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New Technologies in Dentistry

The field of dentistry is constantly evolving and changing to best suit patient needs. Here is just a few of the different technologies

- VEL scope**—VEL scope is a special type of light that a dentist will shine in a patient's mouth to detect any abnormalities. This new form of technology is effectively used to detect early forms of cancer or disease during an oral cancer screening.
- Digital X-Rays**—Digital X-rays are faster and contain less radiation than traditional X-rays. When a patient has a digital X-ray done, the image appears on the computer in a matter of seconds. Your dentist can then zoom into the image to better assess and educate the patient regarding their oral health. Digital X-rays are also less harmful for patients as they contain up to 90% less radiation compared to traditional X-rays.
- Invisalign**—Invisalign are clear, practically invisible braces that can gently straighten your teeth. They provide an effective and comfortable way to straighten your smile without the inconvenience of wearing heavy, metal braces. Invisalign braces are easy to take out for cleaning and don't require a restriction on what type of foods to eat. They get the job done in less time with less hassle.
- Laser Dentistry**—Lasers are used to improve efficiency and eliminate discomfort in a number dental procedures, including filling cavities, reducing tooth sensitivity, getting rid of tumors, and whitening. Laser dentistry is fast, painless, and can effectively eliminate any form of bacteria during the procedure to avoid any further complications or problems.
- Dental Implants**—Dental implants are screw-replacements for the root portion of missing teeth. Implants are used to restore healthy smiles when patients have missing teeth. Implants are effective because they can replace missing teeth, while still giving the patient the feel and look of a natural tooth.
- Heal Ozone**—Heal Ozone is a fast, easy and painless way to eliminate tooth decay. Heal Ozone is effective because it contains ozone (O₃), which is a common, natural gas that effectively kills bacteria and fungus. Heal Ozone is a great tool to detect and get rid of any early signs of tooth decay before it progresses to a more advanced stage.
- DIAGNOdent**—DIAGNOdent is a new, state of the art device that dentists use to detect cavities that are hiding in places regular x-rays can't find. It ensures that your mouth has been thoroughly checked for early signs of cavities to avoid you having to spend more in the future if the cavities progress and expand.
- Intraoral Camera**—The intraoral camera is a tool that dentists use to gain precise and well-defined pictures of hard to see places within a patient's mouth. The camera also allows dentist to show these images to patients while assessing and educating the patient's needs. This new form of technology allows dentist to conduct a thorough checkup of your mouth and better assess their patient's oral care needs.
- Zoom! Whitening**—Zoom! Whitening is a new, state of the art whitening treatment that gives our patients fast and easy results. In just one appointment, Zoom! Whitening can make a significant change in a person's smile and can make their teeth up to eight shades whiter.
- Nitrous Oxide and (Intravenous) IV Sedation**—Nitrous oxide, also known as laughing gas, can calm a patient down to a point that they are relaxed but can still interact with their dentist. On the other hand, IV sedation puts a patient to sleep completely so that they are unaware of what happened during their dental session. This is usually recommended for patients who are fearful of going to the dentist or for procedures that are painful such as wisdom teeth extraction.



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Message from the Secretary



Dr. Suresh Kumar G

Dear members,

Onam greetings.

As we reach midway into the organisational activities for the year the office is extremely proud for the support and involvement of members and branch offices had provided with regard to issues related to the proposed Clinical Establishment bill.

This also marks a turning point with regard to the long standing confusion on the need to recognising Dentistry as a distinct field. Let there be no doubt that while dentistry employs modern medicine in its practice, it is an entirely different stream of treatment and the time has come for the government and public to view dentistry as an entity of its own. Time and again this was talked about in Association forums and close circles, but with the draft Clinical Establishment bill being published it becomes very obvious about the imminent danger of not being recognised as a different stream with independent administrative units.

With every passing day the challenges facing the profession are getting even more formidable but if the recent past has to be believed, the collective effort that we have demonstrated will see us through many a hurdles. The present scenario indirectly presents an opportunity to rectify the pitfalls of the past and take a new path to the future. Short term goals balanced with long term planning will be the winning mantra.

At this point of time when the country is slowly adapting to the biggest tax reform of our times in GST, disruptions are inevitable. But the recent spurt in lab charges, equipment and dental materials in the guise of GST is worrying. The Association is looking into steps to safeguard dental clinics while exploring legal and regulatory options. Healthcare industry has been exempted from GST as of now. Rather than exempting Healthcare services totally from GST we should be put to the Zero Tax group so that we can claim input on credit on GST paid by Dental clinics.

Adversity presents us with new solutions and the long awaited standardization and certification process is getting completed. Another program on the anvil is the project of marketing of consumables and materials by IDA which should also be launched in the near future.

With membership greater than ever before and still growing steadily, the office is confident to overcome the present scenario and once again we use this opportunity to send the members and Branches for the unstinted support and trust shown to the office

Thanking all for the support extended.

Dr. Suresh Kumar G.
Secretary, IDA Kerala State

Message from the President

Dear members,

I am very glad that during the last executive meeting at Kochi we have passed the proposal for implementing the “Clinic Standardization and IDA certification of dental clinics” to standardize the dental clinics in Kerala. The details of the scheme will be conveyed to you soon.

As you all know the Kerala state Government is planning to implement the clinical establishment bill during this assembly session. We are expecting some drastic changes in the functioning of the clinics in the state henceforth. Presently we don't have standardized guidelines for managing a dental clinic, with this new scheme IDA Kerala state is prescribing the basic guidelines/ standards for dental clinics. We are not planning for any categorization or grading of the clinics and definitely this is purely a voluntary scheme. When the Government passes the clinical establishment bill we should be ready with standardization of our clinics.

Even though the draft bill published by the Government does not propose uniform charges for various procedures, we are apprehensive that the final bill might include that. At present our main concern is non-inclusion of IDA in the council proposed to implement the bill. As per the data available from IMAGE there are only 2370 hospitals and medical clinics, whereas 3253 dental clinics are functioning in Kerala state. Considering the number of institutions directly affected, the IDA deserved to be included in the council. We are trying our level best to make the authorities understand the reality and hope we will succeed.

When we approached the politicians in connection with this CE bill many of them asked our association's membership strength, it was an embarrassing question, 18000 registered dentists and an association which claims to represent the whole dentists in Kerala with less than 6000 membership, they were asking whether there is another association. Naturally it's difficult to explain why the rest two third of the dentists are not with us. So once again I urge you all to seriously consider adding every dentist in Kerala to our fold.

The newly introduced GST has far reaching consequences, our equipments and many of the consumables became more expensive, the lab charges also increased. Our secretary is in consultation with the labs, hope something will come out of that. As the health sector is excluded from the purview of the GST, we became the end-user and unfortunately not in a position to reclaim the spend taxes. The present high level of indirect taxes in every sector erodes our savings and to lead the same standard of living, as in pre GST era, we should find new recourses. Earlier only KDC registration was needed, for a clinic to function. At present we need to register with the local body, pollution control board, labor department, AERB and sales tax dept: if you dispense drugs. With the introduction of clinical establishment bill, we will be strangled further. These additional interactions with various government departments will definitely increase our overheads. If you try to absorb this additional burden, you will end up with compromising your quality, so my advice is to increase your charges by at least 10 % and continue to provide good quality. The healthy way to face these challenges is to pass on the increased burden to our patients, they will understand our situation and will co-operate with us.

At this point I would like to thank each and every one who stood with me and our secretary Dr. Suresh Kumar during these testing times to meet the subject committee members and other various political leaders voluntarily, spending their valuable time and resources. The worst is not over; we will overcome all the obstacles with your whole hearted support.

Thank you

Dr. Sabu Kurien
President, IDA Kerala State



Dr. Sabu Kurien



Dr. K. Nandakumar

Can we look to the future without fear?

India had 37 lakhs of engineering seats of which 27 lakhs had no takers. Managements are ready to close down the colleges. Government might help them in the closure by reducing the penalty. The same government has provided the essentiality certificates a few years ago based on which the colleges were started. Are we not aware of the educational needs of the country? Who should keep the data on these? The educational needs should be planned at least 25 years ahead. Politicization and commercialization of education have made the policy makers totally ineffective or they preferred to remain so for various reasons. Net result is that technical education in our country is on doldrums.

All over the world, there are 900 (approx.) dental colleges of which more than one third colleges are situated in India. These Indian colleges collectively produce more than 35000 fresh graduates annually. In 1970 we were producing only 7000 graduates annually which had a fivefold increase in 45 years. Do we really require these many dentists to cater to the needs of our society? Though the population has increased, the dental health needs do not seem to have increased. It would be a fallacy to think that all the people will go to the dentist on a daily basis. The populist jargon of village, city etc. is not painting a realistic picture of the dentist requirement.

The NEET has really changed the profile; to be precise with unexpected dimensions. Fee structure is the singular factor that has upset the balance and the positive changes expected out of NEET. Not all NEET qualified candidates enjoy sound financial status to afford an admission. NEET screening definitely provides better quality students. But many of them are deprived of an admission solely due to their financial status. Many state governments have suggested a uniform fee structure in private colleges which has caused the unaffordability. The situation is complex. Will the merit student be deprived of admission just because they do not have finances? Will government provide financial support to the merit student in the private college? If there are no takers for the seats in private colleges, will the managements be compelled to reduce the fees? Will it be financially viable? In this situation will quality education be maintained? Ultimately are we losing in the fight for quality? Will there be many vacant seats this year? Can we find a solution this year? For whom we have produced these many professional seats?

It is not easy to find answers to these questions. What will be the future of dental education in India? Let us collectively find an answer.

Dr. K. Nandakumar
Editor, KDJ

Evaluation of enamel roughness after debonding and surface preparation with two different methods

* Roopesh R., ** Madhav Manoj K., *** Shaheen Kabeer, **** Rasha Naseem

Abstract

Objective: The purpose of this study was to evaluate the surface roughness and the topography of the dental enamel after using carbide bur at high speed and at low speed for removal of residual resin following debonding of stainless steel orthodontic brackets.

Materials and Methods: Forty freshly extracted human maxillary premolars with intact buccal enamel were collected and surface roughness (Ra) was measured using a surface roughness measuring device. The measurements were made before (Ra Initial) and after (Ra Final) the adhesive remnant removal. The teeth were bonded with stainless steel brackets and light cured using halogen lamp. The debonding of brackets was done using bracket-removing pliers and the remnant adhesive was checked under a stereomicroscope to certify that some amount adhesive were present on enamel. High and low speed tungsten carbide burs were used for the removal of the remnant resin.

Results: Data were statistically analyzed using student T test ($t=2$, $P>.05$). The results of this comparative study, showed that the removal of residual resin after debonding using low speed bur had minimal surface roughness and was better than that of high speed bur.

Conclusion: Tungsten carbide bur at high speed caused more enamel roughness, whereas tungsten carbide bur at low speed resulted in a smoother enamel.

Key words: Enamel surface roughness, Debonding, High speed bur, Low speed bur

► Introduction

Bracket bonding is not a great operational obstacle at present due to the improvement of the bonding materials and techniques. However, problems concerning removal of the residual adhesive and damages on enamel surface due to its removal still persists¹⁻³. The aims of debonding the brackets are to remove the accessories and all the resin attached to teeth, and restore the enamel surface as close as possible to pre-treatment condition, without inducing iatrogenic damages. Residual resin remains in enamel after debonding and depending on the method of debonding used, cracks can be produced on enamel. Therefore, the method of removal of the residual resin is very important to avoid damages on enamel, such as cracks, increased roughness of enamel, excessive enamel wear⁴, overheating of the tooth and pulpal necrosis⁵. Gwinnet and Cens⁶ reported that the existence of small portions of unfilled resin remnants does not predispose to the accumulation of plaque and wear occurs over time. However, this does apply to filled resins because a good part of them has high resistance to wear and biofilm accumulates more easily, making it difficult, the cleaning of these areas.

Several methods and techniques have been proposed to eliminate resin remnants. Ideally, the removal takes place so that the original surface remains

smooth and the qualities of the enamel are preserved intact as close as possible to its original appearance. The fact that the resins usually have similar colour to that of enamel, especially when the tooth is wet, is an additional difficulty even when mechanical devices are employed⁷.

► Materials and methods

Forty freshly extracted human maxillary premolars were collected and stored in a solution of 0.2% (weight/volume) thymol. The inclusion criteria for the teeth that were selected included intact buccal enamel not subjected to any bracket bonding procedures, no damage caused by the extraction forceps and teeth with no dental caries. Teeth were embedded in an acrylic resin, with the crown part exposed. After mounting, typical bonding procedure was done⁸⁻¹⁰. The teeth were cleaned and polished with pumice and rubber prophylactic cups for ten seconds. The teeth were acid etched with 37% phosphoric acid for twenty seconds, washed and dried for ten seconds. The Transbond XT Primer (3M Unitek) was applied on the enamel surface and dried lightly with compressed air for ten seconds. Stainless steel brackets are the most commonly available and most widely used brackets in orthodontics. Because of this reason it has been decided to use stainless steel brackets for this study. The resin composite Transbond XT (3M Unitek) was applied on the bottom of

the stainless steel brackets, positioned and fixed on teeth with manual pressure to extrude the excess material. The photo activation was performed with halogen lamp (LEDition) I for 40 seconds and the specimens were stored in distilled water for 24 hours at 37°C before debonding. The brackets were removed using bracket-removing pliers (Dentoram) and the remnant adhesive was checked under a stereomicroscope at 70X magnification to confirm that some amount of adhesive was remaining on the tooth surfaces.

The adhesive remnant index was taken after debonding (Table 1)

Surface roughness (Ra) is measured using a surface roughness measuring device (profilometre). The measurements were made before (Ra Initial) and after (Ra Final) the adhesive remnant removal. Roughness variation is obtained with the equation:

$$Ra\ \delta = Ra\ final - Ra\ initial.$$

The specimens were divided in two groups (n=20) according to the method of removal of the remnant resin:

Group one: Tungsten carbide bur (TF21EF-Mani) at slow-speed hand piece (NSK).

Group two: Tungsten carbide bur (TF21EF-Mani) at high-speed hand piece (NSK).

Method of grasp for the hand piece used for resin removal was modified pen grasp for all specimens.

One representative specimen of each group was observed under a scanning electron microscope to illustrate the effect of different methods of adhesive removal on enamel topography (Table 2).

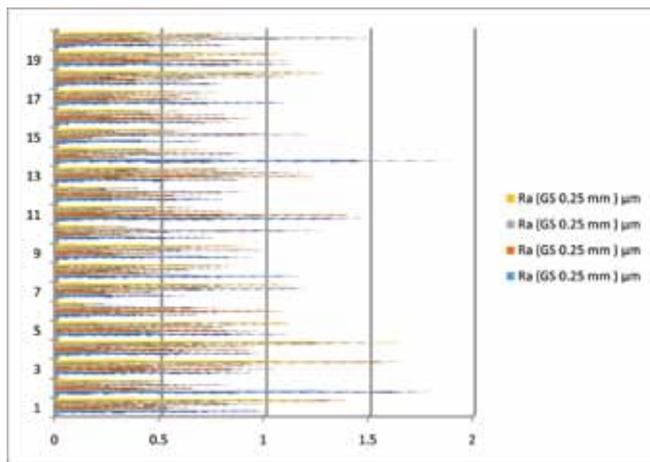


Fig. 1 Surface roughness before and after removal of residual resin

► Results

Figure 1 clearly shows the relationship between removal of residual resin before and after de bonding.

Table-3 shows the mean value obtained for removal of residual resin before de bonding (Pre Test Value) was 0.9105 for group one (sample size 20) and that of the group two was 0.7799 (sample size 20). The corresponding standard deviation obtained was 0.3964 and 0.3098 respectively for the first group and second group of samples. The high Coefficient of Variation obtained (43.54%) for the first sample group (Pre Test Value) shows that mean was low stable and consistent. Similarly, high Coefficient of Variation obtained (39.72%) for second group (Pre Test Value) shows that mean removal of residual resin before de bonding was low stable and consistent.

Hence it was vital to examine whether data pertaining to removal of residual resin before de bonding (pre-test value) for the two groups was statistically significant, therefore Independent Groups (t-test) was done. From ‘t’ -Independent group test, it was clear that, (P>.05), hypothesis formulated in this regard is accepted. That means, there is no significant difference between removal of residual resin before de bonding (pre-test value) for the two groups. This shows the fact that removal of residual resin before debonding (pre-test value) for the two groups was not statistically different. Hence to conclude, since mean removal of residual resin before de bonding (Pre Test Value) for the two groups were not different from each other, the samples considered have no influence on the Post Test Result.

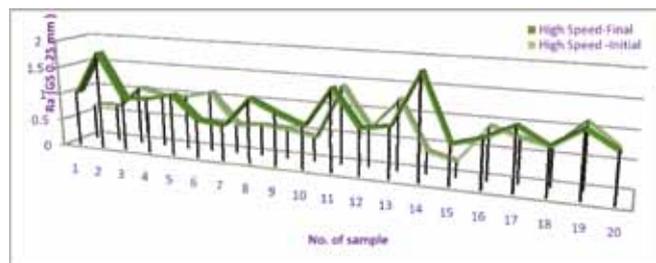


Fig. 2 Comparison of High speed initial and High speed final



Fig. 3 Comparison of Low speed initial and Low speed final

Table-4 shows the mean value obtained for High speed initial (pre-test value) for the removal of residual resin before de bonding was 0.779 and that of the High speed final (Post Test Value), it was 1.031. The corresponding standard deviation obtained was 0.309 and 0.340 for High speed initial (pre-test value) and High speed final (Post Test Value) respectively. The high coefficient of variation obtained (39.72%) for High speed initial (Pre Test Value) shows that mean removal of residual resin before de bonding was low stable and consistent. Similarly, the high Coefficient of Variation obtained (32.99%) for High speed final (Post Test Value) shows that mean was low stable and consistent.

Hence it was vital to examine whether data pertaining to removal of residual resin after de bonding using carbide bur at high speed (Pre Test Value and Post Test Value) were statistically significant, for which Independent Groups (t-test) was done. From 't'-Independent Group Test, it was clear that, ($P < .05$), hypothesis formulated in this regard is rejected. That means there was significant difference between removal of residual resin before de bonding and after de bonding using carbide bur at high speed (Fig. 2). This shows the fact that removal of residual resin after de bonding using carbide bur at high speed (post-test value) is statistically different from removal of residual resin before de bonding (Pre Test Value). Hence to conclude, since mean removal of residual resin after de bonding using carbide bur at high speed (post-test value) is high, it is an effective technique and hence to be appreciated.

Table-5 shows the mean value obtained for low speed initial (pre-test value) for the removal of residual resin before de bonding was 0.910 and that of the Low speed final (post-test value), was 0.743. The corresponding Standard Deviation

obtained was 0.396 and 0.216 for Low speed initial (pre-test value) and Low speed final (Post Test Value) respectively. The high Coefficient of Variation obtained (43.54%) for Low speed initial (Pre Test Value) shows that mean removal of residual resin before de bonding was low stable and consistent. Similarly, the moderate Coefficient of Variation obtained (29.14%) for Low speed final (Post Test Value) shows that mean was moderate stable and consistent.

Hence to examine whether data pertaining to removal of residual resin after de bonding using carbide bur at low speed Pre Test Value and Post Test Value is statistically significant, Independent Groups (t-test) was done. From 't'-Independent Group Test, it is clear that, ($P < .05$), hypothesis formulated in this regard is rejected. That means there is significant difference between removal of residual resin before de bonding and after de bonding using carbide bur at low speed (Figure 3). This shows the fact that removal of residual resin after de bonding using carbide bur at low speed (Post Test Value) is statistically different from removal of residual resin before de bonding (pre-test value). Hence to conclude, removal of residual resin after de bonding using carbide bur at low speed (Post Test Value) was an effective technique and hence to be considered favourable.

In this regard it was felt necessary to analyse that whether the data pertaining to two Post Test Values are statistically significant, that is for the removal of residual resin after de bonding using carbide bur at low speed and carbide bur at high speed, for this purpose independent Groups (t-test) was done (Table 6). From 't'-Independent Group Test, it is clear that, ($P > .05$), hypothesis formulated in this regard is rejected. That means there is significant difference between removal

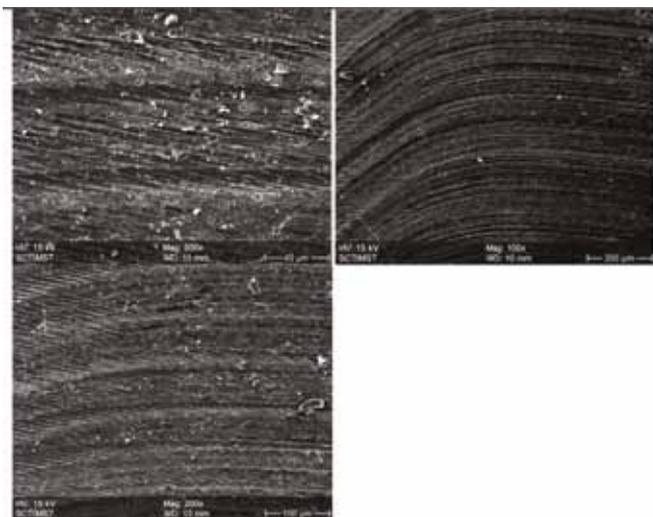


Fig. 4 Representative SEM micrographs of enamel surfaces at 500x, 100x, 200x magnification after clean-up of enamel with: A-tungsten carbide bur at high speed

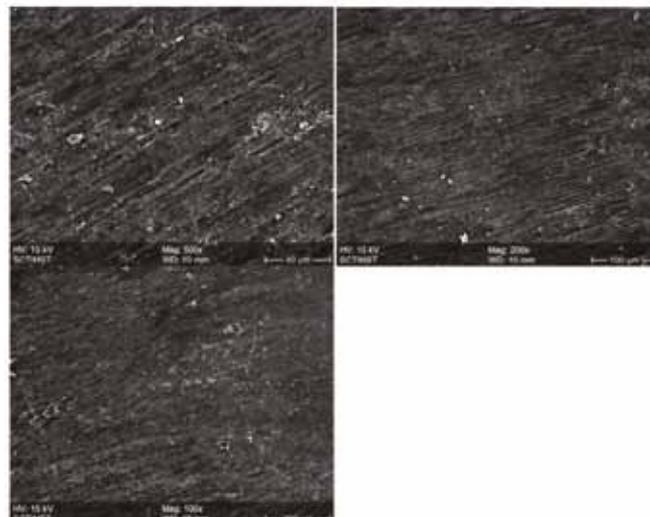


Fig. 5 Representative SEM micrographs of enamel surfaces at 500x, 100x, 200x magnification after clean-up of enamel with: A-tungsten carbide bur at low speed

of residual resin after de bonding by using carbide bur at low speed and carbide bur at high speed. This shows the fact that removal of residual resin after de bonding using carbide bur at low speed (post-test value) is statistically different from removal of residual resin after debonding using carbide bur at high speed (post-test value). Hence to conclude, the mean value obtained from the removal of residual resin after de bonding using carbide bur at low speed (post-test value) is low compared to removal of residual resin after de bonding using carbide bur at high speed (post-test value). This means that removal of residual resin after de bonding using carbide bur at low speed is better and it should be the preferred method for removal of residual resin after dedonding

Table 1

Sample No.	Score	Sample No.	Score
1	1	21	1
2	1	22	1
3	1	23	1
4	2	24	3
5	1	25	3
6	1	26	1
7	1	27	2
8	1	28	1
9	2	29	1
10	1	30	1
11	1	31	1
12	1	32	1
13	1	33	2
14	3	34	2
15	3	35	1
16	1	36	2
17	1	37	1
18	2	38	1
19	1	39	1
20	1	40	2

Discussion

Retief and Denys¹¹ reported that tungsten carbide burs are most efficient for resin removal. However, carbide burs are harder than enamel¹² and, when used at high speed, can damage the underlying enamel^{12,13}. Zachrisson and Artun¹⁴ recommended using carbide burs but at low speeds. Zarrinnia et al.¹⁵ recommended the removal of the bulk of the remaining resin with a 12- fluted tungsten carbide finishing bur (TCB), operated at high speed (above 200,000 rpm) with adequate air cooling. Sevinc Karana et al¹⁶ reported that use of composite burs produces smoother surface than tungsten carbide bur though it takes longer time. Elcio Mario Faria-Junior et al¹⁷ concluded that polishing with aluminium oxide disc produced less enamel surface roughness than with carbide bur. All these investigations were carried out to evaluate the effects of different clean-up techniques on enamel surface.

Table 2

Roughness volume (µm)			
Method	Ra initial	Ra final	Ra delta
Carbide bur at high speed	0.7799	1.0313	-0.2514
Carbide bur at low	0.9105	0.7434	0.1671

Table 3

Hypothesis Test: Independent Groups (t-test)		
Test	Low speed initial (Pre Test Value)	High speed initial (Pre Test Value)
Mean	0.9105	0.7799
Standard Deviation	0.3964	0.3098
Coefficient of Variation	43.54%	39.72%
N	20	20
t' test-Independent Group Test	1.16	
P' Value-	0.2530	
Result	Not Significant	

The literature is controversial about the most effective method of removal of residual resin. Zachrisson and Artun¹⁴ and Van Waeset al.¹⁸ concluded that a tungsten carbide bur at low speed produced the finest scratch pattern with the

least enamel loss of 7.4 µm. Rouleau et al.¹⁹ and Campbell²⁰ suggested water spray instead of air cooling for heating control when compared to Retief and Denys¹¹ study of using tungsten carbide bur at high speed with adequate air cooling.

Table 4

Hypothesis Test: Independent Groups (t-test)		
Test	High speed initial (Pre Test Value)	High speed final (Post Test Value)
Mean	0.7799	1.0313
Standard Deviation	0.3097	0.3403
Coefficient of Variation	39.72%	32.99%
N	20	20
t ² test-Independent Group Test (CVTS)	2.44	
P Value-	0.0193	
Result	Significant	

The removal of residual resin with rotary instruments at low speed produces more vibration and generates discomfort for patients. Although the enamel surfaces after treatment with the low-speed hand piece was irregular, the natural enamel also was slightly repetitive and spiky over the whole enamel surface area. However, resin remnant removal with low speed instruments has disadvantages for pulpal health and patient comfort²¹.

Another disadvantage of removal of residual resin with rotary instruments is the generation of aerosols. It has been found that the potentially hazardous action of adhesive particulate aerosol produced by grinding, composite resin particulates may act as endocrinological disruptors²¹.

Thus, surface quality varies according to each debonding procedure and the type of instruments used^{4,22,23}.

In this study, SEM was used to give a better understanding of what happens to enamel with the different methods of resin removal tested. Nonetheless, SEM lacks a quantitative scale, cannot be used for the comparative assessment, and provides only subjective information²⁴.

Table 5

Hypothesis Test: Independent Groups (t-test)		
Test	Low speed initial (Pre Test Value)	Low speed final (Post Test Value)
Mean	0.9105	0.7434
Standard Deviation	0.3964	0.2166
Coefficient of Variation	43.54%	29.14%
N	20	20
t ² test-Independent Group Test (CVTS)	1.65	
P Value-	0.1064	
Result	Significant	

Table 6

Hypothesis Test: Independent Groups (t-test)		
Test	High speed final (Post Test Value)	Low speed final (Post Test Value)
Mean	1.0313	0.7434
Standard Deviation	0.3403	0.2166
Coefficient of Variation	32.99%	29.14%
N	20	20
t ² test-Independent Group Test (CVTS)	3.19	
P Value-	0.0028	
Result	Significant	

Tungsten carbide bur promoted the lowest roughness on the enamel in the present study. SEM micrographs clearly demonstrate that enamel scarring was inevitable with both high and low-speed tungsten carbide bur (Figs. 4 & 5).

Using tungsten carbide bur with high speed seems to be very fast way to clean the surface and is the least time consuming. The tungsten carbide bur with low speed caused more discomfort to the patient but results in smoother enamel. However, the SEM and surface roughness methods cannot measure the quantitative loss of enamel during clean-up procedures. Therefore, when tungsten carbide bur is used at high speed, damages and excessive wear of enamel may occur due to difficulty of distinguishing the resin from enamel and controlling its wear.

► Conclusion

The findings of this study showed that no method of removal of residual resin was able to leave the enamel surface similar to that of intact enamel. Therefore, after removing the resin remnants from enamel surface following bracket debonding, polishing of tooth surface is recommended to minimize the grooves and irregularities left by the method used for resin removal and reduce the surface roughness.

Based on the methodology and analysis of results it is concluded that:

- The method of removal of the residual resin influenced the roughness of the enamel.
- Tungsten carbide bur at high speed caused more enamel roughness, whereas tungsten carbide bur at low speed resulted in a smoother enamel.
- SEM also showed that no method eliminated all the irregularities that are left behind after the bonding/debonding of brackets.

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Amalgam practicing style and other related variables on Blood Mercury Levels of dentists in Kerala, India

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Abstract

Mercury practicing dentists in general have the risk of exposure to toxic mercury vapour while doing amalgam restorations daily or from the stored mercury. Analysis of blood mercury levels of dentists and the factors influencing it, especially amalgam practicing style, were taken up in the current study to find out the extent of occupational exposure in Kerala scenario. Data for the different variables on exposure were collected using questionnaire. Blood samples were analysed by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS). The average blood mercury levels in dentists in the present study ranged from 1.940 $\mu\text{g/L}$ -1 to 5.383 $\mu\text{g/L}$ -1, which were lower than the recommended guidelines and other reports. Although no statistically significant relationship could be established between the blood mercury level and the factors influencing it in a clinic, low level of mercury in the blood of dental professionals due to chronic exposure must be critically analyzed. This is highly significant when the impact of low levels of mercury in the blood from chronic exposures is not yet fully understood.

Key words: Mercury amalgam, Dentists, Mercury exposure, Blood mercury level

► Introduction

Mercury is a globally notorious pollutant and extremely toxic even in small amounts. It is neurotoxic and bio-accumulative in human and animal tissues¹. Elemental mercury, which is liquid at room temperature, is released as mercury vapour because of its high vapour pressure. When these colourless and odourless vapours are inhaled, rapid absorption and distribution in all the major organs pose great health risk in humans². The primary target organs of elemental mercury are the brain and kidney. It is lipid soluble and can cross the blood-brain barrier and it also enter the brain from the nasal cavity through the olfactory pathway.³ Dentists work with mercury amalgam on a regular and prolonged basis and hence may have higher risk of elevated mercury levels than the general population⁴. Therefore occupational exposure to mercury in dentists in dental clinics is mainly of chronic type⁵. Dental amalgam, an alloy with 45-55% mercury, has a history of more than 150 years of use in conservative dentistry⁶. Though amalgam has a lot of disadvantages such as lack of adhesion, toxicity, poor aesthetics and marginal leakage, it is preferred by most dentists for restoring posterior teeth due to its durability, long term performance, ease of manipulation and low cost which make it affordable to all^{7,4}, despite the introduction of new restorative materials⁸. But while choosing to use amalgam, it becomes mandatory

to follow safe amalgam preparation and mercury hygiene practices in order to ensure the health and safety of the dental personnel and the patients⁹.

Hörsted-Bindslev (2004)¹⁰, in a ten year review up to 2004, concludes that mercury body burden of dental personnel could be kept low if proper mercury hygiene practice is followed. Proper handling and storage of amalgam is essential for minimising mercury exposure in a dental clinic^{11,12}. Poor mercury hygiene practices followed is one of the reasons for elevated blood mercury level (BML) of dentists^{13,14,15,16}. Dental professionals get exposed to mercury vapour mainly during preparation, placement and polishing of dental amalgam restorations^{17, 15}. Elemental mercury is absorbed through direct skin contact or inhalation in occupational exposure in dentistry¹⁸. Amalgam preparation or trituration methods followed in a dental clinic are important in deciding the total mercury concentration in blood of dental professionals, which could be high due to exposure from clinics¹⁹. Blake (2011)⁵ and many others stress the importance of amalgam practicing style, and consider it more important than mercury hygiene. Therefore observing healthy amalgam practicing style is important for occupational, patient, and environment safety⁵. Even though the magnitude of the direct human health impacts on dental workers and patients

from dental mercury is currently a debated topic, occupational exposure to mercury in the dental practice is less well studied than patient and environmental issues²⁰. Heavy metal content in human blood is an important way of assessing risk of environmental exposures from toxic metals²¹. In this context, the present study to analyse the blood mercury levels and the factors, including amalgam practicing style influencing the same, among dental practitioners in Kerala is relevant, and is the first of its kind in the state.

► Materials and methods

Data were obtained through the use of self-administrated questionnaire with questions on general information, amalgam practicing style, and other related variables that could influence BML. Number of years of practice, working hours per day, amalgam preparation method, number of amalgam restorations placed or removed per week, air ventilation mode in the dental office and whether the working area was carpeted or not, were taken as variables in the present study for blood

Table 1. Influence of amalgam practicing style and other related variables on Blood Mercury Levels (BML) of dentists in Kerala

S. No:	Variables	Mean BML (μgL^{-1}) \pm SD	F / t - value
1	Years of Practice 1 - 10 11 - 20 21 - 30 31 - 40	2.915 \pm 1.245 4.563 \pm 2.150 3.936 \pm 1.948 4.140 \pm 2.491	0.874NS
2	Working Hours per Day 4 - 6 7 - 8 9 - 10	3.399 \pm 1.721 3.718 \pm 2.143 4.067 \pm 1.291	0.229NS
3	Amalgam Preparation Method		
3(a)	Mortar & Pestle No Yes	4.486 \pm 1.344 3.438 \pm 2.039	1.197NS
3(b)	Amalgamator & Capsule No Yes	3.895 \pm 2.045 3.767 \pm 1.593	0.141NS
3(c)	Amalgamator & Powder-liquid No Yes	3.538 \pm 1.785 5.383 \pm 1.416	1.674NS
4	Number of amalgam restorations placed/removed per week Nil 1 - 5 6 - 10 > 10	2.240 3.933 \pm 1.634 3.863 \pm 1.995 3.530 \pm 2.378	0.272NS
5	Air Ventilation Mode Fan AC Both	5.000 3.787 \pm 1.856 3.553 \pm 1.830	0.299NS
6	Working Area Carpeted No Yes	3.797 \pm 1.790 1.940	1.541NS

NS: The difference is not significant, since all the p-values are greater than the significance level 0.05.

mercury determination. Postal addresses and e-mail id of dental professionals in Kerala were collected from Indian Dental Association (IDA) directories and website. Questionnaires were sent by e-mail and by post to the dental professionals. Response through e-mail was less, whereas postal response was more. After scrutinizing the questionnaires, surgeons and orthodontists and those dental professionals who do not practice amalgam were omitted, and 40 mercury practicing dentists were selected for blood analysis of mercury on the basis of the order of receipt of filled in questionnaires, and they belonged to six different districts of Kerala such as Palghat, Trichur, Ernakulam, Kottayam, Pathanamthitta and Alleppey. The participants volunteered to provide 3 ml of blood sample. After getting informed consent from each of them, blood samples were collected. A trained technician from the certified laboratory 'Thyrocare' took the sample by venepuncture, following the standard blood collection procedure. Blood samples were collected in 3 ml EDTA tubes, shook well and air transported to Mumbai in a frozen state, on the day of collection itself, for analysis at Thyrocare Technologies Limited, where the blood samples were analysed by Inductively Coupled Plasma - Mass Spectrometry (ICP-MS). Statistical analysis was performed using SPSS (version 20 for Windows). Quantitative data were represented using mean and standard deviation. Independent sample t-test was performed to compare quantitative variables between two groups. ANOVA with Duncan's multiple range tests were performed to compare quantitative variables between three or more groups.

► Result and Discussion

The various parameters considered in the study were not found to show any significant influence on BML of dentists as per the present study (Table 1), since all the p-values were greater than the significance level 0.05. Mean BML was 4.563 $\mu\text{g L}^{-1}$ in the category 11-20 years of practice, the highest in the lot, but years of practice was not found to be statistically significant. Similarly mean BML was highest (4.067 $\mu\text{g L}^{-1}$) when working hours was 9-10 hours per day, but working hours per day was not found significant statistically. It is also evident from Table-1 that all the three amalgam preparation methods namely, using mortar and pestle, amalgamator and capsule, amalgamator and powder- liquid were not found influencing the BML of mercury practicing dentists significantly. Similar was the case with number of amalgam restorations placed or removed per week, air ventilation mode in the dental office, and whether the working area was carpeted or not. The outcome of the present study is similar to those reported from some other parts of the world. Dental workers in Poland did not show statistically significant differences in geometric mean of urine mercury concentrations between the study and control groups²². Previous exposure to metallic mercury and its effects among Norwegian dentists and dental nurses probed for the

previous fifty years reveal that the level of exposure is low^{23,24}. The mean mercury levels in urine and hair are not significantly different in dental professionals and general population in a study by Wang et al. (2012)²⁵. Sahani et al. (2016)¹², in a nationwide study in Malaysia among dental health care workers, found occupational exposure to be insignificant.

Low mercury exposure is reported in Swedish dentists, attributed to method of amalgam preparations and working patterns²⁶. Among Turkish clinicians, dental students, and dental nurses 51.7% had BML within normal range and only 33.6% had above²⁷. Very low mercury exposure to staff in dental practices in Scotland is reported, owing to increased awareness about mercury toxicity and improved methods of amalgam preparation²⁸.

Nagpal et al. (2016)²⁹, in a recent review concluded that dentists had high exposure levels than controls, but below the recommended guidelines. The mean BML in the present study ranged from 1.940 $\mu\text{g L}^{-1}$ to 5.383 $\mu\text{g L}^{-1}$ which were lower than the recommended guidelines and other reports such as 6.43 $\mu\text{g L}^{-1}$ in Iranian dentists¹⁵, 7.74 $\mu\text{g L}^{-1}$ in dentists from Cairo, Egypt³⁰ and 29.835 $\mu\text{g L}^{-1}$ in Pakistan dentists³¹. The mean BML of dental faculty working in the restorative dentistry clinics in a study in Ege University, Turkey, is 15.69 $\mu\text{g L}^{-1}$ at the beginning and 45.02 $\mu\text{g L}^{-1}$ at the end of the academic year¹⁹. The present values were also below the reference values of Iyengar and Woittiez (1988)³² which is 9.5 $\mu\text{g L}^{-1}$, and agreeing with that of Minoia et al. (1990)³³, 5.3 $\mu\text{g L}^{-1}$. Levels of Hg in human blood in the present observations were also well below the reference values of Thyrocare Technologies which is < 5.00 $\mu\text{g L}^{-1}$, except for one mean value of 5.383 $\mu\text{g L}^{-1}$.

With regard to occupational exposure to mercury in dentistry, mercury levels are high in some studies, and low or not statistically significant in others, as per the available literature. Factors influencing the BML too are different in the different studies and thus the outcomes are different in various studies. For example, in Mexican dentists higher urinary mercury levels are positively correlated to years of practice and amalgamation techniques³⁴. Dental students and clinical teaching staff had elevated BML due to lack of mercury hygiene and proper ventilation in a dental school^{19,35}. In a study in Lahore, Pakistan, significantly higher mean concentration of mercury in the blood of dentists is positively correlated with the age, working hours, amalgam fillings done per week, and years of practice³¹. In general, the low level of mercury in the blood of dentists in Kerala remains evidence to their better hygiene consciousness and amalgam practicing style. But it may be noted that the mercury level in different participants vary greatly due to differences in individual practices, which could not be measured properly. However, the low level of mercury in the blood of dental professionals due to chronic exposure need further critical analysis as the impact of such a low level from chronic exposure is not yet fully understood.

► Conclusion

As per the present data no significant relationship could be found between amalgam practicing styles or related variables and BML among the group of dentists studied in Kerala. Safe amalgam preparation methods along with good mercury hygiene practice could ensure safety from occupational exposure to mercury and thus mercury body burden could be kept low. Therefore, it may be concluded that dentists in general in Kerala are following proper hygiene practices and amalgam practicing style. Since the amount of mercury in different dental professionals varied greatly, further elaborate studies need to be taken up in the state in the field of occupational mercury exposure in dentistry. Such studies are significant in developing countries where an immediate total ban on dental amalgam may not be feasible as its alternatives still remain expensive and not affordable to all categories of patients in the society.

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Cuspal dimorphism in mandibular second premolar

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Abstract

Introduction: Evaluation of morphologic variation of mandibular second premolar is a useful tool in anthropological and odontometric researches. To date, no such studies have been found in the literature to evaluate cuspal pattern and occlusal groove pattern in mandibular second premolar in South Tamilnadu population.

Aim & objective: To determine the frequency and distribution of morphological forms of mandibular second premolar and to evaluate its cuspal variations and occlusal groove pattern in Kulasekharam population.

Materials & methods: Study included 1000 participants aged between 20-45 years (500 males & 500 females). Intraoral visual examination was done for cuspal variations and occlusal groove pattern in mandibular second premolars.

Result: Among the whole of participants, the frequent cusp pattern was found to be two cusp variety (54.6%) compared to three cusp variety (45.4%). Two cusp variety was seen in 47.5% of male and 52.5% of female participants and 53% of male and 47% of female participants showed three cusp variety. The predominant occlusal groove pattern was Y-type which was 45.4% followed by U-type and by H-type which were 29.8% and 24.8% respectively.

Conclusion: In this study, the prevalence of two cusp variety in mandibular second premolar was higher than that of three cusp variety in Kulasekharam population.

Key words: Mandibular second premolar, Cuspal pattern, Occlusal groove pattern

► Introduction

Cuspal quantification and morphological variation has always been a topic of research since long time. These structural variations in tooth are the part of dental anthropological system and should be determined in different population or a race. Mandibular second premolar is the fifth tooth from midline and occupies the mid central position in both right and left halves of mandible. The mandibular second premolar assumes two common forms that differ mainly in occlusal design. Two morphological forms of mandibular second premolar namely, bicuspidate (2cusps) and tricuspidate (3cusps) exists. Literature review reveals that 45% of individuals have two cusp type and 55% have three cusp type premolar^{1,2}.

The most common form is the two cusp type, which appears more rounded from the occlusal aspect. The single lingual cusp development attains equal heights with the two cusp type. The less common form is the three cusp type that appears more angular or square type having three cusps that are distinct, with the buccal cusp being the largest and the distolingual cusp being the smallest. Each cusp has well formed triangular ridge separated by deep developmental groove³.

Each cusp has an individual growth pattern and different evolutionary background. Not only the cusp type varies, their occlusal groove patterns also differ. Three different occlusal

groove patterns exist among mandibular second premolars which include Y, U and H patterns. Knowledge of tooth morphology can be employed in the fields of forensic odontology, anthropology and odontology as it can provide information on the phylogenetic relationship between species as well as variations and diversities within a population^{2,4}.

Till date no study has been done to evaluate cuspal variation of mandibular second premolar in Kulasekharam population of Tamilnadu. The present study was carried out to check the frequency and distribution of the two varieties of mandibular second premolars along with the evaluation of cuspal and occlusal groove pattern in Kulasekharam population, so as to collect the base line statistics of these traits in the said population.

► Methodology

A total of 1000 individuals who fulfilled the selection criteria participated in this descriptive cross sectional study. The subjects included were patients attending the dental OPD. Proposed research protocol was reviewed by institutional research committee and ethical approval was obtained. Informed consent was obtained from all the participants. Participants residing at Kulasekharam with presence of bilaterally completely erupted permanent mandibular second premolars, showing clear occlusal outline with all cusps and groove pattern were included in this

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study. Presence of occlusal caries, age related changes and traumatic injuries of mandibular second premolar teeth were excluded from this study.

Intra oral examination with good illumination using sterile mouth mirror and probe was done and direct intraoral photographs with clear cuspal outline and groove pattern were taken to determine the variation in coronal morphology of mandibular second premolars. Age, sex, number of cusp and groove patterns were recorded in a proforma designed for the study and analyzed using SPSS version 20.

In the present study the photographic method was used with intraoral examination which has advantages such as, requirement of minimum armamentarium, less time

consuming, convenient to both examiner and subjects and convenient preservation of digitalized data.

► Results

One thousand subjects aged between 20-45 years were examined and equally selected for gender (500 males and 500 females). Among the whole of participants, the frequent cusp pattern was found to be two cusp variety (54.6%) compared to three cusp variety (45.4%). Two cusp variety was seen in 47.5% of male and 52.5% of female participants respectively. 53% of male and 47% of female participants showed three cusp variety. (Table-1 & Graph-1)

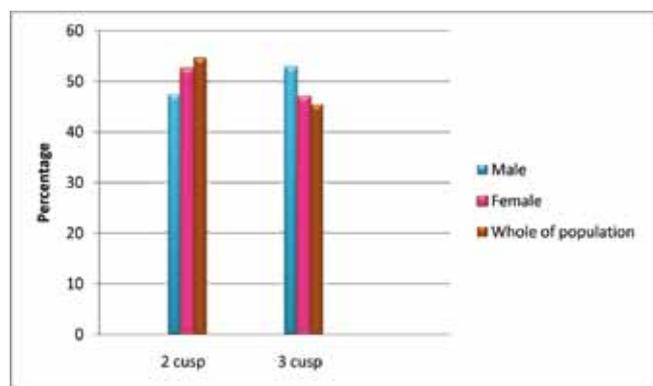
Analysis of the groove pattern showed U & H-type in two cusp variety, while Y-type of groove was seen in three cusp

Table. 1 Distribution of cuspal varieties in mandibular second premolars.

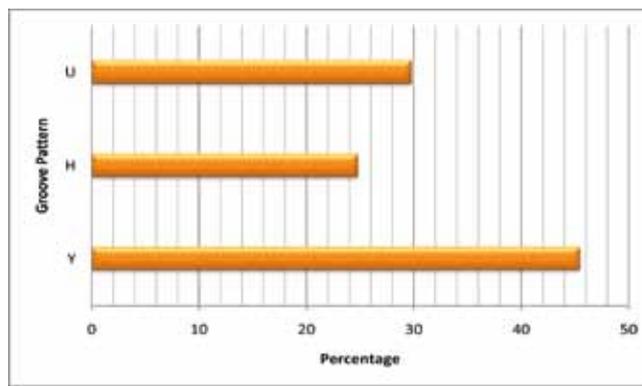
Premolars	Whole of Sample (%)	Males (%)	Females (%)
2 cusp variety	54.6% (546)	47.5% (259)	52.5% (287)
3 cusp variety	45.4% (454)	53% (241)	47% (213)

Table. 2 Distribution of groove pattern in mandibular second premolars.

Groove Pattern	Percentage (%)
Y- type	45.4% (454)
H-type	24.8% (248)
U- type	29.8% (298)



Graph 1 Distribution of cuspal varieties in mandibular second premolars



Graph 2 Distribution of occlusal groove pattern in mandibular second premolars



Fig. 1 Three cusp and Y-type groove in 35



Fig. 2 Two cusp and U-type groove in 45



Fig. 3 Two cusp and H-type groove in 35

variety. The predominant occlusal groove pattern was Y-type which was 45.4% followed by U-type and then by H-type which were 29.8% and 24.8% respectively among the whole of participants. (Table-2 & Graph-2).

► Discussion

Early in 20th century, the world renowned paleontologist William King Gregory (1922) coined that ‘Tooth crown morphology varied hardly to all among the major races of human kind’. However exceptions do exist of which the most common are cusp of carabelli, extra cusp of mandibular second premolar, peg shaped lateral incisors and shovel shaped incisors. The prevalence of these variations can be localized to one tooth or can be generalized to involve all the teeth or they may be a part of systemic or syndromic disorders⁵.

In the present study the frequency of bicuspid and tricuspid variety in mandibular second premolar in the Kulasekharam population was studied and was found to be 54.6% and 45.4% respectively. The two cusp variety was seen in 47.5% of male and 52.5% of female participants respectively. 53% of male and 47% of female participants showed three cusp variety. The study showed that the bicuspid variety was more prevalent which was in agreement with various other studies done by Sunil et al (52.8%)⁴, Dila Baz Khan et al (61.7%)⁶ and Loh et al (66.3%)⁷. The result of our study differs with the study by Asrar Ahmed et al which, was reported as 37.5% and 62.4% in bicuspid and tricuspid variety respectively².

Analysis of the groove pattern showed U & H type in two cusp variety, while Y-type of groove was seen in three cusp variety. The predominant occlusal groove pattern was Y-type which was 45.4% followed by U type and H type which were 29.8% and 24.8% respectively among the whole of participants. These results are consistent with the studies done by Asrar Ahmed et al and Sunil et al, who have reported the prevalent occlusal groove pattern to be U pattern among bicuspid variety^{2,4}.

Mandibular second premolar is one of those permanent teeth with diverse morphological features existing in different population. Knowledge of this trait type is very important from the clinical point of view so that not only its other variants are identified from one another but also to differentiate it from the second deciduous molar. There are major differences between trait frequency and expression between populations, and it is this variation that is of special significance to physical anthropology and allied fields^{2,8}.

Teeth are particularly used in anthropological researches because they have the advantage of preservability, observability, variability and heritability. Thus dental morphological

characteristics and odontometry can help in anthropological research by providing information on the phylogenetic relationship within a species as well as variations and diversity within a population⁹.

Furthermore, knowing the variations in dental anatomy and morphology about each individual tooth can help in performing dental treatments such as endodontic, restorative and orthodontic treatments. Therefore the result of this anatomical study can be used in both anthropological researches and clinical aspect of dental field¹⁰.

► Conclusion

A small population from south Tamilnadu considered in this present study was found to possess a higher frequency of bicuspid variety and Y-type occlusal groove pattern in mandibular second premolar tooth. A slight female predilection for bicuspid variety and male predilection for tricuspid variety was noted. This is a trait with high variability, to know the anthropological significance of cuspal dimorphism in mandibular second premolars. Further studies involving a larger population in different regions of country are necessary to assess the prevalence rate and gender predilection more efficiently.

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The effect of infertility treatment on periodontium

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Abstract

Aim: Women undergoing infertility treatment can be considered to be a 'risk group' for periodontal disease, due to prolonged, sustained serum levels of progesterone and oestrogen. This investigation aims to study the effects of infertility treatment on periodontal tissues of infertile women.

Methodology: 60 women of the age group 18-35 yrs. were included in the study- 20 women in whom infertility treatment had not yet been initiated (Group I), 20 women undergoing treatment for infertility (Group II) and 20 women who had conceived and delivered naturally (Group III-control group). Clinical parameters such as Oral hygiene index- simplified (OHI-S), Gingival index (GI), Sulcus bleeding index (SBI) and Clinical attachment loss (CAL) were assessed.

Results: Despite similar OHI-S scores ($P > 0.05$) in all groups, women of Group II had significantly higher gingival inflammation ($P < 0.05$) compared to women of Group I and Group III.

Conclusions: Increased levels of estrogen and progesterone in infertile women undergoing assisted reproductive therapy is associated with increased prevalence of gingival inflammation and clinical attachment loss. These patients require meticulous oral hygiene practice and periodic professional consultation.

Key words: Assisted reproductive therapy, Infertility, Estrogen, Progesterone, Gingivitis, Loss of attachment

► Introduction

Infertility is "a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse."¹ This condition may be classified as primary infertility, in which no previous pregnancies have occurred and secondary infertility, in which a prior pregnancy, although not necessarily a live birth, has occurred.² The World Health Organization (WHO) estimates that approximately 8% to 10% of couples worldwide experience some form of fertility problem. Today, there is a wide range of medical help that can be offered to infertile couples. In the past few years, there has been great advances in infertility treatment. These new therapies which are commonly referred to as assisted reproductive technology (ART) have raised the hopes in growing number of infertile couples around the world.³

A woman undergoing infertility treatment is mainly given drugs for ovulation induction to produce as many healthy follicles as possible, so as to increase the chances of ovulation and to control the ovulation timing so that the eggs can be surgically retrieved and used for assisted reproductive therapy.^{4,5}

Medications used for ovulation induction include clomiphene citrate, urofollitropins, human chorionic gonadotropins, human menopausal

gonadotropin, menotropins, and follicle stimulating hormone and pulsatile gonadotrophin releasing hormone.^{3,4} Clomiphene citrate is a non-steroidal estrogen antagonist that increases follicle stimulating hormone and luteinizing hormone levels by blocking estrogen negative feedback at the hypothalamus. It is the most commonly used drug for this purpose. A woman taking these drugs produces twice or thrice the amount of progesterone and estrogen in that cycle compared to pre-treatment cycles.⁶

Table 1. Effects of estrogen on the periodontal tissues⁷

- Decreases keratinization while increasing epithelial glycogen that results in the diminution in the effectiveness of the epithelial barrier.
- Increases cellular proliferation in blood vessels
- Stimulates phagocytosis of PMNLs
- Inhibits chemotaxis of PMNLs
- Suppress leukocyte production from the bone marrow
- Inhibits proinflammatory cytokines released by human marrow cells
- Reduces T-cell mediated inflammation
- Stimulates gingival fibroblasts proliferation
- Stimulates the synthesis and maturation of gingival connective tissues
- Increases the amount of gingival inflammation with minimal amount of plaque

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Table 2. Effects of progesterone on the periodontal tissues⁷

- Increases vascular dilatation, thus increases permeability
- Increases the production of prostaglandins
- Increases PMNL and prostaglandin E2 in the gingival crevicular fluid (GCF)
- Reduces glucocorticoid anti-inflammatory effect
- Inhibits collagen and noncollagen synthesis in PDL fibroblast
- Inhibits proliferation of human gingival fibroblast proliferation
- Alters rate and pattern of collagen production in gingiva resulting in reduced repair and maintenance potential
- Increases the metabolic breakdown of folate which is necessary for tissue maintenance and repair

► Materials and methods

A total of 60 women satisfying the inclusion and exclusion criteria were included in the study. All subjects provided written informed consent. Subjects were divided into three groups of 20 women each.

Group I: 20 women with a history of infertility but in whom treatment had not yet been initiated.

Group II: 20 women who were undergoing infertility treatment at the ARMC IVF centre, Calicut.

Group III (Control group): 20 women who had conceived and delivered naturally.

Inclusion criteria

- Women in the age group of 18-35 years
- For Group I and II: women with history of primary infertility
- For Group III: women who conceived and delivered naturally.

Exclusion criteria

- Women suffering from secondary infertility
- Male factor responsible for the infertility
- Presence of complicating systemic conditions
- Tobacco use in any form
- Periodontal treatment undertaken within the previous 6 months
- Use of systemic antibiotics or non-steroidal antiinflammatory drugs in 3 months prior to enrolment in the study.

All individuals were interviewed about their age, occupation, educational level, marital age, medical history, family history and oral hygiene practice.

Clinical examination

The clinical parameters assessed included: Simplified oral hygiene index (Greene and Vermillion; 1964),⁸ gingival index (GI) (Löe; 1967),⁹ sulcus bleeding index (SBI) (Mühlemann and Son; 1971),¹⁰ and clinical attachment loss (CAL).¹¹ Measurements for all the teeth except third molars were recorded.

All measurements were performed by a single examiner using a mouth mirror and a community periodontal index of treatment need (CPITN) probe.

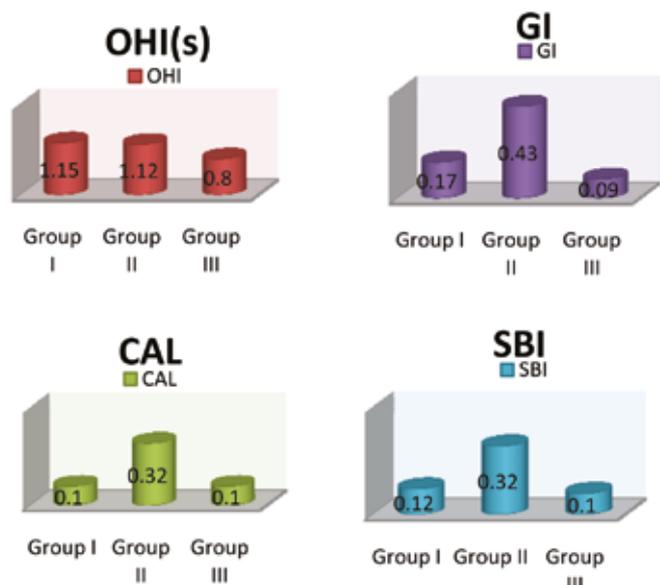
► Statistical analysis

Comparison of groups individually with respect to each clinical parameter was analyzed by Kruskal - Wallis one way ANOVA test. Pair wise comparison of three groups with respect to each clinical parameter was analyzed using the Mann-Whitney U test. $P < 0.05$ was considered statistically significant. Statistical analysis was performed using a statistical package SPSS version 17.0; IBM. Statistical Package for the Social Sciences Version 17.0

► Results

Oral hygiene index simplified (OHI-S): Oral hygiene status did not differ significantly ($P > 0.05$) when the mean values of OHI-S scores of Group I, II and III were compared, indicating that the oral hygiene status was similar in all the groups [Table 3].

GI: When compared to Group I and Group III, Group II had significantly higher scores of GI ($P < 0.05$). However, GI did not show statistically significant difference between Groups I and Group III [Table 4].



SBI: On comparison of mean values of the percentage of sulcus bleeding sites, scores were significantly higher in Group II ($P < 0.05$) when compared to Group I and III. There was no significant difference between the scores of Group I and III [Table 3].

CAL: CAL was significantly higher in Group II ($P < 0.05$) compared to Group I & III. Furthermore, CAL did not differ significantly between Group I and Group III ($P > 0.05$) [Table 3].

Table 3: Comparison of OHI-S, GI, SBI and CAL among study groups

Clinical parameters	Group I & Group II p value	Group I & Group III p value	Group II & Group III p value
OHI(s)	0.154	0.229	0.425
GI	0.012	0.102	0.002
CAL	0.003	0.352	0.000
SBI	0.024	0.744	0.029

► Discussion

The most common oral manifestation of elevated levels of ovarian hormones is an increase in gingival inflammation, with an accompanying increase in gingival exudate. During hormonal therapy, gingival crevicular fluid containing oestrogens and progesterone is in close proximity to microbial colonies; these hormones act as growth factors, thereby contributing to exacerbation of plaque-associated gingivitis.¹²

In this study, the gingival inflammation levels of women undergoing infertility treatment and were investigated and compared with women who were not using these drugs. The role of bacteria on the initiation and progression of inflammatory periodontal diseases is well documented in the literature, so it was important for this study to eliminate its effects on the periodontium in terms of oral hygiene habits.¹³

It was found that, despite similar plaque levels, Group II patients had higher levels of gingival inflammation, bleeding, and increased GCF volume when compared to the other two groups. These effects are presumably correlated with the increased plasma levels of progesterone and estrogen.

Human gingiva contains specific high-affinity receptors for progesterone and oestrogen.^{14,15} These receptors provide evidence that gingivae are target tissue for both gestational hormones. Oestrogen appears to be involved in the synthesis and maintenance of collagen, while progesterone causes

increased vascular permeability, resulting in the infiltration of polymorphonuclear leukocytes. Estrogen may also act as growth factor and promote the colonization of certain highly pathogenic bacteria such as *P. intermedia*.^{16,17} Progesterone and oestrogens have been shown to affect the immune system.^{18,19} Progesterone in particular has been shown to stimulate the production of the inflammatory mediator prostaglandin E2 and to enhance the accumulation of polymorphonuclear leukocytes in the gingival sulcus.^{20, 21} Progesterone has been shown to downregulate IL-6 production by human gingival fibroblasts to 50% of that of control values.²² Cytotoxic effects on B-cells, could reduce the antibody sulcular fluid.^{23,24} Neutrophil chemotaxis and phagocytosis, along with antibody and T-cell responses have been reported to be depressed in the presence of high response, to pathogens which are nutritionally dependent on the circulating hormones.²⁵ Thus, as a result of infertility treatment, the increased levels of female sex hormones present in the subgingival environment could predispose women to periodontal disease.

Gingival inflammation or periodontal disease induced by ovulation drugs may affect the success of infertility treatment.³ Therefore, Patients should be motivated to practice meticulous oral hygiene and routine professional prophylaxis should be performed at the beginning of each menstrual cycle to ensure healthy periodontium on the ovulation day on which assisted reproductive therapy is performed. Furthermore, low levels of plaque should be maintained even after pregnancy is achieved to reduce the risk of pre-term labor and low birth weight.⁴

The limitations of this study include small sample size; and other investigations such as immunologic analysis, bacteriological profile, and hormonal assays were not done. It has been reported that infertility has some severe social consequences such as economic hardship, social stigma and blame, social isolation and alienation, guilt, fear, loss of social status and sometimes violence, especially in developing countries.²⁶ These psychosocial circumstances have been suggested to be significant risk indicators for periodontal disease.²⁷ These factors were also not taken into consideration. The relationship of these factors and periodontal disease in infertile women should be analyzed in further studies.

► Conclusion

From the analysis of the results and within the limitations of the study, it can be concluded that infertility treatment exacerbates gingival inflammation and periodontal disease process. Since periodontitis is a modifiable risk factor associated with adverse pregnancy outcomes, further interventional studies are needed to confirm the effects of periodontitis and periodontal treatment on the outcome of infertility treatment.

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Novel classification system for post endodontic restorations

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Abstract

Post endodontic restoration is one of the most important steps after root canal treatment and before placement of the crown. There is a dire need for a classification so that dental practitioners can visualize and communicate with fellow dental practitioners as well as with patients for a proper treatment planning. It is also important from an academic point of view while training the dental students. The conditions of the remaining dentinal structure always determine the support for the post endodontic restoration. The system of classification given here has five classes with two categories and three modifications for each class. The height of the remaining dentinal wall in the defect area has also been addressed. This system of classification also aims at prescribing the mode of treatment for each class, defect, type and modification.

Key Words: Post endodontic restoration, Classification, Class, Defect, Type and Modification.

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► Introduction

Post endodontic restoration is the most essential step connecting the process of rehabilitation of an infected tooth with root canal followed by crown. The prognosis and long term success of the final crown is determined by the remaining healthy dentinal structure and the post endodontic restorations that are planned. The restoration

of endodontically treated teeth has undergone significant changes in the last 20 years. Most of these changes are associated with the preservation of tooth structure¹. The support for the endodontically treated tooth depends on the condition of the remaining dentinal structure. Loss of tooth structure from caries, trauma or both makes the endodontically treated teeth more susceptible to fracture^{2,3}. Many teeth that require endodontic therapy, have been so damaged by caries, previous restorations, and the endodontic access that limited coronal structure remains to be used for retaining the final structure. Traditionally a pulpless tooth received a dowel to reinforce it and a crown to protect it⁴. But some studies suggest that a post should be used only when there is insufficient tooth substance remaining to support the final restoration⁵. There is at times severe undermining of the lesion that masks the severity of the destruction. All these suggest that a classification system is required for proper treatment planning regarding the need for crown lengthening, use of a permanent restoration or a post and core either a prefabricated, custom made, or a fiber post. A classification system helps in proper visualization and communication among practitioners and students of dentistry for their academic training.

Classification

The classification is based on four factors.

- A) The presence or absence of four walls of the tooth i.e. buccal, lingual or palatal, mesial and distal.
- B) Height of the dentinal wall in the defect area.
- C) The remaining dentinal wall around the pulp cavity.
- D) The occlusogingival length of the crown.

The presence or absence of four walls of the tooth i.e. buccal, lingual or palatal, mesial and distal determines the class. The remaining dentinal wall that is taken into consideration should extend more than half of the tooth on that side. There are 5 Classes, from class I to class V.

Class I

In this class the pulp cavity is surrounded by dentinal wall on all sides. The four walls are the buccal wall, lingual or palatal wall, mesial and distal wall. The dentinal wall should have a vertical height of more than 2mm. (Fig.1)

Class II

In this class the pulp cavity is surrounded by a continuous dentinal wall on three sides and there is a defect on one wall.(Fig.2)

Class III

In this class the pulp cavity is surrounded by a dentinal wall on two sides and there are defects on remaining two sides.(Fig.3)

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Class IV

In this class the pulpal cavity is surrounded by a dentinal wall only on one side and defects on three sides. (Fig.4)

Class V

In this class the dentinal wall is completely absent, except for 1-2 mm of vertical wall around the pulp cavity to be used as ferrule effect. (Fig.5)

After the carious lesion is removed, the height of the remaining dentinal structure left in the defect side may be minimal or at times extend up to the gingiva. Defect is considered only if the height of the remaining dentinal wall has a minimum of 2mm from the gingival finish line. If the height of the wall involving the defect is more than 2mm, it is not considered as a defect. There are three types of defect.

Defect 1

Vertical height of the defect is just 1-2mm above the gingiva.

Defect 2

The tooth structure is at the gingival line.

Defect 3

The tooth structure is below the gingival line.

Each of the above class is further subdivided onto two types depending on the presence or absence of the undermined dentine adjacent to the pulp cavity.

Type A

Here dentinal wall is present adjacent to the pulpal cavity. (Fig.9)

Type B

In this type, there is no dentinal wall adjacent to the pulp cavity. (Fig.10)

Each type is further divided into three modifications according to the height of the crown.

Modification

Occluso-gingival length is important in both retention and resistance of a crown⁴. The modification is primarily determined by the occluso-gingival length of the tooth.

Modification 1

More than half of the vertical height of the tooth is present. (Fig. 6)

Modification 2

Half of the vertical height of the tooth is present. (Fig.7)

Modification 3

Less than half of the vertical height of the tooth is present. (Fig.8)

Criteria to be considered for classification

1) The tooth should be classified only after complete removal of carious lesion and preparation of access cavity for endodontic therapy.

Table 1

	MODIFI-CATION 1	MODIFI-CATION 2	MODIFI-CATION 3	DEFECT 1	DEFECT 2	DEFECT 3
CLASS I	PF	PF	FB, CP			
CLASS II	PF	PF	PFP+A, FB, CP	PF	PF	CL
CLASS III	PFP	PFP+A, FB	FB, CP	PFP	FB	CL
CLASS IV	FB	FB, CP	FB, CP	FB, CP	FB, CP	CL
CLASS V	No modification in class V situation Treatment of choice is FB, CP					

Extension of the abbreviation

PF – permanent filling, PFP – pre fabricated post, PFP+A – prefabricated post with additional pins, FB- fibre post, CP – custom post, CL – crown lengthening,

2) A wall should have a vertical height of more than 2mm or extend more than half of the tooth on that side, if it has to be included in the classification.

3) If there is difficulty in determining the occlusogingival height of the tooth due to destruction, the occlusogingival height of the adjacent teeth is taken into consideration.

4) CLASS V situation does not have any modification.

5) If the height of the wall involving the defect is more than 2mm, it is not considered as a defect.

6) There is no defect in CLASS V situation.

► **Discussion**

Endodontically treated tooth should be properly restored before going for crown preparation. Any remnant caries should be removed completely during the initial stages of

root canal treatment¹. The decision to restore the tooth with a permanent filling material or a post and core depends on the remaining sound dentinal layer. There is no particular criteria to do a treatment plan in such cases. Most often it depends on individual preference. The amount of tooth structure destroyed is only one of the factors to be considered in selecting a restorative material and designing a preparation. Equally important is the location of the destruction and the amount of tooth structure involved. Location can be classified as peripheral occurring on the axial surface of the tooth; central, in the centre of the tooth, or combined, with destruction on both sites⁶. The construction of a core build up is necessary as the amount of residual tooth substance decreases and the build-up augments the development of retention and resistance provided by the remaining tooth structure⁷. The greatest factor influencing the strength of endodontically treated teeth was the amount of remaining tooth structure. If a tooth is not fractured or severely damaged

Table 2

CLASS	TYPE A	TYPE B
CLASS I	PF	PFP, FB
CLASS II	PF	PFP+A, FB
CLASS III	PFP, FB	PFP+A, FB, CP
CLASS IV	FB	FB, CP



Fig. 1 Class I

Fig. 2 Class II

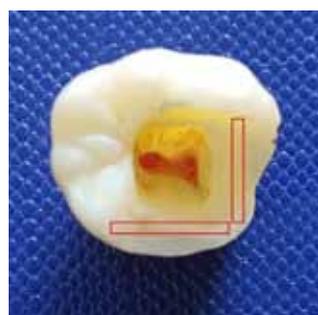


Fig. 3 Class III



Fig. 4 Class IV

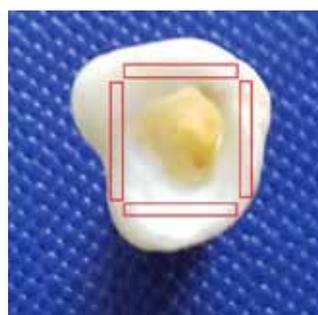


Fig. 5 Class V

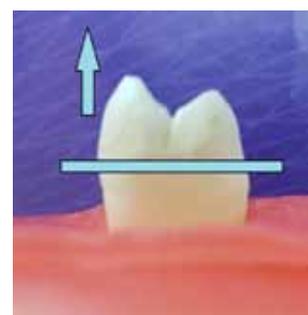


Fig. 6 Modification 1

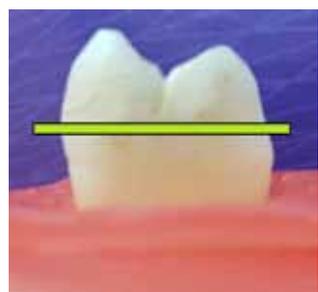


Fig. 7 Modification 2

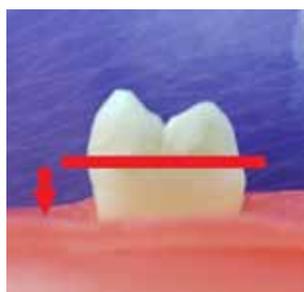


Fig. 8 Modification 3



Fig. 9 Type A



Fig. 10 Type B

by caries before endodontic treatment, it may be sufficient to treat the endodontic access with a simple restoration³.

A classification system is the need of the hour. It is important while training students so that they can easily decide the treatment plan. This will also be helpful for proper visualization and communication between practitioners. The classification is based on four factors, the presence or absence of the dentinal wall, i.e. buccal, lingual or palatal, mesial or distal that determines the class, the height of the dentinal wall in the defect area that determines the defect, the presence or absence of undermined dentine that determines the type and the occlusogingival height of the crown that determines the modification. The presence of a dentinal wall adjacent to the pulpal cavity is important when choosing different post systems. Active posts derive retention directly from the root dentine by the use of threads whereas passive posts gain retention passively seating in close proximity on the luting cement for their retention⁹.

According to Shillingberg, a minimum of 1-2 mm vertical wall is necessary for restoring the tooth⁴. This is the reason why Class V has been given the base line to decide whether the tooth needs to be extracted or restored. Cast crowns with ferrule, reduces the cervical stress by distributing the stress along the entire root¹⁰. To accommodate this multidimensional problem within the classification, the dentinal wall that has been lost due to the defect was also considered. Occlusogingival length is an important factor while determining the retention and resistance of a crown. For restoration to succeed, the length must be great enough to interfere with the arc of casing pivoting about a point on the margin on the opposite side of the restoration⁴. There will be many situations in which sub gingival margins are unavoidable, because preparation length is such an important factor in resistance and retention^{11,12}. The placement of finish lines can be altered from ideal locations by caries^{11,12}. Crown lengthening may be done to surgically move the alveolar crest 3.00 mm apical to the location of the proposed finish line to guarantee the biological width and prevent periodontal pathology⁴. Planning is required not just to provide support to the core but also to plan the final finish line for the crown. This classification system helps to plan whether; crown lengthening is required before going for the crown preparation. Whenever we encounter a defect 3 situation, crown lengthening has to be kept as a treatment option if required.

The classification helps us to decide regarding the type of restorations as well as the post systems to support the core. Different types of post systems are available to treat endodontically treated tooth. Metal posts may be active or passive, tapered or parallel, custom cast post and

core^{9,13}. Non-metallic posts available are Fibre reinforced Resin post systems, carbon fibre posts and ceramic or zirconium posts^{9,13}.

Most endodontically treated molars do not require a post because they have more tooth substance and a larger pulp chamber to retain a core build-up¹⁴. This is true in case of class I, class II, class I Type A, class II Type A, class I modification 1, class I modification 2 and class II modification 1 and 2. When core retention still is insufficient after a single post is inserted, placement of pins can be considered for additional retention¹⁴. Prefabricated post for single canal can be planned for class I Type B, class III Type A and class III modification 1. Single post with additional pins can be considered for class II Type B, class III Type B, class II modification 3 and class III modification 2 (refer table I and II).

Although recent trends in clinical practice has been towards non-metal bonded post systems which seems promising, the research is not entirely supportive and there are still unanswered questions¹³. Non metallic posts like fibre posts strengthen the roots at least for a short time, due to their bonding effect. But this strengthening effect is probably lost with time¹⁵. Fibre posts offer good results for class I modification 3, class II modification 3, class III modification 2 and 3, class IV, class V, class I Type B, class II Type B, class III Type A, Type B, class IV Type A, B and class V cases. Base metal alloys have been used for custom cast post and core, but their hardness may be a major disadvantage in adjustment and may predispose the tooth to root fracture. Many practitioners prefer to use a cast gold post and core for endodontically treated anterior teeth. The major disadvantage is esthetics, as the metal shows through the all -ceramic restorations. Another disadvantage is that it requires two visits and laboratory fabrication⁸. Custom made cast post and core can be selected for class I modification 3, class II modification 3, class IV modification 2 and 3, class V, class III type B and class IV Type B (refer table I and II). Resin based composites have good strength, low solubility and good esthetics⁸. Glass ionomer cement has weak tensile strength, compressive strength, low fracture resistance, poor bonding to dentine and enamel, poor condensability and high solubility¹⁵. Therefore, the use of glass ionomer cement as core material should be avoided⁸. One in vitro study comparing resin based composites, amalgam and cast gold as core material under a crown in endodontically treated teeth found no significant difference in fracture and failure characteristics among these materials, provided a 2mm ferrule existed on the margin of healthy tooth substance¹⁶. When we encounter a defect 3 situation, where the tooth lies below the gingival margin, crown lengthening is required (refer table 1).

► Conclusion

Post endodontic restoration is one of the most important steps in rehabilitation of an endodontically treated tooth. The multidimensional nature of the destruction causes confusion even among experienced practitioners regarding the selection of treatment. The decision to go for a permanent restoration or choose which type of post system is best suited for a particular condition, or even the decision to go for crown lengthening treatment requires proper visualization and communication. In this regard a classification system is the need of the hour. In this article a classification system has been suggested catering to the needs of almost all aspects of an endodontically treated tooth. The classification system may have certain limitations taking into account the complex nature of tooth destruction. Further modifications may be required to accommodate the vast sea of defects.

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VELscope Oral Cancer Examination



One of the VELscope system's most important tasks is to help identify areas that might, if not identified and treated, progress to oral cancer. The statistics below, from the National Cancer Institute's SEER Database, 1999-2006, are a compelling argument for regular VELscope exams:

- Found early, while still Localized (confined to the primary site), oral cancer's five-year survival rate is good: about 83%. Only 33% of all oral cancer discoveries fall into this category.
 - Found while Regional (progressed to regional lymph nodes) the five-year survival rate drops significantly, to about 55%. Approximately 46% of all oral cancer discoveries are Regional.
 - Found late, oral cancer's five-year survival rate is poor: approximately 32%. This accounts for approximately 14% of all oral cancer findings.
- Clearly, finding oral cancer in its early stages is key to survival. The VELscope Vx offers hope for the early discovery

How Does the VELscope Work?

The VELscope's blue light "excites" molecules (called "fluorophores") deep within the layers of oral mucosal tissues. In turn, those fluorophores emit their own light (fluorescence), in shades of green, yellow and red. The VELscope's proprietary filter makes fluorescence visualization possible, by blocking reflected blue light, and by enhancing the contrast between normal and abnormal tissue.

Dental transmigration

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Abstract

Transmigration is a rare entity seen almost exclusively in mandibular canines. Specific aetiology and mechanism of transmigration is still unclear. Pediatric dentists should identify transmigration as early as possible and intervene it or should refer the patient for a multidisciplinary approach. The paper discusses rationale, prevalence, etiology and clinical considerations.

Key words: Impaction, mandibular canines, multifactorial, transmigration

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► Introduction

Intraosseous migration of unerupted teeth across the midline, that is to the contralateral side regardless of the distance is a rare phenomenon known as dental transmigration. Ando et al. in 1964 coined the term transmigration.¹ The pathognomic feature of transmigration is that the unerupted tooth migrates and crosses the midline. It is a very rare entity and canine is the most common tooth which crosses midline.(fig-1)

Prevalence

The prevalence rate of transmigration in mandibular canine region is 0.17% to 0.46%.¹ Transmigrations is seen more commonly in the mandible than in the maxilla.² Maxillary transmigration is cited as extremely rare, since the embryonic suture undergoes closure.³ Unilateral transmigration of mandibular canine is prevalent and left canine is more frequently involved. The incidence

of transmigration of canines is much higher in females than in males.⁴ Bilateral migration of mandibular canines may occur in spite of having adequate space for eruption. The migrated canines are located apical to the lower incisors either buccally or lingually. The literature provides little data about transmigrations of lateral incisors or premolars.⁵ Migration starts during the early mixed dentition and may take place over a long period of time. According to Javid an impacted tooth that traverses more than half its length across the midline is considered as transmigrated.² However, according to Joshi, the tendency to cross the midline is more important than the distance the tooth have moved.⁶

Etiology

The possible reason for transmigration is large cross sectional area anterior to mandibular teeth. Aberrant eruption of teeth may also result from abnormal eruption pathway because of defective osteoclastic activity due to local disturbance in the dental follicle.⁷ Another school of thought is that the displacement of the dental lamina to an abnormal position in early life may result in abnormal eruptive path. Distant migration is possible in the developmental stage of the tooth apex due to rich blood circulation and active alveolar bone formation.⁸ The direction of migration of canines occurs in the direction in which the crown is pointed, that is migration is mesially directed. If it is inclined more than 50 degrees

high chances are there that it crosses the midline.⁹ Axial inclination criteria proposed by Joshi helps predict the likelihood of canine impaction and transmigration. Canines within 25–30 degree of the midsagittal plane are cases of impaction. Canines lying within 30–50 degree of the midsagittal plane tend to cross the midline and for teeth at an angle greater than 50 degree, almost always transmigrate. Other possible aetiology may be premature loss of deciduous teeth, retained deciduous canine, supernumary teeth, inadequate space, odontomas, tumours, cysts, conical shape of canine, trauma, excessive crown length of mandibular canine, long eruption path of canine tooth germs, tooth size arch length discrepancy, heredity etc.^{10,11} The transmigrated tooth can cause root resorption or altered axial inclination of adjacent tooth or sensitivity, pain and discomfort.¹² Transmigrations are often characterized by mandibular lateral incisor or second pre-molar hypodontia and enamel defects.¹³ Usually transmigrated canines are asymptomatic but in cases where there is follicular cyst formation, chronic infection with fistula, pain due to impingement, resorption of adjacent teeth, swelling as well as ectopic eruption could occur, which make them prime candidates for removal.¹⁴ Transmigrated canine can cause deleterious effect due to following factors like loss of canine guidance, sensitive teeth, molar pain, cracked tooth, headaches and TMJ disorders.⁸

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► **Classification**

According to Mupparapu’s classification, 15(fig-2)

Type 1: Canine positioned mesioangularly across the midline within the jaw bone, labial or lingual to anterior teeth, and the crown portion of the tooth crossing the midline.

Type 2: Canine horizontally impacted near the inferior border of the mandible below the incisor apices.

Type 3: Canine erupting either mesial or distal to the opposite canine.

Type 4: Canine horizontally impacted near the inferior border of the mandible below the apices of either premolars or molars on the opposite side.

Type 5: Canine positioned vertically in the midline (the long axis of the tooth crossing the midline) irrespective of eruption status.

Type 1 is the most common type. The incidence rate for type 1 is 45.6%, type 2 is 20%, type 3 is 14%, type 4 is 17% and type 5 is 1.5%. According to Mupparapu 45 percent of transmigrations occur in the mesioangular position, followed by 20 percent in the horizontal position. The transmigrated canines were positioned vertically in the midline in very few cases.¹⁵

► **Diagnosis**

Panoramic radiographs help in diagnosis of transmigration.² Lateral cephalograms, computed tomography (CT), and cone beam computed tomography (CBCT) are used for accurate localization and to detect root resorption of adjacent teeth.¹⁶ Early diagnosis and evaluation of the extent of canine transmigration are critical for the deterrence of impaction, and in turn reduce complications both in esthetics and function. Conversely, failure to intervene the cases can lead to external resorption of adjacent teeth mainly the lateral incisors,

esthetic problems, shortened dental arches, misalignment of neighbouring teeth, increased follicular cyst formation and recurrent infections, resulting in irreversible damage that may eventually cause tooth loss.¹⁶ Transmigration is one of the most difficult cases that an orthodontist will encounter. Stafne found that the greatest amount of tooth migration occurred before the root is completely formed, which emphasizes the importance of early diagnosis to resolve this problem before the tooth migrates far from its ideal location.⁹

Treatment planning

The treatment plan for unerupted transmigrated mandibular canines varies with the age of the patient, stage of development, distance of migration, angulations and degree of transmigration.⁴ They may involve surgical, orthodontic, and cosmetic dental treatment.¹

Surgical removal

Surgical extraction is the treatment of choice when it is not possible to bring the tooth into alignment. It depends on the developmental stage and the distance of migrated canine.

This is the line of treatment if the mandibular arch is crowded and requires therapeutic extractions. Watted et al. reported cases of space closure after surgical removal of transmigrated lower canine.¹⁷ If the patient is symptomatic and associated with abnormalities such as a developing apical cyst, pain, resorption of an adjacent tooth root or displacement of teeth, then also surgical extraction should be planned. Even though the teeth have transmigrated to the contralateral side, they maintain their nerve connection to the originating side.⁴ Therefore, it is important to anaesthetise the nerve on the originating side.

Transplantation

If the mandibular incisors occupy normal position and if adequate space for the transmigrated canine is available, transplantation may be undertaken. Kulkarni and Lee reported cases of canine transmigration managed with transplantation.¹⁸

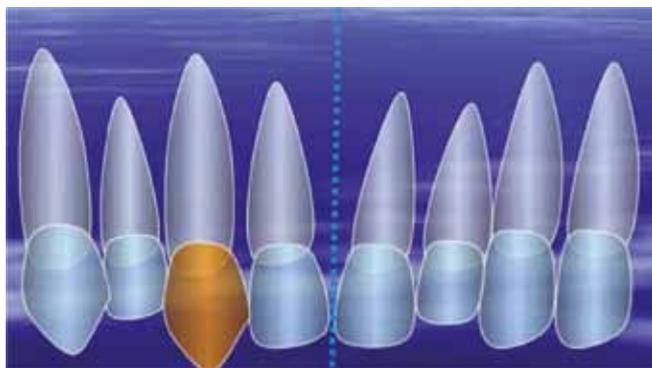


Fig. 1 Transposition

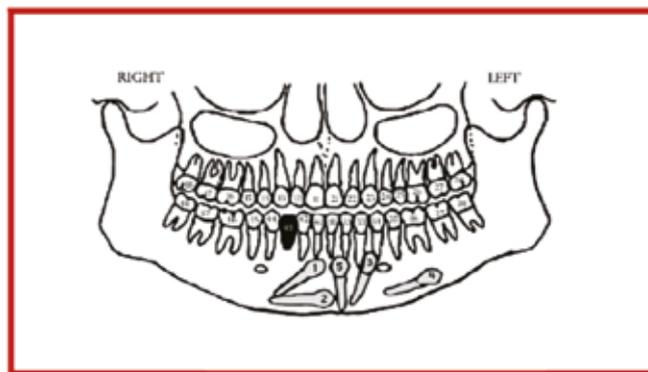


Fig. 2 Classification of transposition

Exposure and orthodontic alignment

Canines are considered to be the cornerstones of the dental arch. They play an essential role in maintaining the facial harmony and functional efficiency. The canines guide the jaw and protect teeth when it is in function. Long and strong canines withstand the chewing forces when the lower jaw moves from side to side during mastication. The posterior teeth do not touch each other in canine guided occlusion. Combined orthodontic and surgical management of a transmigrated mandibular canine is a viable option, although it requires a complex and lengthy treatment protocol. Light forces are required to prevent possible damage to the teeth and supporting structures.⁸ If the teeth is vertically aligned it may be possible to surgically expose and align them, as in the Type 5 cases, if the treatment planning dictates it. Watted et al. reported a case with mesioangular transmigration of 43 with odontoma in the region of 83. Treatment involved surgical removal of the odontoma followed by orthodontic alignment of 43 in the arch.¹⁷ Orthodontic treatment is planned based on the patient's overall facial and dentoskeletal characteristics, the duration, risks, costs of treatment, patient preferences and the orthodontist's expertise.

Management of Erupted Tooth

Treatment plans for an erupted transmigrated tooth include: orthodontic and restorative recontouring; surgical transplantation with or without endodontic treatment; extraction and replacement with implant in the natural position; or monitoring the tooth without intervention.^{8,19}

Observation

An unerupted impacted tooth should be removed at the earliest. However, if the tooth is symptomless, it can be left in place. In these patients, a series of successive radiographs should be obtained periodically to assess if there is any pathological changes.¹⁹

► Conclusion

Early diagnosis of impacted canines is mandatory for timely treatment to ensure facial harmony and improved function. Age of the patient, history of trauma, any contributory medical history, presenting symptoms and most importantly the perception and will of the patient are the major factors affecting the treatment plan. Timely detection and management will help to preserve these canines, surrounding tissues and dentition, ensuring better esthetics and function.

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Obstructive Sleep Apnea

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Abstract

Obstructive sleep apnoea (OSA) is the periodic reduction or cessation of breathing due to narrowing of the upper airways during sleep. It is emerging as one of the most prevalent health and public issue. Orthodontists being qualified healthcare professionals can help to identify and treat craniofacial abnormalities and guide the growth of the craniofacial complex to structurally address the symptoms of OSA. This article provides a literature review for obstructive sleep apnea regarding its predisposing and risk factors, signs and symptoms, diagnosis and management with emphasis on oral appliances.

Keywords: Mandibular advancement appliance, Obesity, Obstructive sleep apnea

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► Introduction

Obstructive sleep apnea syndrome (OSAS), one among the most common sleep disorders, is characterised by recurrent episodes of partial or complete upper airway obstructions during sleep.^{1,2} Frequent apneas can cause many adverse effects, both behavioral and physical. Behavioral consequences include daytime sleepiness, impaired concentration, and neuropsychological dysfunction, whereas physical consequences include acute and chronic hemodynamic effects including increased risk of myocardial infarction, cerebrovascular accidents, hypertension, congestive heart failure and motor vehicle crashes.^{3,4} Sleep apnea is classified as central, obstructive, or

mixed, and it may be mild, moderate, or severe⁵.

Central sleep apnea is characterized by lack of oxygen supply to the lungs, caused by the respiratory muscles making no attempt to breathe, as a result of a central nervous system disorder. In obstructive sleep apnea, the respiratory muscles attempt to inspire, but a blockage in the upper airway prevents air from reaching the lungs. Mixed sleep apnea is a combination of these problems.

Pathogenesis

OSAS results from repetitive upper airway obstruction during sleep because of narrowing of the respiratory passages. Most important factors contributing to OSA include

- Retrognathic jaw which creates insufficient tongue space decreasing the cross-sectional area of the upper airway.
- Peripharyngeal fat infiltration, increased size of the soft palate and tongue as seen in obese individuals
- Decrease in airway muscle tone during sleep and the pull of gravity in the supine position decrease airway size, thereby impeding air flow during respiration.⁶

Initially, there is only partial obstruction leading to snoring. As tissues collapse further, the airway may become

completely obstructed. The patient struggles to breathe and is aroused from sleep often associated with a reduction in oxyhaemoglobin saturation. With each arousal event, the muscle tone of the tongue and airway tissues increases and alleviates the obstruction. Soon after the patient falls back to sleep, the tongue and soft tissues again relaxes, with consequent complete or partial obstruction and loud snoring.⁷

Risk Factors

Obesity: Obesity is the most important general risk factor for OSAS. It is thought to be associated with anatomic alterations that predispose to upper airway obstruction during sleep by increasing adiposity around the pharynx and body.⁸ An increase in prevalence of OSAS has been seen with increased body mass index, neck circumference and waist-to-hip ratio. The occurrence of sleep apnoea was markedly increased to 40-90 per cent in subjects with severe obesity, BMI of >40. According to Tauman and Gozal,⁹ increasing rates of premature obesity have led to an increase in the prevalence of OSAS among children. A 10 per cent body weight reduction was associated with a parallel 26 per cent decrement in AHI and hence weight reduction is an important conservative treatment for sleep apnoea.

Craniofacial abnormalities: Sleep apnea is common in individuals with craniofacial disorders such as Treacher Collins and Pierre Robin syndromes.

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Enlarged tonsils and adenoids are a major risk factor for OSA in children between the ages of 3 and 5 years. Increased tongue size is also a risk factor, as occurs in patients with Down's syndrome, in whom OSA is common.

Smoking and alcohol consumption: Cigarette smoking and alcohol have been shown to be risk factors for OSA. Smoking is associated with a higher prevalence of snoring and sleep-disordered breathing.¹⁰

Age: The proposed mechanisms for the increased prevalence of sleep apnoea in the elderly include increased deposition of fat in the parapharyngeal area, lengthening of the soft palate, and changes in body structures surrounding the pharynx.¹¹

Sex: Increased fat deposition around pharyngeal airway and hormonal differences may play a role in the predisposition of OSA in men.

Family history and genetic predisposition: Familial aggregation and genetics factors are thought to play a role in the development of OSA.

Clinical Manifestations

Excessive daytime somnolence is a key feature resulting from disrupted sleep. Patients often report of falling asleep during daytime while driving, working, reading and watching television.¹² Other common features include snoring, apneic pauses, Restless leg syndrome (RLS), bruxism, mood changes, low frustration, tolerance, impatience, depression, anxiety and social withdrawal, decreased libido, impotence and irritability. Common findings among children are chronic runny noses, upper airway infections, nightmares, cognitive impairment, poor school performance, poor concentration, distractibility and disruptive behaviour.¹³ The manifestations in orofacial region include tonsillar hypertrophy, nasal septal deviation, narrow palate, retrognathic jaws; especially mandible and relative macroglossia.¹⁴

Diagnosis

A presumptive clinical diagnosis of OSA can sometimes be made in patients with subjective, objective and physical assessment.

- Subjective assessment of sleepiness:
It is important that patients will accept treatment unless they can perceive benefit with a reduction in subjective sleepiness or improvement in work performance.
- Objective assessment of sleepiness:
Various tests for assessment include the Multiple Sleep Latency Test (MSLT), Maintenance of wakefulness test (MWT)

and Oxford Sleep Resistance Test (OSLER test; a variant of the MWT)

- Physical examination:
Include assessment of nasal patency visually, upper airway for obvious obstruction using indirect laryngoscopy, inspection of the tongue for macroglossia and assessment of dentition, assessment of pharyngeal appearance, routine respiratory, cardiovascular and neurological examination to detect any coexisting disease etc.

Sleep studies are done to confirm the clinical suspicion of OSA and to assess its severity in order to guide the therapeutic choices to offer patients. Polysomnography¹⁵ (PSG) is a physiologic study, usually attended by a trained technologist performed for at least 6 hours during a patient's normal sleep hours. The study records sleep staging and other physiologic variables. Portable sleep studies are helpful for patients who cannot easily come to the sleep center and for certain limited studies such as follow-up studies after surgery for sleep apnea.

In the sleep study a variety of testing occurs to evaluate the following:

- Cardiorespiratory variables (Limited channel testing)
- Electrical activity of the heart
- Arterial oxygen saturation (Pulse Oximetry)
- Chest and abdominal wall movement
- Brain and muscle activity
- Amount of air flowing through the nose and mouth

During the sleep study, episodes of apnea and hypopnea will be recorded. Respiratory Disturbance Index (RDI) is a complex index that measures the number of apneic and hypopnic events per hour of sleep. The range of RDIs is as follows

- < 5 is normal
- 5-15 is mild
- 15-30 is moderate
- >30 characterizes severe sleep apnea

Treatment Considerations

Obstructive sleep apnea can be managed by either surgical or non-surgical methods. The surgical methods include adenotonsillectomy, maxillo-mandibular advancement and uvulopalatopharyngoplasty procedures. Nonsurgical methods include continuous positive airway pressure, diet, medications and oral appliances.

Treatment modality is solely based on:¹⁴

- 1) Severity of the patient's symptoms
- 2) Results of the polysomnogram
- 3) Impact on co-morbid diseases

Various treatment options

1. Behaviour modifications or conservative treatment
2. Medications
3. Positive airway pressure therapy
4. Oral Appliances
5. Surgical treatment

Behaviour modifications: Snoring and OSA problems can be simply corrected by suggesting modifications in certain areas of behavior such as sleep position, alcohol use, sedative use, smoking, and the patient's weight. Weight loss can reduce AHI in the short term with resolution of AHI and symptoms in some patients with OSA

Medications: Various studies have shown that the drugs like Tricyclic antidepressants, Serotonergic agents, Progesterone, Thyroid hormone replacement, Acetazolamide, Theophylline, Anti-hypertensive agents, Atrial pacing, Modafinil, Opioid antagonist and nicotine have been effective in treatment of OSAS.

Continuous positive airway pressure therapy (CPAP)

CPAP is the most consistently successful and extensively studied treatment modality. This method was developed in the early 1900s and re-discovered and made portable for domiciliary use in the 1980s. It was identified to be effective in managing moderate to severe cases, for the treatment for children whose Obstructive Sleep Apnea symptoms are not relieved after the performance of adenotonsillectomy. A recent systematic review concluded that CPAP therapy improves quality of sleep and reduces problems of excessive daytime sleepiness in patients with obstructive sleep apnea.¹⁷ CPAP is still considered to be the “gold standard” treatment for obstructive sleep apnea patients. The optimal pressure to use in the therapy is determined in a sleep laboratory study, during which the degree of apnea is monitored with various mask adjustments and increasing levels of air pressure. The introduction of automatically adjusting CPAP represents a significant advancement since its inception in 1981. Despite the effectiveness of CPAP, many patients have difficulty tolerating this therapy. Minor complications may occur with CPAP treatment such as nasal symptoms (dryness, congestion, rhinorrhea), air leakage from the mask, claustrophobia, skin abrasions, and conjunctivitis.

Oral Appliances

The use of oral appliances in the treatment of Obstructive Sleep Apnea among both adults and children has raised the role of dentists in the management of this medical condition. Oral appliances used can be of three groups based on their mode of action:

- Tongue retaining devices – They were first described in 1982 by Cartwright and Samelson. To prevent the tongue from approaching the posterior wall of the pharynx, the patient projects the tip of the tongue into a hollow bulb, thereby creating a suction which retains the tongue in an anterior position
- Mandibular advancement appliances- Mandibular advancement devices were first described by Robin in 1934. In general, MADs consist of firm-fitting trays that fit over the maxillary and mandibular teeth. These devices can be fixed-position, with no allowance for advancement or retrusion of the mandible, or adjustable
- Soft palate or uvula lifting device- It is an intraoral device designed to lift the soft palate or reposition the uvula (equalizer). The rationale behind its use is to reduce the vibration of the soft palate that causes the snoring sound

Various oral appliances used are

- Nocturnal Airway Potency Appliance (NAPA)
- Herbst mandibular advancement splint
- Mandibular advancement splint
- Silencor
- Karwetzky U clasp activator
- Hard acrylic splint with bilateral buccal flange
- Functional magnetic system
- AMPA (Anterior Mandibular Positioning Appliance)
- Klearway splint
- OPAP: ‘Oral Pressure Appliance’ - It is a “combination” therapy which combines a nonadjustable Mandibular Advancement Device with Continuous positive airway pressure. The air pressure is delivered through a small conduit that fits across the roof of the patients mouth.

Mode of action of oral appliances

Oral appliances for sleep apnea are often used as a substitute for CPAP or sleep apnea oral surgery. They work by posturing the mandible forward, which increases the size of the upper airway and reduces the pharyngeal collapsibility. It is often used in conjunction with weight loss if the individual is overweight.

Effects of oral appliance

The mandibular advancing devices increase airway caliber more in the retroglossal region than in the retropalatal region, as these appliances advance the mandible and pull the tongue forward. Increases in airway caliber are thought to occur primarily in the anterior-posterior dimension because these appliances increase the posterior airway space to a larger extent. Advancing the mandible may put traction on the lateral walls and result in thinning out of these walls. Their effects on

the dentition are usually represented by a marked reduction in the overjet and the overbite. Mandibular Advancement Devices usually cause labial movement of the lower incisors and lingual tipping of the upper incisors resulting in the reduction of overjet.

Benefits of oral appliances

These appliances are more compliant to the patients when compared to the other treatment modalities for OSAS. Immediate response to the therapy has been observed whereby an improvement in daytime efficiency of the patients has been noticed. They are more compact and portable devices.

Limitations of oral appliances

Excessive salivation and mouth and teeth discomfort have been reported as the most common side effects with oral appliance therapy. Difficulty in chewing, dry mouth, tongue discomfort, jaw discomfort, gum discomfort, headache, occlusal changes, temporomandibular and masseteric pain all have also been reported in various studies. Occlusal side effects include development of a lateral open bite in the premolars and molar area. In rare cases these oral appliances can produce severe dental malocclusion. Another reported problem with sleep apnea oral appliances is their limited life expectancy. They are not designed to last forever. Many are only effective for a year or two before the materials weaken and the appliances loses efficacy. Obstructive sleep apnea patients who present with more severe TMJ pain probably are not good candidates for treatment with mandibular advancing appliances. Also patients with significant bruxism can frequently damage mandibular protrusion devices and thus make this treatment approach inefficient. Very obese patients, with a few exceptions, are best treated by other means than mandibular protrusion.

Surgical treatment

Surgical options are considered in cases where the nonsurgical therapies fail or are unacceptable to the patients. Evaluation of three anatomic sites of the airway for detection of collapse-related abnormalities is essential in surgical treatment adoption:

1. Nose (alar cartilage deformities, septal deviations, enlarged turbinates, nasal floor constriction),
2. Retropalatal area (lymphoid hyperplasia, retrusive maxilla, long palate)
3. Retroglossal area and the tongue (mandibular retrognathia).

The most commonly undertaken surgical procedures include:

Adenotonsillectomy

The primary medical surgical treatment of pediatric OSA

is adenotonsillectomy (AT).¹⁹ Treatment of OSA with AT resulted in improvements in behavior and attention and likely improvement in cognitive abilities

Uvulopalatopharyngoplasty (UPPP)

UPPP is advisable in younger patients and those who cannot tolerate CPAP for the management for sleep apnea. It involves the removal of part of the soft palate, uvula and redundant peripharyngeal tissues.

Maxillomandibular advancement (MMA)

MMA is the most effective surgical treatment for OSA.²⁰ It may be considered as the primary treatment option when diffuse complex or multiple sites of disproportionate anatomy exist in the oral and hypopharynx. It is comparatively safe procedure. When compared, the more commonly noted complications are relatively minor to the risks of inadequately treated OSA. This surgical procedure anteriorly repositions the maxillary and mandibular framework and their attending muscular attachments. It thus addresses the retropalatal and retrolingual regions, provides additional tension for the genioglossus muscle, and increases the available room in the floor of the mouth for the tongue. Some modifications to the technique and inclusion of some adjunctive procedures have happened over time.

► Conclusion

Obstructive sleep apnea is a new addition to life style diseases which affects all age groups and is a serious public health issue. Though most of the patients reporting with OSAS show craniofacial abnormalities involving skeletal structures of respiratory dynamic space and jaws, obesity is increasingly becoming a major etiology. The cause and effect relationship between OSA and craniofacial abnormalities needs to be proven. Interdisciplinary professional communication is indeed needed for OSA management. Dental professionals often encounter patients with OSAS as part of their routine clinical practice. Orthodontists are well suited for treatment of OSAS patients because of their impeccable knowledge regarding the growth and development of oro-dento-facial structures. A thorough understanding of the etiology, pathogenesis and clinical features is hence important for the proper diagnosis and designing of treatments specific for the causes of the condition.

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Dental age estimation in forensic dentistry

* Priyadarsini Geetha Raghuvaran, ** Sheela Sreedharan

Abstract

Forensic dentistry is the proper handling, examination and evaluation of dental evidence, which will be then presented in the interest of justice. Dental age assessment in forensic dentistry has its significance in individuals whose chronological age is at dispute. It is one of the reliable parameters of physiological development that is applicable from infancy to childhood till death. After attaining maturity, teeth continue to undergo changes, making age estimation possible among the deceased.

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► Introduction

History reveals that the first body identified using teeth was of Lollia Paulina, the slain Roman empress of the 38th century when beheaded was identified by her discoloured front tooth. Dr. Paul Revere the first forensic dentist in the United States who identified fallen revolutionary soldiers. Saunders, a dentist, was the first to publish information regarding dental implications in age assessment by presenting a pamphlet entitled “Teeth a Test of Age” to the English parliament in 1837.¹ The theory behind forensic dentistry is that no two mouths are alike (even identical twins are different), and that teeth, like tools, leave recognizable marks. Human dentition is highly resistant to decomposition, thus claiming that dental identification can be made under extreme circumstances. Dental age is considered to be vital as tooth development shows less variability than other developmental features

and also low variability in relation to chronological age.²

Dental Identification Procedures³

There are essentially two forms of dental identification.

1. Comparative identification.
2. Reconstructive identification or dental profiling.

► Dental age estimation

1. Prenatal, neonatal & early postnatal

Radiographically, the mineralization of deciduous incisors starts at the 16th week of in life. Before the mineralization of tooth germs starts, the tooth germs may be visible as radiolucent areas on the radiograph; the subsequent radiographs of the mandible will depict the deciduous teeth in various stages of mineralization as per the pre-natal age of the fetus Kraus and Jordan studied the early mineralization in various deciduous teeth as well as in the permanent first molar. The development is described in ten stages, denoted by Roman numerals from I to X; the IXth stage includes three stages and the Xth stage includes five stages. Kraus and Jordan completed the earliest studies on stages of mineralization of teeth in the intrauterine life.⁴ Stack proposed for age estimation of skeletal remains for which dry weight of mineralized tooth cusps can be measured.⁵

The ‘neonatal line’ is considered as an indicator of birth. Neonatal lines are present in both enamel and dentine of deciduous teeth and permanent first molars which indicate

the development during the transitional period between intrauterine and extra uterine environments. So the neonatal line can be used to assess the amount of pre and post natal enamel formation.⁶

2. Children and adolescents.⁷

Two events used to measure dental age are eruption of teeth and teeth calcification. Age estimation can be done by study of eruption of teeth which involves visual assessment limited to deciduous teeth since their emergence is under genetic control. Emergence pattern of permanent teeth are under influence of intraoral environment, being affected by infection, arch space and premature teeth loss. Evaluation of teeth calcification is better done using radiographs since calcification can be observed for a period of several years, not altered by local factors.

It includes

A. Schour and Masslers [atlas] method.⁸

In 1941, Schour and Masslers studied the development of deciduous and permanent teeth, describing 21 chronological steps from 4 months to 21 years of age and published the numerical development charts for them. These charts do not have separate surveys for males and females.

B. Demirjans Goldsteins and Tanner method⁹

The stages are the indicators of dental maturity of each tooth. The differences in the dental development between males and females are not usually apparent until the age of 5 years. Each stage of mineralization is given a score which

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provides an estimate of dental maturity on a scale of 0–100 on percentile charts.

The maturity scores (S) for all the teeth are added and the total maturity score may be converted directly into a dental age as per the standard table given or they are substituted in regression formula.

C. Nolla's method¹⁰

Nolla evaluated the mineralization of permanent dentition in 10 stages. After every tooth is assigned a reading, a total is made of the maxillary and mandibular teeth and then the total is compared with the table given by Nolla.

The advantages of this method are that it can be applied to an individual with or without the third molar and that girls and boys are dealt with separately.

D. Age estimation using open root apices

The seven left permanent mandibular teeth were valued. The number of teeth with root development completed with apical ends completely closed was calculated (N0). For the teeth with incomplete root development, that is with open apices, the distance between inner sides of the open apex was measured. For the teeth with two roots, the sum of the distances between inner sides of two open apices was evaluated. To nullify the magnification, the measurement of open apex was divided by the tooth length (L) for each tooth and these normalized measurements of seven teeth were used for age estimation.

The dental maturity was calculated as the sum of normalized open apices (s) and the numbers of teeth with root development complete (N0). The values are substituted in the following regression formula for age estimation

$$\text{Age} \sim 8.971z_0:375gz_1:631 | 5z_0:674 N_0 \{1:034s\} \{0:176s:N_0\}$$

where g is a variable equal to 1 for boys and 0 for girls

3. Adults

Includes the following methods

A. Gustafsons method¹¹

Assesses regressive changes such as

- amount of occlusal attrition (A)
- coronal secondary dentin deposition (S)
- loss of periodontal attachment (P)
- cementum apposition at root apex (C)
- root resorption at apex (R)
- dentin translucency (T)

For each regressive changes, different scores ranging from 0-3 were assigned. (eg- A0, A1, A2, A3) X= A3+ S2+ P2+ C1+ R2+ T1

A. Maples & Rice correction

$$\text{AGE} = 13.45 + 4.56X$$

B. Johanson's proposed seven grades (0, 0.5, 1, 1.5, 2, 2.5, 3). The method uses 6 variables giving less variant results, but has inaccuracies in calculation and hence has been discredited. $\text{AGE} = 11.02 + (5.14A) + (2.3S) + (4.14P) + (3.71C) + (5.57R) + (8.98T)$.

B. Dentine translucency¹²

Also known as "Lamendin" method. Root dentin starts to become translucent during the 3rd decade of life beginning at the apex and advancing coronally. Alteration is due to decreased diameter of dentinal tubules due to calcification. Difference in radiopacity between intratubular organic and extratubular inorganic matter is equalized resulting in increased translucency of affected root dentin. For age estimation, translucency length [X] in mm or area may be measured on intact or sectioned teeth.

$$\text{AGE} = B_0 + B_1X + B_2X^2 \quad (\text{Zones of translucency} \leq 9 \text{ mm})$$

$$\text{AGE} = B_0 + B_1X \quad (\text{Zones} > 9 \text{ mm})$$

(B0- regression constant. B1, B2- regression coefficients
X – translucency length)

Irregular junction of translucent and non translucent zones pose difficulty in measuring length resulting in under estimation of age in older age groups.

C. Age determination from incremental lines of cementum

The technique is reliable for periodontally sound teeth, but not for periodontally diseased teeth. In 1982, Stott et al applied the technique to humans, finding a positive correlation between estimated and known age.

D. Radiographic method by Kvaal.¹³

Kvaal's radiographic technique is based on the pulpal changes in teeth to estimate age from digital orthopantomographs of adults. The ratios calculated according to Kvaal's technique were: the tooth/root length (T), pulp/root length (P), pulp/tooth length (R) and pulp/root width at three different levels a, b and c, mean values of all ratios (M), mean value of width ratios from levels b and c (W); mean value of length ratios P and R (L). 'M' was taken as the first predictor and the difference 'W-L' as the second predictor.

Van Heerden¹⁴ assessed the development of the mesial root of the third molar to determine the age.¹⁶ He described the development of the mesial root in five stages using panoramic radiographs.

E. Amino acid racemisation.¹⁵

In adults, the age range estimated with those methods is rather wide, and the estimated and chronological ages often differ. There are several age related changes that occur in

amino acids such as oxidation, isomerisation and racemization. Among these changes, racemization of aspartic acid caused by protein degradation is used to investigate tissue turnover and pathogenesis of typical disease of old. The racemization of aspartic acid proceeds throughout lifetime and also after death, but probably at a reduced rate as a result of a presumed reduction in ambient temperature. In fresh cadavers or putrefied remains; racemization of aspartic acid is applicable as long as the post-mortem interval does not exceed a few decades. All these age estimation methods use gas chromatography. As an alternative to GC, very few estimations used high performance liquid chromatography (HPLC) coupled with ultraviolet detection.

F. Radiocarbon dating¹⁶

Radiocarbon analysis of tooth enamel is a relatively new technique yet to be significantly tested by the forensic community. Radiocarbon dating of enamel provides information about the date of birth of an individual. Radiocarbon dating of dental enamel has recently been used with very high precision to determine the date of birth of identified and unidentified individuals. Rationale is determination of the year of tooth formation based on levels of radiocarbon present in tooth enamel. Radiocarbon, or carbon-14 (¹⁴C), is produced naturally in the atmosphere by cosmic ray interactions with nitrogen-14. Single carbon atoms in the atmosphere are chemically active and are quickly oxidized to form CO₂. CO₂ is then incorporated into plants via the process of photosynthesis. Because radiocarbon is incorporated into all living things, this pulse (known as the “bomb curve”) forms an isotopic chronometer of the past 60 years.

The date of formation of a tissue can be estimated from the bomb curve by considering these lags in incorporation and relating the ¹⁴C concentration with the date. Enamel formation can occur over several years in humans. Hence for radiocarbon analysis of tooth age, the upper limit of enamel formation has been used i.e. the time approaching enamel lay down completion.

► Conclusion

Amongst the various methods used for age determination in individuals, the radiological method has certain advantages over histological and biochemical methods. Other methods require either extraction or preparation of microscopic sections of at least one tooth from each individual. Besides, they are quite expensive and require some sophisticated laboratory equipment. On the contrary, the radiographic method is a

simple, quick, economic, non-mutilating and non-invasive method of age identification. In all the methods used for age determination, the evaluation of radiographs for stages of tooth calcification is the most reliable as tooth calcification can be observed from radiographs for a period of several years and it is not altered by local factors such as lack of space or over retention of deciduous teeth.³ The unique nature of our dental anatomy and the placement of custom restorations ensure accuracy when the techniques are correctly employed, thus opening wide vistas of possibilities in forensic dentist.

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Dentigerous cyst associated with an impacted mesiodens

* Ajeesha Feroz, * Sheethal Joy, ** Bastian T.S., *** Selvamani. M

Abstract

Dentigerous cysts are the most common developmental cysts arising in the jaws. It can arise any where in the jaw and involve any unerupted teeth but most commonly seen in the mandibular molars. It accounts for 24% of the jaw cysts and is rarely seen associated with supernumerary teeth and central incisors. Here, we discuss an interesting case of dentigerous cyst in a 42 yr old male associated with an impacted mesiodens and review of literature.

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► Introduction

Dentigerous cysts are the most common developmental cysts arising in the jaws. It can arise any where in the jaw and involve any unerupted teeth but most commonly seen in the mandibular molars with peak incidence in the 2 and 3rd decade of life. It accounts for 24% of the jaw cysts and is rarely seen associated with supernumerary teeth and central incisors.¹ Most of the dentigerous cysts are unilateral in occurrence, bilateral cases are seen to be mostly associated with number of syndromes namely Cleidocranial Dysplasia and Maroteux-Lamy Syndrome. Here we present a case of dentigerous cyst arising in the anterior premaxilla associated with a mesiodens.

► Case Report

A 42-year old male reported to the

department of oral of Mahe Institute of Dental Sciences and hospital with a chief complaint of sensitivity in upper front tooth region since three months duration. Patient gives a history of sensitivity which aggravates on having hot and cold food and relieves on removal of stimulus. Patient has a history of smoking since 5 years occasionally.

No history of trauma was given, but the associated tooth involved was non-vital on pulp vitality testing. Routine radiograph showed tooth like structure seen on the apex of maxillary central and lateral incisors with ill defined radiolucency and unclear borders. The occlusal radiograph in relation to maxillary anterior exhibited the presence of inverted tooth like radiopacity resembling the morphology of crown and root situated within the alveolar bone of anterior palatal region suggestive of inverted mesiodens, surrounded by a well defined radiolucent area measuring 2x2.5 cm in dimension extending anteriorly upto the apex of central and lateral incisors and posteriorly upto the middle third of the palate with irregular borders. No displacement of the teeth or swelling was noticed intraorally. Based on the clinical and radiographical evaluation provisional diagnosis of Adenomatoid odontogenic tumor was offered. (Fig.1)

On diagnostic aspiration, straw-colored fluid with few cholesterol

crystals was obtained from the lesion. The routine blood investigations were normal and enucleation with removal of mesiodens under local anesthesia was done and specimen was submitted for histopathological investigation.

On Macroscopic examination, revealed a cystic lining greyish in colour totally encapsulating the mesiodens measuring 1.5x1.5 cm in dimension. (Fig 2, Fig 3.)

Histopathological examination showed cystic lining lined by thin uniform non keratinized stratified squamous epithelium made up of 2-4 cell layer of flattened cells. Stroma is made up of loosely arranged fibrous connective tissue with mild inflammatory cell infiltration. Based on the histopathological evaluation a final diagnosis was in favor of Dentigerous cyst associated with a supernumerary mesiodens. (Fig 4, Fig 5.)

Intentional RCT of 11,12,21,22 was done on follow up.

► Discussion

Dentigerous cysts are the most common developmental odontogenic cysts. These cysts occur over a wide age range with peak incidence in the 2nd to 3rd decade of life with a male predominance.³ They are usually derived from the epithelial remnants of tooth

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forming organs.² In addition to the developmental origin, some authors have suggested that periapical inflammation of non-vital deciduous teeth in proximity to the follicles of unerupted permanent successors may be a factor for triggering this type of cyst formation⁴.

Dentigerous cysts are classically defined as cystic lesions that are caused by separation of follicles from around the crown of unerupted teeth. Dentigerous cysts were earlier termed as “Follicular cysts” since it was assumed that these cysts were derived from tooth follicle which is a mesodermal structure².

Dentigerous cyst can involve any unerupted teeth, though it is most commonly seen in the mandibular molars, followed by mandibular premolar and maxillary 3rd molar. But it involves the permanent central incisor, deciduous teeth and supernumerary teeth only very rarely.¹ In our case, it falls into this rare category of central incisors and supernumerary teeth. Shear And Singh (1978) in their study found 1.5% incidence of central incisors involved as compared to 45.7% of mandibular third molar very substantial majority involved

mandibular third molar. Dentigerous cyst associated with supernumerary teeth is even rarer estimated to about 5-6%. According to a study done by Lustmann and Bodner in 1988, 90% of the dentigerous cyst associated with supernumerary teeth are seen to be involving the mesiodens.¹

These cysts are usually painless and may remain dormant for many years with some degree of expansion of the cortical bone, as in our case the patient was totally asymptomatic other than sensitivity of the anterior involved teeth.²

Radiographically, these cysts are usually seen as a unilocular radiolucency.⁵ Often a sclerotic border can be appreciated, which is not so in our case where the borders were irregular. There can be three different variants for the radiological appearance of dentigerous cysts. First being the central variety, in which the cyst seems to be covering the crown of the unerupted teeth, with the crown projecting in to the cystic lumen. Second being the lateral variety, in which the cyst is seen on the lateral aspect of the tooth root with only partial encircling of the crown. Third is the circumferential variety,



Fig. 1 Occlusal radiograph showing well defined radiolucency surrounding the crown of supernumerary tooth



Fig. 2&3: Macroscopic examination showing mesiodens totally encapsulated by the cystic lining

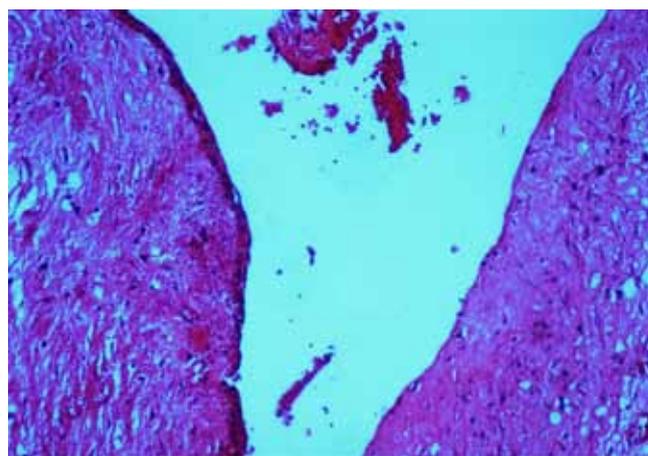
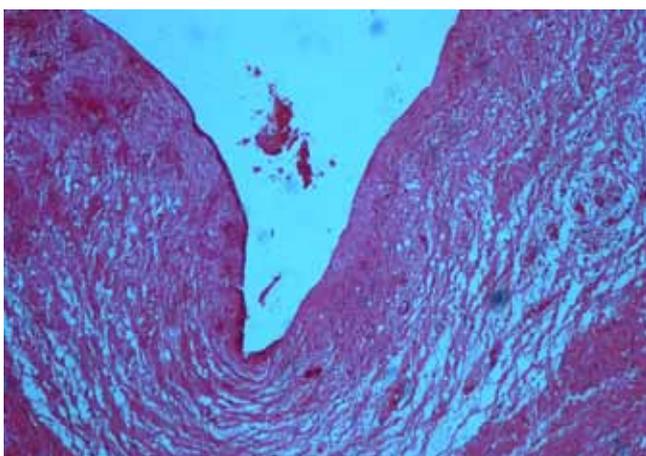
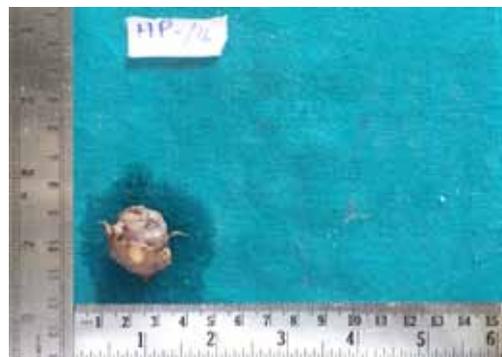


Fig. 4&5: Histopathologically showing cystic lining lined by thin non keratinized epithelium of 2-4 layer thickness. Stroma showing loosely arranged fibrous connective tissue with mild inflammatory infiltrate

in which the cyst totally surrounds the unerupted teeth and the tooth can be seen lying within the cystic cavity.⁵ Our case falls in to the circumferential variety, with the mesiodens lying in the cystic lumen.

Histopathological examination of the cyst wall shows a cystic lining with a non keratinized stratified squamous epithelium resembling reduced enamel epithelium. Cells are cuboidal or columnar with 2-3 layer thickness. As the connective tissue wall is derived from the developing dental follicle it shows a primitive ectomesenchyme like features. It has loose connective tissue stroma rich in mucopolysaccharides. The features may vary depending on the presence of inflammation. When infected, the epithelium may show hyperplastic rete ridges and fibrous connective tissue wall may show inflammatory infiltrate with cholesterol crystals⁵. Our case is in accordance with the literature, shows thin uniform non keratinized epithelium with connective tissue showing only mild inflammatory infiltrate.

Histopathogenesis of dentigerous cyst is based on Intrafollicular and Extrafollicular theory. Intrafollicular theory postulates the formation of cyst by accumulation of fluid between the inner and outer enamel epithelium after crown formation⁵. There have been various studies undergoing in dentigerous cysts. It was Edamatsu et al.in⁶ 2005 who examined the expression of Fas, bcl-2 and single stranded deoxyribonucleic acid in dental follicles to classify the possible role of these apoptosis related factors in the pathogenesis of dentigerous cyst. Claudia et al in 2012,⁷ studied the immunohistochemical expression of p63, epidermal growth factor and notch-1 in the epithelial lining of dentigerous cysts.

Un treated dentigerous cysts lying dormant for years can develop potential complications like pathological bone fracture, impaction of permanent teeth and rarely transform into odontogenic tumors like ameloblastoma and even malignancies like Oral squamous cell carcinoma and mucoepidermoid carcinoma^{8,9}.

Treatment usually followed for dentigerous cyst is careful enucleation of the cyst in toto along with the removal of the unerupted tooth². Marsupialization is another conservative method of dentigerous cyst management especially in the case of children to preserve the permanent tooth bud. Prognosis for most of the dentigerous cysts are fairly good with rare chances of recurrence¹⁰.

In conclusion, Routine radiographs of unerupted teeth is very important for diagnosis and early treatment of dentigerous cysts to avoid the sacrifice of permanent teeth in the case of deciduous dentition and any potential complications arising in the permanent dentition from long standing untreated dentigerous cysts.

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OBITUARY



**K.S.Prasannan
(Mani Sir)**

Mr. K. S. Prasannan (Mani Sir) F/o Dr. Anukesh born in 05.01.1938 started Dentsales in the year 1971 in a small rental shop alone. He struggled a lot since there was not much practicing in Dentist during that time. As a dealer he introduced various innovations in dentistry to the dental fraternity which helped various dentist to bring up their practice. He was the Founder President of KEDDA, and Founder Member of ADITHI. We IDA members pray for the departed soul.

Management of Excessively Proclined maxilla – an interdisciplinary approach

*Joshy P. Abraham, **Kurien Varghese, ***Jaysa J.J., ***Sreelakshmi S.

Abstract

Skeletal and dental bi-maxillary protrusion frequently presents as one of the factors leading patients to seek aesthetic corrections. In the geriatric population, however, orthodontic correction of protrusion is not a viable option considering their poor periodontal status.

This article presents a case report for the correction of excessively proclined maxilla with extensive alveoplasty followed by immediate denture fabrication and later replacement with conventional denture

Key words: immediate denture, bimaxillary protrusion, surgical template.

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► Introduction

Modern Dentistry and the advent of new materials and surgical techniques have transformed the way a dentist approaches patients presenting with various aesthetic concerns¹. A pleasing smile conveys warmth, confidence, individuality and general success of an individual.

Skeletal and dental bi-maxillary protrusion patients frequently present with acute nasolabial angle, protruded and incompetent lips which can place them in severe mental trauma. Conventionally orthodontic and surgical intervention are advised for aesthetically pleasing appearance².

However as we age, even the best efforts can still fall short as our

teeth and gums begin to change, and naturally become more vulnerable to periodontal disease and other age related ailments. Periodontal health of geriatric patients may be adversely affected by surgical and orthodontic treatment modalities, hence not a viable option^{3,4}.

With proper planning, execution, and follow-up care, the anterior maxilla can be surgically recontoured in selected cases to correct the vertical and horizontal manifestation of maxillary excess. Recontoured maxilla can then be prosthetically rehabilitated.

► Case Report

A female patient aged 57, reported to Department Of Prosthodontics for aesthetic rehabilitation of excessively proclined upper anterior teeth and poor facial aesthetics.

She presented with excessively proclined maxillary anterior teeth region with incompetent lips (Fig. 1). Extra oral examination revealed bimaxillary protrusion due to which the upper and lower lip appeared everted with acute naso-labial angle, incompetent lips, protruded chin, flattened Philtrum and obliterated naso-labial fold (Figs. 2,3). On Intra oral examination patient had six unit acrylic vitalium fixed prosthesis from 14 to 24. Generalized grade 3 mobility was noted in the maxillary arch. Dehiscence was present in relation to 13. Clinically missing teeth were 16, 17,26,42,46. (Figs. 4, 5,6).

All viable conservative and conventional treatment options including their merits and demerits were explained to the patient. Finally we decided to do an extensive alveoplasty with immediate denture followed with conventional denture in the upper arch and lower fixed prostheses. Patient was warned about the sudden change of facial appearance following alveoplasty. A written informed consent was obtained from the patient before the procedure.

► Case presentation

Maxillary and mandibular preliminary impression were made for obtaining diagnostic cast for treatment planning. The casts were mounted on a mean value articulator (Fig. 7). The amount of alveolar reduction to be done was marked on the cast (Fig. 8). Reduction of the cast was done with a tungsten carbide bur to simulate the final outcome of the alveoplasty (Fig. 9).

Using this altered cast and considering the lip length, immediate dentures were fabricated at the obtained vertical dimension⁵ (Fig. 10). All necessary lab investigations were done prior to the surgical procedure

Alveoplasty was performed on patient according to the specified requirements using immediate denture as surgical template (Fig. 11)

The immediate denture with soft liner was placed following the alveoplasty and Post insertion instructions were

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Fig. 1 Patient presented with Bimaxillary protrusion



Fig. 2 Everted lips and obliterated nasolabial fold



Fig. 3 Lip appear everted with acute naso-labial angle



Fig. 4 Fractured acrylic vitalium fixed prosthesis which resulted from faulty anterior guidance



Fig. 5 Recession with poor prognosis of 13



Fig. 6 Fractured crown in relation to 23



Fig. 7 Diagnostic cast mounted on mean value articulator



Fig. 8 Alveolar reduction required marked on the diagnostic cast



Fig. 9 mock up prepared for alveoplasty



Fig. 10 Immediate denture fabricated from mock up preparation



Fig. 11 Alveoplasty performed with immediate denture as surgical template



Fig. 12 Post treatment

given⁶. Patient was instructed to wear the denture continuously for 24 hrs and to report back to the department. Regular recall check up was done to assess the progress of healing after alveoloplasty.

After satisfactory healing period of 3 months a conventional complete denture along with mandibular arch rehabilitation with fixed partial dentures after necessary endodontic treatment for the required teeth was done. (Fig. 12)

► **Conclusion**

Successful treatment of patients with bimaxillary protrusion depends on careful consideration of the patient’s concerns and establishing a personalized treatment plan with our counterparts in the oral and maxillofacial surgery department.

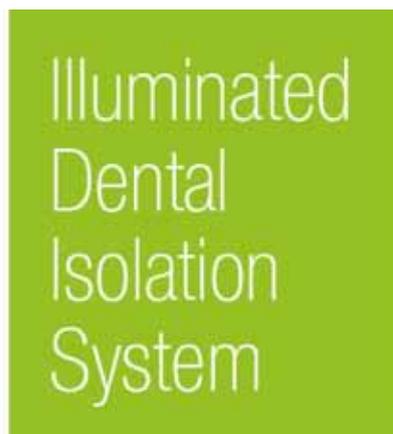
Extensive alveoloplasty with adequate planning sometimes provides an alternative to segmental maxillary osteotomies.

This case report demonstrates a successful attempt of multidisciplinary approach in the correction and esthetic rehabilitation of severe bimaxillary protrusion

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Dens Evaginatus on Occlusal Surface of Maxillary 1st premolar

* Omal PM., ** Thomas Abraham, *** Lisa, **** Poornenthu

Abstract

Dens Evaginatus (DE) is a rare odontogenic developmental anomaly characterized by the development of a tubercle on the Occlusal surface of the tooth. DE usually occurs in the mandibular premolars. Reports of DE on maxillary premolar are rare in the literature. We report one such extremely rare case of DE on maxillary 1st premolar.

Key words: Dens Evaginatus, evaginated odontoma, Leons premolar.

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Introduction

Dens Evaginatus^{1,2} (DE) presents as an innocuous looking tubercle of enamel on the occlusal surface of a tooth. It is most commonly seen in mandibular bicuspid tooth with a rare occurrence in the maxillary bicuspids as well^{2,3}. It occurs in at least two percent of Asian and Native Indian populations³. Dental problems can arise when the tubercle is either worn, ground or fractured off, resulting in pulpal exposure and possible vitality loss of the tooth.^{2,4}

Case report

A 46 year old female patient reported to the Department of Oral Medicine and Radiology, Pushpagiri College of Dental Sciences, Tiruvalla, Kerala, India with a complaint of pain in her lower right back tooth since 2 months. Pain aggravates while chewing food and relieves on taking medication and was

non radiating. Her medical and family histories were non contributory. On general examination patient had an average built with normal gait. Extra oral examination revealed no abnormalities. Intra oral examination revealed retained deciduous tooth-63, missing -26, 48-Decayed and was tender on vertical percussion.

The incidental finding of a rare extra cusp on occlusal aspect of a morphologically altered 24 was observed suggestive of possible Dens Evaginatus on 24 (Fig 1,2). IOPA of 24 revealed central ovoid radio opacity involving enamel, dentin and approximating the pulp, more radiopaque than adjacent structures confirming the diagnosis of Dens Evaginatus in 24 (Fig 3). Incidental finding of an accessory occlusal cusp on 24 was conveyed to the patient. Since there was no occlusal interference or visible fracture of the tubercle resulting in pulp exposure, a wait and watch approach was decided with patient being followed up every 3 months duration.

Discussion

Dens Evaginatus is a uncommon dental anomaly well documented since

19257. It occurs primarily in people of Asian descent and is seen as protrusion of a tubercle from occlusal surface of posterior teeth and lingual surface of anterior teeth. Dens evaginatus occurs during tooth development and results in an abnormal protrusion from the occlusal surface of the affected tooth, often in the area of the central groove between the buccal and lingual cusps⁸. Tubercles have a enamel layer covering a dentin core containing a thin extension of pulp. These cusp like protrusion are susceptible to pulp exposure from wear or fracture because of malocclusion leading to pulpal complications⁷. Dens evaginatus usually occurs in the mandibular premolars, however rare cases have been reported in the literature of its occurrence in the maxilla^{1,2} (Maxillary first premolar and 2nd molar). In our present case Dens Evaginatus was seen in Maxillary 1st premolar coinciding with the literature review as reported by Colak H, Ayliki BU, Keklik H. The presence of dens invaginatus (DI) and dens evaginatus (DE) on same tooth is a rare phenomenon. However, when these dental anomalies occur on a double tooth, it becomes an extremely rare phenomenon. Sharma G, Mutneja AR,



Fig 1 Clinical picture showing rare extra cusp on occlusal aspect of 24.



Fig 2 Model cast showing extra cusp on occlusal aspect of 24.



Fig 3 IOPA -24 showing well defined radio opacity confining to enamel and dentin suggestive of Dens Evaginatus.

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Nagpal A, Mutneja P has reported a rare case of DI and DE on fused permanent maxillary central incisor with supernumerary tooth in a 40-year-old male⁹. Another case report of dens evaginatus and dens invaginatus involving all four maxillary incisors in a 25-year-old patient has been reported in the literature by Vardhan TH, Shanmugam S¹⁰.

► Conclusion

Dens Evaginatus usually affects the mandibular 2nd premolars as an accessory cusp or a protuberance between the buccal and lingual cusp. Reports of Dens Evaginatus on Maxillary premolar are rare in the literature. Early diagnosis and management of Dens Evaginatus is important in order to prevent occlusal interference, Compromised esthetics, Carious Developmental grooves and Periodontal problems due to excessive occlusal forces.

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Management of iatrogenic perforation and rehabilitation of subgingivally fractured tooth with an interdisciplinary approach

* Kripa T, ** Shoba K, *** Anupama Ramachandran, **** Shibu Godfrey, ***** Jithin Balan, ***** Abhilash Antony

Abstract

Perforation is a procedural accident that occurs during root canal treatment, creating an artificial communication between the root canal and the supporting periodontal apparatus. Root perforation results in the loss of integrity of the root and further destruction of the adjacent periodontal tissues. This case report describes about the management of iatrogenic subgingival coronal perforation with surgical and interdisciplinary approach and the subsequent post endodontic restoration of the tooth. Successful treatment depends on immediate sealing of the perforation and prevention of infection.

Key Words: Root Canal, Perforation, RMGIC, orthodontic extrusion, surgical crown lengthening, fiber post

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► Introduction

Procedural accidents are those unfortunate occurrences that happen during treatment, some owing to inattention to detail, others totally unpredictable⁵. Perforations are one among these procedural accidents. It is a mechanical or pathological communication between the root canal/pulp space and the supporting apparatus of the tooth, which leads to a compromise on the health of the periradicular tissue. Iatrogenic

root perforations are the second most common reason for endodontic failure². The iatrogenic root perforations can occur during access preparation, canal location and identification, root canal instrumentation, post space preparation². Factors that affects the prognosis for treatment are time, size, and shape of the perforation as well as its location, which impacts the potential to control infection at the perforation site¹. The present case report explains the management of iatrogenic perforation and the subsequent post endodontic restoration of the fractured tooth

► Case report

A 14 year old boy was referred to the post graduate clinic of Department of Endodontics with fractured maxillary left central incisor (#21) (fig 1). The medical history of the patient indicated that he was in good health and had no systemic diseases. The patient gave a history of dental trauma with crown fracture 1 year prior, and according to the parents endodontic therapy was carried out at a private clinic.

Clinical examination:

Extensive crown fracture extending subgingivally in relation to #21 was noticed. Tooth was non tender on percussion. An erythema & diffuse swelling was noticed on the labial

attached gingiva in relation to fractured tooth. On probing a defect was suspected subgingivally suggestive of an accidental perforation.

Radiographic examination:

#21 with obturated canal; with no periapical radiolucency (fig2)

Treatment plan:

It was decided to expose the defect by raising a flap and seal the perforation immediately. Due to the extensive fracture of the tooth there was insufficient tooth structure for post endodontic restoration; hence different treatment plans were discussed with the patient and parent including orthodontic extrusion followed by post and core and crown, extraction of the fractured teeth and replacement by a fixed prosthesis or implant prosthesis. After thorough descriptions of the pros and cons of each treatment options, cost and prognosis they preferred the orthodontic extrusion of the teeth and replacement of the missing structure with post core and crown

A Triangular flap was raised with vertical releasing incision mesial to left maxillary lateral incisor (fig3) and on reflection, found subgingival coronal perforation in relation to #21. Endodontic perforation repair was then carried out with RMGIC (fig4). On recall

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after 1 week, the erythema and swelling had disappeared (fig5) and patient was asymptomatic

Post space preparation was done with peeso reamer no 3 and a “J” shaped hook was fabricated using 0.7 mm stainless steel wire and cemented to the space prepared (fig 6). Brackets were bonded on the upper teeth from #13 to #23 and 0.016 stainless steel wire with loop was connected to j-hook with E-chain, thus orthodontic extrusion was initiated (fig7,8). Pericision was carried out on alternate days, to prevent coronal displacement of gingiva along with extruded tooth.

This was followed by surgical crown lengthening (fig 9) that helped to keep the margin of repaired perforation above gingiva, along with achieving adequate crown structure for restoration. Tooth was retained in same position for 2 months (after crown lengthening) before crown placement (fig10). After the desired amount of orthodontic extrusion, debonding was done and J hook was removed.

The tooth was restored with a fiber post cemented with dual cure resin cement and core was built up with composite resin, followed by fabrication of crown (fig 11)



Fig. 1 Pre treatment



Fig. 2 Pre operative radiograph



Fig. 3 Exposing perforation site



Fig. 4 Perforation site sealed with RMGIC



Fig. 5 Perforation site healed



Fig. 6 J hook fabricated



Fig. 7 brackets bonded with a stainless steel loop



Fig. 8 J hook extrusion initiated



Fig. 9 Surgical crown lengthening



Fig. 10 After crown lengthening



Fig. 11 Crown fabricated



Fig. 12 Pre operative view



Post operative view



Pre operative view



Post operative view

► Discussion

Root perforation is an artificial communication between root canal system and the supporting tissues of teeth or the oral cavity. Here the cause is iatrogenic probably due to the result of misaligned use of rotary burs during endodontic access preparation and search for root canal orifices. Out of the various factors affecting the prognosis of teeth with iatrogenic perforations, timely intervention and the level of perforation (relative to crestal bone and epithelial attachment) are probably the most important. In this case, first the perforation site was restored with RMGIC after flap reflection; later the perforation site was brought above the level of gingiva by orthodontic extrusion. The high fluidity of resin modified glass ionomer cement promotes better flow and, consequently, better filling of the perforation cavity, thus providing improved seal. It is thus a good material for repair of perforations, especially those located in the cervical region, where use of restorative materials is indicated. Gomes et al. found a reduced periodontal inflammatory response with RMGIC and showed evidence of bone repair and connective tissue coating.⁶

The treatment of subgingival crown root fracture is always a challenging job, would be best to undertake an interdisciplinary approach. While treating such cases different factors such as age of the patient, level of fracture, root form, periodontal condition of the affected tooth as well as affordability of the patient should be well considered. Long term prognosis is guaranteed only when we maintain the good ferrule on the prosthesis, do not violate the biological width and preserve the accepted crown root ratio of the tooth⁴. In the present situation the subgingival fracture does not permit optimal sealing; hence extrusion of remaining crown structure is necessary for the longevity of restoration.

Regarding the extrusion methods of fractured tooth, orthodontic extrusion is the most bio favourable method. It is recommended when existing clinical crown height cannot permit the placement of crown ferrule⁴. It has been demonstrated in experimental and clinical studies that the levels of gingival attachment and bone will follow the extrusive movement for single teeth³. So we combined orthodontic extrusion with surgical crown lengthening to obtain optimal gingival margin of restoration of fractured teeth (fig12).

Finally the tooth was restored with carbon fiber post luted with dual cure resin cement as it gives good esthetic results, increases retention and distributes stresses along the root. Core build up was done with composite resin; such that the entire restoration act as a monobloc restoration, with the

purported advantages of simultaneously improving the seal and fracture resistance of the filled canals⁷.

► Conclusion

Treatment of crestal perforations carries a guarded prognosis because of their proximity to the epithelial attachment. Timely management with biocompatible materials increases the prognosis; subgingival lesions restored with resin modified glass ionomer shows favourable periodontal healing.

If properly diagnosed, multidisciplinary management of complex crown root fracture is possible with long term prognosis. Orthodontic extrusion can be a good option in cases of sub gingival fracture of tooth for better prosthetic management.

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Transplanted tooth obturated with platelet rich plasma and synthetic graft

* Treesa William Gomez, ** Georgeno G.L.

Abstract

Transplanted teeth almost invariably results in severe resorption of the roots resulting in ankylosis or exfoliation of the tooth. The tooth substance, regardless whether the root canal is filled or not, is considered as a non-vital tissue, except in the case of transplanted developing teeth when the vascular supply to the tooth may be re-established and its vitality maintained. Our aim was to use a different treatment modality in obturation, attempting to re-vascularize the transplanted tooth and regenerate the tissues at the apex using platelet rich plasma for an adult patient. Methodology: Impacted right lower third molar was surgically removed and transplanted to the extracted socket of lower right first molar after extraction of lower right first and second molar due to gross decay, periapical deficits and mobility. Access opening was done on the transplanted tooth, pulp was extirpated, shaping and cleaning done. Platelet rich plasma was prepared and mixed with graft and obturated into all 3 canals. Composite permanent filling was given. Patient was free from all symptoms and radiographs showed healing.

Keywords: Reimplantation, Resorption, Platelet rich plasma

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► Introduction

In replanted teeth severe damage in the periodontal ligament and absence of infection will lead to replacement resorption (RR) and ankylosis¹. Prognosis of the replanted tooth depends on the level of periodontal injury². Histologic examination of replanted human and animal teeth have revealed four different healing modalities in the periodontal ligament: healing with a normal PDL, healing with surface resorption, healing with ankylosis, healing with inflammatory resorption³. A normal PDL formation after tooth replantation is difficult to achieve in clinical situations, because the injury results in a minimum lesion in the internal layer of the PDL⁴.

Critical is the endodontic condition. The necrotic pulp often will get infected. When the dentinal tubules are opened at the periodontal aspect by resorption as the result of damage in the PDL the infection in the pulp canal will cause infection related resorption (IRR, formerly named inflammatory resorption) which sets on several days after replantation. Adequate endodontic treatment may stop the progression of this complication. As recommended by most authors and different societies, the endodontic treatment should be carried out about 7–10 days after the replantation, in teeth in which a revascularization of the pulp after replantation cannot be expected¹. To date, most replantation studies have focused on factors such as extraoral period, storage media for

tooth, timing of endodontic treatment, duration of root canal medication and development of healing complications⁶⁻⁸. The root canal filling must not only afford a tight seal at the apex but along the whole root length⁹.

In actual clinical studies on avulsed teeth which were root filled in a conventional way after replantation, the incidence of IRR was 30%¹⁰. A definite root filling using approved endodontic techniques completes the therapy. Immature teeth may be revascularized following replantation. Depending on the width of the apical foramen and on the length of the pulp, the chance of revascularization was about 10–50% in avulsed and replanted teeth¹¹.

Intentional replantation (IR) is a concept that has been known for over a thousand years, defined by Grossman (1966). Intentional replantation may be a viable treatment option. Recent case reports have demonstrated that with good case selection, intentional replantation can be a reliable and predictable procedure. Intentional replantation can have a high success rate with different bio-regenerative materials and be far less expensive than other treatment options¹². The success of this treatment primarily depend upon the maintenance of aseptic conditions during the intervention, atraumatic extraction, minimal manipulation of the periodontal ligament, short extra-oral time, minimizing occlusal forces following

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replantation, as well as carefully controlled postoperative patient compliance¹³. It is thought that subsequent to peri-radicular surgery, mesenchymal cells initiate the healing process by differentiating into mature cells such as osteoblasts, fibroblasts, or cementoblasts thus inducing osseous regeneration and apical attachment healing^{14,15}. In a tooth with an open apex there are possibilities of revascularization of the pulp as well as continued root development¹⁶.

In replanted teeth the technical procedure of conventional root canal treatment is difficult and highly demanding⁹. Therefore, there is a need of new therapeutic strategies to enhance PDL regeneration. Fibrin sealant (FS) contains

thrombin and fibrinogen to form an adhesive fibrin clot routinely used in surgical procedures¹. FS mimics the final stage of the blood coagulation cascade forming a natural bio-scaffold for stem cells to restore the damaged tissue after injury⁵. Platelet-rich plasma (PRP) derived from patients' serum has shown success in tooth replantation, by increasing periodontal tissue regeneration².

► **Case Report**

A 23 year old female patient reported to the Oral and Maxillofacial Department with pain in the lower right posterior region. On examination, the lower right 1st molar was grossly decayed and mobile with tenderness on vertical percussion.



Fig: 1 Pre op OPG



Fig: 2 Transplanted lower right 3rd molar in 1st molar's place.



Fig: 3 Access cavity



Fig: 4 Working length



Fig: 5 PRP



Fig: 6 Synthetic hydroxyapatite bone graft



Fig: 7 PRP injected into the root canal



Fig: 8 Obturation completed with PRP



Fig: 9 Post-op OPG

Intra oral periapical view showed pulp involvement and periapical bone loss. The lower right 2nd molar showed a crown fracture with remaining root stumps. OPG showed both the lower 3rd molars were impacted (Fig:1). Treatment was planned with a combination of Oral Surgical and Endodontic procedures. Patient was informed about the treatment modality, using platelet rich plasma as an alternative treatment to root canal therapy. Informed consent was obtained. An inferior alveolar nerve block was given on the right side to anaesthetize the area. The lower right 2nd molar root stumps were extracted along with the decayed lower right 1st molar. Lower right 3rd molar which was impacted, was surgically removed and transplanted into the extracted socket of the lower right 1st molar (Fig:2). The third molar area was sutured. Stability for the transplanted 3rd molar was obtained by splinting using circumferential wiring with the adjacent tooth. Selective grinding was done to keep the tooth out of occlusion. Access opening was done on the same day (Fig:3). All three canals: the mesiobuccal, mesiolingual and distal canals were located. Pulp was extirpated and a closed dressing was given. Patient was prescribed antibiotics and analgesics and was recalled after a week for suture removal.

Healing was good and sutures were removed. The transplanted tooth was anaesthetized with lidocaine 2% and adrenaline 1/80,000 and isolated with a rubber dam. Canals were relocated. Working length was determined to be 16mm (Fig:4). Shaping and cleaning of the canal was done with saline as irrigation. EDTA was used as a lubricant to aid in shaping and cleaning so as to reduce the pressure during filling motion as it may loosen the splint. 2mm was added to the working length and biomechanical preparation was done. This was to obtain a communication into the periapical tissues. The files were nearly 1mm beyond the apex and shaping and cleaning was done carefully upto file no: 30. This communication was necessary for the entry of platelet rich plasma for regeneration at the periapex. Canals were irrigated finally with saline and dried.

Platelet rich plasma was prepared with blood sample collected from the antecubital vein of the patient and transferred into tube containing anticoagulant. They were subject to centrifugation twice. After the first centrifugation, the supernatant was collected and subjected to a second centrifugation to obtain the platelet rich concentrate. The obtained platelet rich plasma (Fig:5) was first injected into the root canals (Fig:7). PRP was mixed with the sybograft (sterile synthetic hydroxyapatite bone graft-Fig: 6). This graft was used only as a scaffold for the PRP and as a filler for prolonging the action of the growth factors present in the platelet rich plasma. The graft begins to set when PRP is mixed with the graft. A plugger was used to immediately obturate the canals with the mixture.

PRP and the graft was filled up to the pulp chamber and condensed using a condenser (Fig:8). Composite resin was moulded outside the cavity and placed like a lid on to the access cavity above the graft mixed with PRP. This was then cured. Tooth was restored with composite and radiograph taken. For the follow-up patient was free of all symptoms and tooth was firm with no mobility. Transplanted tooth shows similar readings as that of a traumatized tooth in pulp tester. Post operative OPG (Fig: 9) shows healing with a considerably good amount of bone formation and periodontium suggestive of regeneration.

► Discussion

As a blood driven bio-adhesive and bio-scaffold, platelet-rich plasma has shown success in tooth replantation mainly helping regeneration of bone, tendon and periodontal tissues². Fibrin sealant (FS) acts as an adhesive material holding tissues or materials in a required configuration thus providing a 3D scaffold for cells to grow. This might be attributed to the biological effects of FS such as induction of angiogenesis and improving wound healing¹⁷ on the remnant PDL fibroblasts, on the root surface or in the socket of the tooth through their thrombin receptors¹⁸.

The active soluble releasate isolated following activation of platelet rich plasma contains coagulation factors and adhesive protein and can generate fibrin clots¹⁹. Li et al. observed that PRP might promote vascular growth and stimulate endothelial progenitor cells to form vessel-like structures²⁰. Notodihardjo et al. used a gelatin hydrogel compound coupled to platelet rich plasma molecules to stimulate wound healing. They observed an increase in epithelialization and vascular growth when compared to other treatments²¹. Bezgin T. et al revascularized immature teeth with necrotic pulps using concentrated platelet rich plasma (cPRP)²². The appropriate concentration of the PRP treatment enhanced proliferation, mineralization, differentiation of human dental stem cells (periodontal ligament stem cells & dental pulp stem cells)²³. To stabilize growth factors released from platelets, a fragmine-protamine micro-nanoparticle system was used to promote healing events of skin grafts showing a positive effect on wound epithelialization and angiogenesis²⁴.

Vasundara et al concluded the use of PRP as a potentially ideal scaffold for regenerative endodontic therapy has been documented in the literature. Regenerative endodontic procedure are biologically based procedures which deal with the regeneration of pulp like tissue, more idealistically the pulp-dentin complex, damaged coronal dentin such as that following a carious exposure or trauma; and regenerate resorbed root, cervical or apical dentin. The mechanism

behind the revitalization endodontic procedure is that, despite the tooth being necrotic, some pulp tissue can survive apically which under favorable conditions proliferate to aid in the process of regeneration. Although there is no established standardized treatment protocol for endodontics regeneration, many of the cases have shown favourable results, with continued radiographic evidence of development of the dentin-pulp complex and an absence of clinical symptoms²⁵.

► Conclusion

Platelet rich plasma and sybografit is a better treatment modality for posterior teeth where the canals are comparatively thinner than the anterior teeth. It significantly improves success of tooth replantation or transplantation with normal PDL healing and regeneration of pulp dentin complex. Clinical examination and radiographs show progressive healing suggestive that PRP itself can induce endogenous regeneration even in adult transplanted tooth. If a displaced or luxated tooth is repositioned in its normal location, revascularization of the pulp proceeds from the apical opening in a coronal direction. Teeth with short roots and large diameter apical openings heal faster. Thus in some cases, the regenerative potential of platelet rich products are more beneficial to the patient than the conventional methods.

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A rare subcutaneous benign tumour – oral lipoma

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Abstract

Lipomas are one of the most common benign soft tissue neoplasms of the body. However, these occur very rarely in the oral cavity. The oral variant constitutes of approximately 1-4% of all lipomas. They are frequently diagnosed in adult population, although rare cases have been reported in children as well. Pathogenesis of lipomas remains unclear. Lipomas are usually asymptomatic or may be slow growing. But sometimes, the overlying mucosa shows ulcerations resulting in gross diagnostic difficulties and delay in treatment. This article is of a 40 year old female diagnosed with an oral lipoma.

Keywords: lipoma, oral cavity.

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► Background

Lipomas are one of the most common soft tissue neoplasms of the body and only about 15–20% of them have been reported involving the head and neck region. The oral variant constitutes approximately 1–4% of all cases¹. It is frequently diagnosed in adults; lipomas are unusually seen in children. In the oral cavity, lipoma has been reported in individuals ranging from 6 weeks to 75 years of age². The pathogenesis of lipomas remains unclear, but they appear more commonly in obese people.

Usually they present as asymptomatic long-standing soft nodular swellings with normal mucosa. It may vary in size from a very small lesion to a massive tumor³.

Deep-seated lesions appear as a well-defined, round swelling to an ill-defined, lobulated mass. The colour depends on the thickness of the overlying mucosa; usually presents with yellow surface discoloration. Most common intraoral site of lipomas is reported to be the buccal mucosa followed by the buccal sulcus and vestibule, tongue, floor of the mouth, lip, palate and gingiva⁴.

Multiple lipomas have been reported in various conditions like neurofibromatosis, Gardner syndrome, encephalo cranio-cutaneous lipomatosis, multiple familial lipomatosis and Proteus syndrome⁵. In hemifacial hypertrophy, generalized lipomatosis results in unilateral facial enlargement⁶.

An important feature of lipoma is that the tumor, when placed in a 10% formaldehyde solution, has a tendency to float⁴. The diagnosis is however confirmed by histopathological examination of the biopsy specimen. Histologically, they are classified as simple lipoma, fibrolipoma, osteolipoma, chondrolipoma, spindle cell lipoma, intramuscular (infiltrating) lipoma, angiolipoma, myolipoma of soft tissue, angiomyolipoma, pleomorphic lipoma, myxoid lipoma and atypical lipoma.

► Case Report

A 40-year-old female reported with the complaint of swelling over lower right side of the face since 5 years. She also had discomfort in the area of the swelling and a gradual increase in size for the past 6 months. She gives no history

of any trauma in the region of interest. She has no other co-morbidities.

Facial examination revealed a diffuse swelling inferior to right corner of mouth roughly oval in shape; measuring approximately 2 × 1 cm. Skin over the swelling was normal. On palpation, there was little rise in temperature over the swelling. It was soft, non-tender and freely movable [Figs. 1a and 1b].

Intraorally, it presented as a diffuse oval swelling in the right buccal sulcus in the premolar-molar region. The overlying mucosa was erythematous, but no pus discharge or ulcerations were noted [Fig. 2].

Excisional biopsy was planned under local anesthesia. A vestibular incision was followed by blunt dissection; the mucous membrane was undermined exposing an irregular, poorly encapsulated and lobulated pale yellow mass [Figs 3a and 3b]. After achieving hemostasis, incision was closed using resorbable sutures.

The surgical specimen was 3.5x2x1cm in size and was sent for histopathological examination [Fig. 4]. A review after 7 days showed satisfactory healing and the sutures were removed.

Histopathological examination showed lobules of adipocytes with clear cytoplasm and eccentrically placed nucleus separated by a thin connective tissue septa. The lesion is well circumscribed by collagen fibres forming a capsule.

► Discussion

Lipoma is a benign, soft tissue neoplasm of mature adipocytes. Most

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of them are seen involving the trunk and proximal areas of the extremities². Its presence in the oral and oropharyngeal region is quite rare, with a prevalence rate of 1/5,000 adults. Roux, in 1848, described oral lipoma for the first time as a ‘yellow epulis’⁵.

Freitas et al reviewed 26 cases among the Brazilian population showed that the mean age of occurrence is 54.6 years¹⁰. Fornage and Tassin reported that the peak incidence occurs in the fifth or sixth decade of life¹¹; however, rare cases of congenital lipomas have been reported in 20-day and 47-day old babies too¹². Although lipomas, elsewhere in the body, are reported to be twice as common in females as in males¹, oral lipomas are distinguished by a more balanced sex distribution.

The etiology of oral lipoma remains unclear, yet pathogenic mechanisms have been proposed. One such mechanism included the ‘hypertrophy theory’. According to this theory, obesity and excessive growth of adipose tissues contribute to the formation of oral lipomas. But this theory was less convincing regarding occurrence of those lesions in areas devoid of pre-existing adipose tissues⁷. Unlike normal adipose

tissues, these lesions are not utilized in general metabolism during starvation.

A second theory, ‘metaplasia theory’ proposed that aberrant differentiation of in situ mesenchymal cells into lipoblast leads to lipomatous development. This is because fatty tissue can be derived from mutable connective tissue cells almost anywhere in the body⁸.

J. J. Lin and F. Lin suggested that these benign lesions are congenital, arising from embryonic multipotential cells. They continue to exist dormant until they differentiate into adipocytes under hormonal influence during adolescence⁹. However, in some cases, repetitive trauma, metabolic changes or chronic irritation may stimulate soft tissue proliferation leading to lipoma formation⁴.

Lesions which occur in the oral and maxillofacial region usually develop at a later stage in life and are therefore assumed to be neoplasms of adipocytes. Few of these lipomas show rearrangement of 12q, 13q, 6p chromosomes⁵.

The cells of the lipoma differ metabolically from normal adipocytes even though they are histologically similar. Therefore starving individuals tend to lose fat from normal fat depots in



Fig. 1 Frontal and Bird's eye view of the patient.



Fig. 2 Diffuse intraoral swelling in the right buccal vestibule.



Fig. 3 Surgical excision of the lesion under local anesthesia



Fig. 4 Excisional biopsy specimen

the body, but not from the lipoma. Furthermore, the lipoma fat contains more fatty acid precursors than normal fat while lipoprotein lipase activity is relatively reduced⁵.

The oral lesions are usually asymptomatic and often been noted for many months or years before diagnosis. In most cases the size of the lesion is less than 3 cm, but it may go up to 5–6 cm in size over a period of years. The buccal mucosa and mucobuccal fold are the most common intraoral sites and it accounts to 50% of all cases. Less common sites are tongue, floor of the mouth, soft palate, alveolar ridge and gingiva.

Clinically, oral lipomas can be classified as diffuse (those affecting the deeper tissues) or superficial encapsulated forms⁵.

Superficial form appears as a single or lobulated, painless swelling with a sessile or a pedunculated base. They are soft and smooth surfaced yellow masses that are encapsulated. The overlying epithelium is usually thin and the lipomas are freely movable beneath the mucosa. The mucosa over the lesions in deeper tissues appears normal and presents only mild surface elevation.

The lipoma is composed predominantly of mature adipocytes, possibly admixed with streaks of collagen and is well demarcated from the surrounding connective tissue. The lesion is well circumscribed by thin fibrous capsule and a distinct lobular pattern may be present.

A number of microscopic variants have been documented. Lesional fat cells are seen to infiltrate into surrounding tissues, producing long, thin extensions of fatty tissue radiating from the central tumor mass. Within the striated muscle, this infiltrating variant is known as intramuscular or infiltrating lipoma. Extensive involvement of large area of fibrovascular or stromal tissues is best referred to as lipomatosis. Fewer lesions is characterized by excessive fibrosis between the adipocytes (fibrolipoma), excess of small vascular channels (angiolipoma), a myxoid background stroma (myxoid lipoma) or areas with uniform spindle-shaped cells dispersed between normal adipocytes (spindle cell lipoma). When spindle cells appear dysplastic or mixed with pleomorphic giant cells with or without hyperchromatic, enlarged nuclei, the term pleomorphic lipoma is preferred. When the spindled cells are of smooth muscle origin, the term myolipoma may be used. Similarly the term angiomyolipoma is used when the smooth muscle seems to originate from the arteriolar walls.

Occasionally lipoma may be associated with chondroid or osseous metaplasia. When bone marrow is present, the term myelolipoma is used. Sometimes the term adenolipoma is considered when isolated ductal or tubular structures are scattered among the fat lobules. Perineural lipoma has also been reported.

Lipoma of the oral and pharyngeal region is not difficult to differentiate from other lesions, although spindle cell and pleomorphic types must be distinguished from liposarcoma¹³. Very rarely, lipoma in the buccal mucosa cannot be differentiated

from a herniated buccal pad of fat, except in case of any history of trauma. Rare cases on occurrence of hibernoma, a benign neoplasm of brown fat, have also been reported in the oral and oropharyngeal regions.

Surgical excision is considered as the treatment of choice for lipomas if associated with cosmetic or functional difficulties. This treatment modality has proved better outcome with very little or no recurrence reported. However, intramuscular lipomas often require debulking. This is advocated considering its higher recurrence rate because of their infiltrative growth pattern³. But this variant of lipoma is rarely reported in the oral and maxillofacial region so far.

► Conclusion

Oral lipomas are rare benign lesions involving the oral and maxillofacial region. Patients presenting with these lesions usually appear asymptomatic with minimal discomfort. However, it is imperative for a maxillofacial surgeon to identify the lesion and to decide on the treatment of intraoral lipomas in order to render better quality of life.

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Tooth fragment reattachment

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Abstract

A trauma with accompanying fracture of anterior teeth is an agonizing situation for an individual, because of the physical disfigurement and the psychological impact. If the original tooth fragment is retained following fracture, it can be reattached using adhesive techniques. Fibre-reinforced composite root canal posts and adhesive resin composites makes the esthetic reattachment of the crown a feasible option for the clinician. The purpose of this article is to review the considerations in tooth fragment reattachment and to present a series of two case reports of fracture involving pulp.

Keywords: Fibre reinforced resin composite, esthetic reattachment.

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► Introduction

The commonest incidence of fractured teeth occur with maxillary anterior dentition. The nature and intensity of trauma and the characteristics of involved tooth such as periodontal support, degree of protrusion, pulpal involvement etc. will determine the complexity of treatment and prognosis of such cases^{1,2}.

Fractures may be simple involving only the enamel, or they may be complex involving the dentin, pulp or encroaching the critical area of biologic width^{1,2,3}. Again these fractures can be longitudinal, oblique or horizontal depending on the direction of fracture line. The fractured segment may be separated completely or

may be kept in position by the junctional epithelium and connective tissue.

The treatment options vary from simple maintenance without restoration to extraction of the involved tooth and prosthodontic rehabilitation⁴. The biocompatibility of current adhesive technology has helped a lot in the successful conservative reattachment of the fractured piece, in order to conserve natural tooth structure to the maximum. The advanced adhesive systems allow reattachment even when the fracture exposes the pulp or the periodontal ligament⁴.

This article presents a series of two cases of crown fracture involving the pulp.

► Case Report

Case 1

A 35 year old male patient reported to the department of conservative dentistry and endodontics, Government Dental College, Kottayam with the chief complaint of broken tooth -Fig 1(a, b). There was a history of fall in the slippery bathroom floor last evening. Clinical examination revealed an oblique crown fracture of tooth 21 involving the pulp. The fracture was on the mesial half of the crown ending apically at the level of gingival margin. The fractured segment was retained to the tooth and the patient was in an acute state of pain (even mere contact of involved tooth with the antagonist caused severe pain).

A comprehensive treatment plan was developed, which included immediate pulp extirpation and reattachment of the fractured segment using flowable composite resin. Followed by completion of endodontic treatment, post space preparation and full coverage crown.

Treatment plan was explained to the patient and consent obtained. Under local anaesthesia, access cavity was prepared by stabilizing the fragment with other hand. Once the pulp was extirpated, bleeding was under control. After complete isolation, the margins of fracture were bevelled. After acid etching and application of bonding agent, the fracture segment was reattached with dual cure resin-Fig 2(a).

In the subsequent appointments the endodontic treatment was completed Fig 2(b). Post space for fibre post was prepared -Fig2(c), and appropriate fibre post was luted. Tooth preparation was done and impression taken for metal ceramic crown which was luted in the subsequent appointment -fig.3. In the six month follow up the tooth was asymptomatic and the aesthetics was acceptable.

Case 2

A 21 year old male patient was reported to department of conservative dentistry and Endodontics, Govt. Dental college Kottayam with a chief complaint of fractured anterior tooth two days back in a two wheeler

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accident. Clinical examination revealed a class III fracture on tooth 12 and a class II fracture on tooth 11-Fig4(a). The fractured piece was not completely detached from the remaining crown.

A comprehensive treatment plan was decided which included reattachment of the fractured segment followed by root canal therapy of the involved tooth, placement of fibre post and crown on the tooth.

The treatment plan was explained to the patient and consent obtained. Emergency procedure was reattachment of the fractured segment. Pulp extirpation done on tooth 12 under local anaesthesia. Margins of the fracture were slightly bevelled and acid etched. After polymerisation of the bonding agent, the low viscosity resin was used to reattach the fracture ends- Fig4(b). Root canal treatment was completed in the subsequent appointments –Fig. 5, post space prepared and a suitable fibre post was luted. In the next step tooth was prepared for metal-ceramic crown which was luted subsequently-Fig. 6.

► Discussion

Tennery was the first to report the re-attachment of a fractured fragment using acid-etch technique.² Subsequently, Starkey and Simonsen have reported similar cases.^{3,4}

In above cases, reattachment option was chosen for the following reasons. Reattachment may make the margins of the tooth supra- gingival. Removal of the fractured piece, and fibre post and crown may be another treatment option. But the disadvantage of choosing to salvage the fractured piece is that it may reduce the height of the remaining coronal tooth tissue. This may unfavourably affect the prognosis of the final full coverage restoration.

The decision to place a post was in order to reinforce the fractured piece. Bonding with a resin cement will create a single unit of root, post and the crown of tooth including the fractured segment. Moreover, the full coverage crown will further help to bind and reinforce the whole unit.

Advantages of reattachment procedure

Reattachment of the fractured segment provides the patient and the clinician, a number of advantages. Since reattachment re-establishes the original shape, contour, surface texture, alignment and colour of the tooth, it provides optimal aesthetics. Aesthetic results are more lasting than those accomplished with composite resin restorations. Enamel of the reattached fragment exhibits the same brightness and translucency as the coronal segment. The reestablishment of anterior guidance is automatically attained with reattachment, so function is easily re-established. The wear of reattached



Fig. 1 a Preoperative view



Fig. 1 b Preoperative view



Fig. 2 a after reattachment of crown fragment



Fig. 2 b Post obturation.



Fig. 2 c Post space created



Fig. 3 Metal ceramic crown luted.



Fig. 4 a Preoperative view



Fig. 4 b Fragment re-attached



Fig. 5 RCT completed



Fig. 6 Metal ceramic crown luted.

segment is similar to that of adjacent dentition. In many of the cases, reattachment is a simpler and efficacious procedure than the composite or porcelain restorations. Positive emotional and social factor to the patient is also provided by the reattachment procedure^{9, 10, 12}.

Disadvantages

When electing to perform a reattachment procedure the clinician should bear in mind the following disadvantages of the procedure also. Sometimes proper realignment of the fragment may become difficult or impossible. There is always the potential for de-bonding. So be particularly cautious in electing the treatment in children and those with excessive overbite, para-functional habits etc. The fragment may fail to recover the original colour, thus compromising the aesthetics. Also the line of reattachment may become visible in some cases^{12,13,14}.

Conclusion

The fracture of a tooth may be a most traumatic incident for a young patient, but it has been found that there is a positive emotional and social response from the patient to the preservation of natural tooth structure. Tooth fragment reattachment procedure offers an ultraconservative, safe, fast and esthetically pleasing result when the fractured segment is available. Due to the

adhesive potential of advanced composite resin materials and dental adhesive systems, tooth reattachment has become a more comfortable and safer procedure in recent years.

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OBITUARY



Dr. Binu M Prakasan
Member of IDA
Alappuzha Branch

With profound grief IDA, Kerala State inform the sad demise of Dr. Binu M Prakasan born at Vayalarin 1979, S/o Dr. M. K. Prakasan done his BDS from Ambedkar College of Dental Sciences, Patna [2012]. His family, Wife: Dr. Indu Mohan BDS [GDC Calicut], MDS (Oral Pathology) Daughter: Mythili, One year old. We all pray for the departed soul.

Idiopathic Bimaxillary Gingival Enlargement

* Jyotsna J., * Deepthy M., **T.P. Padmakumar, *** Midhulaj, *** Teenu Abraham, *** Harikrishnan Balachandran Pillai

► Introduction

Gingiva is a fibrous investing tissue, covered by keratinized epithelium that immediately surrounds a tooth and is contiguous with its periodontal ligament and with the mucosal tissues of the mouth.¹ Normally the gingiva covers the alveolar bone and tooth root to a level just coronal to the cemento-enamel junction. An increase in size of the gingiva is a common feature of gingival disease. This condition is known as gingival enlargement or gingival overgrowth. The enlargement can be inflammatory, drug induced, associated with systemic disease or condition, neoplastic enlargement or false enlargement based on pathology and etiological factors. Based on location and distribution, it can be localised, generalised, marginal, papillary, and diffuse or discrete.² The colour may be similar to normal gingival or it may be red with spontaneous bleeding tendency. The consistency can be soft and oedematous or firm and fibrous.

Idiopathic gingival hyperplasia is a rare condition of undetermined etiology described variously as fibromatosis gingivae, gingivostomatitis, hereditary gingival fibromatosis, idiopathic fibromatosis, familial elephantiasis, and diffuse fibroma. Idiopathic gingival fibromatosis is a slowly progressive benign enlargement that affects the marginal gingiva, attached gingiva, and interdental papilla. The fibromatosis may potentially cover the exposed tooth surfaces, causing esthetic and functional problems, and may distort the jaws in extreme cases. The condition has been

classified into two forms: the first is the nodular form that is characterized by the presence of multiple tumors in dental papillae, and the other form that is symmetric results in uniform enlargement of gingiva and represents the most common type.³

► Case Report

A 16 year old female patient reported to our department of periodontics, Azeezia college of dental science and research, Kollam with a complaint of overgrowth of gingiva in upper and lower back teeth region. The patient's previous family and medical history was non-contributory.

Intra oral examination: The enlargement was confined to the upper right and left sides of the jaws involving buccal and palatal sides and also present in lower right and left sides of gingiva involving both buccal and lingual sides. (fig. 1) It presents a large mass of firm and dense, fibrous tissues that covers the alveolar ridge and extends over the teeth. In maxillary arch in both sides, it was extending from the second premolar to the tuberosity region upto the palatal side of second premolar (fig. 2). In mandibular region, the enlargement was from first molar to retromolar region upto the lingual side of the same tooth. It was extending upto the occlusal line and was not interfering with the mastication (fig.6). The enlarged gingiva exhibited no colour changes or altered

surface characteristics compared to the adjacent mucosa. It was smooth but firm in consistency and non-tender on palpation. The presence of subgingival deposits were minimal with probing depth of 4-5 mm with no loss of attachment and mobility of involved teeth. The upper and lower arches appeared grossly distorted because of the gingival enlargement.

Treatment Protocol:

Initial therapy has been performed. Patient was asked to report 4 weeks after phase 1 therapy. The surgery was performed in three appointments.- upper right arch in first appointment; lower rightside in one appointment. Upper and Lower left sides in 3rd appointment. The patient was then referred to the department of orthodontics for the correction of malocclusion.

Maxillary arch:

After administration of greater palatine nerve block and posterior superior nerve block, pocket depth was marked on the external surface of the gingiva. A first incision, internal bevel incision, was given extending from 14 to the distal side of 17 which was followed by the second incision; crevicular incision and the third incision; interdental incision. Incision was also given in the palatal side. (fig. 3) The excised gingival tissue (fig. 4) was separated and removed from the underlying tissue and was sent for histological examination. The flaps

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were thinned from the inner aspect, approximated and sutured with resorbable sutures. Surgical pack was placed over the site.

Similar procedure was carried out in the second quadrant in proceeding appointment.

Mandibular Arch:

After giving inferior alveolar nerve block and lingual blocks, probing pocket depth was measured. External bevel incision

was given from 34 to 37 extending to the retromolar region. The granulation tissue was removed using Gracey curettes (fig. 7). The excised band of tissue was sent for pathological examination (fig.8). Surgical pack was placed over the site. Post operative instructions were given along with analgesics and antibiotics. Same procedure was performed in the opposite quadrant. The patient was recalled after 7 days for suture removal. Wound healing was satisfactory. The patient was reviewed regularly at one, two and six months (fig. 9).



Fig. 1 Preoperative study model maxilla and mandible

Fig. 2 Preoperative view of maxilla with enlarged gingiva on right side



Fig. 3 Removal of excess gingival tissue by internal bevel incision

Fig. 4 Excised tissue of maxilla



Fig. 5. Immediate post operative view

Fig. 6 Pre operative view mandible

Fig. 7 Immediate post-operative view



Fig. 8 Excised tissue of mandible

Fig. 9 Post-operative after 6 months

Histological examination

Histological examination showed hyperplastic parakeratinised stratified squamous epithelium exhibiting elongated rete ridges. The associated fibrous connective tissue exhibited diffusely arranged collagen bundles and mild inflammatory cell infiltrate. The features were suggestive of fibrous hyperplasia.

► Discussion

The development of fibrous enlargement of gingiva may be hereditary or drug-induced. Although gingival tissue may appear normal at birth, hyperplastic gingival fibromatosis may become evident with the eruption of primary or permanent dentition, suggesting a trauma-induced tissue reaction during the eruption. The condition may sometimes be associated with physical developmental retardation and hypertrichosis⁴. In this case patient did not presented these symptoms, so syndromic association was ruled out. The patient was not taking any medication as well. The histological examination revealed the enlargement was not neoplastic. When the etiological factor cannot be defined, it is considered to be idiopathic. Trauma and/or irritating factor could be a contributory cause. There is inconsistency in the literature as to the cellular and molecular mechanisms that lead to gingival fibromatosis. An increase in the proliferation of gingival fibroblasts or decreased levels of collagenase activity were reported^{5,6}. The constant increase in the tissue mass can result in delayed eruption and displacement of teeth, arch deformity, spacing, and migration of teeth. The condition is not painful until the tissue enlarges to partially cover the occlusal surface of the molars, thereby getting traumatized during mastication. In the present case the displacement of teeth can be due to the gingival hypertrophy. Gingival enlargement disrupts the oral hygiene maintenance by the patient and favours plaque and calculus accumulation which can lead to severe periodontal diseases.

To maintain patient's oral hygiene it is important to achieve physiologic contour of gingiva around the teeth. The different treatment modalities available for gingival enlargement include – scaling and root planning, gingivectomy and gingivectomy with flap procedure, i.e., undisplaced flap⁷.

► Conclusion

In the present case, the diagnosis of gingival enlargement was made by complete medical history, family history, drug history and clinical examination. The gingival enlargement was diagnosed as idiopathic. It was managed by undisplaced flap procedure and external bevel gingivectomy. Regular follow-up was done. Physiological contour of gingiva was achieved by which the patient is maintaining good oral hygiene.

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Digital Cavity Detection – Spectra Caries Detection

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Diagnose the case

* Dhanya Prakash G, **Preeja Prem Kumar, ***Joseph Edward, ****M S Deepa

A 12 year old girl presented with small diffuse swelling in relation to right lower jaw with occasional pain. She noticed this swelling 2-3 months back and is gradually increasing in size (Fig: 1). The facial asymmetry was noticeable. Mild, dull continuous pain was present. On extraoral examination, diffuse swelling over the Rt lower cheek extending inferiorly to the submandibular region. Good oral hygiene status and there was no signs of infection. No decayed teeth were present. On palpation, bony hard non tender swelling of about 5 x 2 x 1cm in the lower body of mandible involving the lingual cortex. Skin over the swelling is free. No palpable or tender lymph nodes.

What is the provisional diagnosis ??

Provisional diagnosis: Garres osteomyelitis

*Differential diagnosis: Giant cell granuloma,
Fibrous Dysplasia, Osteoma*

Routine blood examination and serum alkaline phosphatase values were within normal limits. OPG (fig: 2) and CT scan (fig: 3, 4 and 5) were done. Radio opaque lesion with homogenous density compared to the adjacent normal bone and increased thickness in the Rt body of mandible can be noticed in OPG. CT showed a radio opaque lesion with no definite demarcation with the normal bone pattern. Increased buccal and lingual cortical thickness with obliteration of medullary cavity at few sections.

Incision biopsy of the involved bone (1cm x 0.75cm) from the buccal cortex is taken via transoral approach.

HPE report showed irregularly shaped bony trabeculae in a hypocellular fibroblastic stroma. Osteoblastic rimming of trabeculae seems to be absent.



Fig 1. Increased thickness of the lower border of mandible can be seen.



Fig 2. Radio opaque lesion with similar density to the adjacent normal bone and increased thickness in the Rt body of mandible can be noticed.



Fig: 3&4. CT mandible shows increased thickness of the buccal and lingual cortex.

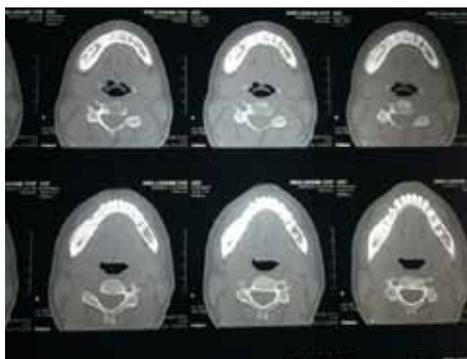


Fig 5 3D scan showing the buccal and inferior border thickening of the body of Mandible (rt side)

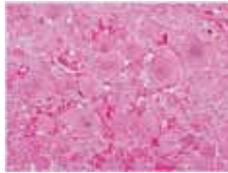
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* Jayanthi, ** Varun B.R.

1. Pear shaped radiolucency in between the roots of maxillary lateral incisor and canine is most probably
 - a. Nasolabial cyst
 - b. Nasopalatine cyst
 - c. Globulomaxillary cyst
 - d. Midpalatal cyst



2. Which of the following is not a giant cell lesion of bone?
 - a. Central giant cell granuloma
 - b. Brown tumor
 - c. Cherubism
 - d. Fibrous dysplasia



3. Which of the following bacteria is not involved in etiopathogenesis of dental caries?
 - a. Streptococcus mutans
 - b. Actinomyces israeli
 - c. Actinomyces viscosus
 - d. Lactobacilli

4. A growth in the alveolar ridge of new born infants is suggestive of
 - a. Congenital epulis
 - b. Granular cell tumor
 - c. Pyogenic granuloma
 - d. Gingival Fibromatosis



5. The most common primary tumor metastasizing to jaw bones are
 - a. Adenocarcinoma of lung
 - b. Adenocarcinoma of intestine
 - c. Breast cancer
 - d. Thyroid carcinoma



6. Which of the following benign tumor is referred to as self healing carcinoma?
 - a. Squamous papilloma
 - b. Keratoacanthoma
 - c. Verrucous carcinoma
 - d. Squamous cell carcinoma



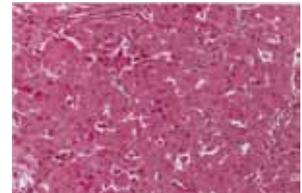
7. Hypodontia, conical teeth and hyperpigmentation of skin are features of
 - a. Ectodermal dysplasia
 - b. Incontinentia pigmenti
 - c. Dyskeratosis congenita
 - d. Epidermolysis bullosa



8. “Honey comb or soap bubble appearance” in a radiograph is not a feature of
 - a. Ameloblastoma
 - b. Odontogenic keratocyst
 - c. Odontogenic myxoma
 - d. Central hemangioma



9. Which of the following tissues contain oncocytes?
 - a. Maxillary sinus
 - b. Ethmoid sinus
 - c. Salivary gland acini
 - d. TMJ



10. The most common UV induced skin cancer is
 - a. Melanoma
 - b. Squamous cell carcinoma
 - c. Rodent ulcer
 - d. Verrucous carcinoma



Answers: 1. c, 2. d, 3. b, 4. a, 5. c, 6. b, 7. b, 8. b, 9. c, 10. c

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CDE Report



Dr Anil Thunoli
Chairman CDE

Dear Colleagues,
As the CDE Chairman I must admit being very happy to see how actively all the local branches are conducting CDE programs in last 7 months and I appreciate all. 95 CDE programs have been conducted by various local branches and all the programs were well attended. We could also conduct two more state CDE programs and that makes 6 programs altogether till August.

The Fifth state CDE was conducted on 18th June at Hotel Sougandhika Residency, Haripad. Faculty Dr Binoy Ambookkan took the class on the topic Interceptive Orthodontics. Past state

president Dr Antony Thomas inaugurated the program. The CDE was hosted by IDA Mavelikara and IDA Alapuzha branches.

The Sixth CDE was conducted on August 6th at Hotel Pearl Regency, Thrissur was given a record participation of 197 attendance, was hosted by IDA Trichur, Kunnankulam, Chalakudy and Kodungallur branches. Dr. Prof. Arun Narayanan, Principal, Kannur Dental College spoke on the topic Surgical Periodontics.

As I mentioned in the last issue of KDJ, the big CDE event, IDA-FDI CDE program is scheduled on November 11&12, 2017 at AMRITA INSTITUTE OF MEDICAL SCIENCES, KOCHI. That program will definitely detail about all the aspects of Dento-Facial Aesthetics. Eminent International and National speakers including Dr Porous Turner, Dr Byju Krishnan, Dr Sandhesh Mayekar, Dr Arvind Shenoy will be giving lectures. IDA Kerala state CDE wing requesting all our members to attend FDI-IDA CDE and make it a grand success.

Thanking You,
Your's in IDA

Dr Anil Thunoli



CDH Report



Dr. Rajesh V.
Chairman CDH

I am extremely happy to see that most of the branches IDA Kerala State are giving top priority in including innovative CDH programmes in their branch level activities. In the mean time, the CDH wing of IDA Kerala State did come up with two extremely successful projects.

World No Tobacco Day: On May 31st 2017 a significant milestone and a historical feat was engraved into the golden almanac of the Indian Dental Association. The observation and conducting of 'No Tobacco Day' state-wide in God's own country was a praiseworthy effort of two committed bodies joining hands to spread one emphatic message -- Tobacco is and will always be a threat to one's health and

development. This was the first of its kind collaboration between the Indian Dental Association and the Southern Railways and needless to say this will be the gold standard for community projects which are to be implemented in future.

The fervent desire of our IDA leaders, to effectively spread the message of harms of tobacco use, could only culminate into fruition because of the strategic execution and likeminded collaborative efforts of Dr. Sony Thomas (President, IDA Trivandrum Branch), Dr. Sabu Kurian (President, IDA Kerala State), Dr. Suresh Kumar (Secretary, IDA Kerala State) and the CDH wing of IDA Kerala State.

The inception of this idea rose from Dr. Sony Thomas (President of IDA Trivandrum branch and Senior DMO- Health & Family welfare, Trivandrum / Southern Railway) who wanted to conduct and observe the World No Tobacco Day in a unique way. Though the Trivandrum division of Railways had limited Dr. Sony's idea to the borders of Kollam, this project received a major boost when IDA Kerala State stepped in to organise a massive cooperation drive among all the branches for this Herculean task. The rest, as they say, is history. IDA branches from Kerala with co-operation from various Dental Colleges and Health Inspectors of various stations worked tirelessly for the smooth conduct and observance of this day at all railway stations throughout Kerala. This mammoth project received national appreciation and attention from the media, public and the IDA HQ itself.

The state level inauguration programme was hosted by IDA Trivandrum branch at Central Railway Station, Trivandrum on May 31st. The programme was

inaugurated by Shri. Prakash Bhutani, Divisional Railway Manager Trivandrum in presence of chief guest, Dr. Ashok Dhoble, Hon Secretary General IDA HO. Dr. Sony Thomas, Sr. DMO/H&FW and President of IDA Trivandrum welcomed the gathering. The presidential address was delivered by Dr. Sabu Kurian, President IDA Kerala State and an Anti tobacco pledge was administered by Dr. Rajesh V, CDH chairman IDA Kerala State. Anti-tobacco posters and pamphlets prepared by Regional cancer Centre, Thiruvananthapuram and Society of Periodontists and Implantologists Kerala were released by Dr. Ashok Dhoble and the key note address was given by Dr. Babu Mathew, Rtd Prof RCC/Trivandrum. Felicitations were given by Dr. Mary Mathew CMS/TVC, Dr. Raveendranath, CDE chairman, IDA HO, Shri. Gopikrishna, General Secretary SRMU, Dr. Chandramohan, RCC Trivandrum and Dr. Suresh Kumar, Secretary IDA, Kerala State. Vote of thanks was given by Shri Pramod Shenoy, SMR/TVC. IDA Kerala State VP Dr. Arun Roy and IDA past national president Dr. A signboard highlighting Tobacco Control was released and would be kept at all railway stations as a permanent fixture for public display. The station premises were adorned with eye-catching posters and informative exhibits, along with walking models and information kiosks. Unlimited tea and snacks were distributed to all attendees courtesy of the Railways.

Dr. (Capt) Vivek, Prof & HOD, PMS Dental College conducted an awareness class and students of PMS Dental College, Trivandrum screened more than 100 railway employees and travelling public. Awareness drama, flash mob and exhibition on platform no.1 & on a train was conducted by students of PMS Dental College, Trivandrum and NIMS Dental College.

The Railway Protection Force (RPF) also demonstrated awareness skits regarding passenger safety in trains and on premises. Shortly, a special exhibition train carrying the awareness message in the form of display posters and exhibits was flagged off from the Trivandrum station, which was said to be the first of its kind in the history of Indian Railways.

Along with quarterly run of ARME, exhibition on SAFETY by Safety Department, SECURITY for passengers by RPF department and exhibition on ill effects of tobacco was arranged in the coach.

All the invitees, IDA office bearers and officials of Southern Railways travelled in the special train to Attingal and Quilon railway stations where similar programmes were organised by IDA Attingal and Quilon branches.

Dr. Ashok Dhoble was the chief guest in both the programmes. Apart from this, programmes were conducted at Kayamkulam (Mavelikara branch), Alapuzha (Alapuzha branch), Chenganur (Pathanamthitta branch), Thiruvalla (Thiruvalla branch), Kottayam (CKK branch), Ernakulam Junction (Kochi branch), Aluva (Malanad branch), Thrissu (Thissur branch), Guruvayoor (Kunnamkulam branch), Shornur (Valluvanadu branch), Palakkad (Palakkad branch), Tirur (Malappuram branch), Kozhikode (Malabar branch), Thalassery (Thalassery branch), Kannur (North Malabar branch), Payyanoor and Kanhangad (Coastal Malabar branch) railway stations in a uniform manner which included video slide presentations. IDA Eranad and Wayanad branches also conducted similar programmes at public places at the same time.

I would like to congratulate IDA Trivandrum branch especially the President Dr. Sony Thomas, Secretary Dr. Aseem H. and CDH Convenor Dr. Tarun Varghese Jacob for their sincere efforts in making this programme an ever memorable one. Presidents, secretaries and CDH convenors of all the twenty



one branches worked in tandem with the state office to conduct this state level programme as a real state wide mega event

This unique project combining the massive reach of the railways and the medical expertise of IDA is hopefully the beginning of more such sustained efforts in future.

World Oral Hygiene Day

State Level Oral Hygiene Day was observed on 1ST August. The programme was jointly hosted by IDA Kodungallur and Malappuram branches at Malabar Dental College and Research Centre with a variety of programmes. Oral Hygiene awareness rally was flagged off by the State Vice President Dr. Subash Madhavan. Members of both branches, students and staff members of the dental college participated in the rally that was flagged off from the college, moved through Edappal town and concluded at Government Old Age Home, Thavanoor. The closing ceremony of the day observation was presided over by the state president Dr. Sabu Kurian and was inaugurated by MLA of Kottappuram constituency Prof. Abid Hussain Thangal. Prizes were distributed to the winners of competitions conducted for school students as part of Oral Hygiene Day Observance. Presidents of IDA Kunnamkulam and Malappuram branches Dr. Justin Mathew and Dr. Sasi Kumar respectively, branch level co-ordinator Dr. Civy Puliyaath and CDH convenors of both branches Dr. Plato Palathingal and Dr. Mohammed Shereef, CC member of IDA Kerala State Dr. Deepu J Mathew, all the members from both the branches and staff members of Malabar Dental College deserve great credit for their sincere contributions for the success of this programme.

I congratulate all the branches that have conducted CDH programmes and I am expecting more from them in the last trimester of this IDA year.

The forth coming CDH programme is the observance of Oral Cancer Awareness Day, which will be hosted by IDA Thiruvalla branch. Expecting a cracker of a programme from them which will be as good as the other CDH programmes held in the year.

Trivandrum Branch

1. MAY 31ST-2017

NO TOBACCO DAY OBSERVATION OF IDA KERALA STATE HOSTED BY IDA TRIVANDRUM BRANCH

IDA Kerala State observed the "World No Tobacco day" at Trivandrum Central Railway Station in association with RCC, PMS Dental College and NIMS Dental College on 31.05.2017. This programme was hosted by the IDA Trivandrum Branch.

2. CDE: i. The Second CDE Programme-2017 (Inter Branch CDE Programme) of IDA Trivandrum on the Topic "Clear Aligners" was held on April 30th from 9am-5pm at Hotel Hycinth, Trivandrum. The faculty was Dr. Tariq Ansari M.D.S (Orthodontics).

ii. The Third CDE Programme-2017 of IDA Trivandrum on the topic: "Everyday Oral surgery-Tips for General practitioners" was conducted on Sunday, May 14th@ Hotel Pattom Royal from 5.30 pm - 9.15pm by Dr. Oommen Aju Jacob M.D.S(Oral & Maxillofacial Surgery).

iii. The Fourth CDE Programme-2017 of IDA Trivandrum was held on Sunday, 4th June on the topic: "ALL-ON-4" -Implants by Dr. Praveen. B M.D.S (Oral & Maxillofacial Surgeon) at Hotel Pattom Royal from 9.15am-4.45pm.

3. CDH: i. CDH Activity-April: A Dental Screening camp for 65 students at the Sri Chitra Home for the Destitute and Infirm was organized by the CDH Wing of IDA Trivandrum in association with Govt. Dental College Trivandrum Mobile Unit Team on April 3rd of 2017

ii. CDH Activity-April: A Dental Screening camp and an Awareness talk on "Oral Health Maintenance and Importance" was conducted for 60 inmates of the Vikalanga Vanitha Sadanam which was organized by the CDH Wing-IDA Trivandrum in Poojapura on April 27th of 2017.

iii. CDH Activity-May: In commemoration of Mother's Day, a Dental Screening camp was conducted for the members of CSI Church, Peyad -

Trivandrum on 14th May 2017 from 3pm to 6pm for the members as well as for the handicapped and mentally retarded of the CSI Home.

iv. CDH Activity-May: CDH programme was conducted for the members of Mar Baselios Mar Gregorios Orthodox Church at Sreekaryam, Trivandrum on 21 May 2017 from 10am to 1pm, which comprised of a Dental Screening camp and an Awareness talk on "Oral Care and Hygiene Maintenance".

4. CLINICAL CLUBS

i. The Second Clinical Club of IDA Trivandrum was held on Tuesday, April 11th@8pm in Innu apartments on the topic: "Clinical Preventive Pedodontics-Redefined" by Dr. Subbalekshmi M.D.S (Pedodontics). Around 40 members attended the clinical club which was followed by dinner.

ii. The Third Clinical Club of IDA Trivandrum was held on Tuesday, May 9th at IDA Hall, Innu apartments by Dr. Arun Ramachandran M.D.S (Prosthodontics) on the topic: "Why consider overdentures" from 8pm-9pm.

5. EXECUTIVE COMMITTEE MEETINGS

i. Third Executive committee meeting-2017 of IDA Trivandrum was held on Monday, 22nd May@8pm in Innu apartments.

ii. Fourth Executive committee meeting-2017 of IDA Trivandrum was held on Thursday, June 29th@8pm in Innu apartments.

6. Immunisation Programmes

i. Vaccination for Hepatitis -B for Dentists and Dental Assistants was held on June 1st from 1pm-3pm at SK Hospital, Edappazhanji. Hepatitis B Antibody titre analysis test was also done for members.

ii. Booster dose for Hepatitis B vaccination was given on July 1st at Geethanjali Hospital, Vazhuthacaud, Trivandrum.

7. ASAP Training:

The new batch for the 2 month Dental Assistant course of IDA Trivandrum Branch- ASAP started on April 3rd with 27 students in IDA Hall, Innu Apartments, Trivandrum.



▶ Tellicherry Branch

Executive committee meeting: on 27th april 2017, 3rd executive committee meeting was held at pearl view residency at 8:30pm, 17 members attended.

CDE PROGRAMMES: 2ND CDE programme was conducted at SOUBHAGYA RESIDENCY, THALASSERY, on 25th may on MINOR ORAL SURGICAL PROCEDURES AND SUTURING TECHNIQUES, programme was conducted by Dr. Saju N.S, MDS(ORAL AND MAXILLOFACIAL SURGEON) from 7pm to 9pm. 19members attended the programme.

CDH PROGRAMME:

1. CDH camp conducted at INDIRA BHAVAN, Mokeri BY Dr. SUNITH. 46 patients attended the camp.
2. An awareness drive on World no tobacco day was organized at Tellicherry railway station in association with IDA kerala state and southern railway Palakkad

division. Programme started around 9:30am and it was inaugurated by Sri Vinod (chief reservation officer), Dr. Purushothaman briefed about the programme and awareness class on demerits of tobacco usage was conducted by Dr. E. Sajeevan.

Mr Jinesh (railway health inspector) delivered the vote of thanks. Posters were displayed and leaflets were distributed along with a campaign drive on both the platform.

It was a well attended function and most of the railway officials and public generously participated in the awareness programme. Members who attended from Tellicherry were Dr. Purushothaman, Dr E. Sajeevan, Dr. Rethnakaran, Dr. KPM Ali, Dr. Firoze, Dr. Vijesh Adiyeri, Dr. Latha johny, Dr. Bulna, Dr. Pramith, Dr. Arun, Dr. Prayaga & Dr. Sharika.



▶ Thiruvalla Branch

1. The Third executive committee meeting was held on April 25th 2017 at Vallamkulam, Thiruvalla.

2. The Fourth executive committee meeting was held on May 5th 2017 at Vallamkulam, Thiruvalla

CDE PROGRAMME: The Second CDE of the branch on Clear Aligners was held on May 21st 2017 at KGA Elite Continental, Thiruvalla From 9:00am-4:30pm. Faculty of the CDE was Tariq Ansari.

CDE was very well appreciated by all the Doctors.110 Doctors attended the CDE.

CDH PROGRAMME: No Tobacco Day was observed on May 31st at Thiruvalla Railway Station. There was a public meeting at Thiruvalla Railway Station. Chief Guest was Bishop Geevarghese Mar Coorilos. The function was

very well organized with the help of Indian Railways. That day there was a Magic Show describing the ill effects of Tobacco. Message was given by our Chief Guest followed by an oath. There was a Poster exhibition and Video Presentation also. Soon after the function a rally was conducted by the Doctors along with the children from Scout and Guides. Public Participation was very encouraging for us all. Many Doctors attended this function and made it a grand success.

FAMILY TOUR: Our family tour for this year was at Summer Sand Resort at Vagamon on 17th and 18th of June. The Climate was very good and all of us had a wonderful time with sightseeing and sumptuous food. We all got the opportunity to meet Superstar Mohanlal who was also at the Resort for Shooting. The memories of this tour will always linger on in our minds.



▶ Malappuram Branch

IDA MALAPPURAM branch conducted 2 CDEs

1. Advanced Radiographic interpretation in clinical practice on 4th june 150members attended the cde

2. Life after life of a tooth cde on post endodontic restorations 60 members attended the cde

NO TOBACCO DAY observation was conducted at tirur railway station on may 31

Our CDH wing conducted 2 treatment camp at the free dental clinic at tavanoor

T eachers training programme was conducted at vkm school on 25th may

We conducted grand ifthar and family get together at volga auditorium valanchery on 22 june. The programme was well attended by members



▶ Pathanamthitta Branch

Indian Dental Association branch observed the World No Tobacco Day on 31st May in a befitting manner.

The program was conducted at the Chengannur railway station at 10 a.m. The President of Ida Pathanamthitta Dr Hema Rajesh presided over the function. The CDH representative Dr Rincy Eugene welcomed the gathering. The Station Master Mr EapenThomas inaugurated the meeting. Mr Abey and

Mr Suresh Kumar felicitated the function. Dr JohnnyKutty Jacob lead the anti tobacco pledge. Dr Eugene Varghese Joseph took a class on the ill effects of tobacco and motivated the gathering to stay away from tobacco usage. An Anti tobacco awareness rally was conducted and anti tobacco pamphlets were distributed among the passengers and Railway staffs. Hon Secretary Dr Ralu Varghese bestowed vote of thanks.



▶ Wayanad Branch

No Tobacco Day Programme:

IDA Wayanad branch observed "WORLD NO TOBACCO DAY" grandly with a variety of programmes. We conducted Wayanad run Mini Marathon (10 km for men and 5 km for women). Flag of ceremony was done by Mr. Rajpal Meena IPS. Anti tobacco campaign rally was organized. Students from different schools, NSS, NCC cadets, nursing students, public and branch members participated in the rally.

Poster Competition: We conducted anti tobacco poster competition for UP, HS, higher secondary students. Students from different schools participated.

Public meeting was organized at Sulthan Bathery Municipal town hall. MLA Shri IC Balakrishnan inaugurated the function, branch president Dr. George Abraham presided the meeting. All the winners of marathon and poster competition were awarded with cash prizes, trophies and certificates.

CDE Programmes:

We conducted 5 branch level CDE and one inter-branch CDE.

Family Tour:

Our branch family tour was organized to Mysore.



▶ Mavelikkara Branch

CDH PROGRAM

1. IDA MAVELIKARA conducted a screening camp for kids at kadakkad Jama at Mosque, Pandalam on 9th April 2017.

2. IDA MAVELIKARA conducted a screening camp for tribal kids at Attathodu Tribal School on May 28th.

Around 100 lunch boxes were distributed to the students of the school. We also awarded a cash prize to the best student of the school who was the topper in the SSLC Exams from the school.

3. IDA MAVELIKARA along with Southern Railways observed No Tobacco Day on 31st May at kayamkulam railway station. A video display on cancer awareness and pamphlets were also distributed.

CDE PROGRAMME

IDA MAVELIKARA along with IDA ALAPPUZHA conducted State Cde on June 18th at Hotel Sougandhika, Haripad. The topic was Interceptive and Preventive Orthodontics by Dr. Benoy Ambooken.

Dr. Antony Thomas was the chief guest.



Kodungallur Branch

APRIL

5/4/17 Executive committee meeting was held at hotel Aswathy, Kodugallur. CDE on 27/4/17 at Rotary hall Kodugallur.
 Subject USE OF CBCT IN DENTISTRY Speaker - Dr. ARAVINDH M.S. 3 CREDIT POINTS
 ASAP: Dental assistant training programme was conducted by IDA Kodugallur
 33 students completed 153 hr theory & 153 hr practical class
 Generalbody and CDE program conducted at Rotary hall, Kodugallur on 27/4/2017.

MAY

Excutive committee meeting was held on 10/5/17,@ IMA hall, Kodugallur, CDE Program conducted on 10/05/2017

Subject NEW GEN. ENDODONTICS

Speaker Dr. Aparajithan Mohan MDS

Fifty members attended

3 credit points

10/5/17 General body conducted at Rotary hall, Kodugallur.

JUNE

Executive committee meeting was held on 7/6/17, at IMA hall, Kodugallur, 17 EC members attended.

CDE program held on 11/06/2017 at Rotary hall, Kodugallur

Subject SMILE DESIGN WITH COMPOSITES

Speaker- Dr.R.S MOHAN MDS

46 members attended.

3 Credit point

Generalbody conducted on 11/06/2017 at Rotary hall, Kodugallur.



Malabar Branch

PARTICIPATION IN IDA KERALA STATE 7NS FOOTBALL TOURNAMENT: IDA Malabar participated in the IDA Kerala State sevens football tournament held on 02/04/2017 at ChelariAlungal Mini Flood light stadium Near Calicut University

KULLIRMA 2017 (10,11,12/04/2017): IDA Malabar branch in association with Milma and Sambodh foundation distributed Butter milk (MilmaSambharam) to public who are tiered walking under hot sun in the SM Street the busiest street in the Kozhikode city during hot summer in April 10th, 11th and 12th 2017 for free of cost.

JALAKAM 2017: Jalakam 2017 was a unique IDA Inter Branch Photography contest conducted by IDA Malabar. The contest was based on "Vishu Easter Festive moments" theme

HOPE EOGM (23/04/2017): IDA Malabar hosted the IDA Kerala State HOPE ExtarOrdinary General Body Meeting conducted at Hotel Maharani on 23rd April 2017.

CDE No.4 (Second Inter Branch CDE): AESTHETIC & POST ENDODONTIC RESTORATIONS WITH LIVE DEMO (30/04/2017): The Fourth CDEand Second Inter branch CDE of IDA Malabar branch was held on 30/04/2017 at Hotel Maharani Kozhikode.

TWIRL 2017: IDA Malabar Branch in association with Rotary Calicut Beach conducted a five day workshop for kids between 6 to 15 years, from 3rd May to 7th May at Samskarika Nilayam Kozhikode.

CDH NO.9: DENTAL AWARENESS CLASS & DISTRIBUTION OF DENTAL KITS: IDA Malabar branch took an awareness class for the students of Twirl 2017 on 04/05/17 at Samskarikanilayam Kozhikode. On behalf of IDA Malabar Branch Dr. Mehul R Mahesh tokk the Awareness Class. Dental kits were also distribute

MOTIVATIONAL TRAINING PROGRAMME (10/05/17): IDA Malabar branch conducted a motivational training programme for Adittional Skill Acquisition Programme (ASAP) students.

CDH No.10: DENTAL CHECKUP CAMP AND AWARENESS CLASS IDA Malabar conducted a Dental Checkup and a awareness class on 11/05/2017 at LP School Chaliyam Kozhikode.

CDE NO.5 (TWO DAY CDE): DENTAL IMPLANTS: The Fifth CDEand first two day CDE of IDA Malabar branch was held on 14,15/05/2017 at Hotel Paramount Tower and Govt. Dental College Kozhikode. The Programme was conducted in association with Govt. Dental College Kozhikode.

CDH NO.11: ICDS DENTAL CHECKUP AND AWARENESS CLASS IDA Malabar conducted Dental Checkup Camp and Awareness class at EMS Hall Ollavanna. Around 100 participants were there.

TEACHERS TRAINING PROGRAMME (16/05/2017): IDA Malabar conducted a teachers training programme on 16/05/17 for Anganvadi teachers at NirdheshChaliyam. Dr. Mehul R Mahesh was the Faculty.

HERITAGE WALK (28/05/2017): IDA Malabar conducted a Heritage walk along the Harbour trail of Calicut learning more about our city's business history and also at the same time getting to know about what transpired in the Zamorins land when our ancestors were here.

NO TOBACCO DAY CELEBRATION (31/05/2017): IDA Malabar in association with Southern Railway observes the No Tobacco Day on May 31st at Kozhikode Railway Station. The Programme was inaugurated by chief guest Mr. JosephMathew Station Manager Kozhikoe at 9.30AM at 4th platform presided by Dr. Binu Purushothaman President IDA Malabar Branch in the presence of Dr. Antony Thomas Past President IDA Kerala State who was the Guest of Honour.



