cervical fractures are also been reported.<sup>4</sup> For these reasons one-visit apexification has been suggested.

Morse et al. define one-visit apexification as the non-surgical condensation of a biocompatible material into the apical end of the root canal. The rationale is to establish an apical stop that would enable the root canal to be filled immediately. Here, there is no attempt at root end closure but an artificial apical stop is created.<sup>7</sup> Recently there have been a number of reports describing the use of MTA in one-visit apexification. They assert that MTA provides scaffolding for the formation of hard tissue and the potential of a better biological seal.<sup>7</sup> The advantages of this material includes; (i) reduction in treatment time, (ii) possibility to restore the tooth with a minimal delay and thus to prevent the fracture of the root and (iii) avoids changes in the mechanical properties of dentine because of the prolonged use of calcium hydroxide. Moreover it is non cytotoxic and has good biological properties.<sup>6</sup> The presence of calcium and phosphate ions results in capacity to attract blastic cells and promote favorable conditions for cementum deposition. The material

consists of tricalcium silicate, tricalcium aluminate, tetracalcium aluminoferrite, calcium sulfate dihydrate and silicate oxide but other mineral oxides may also be added to improve physical and chemical properties.<sup>3</sup> Even with the numerous advantages and utilities in sphere of application for MTA, there are many short comings of MTA such as difficult handling characteristics, long setting time, high cost and potential of discoloration. This has led to the development of newer materials like biodentine.

Biodentine is a novel product recently introduced by septodont which could conciliate high mechanical properties with excellent biocompatibility, as well as a bioactive behavior. It is similar to MTA in its basic composition with the addition of setting accelerators like calcium chloride resulting in faster setting when compared to MTA and improved handling properties and strength. The decreased setting time is achieved through altering the particle size, since higher the specific surface, shorter the setting. Also, adding calcium chloride to the liquid component accelerates the system. Finally, the decrease of the liquid content in the system decreases the setting time to harden within 9 to 12 minutes. Biodentine is also expected to be useful for other purposes including pulp protection, temporary closure, deep caries management, cervical filling, direct and indirect pulp capping, pulpotomy, managing perforations, internal and external resorption and retrograde root canal obturation.

For the above case, we used biodentine as the apexification material to form an apical plug of 4mm against which the gutta percha was placed. Follow up results showed good prognosis and biodentine is an excellent alternative to calcium hydroxide or MTA.

## Conclusion

Single visit apical closure is a viable option for the treatment of immature teeth with necrotic pulps and biodentine with its superior properties has got a bright future in this regard.

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# Revascularization of immature permanent tooth with apical periodontitis: A case report and review of literature

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## Introduction

Treatment of immature permanent tooth with pulpal necrosis has always been an enigma to the dentist. The ideal treatment outcome for a non-vital immature tooth should be the healing of apical pathosis, promotion of continued development of root apex in length as well as in thickness, and making the tooth functionally stable. The conventional methods of treatment being Root Canal Therapy [RCT], apexification and mineral trioxide aggregate [MTA] apical plug procedure. A hermetic apical seal is often difficult to be created in non-vital immature tooth by doing the conventional RCT. Although this difficulty associated with conventional RCT could be overcome by an apexification or an apical plug procedure, the risk of root fracture remains an unsolved issue, as these treatment options do not promote the continued development of root apex<sup>1</sup>.

Root canal revascularization is a new treatment modality, which is based on the principles of regeneration. This is a biologically based procedure, which promotes continued root development and could therefore meet the ideal treatment outcome for a non-vital

## Abstract

Revascularization is one of the most exciting developments in endodontic, which is based on the principles of regeneration. This article describes the successful revascularization treatment of an immature maxillary central incisor with apical periodontitis. Revascularization therapy was performed over multiple visits and on follow-up meetings, evidences of formation of hard tissue as well as elongation and thickening of the dentinal walls and closure of the root apex was seen.

**Key words:** revascularization, vital pulp therapy, immature permanent tooth, open apex

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immature tooth. Being a regenerative modality this procedure needs an interaction of stem cells, growth factors and scaffold<sup>1</sup>. The purpose of the present article is to report the successful revascularization treatment of immature permanent maxillary central incisor with symptomatic apical periodontitis.

## Case report

A 12-year-old boy was reported to the department of Conservative Dentistry and Endodontics, Mar Baselios Dental College with a chief complaint of fractured front tooth. Clinical examination revealed that the tooth #11 had an Ellis Class IV

fracture (Fig 1a). Mobility and periodontal probing were within physiological limits. Pulp sensibility was negative on cold and electric pulp testing (EPT), but the patient reported sensitivity to percussion and palpation. Periradicular radiographic examination revealed that the tooth had an incompletely developed root apex with a periradicular radiolucency (Fig 1b). A diagnosis of pulpal necrosis with symptomatic apical periodontitis was made for tooth #11. Root canal revascularization treatment was planned for the tooth #11 and details of the procedure were explained to the parent and a special informed consent was obtained.

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Fig. 1 (a) Pre-operative photograph. (b) Diagnostic radiograph

In the first appointment the tooth was anaesthetized with 2% lidocaine containing 1:100,000 epinephrine. An access cavity was established under rubber dam isolation. Pus and necrotic tissue were observed within the root canal. The root length was estimated radiographically using a size 30 K-file. The canal was passively irrigated with 20 mL of 5.25% sodium hypochlorite [NaOCl] and then dried with absorbent points (Dentsply Maillefer). A freshly prepared triantibiotic paste [TAP] consisting of Ciprofloxacin, Metronidazole and Minocycline (100 mg of each drug in a 0.5- mL total volume) was placed into the canal using a lentulo-spiral. The access cavity was sealed with Cavit (3M Espe, Seefeld, Germany).

At the 3-week follow-up appointment, the patient was asymptomatic, and the tooth showed no tenderness to percussion and palpation. Under local anaesthesia and rubber dam isolation, the temporary restoration was removed. Using 10 mL of 5.25% NaOCl, the triple antibiotic paste was removed, and the canal was dried with absorbent points. To induce fresh bleeding, the apical tissue in the tooth was nudged using an ISO 50 K-file. A blood clot was formed 4mm apical to the cement-enamel junction (CEJ). After that white MTA (Dentsply Tulsa Dental, Tulsa, OK, USA) was placed over the blood clot. A wet cotton pellet was placed against the MTA for setting. Glass Ionomer Cement [GIC] (Fuji; Fuji Corporation, Osaka, Japan) was placed over the set MTA cement, and the tooth was restored with composite resin (Filtek A110; St Paul, MN, USA) (Fig 2a & b).

At the 6-month follow up examination, the tooth was asymptomatic with a radiographic indication of

continued development of the apex of the tooth with complete resolution of the periapical radiolucency (Fig 2c). At 1-year follow-up, the tooth continued to be asymptomatic and functional. A tendency towards apical closure and dentinal wall thickening was evident in addition to attainment of root length (Fig 2d).

## Discussion

The three important principles of regenerative procedures are root canal disinfection, creation of protein rich scaffold and prevention of reinfection by creating a bacteria tight seal<sup>2</sup>. It is necessary to attain maximum disinfection of the root canal for a successful outcome of this procedure. The mechanical disinfection of the root canal is not possible because instrumentation is contraindicated in this procedure to avoid the possibility of fracture on the thin root dentinal walls<sup>3</sup>. Hence the procedure usually starts with a chemical disinfection using various root canal irrigants and root canal medicaments. Different concentrations of NaOCl [1.25-5.25%], chlorhexidine [CHX] 2%, 0.12% or a combination of NaOCl with either CHX or hydrogen peroxide have been used for this purpose<sup>2</sup>. However it was reported that the usage of CHX is detrimental to stem cells and can interfere the attachment of dental pulp stem cells [DPSCs] to the dentinal walls.<sup>4</sup> Hence in this case, CHX was not used as an irrigant. Trevino et al<sup>5</sup> suggest that final irrigation with Ethylene diamine tetra acetic acid [EDTA] might enhance the outcome of revascularization procedure by optimizing the condition for cellular differentiation, tissue formation and regeneration.

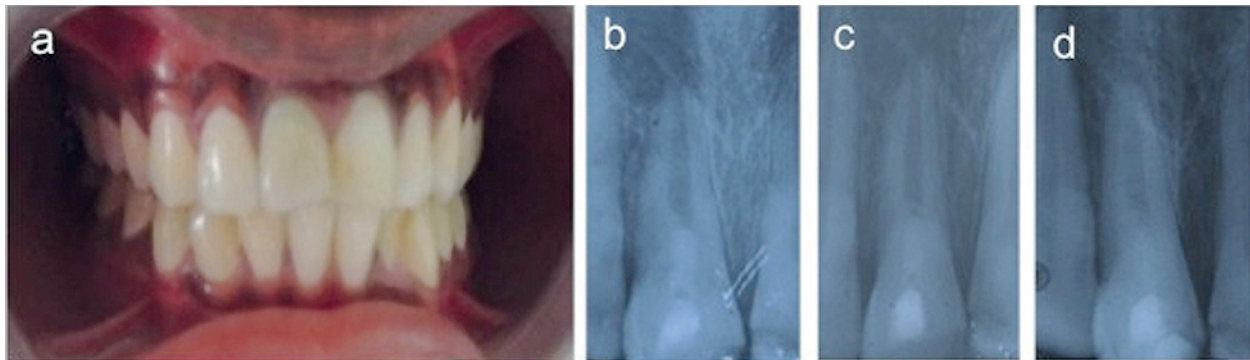


Fig. 2: (a) Photograph showing tooth #11 with composite restoration immediately after the treatment. (b) Long cone periapical radiograph of tooth #11 immediately after the treatment. (c) 6-month follow-up radiograph showing complete resolution of the periapical radiolucency and thickening of the root canal walls. (d) 1-year follow-up radiograph showing increased root length and formation of apical barrier.

In addition to these irrigants various intracanal medicaments were also used to attain optimal canal disinfection. TAP, Modified TAP, Bipaste [BP], Calcium hydroxide [CaOH] and Formocresol are some of the used variants<sup>6</sup>. A combination of amoxicillin and clavulonic acid [Augmentin]<sup>6</sup> has also been proposed. The TAP, also known as Hoshino's paste was used in this cases as the intra canal medicament. The potential disadvantage of TAP is the possibility of crown discoloration due to the presence of Minocycline. The use of MTAP which contains Cefeclore instead of Minocycline or BP which contain Ciprofloxacin, Metronidazole are done to prevent the discoloration<sup>2</sup>. Coating of dentinal tubule with a dentine bonding agent or placing a root canal projector are other methods of preventing discoloration<sup>2</sup>. More over, the promotion of antibiotic resistance to some root canal bacteria, precipitation of allergic reaction in sensitive patient or inducing sensitivity in patient who has never been sensitive<sup>7</sup> are other areas of concern in relation to the usage of TAP. Studies reported the use of CaOH as a medicament in TAP sensitive patients<sup>6,8</sup>. In contrast, Huang et al<sup>4</sup> reported that the use of CaOH could result in an uncontrolled calcification of root canal, which is an unfavorable outcome of revascularization procedure. But it is claimed that by placing CaOH strictly in the coronal third can reduce its harmful effects. Furthermore, it might enhance the successful outcome of revascularization procedure<sup>8</sup>.

Scaffolds are used in regenerative procedures to provide a framework through which the cells and vasculature can grow<sup>9</sup>. In this case, bleeding was induced into the canal to create a blood clot, which can act as a scaffold. However, the induction of

bleeding is not always predictable. The chances of clot formation within the canal can be reduced by the use of either CaOH as a medicament or a local anesthetic, which contain any vasoconstrictors.<sup>1</sup> Recently, efficacy of platelet rich plasma [PRP]<sup>10</sup> and platelet rich fibrin [PRF]<sup>11</sup> as scaffold material were reported and authors claimed that the content of growth factors are more in PRP and PRF when compared to the blood clot. Major limitations of PRP and PRF are the need of blood draw in young patients, and therefore the need of special equipment<sup>12</sup>.

Prevention of reinfection is of utmost importance to attain a successful outcome. A tight coronal seal is needed in order to achieve this. Banch & Trope<sup>13</sup> recommended MTA with a GIC restoration over it and termed it as a double seal. In this case a triple seal was used, suggested by Kottoor & Velmurugan<sup>2</sup> which contains MTA, GIC, and a final composite restoration over the GIC restoration affirming the attainment of a highly tight coronal seal. Placement of MTA was a difficult task in this procedure. To make this step easier Jung et al<sup>3</sup> described the usage of Colla Tape as a matrix against which the MTA can be condensed. According to Petrino et al<sup>14</sup> Colla Plug has a handling property superior to the Colla Tape and can act as a better matrix for MTA placement.

The main limitation of root canal revascularization procedure is lack of definite protocol. Recently American association of endodontists (AAE) put forward some considerations regarding this procedure<sup>9</sup>. Checking the vitality of revascularized tooth is another issue in this procedure. Torabinejad et al<sup>10</sup> report the presence of thermal and electrical stimuli and a normal laser doppler flowmetry reading in a revascularized tooth and also stated that the presence of a thick

coronal restorations can prevent the stimulation which make the tooth unresponsive to the stimuli.

There is little information regarding the histology of revascularized teeth. Wang et al,<sup>15</sup> reported that the hard tissue newly formed on the dentinal wall resembled cementum but with different organization and maturation of collagen matrix and termed as intracanal cementum like tissue and lumen was filled with bone like tissue which was termed as intracanal bone like tissue and the soft tissue formed is a pulp like tissue without odontoblast.

## Conclusions

The exact science behind this procedure is still elusive. A number of long-term case reports with detailed and dedicated analysis are required to understand and improve on the shortcomings of this method. The goal of determining a clear cut protocol to define the best disinfection strategy and ideal scaffold material which contain the exact amount of growth factor required for stem cells to grow and differentiate is yet to be accomplished. Achieving this will make revascularization a gold standard treatment for immature permanent teeth with pulpal necrosis.

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# Retreatment of a three rooted maxillary second premolar

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## Introduction

The myriad of possible variants for the radicular anatomy and morphology demands that the clinician must always look for the missing or extra canals. This is especially so in retreatment cases. And for the clinician thorough knowledge of the root canal space anatomy is a basic pre-requisite for the successful completion of endodontic treatment<sup>1</sup>.

According to Ingle, one of the most important causes of endodontic treatment failure is incomplete obturation of the root canal system. Therefore, the correct location, cleaning, shaping and obturation of all canals are indispensable procedures in root canal treatment<sup>2</sup>.

Studies on maxillary premolars show a low incidence of three root canals. Maxillary second premolars usually have one root with one or two root canals. Vertucci<sup>3</sup> reported the occurrence of one canal at the apex at 75% of the cases and two canals at the apex at 24%. In the same study, Vertucci found maxillary second premolars with three canals at the apex to be only 1% where as Pecora et al<sup>4</sup> reported 0.3% of such cases. This clinical case describes a maxillary second premolar with three roots and three canals- two buccal and one palatal- with distinct apical foramens.

## Case report

A 24 year old male patient reported to the Department of

## Abstract

Maxillary second premolars usually have one root with one or two root canals. Variations in the radicular anatomy and morphology of these tooth demands that the clinician must always look for the missing or extra canals. Failure of root canal treatment can occur due to missed root canal and the same is often diagnosed when patient experiences post-operative pain and discomfort. This clinical case describes retreatment of a maxillary second premolar with three roots.

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Conservative Dentistry and Endodontics with complaint of pain in relation to upper left premolar since last 3 days. Patient gave a history of root canal treatment of that tooth, done one month back from a private clinic. On examination there was a temporary filling on 25 and the tooth was tender. Diagnostic IOPA revealed two incompletely obturated root canals and a possible complex radicular anatomy, with the presence of a faint outline for a third root. Both mesial and distal shifts IOPA of the particular tooth were taken, and the presence of three roots- mesiobuccal, distobuccal and palatal were confirmed. Mesiobuccal was left unobtured.

Retreatment of 25 was planned. Local anaesthesia was given and the tooth was isolated with rubber dam. Temporary filling was removed and access cavity refined. Methylene blue dye was applied and the access

cavity was visualized under dental operating microscope 12.5X (SEILER). Mesiobuccal canal orifice was identified. Vital pulp tissue was found in the mesiobuccal canal. Gutta percha was retrieved from the distobuccal and palatal canals using Endosolv E and H-files. Working length was determined (mesiobuccal -17.5mm, distobuccal -18.5mm & palatal-19mm) and the canals were then cleaned and shaped using crown-down technique till apical size 30. 5% sodium hypochlorite was used as irrigant followed by saline. Final irrigation was done with 2% chlorhexidine. The canals were then dried with paper points and calcium hydroxide was placed inside the canals as intracanal medicament. Temporary restoration was given and occlusion was relieved.

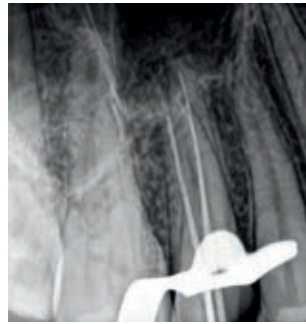
The patient was recalled after 1 week. The tooth was found to be asymptomatic, and the canals were dry. Master cone IOPA was taken

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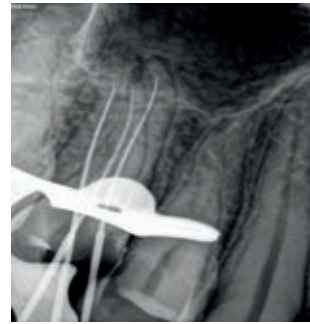




Pre operative



Master cone



Working length



Post operative

and the canals were obturated using lateral condensation technique. Access cavity was sealed with amalgam.

## Discussion

Success rate of root canal procedures are reported to be 30- 98 %<sup>5</sup>. A failed root canal treatment is suspected when there are symptoms like tooth pain and tenderness or swelling. Missed canals are one of the main reasons for the endodontic treatment failure. And this usually happens when a tooth has more root canals than normally anticipated. Methods to locate the missed canals include radiographs, dyes, champagne bubble test, ultrasonics, dental operating microscope, computed tomography, cone beam computed tomography<sup>6</sup> etc. It is reported that CBCT offers one of the best result in locating missed canals and canal variations<sup>7</sup>. Considering the rather high cost, it is beyond the reach of most of the clinics in our country. The same goes true in case of dental operating microscope also. In the present case, extra canal was identified with DOM along with dye. In the absence of DOM, magnifying loupe may be of great help in locating the canals. In cases where unusual root morphology is suspected, multiple radiographs with different angulations are a must. In this case mesial and distal shift radiographs employing SLOB technique helped in identifying the third root.

Studies on maxillary premolars show a low incidence of three root canals. Even then, it is prudent from the clinician's side to anticipate extra canals in all the cases. Variations in pulpal anatomy must be always considered before beginning treatment, and the appropriate diagnostic technique must be employed to identify possible canal variations<sup>8</sup>.

The shape of the pulp chamber and dentinal map will provide valuable clues to the root canal anatomy. In the present case, a lack of proper study of the diagnostic radiograph during the initial root canal treatment might have led to the eventual treatment

failure. And it appears that there was also a failure during the initial root canal treatment in identifying the rather unusual pulp chamber shape which was more of a 'T' shape than the expected oval shape<sup>9</sup>.

## Conclusion

Thorough knowledge of the normal root canal anatomy and its variations are of utmost importance before attempting root canal treatment. The incidence of three rooted maxillary second premolar is very less, but such variations should be expected and ruled out with proper radiographic evaluation and examination of the dentinal map in the floor of the pulp chamber. Complete debridement of the entire canal system and three dimensional obturation is the key to successful endodontic treatment.

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# Unilateral coronal craniosynostosis

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## Introduction

Unilateral coronal craniosynostosis is the second most common unilateral single craniosynostosis occurring in approx 1:10,000 births with features of ipsilateral fronto-orbital bar recession, whereas the contra-lateral fronto-orbital bar and frontal bone are more ventral, leading to facial deformity and increased intra cranial pressure due to inability of brain to grow properly due to premature fusion of coronal sutures. Management requires initial decompression and remodeling of fronto-orbital region for facial deformity correction. Frontal plagiocephaly, a rare congenital deformation of the skull, is one of the most complicated forms of craniosynostosis to treat. The difference between deformational and synostotic frontal plagiocephaly is small. Moreover, the visible deformations are sometimes misleading and may lead to a treatment delay. A multi slice CT scan with 3D reconstruction is the preferred diagnostic tool to differentiate between craniosynostosis and deformational causes of plagiocephaly.

## Case report

A 1 year old child brought to our department of Oral and Maxillofacial Surgery, Mar Baselios Dental College with complaint of facial asymmetry.

## Abstract

Craniosynostosis is the premature fusion of one or more of the cranial sutures and occurs in roughly 1 in 2,000 live births (Cohen, 1986). Unilateral or bilateral fusion of the coronal suture is the second most common form of craniosynostosis and accounts for 20–30% of all craniosynostosis cases and has an estimated incidence of 0.8–1.0 in 10,000 live births (Hunter and Rudd, 1977; Lajeunie et al., 1995). Fusion of the coronal suture may be observed as one characteristic of numerous syndromes or as an isolated condition. The diagnostic phenotype of coronal craniosynostosis in infants is dysmorphology of the craniofacial complex (Fig. 1), confirmed by radiographic evidence of a closed suture. This study focuses on preoperative nonsyndromic isolated unilateral coronal synostosis (UCS). Here we present a case of unilateral coronal craniosynostosis of a one year old infant with right coronal craniosynostosis with all typical features. Suturectomy was carried out at the age of one year for functional correction.

**Key words-** Craniosynostosis, Plagiocephaly Bicoronal Flap, Suturectomy

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## Clinical presentation

Patient had flattening of forehead on right side, orbital dystonia and superior positioning, asymmetry of nasal bone, hypoplasia of zygomatic bone on right side, deviation of chin towards left side, frontal region was more deformed than occipital region, contra lateral brow bossing, there was less marked protrusion of right occipital region. There was facial asymmetry on the right side involving eyes, brows and cheeks (Fig 1)

## Radiographic presentation

Computed tomographic study of brain and skull showed evidence of plagiocephaly with fusion of the right coronal suture and there was remodeling of the brain parenchyma due to the skull vault morphology (Fig 2).

## Management

Our surgical team involved neurosurgeon, craniofacial surgeon, pediatrician and neuroradiologist.

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Fig 1

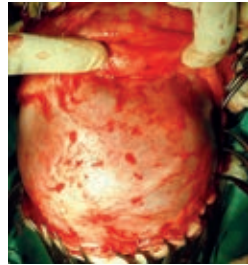


Fig 2



Fig 3

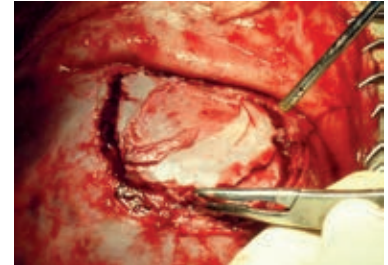


Fig 4

After taking in consideration the function, future growth and development of craniofacial skeleton, we planned for initial suture release, decompression and fronto-orbital advancement as secondary procedure for correction of facial deformity, as patient's parents were not willing for the combined suture release and fronto-orbital advancement procedure.

Unilateral coronal and sagittal suterectomy was carried out under general anesthesia. Bicoronal flap is raised exposing the calvarium and frontal region. The suterectomy site is marked; the periosteum is removed from the suterectomy site to delay the bone forming at surgical gap created. Suterectomy is done and 1.5 cm bone is left around the gap. Bone flap is taken, shaped and placed back with using nylon suture passed through the bone flap and dura for stabilization (Fig 3-7).

Post operative period was uneventful and patient was kept under regular follow up. Stage two surgery involving fronto-orbital advancement is being planned for correction of frontal and orbital deformity correction after assessing the deformity on a later date.

## Discussion

Virchow<sup>1</sup> in 1851 used term craniosynostosis to describe the premature closure of cranial sutures which leads to the cessation of growth perpendicular to the line of the suture, but not parallel to it. Since Rudolf Virchow attributed plagiocephaly to unilateral stenosis of the skull sutures, the term has been commonly used in relation to craniosynostosis<sup>2</sup>. Synostotic anterior plagiocephaly (coronal synostosis) has been referred to in the literature as “plagiocephaly”, “frontal plagiocephaly”, “unilateral coronal synostosis” and “anterior plagiocephaly”. The classic theory, known as Virchow's law, states that premature fusion of a cranial vault suture results in limited development of the skull perpendicular to the fused suture and a compensatory “overgrowth” through the sutures that remain open<sup>3</sup>. The hypothesis remain unchanged for

nearly 100 years till Van der Klaauw in 1948 and Moss in 1959 came with functional matrix theory proposing cranial base is the source of abnormal stress which leads to early fusion of sutures. Marsh and Vannier with their clinical observation following cranioplasty in individuals with sutural craniosynostosis where the surgery altered only the cranial vault structures while previously developed cranial base abnormality were ameliorated<sup>4</sup>. Opperman, Ogle, Longaker et al demonstrated development and biological abnormality in premature closure of sutures. Both performed strip craniotomy for fused sutures in young infants<sup>5,6</sup>. Tessier's recommendation includes wide exposure, intracranial approach to correct the facial deformity, liberal and exclusive use of autogenous bone grafts and reliance on rigid fixation<sup>7</sup>.

The majority of known genetic causes of craniosynostosis are mutations in the genes encoding fibroblast growth factor receptor types 1–3 (*FGFR1*, 2 and 3); other significant genes are *TWIST1* and *EFNB1*<sup>8</sup>. Plagiocephaly (unilateral coronal synostosis) is second most common unilateral synostosis occurring in approx 1:10,000 live births<sup>9,10</sup>.

Craniosynostosis can be divided via several different classification schemes, each of which can prove useful in separating various etiologies. Kimonis et al., classified craniosynostosis depending on the number of sutures that fuse prematurely, craniosynostosis cases can be simple (1 suture) or complex (2+ sutures).

If craniosynostosis occurs due to an intrinsic suture defect, it is termed primary craniosynostosis, while craniosynostosis resulting from another medical condition is designated as secondary craniosynostosis. Finally, depending on whether craniosynostosis is accompanied by other anomalies, it can be labeled as isolated or syndromic. Cohen, 1993; Cohen&MacLean2000; Commonly affected sutures in craniosynostosis, ranked from most to least frequent, are the sagittal, coronal, metopic, and lambdoidal sutures



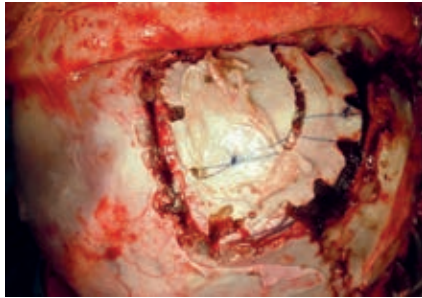


Fig 5

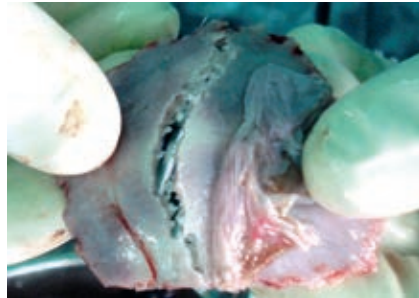


Fig 6

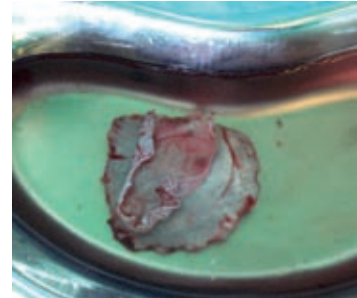


Fig 7

Whitaker and associates<sup>11</sup> classification according to the need of surgery:

*Category I:* no refinements or surgical revisions considered advisable or necessary.

*Category II:* soft-tissue or lesser bone-contouring revisions advisable apt to be performed on an outpatient basis or requiring a maximum of 2-day hospitalization.

*Category III:* major alternative osteotomies or bonegrafting procedure advisable, i.e., orbital repositions, onlay bone grafts, being these procedures not so extensive as the original operations.

*Category IV:* a major craniofacial procedure advisable, duplicating or exceeding the original operation.

Unicoronal synostosis is characterized by a fused coronal suture. The ipsilateral frontoorbital bar is recessed, whereas the contralateral fronto-orbital bar and frontal bone are more ventral. These conditions are the result of secondary deforming changes that occur because of the closed suture. When anteroposterior growth is restricted across the closed coronal suture, compensatory changes take place along the contra lateral suture. The fused suture also restricts the growth of the sphenoid bone, resulting in a reduction of the anteroposterior dimension of the anterior cranial fossa. Consequently, the anterior endocranial base deviates toward the ipsilateral side. Similarly, the ectocranium also deviates to the ipsilateral side. If uncorrected, deviation of the face and an occlusal cant may result. The posterior cranial base, however, remains unaffected. The roof of the orbit, formed by the greater wing of the sphenoid, is raised such that the shape of the ipsilateral orbit becomes more vertical compared with the more horizontal orbit on the contra lateral side. Infant will have flattening of forehead on affected side, orbital dystonia and superior positioning of eye, asymmetry of nasal bone, hypoplasia of zygomatic bone on affected side, deviation of chin towards opposite side. Frontal region

will be more deformed than occipital, contra lateral brow bossing, there was less marked protrusion of affected occipital region. There was facial asymmetry on the affected side involving eyes, brows and cheeks. Functional abnormalities are due to the combination of a rapidly expanding brain and diminished intracranial volume secondary to the restricted cranial growth may result in increased intracranial pressure (>15 mm Hg) with negative neurologic consequences. 14% of children with untreated single-suture craniosynostosis demonstrate increased intracranial pressure<sup>12,13</sup>. When two or more sutures are fused, the likelihood of elevated intracranial pressure increases to 42%. Children with untreated craniosynostosis who develop increased intracranial pressure may exhibit several neurologic changes, including headaches, vomiting, sleep disturbances, feeding difficulties, behavioral changes, and diminished cognitive functioning. Hydrocephalus is not usually observed in patients with nonsyndromic single-suture craniosynostosis, but it may occur independently and not necessarily as a consequence of this condition. In contrast, hydrocephalus is encountered in approximately 10% of children with multiple-suture craniosynostosis and may be seen in the craniofacial dysostosis syndromes<sup>14, 15, 16</sup>.

## Management

There are two primary objectives in the contemporary surgical management of nonsyndromic craniosynostosis: (1) the release of the involved (ie, fused) suture so that brain growth can proceed in an unrestricted fashion and (2) the reconstruction of all dysmorphic skeletal components so that a more anatomically correct shape is achieved. Early surgical techniques used to treat craniosynostosis involved only the removal of involved sutures via a “strip craniectomy”<sup>17,18</sup>. Generally, these limited craniectomy procedures would be performed by a neurosurgeon working independently. The theory behind this approach was that release of the suture would allow



unrestricted brain growth and that the expanding brain would adequately recontour the bones without the need for formal craniofacial reconstruction. The exact surgical plan is formulated based on the extent of the skeletal deformity, the suture or sutures involved, and the age of the patient at the time of diagnosis. An endoscopically assisted approach can be used to carry out a strip craniectomy for release of the involved suture(s) and creation of multiple “barrel-stave” Osteotomies within the cranial vault<sup>19,20,21</sup>.

The primary advantage of this technique is a much smaller surgical incision. Other described theoretical advantages of an endoscopic approach have included the elimination of blood transfusions, less morbidity, and decreased length of hospitalization. The main disadvantage encountered with the use of an endoscopic procedure is that the surgical maneuvers performed do not address the cranial or orbital dysmorphism. A wide range of recommended ages exists among pediatric craniofacial and neurological surgeons who routinely perform these procedures. Some surgeons advocate for a relatively “early” repair performed at approximately 3 to 6 months of age, whereas others postpone surgery until after 9 to 11 months of age<sup>22,23</sup>. Delaying the surgical procedure until approximately 9 to 11 months of age permits a greater proportion of the child’s cranial vault growth to occur before correction. This delay may translate into a more stable skeletal result with fewer postsurgical distortions related to subsequent growth. At this age, the bones are better ossified and harder, which results in less separation at suture lines (eg, fronto zygomatic suture) and easier placement of rigid internal fixation devices. Most residual cranial vault defects heal completely when surgery is performed during the first 2 years of life. When cranial vault surgery is undertaken between 2 and 4 years of life, complete healing of residual full-thickness defects is less predictable, and either immediate grafting or a secondary procedure for repair may be indicated. After age 4, it is unlikely that even small full thickness cranial vault defects will resolve without deliberate reconstruction or grafting at the time of the initial surgery.

**Fronto-orbital advancement procedure:** surgical assess is gained through the coronal incision, making the incision in the hair bearing scalp at the level of coronal sutures. Careful homeostasis should be achieved. Cutaneous flap is detached from the periosteum as far as supra orbital ridge and laterally on the temporal fascia on both sides. Periosteum is detached from the coronal sutures and temporal muscles borders. Muscle remains frontally flapped

allowing possibility of using it for covering or filling defect. Anterior portion of temporal muscle is detached subperiosteally from the temporal fossa. Osseous nasal pyramid is exposed past the nasofrontal suture. Eye capsule is detached from the orbital funnel; base of the palpebral ligaments has to be detached past the zygomaticofrontal suture as far as the lateral infraorbital border. Osteotomy lines are marked running nasofrontal suture to orbital funnel and from there along the roof of orbit to zygomaticofrontal suture, from here line curves up towards coronal suture making a retentive groove in the parietal bone. Same procedure is carried out in the opposite side and fronto orbital area is divided in frontal and orbital bone segments by horizontal cut running under the forehead bulge. Frontal bone is separated by creating several holes using trephine, dura is undermine and detached using different rasps. Osteotomy is done to around the frontal bone encircling it and completely detaches dura so that the whole segment can be removed. Now a clear assess is obtained for intracranial region. Detach the frontal lobes and anterior pole of the temporal lobes epidurally from bone.

Orbital osteotomy cuts start from orbital funnel towards zygomaticofrontal suture to parietals area. Nasofrontal suture is opened extra cranially. Complete the cut intracranially by transecting sphenoid wing and orbital bone. Then moulding of the fronto-orbital bone segments is carried out according to defect and fixed with miniplates in the retentive areas, wires sutures or microplates can be used in frontal region. Temporal muscle is reattached and cutaneous galaea is repositioned and wound is closed.

## Conclusion

Treatment of Unilateral coronal craniosynostosis can be challenging surgical problem. Modalities of treatment vary widely depending on the state of craniosynostosis. Every case should be analysed clinically and radiographically to develop the proper treatment plan. Multidisciplinary team approach should be utilized to ensure successful outcome of the procedure.

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# Variant root canal anatomy of mandibular second molars: A clinical series

\* Dhanya Shaji, \*\* Shoba K., \*\*\* Sheena.P

## Introduction

One of the most important aspects in endodontics is a thorough knowledge of internal root anatomy. This aspect, together with a correct diagnosis and appropriate cleaning and shaping of the root canal system, will usually lead to a successful outcome. *Slowey* emphasized this fact by stating that root canal morphology was limitless in its variability and that clinicians must be aware that anatomic variations constitute an impressive challenge to endodontic success<sup>1</sup>. Undetected extra roots or root canals are a major reason for failure of root canal treatment<sup>1</sup>.

Human molars show considerable anatomic variation and abnormalities with respect to number of roots and root canals. *Weine* has stated that mandibular second molars may have more anatomical variations than all other molar teeth, excluding the third molars.<sup>3</sup> This is a case series reporting five variants of mandibular second molar that we have encountered and successfully treated in the department of Conservative dentistry & Endodontics, GDC Kottayam.

## Case reports

All the patients reported with the complaints of irreversible pulpitis and routine root canal treatment was initiated.

### Case 1:

This case focuses the typical and usual anatomy of the mandibular second molar which is with two roots; one mesial root and a distal root and the mesial root presents with 2 canals and distal with one canal. (fig 1)

### Case 2:

A 20 yr old female presented with the complaint of persistent sensitivity. Root canal presentation on opening revealed, 2 canals – 1 mesial and 1 distal symmetrically placed from the midline. Further exploration of the canals revealed that the two canals were joining at the apex. (fig 2) Canals were prepared with protaper file system and was obturated. (fig 3)

The Canal morphology can be classified under:

Weine's type I configuration and sub class Kartal & Cimilli Type 2a

### Case 3:

A 34 yr old female presented with the complaints of pain. Root canal presentation on opening revealed, 2 canals - 1 mesial and 1 distal canal. The periapical roentgenograph showed very narrow mesial canal with an abrupt termination 4 mm short of apex. (fig 4) On further exploration of the canals, it was found that the mesial canal joined distal canal before apical

termination. The canals were prepared with protaper file system and was obturated. (fig 5)

The Canal morphology can be classified under:

Weine's type II configuration and Subclass Kartal & Cimilli Type 2b

### Case 4:

A 19 yr old female presented with the complaints of pain. Root canal presentation on opening revealed, 2 canal orifices – 1 mesial and 1 distal. On instrumentation, it was found that the two roots were having single canal each. The periapical roentgenograph showed 2 roots with single canals parallel to each other and with independent exit. (fig 6) Canals were prepared with standard k files and was obturated. (fig 7)

The Canal morphology can be classified under: Weine's type I configuration

### Case 5:

A 36 yr old female presented with the complaints of pain. Root canal presentation on opening revealed, a single oval canal orifice in the midline. This was confirmed with the help of a periapical roentgenograph which also showed a single root with a single canal and a single exit. (fig 8) The canal was prepared with standard k files and was obturated. (fig 9)

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Fig:1 case 1: postobturation

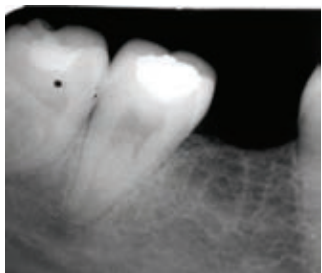


Fig 2. case 2: pre-op

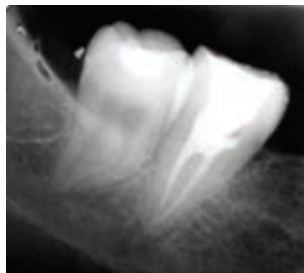


Fig 3 case 2: postobturation

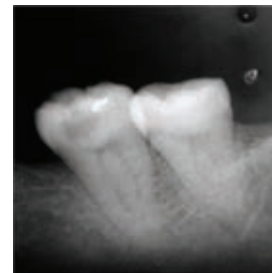


Fig:4 case 3 : preop



Fig 5 case 3: postobturation



Fig 6 case 4: pre-op



Fig 7: case 4: postobturation

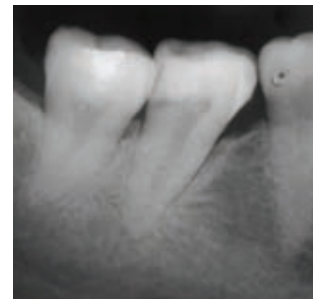


Fig:8 case 5 :preop

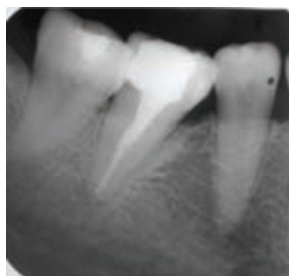


Fig 9 case 5: postobturation

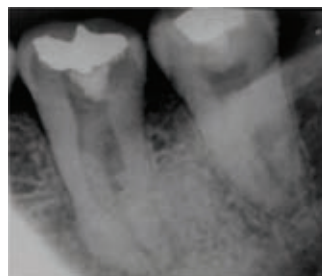


Fig 10 case 6: pre-op

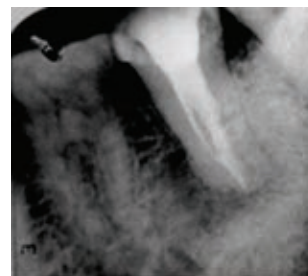


Fig 11 case 6: postobturation

The Canal morphology can be classified under: Weine's type I configuration

### Case 6:

A 36 yr old male presented with the complaints of pain. Root canal presentation on opening revealed, a C-shaped canal running from mesiolingual to distolingual with a separate mesial canal. On exploration, all canals were found to exit through a single apical foramen. (fig 10) Canals were prepared and was obturated with thermoplasticized gutta percha. (fig 11)

The Canal morphology can be classified under: Melton's classification as Type 2, C2 configuration.

### Discussion

Anatomical variations and aberrant canal

morphology should always be expected as a frequent possibility rather than a rare entity. This was emphasized by Hess and Zurcher who stated that "a root with a tapering canal and a single foramen is the exception rather than the rule"<sup>2</sup>.

Various classification systems have been proposed for better understanding of these complex canal configuration systems. These include Weine's classification system which is the simplest and basic system, classification systems by Vertucci,<sup>4</sup> Gulabivala et al,<sup>5</sup> Sert et al, Kartal & Cimilli, Al-qudah & Awawdeh, Peiris et al ; all of which are essentially extensions and additions to the classic Weine's system<sup>3</sup>.

Research has shown that the anatomy of the mandibular molars requires attention because the number of roots and root canals is highly variable. According to Vertucci FJ<sup>7</sup>, the mandibular second



molar is similar to the first one, except that the roots are shorter, the canals are more curved and the rate of anatomical variations is different. Usual anatomy of the mandibular second molar is with two roots: one mesial and a distal one. They usually are separated, but sometimes can merge forming a conical root, with varying internal anatomy, and sometimes can have a C-shaped configuration. In some studies, it is shown that the mandibular second molar may submit three or four roots<sup>10-12</sup>.

Manning SA<sup>9</sup> examined mandibular second molar and found that in 22% of cases it shows a single root, 76% have two roots and only 2% have three roots. In the group of those with two roots, most of them present one or two canals in the mesial root, which is joined before apex, and one canal in the distal root. About 25% of the mesial roots have two separate canals from the pulp chamber to the apex. These teeth have the typical triangular shape of the pulp chamber floor. Very often, in 64% of cases, the mesial root has two canals, about 38% of type II, and type IV – 26%. In the distal root we commonly find one independent single root canal (type I, 92%), type II (rare, 3%), and type IV (4%).

### “C” shaped canals

It was first reported by Cooke and Cox in 1979 and the incidence ranges from 2.7% to 30%.<sup>6</sup> “C” configuration is mostly seen in mandibular second molar followed by other mandibular molars and maxillary molars respectively. It appears to be genetically determined and shows ethnic variation. When present, over 70% of individuals have this canal configuration bilaterally.

C-shaped mandibular molars are so named for the cross-sectional morphology of its root and root canal. The pulp chamber is a single ribbon-shaped orifice with a 180° arc or more, which usually starts at the mesiolingual line angle and sweeping around either the buccal or lingual to end at the distal aspect of the pulp chamber.<sup>11</sup> Below the orifices level, the root structure can be classified into two basic groups:

(1) those with a single, ribbon like C-shaped canal from orifices to apex and

(2) Those with three or more distinct canals below the usual C shape orifices

Melton (1991) has given the classification and

divided it into three main categories. Fan et al (2004) has later modified this classification with a few additions.<sup>3</sup>

Locating these root canal systems and their variations will allow clinicians to remove the entire pulp tissue, preventing failures like the incomplete instrumentation or filling of all root canals. For the success of endodontic treatment, it is necessary to detect all the canals, completely clean and then seal them with an inert filling material.

### Conclusion

Anatomical variations on the number of roots and root canals can occur on any tooth. The possibility of a variant canal must always be taken into account. The cases presented highlight the same, reminding us that during each endodontic treatment variations are to be expected and that they may alter the course of the endodontic treatment.

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# Piezocision – A new frontier in accelerated orthodontic treatment

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## Introduction

The number of adult patients seeking orthodontic treatment is increasing worldwide. A short treatment time and use of an aesthetic appliance has become a recurring request for this group of patients. Newer appliances such as clear brackets, lingual orthodontics & clear aligners have somehow fulfilled the aesthetic demands of adult patients. Another factor important to adult patients is the length of treatment time. In recent decades major attempts have been made to shorten the length of treatment. Significant acceleration in orthodontic tooth movement has been extensively reported following alveolar corticotomies<sup>1</sup> since the end of the 19th century. In the late 1990s the Wilcko brothers added the alveolar augmentation to the corticotomies and developed the Accelerated Osteogenic Orthodontics (AOO) procedure and claimed that the orthodontic treatment time could be reduced by 75% in the majority of orthodontic cases.<sup>2</sup>

An alternative approach has been introduced by Park et al<sup>3</sup> consisting of incisions directly through the gingiva and bone using a combination of blades and a surgical mallet. While decreasing the surgical time (no flaps or sutures; only cortical incisions), this

technique did not offer the benefits of bone grafting to increase periodontal support in the areas where expansive tooth movement was desired. In addition, highly aggressive use of chisels and mallets in maxilla lead to risk of benign paroxysmal vertigo.

In 2007, Vercelotti and Podesta introduced the use of piezosurgery, instead of burs, in conjunction with the conventional flap elevations to create an environment conducive to rapid tooth movement.<sup>4</sup>

In 2009 Dibart et al described a new minimally invasive procedure called Piezocision<sup>5,6</sup>. This technique combines micro-incisions limited to the buccal gingiva that allow the use of a piezoelectric knife to give osseous cuts to the buccal cortex and initiate the regional acceleratory phenomenon (RAP)<sup>7</sup> without involving palatal or lingual cortex. This procedure eliminates the extensive and traumatic surgical approach while maintaining the clinical benefit of a bone or soft-tissue grafting concomitant with a tunnel approach.

## Procedure

The surgery is performed under local anesthesia, a week following the placement of the orthodontic appliance. After local anesthetics application vertical interproximal incisions are made below the

interdental papilla using a number 15 blade. Incisions are kept as much as possible in the attached gingival except when made in the areas of bone grafting. These incisions must go through the periosteum, allowing the blade to come in contact with the alveolar bone.

Ultrasonic instrumentation (BS1 insert Piezotome™, Satelec Acteon Group Mérignac, France) is then used to perform corticotomy cuts through the gingival micro-incisions and to a depth of 3 mm. No suture is required except in areas where a bone graft is placed.

When the corticotomies are finished, the areas requiring bone or soft tissue augmentations are tunneled using a small periosteal elevator through the vertical incisions followed by grafting in the tunneled areas. Vertical incisions are then closed using a resorbable 5-0 suture. At the end of the procedure, the patient is placed on antibiotics, nonsteroidal anti-inflammatory drugs and mouthwashes containing chlorhexidine to allow normal gingival healing.

## Indication

Careful selection of cases is an important factor in the clinical success of the procedure. Most important criteria is that the patient should have a stable periodontal condition. Motivation and

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Fig 1 Vertical interproximal incisions made with no.15 blade

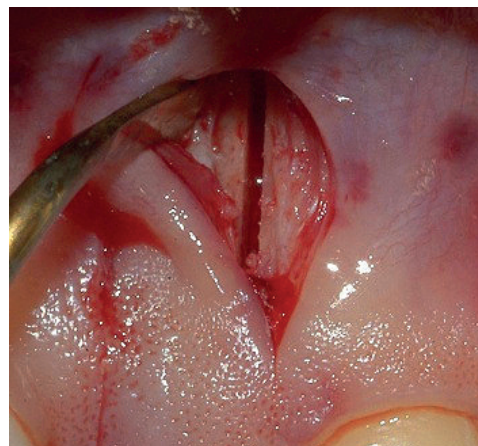


Fig. 2 Corticotomy cuts made with piezotome

cooperation of the patients are essential for the success of the treatment.

From an orthodontic standpoint, the ideal candidate for this procedure presents a class I or a mild class II associated with moderate to severe crowding. Severe deepbites are also corrected in a timely manner following Piezocision. When extractions are indicated, it is made during the piezo surgical procedure and two or three cortical incisions should be performed facing the extraction site to facilitate rapid closure of the space. Typically the graft is performed in case of severe crowding in mandibular anterior region.

Moreover, the procedure can be performed in a segmental manner (single arch or individual tooth) or be incorporated during pre surgical orthodontic procedure allowing for rapid decompensation of the arches prior to moving skeletal bases by orthognathic surgery.

#### Advantages and Limitations of the Procedure

The major advantage of the procedure is it is shorter to perform, minimally invasive and much less traumatic for the patient. Also, the active treatment times are therefore three times shorter than those usually observed after conventional treatment of similar malocclusion. When combined with bone grafting procedure, Piezocision allows non extraction treatment for severe crowding. Postoperative pain is usually minimal and well tolerated by patients.

Major limitation of piezosurgical procedure is the risk of root damage particularly in areas of close root proximity because of the cortical incisions without muco-periosteal flap elevation. A risk also exists at the mental foramen. Extra care is also required as to the location of gingival incisions. It is very important to keep at least 2 mm from the gingival margin to avoid

the formation of gingival clefts. In patients with ethnic gingival pigmentation gingival incisions may be a cosmetic concern.

#### Discussion

Length of treatment time is an important factor for adult patients. In recent decades major attempts have been made to shorten the length of treatment. These techniques include rapid distraction of the canines and corticotomy-facilitated orthodontics. In the late 1990s, Wilcko brothers added the alveolar augmentation to the corticotomies and developed the Accelerated Osteogenic Orthodontics (AOO)<sup>8</sup> procedure and claimed that the orthodontic treatment time could be reduced by 75% in the majority of orthodontic cases.

In 1981, the orthopedist Frost observed that a surgical wounding of the bone induces an increased bone turnover and a decreased bone density in the immediate surrounding of the surgical site (RAP, Regional Acceleratory Phenomenon). RAP is transient, but continuous mechanical stimulation of the teeth would prolong the osteopenic<sup>9</sup> effect induced by the procedure. Hence, it is imperative to see the patient and adjust the orthodontic appliance every 2 weeks. Also it is important to emphasize that higher forces are applied to the teeth as compared to conventional orthodontic treatment to maintain mechanical stimulation of the alveolar bone and the osteopenic state, allowing rapid treatment.<sup>10</sup>

Possible risks of corticotomy procedures include potential damage to teeth and bone, potential marginal osteonecrosis risk, and impair bone regeneration<sup>11</sup>. Piezoelectric incisions are now recommended because of their safety and effectiveness in different type of

surgeries. Piezoelectric knife has micrometric and selective cut so there is no damage on bone tissue and no impact on soft tissue and blood supply. Adding a bone graft to the technique has allowed an increase in alveolar volume and enhancement of the existing periodontium. These physical modifications have proven to be beneficial in several ways: increased stability of the clinical outcomes (less orthodontic relapse), increased scope of malocclusion correction (at times, avoiding orthognathic surgery), and reduced active orthodontic treatment time.

Piezoelectric incisions recently have been reported to be safe and effective in osseous surgeries, such as preprosthetic surgery, alveolar crest expansion, and sinus grafting.

The Piezocision demonstrated similar clinical outcome when compared to classic decortication approach but has the added advantages of being quick, minimally invasive, and less traumatic to the patient. It takes typically 1 hour to complete both arches as compare to 3 to 4 hours with earlier methods. This technique is quite versatile because it allows soft-tissue grafting at the time of surgery to correct mucogingival defects if needed, as well as bone grafting in selected areas by using localized tunneling.

## Conclusion

Piezocision is an innovative, minimally invasive flapless procedure combining piezosurgical cortical incisions with selective tunneling that allows for bone or soft-tissue grafting. This procedure allows treatment of severe malocclusions in a short period without the disadvantages of the traumatic surgical procedures for accelerating orthodontic procedures. Piezocision

proves to be a efficient tool in the hands of multidisciplinary dental team for treatment of adult patients.

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# Bacterial replacement therapy in periodontics – Guided periodontal pocket recolonisation

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## Abstract

The complexity of the periodontal micro biota resembles that of the gastro-intestinal tract, where infectious diseases are treatable via probiotics. Probiotics, re-populate the beneficial bacteria which can help kill pathogenic bacteria and fight against infection. Periodontitis is essentially a microbial disease and conventional treatment of periodontitis involves mechanical subgingival debridement, which results in good reduction of the total subgingival micro biota. However, recolonization toward pre-treatment levels, primarily by bacteria less strongly implicated as periodontopathogens, occurs within weeks, and re-establishment of a more pathogenic micro biota occurs within months. Given the risk of side-effects associated with altering the host response, treatment of periodontitis mainly focuses on the reduction of the bacterial threat. So the application of selected beneficial bacteria, as an adjunct to scaling and root planing, would inhibit the periodontopathogen recolonization of periodontal pockets. Guided Pocket Recolonisation seems to afford greater long term benefits than systemic and continual removal of plaque by patients who have been sent to life on supportive therapy. The article describes on the concept of Guided Pocket Recolonisation with probiotics and its future in periodontal therapy.

**Key words-** Guided Pocket recolonisation, probiotics, bacterial replacement therapy

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acid producing bacteria had long lives. He referred to this bacterium as Bulgarian bacillus. Later it was found out to be lactobacillus and it was also the first probiotic species to be discovered. From Metchnikoff's time to the present probiotics have evolved beyond just fermented dairy products. Many products in the form of tablets capsules and powder forms are available. Use of probiotics in oral diseases is significant because of the similarity of oral flora with gut flora.

Bacterial replacement therapy

Also known as *bacteriotherapy*, the history of replacement therapy dates back to 1877, when Pasteur and Joubert noted suppression of anthrax bacillus growth in co-cultures with 'common bacilli' (probably *Escherichia coli*) and they commented that this "offers the highest hopes for therapeutics"<sup>1</sup>. When more than one type of bacteria colonise a particular ecosystem possibility exists that bacteria may interact which may be beneficial or harmful. One microorganism may prevent or delay the growth and colonization of another member of the same group. This is known as bacterial interference. The concept of both probiotics and bacterial replacement therapy are based on bacterial interference. The basis of

## Introduction

The individual bacterial members of our indigenous microbiota are actively engaged in an unending battle to prevent colonisation and overgrowth of their terrain by competing microbes. Some of them might have pathogenic potential for the host. Humans have long attempted to intervene in these

bacterial interactions. The concept of harnessing bacteria for health benefits has a long history. The invention of probiotics dates back to early 20th century and Eli Metchnikoff is considered as the father of probiotics. He was a Russian Nobel laureate and professor at Pasteur institute in Paris. He observed that Bulgarians who drank milk fermented by lactic-

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Table I

<b>Mechanism of Action</b>
<b>DIRECT INTERACTION :</b>
1. the beneficial organism interacts directly with the disease-causing microbes, making it harder for them to cause the disease
2. Production of antimicrobial substances against pathogens - lactic acid, hydrogen peroxide, biosurfactants, bacteriocins and bacteriocin-like inhibitory substances (BLIS).
<b>COMPETITIVE EXCLUSION:</b> Competition for essential or growth promoting nutrients or by altering the environmental pH and oxidation reduction potential.
<b>ALTERATION OF HOST IMMUNE RESPONSE</b>

bacterial replacement therapy is implantation and persistence of relatively innocuous 'effector' bacteria within the normal microbial flora that can competitively exclude or prevent the outgrowth of potentially disease causing bacteria. This concept could be used to prevent or cure many bacterial diseases including oral diseases<sup>1</sup>.

Periodontitis is essentially a microbial disease. According to the current concepts of aetiology of this disease by Slots and Rams there are three main factors that determine the progression of the disease : 1. Susceptible host 2. Presence of pathogenic bacteria 3. Absence or small proportion of beneficial bacteria.<sup>2</sup> As it is difficult to alter the host response, conventional treatment mainly focuses on reduction of bacterial load, which is accomplished through mechanical and surgical subgingival debridement thus resulting in reduction of the total subgingival microbiota<sup>6</sup>. But then recolonization toward pre-treatment levels, primarily by bacteria less strongly implicated as periodontopathogens, occurs within few weeks<sup>3</sup>, and re-establishment of a more pathogenic microbiota occurs within a few months. Adjunctive use of local or systemic antibiotics and antiseptics improves the outcome of periodontal therapy only temporarily. So a lifelong need for retreatment arises. The application of selected beneficial bacteria, as an adjunct to scaling and root planning can inhibit the periodontopathogen recolonization of periodontal pockets and this form of bacteriotherapy can be used as a valid, non-antibiotic treatment approach for periodontitis.

For replacement therapy to be successful following prerequisites should be satisfied:

1. the effector organism must not directly cause

the disease or predispose the host to other disease states,

2. effector strain must prevent colonisation or outgrowth of the pathogenic strain to levels necessary for it to exert its pathogenic action and

3. effector strain should persistently colonise the host's tissue at risk.<sup>10</sup>

### **Guided periodontal pocket recolonization**

It is a form of replacement therapy where in Sub gingival application of beneficial bacteria after mechanical debridement is done. Some of the pioneers of this technique are Teughels, Newman, Haffajee and Quirynen. The beneficial bacteria used were selected because on their ability to prevent colonization of hard tissues and epithelial cells by periodontopathogens, and their ability to prevent other mucosal infections, including pharyngitis and acute otitis media in vivo.<sup>4,5</sup>

### **Mechanism of action**

One mechanism is by direct interaction where in the beneficial organism interacts directly with the disease-causing microbes, making it harder for them to cause the disease. This could be accomplished through production of antimicrobial substances against pathogens - lactic acid, hydrogen peroxide, biosurfactants, bacteriocins and bacteriocin-like inhibitory substances (BLIS). Another mechanism is through competition for essential or growth promoting nutrients or by altering the environmental pH and oxidation reduction potential. Yet another mechanism is alteration of host immune response<sup>6,7,8,9</sup>. (Table. I) There is not a single probiotic bacterium exhibiting all these properties, so mixtures may need to be used.

### **Technique**

Experiments were conducted in beagle dogs. Bony defects were created surgically prior to the experiment, and after scaling and root planning pure, unsuspended, mixed bacterial pellets consisting of *S. sanguis*, *S. mitis*, *S. salivarius* were locally applied in the designated periodontal pockets by injection with a blunt needle. Results showed that there was significant reduction in probing pocket depth, bleeding on probing and gain in attachment. Microbiological parameters also showed that there was lesser tendency for re-emergence of anaerobic bacteria<sup>4</sup>.

Another animal study using the same bacterial mixture showed significant improvement in jaw bone

density and alveolar bone gain in periodontal pockets that received beneficial bacteria as an adjunct to scaling and root planing<sup>5</sup>.

## Conclusion

Given the emergence of antibiotic resistance and the lack of nonantibiotic treatment options, this Guided Pocket Recolonization approach may provide a valuable addition or alternative to the armamentarium of treatment options for periodontitis. Also it offers a more targeted solution to pathogen control. Although probiotics related bacteraemia has been reported they are rare and is mostly seen with lactobacillus. Also how much reduction of pathogens occurs or to which proportion pathogens need to be reduced, it has not been quantified. More studies are required in this field as only animal trials are available as of now.

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# Solitary Plasmacytoma of Mandible

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## Introduction:

Solitary plasma cell myeloma is an uncommon disease which usually occurs between 40-60 years of age. Males are affected more frequently than females. Presenting signs and symptoms of patients with solitary myeloma affecting jaw are pain, swelling, pathologic fracture, numbness of the jaw, unexplained mobility of teeth and epulis formation.

Plasma cell neoplasms are a group of clinical disorders characterized by an uncontrolled monoclonal proliferation of plasma cells or plasma cell derived (stem cells and lymphoid cell line B) and, in the case of multiple myeloma by monoclonal overproduction of immunoglobulins in blood and/or detecting light chains in the urine as Bence Jones protein<sup>1-3</sup>. The incidence of these tumours is about 2.6-3.3 per 100,000 populations, being higher in blacks. The average age of presentation is in the sixth decade of life<sup>2</sup>. Localized forms of plasma cell neoplasms are solitary bone plasmacytoma (SBP) and Extramedullary Plasmacytoma (EMP), Multiple Myeloma (MM) is the disseminated type of this disorder<sup>1-5</sup>.

## Case Report

A 75-year-old male consulted the Department of Oral and Maxillofacial Surgery, Government Dental College, Kottayam with the complaint of a painful swelling in the left preauricular region of 1

## Abstract

Plasma cell tumours are lymphoid neoplasms with an uncontrolled proliferation of B cells. These are divided into localized forms (solitary bone plasmacytoma and extramedullary plasmacytoma) and disseminated forms (multiple myeloma). The solitary bone plasmacytoma is a rare and controversial disease. This article is based on the presentation of a 75-year-old man with a swelling in the left angle of mandible extending to the preauricular region on the same side. Radiographic examination revealed a radiolucent lesion in the mandibular angle region infiltrating into the masticator space. Histopathological examination confirmed the diagnosis of solitary bone plasmacytoma (SBP).

**Key words:** Mandibular tumours, plasma cell neoplasms, solitary bone plasmacytoma

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month duration for which he did not seek any prior medical treatment (Fig.1). Clinical examination revealed a firm, fixed mass measuring approximately 5 cm in its greatest dimension in the left preauricular region to the angle of the mandible. Neurologic examination of cranial nerves V and VII was found to be normal with no obvious skin changes. Intraoral examination showed a small erythematous swelling at the retromolar region extending to the anterior border of ramus (Fig.2). Dental hard tissue examination revealed poor periodontal status. Unhindered mouth opening was noted with an interincisal distance of 4.5 cm.

## Radiographic Examination:

PA view skull (Fig. 3) and panoramic radiograph showed an

ill-defined, multilocular, radiolucent mass in the left angle and ramus region of the mandible (Fig.4). Ultrasound of salivary glands revealed an extension of the lesion on the superficial lobe of left parotid gland, of size 5.8 cm in its greatest diameter with peripheral desmoplastic reaction. Doppler study was performed and failed to demonstrate any significant increase in vascularity. The Computerized Tomography (CT) showed a 6.5 x 5 x 6.7 cm destructive mass that extended from the posterior third of the mandibular body to the ramus with infiltration of the masticatory space and parotid gland (Figs 5). On the basis of clinical history and radiological findings a provisional diagnosis of a benign odontogenic tumour was made.

Aspiration cytology (Fig: 6) revealed singly scattered mononuclear and plasmacytoid

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Fig. 1: Facial photograph showing swelling of the left side of face.

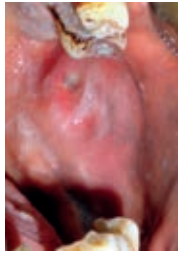


Fig.2: Intraoral view of the lesion.

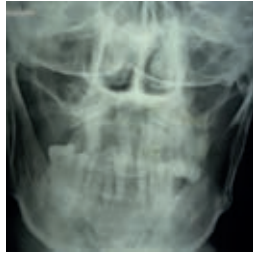


Fig.3: PA view skull radiograph showing osteolytic lesion at the left angle of the mandible.

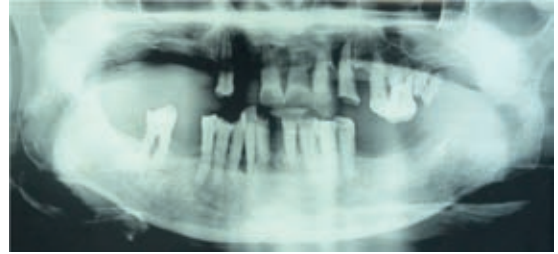


Fig.4: OPG showing radiolucent lesion without definite sclerotic margin involving left angle of mandible.

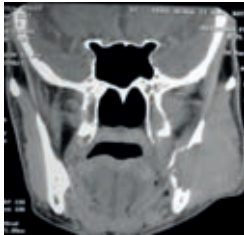


Fig.5: CT scan coronal cut at the level of ramus showing expansion and erosion of the lateral cortex of left ramus area.

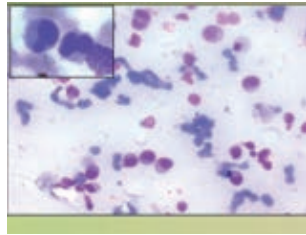


Fig.6: FNAC showing singly scattered mononuclear and plasmacytoid cells.

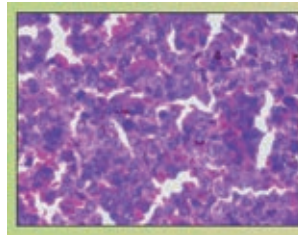


Fig.7: Histopathology slide showing sheets of plasma cells and plasmablasts, some plasma cells showing intracytoplasmic inclusions (Russell body).

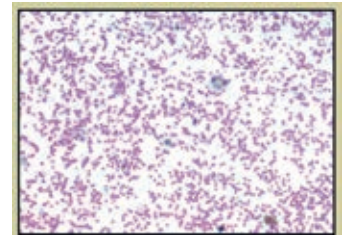


Fig. 8: Peripheral smear showing increased Rouleux formation.

cells showing binucleation, irregular, lobulated nuclei with anisonucleosis coarsely clumped chromatin and nucleoli in a background of blood. This was suggestive of Plasma Cell Myeloma with anaplastic features. Further an incisional biopsy was performed under local anaesthesia. The histopathology examination revealed sheets of neoplastic cells. Individual cells were small round to oval with an eccentrically placed round nucleus having uniformly dispersed chromatin (Fig: 7). Many cells showed intracytoplasmic inclusions called Russell bodies. This confirmed the diagnosis of solitary bone plasmacytoma. The skeletal survey showed lytic lesions in the calvarial bones. Laboratory investigations revealed anaemia (8g/dl), Hypercalcemia (12mg/dl) and renal insufficiency with elevated serum creatinine levels. Peripheral smear (Fig: 8) showed increased rouleux formation. Serum electrophoresis (Fig: 9) showed M band in  $\beta_2$  fraction. The results of bone marrow study (Fig: 10) revealed 70% atypical plasma cells which confirmed the diagnosis of solitary bone plasmacytoma. Patient was referred to Regional Cancer Centre Thiruvananthapuram for further management.

## Discussion:

Solitary Bone Plasmacytoma (SBP) is a localized malignant monoclonal gammopathy which constitutes approximately 3-10% of all plasma cell tumours<sup>1,2</sup>. The peak incidence is in the sixth decade of life with male-female ratio of 2:1<sup>1</sup>. The most common sites of SBP

are vertebrae, long bones and skull. It rarely involves the maxillofacial area. But when it occurs, it is mostly seen in mandible, especially in the bone marrow-rich areas like the retromolar trigone, angle and ramus<sup>4,5</sup>. Local clinical signs and symptoms are bone swelling, localized pain in the jaws and teeth, numbness and/or anaesthesia, bleeding, tooth mobility and possible bone fracture. Involvement of local mucosa or tissues may also be present. Fatigue or fever is the most common systemic symptom<sup>5-7</sup>. Radiographically, SBP is seen as a well defined unilocular or multilocular lytic lesion without periosteal reaction<sup>4</sup> or as a protruding mass with cortical expansion<sup>6</sup>. CT, MRI and more recently PET scan are useful to establish the characteristics of the lesion, tissues involved and to rule out other affected areas<sup>4,7</sup>. The earliest and most pronounced radiographic changes are the classic “punched out” radiolucencies in the skull, ribs, vertebrae, and pelvis.

Diagnosis is based on the presence of malignant proliferation of plasma cells in the biopsy, finally, histopathological examination of the affected bone aids in diagnostic confirmation. Histological features of SBP are sheets or clusters of atypical plasma cells with varying degree of differentiation.

These cells range in presentation from mature plasma cells to those exhibiting different degrees of maturity from undifferentiated cells- similar to lymphoid precursors or intermediate forms between lymphocytes and plasma cells. There are three different

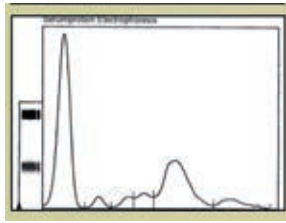


Fig.9. Serum electrophoresis M band in  $\beta_2$  fraction

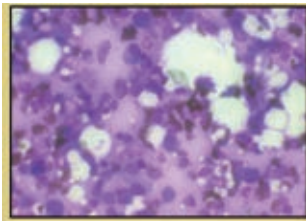


Fig.10. Bone marrow study showing Plasmacytosis (70%)

grades of differentiation which are linked to the survival rate<sup>5,8</sup>:

- 1) Low dysplasia, with less than 10% of plasmablasts
- 2) Moderate dysplasia, with 10-50% of plasmablasts, and
- 3) Severe dysplasia with 50% of immature forms and worse prognosis than the others. These cells are round or oval with eccentric nuclei, “cartwheel” chromatin pattern and acidophilic inclusions known as “Russell bodies”.

### Histopathology

All clinical forms of multiple myeloma and plasmacytic tumors present the similar histology. There is a monotonous proliferation of plasma cells showing varying degrees of differentiation but the plasmacytic nature of the cells is usually apparent with the eccentricity of the nucleus and clumped chromatin. Binucleated cells and some mitoses may be present although the latter are not numerous. The monoclonality of the infiltrate may be demonstrated by immunocytochemistry to demonstrate the presence of a single type ( $\kappa$  or  $\lambda$ ) of immunoglobulin light chain.

### Treatment of plasma cell myeloma

The primary treatment of SBP is radiation therapy, extensive radical surgery or combination of both<sup>8,10</sup>. Radical radiotherapy is the treatment of choice at doses of 40-50 Gy showing an index of local disease control of 80%. Surgical treatment is elective in those selected cases where total tumour is removed with minimal cosmetic or functional deficit or on those to prevent or stabilize a pathologic mandibular fracture.

The addition of chemotherapy to radiotherapy in the treatment of SBP has not been shown to decrease local recurrence or increase survival rates compared to local treatment with radiotherapy alone. Therefore it should be reserved for those cases progressing to multiple myeloma<sup>11,12</sup>. Currently, there is considerable interest in the role of angiogenesis inhibitors,

thalidomide, protease inhibitors or inhibitors of vascular endothelium growth factor in plasma cell neoplasms which could in future be an alternative treatment<sup>13</sup>. SBP have tendency to progress into MM in a period of few months to years. It is not possible to predict which case may transform into MM, although there are some risk factors such as:

- Age (> 60 years)
- M component levels > 20 g / L up to one year following radiotherapy
- Large tumour neovascularization and tumor size > 5 cm<sup>13,14</sup>.

Hence, following institution of proper treatment, the SPB patient must be placed under regular follow up<sup>1,2,5</sup>.

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# Surgical management of an oblique root fracture using MTA

\* Praveena G, \*\* Radhakrishnan Nair K, \*\*\* Arun M, \*\*\*\* Manoj C Kuriakose

## Introduction

Root fractures are generally transverse, vertical or oblique and they may be single or multiple and complete or incomplete. Oblique root fractures are relatively infrequent injuries, in which the root fracture is in a diagonal plane. Thus it acts as an unfavourable root fracture that owes to its poor prognosis.

## Case Report

A 27 year old male patient reported with the chief complaint of pus discharge in relation to upper left central incisor. The patient had a history of Road Traffic Accident 8 months back. Two upper front teeth (11 and 12) were lost. One upper front tooth (21) was slightly pulled out of the socket. The patient reported to a nearby private dental clinic and a fixed prosthesis was placed in relation to 13,12,11,21,22. One month after FPD insertion, he noticed pus discharge in relation to upper left central incisor. The patient then reported to conservative and endodontics department. On intra oral soft tissue examination, a small pus draining sinus tract in attached gingiva in relation to 21 was noticed, which was tender on percussion. Intra oral periapical radiograph of 21 showed wide root canal with a thin dentinal wall towards the apical third of the root. An oblique radiolucent line was seen in the apical third of root extending mesiodistally.

A diagnosis of Ellis Class VI fracture with associated Chronic Periapical abscess in relation to 21 was made. Root canal treatment was completed in 3 appointments with roll cone technique. After achieving proper anaesthesia, incision for Oschenbein- Lubke flap design was made on the attached in relation to 21. The fractured apical root fragment was removed. Root end preparation and retrograde filling with MTA (Angelus, Brazil) was done. The flap was gently placed back to its normal position and sutured.

Patient was recalled after 3 months and one year. On examination 21 was found to be asymptomatic with normal gingival contour. IOPA radiograph showed periapical area with no bone loss.

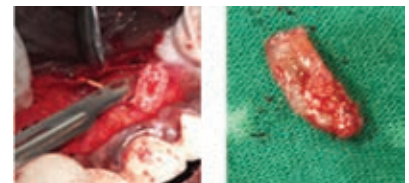
## Conclusion

Oblique root fracture has poor prognosis due to the greater area of exposure of the root canal system to the surrounding tissues. To remove the apical necrotic fragment and to attain a proper apical seal, surgical approach was chosen. Since an FPD was there in relation to 21; Oschenbein- Lubke Flap design was adopted. The compromised crown-root ratio that occurred after the removal of apical fractured segment was compensated by the splinting action of FPD. In this case MTA was used

as the retrograde filling material, which is a biocompatible material and it has the ability to create an ideal environment for healing. Here patient was followed-up for 1 year. Patient was asymptomatic and no signs of periapical pathosis was found.



Preoperative photograph and radiograph



Surgical removal of fractured root segment



Immediate Post-operative radiograph



One year post-operative clinical picture and radiograph

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# A peek into the recent diagnostic aids for periodontal diseases

\* Raju Kurien Ninan, \*\* Teenu Abraham, \*\* Devisree R.V. \*\*\* K. Nandakumar, \*\*\*\* Padma Kumar

## Introduction

Periodontal diseases are probably one of the most common bacterial infections in humans. When there have been significant advances in the understanding of the cause and pathogenesis of periodontal disease, the traditional methods by which clinicians diagnose periodontal disease have remained virtually unchanged. These traditional diagnostic tools such as assessment of probing depth and clinical attachment level have some significant shortcomings.<sup>2</sup> Hence researchers are working to develop techniques that would overcome some of these inadequacies.

## Assessment of Gingival Inflammation

Bleeding on probing (BOP) is an important indicator of gingival inflammation within the periodontal pocket. However, BOP is influenced by repeated probe insertions in a short time as well as by the use of excessive force (>25 N). Calor, or heat, another cardinal sign of inflammation and has been investigated as a diagnostic measure of periodontal status. Haffajee and colleagues made use of a periodontal temperature probe (Periotemp, ABIO-DENT, Inc, Danvers, MA, USA) to assess subgingival temperature and found that elevated mean subgingival temperature was related to subsequent attachment loss.<sup>3</sup>

## Microbial Testing

There are several methods for detecting bacteria in dental plaque. These include bacterial culture, immunologic assays, enzymatic assays, and molecular biologic techniques that detect bacterial DNA or RNA. Bacterial culture is the gold standard against which new microbial tests are compared.<sup>7</sup>

Immunologic methods use antibodies that target specific bacterial antigens. When the antibodies bind their antigen, the reaction can be visualized by techniques such as direct and indirect immunofluorescent microscopic assays, flow cytometry, and enzyme-linked immunosorbent assay. Immunologic techniques enable the identification and quantification (or semiquantification) of bacteria. Several putative periodontal pathogens such as Porphyromonas gingivalis, Tannerella forsythia, and Aggregatibacter actinomycetemcomitans possess in common a trypsin like enzyme that hydrolyzes a substrate N-benzoyl-DL-arginine-2-naphthylamide (BANA). Loesche and colleagues published a study comparing the BANA test to other methods of microbial testing and found that the BANA test had similar sensitivity as the other techniques that were evaluated.<sup>6</sup>

The BANA test is easy to perform chairside technique. Its limitations include its inability to distinguish between individual

bacteria, the ability to detect pathogens only when they are present in high numbers, and the fact that its diagnostic utility has not been validated in clinical trials. Recent chairside technique, Perioscan requires a plaque sample to detect the presence of enzymes capable of degrading N-benzoyl-DL-arginine-2-naphthylamide (BANA) from relatively few anaerobic periodontal pathogens. Another chair side technique, Periocheck assays the presence of neutral proteases in crevicular fluid. Immunological detection using evalu-site conjugates Polyclonal & monoclonal antibodies with fluorescent reporters to enhance the specificity & sensitivity.

## Biochemical Analysis as Part of Periodontal Diagnosis

Salivary and GCF diagnostics have proved to be beneficial for point-of care testing for oral disease and are least invasive of all diagnostic techniques. These systems use small sample and reagent volumes to detect and measure proteins, DNA, RNA, bacteria, electrolytes, and other molecules in saliva. New methodological approaches allow researchers to evaluate multiple salivary biomarkers including MMP-8, microbial factors, viruses and proinflammatory cytokines such as interleukin (IL) 1 $\beta$ , or IL-17 from a single saliva sample to predict disease.

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Prognostik (Dentsply) helps in detection of elastase & proteinase in GCF. Pocket watch and perio guard helps to detect aspartate aminotransferase through colorimetric detection. However, it is also clear that no single marker has been able to fulfil all the criteria necessary for assessment of the clinical state of the periodontium, and future research should be directed possibly at the production of “marker packages” As of now various efforts are on to develop an ideal test, but actual use as a chairside diagnostic is still illusive. Therefore the development of a wide spectrum of markers is the primary goal of periodontal research

## Genetic Testing

In 1997, Kornman and colleagues published a landmark study that found polymorphisms (interindividual differences in DNA sequences coding for 1 specific gene, giving rise to different functional and/or morphologic traits) in the gene for IL-1 to be a severity factor for periodontitis. A diagnostic test based on the carriage of the IL-1 polymorphism was developed and is commercially available. A more comprehensive approach to the search for candidate genes should be considered.<sup>1</sup> Using microarrays, investigators can examine which genes are differentially expressed in periodontitis.

Genomic technologies enable analysis of DNA isolated from plaque using nucleic acid probes or polymerase chain reaction (PCR). Standard PCR is not a quantitative assessment of identified bacteria, although real-time PCR does enable quantification. Nucleic acid probes are synthesized sequences of DNA or RNA that are complementary to specific nucleic acid sequences in the bacterial genome. Bacteria can be identified when DNA isolated from dental plaque is hybridized (paired with complementary DNA) with species specific probes that are labeled to allow visualization. Checkerboard hybridization is a technique that uses probes to simultaneously test for the presence of up to 43 bacterial species and enables rapid processing of numerous plaque samples. Tests that use the genome have the advantage of not requiring viable bacteria, but they are costly and require sophisticated laboratory equipment.<sup>8</sup>

As Technologies evolve, it is easy to imagine the availability of a chair-side test for genetic susceptibility to periodontitis such as the genomic probes (DMDx/PATHOTEK) and Oligonucleotide probes (IAI Pado Test 4.5 System) which can detect P. i, P. g with the aid of purified DNA fragments and A.a can be detected using radioactively labelled DNA probes.

## Current Concepts & Future Trends

Electrochemical biosensors coupled to Magnetic Beads are also used for the Detection of Clinical Biomarkers. Several researchers have focused on genetic single nucleotide polymorphisms in the study of periodontitis. There is a genetic susceptibility test currently available for severe chronic periodontitis (Interleukin Genetics, Waltham, Massachusetts). Individuals identified as “genotype positive,” are more likely to have the phenotype of over expression of this gene Biosensors detects various metabolites like S, HS, H2S, and CH3SH produced by periodontal pathogens. A sulphide sensor, Perio 2000, can measure levels of these compounds and report them as scores ranging from 0 to 5 in increments of 0.5<sup>14</sup> Researchers are developing lab-on-a-chip devices that will enable rapid and simultaneous detection of multiple biomarkers.<sup>5</sup>

## Conclusion

Given the limitations of the latest chair side techniques, new technologies are in development that could be used to enhance the ability to predict, diagnose, and treat periodontitis. At present, diagnostic tests that aid in the assessment and management of patients with periodontitis are not a routine part of dental practice. Historically, this is likely because of the accessibility of the oral cavity to clinical and radiographic examination.

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# Esthetic and functional rehabilitation for a patient with cleft lip and palate using magnetic obturator

\*Anand Kumar R., \*\*Jacob John, \*\*\*Sujana U., \*\*\*Sreedevi Nambiar M., \*\*\*Ratan Das

## Introduction:

Treating patient with orofacial cleft is to restore dentition, speech, velopharyngeal function and for esthetics. Veau classification of cleft lip and palate includes Group I (A) -defects of the soft palate alone. Group II (B) - defects involving the hard and soft palates (not extending anterior to the incisive foramen). Group III (C) - defects involving the palate through to the alveolus and Group IV (D) complete bilateral clefts. There are different treatment modalities for patient with cleft lip and palate. It has been suggested by Bien, that the first obturator of a cleft palate was done by Demosthenes, a Greek orator who filled his palatal defect with appropriate sized pebbles. In the 16<sup>th</sup> century Hollerius, Petronius and Pare provided the description of prosthesis for obturation of palatal defects. Pierre Fauchard described a palatal obturator in the early to mid of 18<sup>th</sup> century. Current prosthetic designs were developed by the works of Snell, Stearn, Kingsley and Suerson during the 19<sup>th</sup> century.

The retention of the obturator prosthesis can be enhanced by incorporating magnets. By 1960 magnets have been used in maxillofacial prosthesis, removable partial denture, and over denture attachments and in implant

## Abstract

Cleft lip and palate are congenital anomaly that affects the lip and the roof of the mouth. Incomplete closure of cleft after the corrective surgery is mainly treated by prosthetic rehabilitation. It restores patient function, esthetics and well-being. Magnetically retained functional removable obturator prostheses are used to treat the congenital cleft hard- soft palate patient. Magnetic systems have been used for many years as aids for denture retention with excellent results and patient acceptability. In this article maxillary obturator fabrication using magnetic assembly for rehabilitation of a cleft lip and palate patient is described.

**Keywords:** Obturator Magfit magnetic assembly. Cleft palate

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supported dentures. In 1971, an extensive prosthesis in which the extra oral and intra oral parts were joined by magnets was constructed by Javid. Moghadam et al described a simple technique of attaching magnets to prepared tooth and the intaglio surface of the denture. In this article describes rehabilitation of cleft lip and palate patient with magnetic obturator.

## Case report

A 65 year old female patient was reported with defects in the upper lip and palate and protruding front teeth (*fig. 1*). The defect was present since birth. On examination, a complete unilateral cleft lip on the right side and palate was present. The defect belongs to group 3 of

Veau classification of cleft lip and palate (*fig.2*). The proposed treatment plan was the surgical correction of cleft lip and extraction of compromised teeth and prosthetic rehabilitation. The surgical correction of the cleft lip was done using modified Millard's technique (*fig.3*). After healing, preliminary impression was made for diagnostic cast preparation. Prosthetic treatment plan were to give a partial overdenture with obturator. To improve the retention and ease of placement crown restoration were given on 16, 17 and 27 to modify their angulation into a single path of placement. Intentional endodontic treatment of 14 and 24 and metal coping with Magfit™ DX (Japan) (*fig. 4*) magnetic keeper and magnetic

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Fig.1 Preoperative



Fig.2 Intra oral view



Fig.3 Post operative



Fig.4 Magnetic assembly

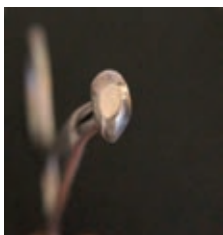


Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9

partial overdenture with obturator enhanced retention.

Magnetic assembly is made of Neodymium Iron Boron rare magnet, covered with corrosion resistant stainless steel. Magnetic keeper is attached to the tooth and is made of corrosion resistant magnetic stainless steel. Holder is laser welded to the edge of the keeper. It aids in the placement of the keeper. The keeper is magnetically attracted to the magnetic assembly. When magnetic assembly is placed over the keeper a closed magnetic circuit is created.

## Procedure

Tooth preparation was done on 16, 17 and 27. Wax pattern were made on prepared 16, 17 and 27. Surveying was done and wax was trimmed for single path of insertion. Casting was done and metal crowns were thus fabricated. Root canal treatment was done on 14 and 24. Root canals were prepared to receive copings with magnetic keeper. Impression was recorded and the cast was prepared. The wax patterns on 14 and 24 were prepared to receive the magnetic keeper. Later, coping with the keeper was cast; metal copings were trimmed and polished (fig. 5). The crowns and copings were cemented in the patient's mouth.

The final impression was made with elastomeric impression material. Try in procedure was done in the patient and final prosthesis with obturator was fabricated, and checked in patient's mouth. Markings were made with indelible pencil on the metal copings on 14 and 24. This marking was transferred to the tissue surface of the denture base and recesses were made with trimmer on 14 and 24 region of tissue surface of

the denture to receive the magnet (fig. 6). After the magnets were positioned on the keeper in the patient's mouth, the recesses were filled with autopolymerising acrylic resin (fig. 7). The denture was placed in patient's mouth and the patient was asked to occlude and wait for the material to set. The magnet is received into the prosthesis.

Excess material was trimmed (fig. 8) and polished and the final prosthesis was inserted in the patient's mouth and retention was checked (fig. 9).

## Conclusion:

Successful treatment of cleft lip and palate patient can be done with good esthetic results. Magnetically retained functional removable overdenture prosthesis was used to treat the congenital cleft palate of this patient. Sufficient retention was obtained and no major complications were seen in patient's prosthesis in periodical check up.

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# Restoration of endodontically treated teeth with metal ceramic endocrowns

\* Kiran V.M., \*\* Mridula Parameswaran, \*\*\* Jolly Mary Varughese

## Introduction

Restoration of endodontically treated teeth has always been a matter of growing interest and intrigue in the field of restorative dentistry and endodontics. Newer materials, methods and restorative approaches are being evaluated and implemented every now and then for ensuring the longevity, function and esthetics of the root filled tooth. According to Cohen, the objectives of restoring the endodontically treated teeth include, protection of the remaining tooth from fracture, prevention of reinfection of the root canal system and finally, the replacement of the missing tooth structure.<sup>1</sup> In this regard, endocrowns offer a feasible restorative option in selected cases.

According to Moore et al an endocrown consists of a circular butt-joint margin and a central retention cavity inside the pulp chamber without intraradicular preparation. Hence it has been referred to as a 'postless core and crown'. In simpler words it is an onlay crown which engages the pulpal chamber.<sup>2</sup>

Similar conservative approaches for the restoration of endodontically treated posteriors has been reported as early as 1980s when Nayyar et al introduced the amalgam coronal radicular dowel and core technique. This method

## Abstract

Among the various restorative modalities to restore the endodontically treated teeth endocrowns are a much less explored, but viable alternative as reviewed by the existing literature. In this era of minimally invasive dentistry, endocrowns offer a much more conservative approach towards restoration of endodontically treated teeth while preserving the form, function and esthetics of the endodontically treated tooth. This case report presents the post endodontic restoration of a maxillary and mandibular molar in a patient using metal ceramic endocrowns.

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primarily consisted of using the pulp chambers and the root canal orifices as amalgam posts for retention. However this technique required the presence of three or four walls and extensive pulp chamber with at least 2 to 4 mm depth.<sup>3</sup>

According to Rocca and Krejci endocrowns are partial crowns made out of ceramic or composite resin and are subsequently bonded to the root filled tooth. The different materials that are used to fabricate endocrowns include feldspathic and glass ceramic, hybrid composite resin as well as CAD-CAM composite and ceramic blocks. The authors have also suggested that scientific knowledge is still uncertain as to which material is the most suitable for endocrown fabrication.<sup>4</sup>

The choice of restoration of an

endodontically treated tooth depends upon several factors like structural integrity of the tooth, functional as well as esthetic requirements<sup>5</sup>. In view of these requirements endocrowns can be considered as a suitable alternative to full crowns for restoration of root filled posterior teeth, especially in cases with minimal vertical dimensions or crown height which has sufficient tooth structure available for stable and durable adhesive cementation.<sup>6</sup>

A review of literature suggests that although many in vitro studies have been conducted demonstrating the success of endocrowns on molars and premolars, only a few clinical trials have been conducted in this regard.<sup>4</sup> Existing literature concentrate around adhesive restorations using indirect composite and ceramic

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Fig 1 Preoperative View 26



Fig 2 Preoperative view 36



Fig. 3 Interocclusal height

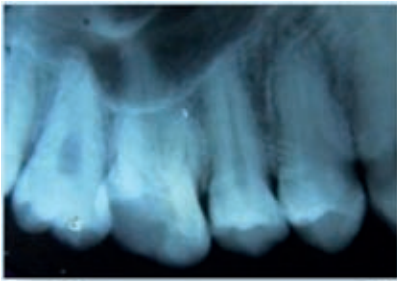


Fig 4 Preoperative view 16

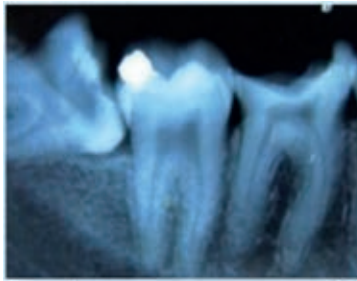


Fig 5 Preoperative view 46



Fig 6 After tooth preparation & gingival retraction

endocrowns as they are expected to provide a monobloc effect for the endodontically treated tooth and thereby increased fracture resistance.

This case report presents the post endodontic restoration of a maxillary and mandibular first molar using porcelain fused to metal endocrowns.

### Case Report

A 23 year old healthy female patient reported to the Department of Conservative Dentistry & Endodontics, Government Dental College, Thiruvananthapuram with a presenting complaint of pain in relation to the upper right and lower right back teeth region. There was history of spontaneous pain and pain while lying down.

Clinical examination revealed caries exposed and fractured maxillary right permanent first molar as well as opposing mandibular right permanent first molar (Fig. 1, 2). The teeth were tender on palpation. The involved teeth were hyperresponsive with lingering pain in response to cold test (Endofrost, Roeko, Germany) and electric pulp tests (Gentle Pulse, Parkell) in comparison with the contralateral teeth, suggestive of irreversible pulpitis. The caries exposed teeth had almost half of sound tooth structure remaining. The occlusion of the patient was assessed and revealed a decreased vertical dimension with inadequate clearance for a conventional full crown post

endodontic restoration (Fig. 3).

Radiographic examination revealed caries extending to the pulp chamber of the maxillary right permanent first molar (Fig. 4) and caries extending to the mesial pulp horn of the mandibular right permanent first molar (Fig.5). The pulp chambers had adequate height and there was adequate sound dentin surrounding the pulp chambers of both the teeth. Both the teeth had normal periradicular structures.

Conventional root canal therapy was planned for both the teeth followed by endocrowns considering the occlusal pattern of the patient. Metal ceramic endocrowns were planned as the patient's economic status as well as the decreased occlusal clearance precluded the use of the indirect tooth coloured restorations.

After explaining the treatment plan to the patient and obtaining the informed consent, conventional root canal therapy was performed on both the involved teeth. After gaining the access under local anesthesia, canals were negotiated with No. 10 K file (Kerr, Sybron Endo), pulp extirpation was done, working length determined, followed by copious irrigation with 5.25% Sodium hypochlorite solution and normal saline. The involved maxillary first molar had a mesiobuccal, distobuccal and palatal canals. The buccal canals were instrumented upto No. 30 K file (Kerr, Sybron Endo) and the palatal canal was instrumented upto No. 40 K



Fig 7 Triple tray impression



Fig 8 Metal ceramic endocrown



Fig 9 Endocrown cemented



Fig.10 Interocclusal view

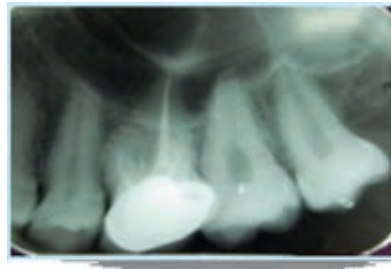


Fig. 11, 12 Postoperative radiographs 6 months



file (Kerr, Sybron Endo) followed by a routine step back preparation.

The involved mandibular first molar revealed a single distal canal and a mesiobuccal and a mesiolingual canal. The mesial canals were enlarged till No. 30 K file and the distal canals were enlarged till No. 40 K file. After shaping and cleaning, final irrigation was done with 2% Chlorhexidine gluconate solution (Aseprc, Steadman Pharmaceuticals, Tamilnadu) and Calcium hydroxide intracanal medicament (RC Cal, Prime Dental) was placed on both teeth. Temporary restoration was done with Cavit (3M ESPE) and patient was recalled after 7 days for obturation.

On the subsequent visit, the canals of both the teeth were obturated with guttapercha cones corresponding to the master apical files using lateral condensation technique. Temporisation was done with intermediate restorative material (IRM) and the patient was recalled after 1 week for post endodontic restoration.

After removing the temporary restoration, all the excess sealant and excess guttapercha was removed from the pulp chamber using a heated excavator. A flat end tapered diamond abrasive (TF-12, Mani Dia-Burs) was used to remove all the undercuts from the pulp chamber taking care to conserve as much sound dentin as possible. In area that were already thinned out, the undercuts were blocked out with Type II Glass Ionomer Cement (GC Fuji 2 Universal Restorative, Tokyo, Japan). The peripheral crown margin was

prepared in the usual way using flat end tapered diamond (TF-13, Mani Dia- Burs) to form a uniform equigingival shoulder finish line. Occlusal reduction was done to get a clearance of 1.5mm. Gingival retraction cord was applied to the prepared teeth to facilitate soft tissue retraction (Fig. 6).

Sectional elastomeric light body – putty impression was taken using a squash technique. The light body (Express Light Body, 3M ESPE) was mixed and syringed into the pulp chamber cavity and also around the margins of the prepared teeth. The sectional tray was loaded with soft putty (Express STD, 3M ESPE) on both the sides and was gently seated over the mandibular right quadrant. Subsequently the patient was asked to close in centric to record the maxillary tooth impression as well as to record the bite simultaneously. This triple tray impression technique facilitated recording of both the prepared teeth and at the same time registered the occlusal pattern of the patient in a single step (Fig. 7). Temporary restoration was done with IRM after placing a piece of cotton within the pulp chamber. Temporary acrylic crown was fabricated for the prepared teeth and cemented using temporary luting cement.

The patient was recalled after fabrication of the metal ceramic endocrowns (Fig. 8). The final crowns were tried in after removing the temporaries and the IRM from within the pulp chamber. After checking the fit and marginal adaptation of the crowns, occlusion

was checked using articulating paper. Centric contact points were checked and high points were corrected by selective grinding. Finally the metal ceramic endocrowns were cemented with Type I luting GIC (GC Fuji 1, Tokyo, Japan). (Fig 9,10)

Postoperative radiographs revealed good marginal adaptation of the endocrowns within the pulp chamber. The tooth was asymptomatic both clinically and radiographically and both the endocrowns were completely functional during 3 months and 6 months follow up examinations. (Fig 11,12)

## Discussion

Restoration of endodontically treated posterior tooth, especially molars has always been a matter of much controversy and interest. Several schools of thought still exist as to whether to go for a complex intraradicular post and core restoration or to consider a simple full crown restoration. Some authors are of the opinion that endodontically treated posterior teeth do not require a post but rather need cuspal coverage because they are subjected primarily to vertical forces. If the loss of coronal tooth structure is not extensive, the pulp chamber and the canals can provide adequate retention for a core build up. (7). Another view is that a post is needed only if one cavity wall is remaining or if no cavity wall remains (8).

In the present case, almost half of tooth structure was remaining in both the involved teeth. But the decreased vertical height precluded the option for a simple full crown due to the reduced retentive features. Hence the decision for endocrown was made for the involved maxillary and mandibular permanent first molars. In addition to the financial constraints of the patient, the decreased occlusal clearance prompted us to consider metal ceramic endocrowns.

Although most of the existing literature emphasizes the advantages of bonded restorations like indirect composite and ceramic endocrowns, the feasibility of such restorations in cases with minimal crown height remains questionable. In addition to

considerations for retreatment at a later stage, the financial limitations of the patient is also of primary concern while planning a post endodontic restoration.

## Conclusion

In the present case the maxillary and mandibular metal ceramic endocrowns served their purpose functionally, conservatively and with acceptable esthetics. Hence in cases with adequate remaining coronal structure, especially with minimal crown height, endocrowns should be considered as a promising restorative option for the endodontically treated posterior tooth. However proper case selection as well as quality of the endodontic therapy should be of primary concern while considering the final restoration of any endodontically treated tooth. Further more, the need for more number of in vivo studies and case reports in this topic cannot be over emphasized in order to evaluate the long term efficacy of this restorative option.

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# A paradigm shift in periodontal treatment: From myth to reality – ‘The Resolvin story’

\* Jithin B, \*\* Presanthila Janam, \*\*\* Bajju R M

## Introduction:

Periodontitis—a chronic inflammatory condition initiated by specific bacteria, induce an inflammatory cascade that leads to destruction of the organ supporting the teeth (periodontium), including soft tissues and particularly bone, through osteoclastic resorption. Periodontitis is thought to be caused by specific gram negative microorganisms, such as *Porphyromonas gingivalis*, *Tannerella forsythia*, and *Treponema denticola* etc. However, the pathogenesis is characterized by the host's leukocyte mediated self-destruction of tissues.<sup>1</sup> This has been proved to be mainly from the body's failure to turn off its inflammatory response to infection. The result is chronic inflammation, which causes much of the tissue damage that we observe in periodontal disease.

In recent years, evidence has prompted a paradigm shift whereby the resolution of acute inflammation is a biochemically active process regulated in part by endogenous PUFA (polyunsaturated fatty acid)-derived autacoids. Among these are a novel genus of SPMs (specialized proresolving mediators) that comprise novel families of mediators including lipoxins,

## Abstract

Periodontitis is a well-appreciated example of leukocyte-mediated bone loss and inflammation. Research suggests that chronic inflammatory periodontal disease involves a failure of resolution pathways to restore homeostasis. In recent years, evidence has prompted a paradigm shift whereby the resolution of acute inflammation is regarded as a biochemically active process regulated in part by endogenous PUFA (polyunsaturated fatty acid)-derived autacoids. Among these are a novel genus of SPMs (specialized proresolving mediators) that comprise novel families of mediators including lipoxins, resolvins, protectins and maresins. An appreciation of these endogenous pathways and mediators that control timely resolution opened a new terrain for therapeutic approaches targeted at stimulating resolution of local inflammation. In this paper, an overview of the biosynthesis and actions of resolvin E1, its applications in periodontal therapy and their present status has been discussed.

**Key words:** Resolvin, Periodontitis, Inflammation

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resolvins, protectins and maresins<sup>2</sup>.

## Resolvin

Studies have demonstrated that human and animal cells convert  $\omega$ -3 polyunsaturated fatty acids (PUFAs) into resolvins. The term ‘resolvins’ or ‘resolution-phase interaction products’ was coined by Professor Charles N. Serhan and colleagues. It was introduced to emphasize that these molecules are endogenous mediators biosynthesized in the resolution of

acute inflammation and control the duration and magnitude of inflammation.<sup>3</sup>

Resolvins (resolution-phase interaction products) are short-lived autacoids, belonging to a novel family of aspirin-triggered (AT) bioactive lipids, which are synthesized during the resolution of inflammation. They exhibit both anti-inflammatory and pro-resolving actions. Resolvin subtypes include the E series (RvE1-3, derived from eicosapentaenoic acid

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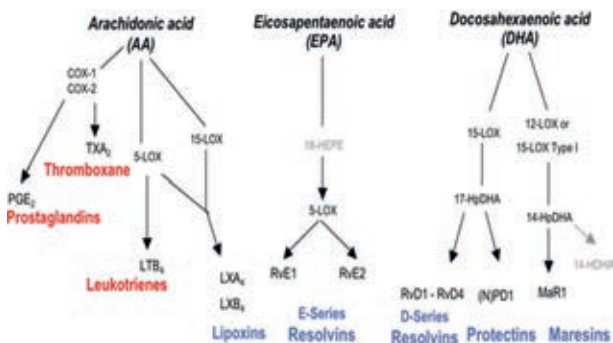


Fig. 1

EPA), the D series (RvD1 and RvD2), derived from docosahexaenoic acid DHA). (Fig: 1)

## Resolution of inflammation

Resolution of inflammation is an actively regulated program rather than the passive termination of inflammation. The crucial identification of the cellular events and molecular signals that determine the end of inflammation and beginning of resolution has led to a new appreciation of pathogenesis in inflammatory diseases<sup>4</sup>. (Fig: 2)

Periodontitis is characterized by destruction of connective tissue and bone by the host response. Lipid mediators of inflammation play an important role throughout the pathogenesis of periodontitis. In particular, PGE<sub>2</sub> (prostaglandin E<sub>2</sub>) and LTB<sub>4</sub> (leukotriene B<sub>4</sub>) are strongly associated with progressive disease and are, in large part, drivers of the chronic lesion. Resolution of inflammation is an active process and that homeostasis cannot be achieved until the lesion is free of neutrophils.<sup>5</sup> Studies demonstrate that exogenous PGE<sub>2</sub> and LTB<sub>4</sub> enhance the local inflammatory response leading to neutrophil recruitment and enhanced neutrophil-mediated tissue damage. Monocytes recruited to the chronic lesion enhance the inflammatory response through secretion of more PGE<sub>2</sub>, IL-1, TNF- $\alpha$ , and other proinflammatory molecules. The resolving molecules stop neutrophil infiltration and drive neutrophils to apoptosis while at the same time attracting monocytes to the lesion.<sup>7,8</sup> RvE1 specifically interacts with the LTB<sub>4</sub> receptor BLT1 on neutrophils and ChemR23 on monocytes to regulate leukocytes during inflammation. RvE1 also stimulates the uptake and clearance of local cytokines.<sup>9</sup> However, the phenotype of the resolvins-recruited monocyte is nonphlogistic, and they phagocytose apoptotic neutrophils without contributing to further inflammation or tissue damage. RvE1 therapy lowers the inflammatory burden locally,

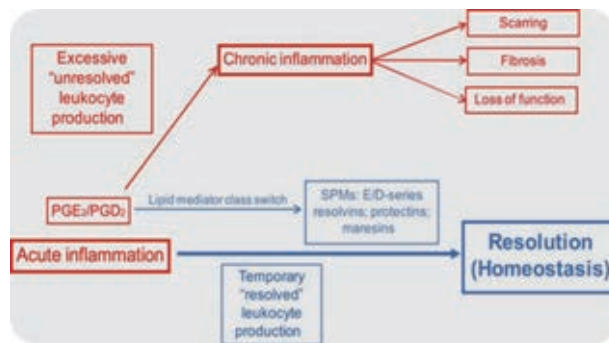


Fig. 2

which results in a lower systemic inflammatory burden.

Resolvins block excessive inflammatory responses and promote resolution of inflammation as follows: (a) blocking cytokine production; (b) reducing PMN transendothelial migration and (c) increasing macrophage activity resulting in the clearance of apoptotic cells and debris from inflamed areas

## Current therapeutic approaches

In addition to being a public health problem in its own right, periodontitis has become a recognized model for examining the relationships between effector cell-mediated inflammation, bone metabolism, and destruction.

RvE1 acts as a modulator of the inflammatory response shifting the response to more rapid resolution and effectively preventing the chronic phase. Elimination of inflammation in the healing lesion promotes tissue regeneration. These principles may be applicable to other inflammatory diseases including arthritis and cardiovascular disease due to the similarities between these diseases, such as the neutrophil induced panus formation in arthritis and the inflammatory tissue damage to blood vessels stimulating atherosclerosis. These observations taken together provide novel evidence that Resolvin E1 not only plays a key role in controlling inflammation but also might be useful for a wide range of complex inflammatory conditions including bone disorders, such as periodontitis and arthritis, by restoration of stem cells thereby promoting regeneration of lost tissues, including connective tissue and bone.<sup>10</sup>

Attempt to block activation of inflammation using anti-inflammatory drugs (non-steroidal anti-inflammatory drugs, TNF inhibitors), or to promote healing with agents such as TGF-1, bridging molecules, and phagocyte receptors have been tried out by several investigators. Resolvins will eliminate the need for such

a therapeutic approach which is toxic in nature due to use of exogenous compounds.

The precursor of resolvin D series, 17S-HpDHA, modulates both the genesis and the maintenance of mechanical hyperalgesia in an arthritis model in rats.<sup>11</sup> Treatment with RvE1, three weeks after nerve injury; transiently reduced mechanical allodynia and heat hyperalgesia.<sup>12</sup> The study suggest that resolvins could be used as a novel class of analgesics to treat inflammatory pain especially in arthritic pain. Two advantages over current drug therapies to treat pain include; high potency and endogenous production in the body.

RvE1 possesses regulatory actions, such as reduction of adenosine diphosphate (ADP) stimulated P-selectin surface mobilization and actin polymerization. The specific platelet actions of RvE1 selectively engaged with ADP activated platelets may contribute to both resolution of vascular inflammation and ADP-dependent platelet activation. RvE2 may also contribute to homeostasis, as it rapidly down regulates surface expression of human leukocyte integrins in whole blood.<sup>13</sup> Additionally, it dampens responses to platelet-activating factor, a potent activator of platelets and leukocytes. These indicate that RvE1 selectively regulates platelets, which are critical cell components for blood coagulation.

Studies have come up with the role of resolvin in treatment of Sjögren's Syndrome (SS) is an autoimmune disease characterized by xerostomia (dry mouth) and Keratoconjunctivitis sicca (dry eyes). Resolvin receptor activation promotes resolution of inflammation and tissue repair in salivary epithelium, which may have relevance in the restoration of salivary gland dysfunction associated with Sjögren's Syndrome (SS).<sup>14</sup>

## Conclusion

The discovery of resolvins and their use in an inflammatory disease model have provided new insight into the determinants of susceptibility of periodontitis. We are entering a new era of investigation and therapeutics that has the potential to have a major impact on our understanding of the best way to treat periodontal diseases. These observations taken together provide novel evidence that Resolvin E1 not only plays a key role in controlling inflammation but also might be useful for a wide range of complex inflammatory conditions other than periodontitis including bone disorders, arthritis, cardiovascular diseases by

restoration of stem cells thereby promoting regeneration of lost tissues, including connective tissue and bone. Newer studies are indicating wider role of this autacoid in pain management, coagulation and signaling pathways and in the treatment of degenerative diseases. Hence this wonder molecule which is endogenous is bound to change the way we manage chronic and debilitating conditions.

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## CDE Report

**Dr Anil G.**  
CDE Convenor, IDA Kerala State



### 1. STATE CDE PROGRAMMES

First State CDE of this year was hosted IDA Cetral Kerala Branch on 16th March. The topic was on practice management (art, science or business) The faculty was Dr. Aswin M. Jawadekar.

Second State CDE will be on 11th May and topic is ' on Straight talk about crooked teeth' by Dr. U. S. Krishna Naik.

### 2. INTER BRANCH CDE PROGRAMMES

IDA Attingal Branch hosted and inter branch CDE On 23rd February and the topic was on building a rewarding

practice. The faculty was Dr. Chandrasekaran Nair.

IDA Thiruvalla Branch conducted and inter branch CDE on 9th March on Ergonomics in Dentistry. The faculty was Dr. Rajesh Gopal V.

On 10th March IDA Malappuram Branch conducted an Inter branch CDE on Fixed orthodontics and Myofunctional Appliances, The faculty was Dr. Binoy Ambookan

On 23rd March IDA Malappuram Branch conducted and Inter branch CDE

on Dental laser in general practice. The faculty was Dr. Joy Kurian

IDA Ernad conducted and Inter Branch CDE on practical Tips in Jaw relations in complete Dental cases and Management of Temporo Mandibular Joint Disorders. The faculty was Dr. Mohan Kumar T.

All the local branches in IDA Kerala State are conducting CDE programmers regularly.



**Dr. Anjana G.**  
WDC Chairperson

## Womens Dental Council

### INSTALLATION CEREMONY

The Installation ceremony of WDC was held along with the Installation of office bearers of IDA Kerala state on 20 th January at Kollam.

After the Presidential address, Dr Thaj S. Prasad installed Dr Anjana G. as the new chairperson of WDC. After her acceptance speech, Dr Anjana.G installed the office bearers. The office bearers of WDC for the year 2014 are:

ADVISORS: DrKunjamma Thomas, Dr Anita Balan, Dr. Vimala Suresh  
IMMEDIATE PAST CHAIRPERSON: Dr Thaj S. Prasad  
CHAIRPERSON ELECT: Dr Mercy.Joji  
SECRETARY: Dr Shoma Anil

JOINT SECRETARY: Dr Elsy Bijoy  
TREASURER: DrJayashree Ajith  
EDITOR: Dr. Rethy

### PROGRAMMES CONDUCTED

Chair person Dr Anjana G. was the faculty of the CDE programme on February 23 rd at Palakkad. The CDE was organized by IDA Palakkad and she spoke on the topic Un co operative child. -Secretary DrShoma Anil gave an oral health orientation class to the students of Kuruva U.P school, Kannur on Dentist day. This programme was organised by IDA North Malabar supported by its women's wing

### WOMEN'S DAY CELEBRATIONS

An Oral health orientation programme and a check up camp was conducted at Pratheeksha Bhavan, Koothattukulam, a home for differently abled women on March 8th.

A CDE programme was conducted on the topic WOMEN EMPOWERMENT AND STRESS MANAGEMENT by Grace Lal who is an eminent psychologist.

Both the programmes were organized by IDA MALANADU and supported by its women's wing

For the first time of its kind WDC Kerala conducted an oral health orientation programme and a check up camp for the inmates of Women's central prison, Kannur. The programme was officially inaugurated by Dr O.V. Sanal, hon secretary, IDA Kerala and Dr Anilkumar P.K joint secretary, IDA Kerala state took the orientation class. The programme was organized by IDA North Malabar and supported by its women's wing.

## NORTH MALABAR BRANCH

### C.D.E PROGRAMMES:

1. C.D.E ON PRACTICE MANAGEMENT  
DATE: 09 – 03 – 2014. TOPIC : Practice Management. FACULTY: Dr. V. Vishwanath. [past president I.D.A. Kerala state .

2. C.D.E. TOPIC : JAW RELATIONS IN COMPLETE DENTure , VENUE : I.D.A Hall Podikkundu. DATE : 06 – 04 – 2014. FACULTY : DR.MOHAN KUMAR M.D.S. Prosthodontist.

C.D.H. Programmes :

1. A dental check up camp and dental awareness class where conducted on 6 – 03 -2014 at KURUVA U.P. school as a part of dentist day celebration .Dr. Shoma Anil, Sec .W.D.C. Kerala took the awareness class. Around 200 patients were examined.

2. A dental check up camp and dental awareness class where conducted on 09– 03 -

2014 at women's central prison, as a part of international women's day celebration. Dr. Anil Kumar P.K. took the awareness class. Around 30 patients were examined

3. A dental check up camp and dental awareness class where conducted on 16– 03 -2014 at Kollantha U.P. School, Malapattam .Dr.Kabeer took the awareness class. Dr. Rameshan T.V. State Treasurer inaugurated the programme. Around 150 patients were examined.

### INTERNATIONAL WOMEN'S DAY CELEBRATION :

I.D.A North Malabar Branch hosted international women's day celebration conducted by women's dental council ,I.D.A Kerala State on 09 – 03 – 2014 at women's central prison ,Kannur.

Beneficiary programmes for members :

We have conducted I.D.A Orientation

programme for new members on 09 – 03 – 2014 along with the first C.D.E. programme .Dr. vishwanath was the faculty. He took orientation class about I.D.A and its importantants.

### EXECUTIVE COMMITTEE MEETINGS:

First executive committee meeting was held on 27 – 01 – 2014 at I.D.A. Hall Podikkundu, Kannur.

Second executive committee meeting was held on 18 – 02 – 2014 at I.D.A Hall, Podikkundu, Kannur.

Third executive committee meeting was held on 19 – 03 – 2014 at I.D.A. Hall, Podikkundu, Kannur.

4th executive committee meeting was held on 21-04-2014 at I.D.A Hall, Podikkundu, Kannur.



## ATTINGAL BRANCH

### 1st Executive meeting (13/01/14)

The 1st executive meeting of IDA Attingal branch was held on 13th Jan 2014 at Vyaparabhavan, Chirayinkhil road, Attingal, 7.00pm.

### CDH activity No. 1 (15/01/14)- 'Observation of World Palliative Care Day'

A dental screening camp was conducted on at Pulloormukku, Kallambalam on 15th Jan 2014. This camp was done as an observation of World Palliative Care Day and in association with Pourasamithi of Pulloormukku.

### CDH activity No. 2 (27/01/14)

Dental screening & awareness camp was conducted for Student Police Cadets at Amritha Higher secondary school, Pariapally on 27th January 2014. Sub Inspector of Police, Pariapally also participated in this camp.

### February 2014 CDH activity No. 3 (4/02/14) - Observation of 'World Cancer Day'

Dental Awareness camp was conducted on 4th february 2014 at St. Jude Higher secondary school, Mugathala, Kollam. An awareness class on oral habits and oral cancer was given to the students.

### 2nd Executive meeting (11/02/14)

The 2nd executive meeting of IDA Attingal branch was held on 11th Feb 2014 at Attingal club, Attingal, 7.00pm. The various proposed projects and programmes for the year 2014, were discussed.

### CDE Program No.1 (23/2/14)

The first Inter branch CDE program of IDA Attingal branch for 2014 was conducted on 23rd Feb 2014 at Park Centre, Technopark, Thiruvananthapuram. The topic of the programme was, 'Building a Rewarding Practice'. The faculty was Prof. Dr. K. Chandrasekharan Nair.

### March 2014 CDH activity No. 4 (06/03/2014)

Observation of 'World Dentist's Day' by

### IDA Kerala State & hosted by IDA Attingal branch

World Dentist's Day, 6th March 2014, observed by IDA Kerala State was hosted by IDA Attingal branch. This event was held at PMS College of Dental Sciences, Vattapara, Thiruvananthapuram. A mobile oral cancer detection camp was flagged off by the chairman of PMS Dental college, Dr. P.S. Thaha. An oral health seminar by Prof. Dr. Babu Mathew (Retd. Prof. of Community Oncology, RCC, TVM) was held for the public and dental students of the college. A health awareness skit was presented by the students of PMS Dental college. Dentist Day celebrations were held in the evening at Hotel Aqua Rock, Mannanthala, Trivandrum. State officials and members from neighbouring branches, Kollam, Trivandrum, Kottarakara, Karunagapally had attended the program.



## KASARGOD BRANCH

### ACTIVITY REPORT JAN-APR

The installation meeting for the year 2014 was held on 29th jan 2014 at IMA hall Kasaragod. The new office bearers being

President - Dr Avinash Mahadev

Secretary - Dr. Navin Dias

Treasurer - Dr. Raghavendra Bhat

The meeting was well attended and followed by Dinner.

The first CDE program was conducted on 12th march. Dr. Hemanth jogi spoke on the topic Biopsy and its clinical implications. The meeting was sponsored by SM Dental Solutions Pvt. The program was well attended and was followed by dinner.



## NEDUMBASSERY BRANCH

### Activity Report of IDA Nedumbassery from Mar 17th to 30th April

Executive Meeting: The third executive meeting was on 29th of Apr at periyar club. Important decisions on future cde's were taken.

CDE: Our branch conducted our second CDE on Combating Mandibular Denture Instability by Dr Eldho Koshi on the 24th of April. The talk was well attended.

CDH: A programme has been formulated for educating and creating dental awareness among teachers, parents and children in schools. We have a free weekly dental check up in Devadhan our adopted old age home and orphanage





## WAYANAD BRANCH

### 1. CDE Programme

Topic: Management of Endo- Perio lesions and gingival plastic surgery

Faculty: Dr. Harikumar K Menon, Associate Professor GDC Calicut.

The first branch level CDE programme held at Wyndvalley Resorts Kalpetta on 16th March 2014. The programme was attended by 28 Dental Surgeons.

### 2. Induction of New Members

1st time in the history of IDA Wayanad Branch we conducted an induction ceremony for the new members. The inducting officer was Dr. Ranjith C.K charter secretary wayanad Br, past president, past state vice president and at present he is a central council member.

### 3. Executive Committee Meeting

a) First Executive meeting held at Wyndvalley resorts Kalpetta on 21.01.2014 15 members attended.

b) Second Executive Meeting held at Hotel Resorts Sulthan Bathery on 10.02.2014 15 members attended.

c) Third Executive meeting held at IMA Hall Mananthavady on 25.03.2014. 16 members attended.

### 4. CDH Activity

a) MEDIA AWARENESS PROGRAMME

The executive committee meeting held on 21/01/2014, 10/02/2014 & 25.03.2014 has decided to conduct a public awareness programme through visual medias ie through local television channels. It is mainly meant to improve the public awareness about dental health which can give an extra mileage to our practice. This programme is named as 'chat with your Dentist'.

The IDA Wayanad executive committee planned the programmes which consists of at least 50 episodes. Thirty minute session

every week of which the first was telecasted on 6th April 2014. This programme is a Q & A type telecasted at a primetime in the local channels like Malanad, Wayanad vision & Asia vision.

b) Dental Awareness camp conducted by Dr. Bleicit L Abraham at Martha Mariyan Samajam St. Thomas Church, Cheroor.

c) Screening camp Conducted at all India trade fair organized by Wayanad chamber of commerce at Kalpetta. 150 patients were screened at this venue.

d) A Dental awareness picture Exhibition conducted at all India Trade fair organized by wayanad chamber of commerce at Kalpetta.

### 5. Family Tour

We conducted the family tour to Meenmutty Heights Waterfalls on 6th April 2014. 15 members attended and every one enjoyed very well.



## MALAPPURAM BRANCH

### REPORT OF ACTIVITIES OF IDA MALAPPURAM FROM 31/01/2014 – 30/04/14

Dentist's Day celebration & International Women's Day observation were held at Tirur on 9/03/14. The programme was really colourful with various entertainments such as live music, dance etc. The hall was jam packed with families. Dr. Nisar o Siyo President, IDA Kerala State was the chief guest. MIDA honoured IPP Dr. Rajesh Raveendranathan & the Hon. Secretary Dr. Sujith MJ by adorning ponnada for making MIDA the best local branch in the state & the national level. Also MIDA cricket team selection was held at Manjeri on 13/4/14.

### CDH Activities

1. 1st CDH camp was held at Kottakkal in association with JCI 2/2/14

2. 2nd CDH camp with awareness programme for teachers and students were held at GMLP School Kidangazhi on 20/2/14

3. 3rd CDH camp with awareness programme for teachers and students were held at GLP School, Thottupoyil on 25/2/14

4. IDA Malappuram adopted Manarul Islam Orphanage Munduparamba on 27/2/14. A dental treatment camp was held on the same day.

### CDE Activities

1. 2nd branch level CDE was held at Hotel Hi-Ton, Perinthalmanna on Sunday 5/2/14

from 7.30 pm to 9.30pm. The CDE included lecture on Suturing techniques by Dr. Roshni Sajid.

2. 3rd CDE was a two day Interbranch CDE with hands on & demo by Dr. Benoy Ambookan on 9th & 10th March 2014 on Fixed Orthodontics & Myo functional appliances.

3. 4th CDE also was a full day interbranch CDE with hands on and demo by Dr. Joy Kurien on 23/3/14 on Dental Lasers in General Practice 13 members attended the CDE

4. 5th CDE was a short lecture on Dentistry & Anesthesia by Dr. Nagamani Nambiar at Hillfort, Malappuram.

5. 6th CDE was a half day branch level lecture "CHILL DRILL & FILL" on pedodontics by Dr. Sunil Mohamad, Dr. Hafeez & Dr. Ratheesh



## KUNNAMKULAM BRANCH

**1st Executive meeting of IDA kunnamkulam** was held on 6th december 2013 at sopanam heritage, guruvayoor, we discussed and decided plans and projects of 2014.

### FAMILY MEET

X mas and New year celebration along with food fest and carnival was held on 5th jan 2014 at IMA hall kunnamkulam. The program started with the lunch followed by the general body meeting, Dr Mohammed faris welcomed the gathering. This is the first time in the history of IDA KKM a food fest and carnival has been conducted. Allmost all the food items was made by our own members.

### CDE Activites

1st inter branch CDE on Dental laser in general practice by Dr Joy Kurian was held on 23rd feb 2014 at sopanam guruvayoor. The CDE programme started by collaring the president by the secretary. Introduction of chief guest was done by Dr Jovee, the first session was lecture on laser and on the second session, hands on and demonstra-

tion on patients was given to registered members.

2nd CDE on common oral lesions, Tmj problems and thier treatments by Dr Haris was held on 22nd march 2014 at sopanam guruvayoor.

### CDH Activites

Dental screening and parent education camp was conducted at Spectrum school perichakam on 15th feb 2014. Dental check up was conducted for the mentally retarded children in the school and parent education talk was given by Dr Sunil and Dr Faris.

Dental screening camp was conducted for the students of govt school palapatty on 15th feb 2014 Dr Mohammed sanju.

IDA kunnamkulam donated Rs 120000 towards babu kudmba sahaya nidi and Rs 5000 for food in visually impaired students sports meet at govt school for visually impaired Kunamkulam

2nd general body meeting was held on 22nd march 2014 at sopanam guruvayoor. The president Dr Faris welcomed the gathering, three months report presented by secretary Dr Sanju and accounts by tressurer Dr Bastain

2nd executive meeting was held on 12th april 2014 at lewa tower kunnamkulam.our branch decided to host the 3rd state executive meeting.



## ERANAD BRANCH

On February 5th, 2014 Clinical club meeting was held at Traveller's Banglow, Nilambur, Dr.Sameer Thavalengal presented a CDE on Myofunctional Treatment at 8p.m-9.30p.m

1st CDE & family get-together was held on 23-02-2014 at lions club hall, Nilambur CDE



on How Best To Manage Periodontitis Patients In General Practice By Dr.Ravi.K, M.D.S from 9am to 4pm this CDE had 6 KDC credit hours, simultaneously spouses & kids programme 'Kudumbasameetham' was held under Women's wing, followed by light entertainment program 'ERANDIAN' children & members of our branch.

On 23 February, after CDE 2nd Executive committee meeting was held at Lion's club hall, Nilambur.

On March 6th at 12pm IDA Ernad branch observed by adopting Ashraya School for Special children at Kuttyil near Wandoor. Entrusted President-Elect Dr.Biju to co-ordinate this program. There was check-up ,

training for care takers & parents, IDA Ernad had joy filled lunch with the 35 students, teachers & parents. Along with Dr.Biju, Dr.Francis, Dr.Philip, Dr.Hifz, Dr.Joe & Dr.Fahseena attended the program. Treatment for these children will be taken up members from Wandoor.

On March 8th, International Women's day was observed by women's wing co-ordinated Dr Sangeetha by conducting check-up & treatment camp of Aayilkootum members at Elamkulam Hospital, Nilambur ,50 patients were treated & referred to clinics in Nilambur for further treatment Dr.Sangeetha, Dr.Ponambili, Dr.Mullai, Dr.Anju, Dr.Nazneen, Dr.Rizla attended the program.

3rd Executive committee meeting was held Hiton Tower, Perinthalmanna on 12th April.

## KOTTARAKARA BRANCH

IDA Kottarakara branch hosted the South zone Cricket tournament on April 6, 2014 Sunday. The venue was Government Boys High School, Kottarakara. The participating

teams were Attingal, Alapuzha, Pathanamthitta and Kottarakara branches of IDA Kerala State.

Captains of the four teams reported by 8 am and after registration and a lot for random selection ; first match was played between Alapuzha and Kottarakara and Kottarakara won the match. Second match was started after a break of 15 minutes. Refreshments



was provided for the teams. In second match between Attingal and Pathanamthitta, Attingal won the match.

Apart from 60 team members of the playing teams around 40 members of various branches participated in the event . Members of hosting branch actively participated for the whole event for the smooth and uninterupted running of the matches. Lunch was provided for 100 people.

Officials provided with the details of winners and other prize categories along with score cards. Prizes were announced and trophies were distributed to the concerned members and teams. The tournament was well organised and conducted punctually and smoothly without any hiccups and with active participation by branch members.



## COASTAL MALABAR BRANCH

### INSTALLATION OF NEW OFFICE BEARERS

Installation of the office bearers of IDA COASTAL MALABAR Branch was held on the 4th Jan 2014 at KBC Greenpark hotel Edat, payyanur at 8 p.m. Dr. Ahammed Shafi installed as president of the branch and Dr. Rajesh. E as Hon. Secretary. The chief guest was Dr. Nizaro Siyo, President elect IDA Kerala State, installed the team of office bearers 2014.

### Free Dental checkup

Dental check up camp & dental exhibition



were conducted in association with Rotary club of payyanur, Pariyaram dental college at Kasthubasmaraka vayanashala Theru, Payyanur on Jan 26 at 2pm. Chief guest was municipal chair person smt. KV. Lalitha, Dr. Jayakrishnanan (IPP) was the Guest of honour.

### 1st Executive Committee Meeting

1st Executive committee meeting was held on 27-1-2014 at Top form hotel at 8pm. We discussed plans & policies of 2014, various sub committees formed.

### CDH ACTIVITIES.

#### MEGA CDH PROGRAMME

IDA Coastal Malabar branch in association with Pariyaram Dental college put a Dental Exhibition stall During Perunkaliyattam at madakkara, Chedruvathur on Feb 1st to 10th Feb. The Stall displayed various Dental Education chart, models for the public awareness. Dr. Jayakrishnan was the chief coordinator.

### CDE PROGRAMME

CDE programme for the year 2014 of IDA Coastal Malabar branch was inaugurated by Dr. Suresh kumar, chairman pension scheme-IDA Kerala state at KBC Green

Park, Edat on Feb-16th (Sunday) at 6pm. He also spoke about IDA pension scheme.

The faculty for first CDE was Dr. Binu Purushothaman (H.O.D., Prof. Dept. of orthodontics, KMCT, Calicut). He spoke about Practice management "Listen to patients" and Micro implants in orthodontics.

### DENTSDAY CELEBRATION

Dentist day celebration of IDA Coastal Malabar was held on March-6th at HighLine Plaza, Cheruvathoor. The chief guest was Dr. Asharaf (chief interventional cardiologist, Sahakarana Hrydayalaya). He spoke about management of medical emergencies and Life style diseases

After the lecture president Dr. Ahammedshafi honoured the past presidents of IDA Coastal Malabar with Ponnada.

### CLEFT LIP & PALATE SCREENING CAMP

IDA Coastal Malabar in association with Rotary club of payyanur conducted CLEFT LIP & PALATE screening camp at Rotary bhavan payyanur on 9th March 2014 at 11am. The screening was done by Dr. Musthafa (Dept. of oral & maxillofacial surgery, Yenapoya Dental college, Mangalore).

## QUILON BRANCH

### Installation meeting 2014

The 22nd installation ceremony of IDA Quilon branch was held on 1 Jan 2014 at Trinity Hall Thangassery Kollam at 7.30 pm. Dr. Samuel K. Ninan was the chief guest. The new president Dr. Santosh Kumar .V was installed as the new president of IDA Quilon branch by the outgoing president Dr. Sunil George. Followed by installation of other office bearers. Felicitation were given by the neighbouring branches [Kottarakara, Attingal, Karunagapally] vote of thank by secretary Dr. Nizamudeen M.

### 1st EXECUTIVE COMMITTEE MEETING

1st ECM of IDA Quilon branch was held on 10/2/2014 at Hotel Ritz from 7.30 pm onwards. A condolence message by the branch president regarding the demise of our past state president Dr. Oommen George. And inform all dentists to close down

their clinic on 13 Feb 2014 as a mark of respect to our oommen George.

### FEB 8 WORLD WOMENS DAY

WDC Quilon branch conducted a oral health awareness and dental check up camp on world womens day [Feb 8] at Mahila Mandhir Karikode Kollam. Dr. Rathy. R MDS [WDC chairperson] Dr. Sutha MDS, chief guest of the day, conducted classes on importance and maintenance of oral health followed by check up camp and distribution of paste and other medicine.

IDA Quilon with ASAP contacted a dental assistance course motivation programme on 21/12/13

16.3.2014 IDA along with JCI Quilon conducted a dental check up camp and a oral health awareness class for school childrens at new nursery school Nedumpana Kannannalloor Kollam. Around 200 childrens

participated the check up camp. followed by an awareness class about maintenance of oral hygiene by Dr. Joseph Edward.

1st GB meeting of IDA Quilon branch was held on 15 March 14 in Lions Hall Quilon.

15.3.2014 IDA Quilon branch conducted a CDE programme; AN UP. DATE ON CANCER AWARENESS' BY DR. RAGHAVARAJ ONCOLOGIST, BISHOP BENZIGER HOSPITAL KOLLAM.

2nd Executive committee meeting of IDA Quilon is held at Fine Arts Society Hall on 28th March 2014.

2nd GENERAL BODY meeting and CDE programme of IDA Quilon branch was held at LIONS HALL Kollam on 24th April 2014. Up coming family meeting and various projects were discussed.

