



# KDJ

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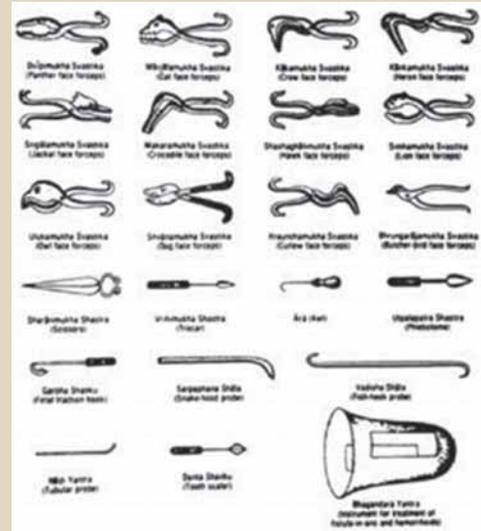
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Sushruta (6th century BC) was the first Indian surgeon of 600 century BC. The only bust of Sushruta is placed in Sushrutanagar, near Siliguri of India, The Sushruta Samhita is a Sanskrit text on surgery. The text preserved dates back to the 3rd or 4th century AD. It is one of three foundational texts of Ayurveda The Sushruta Samhita contains 184 chapters and description of 1120 illnesses, 700 medicinal plants, 64 preparations from mineral sources and 57 preparations based on animal sources. The text discusses surgical techniques of making incisions, probing, extraction of foreign bodies, alkali and thermal cauterization, tooth extraction, excisions, and trocars for draining abscess draining hydrocele and ascitic fluid, the removal of the prostate gland, urethral stricture dilatation, vesiculolithotomy, hernia surgery, caesarian section, management of haemorrhoids, fistulae, laparotomy and management of intestinal obstruction, perforated intestines, and accidental perforation of the abdomen with protrusion of omentum and the principles of fracture management, viz., traction, manipulation, appositions and stabilization including some measures of rehabilitation and fitting of prosthetics. Illustrations of dental instruments can be found in the text. The text was translated to Arabic as Kitab-i-Susrud in the 8th century AD.



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# President's Message



Dr. Nizaro Siyo

Dear friends,

I'm deeply indebted to you all for the trust bestowed upon me to lead this organization through the year 2014.

The feeling of togetherness is the greatest asset for an association but somehow it is slowly eroding from our minds. We are becoming self centered, egoistic in our thoughts and mechanical in our activities leading to friction within members and between branches. I am hopeful that we can bring back the brotherhood amongst us and hence coined the theme for this year "TOGETHER WE BEGIN, MARCH AHEAD & ACHIEVE HEIGHTS."

The year ahead foresees challenges that can shake up our profession from head to foot. Be it the mushrooming of new colleges or the new legislations, dentistry as a profession is at cross road. Our IDA can and should play the lead role in directing the policy makers to transform our profession in the best of interest for us dentists as well as the society. This is one of the priorities on my list for this year.

I urge you all to take up activities within your branch and at the state level that genuinely reflects the professional nature of our organization and not merely a like just another service organization or a recreation club.

The work done by my predecessors are commendable and my efforts are aimed at carrying those forward to the next level rather than allowing it to have a silent death.

I hope each one of you will join hands to stand by me in achieving these goals in the coming year.

Thanking you all once again,

With regards,

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



Dr. O.V. Sanal

Dear colleagues,

It is a very happy occasion for all members of IDA Kerala state after grabbing several national awards during national conference at Hyderabad. IDA Kerala state got seven awards this time.

Dr. Antony Thomas and Dr. O. V. Sanal adjourned best state president and best state secretary respectively. We got best CDE, best journal, best website, best women dental council and student activity. On behalf of IDA Kerala state office, we extend our gratitude to all members, branch office bearers and state executive committee members for their support they had given us for the last one year.

The first year of my three year term got over. We conducted all the programme in a grand manner within the time limit. Six executive committee meetings, dentist's day, oral hygiene day, no tobacco day, students conference, sports, chilamboli, geriatric day, six state CDE programmes one national CDE programmes, one interstate CDE programmes and women dental council programmes were conducted in different parts of Kerala in a fabulous way.

All the branches helped me a lot to complete the activities of last year by hosting events. I offer my sincere gratitude to president Dr. Antony Thomas who stayed with me in all round activities of our association during the year and he shouldered many responsibilities which helped me to overcome many critical situations.

One year IDA activities came to an end with 46th conference held at Kollam. It was a grand programme. Congratulations to organising committee chairman Dr. Samuel. K.Ninan and organising committee secretary Dr. Joseph Edward.

Dr. Nizaro Siyo took charge as a new president of IDA Kerala state on 19th of January. We are expecting whole hearted support from all the IDA members of Kerala and office bearers of branches

With warm regards,

**Dr. O.V. Sanal**  
Hon. Secretary, IDA Kerala State



Dr. K. Nandakumar

## Before the cool breeze turns into a tornado...

This has happened and there is no element of fiction in the description that follows. On 23rd February 2014 a local branch of IDA in Kerala has conducted a professional advancement programme on 'management of dental practice'. Nearly fifty members participated. Majority of the members were not aware of the fact that the national conference was being held on the same day at Hyderabad. Forty years ago this would not have happened. In olden days every member would have been aware of the national conference and many of the members looked forward to the scientific content of the conference as an opportunity to learn. Academic content is wisely or deliberately displaced with the commercial show casing. The worn out coinage, oft repeated in the inaugural sessions-scientific sessions are the back bone-has lost its sheen and relevance. It is high time that we should think seriously on the relevance of IDA in the present context.

National conferences are congregations of unmanageable crowd. Hence there is no comradere which is expected. An ordinary member feels that he is not recognised even in his own branch. Then why should he go for a national conference? It is high time that IDA opted for a federal constitution. Every state is organising an annual conference and there is no need for a national conference. The central office should reduce itself to a coordinating office and it can have an administrator elected periodically. Even the US president can have only two terms and why should the secretary of IDA have more than two terms? The reluctance to leave a post is the classic sign of full blown wested interest.

Other national organisations provide its members a professionally edited journal and that is considered as the right of the member. Every state has a well edited journal and the national journal should top it all. We should have an Indian Dental Journal to match with the medical counterpart. The head office authorities are not recognising the importance of having a national journal. Once well run by Dr.V B Kotak and Dr.V P Jaleeli, the IDA journal has been discontinued and the volume number is totally discarded. Any one in the central administration recognises the value of volume number of a professional journal and its continuity. If they recognise, they would have restored the volume number. Instead a new journal is started.

The balance sheet provided every year before the annual conference is never understood by the ordinary member neither the office bearers do explain it properly in simple terms. Lakhs and crores in the budget. A member never understands where all these funds go. Only the auditor understands and secretaries try to understand. A member will have some doubts. I give heavy subscriptions; I work for the association; I give heavy registration fees to attend a conference; I spent a huge amount on travel and accommodation expenditure. What do I get in return? In distress, will the association help me and if necessary my family? No one answers these questions. Initiatives are there at the state level but for that the national body need not take any pride.

Some of the aspirations of the members which they would like to find in an association are:

- support when you need it most
- help to build your community of colleagues and friends
- access to oral health care and positive practice environments
- influence oral health policy at the state and national levels
- raise awareness on the importance of oral health for everyone
- provide adequate information on dental science
- avenues to enrich practice with relevant science and research
- provide access to reliable continuing education
- funding for ground-breaking dental research
- influence legislative decisions about oral health care
- help in saving money on training and books

Success of an association is in not deterring the common members from the power centre. The centre should empower each member. He should feel proud of IDA. Presently the environment is bad. We all hope for the dawn of change. Every one should realise that without the ordinary member, there is no central office.

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

# Epidemiological study of tobacco related oral habits and associated lesions of oral cavity in a South Indian population

\* Omal P.M., \*\* Durgesh N. Bailoor, \*\*\* Laxmikanth Chatra, \*\*\*\* Prashanth Shenai, \*\*\*\*\* Raghavendra Kini

## Abstract

**Objective:** To study different types of smoking tobacco and smokeless tobacco habits and their associated oral lesions among the rural, urban populations of Mangalore (South India).

**Methods:** Cluster Random sampling was used with 100 subjects examined from each cluster. 8 Clusters (4 rural and 4 urban) were selected for this study. Initially a pilot study was carried out to check the feasibility and to know the existing prevalence of tobacco related chewing and smoking habits. Data's were collected by conducting interviews and clinical examination. Recorded data were later fed into the computer and statistical analysis carried out using SPSS software version 14.

**Results:** Out of 800 patients screened (400- Rural, 400- Urban), 550 were males and 250 were females. Increased prevalence of smoking bidi (8.4%) and chewing betel quid (7.4%) were seen in rural than in urban populations with a male predominance (16.6%,  $p = .001$ ). Cigarette smoking (10.9%) and chewing commercially available gutka (3.2%) were prevalent among males (18.3%,  $p = .001$ ) in urban population. Smoking tobacco related oral lesions were smoker's palate- (91%), Speckled Leukoplakia (89%), inflammatory palatal hyperplasia (18%) and Leukedema - (93.3%). Tobacco pouch keratosis (15%), OSF (85%) and Oral cancer (25%) were the lesions associated with Smokeless tobacco related habits.

**Conclusion:** This study showed an increased prevalence of bidi smoking and betel quid chewing from rural as compared to urban population with a male predominance. Strong association of Speckled Leukoplakia, Smokers palate, Inflammatory palatal hyperplasia were seen in bidi smokers as compared to Oral Submucous Fibrosis (OSMF), Oral cancer in gutka chewers and Tobacco pouch keratosis among snuff placers.

**Key words:** Tobacco, Cigarette, Bidi

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## Introduction

*Tobacco – “Weapon of mass destruction”.*

Tobacco is the world's biggest preventable killer. Our universe is in a state of tobacco epidemic, with larger population of tobacco users emerging day by day. According to World health organization (WHO), nearly 1/3 rd of the global adult population (1.2 billion people, with female population being 200 million) are tobacco users. In India, there are 240 million tobacco users (195 million men and 45 million women) accounting for one fifth of the worlds tobacco consuming population<sup>1</sup>. India is the world's third largest tobacco growing country, which produces an average of 58,0000 tones every year<sup>2</sup>. It was *Christopher Columbus* who discovered tobacco among the treasures of the new world. Followers of Columbus introduced tobacco into Europe in 1556 and it was Spanish and Portuguese sailors who carried this tobacco to the other parts of the world<sup>3</sup>. Tobacco is basically of 2 main types: Smoking and Smokeless tobacco. Present study is an attempt to assess and compare the various tobacco related habits and its associated oral lesions among rural/urban populations within Mangalore.

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Fig. 1 Showing speckled Leukoplakia (left Buccal Mucosa).

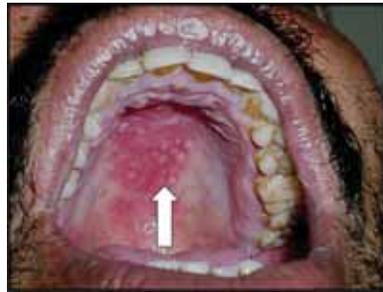


Fig. 2 Showing inflammatory palatal hyperplasia.



Fig. 3 Showing blanched mucosa (OSF changes) in right buccal mucosa.

## Materials and Methods

### Study population:

The area of the district is 842 sq.kms with Male population 4,34,702 and Female population being 4,48,154 totalling to 8,82,856. Among the total population 2,81,777 belong to the rural area and 6,01,079 reside in the urban areas. (2011 census).

### Pilot study:

A pilot study of randomly selected 25 individuals were carried out from Mangalore to determine the feasibility, time required for examining each patient and also to know the existing tobacco related habits.

### Inclusion Criteria:

1. Young, Middle aged and elderly population were included in this study.
2. Both Men and Woman were included.
3. People from other states settled in Mangalore were also included.

### Exclusion Criteria:

1. Non co-operative individuals were excluded.
2. Individuals suffering from any oral mucosal lesions that may mimic those lesions occurring due to tobacco placement.

Study was conducted between (Jan 2011- Dec 2012). 8 Clusters (4 rural and 4 urban) were selected for the study. Random sampling was done with 100 subjects examined from each clusters with a total of 800 subjects screened. Examination was carried out in each individual houses from a particular cluster under natural day light aided with a torch light to visualize the oral cavity. Armamentarium used for the study has been summarized in (Table 1).

## Results

Out of 800 patients screened from rural and urban populations of Mangalore, 550 were males and 250

were females. In rural population, there was an increased prevalence of smoking bidi (8.4%) (Table 2) and was observed among men (16.6%,  $p=0.001$ ) (Table 4) as compared to cigarette smoking (10.9%) (Table 3) prevalent among males (18.3%,  $p=.001$ ) (Table 5) in urban population. High prevalence of betel quid chewing (7.4%) (Table 2) among males (16.6%,  $p=0.001$ ) was seen in rural population as compared to gutka chewing (3.2%) (Table 3) among males (18.3%,  $p=0.001$ ) (Table 5) in urban population. Smoking and smokeless tobacco related oral lesions included- Leukedema (93.3%), Speckled Leukoplakia (89%) (Fig.1), Smokers palate (91%), inflammatory palatal hyperplasia (18%) (Figure 2), tobacco pouch keratosis (15%), OSF (85%) (Figure 3) and oral cancer (25%) among rural /urban populations within Mangalore (Table 6 and Figs. 4, 5).

## Discussion

In our county tobacco has been used in different forms and various forms of smoking/smokeless tobacco are practiced in different parts of the country. The most common form is Bidi, second most common is Cigarette followed by Cherrut or Chutta, Chillum, reverse smoking, Hukli and Hukkah<sup>5</sup>. Smokeless tobacco- Betel nut chewing (Betel quid ) and Chemically processed betel nut chewing are the two commonest form of smokeless tobacco habits pertaining in Indian population. Application of snuff in the labial vestibule is yet another rare type of smokeless tobacco related habit seen in rural population<sup>3</sup>. Concomitant use of Smoking or Smokeless tobacco with alcohol is an existing trend within our society<sup>5</sup>.

Rahman M, Fukui T<sup>6</sup> has reported that smoking bidi (21.56%) among men with little information available about women is popular among rural folk and the urban poor in the South Asian Region. From the present epidemiological study it was observed

Table 1: List of Equipments

Sl no	Item name
1	Mouth mirror and probe.
2	Tongue Depressor
3	Cotton tweezer
4	Kidney tray
5	Cotton holder
6	2*2 inch gauze pieces.
7	Disposable gloves
8	Towel
9	Dettol soap
10	Torch

Table 3: Prevalence of different types of Tobacco related habits from urban population.

Type of Habit	Geographical area	percentage of people involved in the habit
Bidi smoking	Urban	2.7 %
Cigarette smoking	Urban	10.9 %
Betel quid chewing	Urban	2.7 %
Gutka chewing (Processed betel nut)	Urban	3.2 %
Snuff	Urban	0.5 %
Bidi smoking + Betel quid chewing	Urban	0.1%
Bidi smoking + Alcohol	Urban	0.2 %
Cigarette smoking + Betel quid chewing	Urban	0%
Cigarette smoking + Gutka chewing (Processed betel nut)	Urban	1.2%
Total		23.2 %

that bidi smoking among men (8.4%) (Table 2) was most prevalent in Rural Mangalore when compared to cigarette smoking (10.9%) (Table 3) in Urban Mangalore. Mehta FS, Bhonsle RB, Murti PR, Daftary DK, Gupta PC, Pindborg JJ<sup>7</sup> conducted a study to know the lesions associated with bidi smoking in Ernakulam district, Kerala, India. From 182

Table 2: Prevalence of different types of Tobacco related habits from rural population

Type of Habit	Geographical Area	Percentage of People involved in the Habit
Bidi smoking	Rural	8.4%
Cigarette smoking	Rural	4.2%
Betel quid chewing	Rural	7.4%
Gutka chewing (Processed betel nut)	Rural	3.9%
Snuff	Rural	2 %
Bidi smoking + Betel quid chewing	Rural	0.5%
Bidi smoking + Alcohol	Rural	0.2 %
Cigarette smoking + Betel quid chewing	Rural	0.5%
Cigarette smoking + Gutka chewing (Processed betel nut)	Rural	0.2%
Total		27.3 %

individuals examined, they found that, there was a greater incidence of occurrence of speckled Leukoplakia. In a report given by Rahman M, Sakamoto J, Fukui<sup>8</sup> in literature, shows a greater risk of oral cancer associated with bidi smoking. Van der Eb MM, Leyten EM, Gavarasana S, Vandenbroucke JP, Kahn PM, Cleton FJ<sup>9</sup> conducted a cross-sectional study of reverse smoking and its association with pre-malignant and malignant lesions of the palate in the north coastal areas of Andhra Pradesh, India. A total of 480 randomly selected persons were interviewed. Reverse smoking of Chutta was practiced by 33% of the total rural population. The prevalence rate of all palatal lesions was 55% and the lesions included - Leukoplakia palatii, palatal keratosis and palatal cancer.

Tang JG, Jain XF, Gao ML TY, Zhang KHC<sup>10</sup> conducted an epidemiological study of oral Submucous fibrosis in Xiangtan city, China. Among 3907 areca nut chewers (35.37%), 335 cases of OSF were found. In the present epidemiological study, it was observed that habitual areca nut chewers (chemically processed variety) had a higher incidence of OSF strongly

Table 4 Prevalence of different types of tobacco related habits in Male/Female population from Rural sectors of Mangalore.

Sl No	Type of Habit	Sex		Geographic Area
		Male	Female	
1	Bidi smoking	16.6%	0%	Rural
2	Cigarette smoking	8.3%	0%	Rural
3	Gutka (Processed betel nut)	7.8%	0%	Rural
4	Betel quid chewing	16.6%	7.9%	Rural
5	Snuff	2%	1%	Rural
	Total	41.5%	8.9%	

Table 5 Prevalence of different types of tobacco related habits in Male/Female population from Urban sectors of Mangalore.

Sl No	Type of Habit	Sex		Geographic Area
		Male	Female	
1	Bidi Smoking	6.6 %	0%	Urban
2	Cigarette Smoking	18.3%	0%	Urban
3	Gutka (Processed betel nut)	18.3%	1.1%	Urban
4	Betel quid chewing	3.3%	4.7%	Urban
5	Snuff	0.5%	0.5%	Urban
	Total	43.9%	6.3%	

Table 6: Showing various Tobacco related habits and their associated lesions from Rural/Urban sectors from Mangalore.

Sl no	Type of Habits	Associated Lesion	Percentage	Geographic Area with high rate of prevalence
1	Bidi Smoking	Speckled Leukoplakia Smokers palate Inflammatory palatal Hyperplasia Leukedema	89 % 91 % 18 % 93.3 %	Rural
2	Cigarette smoking	Homogenous Leukoplakia	69 %	Urban
3	Gutka (Processed betel nut)	OSMF Oral Cancer	85 % 2 5%	Urban
4	Betel quid chewing	OSMF Oral Cancer	30% 2 %	Urban/Rural
5	Snuff	Tobacco pouch keratosis	15%	Rural
		Total	697 %	

coinciding with the report of Taang JG, Jain XF, Gao ML TY, Zhang KHC.

## Conclusion

Smoking and chewing tobacco habits still persist within our community. Premalignant lesions and Oral

cancer associated with tobacco related habits are also increasing inspite of public awareness and statutory warning to public from the government- "Tobacco causes cancer". Time has come for the government to think differently and to find a new solution to eradicate this weapon of mass destruction from our society.

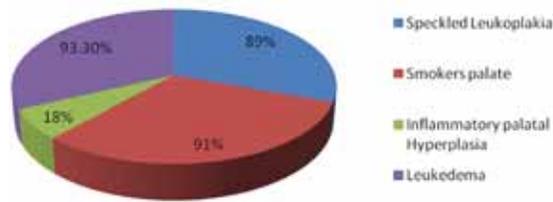


Fig. 4 Pie chart showing smoking tobacco related oral lesions.

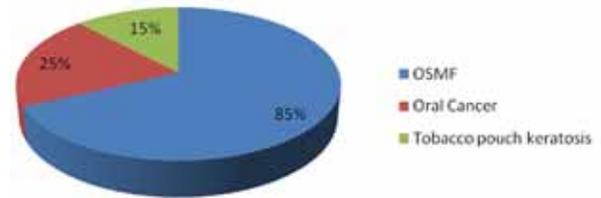


Fig. 5 Pie chart showing Smokeless tobacco related oral lesions.

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# Shoot in the root: *E. faecalis* eradication with three intracanal medicaments- An in vitro study

\* Himani Lau, \*\* Mayank Lau, \*\*\* Swetha M U

## Introduction

The primary goal of endodontic treatment is elimination of microorganisms from the root canal system<sup>1</sup>. Since 1890, when Miller first observed microorganisms associated with pulp tissue, microorganisms have been implicated in infections of endodontic origin. The endodontic microflora is typically a polymicrobial flora of gram-negative and gram-positive bacteria, dominated by obligate anaerobes.

It has been shown that biomechanical cleaning and shaping will render 50-70% of infected canals free of microorganisms while the remaining canals contain vital bacteria. These microorganisms and their toxic metabolic products are responsible for the development and persistence of apical periodontitis of endodontic origin. Thus, insertion of an antimicrobial dressing after preparation is generally recommended to destroy these residual microorganisms<sup>2</sup>.

*Enterococcus faecalis* is a recalcitrant candidate among the causative agents of failed endodontic treatment. The ability of these organisms to cause

## Abstract

**Aim:** Comparative evaluation of *Enterococcus faecalis* eradication with three calcium hydroxide based intracanal medicaments, i.e., calcium hydroxide mixed with sterile saline, 2% chlorhexidine solution, iodoform and silicone oil (Vitapex).

**Materials and method:** Forty single rooted human maxillary anterior teeth were decoronated and intentionally infected with *E. faecalis*. They were divided into four groups of 10 specimens each. The canals were medicated with Group A: calcium hydroxide mixed with saline, Group B: calcium hydroxide mixed with 2% chlorhexidine gluconate, Group C: calcium hydroxide mixed with Iodoform (Vitapex) and Group D: no medication as control group. After one week incubation, medicaments were removed from the canal by irrigation with sterile distilled water. Canals were dried and prepared manually to remove dentinal shavings, which were then weighed and transferred to 1 ml of trypticase soy broth. The contents were shaken and streaked on trypticase soy agar plates. After 24-hour incubation, the colony forming units were counted.

**Results:** Statistical analysis was done using Kruskal-Wallis test and Mann-Whitney test. ( $P < 0.001$ ).

**Conclusion:** Calcium hydroxide - chlorhexidine group showed significantly better results followed by the calcium hydroxide - iodoform group and calcium hydroxide - saline group.

**Keywords:** Calcium hydroxide, Chlorhexidine gluconate, *Enterococcus faecalis*, Vitapex

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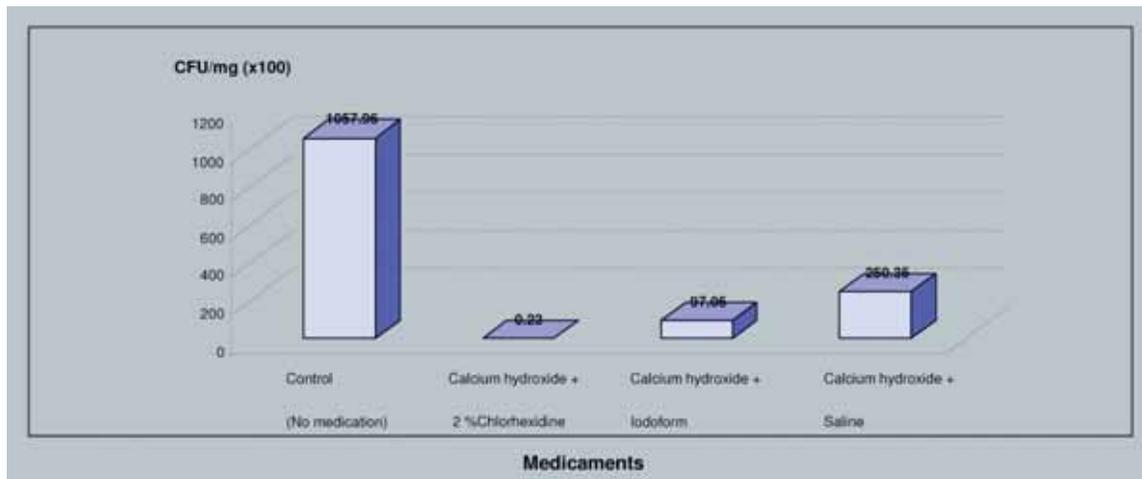
periapical diseases and chronic failure of an endodontically treated tooth is due to its ability to bind to the collagen of the dentinal tubule and remain viable within the tubule<sup>3</sup>.

*Enterococci* possess a number of virulence factors that permit adherence to host cells and extra cellular matrix, facilitate tissue invasion, effect immunomodulation

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Table  
Comparison of colony forming units (CFU/mg x 100) of all groups

Sample number	Calcium hydroxide + Saline	Calcium hydroxide + Iodoform	Calcium hydroxide + 2% Chlorhexidine	Control (No medication)
1.	234.61	103.12	-	1142.85
2.	233.33	121.33	-	1307.60
3.	233.33	87.05	-	1062.50
4.	245.00	73.52	-	1250.00
5.	257.14	87.22	-	900.00
6.	315.83	100.00	1.66	1184.60
7.	226.66	91.57	0.625	914.28
8.	213.75	132.30	-	1166.66
9.	172.00	90.55	-	768.75
10.	371.81	83.33	-	882.35



Mean CFU/mg (x100) in different medicaments

and cause toxin-mediated damage<sup>4</sup>. The species *Enterococcus faecalis* has been recovered in a high proportion of endodontic failures, approximately one third of the canals of root-filled teeth with persistent periapical lesions.<sup>5</sup>

Calcium hydroxide {Ca(OH)<sub>2</sub>} has a strong bactericidal effect on oral bacteria and it is currently one of the most popular antimicrobial dressing agents in endodontic treatment. Although it exerts lethal effects on endodontic microorganisms, some bacteria can survive in root canal systems and can be isolated from infected root canals after dressing with Ca(OH)<sub>2</sub>.<sup>6</sup> Supplementing the antimicrobial activity of calcium hydroxide with other antimicrobial agents may be one way to improve the efficacy of intracanal treatment.

In recent years, several new preparations of calcium hydroxide in combination with iodoform suspended

in an oily vehicle have been introduced to be used as intracanal medicaments. It has been shown that these pastes have superior anti-microbial property, which is attributed to the combination with iodoform as well as the oily vehicle, which may prolong the action of the medicament<sup>7</sup>. This combination is commercially available as Metapex and Vitapex.

Chlorhexidine (CHX) is a broad-spectrum antimicrobial agent that has been reported to be an effective medicament in endodontic therapy<sup>8</sup>. As a root canal irrigant and an intracanal medicament, CHX has an antibacterial efficacy comparable to that of sodium hypochlorite (NaOCl)<sup>9</sup>. It has a bactericidal effect in vitro against a wide range of both gram positive and gram-negative bacteria and is also fungicidal<sup>10</sup>. CHX also imparts substantive antibacterial activity to root dentin after prolonged (i.e., at least 1 week) exposure<sup>11</sup>.



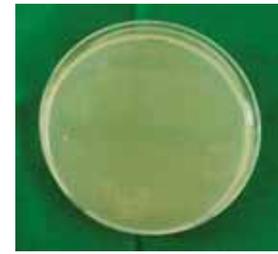
Control Group



Calcium Hydroxide with Saline



Calcium Hydroxide with Iodoform (Vitapex)



Calcium Hydroxide with 2% Chlorhexidine Gluconate Solution

Trypticase Soy Agar Plates after 24hrs of Incubation

Chlorhexidine when added to calcium hydroxide may enhance its antibacterial effectiveness. As no commercial preparation of this combination is available, it was decided to combine calcium hydroxide with laboratory grade chlorhexidine gluconate at a 2% concentration.

This study was designed to compare the antimicrobial activity of three calcium hydroxide preparations – calcium hydroxide mixed with sterile saline, Calcium hydroxide mixed with 2% chlorhexidine solution and calcium hydroxide mixed with iodoform and silicone oil (Vitapex) as intracanal medicaments against *Enterococcus faecalis*.

## Materials and method

### Specimen preparation:

Forty extracted human incisors were used for the study. Teeth having single root and a single canal, with completely formed roots and without any anatomical variations were chosen.

The apical 5 mm and two thirds of the crown were cut off with a rotating diamond disk in a straight hand piece at slow speed. A # 10 round bur was used to enlarge the root canal of the middle segment to standardize the inner diameter of the canal.

The smear layer was removed by irrigating the canals with 10% citric acid. The segments were sterilised by autoclaving at 121°C for 20 minutes. This was repeated three times.

The segments were placed in trypticase soy broth containing a culture of *E. faecalis* ATCC29212 ( $1.5 \times 10^8$  colony forming units / ml) which corresponded to 0.5 Mc Farland units and incubated at 37°C for 5 days. The broth was replaced with fresh broth containing cultures of *E. faecalis* ( $1.5 \times 10^8$  Colony forming units / ml) on the third day.

A sample was taken on the first, third and fifth day and cultivated on blood agar plates to confirm the

purity of *E. faecalis* in the inoculum. After 5 days, the specimens were taken out from the broth and the canals were blotted dry with sterile paper points.

### Specimen grouping:

The specimens were randomly divided into three experimental groups and one control group. (n = 10 in each group.)

#### GROUP A: Calcium hydroxide with saline

Pure calcium hydroxide powder was mixed with sterile saline on a sterile glass slab to form a paste. The paste was loaded in a sterile syringe and the canals were injected with the medicament.

#### GROUP B: Calcium hydroxide with iodoform (Vitapex)

This medicament was used according to manufacturer's instructions and the canals were injected with medicament.

#### GROUP C: Calcium hydroxide with 2% chlorhexidine gluconate solution

Pure calcium hydroxide powder was mixed with 2% chlorhexidine gluconate solution on a sterile glass slab to form a paste. The paste was loaded in a sterile syringe and the canals were injected with the medicament.

#### GROUP D: Control group

The canals of these specimens were not medicated.

### Specimen sampling:

After injecting the medicaments under aseptic conditions, the specimens were transferred separately into sterile glass beakers containing moist sterile gauze (to prevent drying of the medicament). The specimens were incubated at 37°C for 7 days.

After seven days, under aseptic conditions each specimen was individually removed using sterile forceps, the root canals were irrigated with sterile saline to completely remove the medicament. The canals were dried with sterile absorbent points. Each canal

was prepared manually with a new sterile # 40 Hedstrom file.

The dentin removed from the canal was collected on pre weighed sterile aluminum foil. The weight of dentinal shavings was measured in each case and then the shavings were transferred to 1 ml of trypticase soy broth in a test tube.

The contents were shaken up in the test tube and using a sterile metal loop the sample was streaked on trypticase soy agar plates and incubated at 37° C for 24 hours. The same procedure was repeated for every sample.

After 24 hours, the colony forming units were counted. Using the recorded weight of dentin shavings, the number of colony forming units per mg was calculated and the data subjected to statistical analysis. Data were analysed using Kruskal-Wallis and Mann-Whitney test.

## Results

The control group had the highest CFU/mg (x100) followed by Ca(OH)<sub>2</sub> + saline, Ca(OH)<sub>2</sub> + iodoform and silicone oil (Vitapex) and Ca(OH)<sub>2</sub> + CHX respectively.

There was a statistically significant difference between all the groups (P<0.001).

## Discussion

Residual microorganisms in the root canal system following cleaning and shaping or microbial contamination of the root canal system between appointments have been a concern. Antimicrobial agents are recommended for intracanal sepsis to prevent the growth of residual microorganisms between appointments. Such medications must have the greatest possible and most long lasting antimicrobial efficacy against bacterial species in the infected canal, without causing irritation to the periapical tissues.

By remaining for a longer time in the canal than irrigants, antimicrobial intracanal medicaments have a higher probability to reach the microorganisms located in areas unaffected by chemomechanical preparation, thereby helping in disinfecting the root canal system.

The lethal effects of calcium hydroxide are by three mechanisms- damage to bacterial cell membrane, protein denaturation and damage to the bacterial DNA<sup>14</sup>.

The major cause of root canal treatment failure is the persistence of microorganisms in the canal. *Enterococcus faecalis* was chosen for inoculation in the study because it is considerably resistant to intracanal medication with calcium hydroxide and is

demonstrated frequently in post endodontic failure cases. Although it has been shown that *E. faecalis* cannot survive at pH 11.5-12, it is difficult to maintain this alkalinity consistently which leads to the organism not being totally eradicated from the root canal.<sup>5</sup>

Kayaoglu et al. demonstrated that *E. faecalis* showed a pronounced increase in binding to collagen at a mildly alkaline pH. This could occur in the root canal following medication with calcium hydroxide. As adherence of the microorganism to host tissue is an essential step in the establishment of infection, this may contribute to the predominance of this organism in persistent endodontic infections<sup>4</sup>.

Pastes containing iodoform (tri iodo methane) were indicated as antiseptics due to iodine release in nascent state when in contact with secretions or endodontic infections. The antimicrobial action of iodoform occurs from releasing iodine which gives it a high reactivity<sup>13</sup>. The antimicrobial action of iodine is rapid, even at low concentrations, but the exact mode of action is not fully known. It is thought that iodine attacks key groups such as proteins, nucleotides, and fatty acids, resulting in cell death<sup>15</sup>. Vitapex, a combination of calcium hydroxide and iodoform in silicone oil was used in this study.

It performed significantly better than the calcium hydroxide – saline group as well as the positive control. The use of an oily vehicle promotes low solubility and diffusion of paste within the tissues, thus remaining in the root canal for longer time. This is similar to the results of an in vitro study done by Cwikla et al<sup>7</sup>.

Chlorhexidine gluconate, a broad spectrum antibacterial agent, is a cationic bisguanide, which adsorbs onto microbial cell surfaces and reacts with negatively charged groups causing a reduction of the surface charge. The molecules of chlorhexidine gluconate adsorb onto the dentin and prevent microbial colonization on the dentin surface for sometime (substantive antimicrobial activity)<sup>10</sup>.

It was decided to combine calcium hydroxide with 2% chlorhexidine gluconate solution and use it as an intracanal medicament. Best results were obtained, which could be attributed to the substantive antimicrobial activity of chlorhexidine. This is in concurrence with the results of previous studies by Siren et al<sup>10</sup>.

Dametto et al. have shown that 2% chlorhexidine gluconate (gel / liquid) was more effective than 5.25% sodium hypochlorite in keeping low CFU counts of *E faecalis* for 7 days after biomechanical preparation<sup>12</sup>.

The experimental model used in this study was adapted from that established by Orstavik and

Haapasalo for the study of infection and disinfection of tubules<sup>3</sup>. The model was modified by adapting it to extracted human teeth rather than bovine incisors. After intentionally infecting with the organism *E. faecalis*, the specimens were treated with the medicaments for 1 week. The ability of *E. faecalis* to colonize the root dentin was measured to assess the antimicrobial activity imparted by the medicaments.

Supplementing the antibacterial efficacy of calcium hydroxide with iodoform or 2% chlorhexidine gluconate improved the efficacy of the intracanal medicament against *E. faecalis*. The results obtained with the combination of calcium hydroxide with 2% chlorhexidine gluconate were significantly better than the combination of calcium hydroxide with iodoform. Although calcium hydroxide mixed with saline reduced the microbial counts, the other two combinations were more effective.

Calcium hydroxide mixed with sterile saline was not effective in reducing the bacterial counts to large extent. This has been attributed to a functioning proton pump which served to acidify the cytoplasm at high pH, an adaptive response at alkaline pH and a stress induced protein synthesis<sup>5</sup>.

Chlorhexidine gluconate can be used as a routine root canal irrigant and in combination with calcium hydroxide as an intracanal medicament. For increased efficacy, the concentration of chlorhexidine can be increased and commercial preparations incorporating calcium hydroxide and chlorhexidine gluconate as a paste would be beneficial for the clinician and help in eradication of bacteria resistant to calcium hydroxide.

## Conclusion

Under the conditions of this study, it can be concluded that:

1. The addition of 2% chlorhexidine gluconate or iodoform to calcium hydroxide improved the antibacterial activity of calcium hydroxide on *E. faecalis*.

2. The combination of 2% chlorhexidine gluconate and calcium hydroxide decreased the microbial counts significantly better when compared with the calcium hydroxide-iodoform group and the calcium hydroxide-saline group.

3. The results of calcium hydroxide -iodoform group were significantly better than the calcium hydroxide -saline group.

*Enterococcus faecalis* has been reported to be isolated in most root canal failure cases. Both 2% chlorhexidine gluconate and iodoform show a definite promise as antibacterial agents and prove to be useful agents in eradicating *E. faecalis*.

However, in clinical practice we come across various other endodontic pathogens. The medicament that is effective against a single microbe may not necessarily be effective against the complex microbial flora, *in vivo*. Hence, it is prudent to test the combination of these medicaments against them.

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# Prevalence of golden proportion in anterior esthetics of un restored dentition in keralite population

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## Abstract

**Purpose:** This study was designed to investigate a keralite population to determine the lengths, widths, length/width ratios of six maxillary anterior teeth, presence or absence of symmetry or sexual dimorphism and the prevalence of golden proportion.

**Materials and methods:** 17 samples were included in this study. Measurements of length and width of the teeth were taken with digital vernier calipers. For the golden proportion measurements, the teeth were digitally photographed and images uploaded into Photoshop 7.0® and the digital widths were measured. The data were analyzed statistically using Student's t-test.

**Results:** The average values of the length, width, length/width ratio of six maxillary anterior teeth showed no significant difference between males and females ( $p > 0.05$ ). Right and left sides also showed no difference ( $p > 0.05$ ) in length, width, length/width ratio except for maxillary right and left central incisors ( $p < 0.001$ ). It was also found that golden proportion does not exist in this population.

**Keywords:** golden proportion, anterior teeth, length, width.

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Lombardi suggested the Golden proportion to be an important tool to help dentists in predicting the width of the anterior teeth while restoring them<sup>2</sup>.

This study was designed to investigate a Keralite population to determine:

- ♦ The length and width dimensions of the six maxillary anterior teeth.
- ♦ The ratios of intra- and inter tooth lengths.
- ♦ The presence / absence of symmetry or sexual dimorphism.
- ♦ If the Golden Proportion applies to this population group.

## Materials and methods

Ethical approval was obtained from the Institutional Ethical Committee, PMS College of Dental Science and Research, Trivandrum

### Inclusion and Exclusion Criteria:

17 undergraduate dental students were included in this study (3 males, 14 females). The accepted age range was 20–22. Subjects were excluded from the study if the teeth were missing, crowned, veneered, fractured or with evidence of parafunction or wear facets, so

## Introduction

The role of the prosthodontist is not just limited to restoration and rehabilitation, but also in the design of esthetics. The influential factors contributing to a harmonious anterior dentition are the size, shape and arrangement of anterior teeth. The shape and location of the central incisors influences or determines the appearance and placement of the laterals and canines. Golden proportion is a guideline for establishing correct proportions in an esthetically pleasing smile. The first written

definition of the golden ratio was provided by the ancient Greek mathematician Euclid of Alexandria.

Golden proportion can be defined as “the ratio between succeeding terms in a mathematical progression in which each number is the sum of the two immediately preceding it. The ratio converges on approximately 1.618:1. Claims have been made that the golden proportion exists in natural dentition in the ratio of the widths of incisors and canines as seen from the facial surface”<sup>1</sup>.

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Fig. 1 Measurement of the length of tooth with digital vernier caliper



Fig. 2 Measurement of the width of the tooth with digital vernier caliper

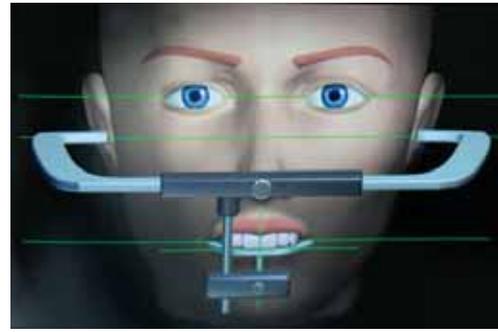


Fig. 3a

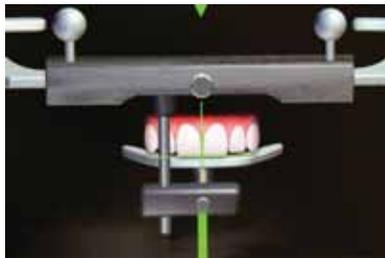


Fig. 3b



Fig. 3c

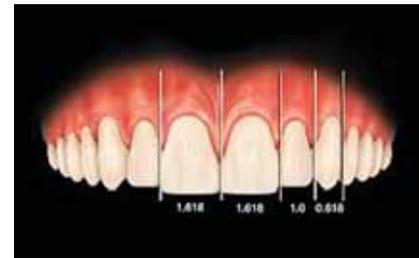


Fig. 4 Golden proportion measurements

Fig. 3(a,b,c) – Orientation of incisal plane as per Fradeani's recommendation

measurement was not possible. Any sample with history of orthodontic treatment was also excluded.

### ► Tooth measurements

Measurements were taken to record the lengths and widths of all included teeth using digital vernier calipers. The clinical crowns of the maxillary anterior teeth were measured (mesio-distal width and their incisogingival length). Measurements of each tooth were made at the largest dimension for length and width. The width was recorded between interproximal contacts, and the length was recorded from the most cervical extension of the tooth directly following the long axis of the tooth to the incisal edge.

### ► Golden proportion measurements

The teeth were digitally photographed from a frontal perspective. The frontal aspect was directly perpendicular to the plane formed by the labial aspects of the central incisors, with the mid incisal point in the image midpoint. For standardization, the incisal plane was kept parallel to the horizontal plane and perpendicular to the midline as per Fradeani's recommendations (fig. 3a, 3b, 3c). A digital SLR camera (Canon D550) fixed on a tripod perpendicular to the frontal plane (object and camera distance 40 cm) with a 18-55 mm macro-lens was used. So the field of view for each photograph was identical<sup>3</sup>.

The images were uploaded and imported to Adobe Photoshop 7.0<sup>®</sup> software. Using the rectangular marquee tool in the information palette, the digital widths (a pixel-based measurement) of the six maxillary anterior teeth were recorded in Excel spreadsheets containing the subject number, gender and width of each tooth.

### Statistical analysis

The data were analyzed using SPSS software. The data are expressed in its mean and standard deviation. Student's t test was used to compare mean values between two groups like gender and side. For all statistical evaluations, a two-tailed probability of value, < 0.05 was considered significant.

### Results

The average values of the lengths of six maxillary anterior teeth showed no significant difference between males and females (Table 1). The measurements of the widths of those teeth when evaluated with the t test revealed that there is no significant difference between males and females (Table 2). As there is no gender difference in length and width measurements of teeth, obviously the average length to width ratios turned up with no difference (Table 3). In case of the length ratios of centrals to laterals, canines to laterals and canines to centrals also, the gender difference did not make any difference (Table 4). On comparing the right and left sides of the arch, male and female groups

Table 1 - Average lengths of six maxillary anterior teeth

Parameters	Gender	N	Mean	$\pm$ SD	Mean Difference	t value	p value	95 % CI
13 Length	Male	3	10.46	0.41	0.96	2.331	> 0.05	0.18 - 1.84
	Female	14	9.50	0.68				
12 Length	Male	3	9.76	0.75	0.87	1.826	> 0.05	0.14 - 1.91
	Female	14	8.88	0.76				
11 Length	Male	3	10.80	1.40	0.39	0.744	> 0.05	-0.73 - 1.51
	Female	14	10.41	0.70				
21 Length	Male	3	10.97	1.11	0.39	0.831	> 0.05	- 0.62 - 1.41
	Female	14	10.57	0.67				
22 Length	Male	3	9.77	0.57	0.83	1.509	> 0.05	-0.34 - 2.03
	Female	14	8.94	0.90				
23 Length	Male	3	10.41	0.41	0.77	1.631	> 0.05	- 0.23 - 1.76
	Female	14	9.64	0.78				

Table 2 - Average widths of six maxillary anterior teeth

Parameters	Gender	N	Mean	+ SD	Mean Difference	t value	p value	95 % CI
13 Width	Male	3	7.74	0.46	0.15	0.536	> 0.05	0.46 - 0.76
	Female	14	7.58	0.45				
12 Width	Male	3	7.66	1.07	0.81	2.331	> 0.05	0.06 - 1.55
	Female	14	6.85	0.41				
11 Width	Male	3	8.77	1.07	0.23	0.629	> 0.05	- 0.55 - 1.01
	Female	14	8.54	0.45				
21 Width	Male	3	8.41	0.52	0.13	- 0.429	> 0.05	- 0.78 - 0.51
	Female	14	8.54	0.47				
22 Width	Male	3	7.65	1.08	0.79	2.375	> 0.05	0.08 - 1.51
	Female	14	6.86	0.37				
23 Width	Male	3	7.80	0.19	0.29	0.885	> 0.05	-0.40 - 0.97
	Female	14	7.52	0.54				

were combined as the above mentioned t tests showed no gender difference. Here, it was found that there is no difference between right and left sides in terms of length, width, length to width ratio except for maxillary right and left central incisors where they showed highly significant difference statistically (Table 5).

On comparing the proportions of apparent widths of lateral incisors to centrals and canines to lateral incisors (Fig. 5) and canines to central incisors (Fig. 6), it was found that there was no significant association between them and the golden proportion guidelines.

## Discussion

The concept of Golden proportion has always fascinated scientists, architects and artists for more than 2,400 years. Although it has always existed in mathematics and in the physical universe, it is still not known exactly when it was first discovered and applied by mankind. The Greeks usually attributed discovery of this concept to Pythagoras or his followers who had come to the conclusion that in order to be beautiful, the repeating units should ideally be in proportion to one another. It was not until 1900s when an American

Table 3 Average length to width ratios of six maxillary anterior teeth

Parameters	Gender	N	Mean	+ SD	Mean Difference	t value	p value	95 % CI
13 L/W	Male	3	1.35	0.03	0.10	1.148	> 0.05	0.08 - 0.27
	Female	14	1.26	0.14				
12 L/W	Male	3	1.28	0.13	0.02	-0.198	> 0.05	0.19 - 0.16
	Female	14	1.30	0.13				
11 L/W	Male	3	1.23	0.09	0.02	0.327	> 0.05	- 0.08 - 0.11
	Female	14	1.22	0.07				
21 L/W	Male	3	1.30	0.06	0.07	1.455	> 0.05	-0.03 - 0.16
	Female	14	1.24	0.07				
22 L/W	Male	3	1.29	0.16	0.02	-0.166	> 0.05	- 0.23 - 1.77
	Female	14	1.31	0.16				
23 L/W	Male	3	1.33	0.03	0.04	0.404	> 0.05	- 0.17 - 0.25
	Female	14	1.29	0.17				

Table 4 Length ratios of centrals to laterals, canines to laterals and canines to centrals

Parameters	Gender	N	Mean	+ SD	Mean Difference	t value	p value	95 % CI
L 1.1 / L 1.2	Male	3	1.10	0.09	0.08	-1.118	> 0.05	- 0.22 - 0.07
	Female	14	1.18	0.11				
L 1.1 / L 1.3	Male	3	1.03	0.13	0.06	-1.272	> 0.05	- 0.17 - 0.04
	Female	14	1.10	0.07				
L 1.3 / L 1.2	Male	3	1.07	0.10	0.002	-0.005	> 0.05	- 0.10 - 0.11
	Female	14	1.07	0.08				
L 2.1 / L 2.2	Male	3	1.12	0.09	0.09	-0.911	> 0.05	- 0.23 - 0.09
	Female	14	1.19	0.12				
L 2.1 / L 2.3	Male	3	1.05	0.10	0.05	-0.908	> 0.05	- 0.16 - 0.06
	Female	14	1.10	0.08				
L 2.3 / L 2.2	Male	3	1.07	0.09	0.01	-0.273	> 0.05	- 0.13 - 0.09
	Female	14	1.08	0.08				

mathematician named Mark Barr represented the *GoldenRatio* by using a Greek symbol phi, after Phidias, a Greek artist who used it extensively in his work.<sup>4</sup>

Levin wrote about aesthetic proportions in dentistry with reference to the 'Golden Proportion', which relates two objects in a harmonious natural appearance and has been used extensively in ancient Greek architecture<sup>5,6</sup>. The ratio of the larger to the smaller is 1618:1. Levin discussed three relationships in this manner; from a frontal perspective, the central incisor being 'Golden' to the lateral and the

lateral 'Golden' to the canine. The incisal edges of maxillary teeth also divide the lower half of the face, with the mandible at rest into a Golden Proportion<sup>6</sup>.

#### **Tooth Dimensions**

Tooth dimensions provided in dental anatomy reference textbooks were determined for extracted teeth or skulls with intact dentitions (length from CEJ to incisal tip) and therefore did not record clinical crown height and are therefore not comparable with the current study<sup>7</sup>.

Table 5 Mean length, width and their ratio comparing between two sides

Parameters	Mean	+ SD	t value	p value	95 % CI
13 Length	9.67	0.73	-1.048	> 0.05	- 0.34 - 0.12
23 Length	9.78	0.78			
13 Width	7.61	0.44	0.465	> 0.05	- 0.15 - 0.23
23 Width	7.57	0.51			
13 L/W	1.27	0.13	-0.951	> 0.05	- 0.08 - 0.03
23 L/W	1.30	0.16			
12 Length	9.03	0.81	-0.681	> 0.05	- 0.22 - 0.11
22 Length	9.09	0.90			
12 Width	6.99	0.62	-0.105	> 0.05	- 0.17 - 0.16
22 Width	7.00	0.59			
12 L/W	1.30	0.13	-0.306	> 0.05	- 0.05 - 0.04
22 L/W	1.30	0.16			
11 Length	10.47	0.82	6.776	< 0.001	0.95 - 1.82
22 Length	9.09	0.90			
11 Width	8.58	0.57	10.171	< 0.001	1.25 - 1.91
22 Width	7.00	0.59			
11 L/W	1.22	0.07	- 2.489	< 0.05	- 0.15 - 0.11
22 L/W	1.30	0.16			

According to Mavroskoufis et al variations in dimensions or form of the left and right maxillary central incisors for individual patients were previously reported in 86–90% of cases, with over 60% of the differences being quite substantial<sup>8</sup>.

However, measurements of 658 incisors in a similar study failed to identify any significant differences<sup>9</sup>.

The current study reported significant difference in mean values of tooth dimensions between sides of the Arch (central incisors).

Sexual dimorphism had been reported previously for tooth dimensions<sup>9,10</sup>.

Significant sexual dimorphism was not seen in this study with respect to length/width/their and this is in accordance with a recent Turkish study<sup>11</sup>.

Sterret found no differences between the genders, with the exception of the canine tooth (mean 30% and 23% for males and females, respectively)<sup>10</sup>.

### Tooth ratios

Magne P et al. in a previous study of unworn anterior maxillary teeth, the central incisor, lateral incisor and canine were 28%, 37% and 37% longer than wider, respectively<sup>12</sup>.

The corresponding values from the current study were 12.3% for the central incisor, 12.8% for the lateral incisor and 13% for the canine.

The difference was most likely due to different methods used previously where 123 extracted anterior maxillary teeth were measured without information provided on age or gender. This study made no attempt to quantify or exclude wear, so this may have resulted in a shorter tooth and a reduced length to width ratio when compared to the Magne study.

### Golden proportion

Arash Nikgoo et al in their study found out that the golden ratio can be useful to achieve esthetic restorations of the maxillary central and lateral incisors. However, the golden ratio between the perceived widths of the maxillary lateral incisors to the canines does not seem to be decisive for an attractive smile and other factors should be considered<sup>13</sup>.

Shibu George et al carried out a study with the objectives of determining if the constant relation of intercanthal distance (ICD) and golden proportion are parameters applicable to our population also. Three hundred south Indian subjects between 18 and 26 years of age, free from facial and dental deformities were examined. They concluded that as in the European population, the ICD and the golden proportion are reliable predictors for determining the width of the maxillary central incisors in the south Indian population also.<sup>14</sup>

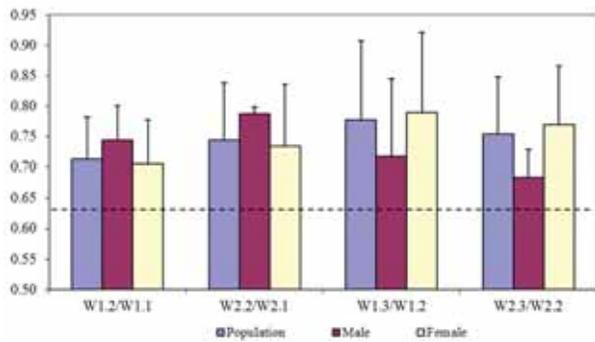


Fig. 5 Golden proportion comparison of laterals to centrals and canines to laterals

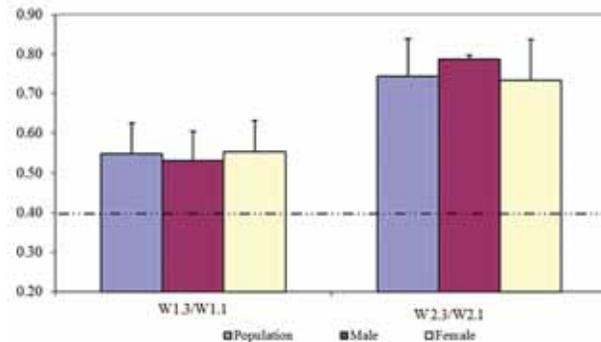


Fig. 6 Golden proportion comparison of canines to centrals

According to Preston, the golden proportion rarely exists in natural teeth, which was determined after measuring 58 computer-generated images of dental casts with an image measurement program<sup>15</sup>. Also, Gillen et al found that the golden proportion was rarely seen after examining 58 subjects. Their measurements were made directly on casts rather than frontal images<sup>1</sup>. Mashid et al conducted a study with 157 dental students (75 females, 82 males) that were selected as having an esthetic smile. They found that the golden proportion was not found to exist between perceived maxillary widths<sup>16</sup>.

The results of the study by Sulieman S et al also supported the absence of golden proportion in the evaluated smiles<sup>17</sup>.

In the current study, application of Golden Proportion guidelines yielded statistically significant differences between the right and left sides so the average values were taken for golden proportion calculation. Result of this study indicates that golden proportion does not exist in the present population.

However, the sample size taken for this study was very small. Also there was a significant difference in the size of male and female populations. Therefore the results thus obtained may not be very conclusive for the particular population. This calls for further investigation in this area with larger sample size.

### Conclusions:

However within the limitations of this study it is concluded that:

- ◆ Tooth measurements were found to be different between the left and right sides for maxillary incisors.
- ◆ Gender dimorphism does not exist for various tooth dimensions
- ◆ Dimensional tooth guidelines should therefore be provided for population not for individual gender.
- ◆ Golden proportion is not applicable to this population.

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# "C" Does Matters– A Case series of Endodontic Management of C shape canal

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## Abstract

Endodontic triad constitutes access cavity preparation, canal preparation and filling of the canal. The ultimate success of endodontic therapy depends on complete debridement and three dimensional obturation of the canal. Although the apical foramen must be sealed by endodontic therapy the root canal is what provides the pathway to the apex. Therefore it is important for the clinician to be familiar with various anatomical variations of the system. Mandibular second molar has more variations than any of the molar tooth. The so called C shaped tooth was first described by cooke & cox. C shaped tooth may be quite difficult to diagnose and treat. This case series focuses on four such cases of C shaped canal configuration in mandibular second molar and their endodontic management.

Key words: C shaped canal, mandibular second molar.

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This C-shaped canal is an anatomical variation of a root fusion and a type of taurodontism. This results from the failure of Hertwig's epithelial sheath to develop or fuse in the furcation area in the developing stage of the teeth.<sup>3</sup> Failure on the buccal side results in a lingual groove, and the opposite case is possible. Failure on both sides results in the formation of a conical or prism-shaped root.<sup>4</sup> Many authors have proposed different classification of 'C' shape canal anatomy. One of them was Melton's classification which is later modified by Fan et al

Fan *et al.*, modified Melton's method into the following categories:

1. Category I (C1): The shape was an interrupted "C" with no separation or division figure 5a.
2. Category II (C2): The canal shape resembled a semicolon resulting from a discontinuation of the "C" outline figure 5b, but either angle  $\alpha$  or  $\beta$  (fig. 6) should be no less than  $60^\circ$ .
3. Category III (C3): 2 or 3 separate canals figure 5c and d and both angles,  $\alpha$  and  $\beta$ , less than  $60^\circ$  (fig. 7).
4. Category IV (C4): Only one round or oval canal in the cross-section (figure 5e).

## Introduction

The goal of root canal treatment is the thorough cleaning shaping and obturation of the entire root canal system. The main reasons for endodontic failure are apical percolation and the presence of microorganisms caused by incomplete instrumentation, inadequate cleaning, insufficient canal obturation, and the presence of untreated canals<sup>1</sup>. Therefore a thorough knowledge of the anatomy of teeth involved in root canal treatment is essential for successful debridement and obturation of the root canal system.

One of the most important anatomic variations is the "C" configuration of the canal system. The C-shaped canal, which was first documented in endodontic literature by Cooke and Cox in 1979<sup>2</sup>, is so named for the cross-sectional morphology of the root and root canal. Instead of having several discrete orifices, the pulp chamber of the C-shaped canal is a single ribbon-shaped orifice with a  $180^\circ$  arc (or more), which, in mandibular molars, starts at the mesiolingual line angle and sweeps around the buccal to the end at the distal aspect of the pulp chamber.

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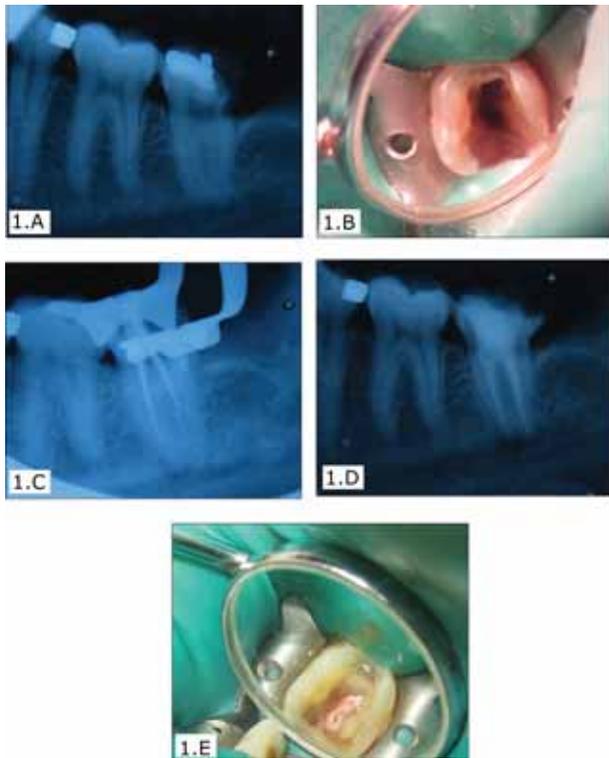


Fig. 1A - Preoperative radiograph of right mandibular second molar  
 Fig. 1B - access cavity preparation revealing "c" shaped configuration  
 Fig. 1C - master cone radiograph  
 Fig. 1D - Postoperative radiograph showing obturation of the C-shaped canal system.  
 Fig. 1E - clinical picture revealing obturation of "c" shaped configuration



Fig. 3A - Access cavity preparation shows presence of category II (C2) "C" shaped canal .  
 Fig. 3B - master cone radiograph shows presence of fused root and two canals joining at the apical third of root.  
 Fig. 3C - Postoperative radiograph showing obturation of the C-shaped canal system.  
 Fig. 3D - clinical picture revealing obturation of "c" shaped configuration

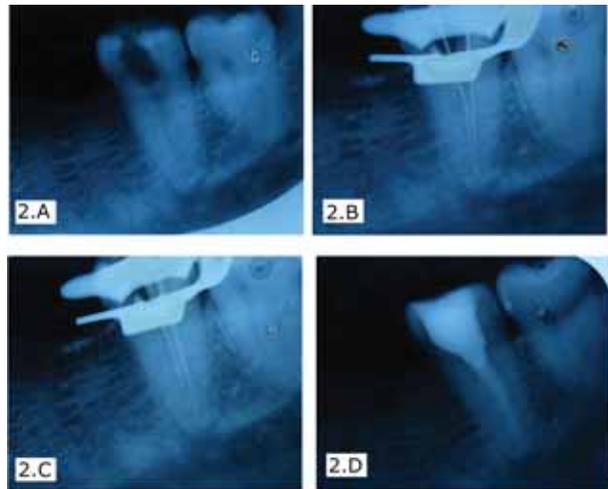


Fig. 2A - preoperative radiograph of right mandibular second molar with single conical root  
 Fig. 2B - Working length radiograph showing two canals are merging to exit through a single apical foramen.  
 Fig. 2C - master cone radiograph  
 Fig. 2D - Postoperative radiograph showing obturation of the C-shaped canal system

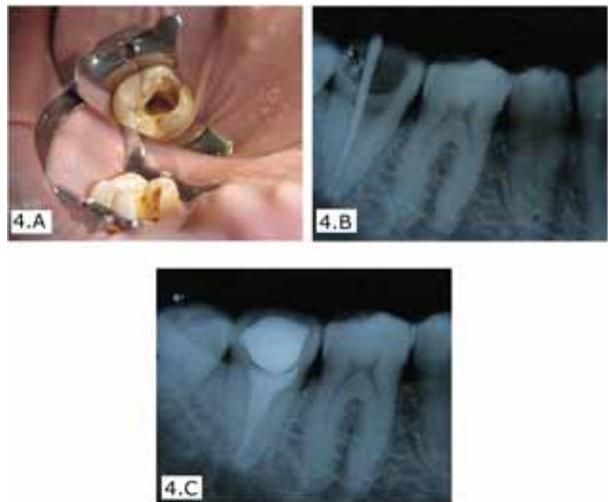


Fig. 4A - Access cavity preparation reveals presence of "C" shaped canal .  
 Fig. 4B - master cone radiograph shows presence of single large canal .  
 Fig. 4C - Postoperative radiograph revealing obturation of the C-shaped canal system.

5. Category V (C5): No canal lumen could be observed (which is usually seen near the apex only) (figure 5f).

Fan *et al.*<sup>5</sup> analyzed the C-shaped canal system using micro-computed tomography (CT) and modified the classification of the C-shaped canal system. They considered that this type of canal system had to exhibit all of the following three features: (i) Fused roots, (ii) a longitudinal groove on the lingual or buccal surface

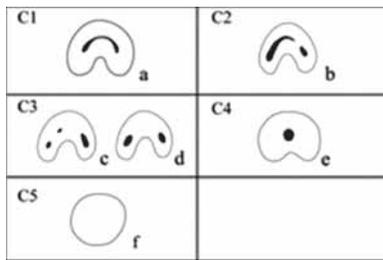


Fig. 5

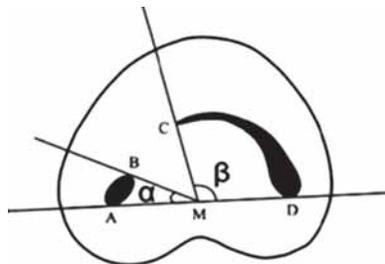


Fig. 6

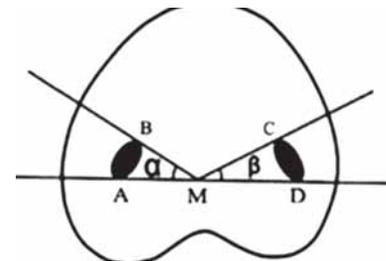


Fig. 7

of the root, and (iii) at least one cross-section of the canal belonging to the C1, C2, or C3 configuration. They found that although the C3-type orifice may look like two or three separate orifices, an isthmus linking them is often discernible.<sup>5</sup>

The C-shaped canal system is most commonly found in mandibular second molars, especially in Asian populations.<sup>4, 6, 7</sup> Recent studies done on mandibular molars with C-shaped roots, NiTi rotary instrumentation was associated with a higher percentage (59.6%) of uninstrumented canal areas than the manual K-file group (41.6%) with more dentine removed from the convex aspect of the C-shaped canal.<sup>8, 9</sup> Once recognized, the C-shaped canal provides a challenge with respect to debridement and obturation, especially because it is unclear whether the C-shaped orifice found on the floor of the pulp chamber actually continues to the apical third of the root

This paper describes successful management of four unusual cases of C-shaped canal configuration.

### Case: 1

A 32-year-old female patient reported to the Department of Conservative Dentistry with a chief complaint of pain in the lower right back teeth region. Medical history of the patient was non-contributory. There was presence of prolonged sensitivity to hot and cold. Clinically, there was a presence of deep carious lesion approaching pulp, the tooth was nonresponsive to vitality tests and it was not tender to percussion. Radiograph showed deep carious lesion approaching pulp with periapical radiolucency involving both the roots. The condition was diagnosed as pulp necrosis with apical periodontitis.

After gaining profound anesthesia and rubber dam application, an access cavity was prepared. After pulp extirpation, 'C' shaped canal configuration was observed with three canal orifices. The pulp chamber was irrigated with 5.25% sodium hypochlorite. Working length was determined using apex locator (Root ZX, J. Morita CO, Tustin, CA), confirmed radiographically. Cleaning and shaping was done with ProTaper rotary files (Dentsply

Maillefer, Ballaigues, Switzerland) till the size of F3 with intermittent irrigation using 5.25% sodium hypochlorite and Passively activated with ultrasonic unit, Piezon EMS (EMS GmbH, Munich, Germany) for 1 minute for maximum debridement of the complex anatomy of the root. Calcium hydroxide (RC-Cal, India), an intracanal medicament was used and the patient was recalled after 1 week. In the next appointment, Master cone was fitted to the working length and radiograph was taken, and the canal was obturated with selected master gutta-percha cone along with accessory cones with AH-Plus endodontic sealer (Dentsply Maillefer Company, USA). A temporary restoration was placed. The patient was recalled after 1 week for a post endodontic restoration. Same treatment protocol was followed in the remaining three cases.

### Case: 2

A 37-year-old male patient reported to the Department of Conservative Dentistry with a chief complaint of pain in the lower right back tooth region. Medical history of the patient was non-contributory. There was a presence of prolonged sensitivity to hot and cold. Clinically, there was a presence of deep occlusal carious lesion with 47 approaching pulp. Radiographically, occlusal radiolucency was seen with 47 involving pulp chamber. Periradicular area of 47 with periapical radiolucency. The condition was diagnosed as pulp necrosis & apical periodontitis with 47. The radiograph also showed a single conical root with two radiolucent canal outline, which were joining at the apical third of the root, suggesting presence of C-shaped canal pattern. After proper isolation and profound anesthesia, an access cavity was prepared. On exploration of pulp chamber, two orifices were recognized, which were then negotiated till apex with the use of multiple small K files with the help of RC-Help (Prime Dent, India) and 3% NaOCl. After proper working length determination, an IOPA was taken and it showed that all the canals were joined at the apical third of the root. Then, cleaning, shaping and obturation was done as mentioned in Case 1. The patient is currently asymptomatic and under follow-up.

### Case: 3

A 26-year-old male patient reported to the Department of Conservative Dentistry with a chief complaint of pain in the lower right back tooth region. Based on signs and symptoms, vitality testing condition was diagnosed as irreversible pulpitis with 47. The radiograph showed a single conical root with slight distal curvature with two radiolucent canal outline, which were joining at the apical third of the root, suggesting presence of C-shaped canal pattern. Tooth was treated endodontically following protocol similar as in other two cases.

### Case: 4

A 43-year-old male patient reported to the Department of Conservative Dentistry with a chief complaint of pain in the lower right back tooth region. Clinically, there was a presence of deep carious lesion approaching pulp, the tooth was nonresponsive to vitality tests and it was not tender to percussion. Radiographically, deep carious lesion involving pulp with apparently normal peri-apex was seen. The condition was diagnosed as pulp necrosis with normal periapical area. The radiograph also showed a single conical root with outline of single root canal, suggesting presence of C-shaped canal which was confirmed clinically after access cavity preparation. Subsequently tooth was treated endodontically.

### Discussion

The definition of a C-shaped canal is not yet clear. Some authors consider C shaped canals as all those with a general outline of a “C” and present in a C-shaped root, regardless of whether a separate canal or orifice was observed<sup>10</sup>. The C-shaped canal system has been the subject of many reports since Cooke and Cox<sup>2</sup> first noted their presence and discussed their potential clinical significance in 1979. Because proper cleaning, shaping, and obturation of the apical third may be regarded as an important determinant to good prognosis<sup>11</sup>, the C-shaped canal system, thus, represents a challenge to its proper debridement and obturation. This has led to the proposal of many modified techniques to optimize the technical quality and hence the chance of endodontic success<sup>12</sup>. Recognition of a C-shaped canal configuration before treatment can facilitate effective management.

Clinical recognition of C-shaped canals is based on the definite observable criteria (i.e., the anatomy

of the floor of the pulp chamber and the persistence of haemorrhage or pain when separate canal orifices were found<sup>13</sup>. When a deep groove is present on lingual or buccal surfaces of the root, a C-shaped canal is to be expected. Radiographs may be the only non invasive means clinically to provide clues about the morphology of the root canal system New methods should be developed to diagnose not only the existence but also the configuration of the entire C-shaped canal system<sup>14</sup>.

The basic feature of C-shaped canals is the presence of a fin or web connecting the individual canals<sup>15</sup>. The convergence of root canal instruments at the apex or being centred and exiting the furcation were used as the criteria for identifying C-shaped canals<sup>16</sup>. The presence of high incidence of transverse anastomoses, lateral canals and apical deltas make it difficult to clean and seal the root canal system in these teeth. The pulp chamber in teeth with C-shaped canals may be large in the occlusoapical dimension with a low bifurcation. Alternatively, the canal can be calcified, disguising its C-shape. At the outset, several orifices may be probed that link up on further instrumentation. In a true C-shaped canal; it is possible to pass an instrument from mesial to distal aspect without obstruction. In other configurations, such passage is impeded by discontinuous dentine bridges. Irregular areas in a C-shaped root canal system that may house soft tissue remnants or infected debris may escape thorough cleaning or filling—this has provoked the many modified techniques to manage such cases endodontically<sup>12</sup>.

The use of ultrasonics along with conventional therapy would be more effective. An increased volume of irrigant and deeper penetration with small instruments using sonics or ultrasonics may allow for more cleansibility in fan-shaped areas of the C-shaped canal (17). Thermoplasticized gutta-percha technique is the recommended technique for canal irregularities<sup>18</sup>. Since routinely followed technique of obturation in clinical practice is lateral condensation technique, we used the same and found excellent results with gutta-percha and AH Plus sealer into the complex anatomy of the canal.

### Conclusion

Knowledge of different possible alterations in the internal anatomy of teeth is important for successful endodontic therapy. This C-shaped canal system tends to vary considerably in their anatomical configuration and thus leads to difficulties in debridement, filling, and restoration.

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# Gingival cyst of Newborn

\* Saman Ishrat, \*Mini M.M., \*\* Tinky Bose, \*\*\* Valsa Thomas

## Introduction

Gingival cysts of odontogenic origin occur in both adults and in infants. Based on histological origin and location in the oral cavity, oral mucosal cysts were classified by Fromm, as Epstein's pearls, Bohn's nodules, and dental lamina cysts. Epstein's pearls are cystic, keratin-filled nodules found along the mid-palatine raphe, probably derived from entrapped epithelial remnants along the line of fusion. Bohn's nodules are also keratin-filled cysts but scattered over the palate, most numerous along the junction of hard and soft palate and most likely derived from palatal salivary glands<sup>1</sup>.

## Case report:

A thirteen day old male child reported to Department of Oral Medicine and Radiology, Government Dental College, Thiruvananthapuram, with parents complaining of swelling of gums of lower jaw. Child was full term born; medical/dental history was not contributory.

Intraoral examination of child revealed solitary nodular swelling over crest of alveolar ridge of mandible. Maxillary alveolar ridge showed no swelling. The size of this swelling was approximately 1 cm. On soft tissue examination, no other abnormality was found on labial, buccal, and lingual mucosa, tongue, palate, and floor of

## Abstract

Gingival cysts of odontogenic origin occur in both adults and in infants. In infants the relative frequency of gingival cysts is greatest during the neonate phase. . Based on location, these cysts can be divided into 'palatal' and 'alveolar cysts'. The reported prevalence of alveolar cysts in newborn ranges from 25-53% and that of palatal cysts is 65%. Owing to the transient nature of these cysts-gingival cysts disappear within two weeks to five months of postnatal life-they are rarely seen by the general dentist or paediatric dentist. As the Gingival cysts of newborn rupture spontaneously, no treatment is indicated and therefore it is important to correctly identify these.

Keywords: Gingival cyst of Newborn, case report

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mouth (fig. 1).

On the basis of clinical examination and characteristic appearance of the lesions, a provisional diagnosis of gingival cysts of newborn and Melanotic Neuro-ectodermal tumour of infancy, was made.

An intra-oral periapical radiograph was taken to rule out the presence of displacement of natal/neonatal teeth (fig. 2).

Final Diagnosis: Gingival cyst of newborn.

Since lesions are self-limiting, the child was kept under observation and referred to Department of Pedodontics for further management.

## Discussion

In infants the relative frequency

of gingival cysts is greatest during the neonate phase. Fetal tissues between 10 to 12 weeks of age show small amounts of keratin within elements of dental lamina. Towards the end of 12<sup>th</sup> week of gestation, disruption of dental lamina is evident, with many fragments exhibiting central cystification and keratin accumulation. Gingival cysts are usually found to increase in number until the 22<sup>nd</sup> week of gestation<sup>2</sup>.

Gingival cysts appear as off-white nodules approximately 2mm in diameter<sup>2</sup>. Ranging from solitary to multiple, they are noted mainly along the alveolar crest. Based on location, these cysts can be divided into 'palatal' and 'alveolar cysts'. If located at the midpalatine raphe these are referred to as palatine cysts whereas if noted on buccal, lingual,

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Fig. 1 Clinical appearance of lesion.



Fig. 2 Intra-oral radiograph of lesion showing un-displaced tooth buds.

or crest of alveolar ridge they are termed as alveolar (or gingival) cysts<sup>3</sup>. The reported prevalence of alveolar cysts in newborn ranges from 25-53%<sup>4, 5</sup> and that of palatal cysts is 65%<sup>6</sup>. Owing to the transient nature of these cysts-gingival cysts disappear within two weeks to five months of postnatal life- they are rarely seen by the general dentist or paediatric dentist<sup>3, 7</sup>. As the Gingival cysts of newborn rupture spontaneously, no treatment is indicated and therefore it is important to correctly identify these.

Dental lamina cyst, also known as gingival cyst of newborn, is true cyst as it is lined by thin epithelium and shows a lumen usually filled with desquamated keratin, occasionally containing inflammatory cells<sup>8</sup>. *Melanotic Neuroectodermal Tumor* of infancy is a benign tumour of neuro-ectodermal origin. The clinical appearance can be similar to congenital epulis of the newborn; an exophytic non-ulcerated mass on the maxillary alveolar mucosa. The tissue may appear to be brown in colour (pigmented). Radiographic examination reveals "floating teeth"<sup>8</sup>.

On rare occasions, if present at mandibular anterior ridge these maybe incorrectly diagnosed as natal teeth. These appear typically as multiple nodules along the alveolar ridge in neonates. It is believed that fragments of dental lamina that remains within the alveolar ridge mucosa after tooth formation proliferate to form these small, keratinized cysts. Majority of these cysts degenerate and involute or rupture into the oral cavity within two weeks to five months of postnatal life<sup>2, 3, 7</sup>.

## Conclusion

Gingival cyst of newborn is a true cyst, as it is lined by thin epithelium and shows a lumen usually filled with desquamated keratin, occasionally containing inflammatory cells. Owing to the transient nature of these cysts-gingival cysts disappear within two weeks to five months of postnatal life- they are rarely seen by the general dentist or paediatric dentist. As the Gingival cysts of newborn rupture spontaneously, no treatment is indicated and therefore it is important to correctly identify these.

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# Ectodermal dysplasia

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## Introduction

Ectodermal dysplasias (EDs) are a large group of syndromes that are heterogenous under clinical and genetic aspects, and are characterized by anomalies in the structures of ectodermal origin<sup>1</sup>. Ectodermal dysplasia might be inherited in any form of several genetic patterns including autosomal-dominant, autosomal-recessive, and X-linked modes.<sup>2</sup> Although more than 170 different subtypes of ectodermal dysplasia have been identified, these disorders are considered to be relatively rare with an estimated incidence of 1 case per 100,000<sup>3</sup>. They are caused by impaired development of the ectodermal appendages and characterized by a primary defect in at least one of the following tissues: nails, hair, sweat glands, or teeth. Ectodermal dysplasia has emotional consequences for affected individuals at early ages<sup>4</sup>. It was first described by Thurnam in 1848 and was coined by Weech in 1929. Freire-Maia and Pinheiro described numerous varieties of ectodermal dysplasias involving all possible Mendelian modes of inheritance. Of these Hypohidrotic ectodermal dysplasia is the most common and estimated to affect at least one in 17000 people worldwide. Before birth, these disorders result in the

## Abstract

Ectodermal dysplasias are a heterogeneous group of disorders characterized by developmental dystrophies of ectodermal structure. The oral manifestations are anodontia and poor bony foundation which impairs both aesthetic as well as the masticatory function. Ectodermal dysplasia has emotional consequences for affected individuals at early ages. The case study of a nine and half year old boy, with positive family history is presented.

Key-words: Ectodermal dysplasia, Oligodontia, Sparse hair

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abnormal development of structures including skin, hair, nails, teeth and sweat glands<sup>5</sup>. The clinical features include sparse hair, abnormal or missing teeth, and inability to sweat due to lack of sweat glands<sup>6</sup>. Genetic studies regarding the etiology of ED reveal that mutations in the ectodysplasin-A and ectodysplasin-A receptor genes are responsible for X-linked and autosomal hypohidrotic ectodermal dysplasia<sup>7</sup>. The etiology of ectodermal dysplasia appears to be genetic in nature. One such case report of ectodermal dysplasia is presented here.

## Case History:

A nine and half- year- old male patient reported to our institution with the complaint of multiple missing teeth since birth. There was no past medical history. Patient had

visited to a dentist 4 years back and was given a denture. But the inconvenience caused by the constant need for refabrication of dentures with the growth of his alveolar ridge prompted him to discard them completely and seek more permanent dental options. The patient also gave a history of delay in the eruption of teeth, intolerance to heat and reportedly less sweat production. On extra oral examination, the patient's skin was dry, periorbital, perioral hyperpigmentation and wrinkling were evident. Patient had sparse hair on the scalp. Prominent supraorbital ridges, depressed nasal bridge & prominent mandible were also present. Both eyebrows & eyelids were scanty (Fig. 1). Lips were dry and everted. However, the shape of the fingernails and toenails appeared normal. During the

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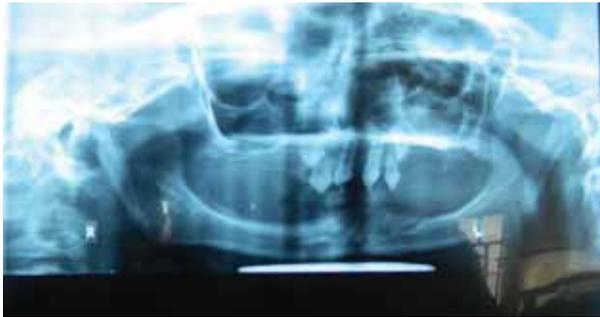
*Fig. 1* Clinical examination of the patient revealed a fine, sparse scalp hair, eyebrows, and eye lashes



*Fig. 2* Maxillary arch showing only four teeth



*Fig. 3* Complete anodontia of mandibular arch



*Fig. 4* Orthopantomograph showing multiple missing teeth.

physical examination he showed no signs of mental problems and his vital signs were normal. Intra oral examination revealed multiple missing teeth in the maxillary and mandibular arches (Figs. 2 & 3). Dental examination revealed complete absence of mandibular teeth and partial anodontia in the maxillary arch. The maxillary anteriors were conical in shape. Salivation was normal. Patient had normal palatal arch and normal oral mucosa. The similar findings were present in the maternal uncle, as revealed by the patient. Based on these clinical findings as well as family history a diagnosis of hereditary ectodermal dysplasia was made.

An orthopantomograph was made which revealed multiple missing teeth (Fig. 4). Only deciduous maxillary central, lateral incisors and canines without roots were present

Since patient was only 9 and half year of age with still growth period left, the treatment plan was formulated to give maxillary removable partial denture and mandibular complete denture with composite build up for maxillary deciduous central and lateral incisors for the patient's aesthetic concerns related with the peg shaped teeth. The definitive treatment will be performed once the growth of child is complete. The options for a definitive treatment plan may include fixed, removable or implant supported prosthesis, singly or in combination.

## Discussion:

Ectodermal dysplasias are a heterogeneous group of disorders characterized by developmental dystrophies of ectodermal structures<sup>1</sup>. The original constructional theme encoded in ectoderm diverges into epidermis, hair, sweat and milk glands, and the mineralized crystalline anvils of teeth, under the direction of local signals emanating from the underlying mesoderm<sup>8</sup>. X-linked hypohidrotic ED (Christ-Siemens-Touraine syndrome) is the most frequent form was first described in 1848 by Thurnam and later in the 19 th century by Darwin. Both autosomal dominant and autosomal recessive inheritance of clinically similar conditions have now been demonstrated and the molecular defects defined<sup>9</sup>. The most reported ED syndrome is x-linked hypohidrotic (anhidrotic) ED (Christ-Siemens-Touraine syndrome) which affects one to seven Individuals per 10,000 with males afflicted more frequently than, females<sup>10</sup>. From the clinical point of view two main forms have been distinguished: 1. Hypohidrotic form/Christ-Seimens-Tourian Syndrome. 2. Hidrotic form/Clouston syndrome. The Hypohidrotic form exhibits the classic triad-hypohidrosis, hypotrichosis and hypodontia. Usually X-linked recessive inheritance is seen. In the hidrotic form teeth, hair and nails are affected. The sweat glands are usually spared. It is usually inherited as an autosomal dominant trait. Other inheritance modalities like autosomal recessive have also been reported<sup>5</sup>. The pattern of inheritance is different, including Mendelian modes and sporadic cases. Several classifications of EDs have been proposed from a clinical point of view, with molecular genetics attribute and based on identified causative genes that most often are involved in processes of intercellular communication and signalling<sup>11, 12, 13</sup>. Freire-Maia and Pinheiro and Giansanti gave a useful classification of ectodermal dysplasia and have reviewed extensively,

the associated syndromes. In their studies, hereditary hypohidrotic ectodermal dysplasia was the most common<sup>11,14</sup>. The major concern seen in these patients is the lack of teeth and the special appearance, as seen in present case<sup>15</sup>. The most characteristic findings are the reduced number and abnormal shape of teeth<sup>15</sup>. The extra oral features seen in this disorder are frontal bossing with the forehead appearing square in shape, prominent supra orbital ridge, depressed nasal bridge (saddle nose) as seen in our case. The other features include midface hypoplasia, pointed chin and everted lips, however these features were also seen in our case<sup>16</sup>. The observation of normal form and shape of finger and toenails in this case agrees with similar observation made by Shaw<sup>17</sup>. The presentation of facial deformity, dry skin, sparse hair of the scalp, eyebrows and eyelashes observed in the case is similar to previous report<sup>17</sup>.

Prenatal diagnosis of ectodermal dysplasia has occasionally been reported which has been diagnosed by foetal skin biopsy, obtained by fetoscopy by 20 weeks gestation<sup>18</sup>. The characteristic facies is pathognomonic but may not be recognized in infancy. In partial forms, the pointed conical teeth provide the most valuable indication and should suggest the need for sweat test and a skin biopsy<sup>19</sup>.

In studies that utilized serial cephalometric measurements, Sarnat et al<sup>18</sup>, Tuchine et al<sup>19</sup>, and Borg and Midtgaard<sup>20</sup> have reported that in general facial growth proportion, and pattern of jaw growth appear to be normal in these children despite the absence of tooth development. Therefore, the protuberant lips observed in these children may be attributed to the reduction in the height of the alveolar process<sup>20, 21, 22</sup>. The repeated episodes of hyperthermia observed in this patient have been attributed to defective skin appendages in previous reports<sup>17</sup>.

## Conclusion

Ectodermal dysplasia is a rare genetic disorder. Young patients with ED need to be evaluated early by a dental professional to determine the oral ramifications of the condition. When indicated, appropriate care needs to be rendered throughout the child's growth cycle to maintain oral functions as well as to address the aesthetic needs of the patient so that positive self image and overall oral health can be achieved.

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# Giant submandibular Sialolith

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## Abstract

Sialolithiasis is one among the common pathologies affecting the major salivary glands especially the submandibular salivary gland. Sialoliths with a size more than 1.5 cm are considered rare. This article focuses on a case report of unusually large submandibular salivary gland calculi in a middle aged male patient.

Key words: Sialolith, Sialolithiasis, Submandibular gland

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## Introduction

Salivary gland calculi (SGC) or sialoliths are calcifications that are occurring either within the salivary gland parenchyma or in the associated ductal systems.<sup>1</sup> It is estimated that sialoliths affects every 12 in 1000 adult population with a twofold male predilection.<sup>2</sup> Children are less frequently affected but a literature review reveals 100 cases of submandibular calculi in children aged 3 weeks to 15 years old.<sup>3</sup> More than 80% of sialoliths occur in the submandibular gland or its duct, 6% in the parotid gland and 2% in the sublingual gland or minor salivary glands.<sup>2</sup> Sialolithiasis is the most common cause of acute and chronic infections affecting the major salivary glands.<sup>4</sup>

The etiology of sialolith formation is not well explained. Factors such as salivary stagnation, irregularities in the duct system, infection or inflammation of the salivary duct or gland, increased alkalinity of saliva, physical trauma

to salivary duct and local irritants may predispose to calculus formation.<sup>2,5</sup> Moreover anticholinergic medications may lead to pooling of saliva within the duct, which can initiate stone formation.<sup>5</sup> Intermittent stasis in the ductal system produces a change in the mucoid element of saliva and forms a gel, and this gel forms a framework for deposition of salts and organic substances creating a stone.<sup>2</sup> Submandibular stones usually forms around a nidus of mucous, whereas sialolith in the parotid are believed to form around a nidus of inflammatory cells or a foreign body.<sup>2,6</sup>

Traditional theories suggest that the formation of SGC occurs in two phases: in the initial phase, a central core is formed by the precipitation of salts, which are bound by certain organic substances and in the second phase, layered deposition of organic and non organic material occurs. According to another school of thought, an unknown metabolic phenomenon

can increase the salivary bicarbonate content, which alters calcium phosphate solubility and leads to precipitation of calcium and phosphate ions. In addition, a retrograde theory for SGC formation has been proposed. According to them, substances or bacteria within the oral cavity might migrate into the salivary ducts and forms a nidus for further calcification.<sup>2,5,6</sup>

## Case report

A 43-year-old male presented to the oral medicine wing of Sri Sankara dental college with a swelling in the anterior part of the left side of floor of mouth which he noticed one month back. He complains of occasional mild pain and a feeling of fullness in the region especially on taking food. Patient's medical history was not contributory. Extra-oral examination revealed mild enlargement of left submandibular gland which was tender. Regional lymph nodes were not palpable. Overlying skin appeared normal with no signs of erythema. Intraoral examination revealed a solitary 2 x 2.5cm, firm, and non-tender swelling in the left anterior floor of mouth in the region of the submandibular duct (Fig. 1). The stimulated and unstimulated salivary flow was inadequate and there was no evidence of suppuration.

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Fig. 1 Swelling in the floor of mouth



Fig. 2 A radiopaque mass approximately 2x1cm in the (left) floor of mouth region



Fig. 3 Sialolith, which has been removed

A mandibular occlusal radiograph was taken, which revealed a well defined radiopaque mass approximately 2x1cm in the left floor of mouth region extending from the region of second premolar to the second molar (Fig. 2). A diagnosis of left submandibular duct sialolith was made. Following routine hematology the sialolith was removed under regional anesthesia. And the calculi measured 22 mm long along its greatest length (Fig. 3). Patient was reviewed after a week to check salivary function of the gland. On review the left submandibular gland was palpable and salivary function was satisfactory.

## Discussion

A review of literature by Lustmann concluded that, of the 302 sialoliths studied, 79.8 per cent were 1 cm or less in dimension and only 7.6 per cent greater than 1.5 cm.<sup>2,7</sup> Large sialoliths in the salivary ducts have been rarely reported though they are frequently been reported in the body of salivary glands.<sup>2</sup> The largest sialolith reported was 71mm, which was removed from Wharton's duct by Cavina & Santoli in 1965.<sup>8</sup> A 27x31 mm sialolith was removed from the left submandibular duct of a 55- year-old male by Brusati and Fiamminghi<sup>9</sup> and in 1999 Leung *et al.* removed a sialolith of dimension 14x9 mm from the right submandibular duct.<sup>10</sup> The sialolith in our case was comparable to these cases.

With the exception of one case, all the giant sialoliths were located in the submandibular gland (94.4%) and only an isolated case was found within the Stenson's duct of the parotid salivary gland.<sup>8</sup> Various suggested factors that promote the development and growth of salivary calculi in the submandibular salivary gland tissues include wider and longer excretory duct of submandibular duct, antigravity flow of saliva in submandibular duct, more alkaline salivary pH and higher level of mucin proteins and calcium and

phosphate content in submandibular saliva in contrast to other glands.<sup>8, 11</sup>

Sialoliths frequently manifest as swelling and pain in the area of the affected gland by obstructing the food related surge of salivary secretion. Sialolith in some instances cause stasis of saliva, leading to bacterial ascent into the duct and gland and causes infection. Sometimes they may be asymptomatic until the stone passes forward and can be palpated in the duct especially when located above the mylohyoid muscle or in the buccal mucosa and lip.<sup>1,2,12</sup> The severity of symptoms depends on the degree of obstruction and residual duct patency.<sup>1</sup> Complete obstruction may presents as an emergency situation with severe symptoms including a tense swollen gland with marked sensitivity, ductal swelling and on occasion suppuration which may collect as a discrete abscess or drain from the duct orifice.<sup>1, 13</sup> Recurrent partial obstructions are the usual clinical diagnoses and correlate with mild symptoms that self-correct within a short period following stimulation, usually meal related.<sup>2</sup> Long term obstruction in the absence of infection can lead to atrophy of the gland with resultant lack of secretory function and eventually fibrosis.<sup>1</sup>

Sometimes sialoliths can appear as coincidental findings on radiographs. Well mineralized and moderate sized calculi are usually evident on plain radiographs but sialoliths of low mineral content remains undetected.<sup>14</sup> Sialoliths developing within the submandibular gland tend to be oval. Due to the postero-inferior position of submandibular gland, a mandibular lateral oblique radiograph may be useful. Sialoliths located within the duct distal to the hilum are better visualized with an occlusal radiograph displaying the floor of the mouth without overlap from other anatomy. Sialoliths are well visualized on panoramic and periapical radiographs but can be obscured with superimposition over the roots of the premolar and molar teeth and mylohyoid ridge.<sup>10</sup> Other useful

imaging modalities are sialography, ultrasound, computed tomography and magnetic resonance sialography.

Lesions which can mimic sialolith include mandibular torus, osteoma, phleboliths, calcified lymph nodes, calcified atherosclerotic plaques in major blood vessels, and rarely myositis ossificans and metastasis from distinct calcifying neoplasms.<sup>15,16,17,18</sup>

Osteoma and torus mandibularis can appear as radiopaque shadow in the same area but their surface contour both clinically and radiographically also reflects the nature of these two lesions and often readily diagnostic moreover pain is rare.<sup>15</sup> Phleboliths can occur in the floor of the mouth and usually present as a dense ring with a radiolucent centre giving a bull's eye or target appearance on an occlusal radiograph.<sup>1,15</sup> However a diagnosis of phlebolith is more likely if there is clinically discernible varicosity and a radiopacity in the floor of the mouth and absence of sialadenitis.

Calcified lymph nodes can be radiopaque and radiolucent with mottled and ragged borders. A calcified submandibular lymph node may be difficult to differentiate from a submandibular sialolith due to its position near the submandibular gland and a similar projection on a radiograph.<sup>15</sup> However a diagnosis of sialolith is more likely if the calcified mass is in the submandibular area since it has a relatively higher incidence

Myositis ossificans is less frequently considered as differential diagnosis for sialolith. It is more common in the masseter but other masticatory muscles can also be affected. When it affects the medial pterygoid, it can mimic a submandibular sialolith. However findings like trismus is in favor of myositis ossificans.<sup>19, 20</sup>

Management of sialoliths depends on its size and location. Conservative management is opted in case of small sialolith. Gland is massaged to promote saliva production which will flush the stone out of the duct if it is small.<sup>2</sup> Also the gland can be milked and manipulated through the duct orifice with a lacrimal probe and dilators. Once the duct is open, the stone can be identified, milked forward, grasped and removed. After removing the sialolith, the gland is again milked to remove other debris in the more posterior portion of the duct.<sup>2, 21</sup> Submandibular calculi in the distal third of the duct require simple surgical release for which an incision is made directly onto the stone in the floor of the mouth and the stone can be grasped and removed and the duct should be left open for drainage. Removal of gland is indicated in case of recurrent infection, fibrosis and intra glandular calculi.<sup>2</sup>

Other treatment modalities include extracorporeal shock wave lithotripsy (ESWL) and endoscopic intracorporeal shockwave lithotripsy (EISWL), in which shockwaves are delivered directly to the surface of the stone lodged within the duct without damaging adjacent tissue.<sup>22</sup>

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# Accelerated orthodontic treatment by alveolar corticotomy

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## Introduction

Twenty-first century discoveries in cellular and molecular biology have explained how clinicians in medicine and dentistry can engineer tissue regeneration with more precision than ever before. This field can also include orthodontists if they are willing to define themselves as dentoalveolar orthopedists by coordinating minor alveolar surgery with orthodontic tooth movement (OTM) and deliver force vectors appropriate for specific alveolus forms. This can be achieved if the orthodontist can modulate physiologic internal strains, similar to those of distraction osteogenesis in long bones- which supplement the work of the scalpel, bone grafts and growth factors.<sup>1</sup> Corticotomy-assisted or corticotomy-facilitated orthodontics is a therapeutic procedure that helps orthodontic tooth movement by accelerated bone metabolism due to controlled surgical damage.<sup>2</sup> This is not a new procedure, although it was initially based more on techniques using osteotomy instead of approaches with corticotomy. It is considered an intermediate therapy between orthognathic surgery and conventional orthodontics. Corticotomy-assisted orthodontics (CAO) has additional advantages, such as less root resorption, due to decreased resistance of cortical

## Abstract

It has long been recognized that the most desirable way to perform orthodontic tooth movement is as quickly as possible, without irreversible damage to the periodontal ligament, alveolar bone or the tooth root. Alveolar corticotomy is an effective means of accelerating orthodontic treatment. The most important factors in the success of this technique is proper case selection and careful surgical and orthodontic treatment. Corticotomy assisted orthodontics advocated for comprehensive fixed orthodontic appliances in conjunction with full thickness flaps and labial and lingual corticotomies around teeth to be moved. Orthodontic treatment time with this technique will be reduced to one-third the time of conventional orthodontics. Corticotomy assisted orthodontics is promising procedure but only few cases were reported in the literature. Controlled clinical and histological studies are needed to understand the biology of tooth movement with this procedure, the effect on teeth and bone, post-retention stability, measuring the volume of mature bone formation, and determining the status of the periodontium and roots after treatment. This article presents a review of the literature, including the historical background, biological and orthodontic fundamentals, and the most significant clinical applications, based on recently published clinical studies.

Key words: Accelerated orthodontics, Corticotomy, Orthodontic tooth movement Osteotomy.

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bone, more bone surrounding teeth, due to addition of bone graft, less and slower relapse, and less need for extraoral appliances and orthognathic procedures.<sup>3</sup>

## Historical background

Recently, there has been a renewed interest in alveolar-decortication. Surgically assisted

orthodontic tooth movement has been used since the 1800s<sup>4</sup>. Corticotomy-facilitated tooth movement was first described by L.C. Bryan in 1893, published in a textbook by S. H. Guilford.<sup>5</sup> The current corticotomy procedures adopted or modified by most clinicians are based on Heinrick Kole's combined radicular

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corticotomy/supraapical osteotomy technique, first described in 1959.<sup>6</sup> Kole's technique consisted of buccal and lingual interproximal vertical corticotomy cuts limited to cortical layers, with these vertical corticotomy cuts being connected by horizontal osteotomy cuts approximately 1 mm beyond the apices of the roots. Then, in 1991, Suya replaced supra apical horizontal osteotomy with horizontal corticotomy to facilitate luxation of the corticotomized bone blocks.<sup>7</sup>

Wilcko et al<sup>8</sup> further modified the corticotomy-assisted orthodontic technique with the addition of alveolar augmentation and patented the procedure as periodontally accelerated osteogenic orthodontics (PAOO). Wilcko's modified technique used a combination of demineralized freeze dried bone allograft or a bioabsorbable alloplastic graft for alveolar augmentation. Tooth movement was initiated 2 weeks after surgery, and every 2 weeks thereafter by activation of the orthodontic appliance. Wilcko et al were first to suggest that tooth movement assisted with corticotomy may be due to a demineralization-remineralization process rather than bony block movement.

### Regional Accelerated Phenomenon

The regional acceleratory phenomenon (RAP) is a local response of tissues to noxious stimuli by which tissue regenerates faster than normal (*i.e.*, without stimuli) in a regional regeneration/remodeling process. RAP was first described by Frost<sup>9</sup> in 1983, although this phenomenon has been familiar to many histomorphometrists since 1966. The RAP is an intensified bone response (increased osteoclastic and osteoblastic activity, and increased levels of local and systemic inflammation markers) in areas around cuts that extend to the marrow. The RAP begins within a few days of injury, typically peaks at 1–2 months, usually lasts 4 months in bone and may take 6 to more than 24 months to subside.<sup>10</sup> This response varies directly in duration, size, and intensity with the magnitude of the stimulus, and it is considered a physiological “emergency” mechanism, which accelerates the healing of injuries that could affect survival. The duration of RAP depends on the type of tissue, and usually lasts about 4 months in human bone. This phenomenon causes bone healing to occur 10–50 times faster than normal bone turn over.<sup>11</sup>

RAP is not a separate healing event, but it can expedite hard and soft-tissue healing stages two- to tenfold. Shih and Norrdin<sup>12</sup> demonstrated that when intraoral cortical bone was injured by corticotomy, RAP accelerated the normal regional healing processes by transient bursts of hard- and soft-tissue remodeling. The two main features of RAP in bone healing include

decreased regional bone density and accelerated bone turnover, which are believed to facilitate orthodontic tooth movement.

Goldie and King<sup>13</sup> induced an osteoporosis state by depleting calcium intake in lactating rats and found an increase in the orthodontic tooth movement. In addition, reduced root resorption was demonstrated. Most recently, Wilcko et al<sup>14</sup> showed radiographic evidence of an osteoporosis state in an alveolar bone treated with corticotomy, a characteristic seen in RAP. Data from computed tomography (CT) scans did not support the concept of “blocks of bone” movement, but suggested a demineralization remineralization phenomenon. Additionally, the researchers found comparable tooth movement acceleration with small, round cortical perforations and with corticotomy cuts in a split-mouth design. This finding further supported that RAP is responsible for rapid orthodontic tooth movement.

A recent histological study by Sebaoun et al<sup>15</sup> showed that selective alveolar decortication induced increased turnover of alveolar spongiosa. The surgery results in a substantial increase in alveolar demineralization, a transient and reversible condition. Some root resorption is generally expected with any orthodontic tooth movement, and its extent depends on the duration of force application. Ren *et al*<sup>16</sup> reported rapid tooth movement after CAO in beagles without any associated severe root resorption or irreversible pulp damage. Some mild root resorption was observed after 4 weeks, which was partially repaired by week 8.

### Clinical applications

To be considered effective, orthodontic treatment must meet the goals established during within the shortest possible time without compromising the quality and stability of the results and, finally, preserving the long term health of periodontal tissues. The CAO procedure has been reported to solve some clinical situations difficult to treat by conventional orthodontic means, including resolution of tooth crowding, shortening of treatment time, canine retraction after premolar extraction, facilitation of impacted tooth eruption, facilitation of slow orthodontic expansion, molar intrusion with open bite correction, and enhancement of post orthodontic stability.<sup>17</sup>

There are a number of clinical principles that must be used to guide this procedure.

The orthodontist determines the plan for movement, identifying which tooth or temporary device will be used for anchorage and which teeth require corticotomy. Periodontal view of the surgery, using minimally invasive incisions and flaps, taking care

to preserve the papillae. The purpose of the decortications is to initiate the RAP response and not to create movable bone segments. Initiation of orthodontic force should not be delayed by more than 2 weeks after surgery. The orthodontist has a “window” period for accelerated movement (4–6 months) after which movements occur at normal speed. Wilcko et al<sup>14</sup> reported two adult patients with severe crowding who were treated by CAO in just 6.5 months.

Yao et al<sup>18</sup> described molar intrusion of 4 mm in 7.6 months using these temporary devices. On the other hand, the same procedure combined with CAO can achieve the same amount of intrusion in 2.5 months. Another indication for CAO is intrusion of molars for prosthodontic reasons. These cases require some corticotomy, depending on the amount of intrusion. Miniplates and microscrews are used with buccal and palatal elastic traction of 100–150 grams (g) per side, observing the results after 2 months (3 mm of intrusion). This procedure may be designated as compression osteogenesis (CO) instead of CAO, because the bone–tooth block is only supported by medullar bone and overlying mucosa and it has lost all of its cortical support. Kanno *et al.* described a CO procedure used to treat a case of severe open bite, moving the upper posterior bone–tooth segments 7 mm in a superior position. They used anchor plates and elastics 3 weeks after surgical intervention in two stages. Satisfactory results were obtained after 6 months of orthodontic treatment.

Stability after treatment has always been an important concern after orthodontic treatment. Thinner mandibular cortices are a risk feature for bony dehiscence after decrowding orthodontic treatment. Techniques that increase alveolar volume with grafts may resolve this situation; thus, where 5 mm of crowding was considered the limit for traditional orthodontics without extraction, this may be extended to 10–12 mm without risk of dehiscence. Retention and stability with CAO are better than with conventional orthodontics. However, there have been no long-term prospective longitudinal studies supporting these initial results.

## Conclusion

Interest in the use of alveolar corticotomies as an adjunct to orthodontic treatment is growing, thanks to a deeper understanding of its effects and more solid evidence-based research. The biological stimulus generated by corticotomies is reflected in the structure of trabecular bone, which provides an opportunity to enhance certain orthodontic movements. Although corticotomies are primarily indicated to shorten orthodontic treatment time, we believe that the more

rational indications for ACS are for cases where either skeletal anchorage devices cannot be used, or both (ACS and anchorage devices) can be used in combination.

As well as shedding more light on how to use CAO in orthodontics, further studies should encourage the search for new and exciting, and hopefully, less invasive procedures.

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# Orthodontic applications of local administration of Bisphosphonates

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## Abstract

Orthodontics is probably the only dental specialty that actually uses the inflammatory process as a means of solving functional and esthetic problems. Mechanical stress such as orthodontic tooth movement induces osteoclastogenesis. Orthodontically induced inflammatory root resorption (OIIRR) or root resorption, is an unavoidable pathologic consequence of orthodontic tooth movement. Bisphosphonates are important inhibitors of bone resorption and widely used clinically to treat osteoporosis, metabolic bone diseases and other orthopedic disorders. Studies suggest that bisphosphonates might have an inhibiting effect on root resorption and may interrupt tooth movement in orthodontic patients, thus altering the outcome of treatment. Mechanically induced bone resorption is an essential step in tooth movement and, therefore, can be a major target for pharmacological intervention to enhance the treatment outcome, in orthodontic treatment. If undesirable tooth movement could be prevented with blockers of bone resorption, treatment would be less complex and more secure.

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in orthodontic patients, thus altering the outcome of treatment<sup>2</sup>. Mechanically induced bone resorption is an essential step in tooth movement and, therefore, can be a major target for pharmacological intervention to enhance the treatment outcome, in orthodontic treatment. If undesirable tooth movement could be prevented with blockers of bone resorption, treatment would be less complex and more secure.

Recent evidences suggest that bisphosphonates also regulate essential signaling molecules involved in osteoclastogenesis such as RANKL which are synthesized by osteoblasts, and bisphosphonates also modulate Osteoprotegerin, a decoy receptor absorbing RANKL and pre-venting RANK activation.

## Introduction

Orthodontics is probably the only dental specialty that actually uses the inflammatory process as a means of solving functional and esthetic problems. Mechanical stress such as orthodontic tooth movement induces osteoclastogenesis. Sometimes, excessive mechanical stress results in root resorption during orthodontic tooth movement. Orthodontically induced inflammatory root resorption (OIIRR) or root resorption, is an unavoidable pathologic

consequence of orthodontic tooth movement.<sup>1</sup> It is a certain adverse effect of an otherwise predictable force application. Although it is rarely serious, it is a devastating event when it is radiographically recognized.

Bisphosphonates are important inhibitors of bone resorption and widely used clinically to treat osteoporosis, metabolic bone diseases and other orthopedic disorders. Studies suggest that bisphosphonates might have an inhibiting effect on root resorption and may interrupt tooth movement

## Bisphosphonates

Bisphosphonates are administered intravenously to treat severe medical conditions such as multiple myeloma, bone metastases of various cancers, hypercalcemia, and severe Paget's disease<sup>3</sup>. Bisphosphonates bind strongly to the bone mineral hydroxyapatite (Jung *et al*, 1973) and inhibit bone resorption. They target calcified tissues, in which they are internalized selectively by bone-resorbing osteoclasts<sup>4,5</sup>. Once internalized, bisphosphonates inhibit the ability

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of osteoclasts to resorb bone by mechanisms that interfere with cytoskeletal organization and formation of the ruffled border, and this leads to cell death by apoptosis<sup>6</sup>.

Clodronate is a non-N-containing bisphosphonate that contains two chlorine atoms in its side-chain. Due to its close structural similarity to pyrophosphate, this bisphosphonate, like etidronate and tiludronate, is known to inhibit osteoclast function by being incorporated metabolically into a non-hydrolysable ATP analogue<sup>6</sup>. In addition to this anti-bone resorbing activity, it has been suggested that this compound also has anti-inflammatory activity<sup>7,8,9</sup>.

Several studies have investigated the influence of bisphosphonates in rat models of orthodontic tooth movement<sup>10,11,12</sup>. Recent advances in molecular biology techniques have provided opportunities for the use of various gene-mutated mice, including those with genes that regulate bone metabolism. The use of these mice in tooth movement experiments can be advantageous for exploring the molecular mechanisms that underlie tooth movement and mechanical loading-induced bone changes. However, mouse models for orthodontic tooth movement have been lacking. For this reason, no study has investigated the effect of bisphosphonates in mice during orthodontic tooth movement.

In order to resolve this problem, a mouse model of orthodontic tooth movement was established using a nickel-titanium (Ni-Ti) closed coil spring inserted between the upper incisor and upper first molar<sup>13</sup>. Root resorption is often observed as an undesirable side-effect of orthodontic treatment. It is a serious problem for most clinicians, but it is still not resolved. At present, root resorption is thought to be caused by odontoclasts, similar to bone resorption by osteoclasts. Root resorption, which is dependent on odontoclast activity, may be prevented by bisphosphonates.

### Role of bisphosphonates in orthodontic tooth movement

There have been a limited number of studies on animal models of tooth movement with administration of bisphosphonates. It has previously been reported that bisphosphonates cause a reduction in orthodontic tooth movement<sup>12,14</sup>. However, all previous research was carried out on rats. Yuji Fujimura and coworkers conducted the first study using mice to investigate the effect of bisphosphonates on orthodontic tooth movement<sup>2</sup>.

Bisphosphonates bind strongly to hydroxyapatite in bone (Jung *et al.*, 1973) and are selectively internalized into mature osteoclasts<sup>4,5</sup>. Osteoclasts then lose their bone-resorbing activity and are induced to apoptosis. The present results demonstrate that local administration of bisphosphonates causes a significant reduction in orthodontic tooth movement and osteoclasts formation. Tooth movement resulted from resorption of alveolar bone by osteoclasts that were induced on the pressure side by mechanical stress. These results suggest that tooth movement was prevented by reduced bone resorption by apoptotic osteoclasts.

4-amino-1-hydroxybutylidene-1,1-bisphosphonate (AHBuBP), a potent blocker of bone resorption could be useful in enhancing anchorage or retaining teeth in orthodontic treatment<sup>11</sup>. Studies have showed that systemic administration of bisphosphonate, pamidronate, decreases the extent of initial relapse in experimentally moved rat molars via a mechanism involving impairment of the structure and resorptive functions of osteoclasts<sup>4</sup>.

### Role of bisphosphonates in root resorption

Chung and co-workers (2008) showed that, during application of a force of 10 g to teeth using a Ni-Ti closed coil spring in mice, root-resorbing osteoclasts and root resorption were observed at the pressure side during orthodontic tooth movement. Root-resorbing osteoclasts and root resorption at the pressure side was also observed in histological preparations and scanning electron micrographs. Excessive orthodontic force might be the cause of root resorption during orthodontic tooth movement (Harris *et al.*, 2006). The mouse experimental model might be able to be applied as a model of root resorption caused by orthodontic tooth movement. In a rat orthodontic tooth movement model, bisphosphonates inhibited root resorption caused by orthodontic tooth movement<sup>15</sup>. In the present study, bisphosphonates also inhibited root resorption in mice. Bisphosphonates induce apoptosis of odontoclasts in the same way as in osteoclasts. Bisphosphonate might be useful for the prevention of root resorption during orthodontic tooth movement. However, bisphosphonate inhibits orthodontic tooth movement at the same time. Bisphosphonates are widely used to treat bone metabolic disorders. The present results support the possibility of inhibition of orthodontic tooth movement in patients taking bisphosphonates.

## Conclusion

The localized use of bisphosphonates such as clodronate could be a beneficial therapeutic adjunct for orthodontic treatment. Clodronate that have anti-inflammatory properties may also be helpful in the treatment of increased bone resorption associated with inflammatory diseases such as rheumatoid arthritis and periodontitis. Bisphosphonates decrease osteoclast formation induced by orthodontic force, which inhibited tooth movement in mice. Bisphosphonates also prevented root resorption associated with orthodontic tooth movement. Bisphosphonates might be useful for control of orthodontic tooth movement and as a candidate inhibitor of root resorption during orthodontic tooth movement. On the other hand, it is possible that orthodontic tooth movement in patients taking bisphosphonates might be arrested.

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Indian Society of Periodontology (ISP) National Award for the Best Oral Hygiene Day celebration in the country was awarded to IDA Kerala State Branch. Dr Antony Thomas, President, IDA Kerala State receiving the award from Honorable Governor Mr. Nikhil Kumar during the IDA State Conference at Kollam.

# Separation anxiety – burs, an occupational hazard to dentists

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## Introduction

Occupational hazard can be defined as the risk to the health of a person usually arising out of employment. It can also refer to work, material, substance, process or situation that predisposes or itself causes accidents or disease at work place.<sup>1</sup>

Dental professionals are predisposed to a number of occupational hazards like stress, allergic reactions, higher noise levels, percutaneous exposure incidents, radiation, musculoskeletal disorders, legal hazards, respiratory disorders, eye insults, psychological problems, exposure to infections etc.<sup>2</sup>

Percutaneous injuries, particularly needle stick and sharp instrument injuries<sup>3-12</sup> are a common problem among dentists, who are among the healthcare professionals most involved in occupational accidents.<sup>13</sup> This is due to the fact that dentists are exposed frequently to sharp devices and work with limited access and restricted visibility.<sup>14</sup>

The incidence of percutaneous exposure incidents (PEI) is reported to be approximately 0.5 to 3 events per year. Percutaneous exposures represent the most efficient method for transmitting blood-borne infections, including Human Immunodeficiency Virus (HIV) and

## Abstract

Burs are commonly used during conservative and endodontic procedures to aid in the removal of carious dentine, access cavity preparations etc. The burs come in various sizes and shapes and are routinely used with high speed air driven hand piece. This case report presents a potential serious complication associated with the use of bur which got embedded in the foot and required surgical removal. Proper office safety precautions and knowledge about post exposure prophylaxis can help prevent accidents that may be hazardous to dentists.

Key words: Burs, Percutaneous exposure incidents, Post exposure prophylaxis

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hepatitis B and C viruses, and exposure to these viruses are a significant occupational hazard among healthcare workers.

Syringe needle-stick injuries are the most common PEIs (about 30-33.4%) followed closely by dental drills and burs (about 17.5 -30%). After a dental bur has penetrated hard or soft tissues, it should be considered as a potential source of blood borne pathogens.

The risk of contracting HIV infection from a percutaneous exposure to an HIV contaminated instrument is approximately 0.3% where as the risk of infection after similar exposure to Hepatitis C virus (HCV) and B virus (HBV) contaminated instruments is much higher, approximately 2.7 to 10% and 5 to 45% respectively.

Although the incidence of PEIs appears to be declining since the wide spread acceptance of universal precautions and implementation of certain workplace safety precautions, PEIs pose the greatest risk for the transmission of blood-borne pathogens from patient to clinician.

In addition to universal precautions, operatory design, especially the location and positioning of dental drills and other sharp instruments can either increase or decrease the risk of PEIs. Implementing strategies to minimize the risk of PEIs in the dental office should be a high priority.

## Case report:

A 21 year old under graduate

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Fig. 1

student was performing restorative dental treatment for the patient in the Department of conservative Dentistry and Endodontics when the incident occurred.

Tooth was prepared with a diamond point and the hand piece with the diamond point was returned to the rack on the front delivery system, from where it accidentally fell on her left foot.

The hand piece was inspected, and it was confirmed that the instrument was broken, with the shank remaining in the hand piece and head missing. The floor around the area was examined, but the missing piece was not located. The student noticed a small wound with minimal bleeding mild pain and swelling. She was administered tetanus injection the next day.

After few days the swelling began to increase gradually without pain. No discomfort was experienced during walking or while performing routine activities. Since the swelling was still persisting, she underwent medical consultation. Radiographs were taken and the missing piece of the separated bur was observed. The missing piece was located very close to the first metatarsal bone.

Surgical removal of the foreign object was planned by her physician. Blood was drawn for base line testing for blood borne pathogens. All her blood reports seemed to be within normal limits. After a review of the medical reports, patient was transferred to the operating room for surgical exploration and removal of instrument. After administering spinal block anesthesia, the area was prepared for surgery. An incision was made by the surgeon and with the help of radiographs the location of the bur was determined. The bur was removed and sutures were placed. The post surgical recovery was uneventful.

## Discussion:

This case report presents with a potentially serious

complication associated with the use of dental burs. The main concern regarding these types of injuries, due to contaminated instruments is that there is always some amount of residual body fluid in the instrument.<sup>15</sup>

It is very common for these contaminated dental burs to be left in position and isolation barriers like gloves, gowns etc may be torn or snagged.

Percutaneous injuries are very common among oral health care professionals. The most common “sharps” injuries among dentists continue to rise from needles and drilling instruments, such as bur.

Dental burs were proved to be the most frequent cause of percutaneous injury.<sup>16, 17</sup> PEI are most likely due to lack of attention during their use or to their remainder attached to the hand piece in the dental unit after use. Hand pieces should be placed in the downward position, with the bur facing the cart, to reduce the risk of such injuries.<sup>18</sup>

PEI represents the most efficient method for transmitting blood-borne infections from patients to dental personals. Of the transmissible diseases, most important are the Hepatitis B Virus (HBV), Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV).

The risk of transmission for virus shows that HBV is the most easily transmitted virus and HIV the least. Estimates based on data from the Center for Disease Control and Prevention, suggest that a healthcare provider's risk of acquiring HIV infection as a result of percutaneous exposure to an HIV-contaminated device is 0.3%.<sup>19</sup> For a susceptible person the risk from a single needle stick or a cut exposure to HBV infected blood ranges from 6-30%.

Patients are often reluctant to disclose their disease status to dental personals especially in case of conditions like HIV/AIDS. Charbonneau et al found that only 54% of HIV +ve patients always revealed their condition to dentists.<sup>20</sup> The treatment strategy and social acceptance to HIV /AIDS have improved a lot in the past decades, but still some patients are either unaware of their disease status or fail to disclose their condition to the health care professionals.

It is almost impossible to know whether or not a PEI has exposed the dentist to a blood borne pathogen.

Penetration of the skin with a contaminated instrument needs medical follow up and a careful evaluation is necessary to determine the need for post-exposure chemoprophylaxis. No post exposure prophylaxis recommended if HIV status of source is

unknown. If known then basic antiretroviral regimen (Zidovudine and lamivudine) is started. The drug therapy should be initiated immediately in such cases. If the patient has received HBV vaccination, no post exposure prophylaxis is recommended.

Knowledge about the post exposure prophylaxis reduces the incidence of accidents and allows the dentist to take precautionary measures.

## Conclusion

Manipulation of intraoral instruments and needles by single or more dental workers in a confined space can lead to accidents. If contaminated burs are in position where contact with the body is possible, they should be removed from the hand piece when not in use. The adoption of infection control measures, extensive training to the dental workers, good ergonomics, improved working conditions, careful handling and disposal of sharp instruments and knowledge of post-exposure protocols can be helpful in preventing these hazards.

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# “Versatility of lazy ‘S’ cervicomastoid approach in condylar fractures” - A prospective study of five cases

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## Abstract

The treatment of fractured mandibular condyles constitutes a true challenge for surgeons because the decision of open versus closed techniques is not so simple. The various types of surgical approaches to treat the condylar process of the lower jaw are all associated with specific advantages and disadvantages. The choice of the approach is of importance to provide Safe and comfortable access with minimal retraction to fracture line, versatility of treatment modalities allowing plates, wires, lag screws, condylar lag screws to be easily implemented without hindrance from the adjacent structures, predictable identification of vital structures, minimal intraoperative and postoperative morbidity and limiting the facial scars. Access with other approaches is often difficult, which may necessitate forceful tissue retraction and oblique insertion of the plates and screws. Reduction of the medially displaced condylar fragment can be difficult. The various types of surgical approaches to treat the condylar process of the lower jaw are all associated with specific advantages and disadvantages. The broad spectrum of approaches and the very different surgical techniques make a comparison of the operational techniques for joint process fractures very difficult. In our study we used Lazy S cervicomastoid approach, which gave excellent exposure of the fractured condyle and for the reduction.

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with intermaxillary fixation for 3 weeks and mouth opening exercise by which they could achieve good results. In the other side of the argument (Surgical treatment) precise open reduction and internal fixation by surgical treatment can prevent unwanted long term complications like shortening of ramus and impaired masticatory function. The decision to proceed with ORIF (Open Reduction and Internal Fixation) generates two other inter-related controversial issues like, one is what type of fixation device that should be employed, another one is the choice of the surgical approach, which should give wide exposure to the fracture site, good accessibility for the fracture reduction and fixation with minimal post operative complications.

A variety of fixation methods are available like plating, lag screw fixation, transosseous wiring, pin fixation techniques and external fixators. Bone plating through a preauricular, submandibular, or retromandibular approaches are the most commonly employed techniques. Preauricular approach or submandibular approach have several disadvantages like limited exposure and minimal accessibility when treating condylar fractures

## Introduction

Fractures of the mandibular condylar process are more common injuries that accounts for 29% to 40% of the fracture of the facial bones and represent 20% to 62% of all mandibular fractures. The treatment for the fractured

condyle have been the subject of so much controversy and debates that have been continuing for the past decades with no general agreement as yet. When considering the risks and morbidity of the surgical procedure some literature advocate conservative treatment

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with fixation devices. By using an intraoral approach, there is limited access which prevents precise positioning of the plate and screw. Retromandibular approach is easier and safer than a submandibular approach because of its greater accessibility and less incidence of encountering facial nerve. The main advantage of retromandibular over other approaches is less conspicuous scar. Zide and Kent<sup>27</sup> described an approach ie rhytidectomy or face-lift approach to the condyle which allows good exposure and visualization for fixation of condylar fractures especially those in the sub condylar region. An approach modified by Blair et al "Lazy S cervicomastoid" with an increased exposure, visibility of the fracture site and ease of placement of fixation devices gained more advantage than that of the rhytidectomy approach<sup>40</sup>.

### Aims & objectives

Our study was done to evaluate prospectively the versatility of Lazy "S" Cervico mastoid approach in treatment of condyle fractures, in terms of accessibility, exposure of the fracture site, ease for the reduction fixation and preserving the facial nerve.

### Materials & methods

The Prospective study included 5 patients who presented to the maxillofacial surgery unit in SRM Dental college, Ramapuram, Chennai 89 between June 2009- Dec 2010 who were diagnosed as condylar fractures and treated with open reduction and internal fixation using Lazy "S" cervico mastoid approach. In our study 5 patients were taken with condylar fractures. In this 4 males and 1 female patient were included. All these patients had trauma due to road traffic accident. These patients were examined carefully and proper diagnosis were made based on clinical and radiographic investigation by Trauma surgeon. All the patients were planned for open reduction and internal fixation of the fractured condyle under general anesthesia. Patients were informed about the procedure duration of hospital stay and possible post operative complication like infection, facial nerve palsy and scar formation. Informed consent were obtained from the patients. All our patients fulfilled the requirement for absolute indication for open reduction. Patients with fear psychosis refusing the surgeries and patients who preferred conservative management were excluded from the study. Pre operative Panoramic radiographs and Computerised tomography were taken to diagnose and evaluate the degree of displacement. Pre operative Inter maxillary fixation was done for

occlusion. Inter maxillary fixation was not done post operatively and patients were encouraged to use the mandible for chewing. All condylar fractures were treated using Lazy "S" Cervico mastoid approach. The fracture site was identified, reduced and fixed with stainless steel miniplates. The miniplates used were 4 hole plate of 2 mm thickness with gap & with out gap, 2 hole plate of 2 mm thickness, 8 mm screws with 2 mm thickness.

Patients were instructed to take normal diet after one week. Clinical and radiologic follow up was done for patients during the 1<sup>st</sup> week, 3 months, 6 months. The radiologic follow up examination consisted of panoramic radiography taken immediate, 6 months and 12 months post operatively. The clinical follow up examination was done at regular intervals postoperatively, which included checking of occlusion, wound healing, facial nerve palsy and scar formation. All patients were discharged after one day. Intra venous medication was given on immediate postoperative period and started with oral medications the next day. Oral medications included antibiotics like 3<sup>rd</sup> generation cephalosporins and NSAID's like Diclofenac sodium for 5 days postoperatively.

### Surgical technique

#### Step 1. Preparation and Draping

Pertinent landmarks useful during dissection should be exposed throughout the surgical procedure. When the lazy "S" cervicomastoid approach was used, the structures that should be visible in the field included the corner of the eye, the corner of the mouth, the lower lip anteriorly, the entire ear and the temporal area must be completely exposed. Inferiorly skin below the inferior border of the mandible was exposed to provide adequate access after draping.

#### Step 2. Marking the Incision and injection under local anesthesia.

#### Lazy S cervico mastoid incision:

Under 2% lignocaine and 1 :80000 concentration of adrenaline Local anesthesia given. A preauricular incision was made which continues just under the lobe of ear, and curves in **lazy "S"** fashion postero-inferiorly to the angle of mandible which extends approximately 2 cm inferiorly.

#### Step 3. Skin Incision and Dissection

The initial incision was carried through skin and subcutaneous tissue only. A skin flap was elevated through this incision using blunt dissection with

Case	Age/Sex	Diagnosis	Approach	Treatment
1	37/F	LeftSubcondylar & RtParasymphysis #	Lazy "S" Cervico mastoid	O R I F With 4 hole plate ( 2.0 mm) & 2 hole plate with gap (2.0 mm), 8.0 mm screws (2.0 mm).
2	31/M	Left & Right Sub condylar #	Lazy "S" Cervico mastoid	O R I F With 4 hole plate ( 2.0 mm) & 2 hole plate with gap (2.0 mm), 8.0 mm screws (2.0 mm).
3	19/M	Right Sub condylar #	Lazy "S" Cervicomastoid	O R I F With 4 hole plate with out gap ( 2.0 mm), 8.0 mm screws (2.0 mm).
4	41/M	Left Sub condylar & symphysis #	Lazy "S" Cervicomastoid	O R I F With 4 hole plate with out gap ( 2.0 mm) & 2 hole plate with gap (2.0 mm) , 8.0 mm screws (2.0 mm).
5	25/M	Left Sub condylar #	Lazy "S" Cervicomastoid	O R I F With 4 hole plate with out gap ( 2.0 mm), 8.0 mm screws (2.0 mm).

Metzenbaum scissors. The flap should be widely undermined to create a subcutaneous pocket that extends below the angle of the mandible and a few centimeters anterior to the posterior border of the mandible. No significant anatomic structures are in this plane except for the great auricular nerve, which should be deep to the subcutaneous dissection. Hemostasis is then achieved with electrocoagulation of subdermal vessels.

The parotid capsule was then identified, incised and blunt dissection was carried out. As soon as the globular parotid tissue started emerging from the fascial incision, blunt dissection with the hemostat was continued parallel to the anticipated direction of the facial nerve branches. Beneath the retracted nerve branches the masseter was soon encountered. The pterygomassetric sling was incised on the posterior border of the ramus, and periosteal elevator was used to expose the fracture site. The fracture was reduced and fixation was done using stainless steel miniplates and screws. The surgical field was then irrigated and hemostasis was achieved.

**Step 4. Closure**

Parotid fascia and SMAS were closed with [polyglactic (vicryl) 3/0] interrupted sutures, to reduce the risk of salivary fistula. The skin was closed by subcuticular suturing using non resorbable monofilament polypropylene (prolene) 4/0 suture.

**Discussion**

The treatment of fractured mandibular condyles constitutes a true challenge for surgeons because the decision of open versus closed techniques is not so simple.

When performing the surgeries of the condyle a proper pre operative evaluation which includes proper clinical and radiological examination. Simple radiographic to advance imaging techniques like computerized tomography and 3D reconstruction. Fractures that appear to be minimally displaced on oblique views or OPG can actually proved to be badly displaced or even fracture dislocations on CT and 3D reconstruction. This gives us to conclude an exact diagnosis and treatment planning. The controversies between open and closed reduction of the condyle always exist and it's a debate. In our study the decision for open reduction was based of the criteria given by Zide and Kent in their study.

The various types of surgical approaches to treat the condylar process of the lower jaw are all associated with specific advantages and disadvantages.

The choice of the approach is of importance to provide Safe and comfortable access with minimal retraction to fracture line , versatility of treatment modalities allowing plates, wires, lag screws, condylar lag screws to be easily implemented without hindrance from the adjacent structures, predictable identification of vital structures, minimal intraoperative and postoperative morbidity and limiting the facial scars.

Access with other approaches is often difficult, which may necessitate forceful tissue retraction and oblique insertion of the plates and screws. Reduction of the medially displaced condylar fragment can be difficult.

The various types of surgical approaches to treat the condylar process of the lower jaw are all

### Lazy "s" cervico mastoid incision



Fig 1a - incision marked  
Fig 1 b fracture site exposed



Fig 1 c fixed with miniplate and screws



Fig 1 d suture being placed



Pre operative o p g



Post operative o p g



Post operative scar after  
6 months

associated with specific advantages and disadvantages. The broad spectrum of approaches and the very different surgical techniques make a comparison of the operational techniques for joint process fractures very difficult.

In our study we used Lazy S cervicomastoid approach, which gave excellent exposure of the fractured condyle and for the reduction. The vertical screw placement for fixation which was very crucial and requires heavy retraction was done with much ease.

The most feared complication common to all other approaches is injury to the facial nerve, which has been reported to be temporary in 30—48% and permanent in 1%. All of our patients didn't have any facial nerve palsy. In this technique, the selection of an area adjacent the buccal branches and the formal identification of the nerve neutralises these issues and as the buccal branch is the only branch normally encountered (if any at all), its retraction, given its excellent cross anastomoses, is inherently less risky.

The intraoperative complication of haemorrhage is also an important factor in open reduction though numerous cases are reported in literature like superficial temporal artery in case of preauricular approach and endaural approach, and retromandibular vein in case of retromandibular approach.<sup>14,19</sup> We haven't encountered any complication of haemorrhage intraoperatively.

The opening of the parotid capsule must be made with a sharp scalpel or a blade leaving straight and firm wound edges which enables to identify the incised margins and to give a watertight closure. Before the closure haemostasis within the masseter muscle and parotid gland must be complete to avoid haematoma formation<sup>12,14</sup>. In our study none of our patients had Sialocele.

The traditional retromandibular approach requires traversal of the Parotid gland from its posterior or inferior lobe to expose the fracture site. Therefore this approach causes severe injury to the facial nerve trunk and branches and the gland tissue. Facial nerve injury and salivary fistula may occur easily after the operation.

The stability after fixation of the fractured segment using mini-plates always questionable. This is because of physiological resorption of the fracture gap, which lead to bending stress and functional loading. In our study we use straight miniplates 4 hole with gap and without gap and fixed with 2 x 8 mm screws. The stability of fractured fragment after fixation was good. There was no movement of fractured fragment, screw loosening and plate fracture in any of our cases on subsequent follow up. Choi et al compared the biomechanical stability of four plating techniques used to stabilize condylar neck fractures and decided that two mini plate system provided greater functional stability to reduce condylar fractures and is indicated to achieve early mobility of the jaw and stability of

the fracture site when open reduction is indicated in case of condylar neck fractures. They have used two miniplates in 4 cases and one miniplate in 2 cases. They did not encounter plate fracture or screw loosening in any of the cases after a follow up period of 1 year.<sup>8</sup>

A patient who has had a condylar fracture cannot be considered to be cured until he is able to masticate easily with the contralateral side of the dentition, which implies the recovery of the condylar excursion. In our study we achieved desirable occlusion post operatively.

Wilson et al used a lazy s incision and preauricular incision with retromandibular extension for treating bilateral condyle fracture dissecting down to the fracture from an area next to anterior edge of the parotid gland through the masseter.

Chossegras et al reported one widened scar (9 cases) after using retromandibular approach. Using the preauricular approach, Pereira et al reported a good quality scar in all cases. In our study, wound healing was satisfactory with less conspicuous scar in all 5 cases.

## Results

Our study included 5 patients in that, 4 were males and 1 was a female patient. All of our patients had been diagnosed as condylar fracture, in that 4 were left sided and 1 was right sided subcondylar fracture. All the patients had been planned for open reduction and internal fixation. Our study was designed to evaluate the versatility of Lazy s cervicomastoid approach by assessing the intraoperative time required for exposure of the fracture site, post operative evaluation of wound healing, facial nerve palsy and scar formation. Lazy s cervicomastoid approach was used in 5 patients. Mini plates were used to fix the fracture after reduction. 3 patients received two plates and 2 patients received single plate fixation. Miniplates used were 4 holed with gap, without gap and 2 holed with gap, without gap and fixed with 2 mm x 8 mm screws. The Postoperative evaluation were assessed based on 3 criteria which includes wound healing, occlusion and facial nerve palsy. These criteria were evaluated at regular intervals in 1<sup>st</sup> week, 3<sup>rd</sup> month, 6 month. The occlusion which was achieved in all the patients remained unchanged. The wound healing was satisfactory in all the patients and no facial nerve palsy was observed. Scar assessment was done in all patients after 6 months postoperative period, which was based on subjective and objective analysis. Subjective assessment was done from the patients feedback on the scar. Objective assessment was done based on the

texture and visibility of the scar. The scar was smooth without any hypertrophy noticed and was hidden from the frontal aspect of the face. In subjective analysis all the patients gave a satisfactory score of "0".

## Conclusion

In our study of 5 cases of condylar fractures which were evaluated prospectively for the versatility of Lazy "s" cervicomastoid approach by open reduction and internal fixation, we achieved encouraging results. An acceptable operative procedure must give sufficient access to allow anatomical reduction and rigid fixation of the fracture and must avoid damage to the vital structures during open reduction which was fulfilled by our study. In conclusion satisfactory results were achieved by surgical reduction and internal fixation of condylar fractures without much damage to the anatomical structures surrounding the condylar fracture. None of our patients had any complain regarding occlusion, mouth opening, and scar formation after the surgical reduction. The direct access to the fracture, good visual contact with the fracture, lower incidence of branches of facial nerve makes "Lazy s" cervicomastoid" our preferred method.

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# Sheuthauer Marie Sinton syndrome – Report of a case of cleidocranial dyaplasia

\* Thomas Varghese, \* Leena Johnson Arakkal, \* Joseph Johny Parakkal, \*\* Kiran Kumar K

## Abstract

Sheuthauer Marie Sinton syndrome is more commonly known by the name of cleidocranial dysplasia (CCD) and is a congenital defect that manifests as abnormalities of the skeleton and teeth which is inherited as autosomal dominant trait caused by the mutation of the CBFA1 gene also called RUNX2 gene located in the short arm of chromosome 6. The characteristic findings include the partial or complete absence of the clavicles, delayed closure of the fontanels, presence of open skull sutures and multiple wormian bones. Dental manifestations of CCD are retention of multiple deciduous teeth, impaction or delay in eruption of permanent teeth and the presence of multiple impacted supernumerary teeth. Here we report a case of Cleidocranial dysplasia in a 30 year old male.

Key words: Autosomal dominant, Cleidocranial dysplasia, RUNX2 gene.

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disorder of mesenchyme or connective tissue, resulting in retarded ossification of bone precursors especially at junctions. This in turn can lead to defective ossification or even failure of ossification of portions of skeletal structures<sup>3,4,5</sup>.

The clinical significance of this condition in a dental setting arises due to the involvement of the facial bones and multiple impacted teeth<sup>7</sup>. The presence of impacted teeth make the patient prone to the development of odontogenic cysts from many impacted teeth, hence early diagnosis and management is necessary to prevent these complications.

## Introduction

Cleidocranial dysplasia (CCD) is a rare congenital defect of autosomal dominant inheritance with a prevalence of less than 1 per million. It primarily affects the skeletal elements that are formed by intramembranous as well as endochondral ossification, such as facial bones, cranium, clavicles also accompanied by late closure of the fontanels, persistently open or delayed closure of sutures, hypoplastic or aplastic clavicles, multiple wormian bones and short stature. The vertebral column and appendicular skeleton are also affected in some cases. Multiple

supernumerary teeth are present often accompanied by delayed or disturbed eruption of permanent teeth.<sup>1,2</sup>

The term cleidocranial dysplasia was derived from “*dysostose cléidocrânienne héréditaire*” which was coined by Pierre Marie and Paul Sinton in 1898. It is also known as cleidocranial dysostosis, mutational dystosis, Sheuthauer Marie Sinton syndrome. The spontaneous mutation in the gene coding for osteoblast transcription factor RUNX2 located in the short arm of chromosome 6 is considered to be responsible for the pathology by causing an early developmental

## Case history

A 30 year-old male came to Department of Oral Medicine and Radiology with a chief complaint of missing teeth in the maxillary and mandibular arches. The condition had been evident since childhood, ever since the exfoliation of the deciduous teeth.

On general examination, the patient appeared well-oriented, moderately built with short stature. Extra oral examination of showed brachycephalic head, bossing of the fronto parietal region, prominent supra orbital ridges, mild hypertelorism and a depressed nasal

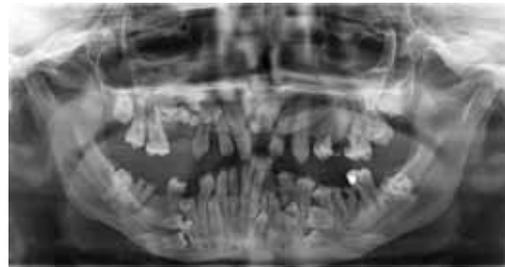
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*Fig. 1* Facial profile view of the patient demonstrating frontal bossing and hypoplastic maxilla .



*Fig. 2* Intraoral view shows multiple missing permanent teeth.



*Fig. 3* Panoramic view of the jaws shows multiple unerupted supernumerary teeth mimicking premolar and underdeveloped maxillary sinuses.



*Fig. 4* Lateral Cephalogram of skull shows underdeveloped paranasal sinuses and zygomaticofacial complex



*Fig. 5* Postero-anterior view of skull shows open skull sutures, large fontanels and underdeveloped paranasal sinuses.



*Fig. 6* Chest radiograph (PA View) shows thinning and hypoplasia of the clavicles and bell shaped rib-cage.

bridge. The characteristic hypermobility of shoulders, seen in CCD due to absence or hypoplasia of clavicles was also present. Intra oral examination (Fig. 2) revealed multiple missing permanent teeth in maxilla and mandible with a high palatal vault.

Panoramic radiograph (Fig. 3) revealed the presence of multiple unerupted permanent teeth and several impacted supernumerary teeth. The lateral cephalogram (Fig. 4) showed the presence of underdeveloped paranasal sinuses. The postero-anterior view of skull (Fig.5) demonstrated open skull sutures, delayed closure of fontanels, poorly formed paranasal sinuses and zygomatic complex. A chest radiograph (PA View) showed thinning and hypoplasia of the clavicles (Fig. 6), scoliosis of the vertebral column and a bell shaped rib-cage.

Based on the clinical and radiographic features a diagnosis of cleidocranial dysplasia was made and the patient was referred to the department of Prosthodontics for rehabilitation.

## Discussion

Cleidocranial dysplasia (CCD) is a rare congenital defect which markedly affects the craniofacial growth. The affected individual usually presents with a broad forehead with frontal bossing and some degree of hypertelorism. A frontal groove is seen in the midfrontal region as a result of incomplete ossification of the metopic suture. Closure of the anterior fontanel and sagittal and metopic sutures is most often delayed. Delayed closure of anterior fontanel and metopic sutures are responsible for the frontal bossing. As the age increases, wormian bones around the lambdoid suture are seen due to delay in normal ossification. The most striking feature of CCD is the appearance of the brachiocephalic head and facies<sup>5,6,8,9</sup>. In regard to the rest of the skeleton the pelvic and pubic bones are narrow and abnormal in shape and a small bell shaped thoracic cage with associated scoliosis has been also reported<sup>5,6</sup>.

In general patients affected by CCD are mentally sound and possess a normal IQ. They are slightly dwarfed, of slender build and have long necks and drooped shoulders. The height of a full grown individual is significantly reduced when compared to the average and is usually mildly disproportionate; i.e. the individual is of short stature with short limbs<sup>6,8</sup>. The one feature that is often considered the hallmark of CCD is clavicular hypoplasia, which depending on the degree of clavicular hypoplasia, can range from a dimple in the skin to sloping, almost absent shoulders. This confers the patient with the ability to voluntarily bring the shoulders together. Hypoplasia of the clavicle is more common than aplasia, more commonly affects the acromial end and is usually seen bilaterally but need not always be so<sup>8</sup>. Abnormalities seen in the hand include short, tapered fingers and thumb with shortening of distal phalanges. All other bones of the hands and feet, especially the distal phalanges and the middle phalanges of the second and fifth fingers are unusually short. Clinodactyly of the fifth finger may be present as well in some cases<sup>6,8</sup>.

The orbit shows prominent ridges but their inferior margins are shrunken into small maxillae, which give the face a flattened appearance resulting in mandible appearing relatively prognathic. The other clinical features are biparietal cranial enlargement, hypertelorism and absence of the nasal bone in few cases. Frontal and paranasal sinuses are frequently absent or reduced in size<sup>6,8</sup>. Due to the facial hypoplasia and underdeveloped paranasal sinuses, these patients frequently suffer from upper airway respiratory disorders such as wheezing, sinusitis, chronic throat infection, chronic nasal congestion, sleep apnea, recurrent bronchitis and recurrent pneumonia. Midfacial hypoplasia may also result in an increased risk of conduction hearing deficit and recurrent ear infection. The deformity of the pelvic bone may lead to an increased rate of Caesarean section delivery in female adult CCD patients<sup>10</sup>.

Intraoral features seen associated with CCD include a high arched palate and clefts involving the hard and soft palates have been described. Retention of the deciduous dentition with delayed eruption of the permanent teeth as well as multiple impacted supernumerary teeth is a relatively constant striking finding. The supernumerary teeth show a tendency to aggregate in the mandibular premolar and maxillary anterior regions. Morphologically and functionally these supernumerary teeth resemble their normal counterparts<sup>6,8,9</sup>.

In relation to the dentition the anomaly manifests as an almost complete absence of cellular cementum

and an increase in the amount of acellular cementum on the roots of the affected teeth. The failure of eruption of a significant number of teeth seen in CCD was thought to be a consequence of this deficit. After the discovery of RUNX2, it is very clear that failure of eruption is mainly due to mutated RUNX2 gene in CCD<sup>5,6,8</sup>. The RUNX2 gene is necessary for tooth development which controls the differentiation of precursor cells into osteoblasts, the cells that actually secrete bony matrix and thereby form bone and regulates chondrocyte differentiation during endochondral bone formation. This gene is one of the key mesenchymal factors that influences tooth morphogenesis and subsequent differentiation of ameloblasts and odontoblasts<sup>5,6</sup>.

The radiological findings of CCD are considered to be pathognomonic and so radiographic evaluation is the most reliable means to confirm the diagnosis<sup>9</sup>. Radiologically, clavicular hypoplasia is one of the hallmarks of CCD and this in conjunction with the presence of retained deciduous teeth, delayed eruption of permanent teeth and multiple impacted supernumerary teeth are practically diagnostic of CCD. In addition, with the identification of the responsible gene, molecular-genetic analysis has become an indispensable diagnostic tool for early detection of CCD<sup>6,8</sup>.

The differential diagnosis of Cleidocranial dysostosis includes Pyknodysostosis, Congenital pseudoarthrosis of the clavicle and Yunis-Varon syndrome<sup>10</sup>. Congenital pseudoarthrosis of the clavicle one of the most common conditions to be considered and occurs due to idiopathic failure of coalescence of its ossification centers. In the greater majority of cases involvement is unilateral but bilateral version may mimic CCD. Pyknodysostosis is a rare autosomal recessive malformation of osteoclast function having a pathognomonic feature of acro-osteolysis with sclerosis of the terminal phalanges and some features similar to that of CCD. It is characterized by features absent in the spectrum of clinical features of CCD such as dwarfism, micrognathia, osteosclerosis, hypoplastic or absent distal phalanges and presence of multiple fractures<sup>8,10</sup>.

Yunis-Varon syndrome which is usually a recessively inherited lethal condition is characterised by prenatal growth deficiency, failure to thrive, abnormalities of calvaria, thumbs, toes, clavicle and high neonatal mortality rate. The severity of the syndrome together with limb malformations and a patchy sometimes sclerotic bone structure makes for an easy distinction from CCD<sup>5,8</sup>.

There is no special treatment for cleido cranial dysplasia although care of oral condition is important. Dental treatment is difficult and time consuming often requiring surgical, orthodontic and prosthodontic interventions.

## Conclusion

Very rarely does cleidocranial dysplasia confront the dentist in clinical practice but when it does it is usually associated with significant dental problems. Being able to diagnose the condition and initiate early treatment is of paramount importance in the preservation of the physical as well as psychosocial well being of the patient. It is also important to bear in mind that successful treatment in cases such as this can only be achieved through a holistic approach that encompasses all aspects of the condition, including the primary pathology, the deformity itself and as well as the psycho-social implications.

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# Avulsed tooth – An unusual experience

\* Nithin Mathew Cherian, \*\* Anju Samuel, \*\*\* SankarVinod V, \*\*\*\* Sujeev N, \*\*\*\*\* Ninan Thomas

## Abstract

Periodontal ligament connects the tooth to the socket and the success of the tooth reimplantation completely depends on maintaining the vitality of the cells remaining attached to the root surface. After reimplantation the living cells attack the root surface by break down and the destruction is called root resorption, which is mainly divided into internal resorption and external resorption. Root resorption can occur due to the pressure on the root surface which mainly includes trauma, tumour growth, excessive occlusal loading and due to excessive inflammation.

This article presents a case report on an avulsed tooth with an extra oral time of 25 minutes, underwent complete resorption of the root, despite complete rehabilitation.

Keywords: Root resorption, reimplantation, dental avulsion

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## Introduction

Traumatic injuries to the teeth during childhood are common, most commonly the affected teeth is permanent anteriors with a frequency of 0.5–16% during the first 7–10 years of age<sup>1</sup>. These injuries are seen in pediatric cases and in patients with proclined anteriors. In general practice, traumatic injuries shows a higher frequency in pediatric cases and the treatment modality followed in such an event depends greatly on the age of patient, condition of tooth during the initial visit to hospital and extra oral time period. Apart from these factors the prognosis of patients with such trauma is often affected by the skill, technique and experience of the surgeon. Numerous studies have

attempted to determine the appropriate treatment for avulsed teeth.

Trauma to the tooth results in unexpected complications, such as pulp necrosis, inflammatory root resorption, ankylosis and loss of marginal bone support. External resorption is encountered in 54.8% of the teeth<sup>2</sup>. Pulp necrosis is the most common complication after luxation injuries<sup>3</sup>, so endodontic intervention is often required as soon as tooth exposed to oral environment after avulsion to prevent complications.

The treatment of avulsed permanent tooth depends upon the extra oral time taken<sup>4</sup>

❖ Tooth with **open apex and less than 60 minutes** extra oral dry time:

- The root is gently rinsed with saline and soaks in doxycycline for 5min, and reimplant.
- Revascularised, no treatment
- If any signs of infection, initiate apexification procedure
- ❖ Tooth with **open apex and greater than 60 minutes** extra oral dry time:
  - Remove the periodontal ligament by placing it in etching acid for 5min, soak it in fluoride and reimplant.
  - Extraoral root canal treatment or initiate apexification procedure with in 7-10days
- ❖ Tooth with **closed apex and less than 60 minutes** extra oral dry time:
  - The root should be rinsed of debris with saline and replanted
  - Initiate endodontic treatment at 7-10 days
  - Incase if signs of resorption are present, treat with calcium hydroxide until evidence of healing present
  - Obturate and crown is placed
- ❖ Tooth with **closed apex and greater than 60 minutes** extra oral dry time:
  - Remove the periodontal ligament by placing it in etching acid for 5min, soak it in fluoride and reimplant.
  - Initiate endodontic treatment at 7-10days

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Fig. 1 Avulsed 11



Fig. 2 Fixation of 11 with Erich's arch bar

Fig. 3 2<sup>nd</sup> day post-operative radiograph

- In case if signs of resorption are present, treat with calcium hydroxide until evidence of healing present
- Obturate and crown is placed

This case report describes the resorption that occurred to an avulsed tooth, managed by root canal treatment with gutta-percha points and semi rigid fixation using Erich's arch bar.

### Case report

A 21-year-old female patient reported with a history of road traffic accident resulting in an avulsed 21 and an Ellis class I fracture. There was an upper lip laceration of size 3×2cm. No other injuries present.

The extra oral time period of tooth was 25 minutes and the tooth was carried in water. Without disturbing the periodontal fibers, the tooth was thoroughly cleaned and reimplanted into the socket after dipping the tooth in tetracycline solution. The tooth was then stabilized by Erich arch bar from 13 to 23. Post operatively patient was on antibiotics for 5 days and on 7<sup>th</sup> day patient was recalled and intentional RCT done.

Patient was regularly followed up, the tooth appeared stable and an IOPAR showed good healing. The arch bar was removed on 21<sup>st</sup> post operative day and patient was asked to continue follow up regularly for 1 year. After a period of one month, the patient failed to appear for follow up and reported after 3 months and 20 days with pain and mild mobility of the tooth. An IOPAR showed complete resorption of the root with only the gutta-percha point holding the tooth crown in place.

### Treatment

The patient was informed about the condition of the tooth and extraction was done under local anesthesia. A thorough curettage was done and the wound was closed with 3-0 silk.

### Discussion

The management of traumatized permanent incisors is a challenging prospect in dental practice. The current literature on this subject presents one with varied options regarding its treatment. Chappius et al<sup>5</sup> reported the survival rate of a tooth that was completely avulsed and replanted as 95.6% with a follow up period of one year. They suggested that the induction of replacement resorption after reimplantation was influenced by the duration of time between avulsion and reimplantation and also the storage of tooth during extra oral period and the condition of periodontal fibers. Donaldson et al<sup>6</sup> reported that the time limit for successful reimplantation was 15 minutes, while Melentyre et al in their report extended the extra oral time limit to 20 minutes. In this case report, complete root resorption had occurred within a very short period of time after reimplantation. This could be explained by poor condition of the periodontal ligament or due to the exposure of teeth in hypotonic solution for 25 minutes and the fact that the material used for root canal filling is gutta-percha points and not calcium hydroxide. J B Martin Trope et al<sup>7</sup> says that if the extra oral time period for the tooth is less than 60 minutes and the tooth has closed apex, then endodontic treatment should be initiated within 7 – 10 days<sup>8,9</sup> critical limit is 14 days. But in this case we have done RCT on the 7<sup>th</sup> day with



Fig. 4 Post-operative radiograph after Erich's arch bar removal



Fig. 5 Post-operative radiograph after 3 months and 20 days

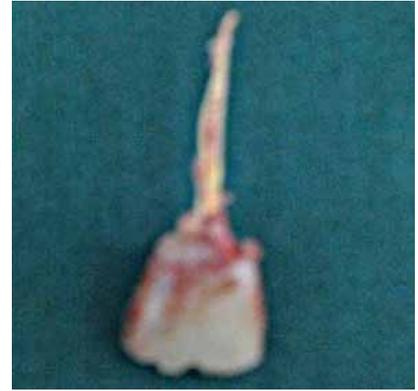


Fig. 6 Extracted 11

guttapercha alone and not with calcium hydroxide. Calcium hydroxide will ensure the root canal to be free of necrotic material and antibacterial property will help for early healing<sup>10</sup>.

Inflammatory resorption of root is triggered by small disturbance in the periodontal ligament or cementum due to the trauma, moreover root canal filling was done with guttapercha points not with calcium hydroxide, which usually prevents the root resorption. Also the extra oral time period was greater when one takes into consideration the time taken by preparing the cavity before reimplantation, and also such procedures increase the risk of damage to periodontal fibers. Thus treatment flaws are assumed to be the cause of rapid root resorption. Another reason may be the mild changes in the position of replanted tooth while splinting.

## Conclusion

Traumatic injuries to teeth present a considerable challenge for the practitioners. To cover all these various demands and necessities in a proper and adequate manner, a sound and comprehensive knowledge and experience of various dental fields is needed. Even if it is impossible to avoid resorption completely, the overall knowledge of both dentist and patient regarding traumatic dental injuries should be improved to delay the progress of resorption.

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# Effect of orthodontic tooth movement on dental tissues

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Orthodontics is a speciality that relies on biological reactions to applied mechanical energy. Orthodontic tooth movement is facilitated by remodeling changes in the periodontal ligament (PDL) and alveolar bone in response to the applied mechanical stimuli. The effects of orthodontic mechanics on various tissue level like periodontal ligament, gingiva, pulp, cementum, and enamel along with the issue of pain following orthodontic appointments is described.

## Periodontal responses to orthodontic force application<sup>1</sup>:

When an orthodontic force is applied, tooth movement will occur in the direction of the force, by narrowing the periodontal ligament (PDL) at the site of compression, with subsequent bending and resorption of the alveolar bone. At sites of force-induced tension in the PDL, a concomitant apposition of bone will occur, until the PDL has regained its normal width. Thus, tooth movement occurs as a direct outcome of force-induced tissue remodeling around the dental root.

Orthodontic forces produce mechanical damage and inflammatory reactions to the periodontium<sup>2</sup>. When strong/heavy forces are applied, the compressed PDL is crushed, resulting in local ischemia and hyalinization, which delay tooth movement. When moderate forces

## Abstract

Orthodontic tooth movement occurs as a result of direct application of mechanical force on the tooth. Like any other treatment orthodontic treatment do have some side effects and understanding the effects of orthodontic force on various dental tissues can minimize the problems. This article is a review on the effect of orthodontic force on various dental tissues and also the pain associated with orthodontic treatment.

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are applied, the PDL may become strangulated, resulting in a delay in bone resorption. However, light forces will produce only a partial PDL ischemia, along with direct bone resorption, resulting in a continuous tooth movement. Kotaro Miyoshi et al<sup>3</sup> found out there was considerable difference in tooth movement and periodontal tissue response when orthodontic force are applied at different times of the day. This suggests the diurnal rhythms in bone metabolism. Saito et al<sup>4</sup> indicated that there was increase in prostaglandin level (inflammatory mediator) on PDL during orthodontic treatment. Studies have shown that local administration of PG in rats accelerate the tooth movement and bone resorption after application of force<sup>5</sup>.

## Effect on dental pulp<sup>6</sup>

Profitt and Fields stated that “although pulpal reactions to orthodontic treatment are minimal, there is probably a modest and

transient inflammatory response within the pulp, at least at the beginning of treatment.”<sup>7</sup> The latter may contribute to the discomfort that patients often experience for a few days after appliances are activated.

Orthodontic force will induce damage, inflammatory changes, and circulatory disturbances in the dental pulp<sup>8</sup>. Orthodontic force may result pulpal changes in the form of induction of neurogenic inflammation leading to release of neuropeptides. These neuropeptides alter the pulpal blood flow and release of proinflammatory cytokines leading to pulpal inflammation and hyperemia. Substance P present in the nerve fibre<sup>9</sup> may be involved in the pulpal inflammation following orthodontic force application. Masary Yamaguchi<sup>10</sup> stated that there is possibility of loss of pulp vitality during orthodontic treatment, its mainly seen in tooth with a history of trauma.

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Paul A Hamersky et al<sup>11</sup> in their study concluded that orthodontic force of very short duration can cause biochemical and biological alteration of pulpal tissues after orthodontic force application for 3 days in premolar extraction cases.

### **External apical root resorption<sup>12</sup>:**

External apical root resorption (EARR) is a common clinical complication of orthodontic treatment. It is the permanent shortening of the end of the tooth root. Maxillary incisors are most often affected. Continuous pressure stimulates the resorbing cells in apical third of root, resulting in the shortening of the tooth. Radiographically no signs of radiolucency can be observed in the apical third of the root due to orthodontic pressure. Removing the orthodontic pressure prevents further resorption and repair of the root<sup>13</sup>.

Studies have shown that tooth with incomplete root formation<sup>14,15</sup> endodontically treated tooth<sup>16</sup> and aspirin therapy<sup>17</sup> have lower incidence of root resorption. Teeth with open apices exhibited less severe pulp changes than those with complete root development<sup>18</sup>. So it is advantageous to initiate orthodontic correction of incisor at mixed dentition stage, as an introductory phase of treatment. Time and initial stress affects on EARR. R F Vicilli<sup>19</sup> in his study found that orthodontic ERR was not significantly different between control and treated animals over time in the region of low stress where as in high stress area there was 5 fold increase in EARR.

Histological root resorption (RR) usually presents as microscopic areas of resorption lacunae on root surfaces. Orthodontic force applied to teeth for a short amount of time can produce resorption lacuna which is absent of radio graphically. Seventy-five percent of these areas show complete repair with secondary cementum. When root resorption exceeds the reparative capacity of cementum, EARR becomes evident.

### **Effect on gingiva:<sup>20</sup>**

The periodontium can be divided anatomically between the gingival unit (the soft tissue coronal to the bony crest of the alveolus in health), and the periodontal attachment apparatus, defined by the cementum, the periodontal ligament (membrane), and the cribriform plate of the alveolus.

Orthodontic treatment has a direct influence on gingival health. Glans and coworkers reported on a marked and statistically significant improvement in gingival health of patients with initially crowded dentitions, from 12 weeks after bonding until debonding. They attributed this finding to leveling of

the dentition performed within these 12 weeks, making oral hygiene measures effective, while at the same time evoking patient motivation by creating better esthetics. So oral hygiene instructions should be given before the initiation of orthodontic treatment and it should be reinforced every visit. The use electrical and ultrasonic brushing shows better plaque control than manual brushing there by reducing gingival inflammation<sup>21</sup>.

### **Effect on enamel<sup>22</sup>**

Tooth enamel is the most mineralized tissue of the human body. Orthodontic treatment has the potential to cause some damage to dental enamel during cleaning with abrasives, during the acid etching process itself, by forcibly removing brackets and mechanical removal of composite remnants with rotary instruments. Studies show that 23 % of patients developed white spot lesions (WSL) following orthodontic treatment<sup>23</sup>. In addition the enamel surface may be demineralized as the result of bacterial biofilm (dental plaque) around orthodontic attachments. Structural damage may also be caused intentionally by clinicians when reducing enamel by interproximal enamel stripping to gain space. Decalcification of enamel (white spots) is a common adverse effect of orthodontic treatment. Decalcification is considered to be the first step toward cavitation. The most affected teeth are the maxillary incisors<sup>24,23</sup> followed by maxillary canine and mandibular canines<sup>23</sup>. The significant risk factors for developing WSL during orthodontic treatment were identified as, increase in treatment time i.e. more than 36 months, teeth with fluorosis, patients with poor oral hygiene, patients whose oral hygiene declined during treatment, and preexisting white spot lesions<sup>23</sup>.

The prevention protocol for decalcification includes plaque control through brushing of the teeth with fluoridated tooth paste. Conservative treatment options for WSLs is by the application of low levels of fluoride and calcium ions, which can penetrate deep into the WSL<sup>25</sup> Daily rinsing with a 0.02% or 0.05% sodium fluoride solution can also minimize decalcification of enamel. Additionally, fluoridated solutions may delay the progression of lesions.<sup>26</sup> Highly filled (58%) resin sealants reduce enamel demineralization during fixed orthodontic treatment and minimize white spot lesions<sup>27</sup>.

### **Pain associated with orthodontic treatment**

Pain and discomfort is a common adverse effect associated with orthodontic treatment. Pain was cited as most common negative effects of orthodontic therapy, even when compared to those experiences

after other invasive procedures, such as extractions<sup>28</sup> and this pain could be a reason for discontinuing orthodontic treatment<sup>29</sup>. Previous studies have indicated that 8% and even up to 30% of orthodontic patients discontinue treatment because of pain.<sup>30</sup> The pain and discomfort associated with orthodontic treatment is characterized by pressure, tension, or soreness of the teeth. Pain in the anterior teeth is greater than the posterior teeth. Pain has been reported to begin 4 hrs after the placement of separators or orthodontic wire, and the worst pain was found to occur on the second day of treatment. Usually, pain lasts for seven days. Management of pain should include informing the patient of the possibility of experiencing pain to reduce anxiety. Furthermore, the clinician can ask the patient to chew on plastic wafers or chewing gums containing aspirin. Chewing on plastic wafers theoretically increases the circulation in the periodontal ligament, which reduces the pain and discomfort. Studies have shown that CO<sub>2</sub> laser irradiation will reduce pain associated with orthodontic tooth movement. Furthermore when patients were properly informed about the level of pain they might experience, they gain an increased sense of control, and as a result, pain can be reduced.

## Conclusion

Orthodontic treatment is like any other treatment that can be associated with unfavorable side effects. Knowledge of these side effects is essential to the orthodontist and the patient willing to have orthodontic treatment. Obtaining an informed consent from the patient is as important as executing the treatment plan.

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# A case report on osteochondroma of temporomandibular joint: dilemma among TMDs

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## Abstract

Osteochondromas are the most common benign bone tumour, usually occurs in the metaphyseal region of the long bones. This tumour takes the form of a cartilage-capped bony outgrowth on the surface of the bone; however, they rarely involve facial bones, particularly the mandible (0.6%). The mean patient age was 39.7 years with a peak in the fourth decade. We report a case of osteochondroma of the mandibular condyle which was misdiagnosed as temporomandibular disorder, and the importance of radiographs in diagnosing.

Keywords: Osteochondroma, Mandible, Temporomandibular joint

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## Case report:

A 64 year old women was referred to the Department of Oral Medicine And Radiology, GDC Thiruvananthapuram with a complaint of pain on the right side of face since 2 years. She was under treatment in a private clinic as temporomandibular disorder, noticed swelling and a slight fascial asymmetry since one month, swelling gradually increased in size. There was no history of facial trauma. She also noticed a slow progressing limitation in mouth opening. Physical examination revealed a tender, bony, hard swelling in the right pre-auricular area, which was fixed to the underlying bone and was non-mobile (Fig 1). On opening and closing of the mouth, a click was heard in the right temporomandibular joint. There was approximately 3mm deviation of the midline to the left side. The patient's maximum mouth opening measured 33mm. Based on the clinical examination, patient history, and complementary examination; the hypothesis of osteochondroma was established. Clinical differential diagnosis of TMDs, condylar hyperplasia, osteoma, giant cell tumour, fibro-osteoma and metastatic disease was ruled out radiologically.

## Introduction:

Osteochondroma (OC) or osteocartilagenous exostosis, a cartilage-capped exophytic lesion (World Health Organization International Classification of Diseases for Oncology code 9210/0) that arises from the bone cortex, is one of the most common benign bone tumors. It constitutes 20% to 50% of all benign tumors and 10% to 15% of all bone tumors but it is actually a developmental lesion rather than a true neoplasm<sup>1</sup>. It usually occurs in the axial skeleton, especially long bones. The oral and maxillofacial regions are not common sites of OCs, but the embryonic development of the temporomandibular joint (TMJ), by the endochondral ossification,

makes this area the most frequent facial site of this type of tumor<sup>2,3</sup>. Osteochondroma might arise on the different condylar areas, such as the medial aspects (55.9%), anterior-superior (11.8%), posterior-superior (11.8%), lateral (8.8%), and generally enlarged (11.8%)<sup>4</sup>. It also occurs at the tip of the coronoid process. The most common clinical symptoms are progressive fascial asymmetry, and deviation of lower jaw while opening which mimics the TMDs. Radiographically, osteochondroma usually shows a globular projection extending from the margins of the condylar head with the normal outline of the condylar head being maintained<sup>1</sup>. This paper reports a case of OC in a 65 year old lady who was misdiagnosed as TMD.

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*Fig 1* Extra oral view showing asymmetry on right side and deviation



*Fig 2* Panoramic view



*Fig 3* CT axial section showing large calcified lesion with irregular lobulated contour seen arising from mandibular condyle



*Fig 4* MRI showing Irregular mushroom shaped sclerotic mass

On the panoramic radiograph bony outgrowth with heterogeneous radiographic density arising from the right mandibular condyle of size 3x4cm without any destructive features (Fig 2). On the coronal axial and 3-dimensional CT image, it was clearly distinguished that there was a large calcified /ossified lesion with irregular lobulated contour seen arising from right mandibular condyle with an apparent continuation from cortex and medullary space extending superiorly upto glenoid fossa inferomedially projecting into the fat in the prestyloid compartment of parapharyngeal space laterally into the parotid space (Fig 3). MRI was suggestive of an ill defined mushroom shaped sclerotic mass lesion in the posterior aspect of ramus of right mandible with osseous and cartilageous component extending into the right TMJ causing displacement of the condyle (Fig 4). CT and MRI were suggestive of osteochondroma on the right condyle. Excision biopsy was performed and histologically it was confirmed as osteochondroma of the mandibular condyle with the presence of a cartilage cap, which is characteristic feature of osteochondroma.

## Discussions

Osteochondroma is one of the most common benign condylar tumour together with chondroma and

osteoma, however this is most frequently found on the metaphyseal region of long bone (femur, tibia etc) and unusual on the skull. First reported by Langenbeck in 1853<sup>5</sup>. Review of the literature indicates that patients with these tumours present mainly in the fourth decade with mean age of 39.7 years and a male to female ratio of 1:1.5<sup>1</sup>.

The pathogenesis of osteochondromas of the mandibular condyle is speculative. Trauma and inflammation have been implicated as either initiating or predisposing factors. Lesions consistently arise from the anteromedial surface of the condylar process at the site of attachment of the lateral pterygoid muscle. The tumours are thought to develop from the tendinous attachment of this muscle, similar to the tendency of long bone osteochondromas to arise at the tendinous attachments, where focal accumulations of cells with cartilaginous potential exists, leads to formation of these tumours. This may also explain the occurrence of the OC in coronoid process stressed by the tension of temporalis muscles<sup>6</sup>. Porter and Simpson suggested that a genetic component might also be involved in the neoplastic pathogenesis is due to somatic mutations found in chromosomes 8 and 11<sup>7</sup>. Other theories as to cause include neoplastic, developmental, reparative and traumatic etiologies.

Common clinical manifestations of the OC of the mandibular condyle include facial asymmetry, swelling at the TMJ region, disturbance of mouth opening, and joint pain<sup>8</sup>. The growth of an OC is usually slow, causing gradual displacement and elongation of the mandible<sup>9</sup>. Seki et al reported a case of condylar OC with complete hearing loss<sup>10</sup>.

The diagnosis of OC was proposed based on clinical and radiographic findings. Imaging techniques can be valuable tools for accurately diagnosing and determining treatment for variety diseases and are supportive to clinical examination. On plain film osteochondroma can be either sessile or pedunculated, and is seen in the metaphyseal region typically projecting away from the epiphysis. There is often associated broadening of the metaphysis from which it arises. The cartilage cap is variable in appearance. It may be thin and difficult to identify, or thick with rings and arcs calcification and irregular subchondral bone. New cortical irregularity or continued growth after skeletal maturity has been reached, as well as frankly aggressive features (e.g. bony destruction, large soft tissue component, metastases) are all worrying for malignant transformation<sup>10</sup>.

CT demonstrates the same findings as on plain film, but is better able to demonstrate medullary continuity and the cartilage cap. CT clearly depicts the continuation of the cortex and medulla of the parent bone with that of the tumour, a feature considered diagnostic of osteochondromas<sup>1</sup>. CT also delineates the soft-tissue alterations secondary to the growth. In our patient OC was seen inferiomedially projecting into the fat in the prestyloid compartment of parapharyngeal space laterally into the parotid space. Preoperative CT assessment can be of great important role in the treatment planning of these tumours. CT images are also of great value for differential diagnoses, especially in differentiating condylar OC from unilateral condylar hyperplasia. OC is usually seen as a growth of the morphologically normal condyle, while condylar hyperplasia is seen as an enlargement of the condylar process<sup>1</sup>. Differential diagnosis of solid lesions of the condyle should include condylar hyperplasia, osteoma, chondroma, giant cell tumour, fibro-osteoma and metastatic disease<sup>11</sup>.

Ultrasound is able to demonstrate the cartilage cap very accurately as a hypoechoic region bounded by bone on its deep surface and muscle / fat superficially. MRI is best at assessing cartilage thickness (and thus assessing for malignant transformation), presence of oedema in bone or adjacent soft tissues and visualising neurovascular structures in the vicinity. The cartilage cap of osteochondromas appears the same as cartilage elsewhere, with intermediate to low signal on T1 and

high signal on T2 weighted images. A cartilage cap of over 1.5cm in thickness is suspicious for malignant degeneration<sup>10</sup>.

Histologically, the diagnosis of an OC includes chondrocytes of the cartilaginous cap arranged in clusters parallel to lacunar spaces. Differential diagnoses of OC include osteoma, benign osteoblastoma, chondroma, and chondroblastoma<sup>3</sup>. It is very important to differentiate OC from these previous lesions.

## Conclusion

Mandibular osteochondroma, though a rare entity, should be considered in the differential diagnosis of masses in the region of the temporomandibular joint. Panoramic radiographs at best can be considered as a screening modality in the detection of these lesions. Familiarity with radiological finding will enable the clinician to rule out other lesions in the temporomandibular joint. Early diagnosis and judicious management gives better prognosis.

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# Innovations in Orthodontics

\* Chandradas, \*\* Rajesh

## Introduction

Advances in the field of materials and biological sciences led to greater expectations from Orthodontists.

20<sup>th</sup> century saw the beginning of the speciality as we know it today. E.H. Angle introduced tooth movement with fixed appliance and started teaching Orthodontics as a unique discipline. In spite of many advances it might be acknowledged that Orthodontic treatment has not changed fundamentally. This article gives an insight into the latest development in the field of orthodontics and dentofacial orthopaedics and the future trends likely to be introduced into daily Orthodontic practices.

Changes in the goals of treatment represents a shift, away from an emphasis on skeletal and dental relationships towards a greater consideration of oral and facial soft tissues.

*Older Concept:* Ideal occlusion, ideal jaw relationship, diagnosis based on cephalograms and casts, retention related to dental occlusions.

*New Concept:* Normal soft tissue adaptations, functional occlusion, clinical examination, retention related to equilibrium effect.

## Digital impression:

Intra oral digital impression systems are coming to the fore front of Dentistry. Conventional method of tray and putty, alginate and elastomeric impression are replaced with a highly detailed digital scan of the teeth.

LED or laser based scanners capture continuous 3D video

## Abstract

The new millennium was ushered in with a lot of anticipation for the future. Innovations in the field of material and biologic science led to greater expectations from the orthodontists. The improved diagnostic procedures, better understanding of growth and innovative treatment techniques has influenced almost every aspect of orthodontic practice. A paradigm shift in treatment approach using micro implants and esthetic treatment approaches has opened up a whole new set of patients. Invisible orthodontics in the form of ceramic brackets, lingual orthodontics and Invisalign have addressed the esthetic concerns of many patients. Better knowledge of molecular events of tooth movements have provided clinicians with new tools to monitor biologic responses to treatment. This should result in efficient treatment with less risk of negative sequelae. Numerous challenges and opportunities to orthodontists will be presented as bioengineered periodontal ligament and alveolar bone regeneration will become clinical practice or one day entire tooth will be bioengineered. This presentation gives an insight into the latest advancements in orthodontics and an exciting technologically advanced future.

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images to create precise dental modules which can be viewed immediately.<sup>3</sup> Digital impression systems such as the LAVA chair side oral scanners by 3M, the CEREC AC by Sironia and Cadent iTero systems are used to make digital impressions of the teeth.

## E-models / digital models:

3D digital models eliminate the need for traditional plaster models.

Advantages are –

- ♦ No need of plaster models
- ♦ Allows online digital storage which enables easy communication.

Two different technologies to produce E - models:

- 1) 3D scanner – can work directly in the mouth.
- 2) 3D CT – It uses impression

of the dental casts. After creating a 3D CAD/CAM model, the working model is built using Sterolithography.

## Craniofacial skeletal imaging:

Conventionally, a lateral cephalogram has been the main radiographic tool to access the craniofacial region, when coupled with calibrated P.A view; there is a possibility of merging data from the two gives a realistic 3D image. The basic ways in which 3D images can be reconstructed from 2D images are

1. Orthogonal approach
2. Triangular approach

CT allows 3D reconstruction of cranium and face, but the cost and radiation dose made it an unrealistic choice for this purpose.<sup>5,6</sup>

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Recently cone beam CT (CBCT) has been introduced. Its application in orthodontic diagnosis, treatment planning, particularly in cases of facial asymmetries, jaw deformities, cleft palate and canine impactions and major reconstruction surgery. Advantages are low radiation, better detailing, low cost CBCT have aimed at obtaining precise and realistic facial and dental images which may make this the most powerful tool to visualize the craniofacial region accurately<sup>72</sup>.

### 3d facial imaging:

3D facial imaging is – contour mapping, tridirectional photography, 3D facial morphometry and contact 3D digitization. Presently popular techniques are broadly classified as light based imaging systems or laser based. Structured light as Stereophotogrammetry have gained popularity.

### Simulation and virtual reality:

Simulation of dental movement in order to plan orthodontic treatment has been made possible through technologies such as the ones used by Orthocad for diagnostic setups as well as bracket placement using Digital wand. Invisalign uses CAD – CAM generated models for simulating step wise movement of teeth to their final position. Oramatrix used robots to bend arch wires for individual tooth based on the digital images.

The film based technology will be extinct in near time. Advances in imaging will substantially enhance our ability to identify conditions that are not detectable with currently available imaging techniques and will help improve accuracy and reliability of diagnosis and treatment planning<sup>6,8</sup>.

### Contemporary fixed appliances:

Stainless steel brackets are now made by metal injection moulding process producing accurate, durable and superior brackets. Titanium as an alternative to

stainless steel has been used in patients with Nickel allergy and is exceptionally biocompatible.

Non – metallic are used to make the fixed appliances more aesthetic. Ceramic, composites, glass and plastic brackets overcame the aesthetic appearance of metallic brackets.

To reduce the friction between wire and brackets, self-ligating brackets were introduced. Easier placement and removal of arch wires was secondary benefit and reduces the chair side time and shorten the treatment time.<sup>11,12</sup>

### Bracket design of the future:

Single bracket prescription is not suitable for variations in face types and severity of malocclusion. This implies finishing all cases in the same manner despite the malocclusion, facial characteristics and treatment mechanics involved. Treatment customization that is designed and fabricated to match the unique morphology and treatment needs of the patient may be the future norm.<sup>11,13</sup>

### Individually customized brackets:

Because of individual variations in contour of teeth, no appliance prescription can be optimal for all patients and compensatory bends are necessary in finishing arch wire. Custom brackets for each tooth can eliminate all most all wire bending. Each bracket is precisely cut using CAD – CAM technology with base of the bracket contoured, appropriate thickness of the slot incorporating inclinations and torque for ideal positioning of the teeth.

### Arch wires and arch form customization:

The use of new age wires like NiTi, TMA, Eligiloy, Nickel free stainless steel wires has become common. NiTi coaxial wires (super cable) maximize flexibility and minimize force delivery. Turbo wire or braided rectangular NiTi wire affords early torque control. Aesthetic tooth



coloured wires have been introduced. Wire bending robots are used to shape the arch wire and provide correct in – out angulations and torque bends.<sup>11</sup>

#### **Sure smile:**

Sure smile integrates digital imaging, computer modelling, and robot technology and high-tech materials into a start to finish orthodontic treatment process. The patient's mouth is scanned using Orascanner to create a 3D model. A wire bending robot bends wires made of CuNiTi, shape memory alloy to a level of precision well beyond human abilities which move the teeth precisely into the desired final position. This will result in shorter treatment time.

#### **Clear allginer therapy:**

Clear plastic appliances for retention have gained popularity with public and orthodontist. Clear aligner is indicated to those populations typically adults who want to have their teeth aligned, but do not want to wear fixed appliances. This therapy has got two systems.

1. Invisalign (Align technologies, Santa clara, California)
2. Essix system (Raintree Essix, Hetairie, Louisiana)

These appliances are excellent for patients, whose chief complaint centres around mild to moderate alignment problems<sup>13</sup>. In Invisalign the clinician plans the entire treatment to the finished stage before initiating treatment. A series of appliances are worn till the desired results are achieved. Average number of appliances need may be in between 15 – 30 according to the severity of malocclusion. Wearing time of each appliance may be 10 – 15 days. The Essix is based on the clinician making adjustments in the course of treatment to achieve the treatment goals<sup>15,16</sup>.

#### **Temporary anchorage device (tad):**

Orthodontic treatment planning in the past always revolved around one chief factor “anchorage

requirement” in that case. Many intra oral and extra oral anchorage methods were used to achieve best of treatment goals. Endosseous implants and onplants achieved absolute anchorage but had many disadvantages like being bulky, waiting period for osseointegration before loading, expensive clinical and lab work, difficulty during removal and high cost.

Mini or micro screws are better sue to their small size, greater number of placement sites, simpler surgical procedures, no lab work, easier removal and low cost. They do not need osseointegration and hence can be loaded immediately. Future orthodontic implants are likely to be biodegradable.

#### **Future of maxillomandibular distraction osteogenesis:**

It has a very important role as an alternate method of skeletal correction in patients with severe maxillo mandibular deficiency. However it is not a replacement for established treatment procedures like growth modification and orthognathic surgeries. Bone morphogenic proteins may be used to accelerate consolidation phase.

#### **Wilckodontics / accelerated osteogenic orthodontics:**

During treatment, a surgeon prepares the bone covering each root and applies bone grafting material. This preparation changes the physiology of bone creating what is known as regional acceleratory phenomenon (RAP). It is a process where tissue forms 2 – 10 times faster than the normal regional regeneration process in response to a stimulus. There is temporary osteopenia thus creating the ability for more rapid tooth movement that translates to shorter orthodontic treatment times and more stable final results. This procedure is feasible for most patients regardless of age as long as their permanent teeth are present.<sup>22</sup>

#### **Cyclic forces:**

New concept of moving teeth using “novel mechanical stresses” has been under research. Cyclic forces that oscillate the magnitude over time are shown to induce bone remodelling effectively than static forces of matching magnitude and duration. Recently a device (Acceledent) has been developed utilizing this concept to reduce the orthodontic treatment duration through accelerated bone remodelling. It can be used with fixed

appliance or clear aligners offering flexibility and short term daily use for 20 minutes is an added advantage.<sup>23</sup>

### Nano technology:

“Nano dentistry” may make it possible to maintain near perfect oral health through the use of Nano materials, biotechnology including tissue engineering and nano robotics. In orthodontics, impression materials with nano technology application (Nano Tech Elite H – D +) have better flow, fewer voids and enhanced detailing precision, nano composites have superior strength. Reduced friction during retraction was reported by coating the wire with tungsten di sulphide nano particles known for their excellent dry lubrication properties. Advances in nano technology could lead to smart materials (shape memory polymers) that use embedded microprocessors to detect changes in alignment and automatically adjust.

### Biolux

Now the use of phototherapy to speed tooth movement is available. Phototherapy (BIOLUX) use light with an 800 to 850 nanometer wave length that penetrate soft tissue and reach directly in to bone tissue. 97% of light energy is lost before it penetrate through the cheek and alveolar bone to the interior, but remaining 3% is said to have enough energy to excite the intracellular enzymes and increase cellular activity in periodontal ligament and bone.

It would increase the rate of bone remodelling and tooth movement. Biolux device can be adjusted to apply light only to the anterior teeth, the whole arch or only to the posterior teeth, which would potentially improve anchorage control if the light application does speed up tooth movement in the illuminated area.

### Conclusion

This appears to be a growing recognition among orthodontists that no two individuals are exactly the same and that we have attempting to standardise the nonstandard. Treatment option will be more exacting and we will be able to make the diagnosis with patient's preference and his genetic make up in mind. Continual refinement of traditional methods, development of advanced materials and new treatment approaches will continue to improve orthodontic care.

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# Hypomochlion aided reduction for sub-condylar fractures

\* Yeshaswini Thelekkat, \*\* Shyammohan

Sub-condylar fractures have always been a point of controversy. Although surgical mode of management of these fractures has become popular, there are many who prefer the non-surgical management due to the complications possible from surgical intervention.<sup>1</sup> In displaced fractures, it is often observed that the fragments over-ride when brought into occlusion, shortening the ramal height significantly. The condylar fragment also gets locked in the incorrect position.<sup>2</sup>

The use of a hypomochlion (hypo – small; mochlos - lever) to distract the posterior mandible downwards and elastics, to rotate the mandible upwards anteriorly can preclude this problem. With distraction posteriorly, the condylar fragment does get released and may get better aligned in the fossa. This paper describes a similar technique using acrylic jigs as hypomochlion for reducing a sub-condylar fracture and attaining complete occlusion.

## Technique

The associated fractures of the mandible such as the symphysis/parasymphysis are treated by open reduction and internal fixation prior to tackling the open bite problem. The hypomochlion is used here in a case of bilateral sub-condylar fracture associated with symphysis fracture. The amount of anterior open bite is

measured with dividers. This will give an idea regarding the amount of distraction required posteriorly. Clear cold cure PMMA resin (DPI, Mumbai) is mixed to a thick consistency and hand moulded in the dough stage, with the aid of petrolatum jelly, into blocks measuring approximately 2.5 x 1cm. This is inserted posteriorly along the molar area. The patient is gently assisted to occlude onto the jig to get the teeth indentations on both sides, taking care that the excess resin is not flowing to any soft/hard tissue undercuts. Once the polymerisation starts progressing to the exothermic stage, the jig is carefully retrieved and stored in water until it fully hardens. This is then trimmed and rechecked intra-orally for fit and stability. The acrylic jig of the contralateral side is similarly made with the completed jig in place as a guide. Both the jigs are trimmed and polished (fig 1) and inserted bilaterally as assisted by the recorded indentations on the surface (fig 2). Inter arch traction elastics are put in such a way allowing rotation of the mandible along the jigs (hypomochlion) without any resistance. The jigs are periodically trimmed to aid complete intercuspation (fig 3) which usually occurs within 48hrs-72hrs. The placement of the jig usually distracts the mandible posteriorly and satisfactorily reduces the condylar segment. The occlusion is maintained

in perfect intercuspation after removal of arch bars at 3 months post-op (fig 4).

## Summary

Nonsurgical treatment using maxillomandibular fixation (MMF) accompanied by adequate physiotherapy has known to yield acceptable results and has stood the test of time. However, shortening of the ascending ramus of more than 8 mm resulting in functional disturbances and TMJ dysfunction does occur following non-surgical management.<sup>2,4</sup> There are reports of patients having to undergo orthognathic surgery to correct the persistent anterior open bite, despite prolonged periods of intermaxillary fixation.<sup>5</sup> Maxillary splint with a hypomochlion has been used to distract the posterior mandible for moderately displaced condylar fractures.<sup>6</sup> The acrylic blocks described here eliminates the discomfort of making an impression & complete palatal coverage and can be prepared easily bed/chair side. It is easier to remove and trim periodically till occlusion is achieved. The possibility of dislodgement is also nullified due to the firm anchoring of the jaws on to the jig by the elastics.

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Fig 1. acrylic jig



Fig 2. jig inserted



Fig 3. intercuspation attained

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Fig 4

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# Report - 46<sup>th</sup> Kerala State Dental Conference QUICON 2014

The 46<sup>th</sup> Kerala State Dental Conference QUICON 2014 Organized by IDA Kerala State was successfully hosted by IDA Kollam branch on 17<sup>th</sup>, 18<sup>th</sup> and 19<sup>th</sup> January 2014.

The preconference courses on hands on workshop of Dental Implants, Rotary Endodontic and Shade Selection was successfully conducted with active participation, at three different venues on 17<sup>th</sup> January.

The conference was inaugurated by Hon. Minister for Labor and rehabilitation, Shri Shibu Baby John on 17<sup>th</sup> January at 7:00pm at C.Kesavan Memorial Town Hall. He also launched the IDA pension scheme. The Scientific Session was Inaugurated By Dr K. Mohandas (Vise Chancellor KUHS), the scientific abstract was released by Dr Ipe Varghese (Registrar KUHS) and the Conference Souvenir was released by Shri Abdul Azeez Chairman – Azeezia Group of Institutions.

Nearly 1600 delegates registered and 160 traders contributed to the Trade fair. A public awareness programme and check up campaign was conducted in association with Azeezia College of Dental Sciences and research for the first time in the history of IDA state conference.

A gala banquet and a marvelous dinner was arranged in ATSK Gardens, Thevally, Olayil Kollam which was a momentous one.

On 19<sup>th</sup> January the HOPE AGM was conducted at 09:30 am followed by IDA state AGM at the main venue and concluded with the installation of new office bearers for IDA Kerala State 2014. Dr Nizaro Siyo sworn in as the president of IDA Kerala State and Dr O. V. Sanal as the secretary and the new team of office bearers was installed for the year 2014.



## President's & secretaries seminar ACQUIRE 2014



Inauguration of President 's & secretaries seminar ACQUIRE 2014 at kannur hosted by IDA North Malabar branch on 16<sup>th</sup> February. Past IMA State president Dr. Muhammad Ali inaugurated the programme. State president Dr. Nizaro Siyo presided. All the State office bearers, President and secretary of all the branches, members from host branch also participated. Chief co ordinator Dr. Salim. C. K welcomed the gathering. IPP Dr. Antony Thomas, president elect Dr. K. C Thomas, North Malabar branch president Dr. Anil felicitated. Senior trainer and ret'd deputy labour commissioner Mr. Vijayarajan took class and Dr. O. V Sanal, State secretary proposed vote of thanks.



Dr. Joji George

## Council on Dental Health - CDH

"Charity Dental Treatment Year - 2014"

This year 2014 marks the 60th anniversary of CDH and the 60th year of honouring Dr. Rafiuddin Ahmed, father of Modern Indian dentistry with Padmabhushan by Govt. of India (1954).

**The projects for the year 2014 are as follows.**

- Charity dental treatment year 2014. Kindly do at least one dental treatment free of cost to the needy; But do as many as possible and report such activities to [cdh@idakerala.com](mailto:cdh@idakerala.com)
- Diagnostic & Treatment Camps alongwith classes and workshops.
- National doctors' day on July 1st in all branches.
- Observance days-March 6th (World dentists' day), April 7th (world health day), May 31st (world no tobacco day), Jul 1st (National doctors' day), August 1st (National Oral hygiene day), Sept. 12th (world Oral health day), and Nov. 14th (National children's day).
- Special request to IDA headoffice & DCI for commemorating the 125th birth anniversary of Dr. Rafiuddin Ahmed (1890-2015), the father of modern Indian dentistry and 100th year of Indian dentistry (1915-2015) in 2015.



## IDA HOPE report

### IDA HOPE (Help Offered to Professionals in Emergencies)

IDA HOPE is the welfare scheme of Indian Dental Association Kerala State Branch Society.

It covers the professional legal liabilities up to Rs.200000 (Two Lakhs) and Rs.10 Lakhs as Death / Total permanent disability for a member.

Only members of IDA Kerala State below the age of 50 are eligible to join HOPE.

Until 31st March 2014, the joining fee is Rs. 1500 up to Age 35, Rs.2500 for Age 36- 40, Rs. 3500 for Age 41- 45 and Rs. 4500 for Age 46-50. Members who join this year will have their next yearly renewal in April 2014.

Annual renewal fee in the month of April every year will be Rs. 1400 for the 2nd year, 1300 for the 3rd yr, 1200 for the 4th yr, 1100 for the 5th yr and 1000 for the 6th yr.

In addition to the annual renewal fee, Rs. 500 to be paid per death / total permanent disability claim of any member of the scheme in a year.

From the 7th year onwards annual renewal fee of Rs. 1000 includes up to two deaths / total permanent disability claims in a year.

Application forms are available with all local branch Representatives.

Completed application forms attested by Branch Secretary/Representative with IDA Local branch seal, Two passport size photos, Copies of Degree Certificate, Age

proof, Dental council registration and Demand Draft in favor of IDA HOPE, payable at Pathanamthitta should be forwarded to: Dr. Samuel K. Ninan, Hon Secretary, IDA HOPE, Kolabhagathu Dental & Orthodontic Speciality, Opp. K.S.R.T.C. Bus Station, Pathanamthitta - 689645 Ph: 0468 2224676 (O ) 2321676 (R) Mob: 9447440004 Email: [secretaryhope@gmail.com](mailto:secretaryhope@gmail.com)

Please visit [www.hope.idakerala.com](http://www.hope.idakerala.com) for details of the local branch representative in your area.

***It is better to join HOPE this year itself (2013-14) as there will be a considerable amount of increase in the joining fee (Rs.5000-10000) and also subsequent renewal fee after March 2014. Their renewal for the next year (2014-15) will be in the month of April – May 2014.***

This is the only scheme where you get a death / disability benefit of Rs. 10 Lakhs plus professional protection at such a nominal premium. More over it is managed by our own members. So a member can always expect a friendly and caring approach.

IDA HOPE is managed by a well experienced team of office bearers and around 35 dedicated managing committee members including one representative each from every local branch.

Presently, we have around 2000 members. So Rs. 500 X 2000 members = Rs.1000000 which meets the death / total permanent disability claims. The legal claims and expenses are met by the corpus fund formulated from the admission fee.

If you are not a member of IDA Kerala State, you can join this year itself and subsequently apply for HOPE.

## COSTAL MALABAR BRANCH

**INSTALLATION CEREMONY ON 4-1-2014** Installation of the office bearers of IDACOSTAL MALABAR Branch was held on the 4th Jan 2014 at KBC Greenpark hotel Edat, payyanur at 8.p.m.

President Dr.jayakrishnan installed Dr.Ahammed Shafi as president of the branch and Dr. Rajesh.E as Hon. Secretary for the year 2014. Dr. Nizaro Siyo, President elect IDA Kerala State was the chief guest.

Newly installed president Dr.Ahamed shafi installed the team of office bearers. Dr. Santhosh Sreedhar, Past President IDA Kerala state and Dr. Praveen Gopinath Tresurer IMA Payyanur Felicitate the function.

An entertainment programme was conducted after the installation ceremony

### Dental checkup camp on 26-1-2014

Dental check up camp&dental health education talk and dental exhibition were conducted in association with Rotary club of

payyanur,Pariyarm dental college at Kasthurba smaraka vayanashala Theru,Payyanur on Jan 26 at 2pm. Smt.KV.Lalith, municipal chair person was the Chief guest .Dr.Jayakrishnanan(IPP)was the Guest of honour.Dr.santhoshn Sreedhar Took Oral Healthn Awareness class for the public many members from the branch examined patient. Free medicine were also distributed.

### 1st Executive Committee Meeting ;( 27-1-2014)

1st Executive committee meeting was held on 27-1-2014 at Top form hotel at 8pm.We discussed plans an projects of 2014,varies sub committees were formed. Meeting Discussed CDE&CDH activities,ida HOPE,ida pension scheme, clinic standization ,family picnic,and upcoming events etc.President Dr.Ahamed Shafi chaired the meeting. Hon Secretary Dr.Rajesh Proposed Vote of thanks.



## PATHANAMTHITTA BRANCH

### Activity Report - January 2014

1. First executive committee meeting of IDA Pathanamthitta was held on 7th January 2014 at Hotel Mannil Regency, Pathanamthitta at 7 30 pm. Sixteen executive committee members attended the meeting and decisions on conducting installation ceremony and starting of a chitty by the branch among the members was taken.
2. Installation of IDA Pathanamthitta branch for the year 2013 was held on 26th January 2013 at Hotel Hills Park, Pathanamthitta. Chief Guest of the program was Dr. O V Sanal, Secretary, IDA Kerala state. Assistant District Medical Officer Dr. Thomas Alfonse was the guest of honour and IDA Kerala state CDE Convener Dr. Anil G was the Special guest.

Dr. O V Sanal inaugurated the programme and activities for the year 2014. President Dr. Binu Chacko installed the newly elected President Dr. Biju U Nair and his team of office bearers. Annual edition of the journal "EXTRACT" was released by state secretary Dr. O V Sanal by handing over the journal to Dr. Thomas Alfonse. 90 peoples attended the programme including the branch members, their families, neighboring branch members and special invitees from various clubs like Rotary and JCI. IDA members from neighboring branches like Central Kerala, Kottayam, Thiruvalla, Mavelikara and Kottarakkara made their presence to make the event a grand success.

The meeting was followed by dinner, fellowship and various cultural programs by members and their families.



## MALANADU BRANCH

**Installation Report**

23rd installation of IDA malanadu branch was held on 29th December 2013, Sunday at Hotel Paray Residency Muvattupuzha.

Meeting was started at 7:00 p.m. presided by Dr. Ciju A. Paulose. Meeting was started with the collaring of the President Dr. Ciju A. Paulose by secretary Dr. Jayan Jacob Mathew. Followed by prayer song. Dr. Alias Thomas welcomed the gathering.

The IDA State President Elect Dr. Nizaro Siyo installed the new President, Dr. Byju Paul Kurian followed by the in-

stallation of new office bearers by Dr. Byju Paul Kurian.

Hon. State Secretary Dr. O.V. Sanal inducted the new members. A total of 5 members joined IDA Malanadu that evening.

Chief guest for the day was Padmashri. Dr. Jose Chacko Periapuram, he released the theme logo for the year 2014. Dr. V.P. Gangadharan the famous oncologist inaugurated branch's "Oral cancer detection program - 2014".

Dr. R. Sindhu, only women gastro enterology surgeon in Kerala, who fought polio in real life inaugurated womens den-

tal council by releasing the logo of WDC and handed over it to Dr. Jency Mary John, WDC Chairperson. Adv. T.S. Rasheed AKPDC President, Dr. Mohan Markose, IMA Muvattupuzha President, Rotary District Governor Rtn Venugopalamenon, President Rotary club Muvattupuzha Rtn. Sherimon gave felicitations.

Pleasantries were given to the guests by Dr. Byju and Dr. Joby. Dr. Joby J. Parappuram, the new secretary gave vote of thanks.

Meeting was adjourned for fellowship and dinner by 9:30. Cake cutting and Christmas celebrations followed.



## ERNAD BRANCH

As New Year rolled out, the new branch 'Indian Dental Association -Ernad Branch' 29th branch of IDA Kerala State was officially inaugurated by IDA Kerala state President Dr. Antony Thomas & installation of new office bearers under the President-ship of Dr. Joy Thomas Chiramel was held at Hotel Woodbine, Manjeri on 11/1/14 at 5 p.m.

The inauguration & installation ceremony was held in the presence of Dr. Nizaro Siyo, President-Elect, IDA Kerala State, Dr.O.V.Sanal Hon.Secretary, IDA Kerala State, Manjeri M.L.A Adv. Ummer & Mr.Pradeep Pallurithy renowned Playback Singer.

The new office of IDA Ernad comprised of Dr. Joy Thomas, President, Dr.Sameer, T.A, Secretary, Dr. Francis Treasurer, Dr.Biju.J.Nair, President Elect, Dr.Ravi CDE convener & Dr.Ummer Hasoon CDH convener

A curtain raiser for current year activities took place with Symbolic inauguration of 'Kaatu-kurunizhi' is a year long Community dental health program for tribal colonies in IDA ERNAD region by Dr. Nizaro Siyo, President-Elect, IDA Kerala State.

IDA Ernad is moving towards Hepatitis-B free, in this Endeavour SAHE-B 2014 community dental health program is aimed

at vaccination of our members & their staff, preventing & education on infectious diseases in dental practice this program was inaugurated by Dr. O.V.Sanal, Hon. Secretary, IDA Kerala State.

'GYANA JYOTHI' program was jointly inaugurated by of Dr.NizaroSiyo, President-Elect, IDA Kerala State, Dr.O.V.Sanal Hon. Secretary, IDA Kerala State 'GYANA JYOTHI' program is part of CDE project in which clinical clubs will actively involved in providing Evidence based dental care in our region. & keep our members abreast with latest in science & technology & Promoting Peer review.

Mr.Pradeep Pallurithy renowned Playback Singer inaugurated 'ERNADIAN' IDA Ernad's cultural & sport forum which will be actively involved in recognizing & developing hidden talents among our members & their families.

Variety entertainment programs by Mr.Pradeep Pallurithy, Wandoor Jaleel & team enthralled the gathering & was followed by appetizing feast.

The Inauguration of the New branch was well covered & supported by the Media & Social forums.

On Jan 24th Friday 1st Executive committee meeting was held at Hotel Sarafiya Wandoor at 8p.m

Pain & Palliative care day was observed with branch participating observation at Girls High School, Perinthalmanna & Areacode



## NORTH MALABAR BRANCH

### INSTALLATION CEREMONY OF IDA NORTH MALABAR BRANCH 2014.

Installation of the new office bearers of 2014 was held on 12 January Sunday at chamber of commerce hall, Kannur. The chief guests of the programme was the president elect of IDA kerala state Dr.Nizaro siyo. Dr.Raveendranath [IPP Kerala State] and Dr.O.V Sanal Hon. Secretary IDA kerala state were the guests of honour. Dr. Saleem C.K. in his outgoing address thanked all the members for the co-operation and support rendered through out the year. He made special

mention about the building committee and kuri committee which help to repay all the outstanding loans. He later installed new president Dr.Anil Thunoli. In his presidential address Dr.Anil Thunoli congratulated the previous office bearers for their fantastic efforts. He promised to live up to all his expectations. He then installed all his office bearers. Dr.Naveed Sait ,Hon. Secretary IDA north Malabar branch handed over the constitution to new secretary Dr.Mahesh Raj V.V. In the same function the new president of women's dental council was installed. The past

president Dr.Jayasree K.T. handed over the collar to Dr.Sumitha vishwanath who intern installed all the office bearers of women's dental council. Cake cutting was also done on this occasion to celebrate new year. The programme was inaugurated by Dr. Nizaro Siyo by lighting the traditional lamp and Dr.Raveendranath, Dr. O.V. Sanal offered the felicitations. The new secretary Dr. Mahesh Raj V.V. delivered the vote of thanks. The programme was followed by variety of entertainments and dinner.



## ALAPPUZHA BRANCH

### Report Of Installation-2014

On 1st December 2013 at Rotary East Hall, Chathanad, Alappuzha by 7.30pm with Ida Kerala State President Elect Dr.Nizaro Siyo as chief Guest, Dr.Rajesh C

Pazheparambil took over as 14th President of IDA Alappuzha. Hon Secretary Dr. Aji Sararsan presented the annual report and accounts for the previous year.

Honoring of senior members who had

a practice of more than 20years in the field of dentistry was done.

Key note address was given by the Chief Guest Dr.Nizaro Siyo. He spoke of his theme for the coming year.



## KODUNGALLUR BRANCH

### Report of installation meeting of IDA Kodungallur branch 2014

The installation of office bearers of IDA Kodungallur branch for 2014 was held on Saturday 7th December 2013 at IMA hall Kodungallur. Dr Nizaro Siyo, President elect IDA Kerala State was the chief guest.

The new office bearers are  
President : Dr K.G.Gokul  
Secretary : Dr P.M.Nazeer  
Treasurer : Dr Ajith Kumar

The meeting was attended by 50 number of members, families and was followed by dinee.

Ist executive meeting 20-12-2013.

Ist executive committee meeting of IDA Kodungallur branch was held at IMA Hall Kodungallur. Goal and plans for the year

2014 was discussed. Dr Tennison Chacko elected as a representative from our branch for the state pension scheme.



CHALAKUDY BRANCH

IDA Chalakudy br conducted its installation of the new office bearers on 5th jan 2014 at clayhouse hotel muringoor, chalakudy. Dr NIZRO SIYO, PRESIDENT ELECT 2014 was the installation officer for the function. Dr SABU THAZHATH was installed as

new president of ida chalakudy, dr JOPHY MOYALAN was thesec Dr JOE PAUL as cde and Dr Ijesh was the cdh for year 2014.



KOTTARAKARA BRANCH

**CDH Activity**

A dental checkup camp and dental awareness programme conducted on 06.02.2014 at Devi Vilasom UP School, Pattazhi. 120 students participated in the programme. State CDE

Dr Anil G, Dr Asok S, Dr Manu S Das (Branch Cdh), Dr Sunjith Sudhakar (Hon Sec), Dr Santhosh K Tharian, Dr Pradeep S Nair, Dr Nisha Jose attended the programme.



ATTINGAL BRANCH

**Report of Installation Ceremony 2014 of IDA Attingal branch**

The 14th installation ceremony and family get together of Ida Attingal branch was held on 5th Jan 2014 at Vakkom Palazzo, Vakkom by 5.00 pm. Dr. Antony Thomas (Imm. Past President of IDA Kerala state) was the chief guest. Dr. Dinesh .N, in his Presidential address congratulated all the office bearers for making his term successful. The hon. secretary, Dr. Rudy A. George, for the first time in the history

of IDA Attingal branch, presented the annual report in an audio-visual manner. It was appreciated by all. Dr. Arun .S, was installed as the new President of IDA Attingal branch by the outgoing President, Dr. Dinesh .N. Dr. Arun .S then, installed his team of office bearers for the year 2014.

Dr. Antony Thomas, in his address, commended Attingal branch for all the activities done in the previous year and applauded the work done by the secretary.

New members were inducted by the state President. Felicitations were given by Dr. Ashok Gopan (State VP), neighbouring branch office bearers, Dr. Anish .P (member of Kerala Dental Council), Dr. Joseph Edward, Dr. Sajis Mathai & Dr. Stephen Joseph. Vote of thanks was bestowed by Dr. Rudy A. George, secretary of IDA Attingal branch. Musical entertainment night and dinner followed. More than 150 delegates attended the event.



## THRICHUR BRANCH

1st General Body Meeting and Installation of office bearers for the year 2014 was held on Dec 20th 2013 at hotel Mangla Towers. The new office bearers are President : Dr Tharian. B . E m m a t t y , Secretary : Dr Abilash.T.K.Treasurer: Dr Sunil Fhad.Dr.P.G.Francis gave Oath of office to new committee. Meeting was attended by 60 members of IDA Thrichur.

A Dental camp was conducted on 21st Jan 2014 at Govt LP School Pattikad. More than 500 students were examined by Dr.Benil and his team.

Second General Body Meeting and First CDE programme was held on 8th Feb 2014 at Hotel Mangala Towers.CDE programme was on Growth Modification and itsTiming by Dr,Sunil Abraham. Meeting was attended by 45 members.



## VALLUVANAD BRANCH

Installation of IDA Branch was conducted on 2nd Feb 2014, in the presence of Dr O V Sanal as the Chief Guest and the Installation Officer.

The Office bearers are: President: Dr Sanjay Kumar; Hon. Secretary: Dr Rajeev Chandran K; President Elect: Dr Sreekanth S; Vice President: Dr Vishal Korah; Vice President: Dr Sunil Balakrishnan; Treasurer: Dr Shoukath Ali; Rep To State: Dr

Balasubramaniam; Rep To State: Dr Subash Madavan; Editor: Dr Riyas Ali; Rep to CDE: Dr Thomas Cheriyan; Rep To CDH: Dr Vikas Elias Korah; Joint Secretary: Dr Yousuf; Asst Secretary: Dr Haris; Rep to Hope: Dr Subash Madavan; Rep to State Women's Wing: Dr Aruna Subash; Coordinator to Pension Scheme: Dr Sajoy Mathew; Rep to Image: Dr Sreekanth S; Executive Members: Dr Afsal, Dr Abdul Amanaf, Dr Naveen V, Dr Shabeer



## TRIVANDRUM BRANCH

### Report- Annual General Body meeting

Annual General body meeting was conducted at Trans Towers Vazhuthakadu On 9th February 2014. Mr PP James, President Press club, Chief editor, Kerala kourudi was the Chief guest. Dr. KC Thomas, President elect, IDA kerala State and Dr. K. Nandakumar, Editor IDA Kerala state were the guest of honour.

Dr. Vivek V, Incoming President took over the office from Dr. Krishnakumar. Other office bearers are Dr. Achuthan Nair President elect. Dr. CP John, Dr. Vinod MP - Vice Presidents.

Dr.Mathew Jose - Hon Secretary, Dr.Sangeeth Cherian-Treasurer, Dr.Benoy Stanley - Hon Joint Secretary, Dr.Arun R-Hon. Asst Secretary, CDE- Dr. Akshay, CDH Dr. Abraham John . Rep to Hope- Dr. Aseem, Rep to Image- Dr.Asif Shah. Dr Siddharth Editor. Rep to state-Dr. Suresh Kumar, Dr. Mukesh T, Dr. Sangeeth Cherian, Dr. Mathew Jose. Exe. committee members. Dr. Gopakumar, Dr.Asok, Dr. Anoop Harris, Dr.Shibu A, Dr sangeetha Kurup,Dr.Hari Krishnan, Dr.Tarun, Dr.Harshakumar, Dr.Nisanth Krishna. The programme ended with a variety entertainments and grand gala Dinner.



## KOCHI BRANCH

The CDE program organized by Indian Dental Association, Kochi branch, and Colgate was on on Monday, January 27th at IMA House, Kaloor, Kochi. This was the first CDE program of this year. The CDE started with a silent prayer followed by welcome address by Dr.Arun Babu, President of Ida Kochi. The faculty was Dr. Amir Gazmawe from Israel . He is a accomplished speaker and has presented several papers on national and international conferences and has won many accolades. Dr. Gazmawe has presented many lectures in Israel (The Israeli Prosthetic Association). He practices Implantology surgery and prosthodontics in a private clinic in Ramat-Hasharon, Israel.He was introduced by Dr. George P John, CDE Chairman of IDA Kochi branch. This was followed by lecture. The lecture was assisted by audiovisual aids. He delivered a very informative lecture on "Recent Advance in Implant Prosthetics". There were 110 participants for this program. The program started at 7 pm and ended at 10.30 pm and was very much appreciated by all members.

Dr.Jayakumar, Secretary IDA Kochi thanked the speaker and Colgate for supporting IDA Kochi with this program. As a token and affection memento was given to the speaker. As soon as the lecture came to close the participants were served Dinner .



## MALAPPURAM BRANCH

Installation ceremony of new office bearers for IDA Malappuram Branch for the year 2014 was held at Hotel Woodbine, Manjeri on 5th Jan 2014 at 7 p.m. Dr. OV Sanal, Hon. Secretary of IDA Kerala Stae was the chief guest and Sri. Bharath Das, International Trainer, Jaycees and Dr. KC Thomas, President elect IDA Kerala State were the guests of honour. Dr.Rajesh Raveendranathan, president IDA Malappuram presided the ceremony. Dr. OV Sanal, Hon. Secretary of I.D.A Kerala State installed the New Team of office bearers under presidentship of Dr. Sunish Mohemad. Installation ceremony was followed by new year celebrations & culminated with mouth watering cuisines.

### CDH Activities

1. As a curtain raiser for current year activities launching of community dental

health wing project "Healthy Smile... Happy Life..." was done by Dr. KC Thomas (President elect, IDA Kerala State) on the installation day

2. MIDA participated in the ASAP orientation exhibition held at Government College, Malappuram on 21/12/2013

3. CDH wing in association with the MIDA LOTUS (Women's Dental Council) observed the World Pain and Palliative Day on 15th Jan 2014 at new bus stand premises Manjeri

### CDE Activities

1. 1st branch level CDE was held at Hotel Hillfort, Malappuram on Sudaay 27th Dec. 2013 from 7 pm to 9 pm. The CDE included lecture on Practice Management by Dr. Mohammed Sameer PT. The CDE was attended by 13 members.

### Day Celebrations / Observation

1. Pain and Palliative day was observed at Pain & Palliative Booth of Pain & Palliative Clinic, Manjeri on 15/01/2014

### MIDA LOTUS (WDC)

1. MIDA LOTUS (Women's Dental Council) celebrated the new year by cutting the cake and the ariety entertainments on the day of installation.

2. MIDA LOTUS in association with the CDH wing observed the World Pain and Palliative Day on 15th Jan 2014 at new bus stand premises Manjeri

### Executive committee meetings:

1st Executive committee meeting held on 27/12/2013 8pm. onwards at Hotel Hillfort, Malappuram. 13 members attended.



NEDUMBASSERY BRANCH

The AGM & Installation of the office bearers of Ida Nedumbassery for the year 2014 was held on 12th of January 2014.

Dr. Alias Thomas IDA past national vice president was chief guest. The outgoing President Dr. Vinu installed Dr. Prince Uemese as the President of the branch. The function was well attended by our members and members of our neighbouring branch.

Dr. Alias Thomas released our biannual bulletin Reflections. The meeting was followed by programmes and sumptuous dinner.

The office bearers of IDA Nedumbassery 2014 are;

President : Dr. Prince Urmese, Secretary : Dr. Subash Rajagopal, IP. President : Dr. Vinu P.R., President Elect : Dr. Jose G. Parakkal, Vice Presidents 1) : Dr. Reena Kovoov, 2) : Dr. Dinesh P.A., Joint Secretary : Dr. Logi C.G., Asst. Secretary : Dr. Binu Abraham, Treasurer : Dr. Johncy Varghese; CDE Convener : Dr. Dr. (Major) Jude John; CDH : Dr. Dr. Senny Thomas; Editor : Dr. Dr. Linta Saji; Rep. to State : Dr. Santhosh Thomas, Dr. Jaibin George HOPE Rep. : Dr. Dr. Sajith N., IMAGE Rep. : Dr. Dr. Satheesh Ashok, WDC Rep. : Dr. Zahira Shukoor, Website incharge : Dr. Saji Francis, Exe. Co. Members: Dr. Rekha Prabhu, : Dr. Bijish Mathai, Dr. Shiju Augustine, Advisors : Dr. M. Chandrasekharan : Dr. A. K. Balachandran, Dr. Reji Thomas



# Obituary



**Dr. Oommen George (48)**, popularly known as Binny, Past President, IDA Kerala State and Chairman, IDA HOPE Expired on 10th of February 2014 at his residence, Georgie Bhavan, Kadakkamon, Pathanapuram.

He was the owner of Binny Dental Clinic & Orthodontic Speciality Centre, Kallumkadavu, Pathanapuram.

He joined for Dentistry in 1986 at Bapuji Dental College, Davangere and he was a student member of IDA since then. After completion of his course in 1992, he joined IDA Malanadu Branch and later became member of IDA Quilon and IDA Mavelikara Branches. In 2001, IDA Pathanamthitta Branch was formed under his initiation and he became the Charter President. During that period, the branch received the state award for the best young promising branch.

He was a member of IDA, Kerala State Executive since then and was a Central Council member for many years. He has also served as the Chairman of various sub committees at the state and national level. In 2006-07, he became the President of IDA Kerala State. During the period IDA HOPE was formed by merging Professional Protection Scheme and Social Security Scheme and he became the Chairman of the Adhoc Committee. He received several national & State awards in IDA for his services to the profession.

In 2012, he became the Chairman of IDA HOPE. He was instrumental in Legalizing IDA HOPE, by registering IDA Kerala State as a society. Raising the fraternity contribution from Rs. 3 Lakhs to 10 Lakhs and adding permanent disability benefit to IDA HOPE was also a credit to his team and IDA HOPE witnessed good amount of a membership growth during the period. He was also the Charter President of Junior Chamber, Pathanapuram and Zone Chairman, Lions Club international. He had a great friends circle and tried to maintain it till the end.

He was survived by his wife Mrs. Anitha Oommen and Children Jikku George Oommen and Dany Oommen George.

His departure has created a great void in IDA Kerala State and Indian Dental Association and IDA HOPE expresses our deepest condolences to the sorrowing family.



**Dr. K. V. SOSA** was a Alumina of 4th Batch student of Government Dental College, Trivandrum. Madam obtained MDS (Periodontology) from Government Dental College, Bangalore. Joined as Tutor in Government Service and later retired as Professor and HOD Dept of Periodontics, Government Dental College, Trivandrum.



**Prof. Dr. N George Paulose**, was a pioneering clinician and an eminent academician. He secured his Bachelors Degree in dentistry in 1963 and MDS in Prosthodontics in 1972 from Govt. Dental college, Trivandrum. He was the director and post graduate professor in the Department of Prosthodontics, Govt. Dental College, Trivandrum. He eventually became the joint director of medical education (JDME) under Kerala

State Govt. He has also been the Dean of the Faculty of Dentistry in the University of Kerala. He was also a member of Academic council and Board of Studies. He was the Principal of PMS College of Dental Science and Research from 2002-2008. He was the chief clinician and prosthodontist in Spring Garden Dental Clinic, Trivandrum from 2002-2013. Above all he was an affable and compassionate gentleman who guided many to scale the pinnacle of success. May his soul rest in peace