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> Ref. No. ..... Date .....

### MESSAGE

I would like to begin with a hope and desire that all our healthcare providers are safe in this unexpected battle against COVID-19 pandemic which has gripped the world and has cost so much in life & resources.

First of all, I would like to congratulate the Chief and associated Editors, Advisory Board comprising of Professors from various distinguished institutions, other faculty members and contributors, patrons and our beloved stundets and researchers associated with the Journal of Oral and Dental Health. It gives me tremendous delight to see this journal bringing up yet another issue. I want to specially congretulate **Mithila Minority Dental College & Institution** for its brilliant effort and statesmanship for making the Journal of Oral and Dental Health the official publication of L.N. Mithila University, Darbhang.

It gives me immense pleasure to see the Journal in widespread circulation and benefitting numerous researchers and academicians in their quest for scientific temper and knowledge. This Journal and its issues are greatly benefitting Dental professionals and practitioners associated with the field of Dentistry and its allied post-graduate branches, thereby providing an overall enlightenment.

Today, Dentistry has evolved much since its inception and humble beginnings. The skeletal and aesthetic treatment & satisfaction of a patient often involves an interdisciplinary approach. As such, the Journal of Oral Dental Health through its collection of brilliant researches from all across the country, Epidemiological studies and data presented in its various issues boost a lot of confidence in young surgeons and Dentists alike.

I would conclude by wishing lots of success to the Editorial and Advisory Board in its present and future endeavours.

Best wishes & regards,

Contact : 06272 - 222463 (T-F) - Office, 222598 (T-F) - Resd., 222589 (T) - Resd., Mob.: +918544513251, E-mail vc@Inmu.ac.in, vc-Inmu-bih@nic.in

## MESSAGE FROM THE MANAGING DIRECTOR

-It is the supreme art of the teacher to awaken joy in creative expression and knowledge.

#### **Albert Einstein**

I am extremely happy and proud that a new issue of our esteemed Journal is being published. Our editorial team is continuously working hard to upgrade the quality of the publications. I am sure that these articles will be of extreme help to upgrade the knowledge of dental education.

Our faculties and post graduate students are getting an opportunity to publish their work which I am very happy about. And I came to know that even authors from many other Dental Colleges are contributing their articles. This I believe will be an excellent platform for sharing scientific thoughts.

With more and more original articles pouring in, I am sure that Journal of Oral & Dental Health will be one of the premium Journals in the field of Dentistry.

Wishing success and best wishes to the Editorial team.



Managing Director Mithila Minority Dental College & Hospital, Darbhanga, Bihar



Dear Readers,

I am honored to have been chosen as the new editor-in-chief of –The Journal of Oral and Dental Healthl and am thrilled to share my vision for the future of our illustrious journal. The journal will continue to publish high quality clinical and epidemiological research in material and dental disease in later life. Original research articles form the bulk of the content, with systematic reviews an important sub-section. The methodological quality of such publications has improved dramatically over the last few years

Every individual is equipped with talent. Nobody is born to be idle. A person will succeed in life only when he identifies the dormat talents within himself when it happens, there will be a change in the attitude followed by a paradigm shift in



behaviour. However even the best clinical research publications, subjected to close scrutiny by peer review, often have weaknesses. Here editorials and commentaries play a key role in exploring more contentious issues in a balanced way, allowing the reader to make an informed decision on how or whether their clinical practice should be altered.

It is important we have a good balance of different article type within the journal. I am keen to encourage publication of high-quality evidence-based guidelines in dental practice. Such articles are widely read (and downloaded), can have major impact on clinical practice, and also tend to be highly cited to the benefit of our Impact Factor. The journal also has the potential to (re-) shape thinking on important concepts in clinical care, and here \_new horizons' articles have a particular role.

Every obstacle that we come across gives us an opportunity to improve our circumstances, and while the lazy complain, others are creating opportunities through their kind hearts, generosity, and willingness to get things done

Lastly I should thank all our submitting authors, who have toiled in the production of their work, and have chosen Age and Ageing as the journal they would like to publish in. Those that do have their work accepted should be proud of their achievement.

**Dr. Rohit Miglani** Dean Students Welfare

Mithila Minority Dental College & Hospital Journal of Oral and Dental Health • Vol 6 • Issue 2 • 2021 Darbhanga (Bihar)

## MESSAGE FROM THE ADVISORY BOARD

-Research is the creation of new knowledge - Neil Armstrong Greetings to one & all!

It gives me immense pleasure to welcome all avid readers to this inaugural edition of the Journal of Oral and Dental Health. This Journal is an official publication of the Mithila Minority Dental College & Hospital, Darbhanga (Bihar) affiliated to the State run Lalit Narayan Mithila University, Darbhanga, Bihar State (India) established and administered by the State Govt. of Bihar State and holds abundant potential to provide a platform for budding research professionals in Dental Sciences across the country and the South East Asian region.

In today's era of constant need of advanced technologies in every discipline, it has become imperative for young professionals and academicians alike to keep themselves updated with the latest scientific innovations & break through. This is only possible through a constant review of scientific literature and adopting a temperament of scientific research.



Every scientific break through has been made possible only by inculcating a scientific temperament which promotes scientific curiosity & research in individuals. Research is a constant and dynamic pursuit of an idea and developing into an hypothesis, testing it through various methodologies which finally culminates into publishing it through various platforms.

A publication signifies the efforts of various individuals associated with an idea and the results and thus a scientific journal is a worthy platform which helps in showcasing these efforts. This journal, a culmination of efforts from stalwarts of various disciplines, will definitely prove to be wonderful opportunity for academicians as well budding professionals

My gratitude to the Founder Chairman of Mithila Minority Dental College & Hospital and the leadership of this journal, the Chief Patron – Acharya Shaukat Khail for his invaluable guidance. I thank the Patron of the Journal as well as Managing Director of MMDCH Mr. Imbesat Shaukat for getting me on board with this wonderful initiative. I thank the Editor in Chief, Dr. Rohit Miglani and the rest of the Editorial Board for their support.

I also take this opportunity to invite faculties in various dental institutes, clinicians, students, etc. to contribute to this journal by sending in their scientific studies and help enhance the scientific content of our discipline of dentistry.

Lastly I congratulate the authors of the articles of this inaugural edition for successful publication of research.

Thank You Regards DR. ARUN S. DODAMANI Principal, Prof & Head, Dept. of Public Health Dentistry, A.C.P.M. Dental College, Dhule

#### Maharashtra University of Health Sciences, Nashik

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Hon. Gen. Secretary Indian Association of Public Health Dentistry – Maharashra Chapter

Journal of Oral and Dental Health • Vol 6 • Issue 2 2021

Dear Readers,

Authors of various articles appriciated for chosen "Journal of oral & dental health" for publication. How ever our priority of publication is always remains for innovative research, work.till date no concretework has been done on prevention of spread of viral infection from patient to dental surgeon vice versa.

So scope is awaited for research & innovation. Hope authors take interest to gohead with research on this aspect brings shield of Protection.



Dr. M.S. Raju, Principal, Professor & Head , Oral Medicine & Radiology Editor in Chief Journal of Oral & Dental Health

> Mithila Minority Dental College & Hospital Journal of Oral and Dental Health • Vol 6 • Issue 2 • 2021 Darbhanga (Bihar)

## **MESSAGE FROM THE CO-EDITOR**

"Student: Dr. Einstein, Aren't these the same questions as last year's [physics] final exam?

Dr. Einstein: Yes; But this year the answers are different." – <u>Albert Einstein</u>

The quantum of knowledge that we are acquiring everyday is in fact enormous. Dental field is no exceptional. How to implement this knowledge is the onus on us. To carry forward the science and pave future paths for coming generation of aspiring researchers. Journal of Oral and Dental Health , the official publication of L.N.Mithila University has till now tried to maintain its standard in publishing remarkable works in the field of Dentistry. Our endeavour and focus is on making this journal relevant and contemporary with a higher impact and greater significance. Articles from all fields of dentistry from various colleges of the country are incorporated not only get a diversified view but to maximise chances of citations. We scrutinize all articles, get it reviewed by experts following plagiarism checks to deliver authenthic works.



Finally, I would like to thank the management of MMDCH to provide all possible help and continuous support in regular uninterrupted publishing of the Journal. I would like to thank the authors, readers, reviewers for their great help and support and cooperation.

I wish the Journal will reach newer heights in future.

Prof (Dr) Dipto De

Co-Editor Journal of Oral and Dental Health

## **MESSAGE FROM THE CO-EDITOR**

"Education's purpose is to replace an empty mind with an open one."

#### - Malcolm Forbes

Greeting to all,

The Journal of Oral & Dental Health is an Open Access online journal, (An Official Journal of Lalit Narayan Mithila University, Darbhanga, Bihar) publishes Research articles, Reviews, case reports, innovations, letters and guest edited single topic issues in the field of different specialities of Dentistry, aiming at providing the most complete and reliable source of information on current developments in the field.



Each peer-reviewed article that is published is universally and freely accessible via the Internet in an easily readable and printable PDF format.

I, on behalf of Mithila Minority Dental College & Hospital- a PG institute welcome authors to contribute their original researches, cases & Innovations. We are delighted to receive articles from various state of our country. I thank the contributors for their cooperation in the present issue. I also thank the associate editors, managing editors, The review committee & advisory board for their valuable support and suggestions for the betterment of JODH.

**Prof. Dr. Amit Kumar** Professor Department of Orthodontics & Dentofacial Orthopedics Mithila Minority Dental College & Hospital, Darbhanga

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# **Comparative Evaluation of Gingival Zenith Positions and Levels of Maxillary Anterior Dentition in Males and Females**

#### Abstract

The aesthetic evaluation of dento-facial structures always starts with smile analysis. The position and level of the gingival zenith directly relates to the aesthetics of the smile. Therefore, it is expected from the dentist to preserve, create, or enhance a pleasing smile without impairing function. The aim of the study was to evaluate the gingival zenith position and level in maxillary incisor and canine and their comparison in male and female. Two hundred young adults (100 males and 100 females) within the age group of 21 to 30 years with healthy gingiva were randomly selected. Impression making was done.

Gingival zenith level and position was calculated, statistical analysis was done using spss software and it was found that there was statistical significant differences in the mean Gingival Zenith Position (GZP) values of different tooth types, The mean GZP of lateral incisors in males was found to be higher and statistically significant than that of females(p<0.05). The Gingival Zenith Level (GZL) of lateral incisor was found to be  $0.83\pm0.38$  mm coronally compared to other teeth . There was no statistical significant difference between the mean GZL in males and females (p>0.05).

Shweta Singh<sup>1</sup> Vijayendra Pandey<sup>2</sup> Tanya<sup>3</sup> Alok Kumar Gupta<sup>4</sup> Ashok Kumar<sup>5</sup> Rohit Singh<sup>6</sup>

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#### **INTRODUCTION**

A smile makeover can change a person's appearance virtually overnight.<sup>1</sup> . An ideal smile depends on the symmetry and balance of the dento-facial features<sup>2</sup>. Healthy gingiva is an important component of a beautiful smile<sup>3</sup>. **Bensimon GC<sup>4</sup>** in1999 described it as "allowing a thin, scalloped, knife edged gingival contour with pyramid shaped papillae that fill the interproximal space. Gingival zenith position is one of the significant clinical parameters of gingival morphology that is the distance of the gingival zenith from the VBM (VerticalBisected Midline) axis of each individual maxillary anterior tooth . Other significant feature of gingival morphology is the gingival zenith level, which is defined as the line joining the tangents of the gingival zeniths of the central incisor and canine<sup>5</sup>. Here is the study evaluating the influence of gender on the gingival zenith position and levels.

## **AIMS & OBJECTIVES**

The aims & objectives of this study were to evaluate and establish the following

two clinical parameters and the influence of gender on these parameters i.e.

1. To evaluate and establish the Gingival Zenith Position (GZP) by measuring distance of Gingival Zenith from Vertical Bisected Midline (VBM) axis of each maxillary incisor and canine.

2. To evaluate the Gingival Zenith Level (GZL) in an apical coronal direction of the lateral incisors relative to the gingival line joining the tangents of the gingival zenith of the adjacent central incisor and canine under healthy conditions.

3. To compare the Gingival Zenith Position (GZP) and Gingival Zenith Level (GZL) in

male and female subjects.

### **MATERIALS & METHOD**

The present study was conducted on the relatives of the patients visiting the Out-

Patient Department of Periodontology and students of Vananchal Dental College and

Hospital, Farathiya, Garhwa. Two hundred young adults (100 males and 100 females) within the age group of 21 to 30 years with healthy gingiva were randomly selected. Approval for the study was obtained from Institutional Ethical Committee of Vananchal Dental College & Hospital. All subjects were informed about the nature of the study and informed consent obtained. Only those subjects who satisfied the following inclusion criteria were selected for the present study.

#### Inclusion criteria:

Subjects with non restored maxillary anterior teeth, absence of crowding or spacing in maxillary anterior teeth, absence of any signs of gingival recession, gingival overgrowth, or altered passive eruption, no missing tooth in anterior region of maxilla, smoker and pregnant women.

#### METHODOLOGY

Impression making was done

# Steps for measuring Gingival Zenith Positions and Gingival Zenith Levels

A digital calliper with a light emitting diode (LED) display was used to measure 2 sites per tooth of the anterior maxillary teeth on the respective stone casts<sup>6</sup>. The digital calliper was calibrated prior to each measurement. Reference lines were drawn on the stone casts with indelible marking pencil using 2.5 magnification optical loupes. The proximal incisal contact area position and the apical contact area position served as the reference points to define the tooth width. Each width was divided in half, and the centre points were marked. Centre points were extended to a line toward the gingival aspect of the clinical crown to define the Vertical Bisected Midline (VBM).

The most apical point of the free gingival margin was marked as gingival zenith. The distance of the gingival zenith to the VBM was measured for central incisors, lateral incisors, and canines to obtain the gingival zenith position (GZP) in a medio-lateral direction. The gingival line (i.e. a line joining the tangents of the gingival zeniths of central incisor and canine) joining maxillary centrals to the canines was drawn<sup>3</sup>. The distance of the contour of the gingival margin for the lateral incisor was measured from the line to obtain the Gingival Zenith Level (GZL) in an apico-coronal direction of the lateral incisors relative to the adjacent central and canine gingival zenith points.

The data thus collected was subjected to statistical analysis.

## RESULT

Statistical analysis was done using Statistical Package for Social Sciences (SPSS 11.5). Descriptive statistics were used to find out mean Gingival Zenith Positions and mean Gingival Zenith Level. Comparison of means of GZP and GZL between males and females was done using independent sample t-test, and comparison of mean GZP of different tooth types was done employing Analysis of Variance (ANOVA). The level of significance was fixed at p<0.05. Hence, the results presented are on account of the following parameters-

1.Comparison of Gingival Zenith Position for central incisors, lateral incisor and canines

GZP	Ν	MEAN±.SD	Р
			VALUE
CI	200	.74±.39	0.00(HS)
LI	200	.20±.29	0.00(HS)
CANINE	200	.33±.35	0.00(HS)

p<0.001: Highly Significant (HS)

**Table 1.** Shows comparison between mean Gingival Zenith Positions of central incisors, lateral incisors and canines which was done using one-way ANOVA. The analysis showed that there were statistical significant differences in the mean GZP values of different tooth types . The post-hoc analysis showed that the mean GZP of central incisors was higher than that of lateral incisors and canines (p<0.05). Also, the mean GZP of cances was found to be higher than that of lateral incisors (p<0.05). The p value was found to be highly significant on comparison for central incisors, lateral incisors and canines.

2.Comparison of Gingival Zenith Position for central incisors, lateral incisor and canines for males and females.

GZP	MALE(100)±SD	FEMALE(100)±SD	
CI	.74±.39	.76±.40	.71(NS)
LI	.24±.27	.19±.26	.03(S)
CANINE	.40±.35	.29±.37	.13(NS)

p≤0.05:- Significant(S); p>0.05:-Not Significant

**Table 2.** Shows comparisons between mean Gingival Zenith Positions (GZP) values between males and females. There were no statistical significant differences between the mean GZP of central incisors and canines (p>0.05). However, there were statistically significant differences between males and females in relation to mean GZP of lateral incisors (p<0.05).

3.Distance of the Gingival Zenith Level (mm) of the lateral incisors in an apico- coronal direction relative to the gingival line, joining the tangents of the gingival zenith position of the adjacent central incisor and canine teeth.

	Ν	RAN	MINIM	MAXIM	MEAN±
		GE	UM	UM	SD
GINGIV	20	1.99	0.00	1.99	.83±.38
AL	0				
ZENITH					
LEVEL					

**Table 3.** Shows the mean Gingival Zenith Level (GZL) for lateral incisor which was found to be  $0.83 \pm 0.38$  mm. The range of values measured was 0 to 1.99 mm.

4.Gender-wise comparison of Gingival Zenith Level of the population.

Gingival	Males(100)	Females(100)	P Value
zenith level	Mean±SD	Mean ±SD	
Gingival	.85±.38	.82±.39	.44
zenith level			

**Table 4** shows the comparison of mean Gingival Zenith Level (GZL) in males and females. The mean GZL in males was found to be  $0.85 \pm 0.38$  mm, and in females it was  $0.82 \pm 0.39$  mm. There was no statistical significant difference between the mean GZL in males and females (p>0.05).

#### DISCUSSION

Gingival Zenith Position (GZP) and the Gingival Zenith Level (GZL) can significantly influence the esthetic appearance of a smile. Many factors are important for aesthetics and limited research has been conducted to quantify these two clinical parameters:

(1) The GZP i.e the distance of the gingival zenith from the VBM (VerticalBisected Midline) axis of each individual maxillary anterior tooth.

(2) The GZL i.e. the distance of the gingival zenith of the lateral incisors in an apico-coronal direction from the line joining the tangents of the gingival zenith of the adjacent central incisor and canine under healthy conditions.

In the present study the distance of the gingival zenith position (mm) from the vertical bisected midline of the clinical crown along the long axis for central incisors, lateral incisor and canine was measured. For central incisors the mean Gingival Zenith Position (GZP) was found to be  $0.74 \pm 0.39$ mm, for lateral incisor  $0.20 \pm 0.29$ mm, and for canine was  $0.33 \pm 0.35$ mm. It was found that there was distal displacement of the GZPs of all three teeth i.e. central incisor, lateral incisor and canine. These findings are similar to the studies done by **Magne and Belser** & **Morr** T<sup>7</sup> who suggested that the GZP was distal to the long axis of all the maxillary anterior teeth.

On comparing the Gingival Zenith Positions (GZP) of central incisors, lateral incisors and canines it was found that the value of mean GZP of central incisors was more statistically significant than that of lateral incisors and canines. Also, the mean GZP of canines was significantly higher than that of lateral incisors. According to the results in the present study gingival zenith position was more distally placed on central incisors & canines than lateral incisors. These results are in accordance with the study done by **Rufenacht**<sup>8.9</sup>who found that the GZP was distally displaced on the central incisors and canines only, whereas those of the lateral incisors were coincident with the vertical bisected midline which is in contrast to our study.

In the present study the gender wise comparison of mean GZP for central incisors, lateral incisor and canines for males and females was done. This comparison was done between 100 males and 100 females of same age group. There was no statistical significant difference between males and females in relation to the mean GZP of central incisors and canines. However, there were statistical significant differences between males and females in relation to mean GZP of lateral incisors which were higher in males than that of females. So far to our knowledge no similar study has been done before showing the gender difference in relation to the GZP.

In the present study, the mean distance of the contour of the gingival margin in an apico-coronal direction of the lateral incisors (GZL) relative to the gingival line joining the tangent of the adjacent central incisor and canine GZPs was found to be coronally placed at  $0.83 \pm 0.38$  mm. The range of values measured was 0 to 1.99 mm. These findings are in accordance with the study done by Mattos and Santana where the coronal displacement of the gingival zenith of the lateral incisor was found to be 0.70  $\pm$  0.60mm. **Rufenacht** <sup>10</sup> suggested that for a Class 1 occlusion, the ideal GZL should be where the gingival contours of the central incisors and canines are at the same level and the lateral incisor positioned slightly more coronal. In Class 2, division 2 malocclusions, the GZL of the lateral incisors are more apical compared with that of the central incisors and canines, as the lateral incisors tend to overlap the distal aspects of the central incisors.

In the present study the gender wise comparison of mean GZL was done for males and females. This comparison was done between 100 males and 100 females of same age group. There was no statistical significant difference between males and females in relation to the mean GZL.Similar results were observed by **Charruel et al**<sup>11</sup> where analysis of the data showed no difference between genders.

The data provided can be used clinically to determine the ideal positioning of the gingival margin during periodontal crown lengthening and root coverage procedures, orthodontic, restorative, and orthognathic surgical therapy.

## CONCLUSION

The conclusions drawn from the present study are:-

1. The mean location of the Gingival Zenith Position (GZP) from the Vertical Bisected Midline (VBM) of the central incisors, lateral incisors, and canines was about 0.74 mm, 0.20 mm and 0.33 mm, distal respectively.

2. The Gingival Zenith Positions of all three teeth i.e. central incisor, lateral incisor and canine lies distally to the vertical bisected midline. While the mean GZP of central incisor is more distal than that of canines which in turn is more distal than that of lateral incisors.

3. There was no statistical significant difference between males and females regarding the mean Gingival Zenith Position of central incisors and canines. But the mean Gingival Zenith Position of lateral incisors was found to be more distal in males than that of females.

4. The Gingival Zenith Level in an apical-coronal direction of lateral incisors relative to the gingival tangential zenith line joining adjacent central incisor and canine was approximately 0.83 mm placed coronally under healthy conditions.

5. There was no statistical significant difference regarding the mean Gingival Zenith Levels between males and females

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#### **Research Article**

# Assessment of oral health status and periodontal treatment needs among rural and urban population of Udaipur District, Rajasthan State

#### Abstract

**Background:** The dental profession has the primary responsibility for the oral health care of the public, and through the enforcement of Dental Practice Acts, it has included essentially all the exclusive jurisdiction for the provision of oral health care in all subsets of populations. The community periodontal index of treatment needs (CPITN) provides a picture of the public health requirements in the periodontal field, which is essential for national oral health policy- making and specific interventions

**Materials And Methods:** An epidemiological, cross sectional survey was carried out on 1000 subjects of either sex which were equally divided into 500 participations belonging to rural and urban sectors and further equally divided into two subgroups according to the age were selected to assess their periodontal status, hygiene awareness and treatments needs.

**Results:** An inference was drawn from the results that among 1000 participants from the two population groups in rural group maximum, i.e.,51.8% of individuals needed TN2 whereas 26.8% of individuals needed TN3 and 21.4% of individuals needed TN1 and in urban group it is maximum, i.e.,63.6% of individuals needed TN2 whereas 18.2% of individuals needed TN3 and TN1.

**Conclusion:** There is a need to educate people about the significance of oral health-related problems, maintenance, link with general health, especially among the rural population by different out reach programs and public health awareness measures to create a hale and hearty civilization This is a serious concern, as the non urban areas suffer from lack of oral health education and utilization of health care facilities, continuing from decades.

Keywords: periodontal treatment, oral health status, population group

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### INTRODUCTION

The prevalence of periodontal disease in India ranges from 90% to 95% in different population groups, and the periodontal conditions differed in severity between the various age groups and numerous studies showed increase in disease severity with

advancement of age.<sup>1</sup> Access is one of the main barriers of health care delivery system in the present situation which should be overcome by establishment of primary health care setup <sup>2</sup>. One of the strategies in public health surveys is to identify unique population groups, study their health problems and disease prevalence's and explore methods for delivering health care services<sup>3</sup> The dental profession has the primary

responsibility for the oral health care of the public, and through the enforcement of Dental Practice Acts, it has included essentially all the exclusive jurisdiction for the provision of oral health care in all subsets of populations. The magnitude of these conditions as evidenced by numerous studies states the universality of the diseases prevalence's and the extensive levels of untreated pathology still persists as a major public health problem in different subsets of populations in a major proportion<sup>4</sup>. Udaipur is the third largest city of Rajasthan region having diverse subsets of populations residing in various subsets of rural as well as urban industrialized sectors. Dental disease levels do have an association with cultural differences, low socioeconomic status, lower educational levels, inadequate oral health knowledge, improper oral hygiene, less dental visits, highly cariogenic diet and non-adherence to dental hygiene practices5.

The present study was designed to assess the oral health status and periodontal treatment need among rural and urban population of different age group in Udaipur district of Rajasthan state.

## MATERIAL AND METHOD

# BRIEF PROFILE OF THE STUDY POPULATION

#### **Study Design Area and Population**

The subjects for the present study were selected randomly from rural and urban population of Udaipur district, Rajasthan State. An epidemiological, cross sectional survey was carried out on 1000 subjects of either sex which were equally divided into 500 participations belonging to rural and urban sectors. 500 participants from each population groups (rural and urban) were selected which were further equally divided into two subgroups according to the age i.e.

**Group 1:** Rural population divided into two groups consisting of 500 individuals:

1A (15-35 years) 1B (36-60 years)

**Group 2:** Urban population divided into two groups consisting of 500 individuals:

2A (15-35 years)

2B (36-60 years)

were selected to assess their periodontal status, hygiene awareness and treatments needs.

**Table 1:** Distribution of percentageprevalence of periodontal disease and treatment need in Rural (Group1) and Urban population (Group 2).

	Ti			
Group	TN1	TN2	TN3	Total
Rural	107	259	134	500
% Prevalence	21.4%	51.8%	26.8%	100%
Urban	91	318	91	500
% Prevalence	18.2%	63.6%	18.2%	100%
Total	198	577	225	1000
	Pearson Chi- Square	15.54	p-value	<.0001**





Where N/C= Neem/Charcoal, F/TPO= Finger / Tooth Powder, F/S+O = Finger/ Salt with Oil, F/S = Finger/ Salt, B/PA= Tooth brush/ Tooth paste, B/PO= Tooth brush/ Tooth powder.

## Method of obtaining data: (CLINICAL ASSESSMENT AND DATA COLLECTION)

The data were collected by means of a door-to door survey and at places of work. The recorder was made to sit close to the examiner so that instructions and codes could be easily heard and the examiner could see that the findings were being recorded correctly with the aid of a mouth mirror, explorer and CPI probe under adequate natural light.

## Clinical Examination: ORAL HEALTH ASSESSMENT FORM:

A self-made structured close ended questionnaire consisting of sections assessing the disease prevalence was prepared which included the information's related to the patient's name, age, sex, socio-economic back ground and the residential area. The questionnaire was further categorized to evaluate the knowledge, practices ,methods, frequency and duration for oral hygiene practices, and behavior pattern related to oral health and community periodontal index of treatment needs (CPITN) were assessed using this questionnaire.

#### **Exclusion criteria**

- . . . . . .
- Patients under 14 years of age.
- Edentulous individuals
- Subjects with partial dentition having two or more missing teeth.
- Subjects who were systemically / mentally compromised and are on medication.
- Subjects with history of smoking, history of alcohol use, smokeless tobacco use and drug abusers.
- Presence of any oral lesions apart from periodontal disease manifestations.
- Pregnant or lactating females.
- Presence of multiple carious teeth.

## **EXAMINATION PROCEDURE**

The oral examination of each individual was carried out using the questionnaires Performa. Clinical examination was carried out under natural light using dental flat mirrors and CPITN Probe (Designed by WHO/IDF) with application of a gentle probing force (20g/N or lower) according to the WHO criteria.<sup>5</sup>

Six segments of each index tooth were assessed, for pathological pockets depth and measured at six sites around each tooth which includes (mesial, mid-buccal/lingual/palatal and distal on both vestibule and lingual/palatal surface). The index tooth included in the study were 16, 11, 26 for maxillary arch and 36, 31, 46 for manibular arch. If less than two functional teeth existed, the sextant was classified as edentulous and was excluded from the study. Each sextant, based on which tooth showed the worst situation a Grade was assigned and was registered according to the highest recorded at the index teeth.

A sextant on examination was designated as healthy and (Code 0 = TN 0) was assigned when on periodontal examination no gingival inflammation was detected and no treatment were required. In case of bleeding on probing without presence calculus, improvement of oral hygiene was indicated and (Code 1 = TN1) were assigned. In the presence of calculus and absence of pathological periodontal pocket, oral hygiene instructions and professional cleaning were indicated and (Code 2 = TN2) were assigned. In the Presence of 4 - 5 mm probing pocket depths (Code 3 = TN 2), and in presence of 6 mm or deeper probing pocket depth (Code 4 = TN3) were assigned and treatment by deep scaling and root planning with more complex surgical procedures were indicated<sup>6</sup>.

#### **Calculation of CPITN:**

The CPITN for a population group was calculated as follows:

**Step 1:** Number of charts with different code individually i.e. (0,1,2,3,4) were counted.

**Step 2**: All the individuals were given Treatment need (TN) i.e. TN 0, TN 1, TN 2, TN 3 according to their codes respectively.

**Step 3**: Each population group was assessed as per their treatment needs and their percentage prevalence was obtained.

**Step 4:** Inter group assessments were made using their percentage prevalence.

All information and data were collected by personnel interview method and oral cavity examination. Only completely filled forms were considered for statistical analysis.

## STATISTICAL ANALYSIS

Statistical analysis was done by using statistical package for social science (SPSS version 21. Chicago Inc. USA) data comparison was done by applied specific statistical test to find out the statistical significance of the comparisons. Quantitative variables were compared using mean value and qualitative variables using proportion.

Significance level was fixed at p < 0.05.

#### RESULT

The primary aim of the present study was, to assess the oral health status and periodontal treatment needs among rural and urban population of different age groups of Udaipur district of Rajasthan state.

## DISCUSSION

The objective of the present study was to deliver a systematic evidence on the periodontal health status of the rural and urban population of Udaipur district, which may further aid in the planning for prevention and oral health advancement programs. There was no participant in any of the population group with a completely healthy periodontal tissues so TN Code 0 was not assigned to any of the population groups and was not included in the statistical analysis

On gathering the results of the present study, we perceived a high percentage of periodontal disease and Treatment Needs 2 i.e oral hygiene instructions and professional cleaning needed in the urban population (63.3%) as compare to rural population (51.8%) which on comparison were highly significant and the possible reason for this could be inferenced from the present facts that because of the rapid urbanization and industrialization of Udaipur city, many food chains had been opened in recent times and food habits of individuals had been changed due to lack of time due to which more intake of processed food had been included in their daily diet regimes and apart from it presence of adverse habits like tobacco chewing and smoking present in the major group of populations as per the data collected could be a possible reason for an increase in Treatment need 2 in urban population while rural population still have coarse foods in their daily diet regime which do help in removal of plaque to some extent. While treatment need 1 recommended to improve the oral hygiene were almost similar in rural and urban population 21.4% and 18.2% respectively and Treatment Need 3 deep scaling, root planning and more complex surgical procedures on comparisons were also almost similar in rural and urban group inferenced to about 26.8% and 18.2%respectively.

On comparison within Rural group of populations Group 1A (15-35 years) and Group1B (36-60 years) for the percentage of periodontal disease incidences and the codes obtained for

Treatment Need 1, Treatment Need 2 and Treatment Need 3 were almost similar (20%, 22.8%; 50%, 53.6%; 30%, 23.6%) respectively which was on comparison were not statistically significant and the possible reason for this could be inferenced that both rural groups had same lifestyle, awareness for maintenance of oral hygiene and followed a similar oral hygiene practices on a regular basis.

On comparison within Urban group of population Group 2A (15-35 years) and 2B (36-60 years) the percentage prevalence of periodontal disease incidencesand Treatment Need 2 in urban group 2A population was (73.2%) as compared to Group 2B (54%) which on comparison were highly significant and the possible reason for this might be due to eating habits and lack of oral hygiene practices and awareness and apart from its presence of adverse habits like tobacco chewing and smoking in youngsters have duly increased in recent times could be a possible reason for an increase in need of Treatment need 2.

Treatment Need 1 were almost similar in urban group 2A and Group 2B population 18.8% and 17.6% respectively. While treatment need 3 was more in Urban Group 2B 28.4% as compared to Urban Group 2A 8% which was statistically significant the possible reason could be the age factor which is in accordance to age related increase in periodontal disease which is in agreement with the general trend observed in majority of the studies which depicts age as a surrogate for the length of exposure to etiological factors.

On comparison of Group 1A (15-35 years) and Group 2A (15-35 years) the percentage prevalence of periodontal disease and treatment needs 2 in Group 1A population was (50%) as compared to group 2A (73.2%) which on comparison were highly significant While treatment need 1 were almost similar in rural group 1A and urban group 2A population 20% and 18.8% respectively. While treatment need 3 were more in rural group 1A 30% as compare to urban group 2A 8% the possible reasons which could have contributed to this could be due to exposure to certain risk factors such as smoking, chewing tobacco and use of indigenous oral hygiene methods for cleaning teeth along with lack of oral hygiene awareness in rural population group.

On comparison rural population group 1B (35-60 years) and urban population group 2B (36-60 years) the percentage of periodontal disease and treatment needs 1, treatment need 2, treatment need 3 were almost similar (22.8%, 17.6%; 53.6%, 54%; 23.6%, 28.4%) respectively which on comparison were not statistically significant and the possible reason for this could be inferenced that both groups were of same age groups.

On collection of data for techniques of oral hygiene practices 37.8% of rural and 78% of urban population used tooth brush with paste as a method for cleaning their teeth. This was due to the trends and changes in accessibility and availability of information, governance and improved economic situations over the time have resulted in high use of toothbrush and tooth paste in urban sectors. However on obtaining the data for various other methods of teeth cleaning, higher incidences of inappropriate methods of teeth cleaning 26% of rural compared to only 22% of urban population used tooth brush with powder as a method for teeth cleaning also on the contrary 14.2% of rural population also had a habit of using neem stick with charcoal, and 15.8% of rural population used only finger with tooth powder and 5.8% used finger with salt and oil which clearly states that healthier tooth cleaning habits are better reported in urban groups of populations and rural groups of population lacks proper education for correct oral hygiene practices and tend to use those techniques which are easily accessible and more comfortable for them.

Although brushing was the commonly used method of cleaning in both the groups, the percentage of subjects brushing their teeth twice daily was 47.3% in urban population in comparison to only 1% present in rural population groups which depicts a picture that urban population groups do lay an importance in maintaining oral hygiene which could be explained from the fact that oral hygiene importance are being imparted to them since their childhood probably due to school education and various other media such as televisions, radio and wide extent of advertisements of oral hygiene products.

On collection of data for the types of tooth brush used data revealed that only 0.2% of the rural population used soft tooth brushes, as compared to 37.4% of urban population who used soft brushes as a tool for brushing. 28.2% of rural population and 46.6% of urban population used medium types of brush, and 36% of rural population used hard brush and 35.6% of rural population and 15.6% of urban population never noticed the type of brush they have used in their routine oral hygiene practice.

It was noteworthy that 61.6% of rural population and 14.4% of urban population brushed their teeth using the traditional horizontal method, which have incidences of jeopardizing the tooth structure. This finding was in agreement with the study done by Zhu *et al.*<sup>64</sup> where 60% of the population sampledid the same, whereas in urban population 37% brushed in vertical motion and 48.6% brushed using the combined method.

On collection of data in regard for frequency of changing tooth brush 40.8% of rural and 15 % urban population had a tendency to change their brushes when it was completely frayed or unusable and 2.6% of rural compared to 51% of urban population had a habit of changing their brushes in 3 months and 19.8% of rural and 34% of urban population change their tooth brushes in 6 months.

51.4% of rural and 92.8% of urban population had a knowledge and habit of cleaning their tongue on a regular basis with tooth brush or by using a tongue cleaning aid and almost equal numbers of individuals in both the population group had the habit of rinsing their mouth with plain water after eating food at regular intervals as the most utilized and regularly implemented method of maintaining oral hygiene.

73.4% of rural and 88% of urban population desired to get their teeth clean while 26.6% of rural and 12% of urban population was not keen on getting their teeth clean or undergo a professional prophylaxis.Present study elicited worse periodontal health among both the groups and indicated a need for immediate awareness, professional cleaning in both the rural and urban sectors of Udaipur, and more attention has to be undertaken to motivate the people in both the groups for importance of maintenance good periodontal health. Adequate treatment facilities should be provided to the population of all age groups.

## SUMMARY AND CONCLUSION

The knowledge about dental problems and attitude towards dental need of the study subjects about oral health were found to be non satisfactory, but the oral health practices seemed to be acceptable. This study points to the fact that knowledge regarding oral health and oral hygiene maintenance techniques is not well known to the rural population as compared with the urban population. This is a serious concern, as the non urban areas suffer from lack of oral health education and utilization of health care facilities, continuing from decades.

There is a need to educate people about the significance of oral health-related problems, maintenance, link with general health, especially among the rural population by different outreach programs and public health awareness measures to create a hale and hearty civilization.

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#### **Research Article**

# Normal Mouth Opening in an Adult Mithilanchal Population

#### Abstract

**Introduction**: It is seen that mouth opening in different population have significantly differ in same age groups. Limitation of mouth opening is one of the early signs of many pathological and traumatic conditions. Early recognition of decreased or limited mouth opening is necessary for a prompt and efficient approach to diagnosis and to plan the treatment options judiciously. The recent studies have shown that the mouth opening differ with the different geographical locations and age group. This present study is attempt to calculate the normal mouth opening in adult Mithilanchal population so that it enables a surgeon to establish a proper knowledge of normal range of mouth opening of this region. This is the first study which is conducted in this population.

**Methodology**: A total number of 1000 adults. In which 639 were male and 361 were females, in the age range of 18 to 75 years in this study. Subject were asked to open their mouth till no further mouth opening is possible. Inter incisor distance were measured by the calibrated metal ruler. To determine the correlation of mouth opening as per age, sex and in different age groups, and analysis was performed and statical signification was tested.

**Result**: Mean maximal mouth opening for males was 52 mm (S.D 9mm). it ranges from 46 mm to56mm, the maximum mean value in female was 44 mm (S.D 5mm) ranges from 42mm to 48mm, there was significant difference in mouth opening in male and female in all age group.

**Conclusion**: The mean maximal mouth opening in mithilanchal population of male is 52mm and for female 44mm, the mouth opening seem to be decrease with age.

**Keywords:** Mouth opening, Mithilanchal population, inter incisor distance.

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## **INTRODUCTION**

Mithilanchal have a very vibrant and old culture in northern India eating habits, such as spicey foods, paan, betelnut are the part of their culture. A long percentage of population both male and female have frequent pan chewing habits. According to many scientific research frequent betelnut chewing is the main etiological factor of causing an OSMF (oral submucous fibrosis), OSMF lead to reduced mouth opening and later it hampers proper function and esthetics of the individual, and have potential to convert in to malignancy, many other causes that also lead to reduces mouth opening such as, maxillofacial trauma, T.M.J disfunction, Limited mouth opening is an early sign of many pathological diseases. Variation in range of mouth opening seen most common in different regions. Research has shown the measurement of mouth varies significantly with age, sex, and races<sup>2</sup>. Many studies across worldwide conducted to evaluate the mouth opening in their population. However, it is first time that such types of study are done on this population groups.

### PURPOSE OF STUDY

To evaluate the normal mouth opening range in different age group and stabilized ideal mouth opening during corrective surgery in different age groups in Mithilanchal population.

#### **METHOD**

This present study was carried out in a Mithila minority dental college and hospital. Total numbers of adults 1000 were included, in which males were 650 and female were 350, age range was from 18 to 75 years. Subjects were further sub divided in to five groups according to their age. In group I (18 to 30 years), group II (30 to 40), group III (40 to 50), group IV (50 to 60 years), group V (60 to 75 years). The mouth opening was measured using all standardized protocol. Subjects are asked to open their mouth till no pain or further mouth opening is not possible. Two consecutive measurements were taken between the inter incisor distance of upper central and lower central incisor was, by using calibrated metal ruler. All these measurements were taken by single examiner.



Fig.1 showing normal Mouth opening

#### Inclusion criteria

- Age 18 years and above
- No history of trauma, malignancy, pathology, impaction, TMJ disorder or any surgery on face or jaws.
- upper and lower anterior teeth must be present.

#### **Exclusion criteria**

- Less than 18 years
- Completely edentulous
- No anterior teeth.
- Any history of TMJ disorder, OSMF, etc

#### DISCUSSION

Mouth opening is a commonly used term in our daily practices. Number of pathological conditions which can alter the normal range of mouth opening. Many studies and research are done to find out the most common cause to reduce the mouth opening. S.C Cox et al 1997 did a study on 700 napalese including both male and female over 6-month period and they found that OSMF was the most common cause for reducing mouth opening in these population<sup>2</sup>. Agerberg G did a study in 1974 and find in his study that the mouth opening is occasionally related to factor such as body, height, although no direct proportion have been found<sup>3</sup>. Michad mezitis et al found in their study that mouth opening various from age to age<sup>4</sup>. Ranvleen nagi et al in 2017 did a study to evaluate the maximal mouth opening in different

age groups and they suggested that three figure is a convenient and reliable tool for assessing normal maximal mouth opening and most appropriate method to measure normal mouth opening for indivsual<sup>5</sup>. Pullinger et al studied the angle of opening at tmj and found it to be increases in woman. When they should have a greater range of mouth opening. When the measurement is corrected for stature and body mass but still have lesser mean mouth opening as compared to men.

The present study attempts to calculate the mouth opening for Mithilanchal male and female adult population and indifferent age groups. This data is important because of many complex surgical procedures are routinely performed in this part without proper references value. Inevitable reference to international data is obviously not justified as the mouth opening, is clearly different in different population. As in this study we found that mouth opening is not related to body mass or stature and it seem to decreases with age.

#### RESULTS

Mean maximal mouth opening for male was 48 mm (S.D 9.5mm) ranges (39-58mm).

The maximal mouth opening for female was 46.5mm (S.D 7.5 mm) ranges 37-52 mm.

In Group I maximal mouth opening was seen 51mm, (S.D 5.5mm) ranges 47- 57mm.

In Group II max mouth opening was seen 52.2mm, (S.D 6mm) ranges 47- 59mm.

In Group III max mouth opening was seen 49mm (S.D 5.5mm) ranges 44- 55mm.

In Group IV max mouth opening was seen 47mm (S.D 6.3mm) ranges 43-52mm.

In Group V max mouth opening was seen 42mm (S.D 4mm) ranges 39- 48mm



Graph 1: no of male and female in each group

	GROUP- I	GROUP- II	GROUP- III	GROUP- IV	GROUP- V
AGE	18 - 30	30 -40	40-50	50-60	60 - 75
NO. OF MALE	140	165	105	135	105
NO. OF FEMALE	60	100	70	70	50
AVERAGE MOUTH OPENING IN MALE	51mm	52.5mm	49mm	47mm	43mm
AVERAGE MOUTH OPENING IN FEMALE	46mm	47mm	45mm	43mm	41mm
TOTAL NO OF PARTICEP ENTS	200	265	175	205	155
S TANDER DEVIATIO N	6mm	9 mm	7 mm	8mm	5mm

 Table 1 sowing the variation of mouth opening in each group with age



## CONCLUSION

The mean maximal mouth opening for Mithilanchal population, Bihar India is 52.2mm which was in age between 30-40 years of age groups. The mouth opening seems to decreases with age, the mouth opening of female is significantly less than male in all age groups.

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## **Research Article**

# To Evaluate the Efficacy of Tranexamic Acid, An Antifibrinolytic Agent in Comparison with a Placebo with Respect to The Reduction of Incidence of Alveolar Osteitis After the Extraction of Mandibular Molars.

#### Abstract

**Background:** Alveolar osteitis (AO) is a significant postoperative delinquent with frequency of 20% to 35% particularly widespread after the removal of mandibular molars. Fibrinolysis with consequent loss of blood clotting is supposed to be the overall cause of Alveolar Osteitis.

**Objectives:** To evaluate the efficacy of tranexamic acid, an antifibrinolytic agent in assessment with a palliative with respect to the drop of frequency of Alveolar Osteitis after the extraction of mandibular molars by using following limits: Pain, disintegration of Clot, halitosis.

**Materials and Methods:** A double blind study comprised of 150 patients, who endured routine dental extractions of mandibular molar teeth. Group A (75 patients) requiring routine dental extractions of mandibular teeth was arbitrarily selected and was directed a dose of tranexamic acid orally (Trenexa 500mg) one hour prior to extraction of teeth. Gel foam soaked in tranexamic acid (160mg) was placed into the extraction socket postoperatively. A figure of eight silk suture was sited over the socket to secure the gelfoam. Group B (75 patients); a placebo (Sumol 650mg) was administered orally one hour prior to the extraction and gel foam soaked in saline was placed into the extraction socket postoperatively. A figure of eight silk suture was sited over the socket to secure the gelfoam. Pain was rated individually by each patient at 3rd, 7th, 14th day after extraction and the results was statistically analysed.

**Results:** This study cares that the use of tranexamic acid both locally and systemically following the removal of the teeth decreases the frequency of Alveolar Osteitis with the extraction of mandibular molars.

**Conclusion:** Tranexamic acid has numerous recompenses also when used for simple dental extractions, namely: low cost and availability and therefore we recommend this treatment modality.

Keywords : Alveolar osteitis, Gel foam, Fibrinolysis

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### **INTRODUCTION**

Dry socket is one of very common complication that is seen postoperatively after the extraction for permanent teeth<sup>1</sup>.Crawford in 1896 first described this term. Many additional terms that are used as synonym for this state in literature- alveolar osteitis (AO), alveolalgia, localized osteitis, alveolitis sicca dolorosa, postoperative alveolitis, necrotic socket, localized osteomyelitis, septic socket and also fibrnolytic alveolitis.<sup>1,2Dry</sup> socket / alveolar osteitis is explained as "postoperative pain inside and around the extraction site, that increases in severity at time between the first and third day following the extraction, accompanied by a complete or partial disintegrated blood clot within the alveolar socket with or without halitosis<sup>1</sup>. The prevalance of dry socket is 3% - 5% of all extractions<sup>2</sup>. Till date no clear etiology has been identified, but various factors are implicated. Considering etiology of dry socket following Two theories are proposed which are: BIRN THEORY and NITZAN THEORY.BIRN stated etiology for alveolar osteitis is increase in the local fibrinolysis which leads to disintegration of the clot3.NITZAN stated that Treponema denticola multiplies and lyses the clot of blood without giving any of the clinical symptoms characteristic of infection, such as redness, inflammation or pus formation, and has previously been obtained from dry sockets<sup>4</sup>. Various other etiological factors that can lead to dry socket are:During extraction , trauma that is caused and difficulty in surgical procedure.  $^{\rm 1.3}{\rm Birn}$  also stated that any root or also any of the bone fragment that remains in the extraction socket also leads to dry socket.<sup>1,3</sup>Also irrigation in excessive amount and the excessive curettage of the socket leads to dry socket.<sup>1</sup>The clot getting dislodged from the socket leads to dry socket.1Since the last century, numerous efforts are made to search successful ways in prevention of AO and numerous clinical studies are conducted for this. Considering the dry socket prevention, both pharmacological or nonpharmacological are possible. Non pharmacological measures include a good history taking procedure, identification and also attempting in elimination of risk factors<sup>5</sup>. A lot many clinical trials for reducing the occurance of dry socket by prophylactically administrating ,antifibrinolytic compounds have depicted that locally administrating the compound is probably much better to general treatment  $^{6,7,8,9}$ . **Tranexamic** acid(TXA) is a drug used to manage and also prevent excessive blood loss that is excessive resulting from any major trauma, surgery, tooth extraction, postpartum bleeding, nosebleeds, and excessive menstruation also. It can be taken either oral or by injecting in a vein<sup>10</sup>. Tranexamic acid – which is antifibrinolytic agent which inhibits proteolytic degradation of fibrin as it prevents attachment of the plasminogen as well as plasmin<sup>6</sup>. This is also used generally <sup>6,11,12</sup> and also has its use in local therapy12.Chemical formula- C8H15NO2 Also known as trans-4-amino methyl cyclohexane carboxylic acid.Tranexamic acid, first found in year 196213. It's on list of World Health Organization's of Essential Medicines, which are considered the safest ,also effective medicine that is required in the health system<sup>14</sup>. There exists variation for licensing of different medicines which posses this drug. It is accessible in various forms by manufacturers on special orders which comprise, oral solution, oral suspension, mouthwash Tablet <sup>10</sup>.Available as Tranexamic acid. Dose -500mg Tablet Trenexa 500mg<sup>8</sup>. Solution for injection Tranexamic acid vial 100 mg per 1 ml<sup>10</sup>.Inspite of its alluring qualities of TA also known fact of achieving local haemostasis improvement following any dental extractions for long many decades, still this did not succeed in achieving any worldwide acceptance for prevention of AO <sup>15</sup>. Considering all the clinical and beneficial uses of this (antifibrinolytic) agent Tranexamic acid, a "Double Blind Study on the efficacy of tranexamic acid in the reduction of incidence of dry socket" is conducted 11.

## MATERIALS AND METHODS

Double blind study to evaluate the efficacy of tranexamic acid for prevention of dry socket after extraction of mandibular molars.. The present study was carried out in the Department of Oral and Maxillofacial Surgery at Mithila Minority Dental College And Hospital Darbhanga Bihar India.A total of 150 patients were included in the study out of which 75 patients will be under group A and the other 75 patients will be under group B. Study period 12-14 months. Statistical analysis was done with the help of test named chi square and fisher's exact .A detailed informed written consent form was signed by each and every patient, who willingly participated in this study.Armamentarium straight probe, mouth are forcep,dispovan mirror,tweezer,elevators,extraction syringes(2ml/10ml),tranexamic acid,abgel,3-0 mersilk holder,scissor,betadine,gauge suture,needle piece,local anesthesia(lignocaine 1:100000),kidney tray etc.



Fig-1: Armamentarium Used in Study

Inclusion Criteria are - Patient should be young i.e. from 2nd and 3rd decade.Both female and male patients ( no differentiation of sex)The site of dental extraction and also the neighboring teeth was infection free and also no inflammation was present. The patient was fit medically with no medication history like of antibiotics and analgesics. There was no hypersensitivity reactions history.Exclusion Criteria are- Old patients, Contaminated extraction sites, Medically compromised patients. In patients of both groups , proper medical history was taken during the very first visit and also a complete clinical history was taken of each patient. The record of patient included patient's age, gender, habit(i.e. tobacco smoking) ,oral hygiene and also oral contraceptives use. Oral Hygiene was evaluated and scored using the simplified Oral Hygiene Index i.e. OHI-S which is : good- 0 to 1.2; regular- 1.3 to 3; and poor- 3.1 to 6. Smoking criteria was recorded as-Non smoker ,10 cigarettes in one particular day,11 to 20 cigarettes in one particular day,20 cigarettes in one particular day or more. Oral contraceptives use was scored as yes or no.An informed full consent as necessary by ethical clearance of the institution for this particular study was made to sign by every patient participating.. The patients were classified into the lower income, middle income and the high income of groups on their occupation basis.13 Collection of data-A double blind study was carried out which consisted of Group A- including 75 patients out of 150, that required routine extractions of mandibular teeth was arbitrarily chosen. Tranexamic acid soaked gelfoam, placed in extraction sockets after extraction postoperatively.3-0 Silk suture ,figure of eight was given over the extraction socket securing the gelfoam in socket. In case of another Group i.e. B - 75 patients, extraction was done likewise of previous group and then the gelfoam which was soaked in saline was secured in the postoperative extraction socket. A 3-0 silk suture(figure of eight), was given over the socket securing the soaked gelfoam. In both groups i.e. all the patients ,inferior alveolar nerve block was given and also

lingual nerve and buccal nerve was anesthetized. In this procedure 2% of lignocaine with adrenaline 1:100,000 was used. For the purpose of this investigation, the diagnosis of dry socket was based on clinical symptoms rather than the appearance of dry socket. Pain was rated by each patient at 3rd, 7th, 14<sup>th</sup> day after extraction during followup.



Fig-02 Gelfoam Soaked With Tranxenamic acid



Fig-03 Gelfoam Soaked With Saline



Fig-04 Suture Placed in Extracted Tooth Socket

#### **RESULTS**

AGE DISTRIBUTION OF STUDY SUBJECTS

Age in years	n years Control N (%)		Control Treatment N (%) N(%)	
Age in years				
15-20	12	16.0%	9	12%
21-25	13	17.33%	12	16%
26-30	16	21.33%	15	20%
31-35	19	25.33%	21	28%
36-40	15	20%	18	24%



Among the study subjects in the control group 25.33% were of 31-35 years age group, 21.33% were of 26-30 years age group and 20% of 36-40 years age group. In the treatment group 28% of 31-35 years age group, 24% were of 36-40 years age group and 20% were of 26-30 years age group.

#### GENDER DISTRIBUTION OF STUDY SUBJECTS

Gender	Control	Treatm ent
Male	37	40
	(49.33%)	(53.33%)
Female	38	35
	(50.66%)	(46.66%)



In the control group 50.66% were the females and 49.34% were the males. In the treatment group 53.33% were the males and rest 46.66% were the females.

Comparison of Efficacy of Treatment and Control Group on 3rd Day Postoperative

	Treatement	Control	P value	Significance
Pain	55 (73.3%)	72 (86%)	0.001	Significant
Clot Disintegration	12 (16.0%)	22 (29.3%)	0.039	Significant
Halitosis	28 (37.3%)	32 (42.7%)	0.279	Non-Significant



Control

At 3<sup>rd</sup> postoperative day 86% of the subjects in the control group had pain, 29.3% had clot disintegration and 42.7% had halitosis. In the treatment group the 73.3% subjects had pain16% had clot disintegration and 37.30 % had halitosis. The difference between the control and treatment group was statistically significant for the pain and clot disintegration ( $p\leq0.05$ ) when analyzed using Chi Square test whereas for the halitosis the difference between the groups was statistically non-significant.

Comparison of Efficacy of Treatment	and Control	Group
on 7th Day Postoperative		

	Treatement	Control	P value	Significance
Pain	18 (24.0%)	57 (76%)	0.001	Significant
Clot Disintegration	00 (00%)	06 (8%)	0.024	Significant
Halitosis	08 (10.7%)	16 (21.3%)	0.191	Non-Significant



At 7<sup>Th</sup> postoperative day 76% of the subjects in the control group had pain, 8.0% had clot disintegration and 21.30% had halitosis. In the treatment group the 24.0% subjects had pain, 00% had clot disintegration and 10.70 % had halitosis. The difference between the control and treatment group was statistically significant for the pain and clot disintegration (p $\leq$ 0.05) when analyzed using Chi Square test whereas for the halitosis the difference between the groups was statistically non-significant.

Comparison of Efficacy of Treatment and Control Group on 14th Day Postoperative

	Treatement	Control	P value	Significance
Pain	00 (00.0%)	09 (12%)	0.001	Significant
Clot Disintegration	00 (00.0%)	05 (6.33%)	0.046	Significant
Halitosis	04 (5.3%)	06 (8%)	0.586	Non-Significant



At 14<sup>th</sup> postoperative day 12% of the subjects in the control group had pain, 6.33% had clot disintegration and 8.00% had halitosis. In the treatment group the 00.0% subjects had pain, 00% had clot disintegration and 5.30 % had halitosis.. The difference between the control and treatment group was statistically significant for the pain and clot disintegration (p $\leq$ 0.05) when analyzed using Chi Square test whereas for the halitosis the difference between the groups was statistically non-significant.

		<u>Treatement</u>	Control	<u>P</u> value	<u>Risk</u> Ratio
Pain	3 <sup>ri</sup> Day	55 (73.3%)	72 (86%)	0.001	0.11
	7 <sup>th</sup> Day	18 (24.0%)	57 (76%)	0.001	0.09
	14 <sup>th</sup> Day	00 (00.0%)	09 (12%)	0.001	0.88
Clot Disintegration	3 <sup>ri</sup> Day	12 (16.0%)	22 (29.3%)	0.039	0.45
	7 <sup>th</sup> Day	00 (00%)	06 (18.0%)	0.024	0.57
	14 <sup>th</sup> Day	00 (00.0%)	05 (06.3%)	0.046	0.59
Halitosis	3 <sup>si</sup> Day	28 (37.3%)	32 (42.7%)	0.279	0.80
	7 <sup>th</sup> Day	08 (10.7%)	16 (21.3%)	0.191	0.44
	14 <sup>th</sup> Day	04 (5.3%)	06 (8%)	0.586	0.64

#### **Overall Comparison of Control and Treatment Group**

Risk Ratio<1-Less Likely of Risk in Treatement Risk

Ratio>1-More Likely of Risk in Treatement

Risk Ratio=1- Equally likely between two groups

Comparative analysis showed tranexamic acid to have comparatively less associated problems like disintegration of clot and halitosis and the overall differences between the groups was of statistical significance except for the halitosis. This study reveals favourable effect of tranexamic acid over the control group.

#### DISCUSSION

The exact and completely explaining etiology for AO is still left unexplained or not completely understood. But various systemic as well as local factors such as any localized surgical trauma ,infection from bacteria ,clot dislodgment are considered to be contributory to this particular condition of AO. Various efforts have been made till date in preventing the prevelance and development of this dry socket. Many studies have also been done to minimize the development of dry socket like placement of PRF in extraction sockets. These have led us to positive results. But an experienced skillful hand with proper surgical skills is most necessarily required factor in an effort in minimizing this condition. One must avoid placing something in an alveolus to reduce its prevalence as the material that is placed can itself be a source for infection or any type of foreign body reaction. Hence it can retard or delay the healing of socket. Fibrinolytic process initiation is considered somehow related to this occurance of dry socket. Various studies done in the past and current time i.e. studies including use of various antibiotics ,antifibrinolytic agents and even simple oral rinses have shown improvement in its prevention. Hence these all are the contributing factors. Hence there can be no single solution to overcome all these factors. Management to this condition is reducing pain of the patient till the healing occurs in extraction socket. Healing process can be improved by preventing accumulation of food debris as well as of microorganisms, irrigating the socket with chlorhexidine , placing of (medicated) dressing. Our aim of this study is to overcome this condition by placement of tranexamic acid topically in the extraction socket. The topical placement of these antifibrinolytic agents have shown to reduce postoperative bleeding following any dental extraction these have also potentially decreased post op bleeding in patients on anticoagulation drugs. In this particular study comparison was done b/w the control group and treatment group on clinical basis. This comparison was carried out to evaluate the efficiency of tranexamic acid in limiting the incidence of dry socket. As particularly general health condition effects the procedure of wound healing of extraction wound as well as dry socket. Hence such compromised patients were excluded from this particular study. Various number extractions which have been performed on daily basis, extraction sites were infection free. No statistically significant relationship was seen in the gender establishment who underwent extractions and developed dry sockets. The patients ages ranged between 15-40 years. The extractions as ell as placement of medication is done by the same post graduate student. As expected, pain was the main complaint that was seen in both group patients which was either related with disintegration of clot or that of halitosis or either presented with this individually. On the other hand patients under the group in whom medicament was placed in the socket, reported very less with such problems. Pain was reated in each patient on 3<sup>rd</sup>, 7<sup>th</sup> and 14<sup>th</sup> day postoperatively in this particular study. Hence we clinically find that tranexamic acid resulted in promoting action in prevention of dry socket which also coincides with also based on the same criteria of dry sockets. Hence it has been studied as well as reported that tranexamic acid which is a well known - an antifibrinolytic agent , successfully prevents the proteolytic degradation of fibrin by process of inhibting the attachment of- plasminogen and plasmin. Hence it promotes the process of wound healing and thus preventing AO by reinforcement of the biological glue.

#### CONCLUSION

The present study was undertaken at Mithila Minority Dental College & Hospital Darbhanga Bihar, with the aim to evaluate the role of tranexamic acid in the prevention of dry socket after extraction of mandibular molars. The objectives were to evaluate pain, clot disintegration and halitosis postoperatively and hence determine the efficacy of tranexamic acid in the prevention of dru socket formation. The present study was conducted on 150 patients , which were divided into 2 groups of 75 patients each. Mandibular molar extractions were done in patients in both patients and one group received tranexamic acid and the other group received placebo packed in extraction sockets .Pain was measured with the help of Visual Analog Scale on 3rd, 7th and 14th post-op day. Clot disintegration was also evaluated postoperatively on these same days. Post operative pain was statistically significant on 3rd, 7th and 14th postoperative follow up between the two groups.Clot disintegration was found to be statistically significant on 3rd, 7th and 14th postoperative follow up between the two groups.Tranexamic acid significantly decreases pain and clot disintegration after extractions performed and hence reduces patient discomfort.Tranexamic acid can be used to achieve better postoperative results following extractions and enhancing patient comfort.Further studies are recommended including other factors for more evaluation of efficacy of tranexamic acid.

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#### **Research Article**

# Determining the Reliability of "Enucleation & Packing Open": A Modified Conservative Approach for treating Odontogenic Keratocyst

#### Abstract

The aim of this study was to report the outcome of a conservative treatment protocol – "enucleation and packing open" for odontogenic keratocyst (OKC). Ten patients with OKC were treated at our institute by enucleation followed by open packing. This conservative treatment protocol was selected because of relatively young age of the patients and relatively large size of the lesions. All the cases were monitored at regular predetermined intervals using clinical evaluation and panoramic radiographs. There was no evidence of recurrence during follow-up. The conservative treatment protocol for OKC, based on enucleation followed by open packing would be a possible choice in view of the simplicity of surgical procedure and low morbidity.

This treatment modality has a low recurrence rate and may be particularly useful in young patients and patients with advanced systemic disease not amenable to major surgical intervention.

Keywords: Conservative treatment protocol, enucleation, odontogenic keratocyst.

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## **INTRODUCTION**

The odontogenic keratocyst (OKC), previously termed as the keratocystic odontogenic tumor, is a unique form of the developmental odontogenic cyst. It deserves special consideration because of its unique histopathological features and clinical character. The most general conservative approach to treating odontogenic keratocyst is enucleation and curettage. The alternative therapies like enucleation with peripheral ostectomy, complete resection, enucleation with cryotherapy or chemical adjunct therapy, and decompression and marsupialization as treatment modalities are also valid but have specific limited indications. In comparison to other cysts of the jaws, OKC is distinctive because of its distinguishing clinical features, including potentially aggressive behavior, high recurrence rate, and an association with the nevoid basal cell carcinoma syndrome (NBCCS).<sup>1</sup> Its etiology is mostly related to the dental lamina and its remnants. Many attempts have been made to reduce the high recurrence rate of OKCs by modifications in the operative technique. Advocates of conservative treatment suggest that marsupialization yields results comparable to those obtained with more extensive surgery such as enucleation, en bloc, and segmental resection.<sup>4</sup> The reported frequency of recurrence in various studies ranges from 5% to 62%.<sup>3</sup>

In this study, we present ten (n = 10) cases of OKC treated by enucleation followed by packing open through an intraoral approach. Young patients and patients with advanced systemic disease not amenable to major surgical intervention are also included.

### MATERIALS AND METHODS

#### **Study Population:**

This clinical study was conducted in the Department of Oral and Maxillofacial Surgery in Mithila Minority Dental College & Hospital, Darbhanga. The recruitment of patient and subsequent treatment was conducted under an informed consent document for treating the OKC by Enucleation and Packing Open approach.

Approval of the study protocol was obtained from the Institutional Review Board (The Ethical Committee) of the Mithila Minority Dental College & Hospital, Darbhanga.

A total of 10 patients were included in our study. The same surgeon treated all patients to prevent inter operative variability.

#### Methodology

The following methodology was adopted for the study:

#### **Selection Of Patients**

Young patients and patients with advanced systemic disease not amenable to major surgical intervention are also included.

#### **Surgical Procedure :**

The surgical procedure was divided in Flap Design (Incisions), Flap reflection, Enucleation, Chemical curettage with Carnoy's solution, Irrigation & Debridement, and packing open approaches.

The condition of adjacent teeth, ridge condition, soft tissue condition, bone in affected area, CT, BT, Hb%, Random Blood Glucose, Blood Pressure, IOPAR, OPG, previously done incisional biopsy and fine needle aspiration cytology were evaluated. Before the initiation of the surgical procedure local anaesthesia was achieved by nerve blocks with 2% lignocaine hydrochloride containing 1:80,000 concentration of adrenaline.

Following administration of local anaesthesia conventional flap approach was initiated by intracrevicular ( sulcular ) incisions or vestibular incisions varied accordingly to the location of OKCs in different patients using Bard Parker no 15 surgical blade. Full thickness mucoperiosteal flap was reflected using a periosteal elevator to expose alveolar bone margin. Extreme care was taken to avoid flap perforation.Electrocautery and tissue dissecting scissor were used to separate the mucopertiosteal flap from cystic epitheliuym occasionally where bone perforation was present leading to invasion of cystic epithelium in surrounding intraoral mucosa.

Thereafter cystic enucleation is done intoto followed by extraction of the affected teeth was done and the cavity was chemically curetted with Carnoy's solution followed by irrigation and debridement was done with normal saline and povidine iodine solution.

The resulting cavity was packed with povidone iodine gauze. The packing was replaced, during the recall visits, three times in a week for 4 months following the initial surgery. The patient was reviewed clinically and radiographically every 6 months during the follow-up period. At the end of the follow-up period, no evidence of recurrence was noticed.

## **PRE-OPERATIVE**



Fig-1: Pre Operative Intra Oral Occlusal View



Fig-2: Pre Operative OPG

## **INTRA-OPERATIVE**



Fig-3: Intra Operative After Enucleation



Fig-4: Packing Open

## POST-OPERATIVE



Fig-5: 2 Weeks Postoperative Intraoral View



Fig-6: 2 Months Postoperative Intraoral View

## DISCUSSION

#### **Naming Dilemma**

OKCs of the jaw have been the most debated pathologic cystic lesions in the maxillofacial region.<sup>[5]</sup>The odontogenic keratocyst was classified by World Health Organisation (WHO) in2005 as a benign tumour that has an odontogenic epithelium with mature fibrous stroma without odontogenic ectomesenchyme and named as Keratocystic Odontogenic Tumour (KCOT). The

propensity for recurrence & association with mutation of Drosophilia segment polarity gene patched (PTCH) gene had been taken as neoplastic designation for the OKC which led to take this decision.<sup>4</sup>

KCOT was reclassified as OKC in the classification of developmental odontogenic cysts and relocated from the neoplastic category back into the cyst category until there is more definite evidence for classifying as KCOT by WHO in 2017 because patched homolog gene (PTCH) mutations are only found in 30 % of sporadic OKCs, such genetic alterations have been even reported among several non neoplastic lesions including dentigerous and orthokeratonised odontogenic cysts.<sup>4</sup>

### Etiology

The primordium of the tooth was originally thought by many authors to be the origin of these cysts, it is now the dental lamina that is thought to be the most likely origin. The basal cell layer of the oral epithelium is also thought to possibly play a role in the etiology of these cysts. Other potential causes, though unlikely, include a genetic trigger. The fact that OKC are often present with nevoid basal cell carcinoma syndrome could indicate this. So basically most odontogenic keratocysts (60%) arise from dental lamina rests or from the basal cells of oral epithelium and are thus primordial origin odontogenic keratocysts. The remaining 40% arise from the reduced enamel epithelium of the dental follicle and are thus dentigerous-origin odontogenic keratocysts. This clinical identification is of some importance because recurrences are more frequently seen after treatment of the primordial-origin type.<sup>2</sup>

## **Pathogenesis Of OKC**

OKC's arise from the proliferation of remnants or offshoots of the dental lamina as an intraosseous lesion associated or not with an unerupted tooth, mainly in the tooth bearing area (i.e., incisors, canines, premolars and  $1^{st}/2^{nd}$  molars area).

They may also arise from epithelial cell nests and microcysts, often located in the basal layer of the oral mucosa, mainly in the posterior region of the jaws (i.e., 3<sup>rd</sup> molar, angle and ramus in the mandible and

3<sup>rd</sup> molar/maxillary tuberosity in the maxilla).<sup>6</sup>

## Epidemiology

One of the most threatening feature of OKC is that it may grow to a large size before it manifests clinically and that, unlike other jaw cysts, it has high recurrence rate following surgical treatment.<sup>2</sup> OKC may be found in population, which range in age from infancy to old. Slight male predilection.<sup>3</sup> Literature review suggests, mandible is involved in 60%–80% of cases, with a noticeable tendency to involve the posterior body and ramus of mandible.<sup>6</sup>

#### **Clinical Features**

Mostly are asymptomatic to patient until found accidently during radiographic examination or until they attain a large size.<sup>2</sup> Some will rupture and leak keratin into the surrounding tissue, provoking an intense inflammatory response that causes pain and swelling. occasionally paresthesia of the lower lip noted if the inferior alveolar nerve has been impinged upon. Larger lesions causes displacement & mobility of teeth & displacement of adjacent structures & penetration into surrounding soft tissues. Moderate expansion of jaw is noted. The occurrence of large OKC involving the maxillary sinus and causing destruction of the floor of the orbit, proptosis of the eyeballs has been described by Lund.<sup>7</sup> Penetration of cortical bone and involved surrounding soft tissues due to the aggressive behavior of OKC is documented by Emerson et al. <sup>8</sup> Jackson et al. reported that OKC extended from the maxilla and eventually involved the base of the skull, "behaving rather like a low-grade squamous cell carcinoma."<sup>9</sup>

### Nevoid Basal Cell Carcinoma Syndrome

Multiple OKCs occur in 75% of the patients involved with the NBCCS. There are some differences between the cysts in patients with NBCCS and those with isolated keratocyst. In most cases, initially, only a solitary cyst is present, but additional cysts may develop over periods ranging from 1 to 20 years. In NBCCS, cysts are frequently associated with the crowns of unerupted teeth; on radiographs, they may resemble dentigerous cysts.<sup>3</sup>

## **Genetic Alterations**

The neoplastic concept of OKC is aided by molecular studies that verified loss of heterozygosity.<sup>12</sup> which showed evidence of allelomorphic loss mainly in p16, p53, PTCH, MCC, TSLC1, LTAS2, and FHIT genes.<sup>13</sup> P53, a tumor-suppressor gene is frequently mutated in various malignant neoplasms.<sup>14</sup> Positive p53 labeling in epithelial cells of the OKC has been shown by a number of studies.<sup>18</sup> Although it was not followed by p53 gene alteration using stranded conformation polymorphism (polymerase chain reaction–single-strand conformation polymorphism).<sup>17</sup> It suggests that p53 mutation is not a significant event to OKC pathogenesis.<sup>13</sup>

Mutations of PTCH1in OKCs associated with NBCCS were first described by Lench and colleagues<sup>[19]</sup> Pan and Li demonstrated that Ki-67 labeling index in the epithelium of OKCs with PTCH1 mutation was significantly higher than in cases with no PTCH1 mutation. An additional study showed that Gli1, a downstream signaling molecule of the SHH/PTCH pathway, is overexpressed in OKC.<sup>[20]</sup> Epigenetic alterations are considered important events in the tumorogenesis of benign and malignant tumors of the head and neck. The Drosophila patched gene (PTCH1) methylation has been suggested as an alternative to mutational causes of the PTCH pathway deregulation in tumors associated with NBCCS syndrome.<sup>21</sup>

OKC has presented methylation of the P21 gene. It is suggested that, residues of OKC lining which are left behind at operation, the apparently high metabolic activity of the epithelium, as demonstrated by the high activity of oxidative enzymes representing glycolytic, citric acid, and pentose phosphate shunt mechanisms, were likely to be factors of importance to consider among reasons for the high incidence of OKC recurrences. Within 2 days of explanting the OKCs, there was the growth of epithelial cells and fibroblast-like cells, which showed moderate-to-high activity of NADH-diaphorase and acid phosphatase.<sup>6</sup>

## **Biological Markers**

Literature showed that fluids from keratinizing cysts have lower soluble protein levels than nonkeratinizing cysts and it was suggested that a protein level of < 4.0 g/100 mL would indicate a diagnosis of OKC. In the fluid of OKCs, an antigen was localized to the epithelial cell which was not present in the fluids neither of other cyst types nor in plasma or saliva. They called it keratocyst antigen (KCA).[27,28] A later study suggested that the keratin might become soluble in the cyst fluid by proteolysis. This relationship of keratin and KCA would enable the use of commercially available antikeratin antibodies in the preoperative diagnosis of the OKC.9 A major antigen, lactoferrin was identified in the aspirated fluid of all OKCs which was apparently of epithelial origin, but not a keratin. It is a secretory substance present in the azurophilic granules of polymorphonuclear leukocytes and body secretions but not in serum. OKC fluids contained significantly higher concentrations of lactoferrin than fluids from the other cysts, but with a wide range of values for each group and this could therefore not be regarded as an absolute marker for OKCs.<sup>21</sup>

## **Radiographic Assessment**

In Orthopantomograms it may represent as either unilocular or multilocular radiolucency. Scalloping may be seen. Frequently displace the inferior alveolar neurovascular bundle to the inferior border & other soft structures too and resorb the roots of adjacent teeth in a smooth and regular pattern.<sup>2</sup>

In Computed Tomography Scans we can appreciate reminiscent of plain radiographic findings, but in better detail. Visualised as an expansile, cystic lesion with scalloped, well-corticated borders. Density of cystic contents varies with viscosity. Cortical breach suggests possible soft tissue involvement. Expansion of the cortical bone may be more readily apparent than on plain film .Their resorption of bone will include cortex and inferior border but at a slower rate than the intermedullary trabecular bone, which is less dense. Therefore, they extend further anteroposteriorly than buccolingually . This principle of further extension through bone that is less dense also explains the finding of greater buccal expansion than palatal expansion in the maxilla.<sup>4</sup>

In Magnetic Resonance Imaging OKCs typically demonstrate as follows :T1: High signal due to cholesterol and keratin contents. T2: Heterogeneous signalDWI: Restricts due to presence of keratinT1 C+: Peripheral enhancement but unlike ameloblastomas no enhancing nodular component.<sup>6</sup>

## Diagnosis

The diagnosis of OKC is primarily based on the histopathological features. It typically shows a thin, friable wall, which is often difficult to enucleate from the bone in one piece. The cystic lumen may consist of a clear liquid, similar to a transudate of serum; or a cheesy material. The thin fibrous wall is essentially lacking of inflammatory infiltrate. Perhaps small satellite cysts, cords, or islands of odontogenic epithelium are seen within the fibrous wall.<sup>3</sup> The radiographic findings in OKC may replicate a dentigerous cyst, a radicular cyst, a residual cyst, a lateral periodontal cyst. OKC of the anterior midline maxillary region can impersonate nasopalatine duct cysts. Peripheral OKC within the gingival soft tissues has been reported rarely.<sup>3</sup>

## **Treatment Modalities**

The treatment should aim at the elimination of possible vital cells left behind in the defect from the original lining or derived from microcysts in the wall. The choice of treatment approach should be based on the size of the cyst, recurrence status, and radiographic evidence of cortical perforation<sup>4</sup>Stoelinga advocated the use of chemical cauterizing agent such as Carnoy's solution. In case of multilocular cyst, one should eliminate the bony septae as to assure proper treatment of the resulted cavity with Carnoy's solution. If the cyst has penetrated through the lingual or buccal cortex, electrocauterization should be carried out to avoid a recurrence in the soft tissues. Elimination of the epithelial islands and microcysts located in the overlying, attached mucosa should be assured by excising the part of the mucosa. Preferably, the cyst with the attached overlying mucosa should be removed in one piece<sup>21</sup>

Yildirim et al. advocated a conservative treatment protocol for OKC. He suggested enucleation followed by open packing. The resulting cavity was irrigated with mixture of normal saline and chlorhexidine gluconate. The resulting cystic cavity was packed with iodoform gauze impregnated with bacitracin ointment to minimize the risk of recurrence in each recall visits. The benefit of this protocol lies in the minimal surgical morbidity, decreased incidence of damage to associated structures such as the inferior alveolar nerve and developing teeth.<sup>21</sup>

Here in our department of Oral & Maxillofacial Surgery at MMDCH we practised the enucleation and packing open

method on 10 patients and done a thorough follow up on each one of them and none of them showed recurrence or any other post operative complications.

#### Recurrence

OKC has high propensity to recur following surgical treatment. The first to point out this peculiarly aggressive behaviorwere Pindborg and Hansen (1963). Recurrence is encountered more often in mandibular OKC, particularly those in the posterior body and ascending ramus. Multiple recurrences are not unusual. Although many OKCs recur within 5 years of the original surgery, a significant number of recurrences may not be manifested until 10 or more years after the original surgical procedure. Long-term clinical and radiographic follow-up, therefore, is necessary.<sup>3</sup>Yagyuu et al. found in their study that the mean length of recurrent OKC lesions ( $62.8 \pm 6.5 \text{ mm}$ ) was greater than that of nonrecurrent lesions (43.0  $\pm$  4.0 mm) (P = 0.0363).<sup>6</sup>It is suggested that there may be an inherent tendency to develop such cysts; any remnants of dental lamina may form the target for new OKC formation such as patients with the NBCCS.<sup>21</sup> OKCs may arise from proliferations of the basal cells of the oral mucosa, predominantly in the third molar region and ascending ramus of the mandible.<sup>2</sup>

## **Follow-Up**

The literature suggests that most recurrences will present the first 5 years after primary treatment. The recommended followup for OKCs is once a year for the first 5 years postoperatively. As the recurrences or newly developed OKCs may also present late clinically, a follow-up every 2 years thereafter seems a reasonable policy. Pogrel recommended follow-up, primarily with panorama type radiographs, every 6 months for 2 years, every year for 5 years, and every 2 years for 10 years in asymptomatic patients.<sup>21</sup>

In our opinion, "enucleation and packing open" is an excellent treatment option for OKC fulfilling the above requirement. Major surgical intervention such as resection and reconstruction should be limited to cases with recurrence. Therefore, the patients should have radiographic and clinical examinations at regular intervals.

#### **Declaration Of Patient Consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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#### **Conflicts Of Interest**

There are no conflicts of interest.

#### CONCLUSION

In our study the reliability of modified conservative approach for treating OKCs by "enucleation and packing open approach" has successfully been justified as it showed no recurrence or post operative complications till now, however more extensive study population with long term follow up should be necessary for further justification of the procedure.

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#### **Research Article**

# Different Maxillary and Mandibular Sagittal Positions in a Cephalometric Airway Analysis of Mithilanchal Population: A Pilot Study.

#### Abstract

**Objective:** To evaluate the nasopharyngeal, oropharyngeal and hypopharyngeal airway spaces into 3 groups – Class I, Class II, and Class III in mithilanchal population.

**Materials and Methods:** For analysis 27 patients lateral cephalograms were used, 9 each for Class 1, Class 2, Class 3 respectively which were clinically evaluated. The airways were evaluated using the sleep apnea cephalometry consisting of 14 parameters. Kruskal Wallis Test was used for intergroup comparison for all 14 parameters, which conclude that the superior and middle pharyngeal space, median posterior palatal space and inferior pharyngeal space was higher in Class III patients, in comparison to Class I and II patients, and the soft palate length was less in Class III patients as compared to Class I and Class II patients.

**Results:** Among groups the statistically significant difference was verified for the Superior pharyngeal space, Middle pharyngeal space, Median posterior palatal space, Soft Palate length, Inferior pharyngeal space and Posterior airway space (p<0.05), and for the other measurements, there was no statistically significant difference (p > 0.05).

 $\label{eq:conclusion: The nasopharyngeal, oropharyngeal and hypopharyngeal airway spaces shows increased values in Class III patients with significance level (p < 0.05).$ 

Keywords: Lateral cephalometric radiographs, Nasopharynx, Oropharynx, Hypopharynx, Class I, Class II, Class II, Airway.

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### **INTRODUCTION**

The association between craniofacial morphology and respiratory function has been studied extensively since the start of 20th century. Still, there is a dispute on whether this relationship between craniofacial morphology and respiratory function causes dentofacial anomalies<sup>1</sup>.

Pharyngeal space size is decided primarily by the relative growth and size of the soft tissues surrounding the dentofacial skeleton and therefore the dimensions influenced by the facial skeletal pattern, in which the relationship between the position of the maxilla and mandible in the anteroposterior direction has great influence on space <sup>2</sup>.

The pharynx is a tube-shaped structure that hold out superoinferiorly from the cranial base to the level of the inferior surface of the sixth cervical vertebra. Mainly divided into three parts: Nasopharynx, oropharynx and laryngopharynx. A mutual interaction is predicted to occur between the pharyngeal structures and thus the dentofacial pattern thanks close relationship between them and therefore justifies orthodontic interest. Craniofacial abnormalities, like mandibular deficiency, bimaxillary retrusion, steep occlusal plane, increased mandibular plane angle, and a more caudally positioned hyoid end in narrowing of the pharyngeal airway passage. The nasorespiratory function and its relation to craniofacial growth is of great interest not only for orthodontist but for pediatricians, otorhinolaryngologist, speech pathologists and other members of health care community as well<sup>3</sup>.

Reduced maxillomandibular dimensions can result in reduced airway size, and the pharyngeal morphology shows a continuous change throughout adult life. A shorter, narrower, and tapered maxillary arch with a mandibular deficiency is related with OSA. Obstructive sleep apnea (OSA) is characterized by the repetitive collapse and reopening of the upper airway during sleep, impairing oxygenation and resulting in intermittent hypoxemia and hypercapnia<sup>4</sup>.

Lateral cephalometric radiographs (LCRs) have been used to look over the intramural airway spaces, tongue, soft palate, and supporting structures, such as the hyoid bone, mandible, and cervical vertebrae. Some of these structures could also be difficult to spot and for instance, the utilization of a radiopaque paste has been advocated to spotlight the tongue contour <sup>5</sup>. Lateral cephalometric radiograph is a conventional orthodontic method for evaluating pharyngeal patency <sup>6</sup>.

#### AIM

The aim of this study is to evaluate the nasopharyngeal, oropharyngeal and hypopharyngeal airway spaces with different maxillary and mandibular sagittal positions

#### **OBJECTIVES**

- 1. To collect and divide cephalometric data into 3 groups Class I, Class II, and Class III.
- 2. To evaluate the nasopharyngeal, oropharyngeal and hypopharyngeal airway spaces in these three groups in mithilanchal population.

## METHODOLOGY

The 27 patients were selected from the OPD of department of Orthodontics and Dentofacial Orthopedics and the department of Oral medicine and Radiology at Mithila Minority Dental College and Hospital, Darbhanga, including the patients from the nearby areas of the mithilanchal and their lateral cephalograms were collected for this study. The ethical clearance was obtained from the ethical committee of Mithila Minority Dental College and Hospital, Darbhanga.

The following is being followed during the selection of subjects:

#### Inclusion criteria:

- i. Age between 18 25 years.
- ii. Able to breathe comfortably through the nose.
- iii. No previous history of orthodontic treatment.
- iv. Have a normal vertical occlusal relationship.
- v. No wound, burn or scar tissue in the neck region.
- vi. No deglutition disorder present.
- vii. All patients should have standardized lateral cephalometric radiographs.

#### Exclusion criteria:

- i. Lateral cephalograms showing distinctness of structure in the image.
- ii. Participants with cardiovascular disease, diabetes, chronic obstructive or restrictive lung disease, a previous history of pharyngeal surgery or tonsillectomy, craniofacial deformity, cleft lip and palate, orthodontic treatment and/or orthognathic surgeries.
- Lateral cephalograms showing mouth opening, swallowing action, tongue not in rest position, evident changes in head posture, or tissue falling outside the frame.
- iv. Volunteers submitted to extractions, or those with dental agenesis.

Each lateral cephalogram manually traced on a 0.3 Acetate sheet with 0.3mm pencil, and, the subjects where divided into three groups – Class I, Class II, and Class III. The airways is evaluated using the sleep apnea cephalometry consisting of 14 parameters, which have been enumerated in table 1:

Table 1: Factors for sleep apnea cephalometry

Location	Parameters	
1.Cranial base	1.Anterior base of the cranium (N-S)	
2.Maxilla and	2.Maxillary length (ANS-PNS)	
Mandible	3.Mandibular length (Me-Goc)	
3.Nasopharynx	4.Atlas – maxilla distance (At-PNS)	
	5.Superior pharyngeal space (PPFS-PP1)	
4.Oropharynx	6.Middle pharyngeal space (PPFM-PAFM)	
	7.TGL (tongue length) (Tt-P)	
	8.TGH (tongue height) (Tt-DI/P)	
	8.Median posterior palatal space (Pp2-Pp2')	
	10.Soft palate length (PNS-P)	
	11.Inferior pharyngeal space (C3'-H')	
5.Laryngopharynx	12.Posterior airway space (BGo-Tt)	
	13.Hyoid - third vertebra distance (H-C3)	
	14Hyoid - mandibular plane distance [MP	
	(Me-Go)/H]	

Finally, a comparison would be statistically made based on these 14 parameters among the three groups. For landmarks and planes refer figure 1,2,3 respectively and for landmarks definition refer table no 2 and 3 respectively.

LEGEND	CEPHALOMETRI	DEFINITION		
	C LANDMARKS			
Α	(N-S)	Anterior Base of the		
		cranium		
В	(ANS-PNS)	Maxillary length		
С	TGH	Tongue-Height (Tt- DI/PPM)		
D	TGL	Tongue-Length (Tt-P)		
Е	Me-GOC	Mandibular Length		
F	(MP(Me-GOC)/H)	Hyoid-Mandibular Plane Distance		
G	(At-PNS)	Atlas-Maxilla Distance		
Н	(PPFS-PP1)	Superior Pharyngeal space		
Ι	(Pp2-Pp2')	Median posterior palatal space		
J	(PNS-P)	Soft palate length		
К	(PPFM-PAFM)	Middle pharyngeal space		
L	(C3'-H')	Inferior pharyngeal space		
М	(H-C3)	Hyoid – Third Vertebra Distance		
N	(BGo-Tt)	Posterior airway space		

Table 2: Legend, cephalometric landmarks, and definition

LEGEND	CEPHALOMETRIC	DEFINITION
	LANDMARKS	
1	Ν	Nasion
2	S	Sella
3	ANS	Anterior Nasal Space
4	DI	Tongue Dorsum
5	PNS	Posterior Nasal Space
6	PP2	Posterior Palate 2
7	Pp2'	PP2 Projectiobn to
		posterior pharynx wall
8	Tt	Tongue Tip
9	Ppd	Downs Posterior Point
10	PAFM	Anterior Medium
		Pharynx Wall
11	PPFM	Posterior Mesdium
		Pharynx Wall
12	At	Atlus Vertebra
13	Р	Lowest Point of the
		Soft Palate
14	Bgo	Me-GoC projection to
		posterior
		laryngopharynx wall
15	Goc	Cephalometric
		Gonion
16	Me	Menton
17	Н	Hyoid
18	H'	Hyoid Projection to
		anterior
		laryngopharynx wall

19	C3'	3 <sup>rd</sup> Cervical Vertebra
		projection to posterior
		laryngopharynx wall
20	C3	3dr Cervical Vertebra
21	PP1	Posterior Palate 1
22	PPFS	Posterior nasopharynx
		wall

Table 3: Legend, cephalometric landmarks, and definition



Figure 1: Cephalometric landmarks for sleep apnea analysis



Figure 2: Cephalometric planes (oropharynx and laryngopharynx) for sleep apnea analysis



Figure 3: Cephalometric planes (oropharynx and laryngopharynx) for sleep apnea analysis

### RESULTS

Table 4: Mean and standard deviation of the 14 factors of cephalometric parameters and the respective p values of the comparison among the groups

Parameter				р-
s	Class I	Class II	Class III	values
	Mean±S D	Mean±S D	Mean±SD	Kruska 1 Wallis Test
1. Anterior base of the cranium (N-S)	72 2+3 6	73 6+3 7	72 4+3 3	0.757
2. Maxillary length (ANS-PNS)	54 7+3 6	54 1+4 7	56 4+2.9	0.648
3. Mandibular length (Me- Goc)	74 6+4 3	69 6+6 5	67.7+6.5	0.103
4. Atlas- Maxilla distance (At-PNS)	37.4±3.3	37.9±3.1	37.8±3.4	0.747
5. Superior pharyngeal space (PPFS-PPI)	15.1±2.8	13.6±3.1	18.8±1.6	0.015
6. Middle pharyngeal space (PPFM- PAFM)	12.2±3.4	12.1±3.2	15±0.9	0.038
7. TGL (tongue length) (Tt- P)	71.8±5.6	73.4±5.4	72.7±4.3	0.737
8. TGH (tongue height) (Tt- DI/P)	16.7±3.2	15.3±2.2	14.4±2.1	0.277
9. Median posterior palatal space (Pp2- Pp2')	14.7±3.5	13.2±3.5	18.1±1.5	0.031

IU. Soft				
Palate				
length				
(PNS-P)	36.3±5.5	35.6±3.6	$29.5\pm2.8$	0.032
11. Inferior				
pharyngeal				
space (C3'-				
H')	17 4+2 7	15 5+2 6	22 1+4 6	0.019
12	11.122.7	10.0_2.0	22.1	
Posterior				
oirwow				
an way				
space (Bgo-	741.50	741.51	72 5 4 2	0.049
It)	/4.1±5.2	/4.1±5.1	/3.5±4.2	0.948
13. Hyoid-				
third				
vertebra				
distance				
(H-C3)	71±5.5	70.6±6.2	74.6±5.9	0.397
14. Hyoid -				
mandibular				
plane				
distance				
[MP (Me-				
Go)/H]	$17.1 \pm 4.8$	13.7±5.3	13±8.1	0.336

Interclass comparison of cephalometric parameters



Figure 4: Interclass comparison of cephalometric parameters

In the comparison of the three classification for every of the 14 sleep apnea cephalometric measures, statistically significant distinction was verified among the groups for the Superior pharyngeal space, Middle pharyngeal space, Median posterior palatal space, Soft Palate length, Inferior pharyngeal space and Posterior airway space (p<0.05). For the other measurements, there was no statistically significant difference (p > 0.05).

On analyzing the Table 4 the intergroup comparison with Kruskal Wallis Test the superior and middle pharyngeal space, median posterior palatal space and inferior pharyngeal space was elevated in Class III patients, in comparison to Class I and II patients, and the soft palate length was less in Class III patients as comparied to Class I and Class II patients which is shown in figure 4.

#### DISCUSSION

It is a general belief that the upper airway structures play a big role over the event of craniofacial complex (Tourne, 1991; Johnston and Richardson, 1999; martin *et al.*, 2006)<sup>7,8,9</sup>. Malocclusion is one among the most complaints of patients that

they seek dental consultation. Among several classification of malocclusion, the foremost common is Class II followed by Class I and Class III. It is further divided into dental and skeleton malocclusion. Skeleton malocclusion type II is identified by maxillary bone protrusion and subsequently mandibular retrusion. In this deformity, maxilla is forwardly placed as compared to mandible resulting in unesthetic appearance <sup>10</sup>. In the present study, we assessed Class I, Class II, Class III patients using lateral cephalogram in the study population.

Kirjavainen and Kirjavainen <sup>11</sup> studied the upper airway in Class II division 1 malocclusion and compared them with a Class I molar relationship and concluded that the children with Class II malocclusion had a wider or similar nasopharynx than that of the controls but narrower oropharyngeal (OP) and hypopharyngeal areas. Martin et al <sup>12</sup> had also found that the lower pharyngeal dimensions were increased in Class III subjects. Indistinguishable findings were noted within the studies of Trotman et al <sup>13</sup> and Athanasiou et al <sup>14</sup>. Lateral cephalogram was conducted for all the mentioned studies <sup>1</sup>. But as compaired to these studies the present study show decreased value for nasopharynx and similar findings for oropharyngeal(OP) and Hypopharyngeal areas.

In the present study we have included 27 individuals aged 18-25 years and all were subjected to lateral cephalogram and the 14 obstructive sleep apnea parameters. In the study we found the significant value for Superior pharyngeal space, Middle pharyngeal space, Median posterior palatal space, Soft Palate length, Inferior pharyngeal space and Posterior airway space (p<0.05). And On analyzing intergroup comparison with Kruskal Wallis Test the superior and middle pharyngeal space, median posterior palatal space and inferior pharyngeal space was higher in Class III patients, in comparison to Class I and II patients.

It has been mentioned in the literature that malocclusion type does not have any influence pharyngeal airway width (Watson *et al.*, 1968 ; de Freitas *et al.*, 2006 ; Alves *et al.*, 2008)  $^{15,16,17}$ . However, Kim *et al.* (2010)  $^{18}$  found that the mean total airway volume of retrognathic patients was significantly smaller than patients with normal antero - posterior relationship. Grauer et al. (2009) <sup>19</sup> also confirmed that airway volume and shape differed among patients with different antero - posterior jaw relationships. In the study by aurthors El and Palomo (2011)<sup>20</sup> the relationship between different Angle classifications and airway volume was evaluated. It was also found that Class II subjects had lower OP airway volumes but the answer to which jaw was responsible remained unclear, but in his study in 2013 which serves as the next logical step, stratifying which jaw played a larger role. In study, it was observed that CII MandR(Class II Mandibular retrusion) subjects had the lowest OP and NP airway volume <sup>1</sup>, which is reflected in the present study as well were not only OP (Oropharynx) and NP ( Nasopharynx) has lowest value but HP (Hypopharynx) also has the lowest value.

Contemporarily, The Lateral Cephalogram still seems to be the Dominating Evaluation Tool in the field of Upper Airway Research in spite of its Disadvantages. The Main Disadvantage, without any doubt, is considered as the degradation of a three-dimensional (3D) entity into two dimensions (Lenza *et al.*, 2010)<sup>21</sup>. with the introduction of computed tomograph (CT, shortcomings of lateral cephalograms have been prevented. despite the widespread use of CT examinations in clinical practice, this new technology brought along concerns about the exposure to ionizing radiation and its potential hazards<sup>1</sup>.

#### CONCLUSION

• The nasopharyngeal, oropharyngeal and hypopharyngeal airway spaces among these three groups ( Class I, Class II, Class III ) in mithilanchal

population shows increased values in Class III patients with significance level (p < 0.05).

- The findings of this study suggests that the lateral radiographs can be used as a screening tool while evaluating pharyngeal airway size.
- The Class III patients have wider pharyngeal airway than Class I which in turn has wider pharyngeal airway than Class II Div 1

Even if we have come to this conclusion but further studies need to be done on a large sample as this study has short sample size so further study needs to be done

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# **Comparative Evaluation of Efficacy of Tetracycline Fiber as a LDD System in the treatment of Chronic Periodontitis as an adjunct to SRP – A Clinical Study**

#### Abstract

Tetracycline and its derivatives has shown to be highly effective in the treatment of chronic periodontiits. Since there are very limited microbiological study conducted to evaluate the efficacy of tetracycline fibers as a local drug therapy, the study has been taken up to evaluate the efficacy of locally delivered tetracycline fibers (Periodontal AB Plus) in conjuction with scaling and root planing in the treatment of chronic periodontiits in the patients who are not willing to undergo periodontal flap surgery.

**Keywords:** Tetracycline, Local Drug Delivery System, Chronic Periodontitis, Scaling and Root Planing, ClinicalStudy

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## INTRODUCTION

Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with increased probing depth formation, recession, or both.<sup>1</sup>

Chronic periodontitis is an infection involving the destruction of supporting tissues surrounding the tooth.<sup>2</sup> There is considerable evidence supporting the role of bacteria as the etiology of periodontal disease. Elevated numbers of sub gingival microorganisms have been associated with destructive periodontal disease activity.<sup>3</sup> The elimination or reduction of microbial pathogens present in sub gingival plaque is one of the primary objectives of periodontal therapy.<sup>3</sup> Recognition of specific role of certain bacteria in chronic periodontiis has tended to consolidate ideas in therapeutic management of such diseases.<sup>4</sup> Removal or inhibition of sub gingival plaque thus plays an important role in the maintenance of oral health.<sup>5</sup>

Antimicrobial therapy has also been directed at specific bacteria associated with clinically diseased sites to help augment the mechanical treatment aimed at the removal of sub-gingival calculus and toxins. However, the inability to achieve and maintain therapeutic concentrations of the antibiotic in the crevicular fluid with systemic administration can limit its effectiveness.<sup>6</sup>

Also, the Systemic administration of antimicrobial agents requires frequent dosing which is associated with the risk of developing resistant organisms and super infection as well as adverse effects such as gastrointestinal disturbances.<sup>7</sup>

Pitcher et al. observed that mouth rinses and agents used during supra-gingival irrigation do not predictably reach beyond 5 mm into the periodontal pocket. For antimicrobial agents to be effective, the concentration of the drug should be adequate at the site and also there should be prolonged drug microbial contact.6 In order to overcome the drawbacks associated with systemic and conventional mode of therapy, local drug delivery systems were developed, which is used in this study.<sup>8</sup>

The antimicrobial agents used as local drug delivery agents include tetracycline, ofloxacin, clindamycin, chlorhexidine, etc. Tetracycline as well its derivatives doxycycline and minocycline are the most commonly used antimicrobial agents in the treatment of periodontal infections. Tetracycline also binds to the root surfaces and can be released in active form over extended periods of time. The sub-lethal concentration of a number of disease associated bacteria including P. gingivalis and P. intermedia.<sup>9-10</sup>

Tetracyclines are semi-synthetic chemotherapeutic agents which are bacteriostatic in action and hence are effective against rapidly multiplying bacteria. Tetracycline have been incorporated into a variety of delivery systems (nonresorbable or bioresorbable) for insertion into periodontal pockets. These include hollow fibers (Goodson et al., 1979), ethylene vinyl acetate copolymer fibers (Goodson et al., 1983), ethyl cellulose fibers (Friedman and Golomb, 1982), acrylic strips (Addy et al., 1982), collagen preparations (Minabe et al., 1989), and hydroxypropyl cellulose films (Noguchi et al., 1984).

Recently, a new local drug delivery system, Periodontal Plus AB, which contains 25 mg pure fibrilar collagen with approximately 2 mg of evenly impregnated tetracycline hydrochloride (Advanced Biotech Products, Chennai, India) have been introduced for the treatment of gingival and periodontal diseases.<sup>11</sup> The present three month study was designed to reduce the surgical intervention in the treatment of periodontal pocket and to use locally available material so as to reduce the financial burden on the patient and thereby making cost effective management.

Since there are limited microbiological studies conducted to evaluate the efficacy of tetracycline fibers as a local drug therapy, the study has been taken up to evaluate the efficacy of locally delivered tetracycline fibers (Periodontal AB Plus) in conjuction with scaling and root planing in the treatment of chronic periodontitis in the patients who are not willing to undergo periodontal flap surgery.



Figure 1: Periodontal Plus AB.

## MATERIAL AND METHODS

A total of 30 human subjects consisting of both genders (male & female, aged between 35 to 60 years were selected from department of periodontics and implantology, Mithila minority dental college and hospital Bihar, All the 35 subjects completed the 3-month follow-up study.

#### **Study population**

Inclusion criteria

- 1. Patients who had not undergone any surgical or nonsurgical periodontal therapy in the past 6 months.
- 2. Patients who had not taken antibiotic therapy in the past 6 months.
- 3. Patients able to follow verbal or written oral hygiene instructions.
- Patients having two nonadjacent teeth separated by at least 1 tooth with ≥5 mm periodontal pocket that bleed on probing at the initial visit.

- 1. Patients with a history of using antimicrobial mouthrinses within 2 months of the baseline visit or on routine basis.
- Patients having history of allergy to tetracycline or cyanoacrylate adhesive.
- 3. Pregnant woman or nursing mothers.
- 4. Patients with periodontal packets in which the depth of the pockets corresponded to the apex of the tooth as in probable endodontic-periodontic conditions.
- 5. Medically compromised patients.
- 6. Teeth with furcation involvements.

Thirty-five subjects with a total of 70 sites were selected. The selected sites were randomly divided into test group and control group.

- Test group included 35 sites treated with local drug delivery and scaling and root planing.
- Control group included 35 sites treated with scaling and root planing alone (without local drug delivery).

**Test group** - included 35 sites that were selected for the placement of Periodontal Plus AB; Tetracycline fibers (local drug delivery) after scaling and root planing.

**Control group** - included 35 sites that were treated with scaling and root planing alone (without local drug delivery). Clinical examination for the base line parameters were done after obtaining written consent from each patient who had participated in the study. The ethical clearance obtained from ethical committee of Mithila minority dental college and hospital ,Bihar.

Clinical attachment level measurement from cemento- enamel junction as a reference point to the base of pocket with William's graduated probe at baseline, 1 month, 2 months, and 3 months post-therapy.

## RESULT

Results showed a significant improvement in all the clinical parameters. There was significant decrease in mean probing depth from base line to 90 days, and also there was significant gain in CAL in the test group as compared to control group.



Figure 2: Test site Measuring of probing pocket depth and CAL using acrylic stent at base line.

Exclusion criteria



Figure 3: Placement of Periodontal Plus AB at test site.



Figure 4: Measuring of probing pocket depth and CAL using acrylic stent at 3 months.

## CONCLUSION

- 1. Application of the tetracycline in modified collagen matrix following scaling and root planing might be beneficial in treatment of chronic adult periodontitis and mproving periodontal parameters for 3-month duration.
- Though the local drug delivery system used in the study is the safe and effective treatment modality, further clinical and microbiological studies are required to determine the effect of this treatment modality over long period.
- 3. Despite the proven additive benefits, the availability and cost associated with various controlled delivery devices (EVA fibers) have so far limited the application of tetracycline fibers. As this material is relatively cost effective and biodegradable, its use can be expanded in general population.

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## **Management of Calcified Canals: A Review**

#### Abstract

Root canal calcifications are a great challenge in root canal treatment. The exact mechanism of canal obliteration is unknown but is believed to be related to damage to the neurovascular supply of the pulp at the time of injury. Pulp canal obliteration occurs commonly following traumatic injuries to teeth. It is characterized by apparent loss of the pulp space radiographically and that causes the darker hue, translucency loss and the yellowish appearance of the tooth's crown. Partial or total pulpal canal obliteration is a common sequel of a traumatic injury. Teeth with calcified canals are generally asymptomatic. Locating the canal and negotiating it to full working length may lead to endodontic mishaps such as fractured instrument and perforation. Obliterated canals can be dealt under the magnification of dental operating microscope, guided endodontic treatment, Dynamic Navigation System, CBCT-Aided microscopic and ultrasonic treatment. The purpose of the present article is to review the etiology, prevalence, classification, mechanism, diagnosis as well as treatment options for teeth with calcified canals.

**Keywords:** Calcification, Pulp canal obliteration, Calcific Metamorphosis, Access cavity Canal negotiation, Dental operating microscope, CBCT, Dynamic navigation, Guided endodontics.

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#### INTRODUCTION

Calcification of the root canal system is a well-studied phenomenon.<sup>1</sup> Calcification of the dental pulp may be discrete or diffuse in its form. Discrete calcification results in the formation of pulp stones, denticles, or nodules. Diffuse calcification results in a symmetric reduction in the size of the pulp chamber and the radicular pulp space, which is more commonly observed in older patients. Dental pulp calcification may occur in response to both local as well as systemic factors. Local factors include caries, cavity preparation, the presence of restorations, and excessive forces caused by clenching and trauma. Systemic factors include hypercalcemia, gout, and endstage renal diseases.<sup>2,3</sup> Some miscellaneous etiology like orthodontic treatment, endodontic regenerative procedures, surgeries, auto-transplantations and any iatrogenic dental treatment may also lead to such pulpal calcifications.<sup>3</sup> American Association of Endodontists defined Calcific Metamorphosis as "A pulpal response to trauma characterised by rapid deposition of hard tissue within the canal space."<sup>4,5</sup> This is also known as obliteration of pulp canal, Dystrophic Calcification, Diffuse Calcification and Calcific Degeneration. Calcification which is uncontrolled due to failure of enzyme pyrophosphatase,

reduction in capillary permeability and blood supply causes calcifications.<sup>4</sup> This is a slow, normally occurring physiological aging process. Hard tissue deposition occurs in response to tooth wear, at a slow pace.<sup>5</sup> The Calcific deposits of the pulp chamber causes the darker hue, translucency loss and the yellowish appearance of the tooth's crown.<sup>4</sup> Partial or complete canal calcification is a common finding in permanent teeth but the root canal treatment is recommended in symptomatic cases of pulpal and/or periapical pathosis. Localization and negotiation of calcified root canals is a challenging procedure, where iatrogenic errors may occur.<sup>6</sup> The American Association of Endodontics (AAE) classifies the root canal treatment in pulpal calcifications as a high difficulty procedure, owing to the risk of complications, or even failures.<sup>3.6</sup>

The recent advances in the field of imaging, magnification and novel instruments aid in negotiating and managing these calcified canals efficiently without any procedural mishaps.<sup>5</sup> Long-shank drills and ultra - sonic tips coupled with dental operating microscope, Cone beam computed tomography (CBCT), are used for such cases. Guided endodontics and virtual planning help to preserve the remaining tooth structure and avoid procedural errors.<sup>6</sup> This article is designed to help the clinician to understand the etiology, diagnosis and treatment options of the calcified canals.

## ETIOLOGY

The most common etiological agents are prolonged trauma, natural process of aging, gender, various systemic diseases, nonvital tooth without endodontic treatment, long-term irritation such as dental restorations and crowns that exert constant force on the tooth.<sup>2,4,5,6,7</sup> Dental pulp calcification may occur due to both local as well as systemic factors. Local factors may include caries, the presence of restorations, excessive forces caused by clenching and trauma, and cavity preparation. Systemic factors may include hypercalcemia, end-stage renal diseases and gout. Some miscellaneous etiology like orthodontic treatment, regenerative procedures, endodontic surgeries, autotransplantations and any iatrogenic dental treatment may also lead to such pulpal calcifications.<sup>3</sup>Trauma to the tooth usually stops the blood supply and decreases the vascularity over time, causing trauma associated calcification of the canal.<sup>4</sup> In elderly patients, most cases of pulp necrosis occur without the classic symptoms of reversible and irreversible pulpitis. Aging pulps can be considered "sclerosed" or "calcified," due to the continued deposition of regular secondary dentin. With increasing age, the number of odontoblasts decreases and the reparative ability of the pulp is reduced.8In addition, the blood supply decreases with age. The pulp horns and the floor and roof of the pulp chamber in molars, may be converted from a large rectangular cavern in the young, to a flat disc in the elderly. Pulp chamber is further constricted by reactionary and reparative dentine which is laid down to reduce the porosity of dentinal tubules opened to the mouth by caries, trauma or dental treatment, or to heal frank pulpal exposures. Generalized pulp obliteration has also been seen in certain diseases like Marfan syndrome and in renal osteodystrophy and atherosclerosis. Calcified canals are more often observed in patients who have suffered concussion or subluxation injuries.<sup>5,7</sup> Andreasen (1987) reported an increased incidence of pulp obliteration after orthodontic band fixation of traumatized teeth, and they assumed that band application might have caused displacement of root with compression of the apical vessels. The frequency of pulp obliteration is dependent on the extent of the luxation injuries and the stage of root formation. It has been seen that in teeth with closed apices, there is constriction of blood vessels leading to pulpal necrosis, whereas if the apices are open, the tooth will react with increased deposition of sclerotic dentin. Calcification can either be due to physical factors, local factors, or systemic factors as mentioned above, along with that it can also be due to hereditary diseases like dentin dysplasia or dentinogenesis imperfect.

## CLASSIFICATION OF PULP CALCIFICATION

According to Kronfeld and Boyle, there are two distinct types of calcification that occur in the pulp: Those more frequent in the radicular pulp are generally termed diffuse or linear calcifications, whereas those more commonly found in the coronal region are known as pulp stones (denticles).<sup>4,9</sup>

Traditionally, calcified bodies in the dental pulp have been classified on the basis of their structural characteristics.

The classification by Kronfield is most commonly used.

1. "true" denticles (composed of tubular (ortho) dentin),

2. "false" denticles (composed of concentric layers of calcified material not resembling dentin),

3. "diffuse calcifications" (small calcified deposits scattered throughout the pulp tissue).<sup>4,10</sup>

True pulp stones have dentinal tubules like dentin, odontoblastic processes, and few odontoblasts, whereas false pulp stones are concentric layers of calcified tissue with a central cellular area, which might be necrotic and acts as nidus of pulp stone formation.<sup>5</sup>

The degree of pulp obliteration can further be classified as total obliteration and partial obliteration. In total obliteration the pulp chamber and root canal are hardly or completely not discernible, and partial obliteration, in which the pulp chamber is not discernible and root canal is markedly narrowed but clearly visible.<sup>5</sup>

According to their location; they can be classified into embedded, interstitial, adherent, and free denticles.

Pulp obliteration can be classified as -localized and generalized.<sup>4,5,11</sup> In the localized form, the etiologic agent most often is trauma and this condition has been described relatively frequently after crown and root fractures, tooth luxation, jaw fractures, tooth replantation, and endodontic procedures.

## MECHANISM

The mechanism underlying the pulp canal obliteration is mysterious. According to Torneck (1990)<sup>12</sup>the deposition of hard tissue is either a result of stimulation of the pre- existing odontoblasts or a result of the loss of their regulatory mechanism containing a maze of small irregular spaces and culde-sacs, which extend from the pulp chamber to the apical foramen. Andreasen and Andreasen (1994)<sup>13</sup>described calcific metamorphosis as a response to severe injury to the neurovascular supply to the pulp, which after healing leads to accelerated dentin deposition, and is closely related to the loss and re-establishment of the pulpal neural supply.14 None of these mechanism have been proved hence further evidence based research is necessary to prove the above mechanism. The odontoblasts at the periphery and the undifferentiated pulp cells produce the osteoid tissue similar to that of dentin along the periphery or with in the pulp. These tissues can eventually fuse with one another, producing a rapid and complete pulp canal obliteration. <sup>15</sup>Ten Cate (1998)<sup>16</sup> identified this process as the deposition of tertiary or reparative dentin in response to irritation or trauma. Reparative odontoblasts are somehow able to differentiate from dental pulp cells in the absence of any epithelial influence. During the development of the tooth, the undifferentiated ectomesenchymal cell of the dental papilla divides into two daughter cells. One daughter cell is influenced by the epithelial cells and differentiates into an odontoblast, while the second daughter cell that is not exposed to the epithelial influence persists as a subodontoblast cell, which under certain influences differentiates into odontoblast-like cells and deposits dentin-like hard tissue.<sup>17</sup> Reparative dentin or tertiary dentin is deposited at specific sites in response to injury, and rate of deposition depends on the degree of injury. This result in accelerated hard tissue formation that traps some pulpal cells and gives the histologic appearance of osteodentin with an irregular tubular pattern. Evidence indicates that reparative dentin is produced by newly differentiated cells and incorporates type I and III collagen in its matrix, which exhibits diminished phosphophoryn<sup>16</sup> content. The deposition of fibronectin on predentin provides the mechanism for positioning the cells that then produce a matrix of type I and II collagen that accepts mineral in the absence of phosphoryn content. There is much discussion as to whether the mineralized tissue so formed is truly dentin, because the original odontoblasts express type I collagen and phosphophoryn<sup>17</sup> content.

## **CLINICAL FINDINGS**

**Colour:** According to the Jacobsen & Kerekes  $(1977)^{18}$  the crowns 79% of 122 teeth with pulpal obliteration of the tooth showed yellow discoloration. These teeth with pulp obliteration is darker in hue than the adjacent teeth and exhibits a dark yellow color because of a greater thickness of dentin under the enamel leading to decrease in translucency. Some teeth present itself with grey discoloration .it is not mandatory that all teeth with radiographic signs of pulpal obliteration undergo a color

change.<sup>5</sup> It has also been found that more than two-thirds of teeth with pulpal obliteration are asymptomatic.

**Pulp sensibility testing:** Electrical or thermal vitality tests show negative responses in obliterated case. As pulp calcification becomes more pronounced there is a progressive decrease in the response to thermal and electrical pulp testing. The tooth affected by concussion or subluxation injuries, do not always react to sensibility tests for some time.<sup>19</sup> This lack of a response can be reversible, and it is possible that after some weeks, sensibility tests will show positive results, It has also been reported that teeth with partial pulpal obliteration were more responsive to electric pulp testing than compared to that were totally obliterated. It is generally accepted that the absence of a positive response to the electric pulp test does not automatically imply pulp necrosis.<sup>20</sup>

**Radiographic Findings:** The radiographic appearance of an obliterated pulp space is present with the absence of pulp chamber. The lamina dura remains intact if there is no evidence of apical involvement of bone. The chamber can be partially obliterated which means the pulp chamber is not visible and narrowing of canal whereas in total obliteration the pulp chamber is completely not visible and the canal also hardly visible but sometimes may not be visible also.<sup>4,5</sup>

#### MANAGEMENT

The obliterated pulp canal is debatable on showing no symptoms or pathosis of the periapical region. Continuous observation and follow up gives a better intervention before deciding the conclusion. Calcific Metamorphosis is generally asymptomatic and clinically the patients present to the practitioner with yellow discoloration of the affected tooth crown. According to literature, the incidence of a calcified tooth developing pulpal pathology is in the range of 1 - 16%. If the patient's complaint is only discoloration, then a vital (external) bleaching technique can be an option.<sup>4,7</sup>

#### Negotiation:

#### The use of Instruments:

A variety of "pathfinding" instruments have been introduced. DG-16 explorer (Hu-Friedy, Chicago, IL) is a very helpful instrument in the location of canal orifice. To negotiate these canals, instruments with reduced flute can also be used, such as a Canal Pathfinder (JS Dental, Ridgefield. Conn) or instruments with greater shaft strength such as the Pathfinder CS (Kerr Manufacturing Co.), which are more likely to penetrate highly calcified canals. C+Files (Denstply, Tulsa, OK, USA) are also ideal for initial instrumentation of calcified root canals. They have a cutting tip that engages the dentin. The long neck (LNbur) round bur (Caulk/Denstply, Tulsa, OK, USA), extendedshank round burs, such as the Mueller bur (Brasseler, Savannah, GA, USA), can also be used for locating the orifices of calcified canals. Apart from these, there is also the Munce Discovery bur (CJM Engineering, Santa Barbara, CA), which is similar to the Mueller but has a stiffer shaft and is available in smaller head sizes. The extra-long shank of these burs moves the head of the handpiece away from the tooth, improving the clinician's visibility during this delicate procedure. EndoGuide® Burs (SS white, NJ, USA) increase visibility and control during endodontic exploration while locating canals and navigating deeply calcified canals.<sup>4</sup> Fachin et al. described the "Modified-Tip Instrument" technique for removal of hard pastes from the root canal during retreatment and suggested its use to gain length in extremely calcified canals. The tip of a K-type file (quadrangular section), #30 and #35, is cut by 4 mm using an orthodontic wire cutter producing a sharp edge at the new working end. Used with an apical pressure and reaming motion this file now becomes an efficient and potent cutting instrument. Similar technique has been reported by Siddiqui<sup>21</sup> and Kobayashi<sup>22</sup> also. Possible drawbacks of this technique could be: Repeated radiographs to assess the progress and direction of the file; Perforation if misdirected due to the files

aggressiveness; and Difficult to work in curved canals. Because this modified K file has an especially fine tip and an appropriate stiffness, it followed constricted or sharply curved canals well and had a high penetration potential.<sup>7</sup>

The most commonly used technique to access a calcified canal is to carefully drill through the calcification following the long access of the tooth. Periapical radiograph at multiple angles should be taken to check the direction of the bur to avoid perforation. Ultrasonic and dental operating microscope (DOM) are good tools that help in treating calcified canals. The American Association of Endodontics and the American Academy of Oral and Maxillofacial Radiology were recently updated the joint position statement regarding the use of cone-beam computed tomography (CBCT) in endodontic treatment. They recommended the use of limited field of view (FOV) CBCT in identification and localization of calcified canals. The advantage of CBCT in demonstrating anatomic images helped in successful negotiating of the calcified canals without adverse mishaps such as perforations. The use of CBCT cannot substitute the use of the conventional radiography. However, the advantages and the indications to use this technology should be considered.<sup>23</sup>Locating calcified canals is difficult and is associated with procedural errors including perforation, canal geometry alteration, and loss of dental hard tissue. Magnification and illumination with a dental operating microscope (DOM), ultrasonic tips, long-shank drills, and conebeam computed tomographic (CBCT) imaging aid in treating calcified canals. Even with these technologies, excessive dentin removal occurs. Guided endodontics is a new approach that uses a printed template to guide a dental bur toward the root canal resulting in a conservative access cavity preparation. Requirements include intraoral scan acquisition and template fabrication. Dynamic navigation with passive optical technology that has been used in implant dentistry in recent years uses a computer to guide implant placement in real time based on information gathered from a CBCT image. Motion tracking enables the system by following the position of both the patient and the dental handpiece throughout the procedure. The ideal drill position is planned virtually by the surgeon using the CBCT data set uploaded into the planning software. Sensors attached to the surgical handpiece and the patient's head or teeth transfer 3-dimensional spatial information to a stereo tracker. Several studies have confirmed the accuracy of different systems. There is potential for this technology to be used in endodontics for accessing teeth with PCO, but studies on endodontic applications are limited.24

The successful nonsurgical treatment of "calcified" canals can be accomplished most of the time. It requires a multifaceted approach, which includes: recognition of the problem before treatment; planning of lengthy, multiple visits; having the right instruments, mainly the dental operating microscope (Dentiscope); and being able to generate optimism and confidence about the outcome.

Endodontic surgery: Root-end resection and filling should be considered when a canal cannot be located. Clearly, such endodontic microsurgery is an option in the treatment of calcified canals as it offers a direct approach to the root apex. Canal identification can be problematic in the calcified canal after root resection. The guiding influence of a canal space will be non-existent in the calcified and previously unprepared canal system.<sup>4</sup> It is proposed that once the apex is resected, necrotic pulp pockets trapped during the calcification process may be exposed to the surrounding periapical tissues which could cause failure of treatment due to persistent chronic inflammation.<sup>7</sup> It is likely that this will be a further complicating factor in carrying out surgery on a calcified canal system where there has been no attempt at orthograde root filling. The surgical treatment approach should be considered only in cases where nonsurgical treatment or retreatment has resulted in a persistence of periapical disease and/or symptoms4

#### Agents-Is There Any Role?

Chelator preparations have been advocated frequently as adjuncts for root canal preparation, especially in narrow and calcified root canals. Apical dentin is more frequently sclerosed, and is more mineralised. Several authors recommend liquid EDTA solution be introduced into the pulp chamber (pipette, cotton pellet) to identify the entrance to calcified canals.<sup>25</sup>

### CONCLUSION

The successful nonsurgical treatment of "calcified" canals can be accomplished most of the time. It requires a multifaceted approach, which includes: recognition of the problem before treatment; planning of lengthy, multiple visits; having the right instruments, mainly the dental operating microscope; and being able to generate optimism and confidence about the outcome. Though negotiating and managing calcified canals can be challenging, they can be managed if a proper protocol is followed. Operator's skill, patience, and a proper armamentarium are the requisites to overcome the difficulties posed by these unforgiving canals for their successful treatment. The locating of the canal becomes difficult, these difficulties can however be managed by using various instruments to negotiate the canal.

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#### Review

## **Obturating Techniques in Pediatric Dentistry: A Review**

#### Abstract

Primary teeth maintain the arch length and form by maintaining proper guidance for permanent teeth. Pulpectomy is the one of the treatment option available to preserve the tooth and thus helps in maintaining normal space. Pulpectomy consists of removing the pulp tissue associated with micro-organisms and debris from the canal and obturating with resorbable filling material. Success of pulpectomy depends on many factors like the primary tooth canal systems, their formation and resorption pattern, obturating material as well as obturation technique used that is capable of densely filling the entire root canal system and providing a fluid tight seal from the apical segment of the canal to the cavosurface margin in order to prevent reinfection resulting inflammation. This review article basically focuses on various obturating techniques used in deciduous teeth with their comparison, pros and cons.

Keywords: Deciduous teeth, Obturation techniques, Pulpectom.

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## INTRODUCTION

Major goal of paediatric dentist in modern dentistry is to maintain the integrity of the primary dentition until normal exfoliation. Pulpectomy is a conservative approach to preventing the premature loss of primary teeth that can result in loss of arch length, insufficient space for erupting permanent teeth, impaction of premolars, and mesial tipping of molar teeth adjacent to the lost primary molar.<sup>1</sup> Pulpectomy in primary teeth is needed to achieve good hermetic seal which depends on various factors such as good biomechanical preparation, type of obturating material used and achievement of minimum voids. Obturating the canal creates a fluid tight seal along the length of the root from the coronal opening to the apical end and eliminating the entry of micro-organism between the periodontium and the root canal.<sup>2,3</sup> Teeth with inadequate obturation, unfilled root canals, or underextended root fillings might require retreatment before coronal restoration.4 These unfilled areas might create problems because they might contain bacteria that can multiply when in contact with nutrients via the periapical region or lateral canals.<sup>5</sup> For this purpose, several techniques have been used for the filling of material into primary teeth root canals. An ideal filling technique should assure complete filling of the canal without overfill and with minimal or no voids.<sup>6</sup> It is important to select an obturation technique that offers consistency and is easy to use.<sup>4</sup>

Key factor for obturation is cost effectiveness of carrier which is used to carry the material to the canal, ease of obturation, control and manipulation of material leads into successful outcome of clinically precise obturation. Commonly used techniques for obturation of primary canals are conventional manual incremental lateral condensation by tuberculin syringe, amalgam pluggers, navi tip, disposable injection technique, hand-held, rotary lentulo spiral, endodontic pressure syringe, past inject, jiffy tubes etc.<sup>8</sup> In all these, lentulo spiral is the most commonly used instrument as the root canal paste carrier and it can be used manually or can be mounted on micromotor handpiece. This process is easy and economical.

Filling the root canal does not produce a densely compacted root canal filling and much reliance is placed on adherence of the paste to the walls of the canal.<sup>9</sup> Disposable syringe is the simplest method of completely obturating canal space and filling the apical portion of the root canal and thereby, eliminating voids and incomplete filling along the root canal space.<sup>10</sup>

The past inject paste carrier is similar to lentulospiral obturation technique and it provides good placement of the obturating material, while eliminating voids and providing a high density of the obturating materials.<sup>11,12</sup>

So far, none of the obturation techniques available have been found ideal for obturation of root canals in primary teeth. Past inject is used for the placement of calcium hydroxide and root canal sealers in the permanent teeth, but there are not enough studies to evaluate its use as obturation technique in primary teeth. Various studies have been conducted to find out the ideal root canal filling material and best technique of obturation, but they all have been inconclusive.

#### 2) Primary root canal obturating techniques are:

Success rate for pulp therapy mostly depends on obturating material and technique used for obturation.<sup>13</sup> Root canal obturating techniques are :

**Endodontic pressure syringe**: This technique was decribed by Greenberg (1963). The standardized mixture was injected into the simulated canals in an vitro study conducted by **S. Aylard** and **Ronald Johnson**. The needle was inserted into the simulated canal until wall resistance was encountered. Using a slow, withdrawing-type motion, the needle was withdrawn in 3-mm intervals with each quarter turn of the screw until the canal can be visibly filled at the orifice with zinc oxide eugenol paste.<sup>14</sup> The 13 to 30 gauge needle which corresponds to the largest endodontic file can be used to instrument the root canal. It has been noted that the needles are very flexible and can easily be maneuvered in the tortuous canals of primary molars.<sup>13</sup> Overfill is a common clinical finding in the primary dentition, especially when apical resorption and/ or the paste is applied through a pressure syringe.

<u>Disadvantage</u>: Difficulties in placing the rubber stop correctly and removing the needle (because of the need to refill the hub of the syringe several times during the procedure) may lead the clinician to remove and reinsert the syringe repeatedly, which, in turn, may displace the paste, create voids, and thus decrease filling quality. In addition, the need to clean the syringe immediately after use makes this method more complex and time-consuming.<sup>15</sup>

According to **Mallayya C. Hiremath** et al compared endodontic pressure syringe, insulin syringe, jiffy tube, and local anesthetic syringe in obturation of primary teeth and found that Endodontic pressure syringe produced the best results in terms of length of obturation and controlling paste extrusion from the apical foramen. However, insulin syringe and local anesthetic syringe can be used as effective alternative methods.<sup>16</sup>

**Lentulo spiral** - This obturation technique was advocated by **Kopel** in 1970. The Lentulo spiral is one of the most effective and straight forward techniques for applying sealers and calcium hydroxide into permanent tooth root canals or pastes into primary tooth canals.

#### Instructions:

- Lentulospiral is dip into the mixture
- Introduce into the canal to its predetermined length
- Rotate in the canal
- Additional amount of paste is added into the canal, till it is filled

Advantage: The design and flexibility of the Lentulo spiral allow files to carry the paste uniformly throughout the narrow, curved canals in primary molars

#### Disadvantages

- Difficulties in fitting the rubber stop
- Instrument fracture
- Tendency for extrusion beyond the apex

.A study conducted by **Peters et al** and **Sigurdsson** who reported that application with a lentulo spiral was more homogenous than injection of Ca(OH)2 paste. <sup>17,18</sup> **Bawazir** and **Salama** evaluated in vivo two different obturation techniques, lentulospiral mounted in a slow speed handpiece and hand-held in primary teeth. Authors concluded that there was no statistically significant difference between the two techniques of obturation, according to the quality of the root canal filling or success rate.<sup>2</sup>

According to **Reddy PVR** compared the obturation qualities in primary teeth using three endodontic obturation techniques namely incremental filling technique, lentulospiral technique and pressure syringe technique and found that there was no statistically significant differences among the three techniques tested when apical seal, voids and extrusion were evaluated.<sup>19</sup>

**Mechanical Syringe** - This method was proposed by Greenberg in 1971. The standardized ZOE mixture Is loaded into the syringe as per the manufacturer's recommendation and expressed into the simulated canal with continuous pressure via a 30-gauge needle while withdrawing the needle. The pressure is generated by the mechanical lever action of the trigger grip which then is transferred to a plunger and in turn express the ZOE out of the needle. The canal shape governed the selection of the filling technique and the mechanical syringe was a poor performer in both canal types i.e. curved and straight canals in a study conducted by **Aylard and Johnson**. The screw mechanism of the endodontic pressure syringe would be able to generate far greater pressures than could a plunger system as is seen with the mechanical syringe.<sup>14</sup>

**The Incremental Filling Technique** - This was first used by **Gould** in 1972. An endodontic plugger, corresponding to the size of the canal, with rubber stop was used to place a thick mix of zinc oxide-eugenol paste into the canal. Length of the endodontic plugger equaled the predetermined root canal length minus 2 mm. Additional increments of 2-mm blocks were added until the canal was filled to the cervical area.<sup>20</sup>

<u>Disadvantage:</u> Placing the paste in a narrow, apically curved canal is more difficult than in a wider apical preparation. because the flexibility of endodontic pluggers is limited, the paste cannot be placed in the full working length of narrow, curved canals. In addition, movements of the plugger during paste application may increase the risk of large voids.

**Memarpour et al** conducted a study and found that an optimal filling result was obtained more frequently with the Lentulo instrument than with the packing technique.<sup>15</sup>

**Jiffy Tube** - This technique was popularized by **Rifficin** in 1980.<sup>14</sup> The material of choice for filling the root canals of pulpectomized primary teeth is pure ZOE, first mixed as slurry and carried into the canals using paper points, a syringe, a Jiffy tube, or a lentulo spiral root canal filler.<sup>1</sup> The standardized mixture of ZOE is back-loaded into the tube. The tube tip is placed into the simulated canal orifice and the material expressed into the canal with a downward squeezing motion until the orifice appears visibly filled.

**Tuberculin syringe** - This syringe was utilised by **Aylord and Johnson** in 1987. The standardized mixture of ZOE was backloaded into the syringe with a standard 26- gauge, 3/8-inch needle. The material was expressed into the canal by slow finger pressure on the plunger until the canal was visibly filled at the orifice. There appeared to be no difference in the straight canal filling capabilities of either the tuberculin or mechanical syringes.<sup>14</sup> The tuberculin syringe group had the worst results for the length of obturation among other techniques used in a study conducted by **Memarpour et al**. The main drawback of the tuberculin syringe technique is the difficulty of separating the tip during injection, which results in the need to repeatedly replace the needle. This may compromise optimal filling and increase the presence of voids in the paste.<sup>15</sup>

**The Reamer Technique** - A reamer coated with ZOE paste was inserted into the canal with clockwise rotation, accompanied by a vibratory motion to allow the material to reach the apex, and then withdrawn from the canal, while simultaneously continuing the clockwise rotary motion. A rubber stopper was used to keep the reamer to the predetermined working length, and the process was repeated 5 to 7 times for each canal until the canal orifice appeared filled with the paste.

**The Insulin Syringe Technique** - As described by **Priya Nagar et al**, a homogeneous mixture of ZOE, according to manufacturer's instructions is loaded into the insulin syringe and a stopper is used after assessing the working length of the canal. The needle is inserted into the canal and kept about 2mm short of apex. The material is then pressed into the canal and while doing so the needle is retrieved from the canal outwards while continuing to press the material inside. This helps avoid incorporation of voids into the canal. Finally, over the orifice more material is pressed and compressed using wet cotton. It can be concluded from this study that with optimum operator skills and proper material mix optimal filling with less number of voids and good radiopacity can be achieved with both hand reamer technique as well as the Insulin Syringe technique with comparable results.<sup>21</sup>

**Malayya C. Hiremath** et al compared endodontic pressure syringe, insulin syringe, jiffy tube, and local anesthetic syringe in obturation of primary teeth and found that insulin syringe and local anesthetic syringe can be used as effective alternative methods.<sup>16</sup>

**Disposable Injection Technique** - ZOE can be loaded in a 2-ml syringe with 24-gauge needle along with stopper adjusted to measured length taking RCT instrument as guide and the material is gently pushed into the canal till the material is seen flowing out of the canal orifice. Now the needle is gradually withdrawn while pushing the material till the needle reaches the pulp chamber. The technique described is simple, economical, can be used with almost all filling materials used for the purpose, and is easy to master with minimal chances of failure as reported by Bhandari et al.<sup>10</sup>

**NaviTip(Ultradent)** - Recently, a thin and flexible metal tip was introduced viz., NaviTip (Ultradent), in the market to deliver root canal sealer. This NaviTip comes in different lengths and a rubber stop may be adjusted to it. Guelmann et al assessed the quality of root canal filling by using three filling systems: syringe with plastic needle (Vitapex), syringe with metal needle (NaviTip), and lentulo spiral. Filling quality was determined radiographically. Tip thickness, limited flexibility, difficulty to adapt a stopper and operator experience with the Vitapex delivery system may explain the less than ideal results. Unfortunately, due to paste thickness, material could not be expressed via the NaviTip<sup>TM</sup> lumen. EndoSeal, a syringe delivered zinc oxide eugenol based canal sealer can be expressed by the NaviTip system.<sup>6</sup>

**Mahtab Memarpour et al** conducted a comparative study of anesthetic syringe, NaviTip syringe, pressure syringe, tuberculin syringe, lentulo spiral and packing with a plugger that lentulo produced the best results in terms of length of obturation, while NaviTip syringe produced the best results in controlling paste extrusion from the apical foramen and having the smallest void size and lowest number of voids.<sup>15</sup>

Bi-Directional Spiral - Dr. Barry Musikant (1998) developed a new obturation technique with bi-directional spiral. This technique ensures that a minimal amount of obturating material will past the apex. This controlled coverage is achieved because the spirals at the coronal end of the instrument spin the material down the shaft towards the apex, while the spirals at the apical end spin the material upward towards the coronal end. Where they meet (about 3-4 mm from the apical end of the shaft), the material is thrown out laterally. According to Muskant et al. [1998] observed that the bi-directional spiral prevented the apical extrusion of the sealer from the root canals of permanent teeth. The highest number of voids was seen in canals filled with the lentulo spirals and bidirectional spiral as observed by Grover et al.9 NS Ca(OH)2 injected into canal with NaviTip consistently produced better results than the spirally placed dressings in a conclusion drawn by the study reported by Gibson et al.<sup>2</sup>

**Musikant, Cohen and Deutsch,** observed that bi-directional spiral prevented apical extrusion of sealer.<sup>23</sup>

**Pastinject** - Pastinject (Micromega) is a specially designed paste carrier with flattened blades, which improves material placement

into the root canal. In a study conducted by Grover et al, it was concluded that among lentulospirals, bi-directional spiral, pastinject and pressure syringe, the pastinject technique has proved to be the most effective, yielding a higher number of optimally filled canals and minimal voids, combined with easier placement of the material into the canals.<sup>9</sup>

**Deveaux et al<sup>11</sup> and Oztan Meltem et al** (2002)<sup>12</sup>reported that special design of the Pastinject seems to favour a better intracanal placement of calcium hydroxide paste in single rooted teeth.

**Joseph Meng et al** reported that a specially designed paste carrier technique is also found to be an effective technique in the intracanal placement of calcium hydroxide.<sup>24</sup>

## CONCLUSION

Several different approaches to successfully fill the pulpectomized canals of primary teeth have been tried out. Cost effectiveness of carrier which is used to carry the material to the canal, ease of obturation, control and manipulation of material have been the key factors for successful outcome of clinically precise obturation. Different obturation techniques to fill the primary root canal include conventional manual incremental lateral condensation by amalgam pluggers, tuberculin syringe, disposable injection technique, navi tip, hand-held, rotary lentulospiral, jiffy tubes, endodontic pressure syringe, past inject, etc.

The lentulo spiral is the most commonly used instrument as the root canal paste carrier. The obturating paste can be filled by means of a manual lentulo spiral or mounted on micromotor handpiece. The process is easy and economical. Filling the root canal does not produce a densely compacted root canal filling and much reliance is placed on adherence of the paste to the walls of the canal. Bhandari SK et al., used disposable syringe in their study. This is the simplest method of completely obturating canal space and filling the apical portion of the root canal and thereby, eliminating voids and incomplete filling along the root canal space.

Pastin-ject seems to be more preferred than other methods as concluded from various studies but it is totally dependent on dentist choice which technique he or she want to use The past inject provides good placement of the obturating material, while eliminating voids and providing a high density of the obturating materials.

So far, none of the obturation techniques available have been found ideal for obturation of root canals in primary teeth. Past inject is used for the placement of calcium hydroxide and root canal sealers in the permanent teeth, but there are not enough studies to evaluate its use as obturation technique in primary teeth.

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#### **Review Article**

## **Forensic Paediatric Dentistry**

#### Abstract

Forensic paediatric dentistry is the field of dentistry which legally deals with analyzing dental evidences of children in the interest of justice. Children are often easy targets in many crimes and they have higher tendency to get involved in accidents more frequently than adults. Pedodontist plays an important role in forensic dentistry by applying his expertise in various fields such as accidental or non accidental oral trauma, child abuse and neglect, age determination, dental records, and mass disasters by examination of the teeth and jaws structure for clues. These dental findings/records may be helpful in forensic identification where an unidentified individual can be identified using dentition. Information of teeth record remains throughout life and beyond, due to their physiologic variations, pathology, and effects of therapy. Lip prints and palatal rugae patterns can also lead us to important information and help in person's identification. Teeth can also help in determining gender of the skeletonized remains using dental DNA. Forensic dentist also plays role in crime investigation caused by dentition, such as bite marks. This paper aims to discuss the forensic aspect of paediatric dentistry.

**Keywords:** Age estimation, child abuse, forensic aspect, forensic dentistry, identification, paediatric dentistry.

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#### INTRODUCTION

The science of dentistry as related to the law is known as forensic dentistry or forensic odontology.<sup>[1]</sup> The theory behind forensic dentistry is that "no two mouths are alike".<sup>[2]</sup> The teeth develop throughout the first two decades of life and the physiological variations, pathoses and effects of dental therapy will be recorded in the hard tissues through beyond(Sweet and Bower 1998).Forensic odontology relies on the indestructibility of the tooth in various environments and its scientific advancement is designed to extract identifiable information from oral structures(Whittaker 1994). Forensic dentistry plays an important role in mass disasters, child abuse cases, bite mark analysis, criminal and natural deaths and injuries, bioterrorism, etc. It also helps in identification of decomposed and charred bodies like that of drowned persons, burns and victims of motor vehicle accidents. The different methods employed in forensic dentistry include bite mark analysis, tooth prints, rugoscopy, cheiloscopy, dental-DNA analysis, radiographs, and photographic analysis.<sup>[3]</sup>

### **Dental Identification**

The primary utility of forensic odontology is in identification of human remains based upon the individualistic characteristics present in the teeth of different individuals. Every tooth possesses a set of unique characteristics called 'tooth class characteristics' which form the basis of identification. Dental identification can be either, visual, clinical and radiographic interpretation of sound and carious teeth, eruption sequence, shedding sequence, tooth calcification and maturation, trauma to the tooth, root canal treatment, dental restorations, dental crowns and bridges, orthodontic appliances, oral and maxillofacial pathologies.<sup>[4]</sup> Dental DNA has highest likelihood of survival for a long period; hence, it is a useful forensic identification tool.<sup>[5]</sup>

#### **Comparative Identification**

Human dental identification is required in different situations for different reasons. The postmortem dental remains with antemortem dental records are compared to confirm identity.<sup>[6]</sup> Most commonly comparisons are made based on individual teeth and dental restorations encompassed along with presence or absence of teeth, tooth positions, recent extractions, and eruptive conditions.<sup>[7]</sup>

### **Role of Radiology**

Radiology is being used extensively for dental identification based on anatomy and maxillofacial skeletal landmarks in antemortem and post-mortem records. Radiographs play a major role in dental maturation assessment and age estimation.<sup>[5]</sup> The diagnosis of physical abuse is confirmed and categorized using radiographs especially in cases of "Battered child syndrome" (Cottone 1982). [figure-1]



Figure-1: Battered Child Syndrome

#### **Age Estimation**

Paediatric dentistry is best used for age estimation. Estimation with help of skeletal structures such as fontanelles closure, hand wrist radiograph, mandibular structure, or with help of dental structures by various techniques such as Schour and Massler, Demigran, Cameriere, Nollas method. Neonatal lines, cementum annulations, third molar eruption are also used for age estimation of individuals.<sup>[5]</sup> Mineralization of tooth is divided in to 10 stages, age was estimated using a standard chart given by Nolla. (figure-2)



Figure-2: Nolla's Method of Age Estimation

### **Palatal Rugae Identification**

Palatal rugae is like finger prints, which do not change during the life of the individual. They also reappear in the same position post any trauma. Total number of primary rugae found to be more in females than in males. In edentulous cases, the evidence can be taken not only from the hard palate directly, but also from the mucosal surface of the dentures.<sup>[8]</sup> (figure-3)



Figure-3: Palatal Rugae Patterns

#### Cheiloscopy

Study of lip prints is termed as Chelioscopy. Lip prints are said to be permanent and unchangeable.<sup>[9]</sup> Cheiloscopy is determined by lip anatomy, thickness, and position. The mucosal area which is covered with wrinkles and grooves is used for identification.<sup>[7]</sup> The secretions of oils and moisture form sebaceous and sweat glands in the edge of lips enable development of latent lip prints, analogous to latent finger print. The middle portion of lip is taken in to account, since this portion is always visible in traces.

## **Bite Marks**

A bite mark is known as the registration of the cutting edges of teeth on a substance caused by a jaw closing. As a pattern of tooth arrangement is unique for individuals, bite marks can be used to identify the individual. Bite marks are often associated with violent fights, child abuse, sex crimes, or sporting events. They can be self-inflicted and can be collected at the scene of crime from foodstuffs or fruits, etc.<sup>[10]</sup> Bite mark analysis can be done manually with help of plaster casts or photographs or can be compared through computer based software.

#### **Child Abuse**

#### 1. Physical abuse

Physical abuse results in the face, head, and neck injuries. Accidental injuries are common in the oral cavity due to physical abuse. Dentist should have knowledge to distinguish physical abuse with other types of abuse by observing history, multiple injuries, and stages of healing.<sup>[11]</sup> Injuries due to child abuse include tooth fracture, avulsion, luxation injury, laceration of frenum, lip bruising, maxilla, and mandible fractures.<sup>[12]</sup>

#### 2. Sexual abuse

Injuries to mouth are rare in children who are sexually abused.<sup>[13]</sup> All suspected or diagnosed sexual abuse cases should be intimated to law enforcement agencies or child protection cell for proper investigation.<sup>[14]</sup>

### CONCLUSION

Dental evidence plays a major role in establishing the identity of the unknown body and living victims of child abuse, sexual assault, and other domestic violence. The present review is an effort to explain the scope of forensic odontology from a paediatric dentist's perspective with an insight into current updates in this field which may help in arriving at a proper and accurate conclusion when working with children. A further research in each of the areas can be undertaken which will expand the scope and set way for better and reliable outcome.

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**Review Article** 

## **RUBBER DAM ISOLATION**

#### **INTRODUCTION**

Operative dentistry deals with restoration of teeth that are defective because of trauma, disease or any other abnormality to achieve functions and esthetics. It includes restorative dentistry, preventive dentistry and esthetic dentistry. The ultimate aim is to prevent the destruction of teeth followed by restoring the damaged tooth to its function. According to RH Roodhouse's quotation, "The dentist is working rapidly upon a small hole in a warm, moist, dark, restricted region that is likely to move, resist, and complain." <sup>2</sup> Exclusion of the secretions of the mouth from the field of operation and obtaining an absolute dry field of operative dentistry good results in operative dentistry procedures.<sup>3</sup>

#### **IMPORTANCE OF ISOLATION**

The following are the main advantages of isolation of operating field:

- A dry and clean operating field
- Better access and visibility
- · Improved properties of dental materials hence better
- results are obtained.
- Protection of the patient and operator.

## DIFFERENT METHODS OF ISOLATION OF OPERATING FIELD

- 1. To isolate from moisture.
- 2. To isolate from soft tissues:
- 3. Retraction of cheek, tongue and lips
- 4. Gingival retraction

# CLASSIFICATION OF MOISTURE CONTROL

- A. Direct Methods
- 1. Rubber dam
- 2. Saliva Ejector
- 3. High Volume Evacuators
- 4. Absorbents (Cotton Roll and Cellulose Wafers)
- 5. Throat Shields
- 6. Retraction Cord

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7. Adjunct – Mouth mirror, evacuation tip retraction, mouth props

#### **B. Indirect Methods**

- 1. Patient management
- 2. Local anaesthesia
- 3. Drugs Antisialaogogues, Antianxiety drugs & Muscle relaxants

## Another classification describes mechanical, chemical & other methods of moisture control.

- A. Mechanical
- a) Rubber damb) High volume vacuumc) Saliva ejectord) Svedopter

#### **B.** Chemical

a) Anti-sialogoguesb) Local anesthetics

#### C. Others

a) Cotton rollsb) Cellulose wafersc) Throat shields

#### **RUBBER DAM ISOLATION**

Rubber Dam Isolation Although the concept of isolating teeth undergoing root canal treatment (RCT) was first introduced 150 years ago, to this date, rubber dam is still the ideal tool for tooth isolation during dental therapeutic procedures. It has several advantages during RCTs for dental professionals and patients. It facilitates washing and scrubbing the working field and prevents salivary contamination; hence it enables the preparation of an aseptic working field. Rubber dam also, helps protecting patients from inhalation or ingestion of endodontic instruments, retracting soft tissues, and contributing to efficient treatment.<sup>13</sup> In spite of these numerous advantages, it is observed from many questionnaire studies that rubber dam usage is not regular. In some countries like the UK and US studies have contradictory findings with recent studies showing a higher percentage of use of rubber dam in dentistry. Recently a study in Saudi Arabia highlighted the usage to be less from Dentists in a few countries and the reason being lack of under graduate training and facilities too.14 History The invention of the rubber dam isolation technique dates back to 1864 in New York, when young dentist Sanford Christie Barnum finally found a solution to prevent the contamination by oral fluids of the target tooth during fillings. He took a rubber sheet, pierced it and tied it to the tooth to be filled with a silk floss, thus obtaining an operative field with a humidity control which was definitely superior to the one achieved by the means used so far. This cutting-edge technique became widespread and in the following years some tools were introduced to make the application easier. Dr. Barnum himself designed a set of steel clamps to stabilize the dam around the tooth. In 1873 the plier designed by Dr. Royce to ease tooth Rubber dam isolation <sup>12</sup> clamping procedure was already available for sale, while in 1875 Dr. Delos Palmer introduced a set of 32 clamps, each one designed for a specific tooth. Subsequently, in 1879 Dr. Ainsworth launched the rubber dam punch plier, which remained almost unchanged compared to the present version. In 1901, with the introduction of the metal frame by Dr. Young, the core instrumentation to achieve proper operative field isolation was complete: rubber sheet, punch plier, clamp set with dedicated plier and metal frame to stretch the dam.<sup>15</sup> Isolation of teeth using rubber dam was first proposed by Sanford Christie Barnum in 1864. In the year 1882 Dr. Delous Palmer introduced clamps specific for each tooth. Rubber dam has been known to serve various advantages such as protection of patient against aspiration of instrument, prevents laceration of soft tissue from rotary or hand instrument, improves accessibility and visibility, retraction of soft tissue to some extent, and also precludes cross infection When the rubber dam is used, many procedures are facilitated because dryness is ensured during tooth preparation and restoration. Also, there are fewer interruptions to replace cotton rolls to maintain isolation. When excavating a deep carious lesion and risking pulpal exposure, use of the rubber dam is strongly recommended to prevent pulpal contamination from oral fluids.5

# RATIONALE FOR USING RUBBER DAM

Comprehensive operative field isolation is considered as one of the key steps for a predictable clinical result.<sup>15</sup> Successful treatment depends on effective contamination control measures to prevent reinfection of the root canal system. This can be more predictably achieved by isolating the operating field. Rubber dam is a mandatory adjunct and is universally acknowledged particularly during endodontic and aesthetic treatment. Its usage has been advocated and encouraged by many authors to adopt in routine practice including operative dentistry field.<sup>17</sup> However, there is no specific rational basis to carry out treatment without the rubber dam: the advantages connected to it are clear and undeniable for the skilled practitioner, who gets to know and appreciate them day by day.<sup>15</sup> Advantages The advantages of the rubber dam are significant and become obvious as the operator gains proficiency.

The advantages of isolation of the operating field are:

**1. Dry, Clean Operating Field**: The operator can best perform procedures such as caries removal, proper tooth preparation, and insertion of restorative Rubber dam isolation materials in a dry field obtained by rubber dam isolation.<sup>14</sup> Teeth prepared and restored using rubber dam isolation is less prone to

postoperative problems related to contamination from oral fluids. The time saved by operating in a clean field with good visibility may more than compensate for the time spent applying the rubber dam. It makes a near surgically clean cavity. Place a drop of saliva on a piece of glass and allow it to dry<sup>32</sup>.

**2.** Access & Visibility: The rubber dam provides maximal access and visibility. It controls moisture and retracts the soft tissue. Gingival tissue is retracted mildly to enhance access to and visibility of gingival aspects of the tooth preparation. Gingival retraction is better termed "Compression" in the interproximal spaces. With a heavier weight rubber dam, it is possible to compress 1mm or more of the interdental papilla. The dam also retracts the lips, cheeks, and tongue. A black ("dark") rubber dam provides a dark, nonreflective background in contrast to the operating site. Because the dam remains in place throughout the operative procedure and access and visibility are maintained without interruption.18

**3. Improved Properties of Dental Materials:** The rubber dam prevents moisture contamination of restorative materials during insertion and Rubber dam isolation 15 promotes improved properties of dental materials. Amalgam restorative material does not achieve its maximal physical properties if used in a wet field. Bonding to enamel and dentin is unpredictable if the tooth substrate is contaminated with saliva, blood, or other oral fluids. in such cases that a jury is deemed competent to determine negligence. Although the reasons for rubber dam application are primarily biologic, legal ramifications also make its use mandatory pain.

It aids in a more thorough examination of the teeth.3 > Subgingival accretions are more readily revealed and removed. > Tooth anatomy may be more minutely studied. > Occlusal and proximal surfaces may be more successfully examined. > Vitality tests may be more successfully accomplished. > There is no fogging of the mirror. 6. Operating Efficiency: Use of the rubber dam allows for operating efficiency and increased productivity. Excessive patient conversation is discouraged. The rubber dam retainer helps to provide a moderate amount of mouth opening during the procedure. Quadrant restorative procedures are facilitated. Etched enamel is more definitely revealed, hence it aids in the proper extension for prevention.

4. The debris from cutting is more easily removed from the preparation if it has not been plastered to the cavity walls by moisture.

5. It reveals the true condition of the tissues to be excavated It reveals backward caries at the dentinoenamel junction.

6. It aids materially in determining the proximity of pulpal horns

7. Discolorations due to caries, emanating from beneath translucent enamel, are more readily revealed.

8. Necessary dryness is obtained for making application of medicinal agents such as silver nitrate.

9. Cement bases are more successfully placed.

10. It is indispensable for gold-foil placement. Rubber dam isolation  $^{\rm 19}$ 

11. Inlays and bridge abutments may be set in dry and clean preparations.

12. It allows for the placement of silver amalgam restorations free from contaminating moisture.

13. It protects silicate cements from moisture during initial set and conversely aids in their removal allowing dehydration.14. It prevents pulpal contamination by microorganisms of the mouth during pulp-capping operations.

15. It prevents contamination by oral infection during endodontic operations. <sup>7</sup>. Eliminates need for repeated change of cotton rolls due to flooding of saliva or root canal irrigants. <sup>17 8</sup>. Minimizes patient's conversation during root canal treatment and encourages them to open their mouth.<sup>17</sup>

## DISADVANTAGES<sup>5</sup>

Rubber dam usage is low among private practitioners due to certain drawbacks:

1) Time consumption and patient objection are the most frequently quoted disadvantages of the rubber dam. However, these concerns are reduced with the use of a simplified technique for application and removal. Usually, the rubber dam can be placed in 3 to 5 minutes. This is also the approximate time necessary for onset of anesthesia.

2) Whilst dental students believe that rubber dam is relevant to clinical dentistry, there are negative perceptions associated with its use amongst dental students. More than half of those questioned predicted their use of rubber dam would decrease once in independent practice. Greater emphasis Rubber dam isolation <sup>20</sup> should be placed on the advantages of using rubber dam in clinical dentistry whilst at dental school.

3) Minor damage can occur to the marginal gingiva and cervical cementum when clamps have been used, but this can be minimized if care is taken in selection and placement of clamps, metal crown margins show microscopic defects following clamp removal and ceramic crowns may fracture at the margins if clamps are allowed to grip the porcelain.<sup>26</sup> 4) Rubber dam clamps have been lost into the alimentary and respiratory tracts, although surprisingly this appears only to have been documented in young children. Floss ties are therefore clearly indicated on clamps to prevent this danger.<sup>26</sup> There are certain oral conditions that may impede the use of the rubber dam. They are: <sup>27</sup>

 $\boldsymbol{\diamondsuit}$  Teeth that have not erupted sufficiently to support a retainer.

- Some third molars.
- Extremely malpositioned teeth.

◆ Patients suffering from asthma may not tolerate the rubber dam if breathing through the nose is difficult.

✤ Also, there are rare instances when the patient cannot tolerate a rubber dam because of psychologic reasons or latex allergy.

However, latex-free rubber dam material is currently available.

◆ Reports of patients disliking the rubber dam are usually the result of a lack of confidence of the dental team with its application.

 $\clubsuit$  Some practitioners are of the view that rubber dam is too time consuming to apply.

However, studies have shown that application time may be as little as Rubber dam isolation <sup>21</sup> 90 seconds on average in the hands of an experienced operator.

The factors that could influence the level of acceptance of rubber dam usage include:  $^{28}\,$ 

- $\checkmark$  Explanation and demonstration of technique.
- ✓ Experience of operator and assistant.
- ✓ Enthusiasm and competence of operator and assistant.
- ✓ Extremes of age of patients.
- ✓ Gender of patients.
- ✓ Difficulty of placement of rubber dam.
- ✓ Time spent in applying the rubber dam.
- $\checkmark$  Time the rubber dam is in place
- ✓ Patient selection

### ARMAMENTARIUM

A rubber dam kit should have the following items on it:-RUBBER DAM SHEETS/MEMBRANE The rubber dam sheet can be made of latex or synthetic material. Latex is a complex emulsion with two main features: elasticity and resilience, that is a material's capacity to come back to its original shape after being twisted or squeezed. These features are very useful during isolation since the hole in the sheet has always a smaller diameter than the tooth.

✓ Elasticity prevents the sheet from tearing apart when the practitioner stretches it to fit it around the tooth clinical crown.

✓ Resilience contributes to a perfect seal since the sheet adheres firmly to the tooth neck (cervix). Powder-free latex sheets for people suffering from contact dermatitis and synthetic material latex-free sheets for latex-allergic patients are available; it ought to be remarked however that these dams are less elastic and less resilient compared to the latex ones.<sup>15</sup> Available in the form of rolls 5 and 6 inches wide from which square sheets can be Rubber dam isolation 23 cut or individual sheets are also available<sup>4,5</sup>

These ay have the following characteristic features:

• It may also be supplied precut in 5 X 5 inch (12.5 X 12.5 cm) or 6 X 6 inch (15 X 15 cm) sheets.

- The advantage of roll is that different sizes can be made.
- While the advantage of square is that time is saved.

• 5 X 5 inch sheet may be used for anterior teeth & 6 X 6 inch sheet for posterior teeth.

• Sterile dam material is also available packaged as individual sheets.

These may have the following characteristics:

- 1 Size: 5"x 5" or 6" x 6" square Thickness:
- Thin 0.0063"
- Medium 0.008"

• Heavy - 0.010" (Provides better retraction of soft tissue and are more resistant to tearing)

• Extra heavy – 0.012"

• Special heavy -0.014" The heavy and extra heavy are the most suitable for operative procedures, while the light and medium are adequate for endodontic therapy.<sup>4</sup> The thicker the material, the better is the isolation. Thick rubber dam places a high stress on the retainer. This is particularly apparent when isolating a molar tooth under rubber dam. Therefore, thin rubber dams are recommended for the isolation of posterior teeth, reserving thicker membranes for the interior teeth. Medium thickness can be used throughout the mouth.30 Medium thickness is recommended for molar applications; Rubber dam isolation 24 heavy (or extra heavy) for anterior & bicuspid application.2 A thicker dam is more effective in retracting tissue and more resistant to tearing; it is especially recommended for isolating Class V lesions in conjunction with a cervical retainer. The thinner material has the advantage of passing through the contacts easier, which is particularly helpful when contacts are tight. Using thin dam on mandibular anterior teeth and partially erupted posterior teeth has an advantage. The problem of retaining a clamp on these tapered teeth is solved by applying a thinner dam.<sup>5,31</sup> Both light and dark dam material are available, but the dark color is preferred for contrast. Green, dark brown, blue, ivory and black colors are marketed.<sup>5</sup> It is important in operative dentistry to use a dam color that contrasts with the color of the teeth, the ivory colored dam is therefore not recommended. The original gray dam is still available but bright colors are preferred. Some operators use the gray dam because they believe that it is better for matching shades. But shade matching is done prior to rubber dam placement, so, bright colored dams wound not have any effect on shade selection.<sup>32</sup> Green rubber dam is available treated with an oil of wintergreen scent, which claims to improve acceptability to patients. Beige or Natural or translucent rubber dam has advantages for endodontic radiography with the dam in place, allowing the position of the film behind the dam to be seen.<sup>26</sup> Rubber dam material has a shiny and a dull side. Because the dull side is less light reflective, it is generally placed facing the occlusal of the isolated teeth. Placing the dull side of the dam towards the operator also reduces glare and eyestrain. It also enhances contrast. Generally, dark, heavy, 6 X 6 inch sheets are recommended.5,33 Rubber dam material, as with all rubber products, deteriorates over time, resulting in low tear strength. Therefore, material that is reasonably new should be used. It has a shelf life of more than a year, but aging is accelerated by heat.32



Fig 1: Rubber dam sheets

#### **RUBBER DAM HOLDER/FRAME**

It holds the borders of the dam and positions it. The frame is U shaped and could be an adult or pedodontic one made of metal or plastic. The metal one is known as the Young's frame. Plastic frame is useful when a radiograph is to be taken without removing the frame. The frame has minute projections on its outer surface where the dam is secured. An additional two hooks may be present on the sides of the frame where the neck strap may be optionally attached. The frame is preferably placed beneath the dam rather than above it<sup>5,15</sup>

New frames:

- \* Nygaard ostby frame
- o Radiolucent nylon frame
- o Polygonal in shape
- o Also known as shark mouth Rubber dam isolation<sup>26</sup>
- Articulated frame
- o Foldable metal frame
- o Developed to facilitate endodontic radiography
- Derma frame
- o Pliable metal rubber dam frame.

o Can be bent to take radiographs and for patient comfort while retaining the dam in place.

- ♦ Safe T frame
- o New rubber dam frame design.
- o Easier to use with a more secure fit.

o Replaces the conventional one-piece frame with a two-piece frame design. (sikri) Metal and transparent plastic frames with different shapes are available. The Metal "U shape" frames are recommended for conservative dentistry, while the plastic version is used in endodontics because they are radio-transparent (so avoid interfering with intraoperative radiography). Amongst radio-transparent plastic frames, the Nygaard-Ostby type is very functional to endodontic treatments: the octagonal shape fits very well to the patient's face avoiding operative field contamination and allowing for intraoperative radiography without disassembling the sheet from the frame.<sup>15</sup> Rubber dam isolation.<sup>27</sup>



Fig 2: Metal 'U'shaped frame



Fig 3: Plastic 'U'shaped frame



Fig 4: Radio-transparent plastic frame [Nyard-Otsby type]

#### The holder consists of:

 $\Rightarrow$  Two metal frames, one for either side of the face, a right and left, and each with

- $\Rightarrow$  the working parts facing medially.
- $\Rightarrow$  Three metal snaps on each frame.
- $\Rightarrow$  Adjustment slots on each frame where tapes are placed.

 $\Rightarrow$  Two tapes extending from the top and bottom slots of each frame to the corresponding slots on the opposite side. For convenience in placing, the ends of the tapes on the left frame should be sewn permanently. Then, when the dam is placed, only the right side needs to be tightened. A third tape may be added joining the two vertically and preventing twisting of the first two in placement. It is also an additional aid in preventing the upper tape from slipping too far forward on the head after it has been placed high enough to prevent it from dropping down on the neck. It is usually positioned on the outside surface of the dam so that it is not in contact with the patient's face. Its light weight, shape & good dam retention favor the routine use of the Young's frame.<sup>5,30,32</sup> Endon: A variation of Young's frame-style is the Endon. This has a rigid extension fastened to the horizontal bar which provides a pouch when the rubber dam is drawn around it.34 Nygaard-Ostby frame: It is also a variation of Young's frame-style. It is normally positioned on the tissue surface. It is nick-named as the "Shark mouth." <sup>36</sup> The Nygaard-Ostby frame is contoured to the face and made from a nylonbased material.34 It attaches the rubber dam on all four sides and requires more care in hole placement because it is more difficult to adjust the height of the superior border of the dam.<sup>37</sup> The use of Ostby frame should be reserved for anterior teeth because, when used in posterior regions, it tends to impede access to the teeth.38 40 Dry Dam: An alternative type of rubber dam is available which does not require a frame or harness, and is marketed as "Dry dam.41 This consists of a small sheet of rubber set into the center of an absorbent paper sheet with light elastics on either side Rubber dam isolation<sup>31</sup> to pass over the ears. This arrangement is most useful for quickly isolating anterior teeth,

but is not suitable for isolation of molar teeth, or for procedures such as endodontics or bleaching, due to the absorbent nature of the paper surrounding it.<sup>26</sup> Recently two frame combinations have been introduced. One has a pliable plastic frame around the perimeter of the rubber dam and comes in three sizes.

HandiDam: Disposable, single-use, preframed dental dams are the HandiDam and the InstaDam. They can be applied quickly without the addition of a conventional frame. Both of these devices are available as latex and latex free versions.42 InstaDam: is a pre-punched dam mounted on a frame. Optra Dam: It is an anatomical design rubber dam without metal clamps. It evenly retracts lips and cheeks around the entire circumference of mouth creating more access to a considerably larger treatment field. Dental arches are imprinted on the rubber dam. The inner ring is positioned in area of gingivo-buccal fold, pulls the latex into the fold & absorbs all the tension. Its design allows easy placement by a single person. As OptraDam is flexible in all directions, thus, it is very comfortable for the patient to wear even during lengthy procedures. It can be used for wide range of procedures, such as adhesive restorative and luting procedures as well as endodontic treatment. It may even remain in place during X-rays - time-consuming removal and reinsertion is thus eliminated. It is available in the adult sizes "Regular" and "Small".43 Opti Dam: Its 3-dimensional shape and anatomical frame shape match the contours of the mouth. Its unique design reduces preparatory time and work in comparison to Rubber dam isolation <sup>32</sup> a conventional rubber dam. It simply cuts off the projections that correspond to the tooth to be worked on. The frame is autoclavable.43 Dermafarme: is a soft metal frame that may be formed to fit the patient's face. The frame retains its configuration but may then be reshaped after use.42 Quick Dam: It is a new isolation device, is smaller than the conventional rubber dam, approximately 4 1/2 inches X 2 1/2 inches, and is supported intraorally by a rolled spring borderflex ring. Its thickness corresponds to medium-to heavy-weight rubber dam. It is available in three sizes - small, medium & large. The flex ring must fit buccal to the teeth and form a seal with the walls of the cheek. Before insertion, it folded. Should the patient have a strong gag reflex, it may be overcome by showing the patient how to fold and place the dam and letting the patient install it. It is placed flat on one hand with the rolled border uppermost, facing the operator. Using the thumb and second fingers of the other hand, the dam is folded on itself to form a "C" shape, and inserted in the mouth for try-in. The sheet is now clamped securely in the frame, and the frame/sheet assembly is ready to be placed in the patient's mouth.



Fig 5: Young frame



Fig 6: Sauveur oval frame



Fig 7: Handi dam



Fig 8: Insta dam



Fig 9: Optra dam



Fig 10: Opti dam Rubber dam isolation <sup>35</sup>

## **RUBBER DAM ETAINERS/CLAMPS**

These are used to secure the dam to the teeth that are to be isolated. These also minimally retract the gingival tissue, which is especially useful when preparing and restoring class V cavities. A retainer has 2 jaws connected by a bow. On each jaw are present 2 prongs which means that there are 4 prongs in a clamp and each prong rests on the mesial/distal line angle of the tooth to be clamped. A prong should not extend beyond the angle of the tooth otherwise it would interfere with the placement of a wedge or matrix band and also may cause gingival trauma. Certain retainers have prongs that are inverted, i.e. directed gingivally. These are more convenient to use on partially erupted teeth or when additional soft tissue need to be retracted.26 History Before rubber dam clamps were developed retention of the rubber dam on the teeth was exclusively by means of wedges and floss silk ligatures. Hodson's 1870 article describes the construction of seven types of clamps which were designed solely to achieve improved gingival retraction, and appear to have been placed without the aid of clamp forceps. Two of these clamps gained popularity for a while. By 1890, some clamps were being made with holes in the jaws to allow the use of forceps similar to the Stokes pattern of today. About the same time the Hickmann "lipped" clamp was in use, in which the rubber sheet was retained on this clamp between two lips on each jaw. The design was not universally popular due to the difficulty of detaching the rubber sheet from these lips. The development of "wings", as we know them, on the clamp jaws only became fully developed in the early years of the following century. Clamps were still in the process of evolution from devices for gingival retraction to more familiar designs used primarily as retention aids. A Rubber dam isolation 36 few of these early designs have remained popular to the present day, for example, the "Tees Festooned Clamp". It was developed in the 1870s but will look quite familiar to today's operator, having remained virtually unchanged as the familiar pattern 26 and 27 clamps, the only feature lacking when compared to the modern version being the holes in each jaw. This design was also one of the first to feature jaws which were directed gingivally or "festooned", a forerunner of the retentive jaw designs of today.26 Two types of retainers are preset:1 Bland clamps can be recognized by the jaws, which are flat and point directly towards each other and are designed to grasp the tooth at or above the gingival margin. These clamps tend to cause minimal gingival damage, hence their name. Retentive clamps have jaws which are directed more gingivally so that they can grasp the tooth well below the gingival margin. Retentive clamps are used when the maximum diameter of the crown is below the gingival margin. Retentive clamps will generally be required for partially erupted

teeth. 8 Bland clamps are preferred if they can provide adequate retention. A bland clamp fitted to a tooth beneath the maximum coronal diameter. Both bland and retentive clamps can be further subdivided into winged or wingless types.<sup>26</sup>

> Winged retainers: These retainers have wing like projections on the outer aspect of their jaws. Hence they provide extra retraction of the rubber dam from the field of operation. The wings are passed through the punched hole in the dam and then the dam and the retainer placed together onto the concerned tooth. After placement, the dam is slipped carefully over the wings onto the tooth.

➤ Wingless retainers: These have no wings on their jaws, i.e. they are smooth Rubber dam isolation 37 on their outer aspect. The retainer is first placed on the tooth and the dam then stretched over the clamp onto the tooth. Several clamps are available in various sizes and shapes. The larger clamps are used for adult patients and the smaller ones (pedodontic clamps) for children. There can be universal clamps for mandibular molars, maxillary molar clamps, bicuspid clamps, double bow clamps for anterior teeth.<sup>26</sup>

New clamps  $\Rightarrow$  Tiger clamp • These are clamps with serrated jaws.

• For partially erupted and structurally compromised teeth ⇒ Silker-Glickman clamp (S-G clamp)

- Extended wings allow for rubber dam placement around teeth with minimal tooth structure  $\Rightarrow$  Haller clamp
- Holding of the tongue and cheek
- Fixation of cotton rolls
- Retraction of the gingiva
- Dryness of the field work
- · Keeps operating field dry in all tasks of adhesive dentistry
- · Possible to work without assistance
- Improves the optical impression (Cerec) Improved relative dryness when rubber dam is not required
- Quality improvement  $\Rightarrow$  Cushee clamp
- Increases patient comfort through eliminating contact of steel clamp Rubber dam isolation <sup>38</sup> with gingiva and tooth enamel.

• Enhances rubber dam seal to limit leaking from above or below dam.

• Helps protect natural tooth structure and delicate, costly restorations.



Fig 11: Rubber dam retainer



Fig 12: Different types of retainers

#### According to Sturdevant<sup>5</sup>

Retainer	Application in various anchor tooth		
W56	Most molar anchor teeth		
W7	Mandibular molar anchor teeth		
W8	Maxillary molar anchor teeth		
W4	Most premolar anchor teeth		
W2	Small premolar anchor teeth		
W27	Terminal mandibular molar teeth requiring preparations involving the distal surface		

## COMMONLY USED RETAINERS/CLAMPS

Rubber dam isolation 39 According to Sturdevant5 Retainer Application in various anchor tooth W56 Most molar anchor teeth W7 Mandibular molar anchor teeth W8 Maxillary molar anchor teeth W4 Most premolar anchor teeth W2 Small premolar anchor teeth W27 Terminal mandibular molar teeth requiring preparations involving the distal surface According to Howard 27 Fig 13: Clamps applications according to Howard Rubber dam isolation 40 Fig 14: Clamps in different tooth According to Summit27 Fig 15: Clamps for inclusion in operative dentistry Universal Clamp Designs: Two designs namely the butterfly SSW 211 (or Ivory 9) and the Ivory 56, are suitable for the

Wingless clamps*	Winged clamps	Tooth fit	Comment
W8A, W8ASA,	8A	Molar	
or B1	27	Molar	Bow extended distally in 27
W2A	2A	Premolar	
212SA		Premolar, canine, and incisor	For Class 5 isolation
*Clamps recommende All clamps except B1 a B1 is from Hygenic, ar	ed to be avail and W8ASA a nd W8ASA is	able for routine use. are from Ivory catalog (H from Hu-Friedy.	leraeus Kulzer}.



Fig14: Clamps in different tooth



Fig 15: Clamps for inclusion in operative dentist

majority of isolation procedures. The butterfly design (No. 211 or No. 9) is for anterior teeth and premolars. Both of these provide better isolation, particularly in difficult situations, because the small Rubber dam isolation 41 radius beaks can be positioned farther apically on the root; this stretches the dam cervically in the interproximal area. The Ivory 56 can be applied to most molars except those that are small or abnormally shaped; with these, a clamp with a smaller radius (No. 14) is necessary. Fatigued anterior & premolar clamps are often used for unusual molar applications.37 Clamps may act as rubber dam retainers as well as gingival tissue retractors. One clamp, however, the butterfly clamp, No. 212SA, is designed to serve as a retractor only.

 $\succ$  Clamp with four-point contact blades: The blade portions of the jaw point inwards at each corner, so that all the gripping forces will be applied on these four points only. Usually they contact the axial angles of the tooth and create a very secure

attachment with the tooth. This principle of four-point contact reduces the number of retractors necessary for tissue retraction.34





Fig 16: Pair root clamps

◆ Two special clamps for third molars are illustrated. They are a pair, with very strong bows and a forceful grip. The bow is inclined very slightly to the distal in relation to the jaws, to permit their use on third molars without impingement on soft tissues. The jaws are inclined gingivally at such an angle that they will often hold when placed slightly occlusal to the height of contour of the crown. They were designed to be applied to any molar which Rubber dam isolation 44 is not fully erupted, or which has buccal or lingual surfaces so much inclined towards the median axis that the other clamps slip off occlusally.47

◆ There are two pairs of special root clamps. They were designed for application to root of any tooth whose crown has been lost. The smaller pair is for anterior teeth & the larger pair for molars. The jaws are very much inclined gingivally and when spread apart, they become so nearly parallel that the points will grasp the end of a root which does not project over the gums.47 Fig 16: Pair root clamps Rubber dam isolation 45

✤ Isolation For Cervical Third Of Distobuccal Surface Of Molars: Isolation is not always possible in this situation because of the cervical extent of caries & the instability of the retainer. A W8ARE rubber dam retainer was chosen for modification as it fits well on most maxillary & mandibular teeth. The RE series retainers has a great angle between the bow & the jaws of the retainer that enables greater access for operating on the distal surface of the tooth being treated.48 Bird-beak orthodontic pliers and standard square nose utility pliers are used to modify the W8ARE retainers.

Ivory No. 21 clamp for severely broken down teeth. It is also called the S-G (SilkerGlickman) clamps.50

Clamps with long guard extension: These retract and protect the cheek and tongue. It is used with gauze or cotton rolls. Very big wing is for tongue pressing.

✤ Tiger Clamps: These are retainers with serrated jaws. They increase stabilization of broken down teeth.50

✤ Offset Clamps: The bow of the clamp is placed to one side (right/left). It provides better access and does not interfere with the normal anatomic structures. It provides space for matrix band retainer. The bow lies offset to the palatal side to avoid the ramus so that it can be placed on third molar50 Rubber dam isolation 46 ◆ Fiber Optic Clamp: It is the clamp with high intensity light which transilluminates pulp chamber & canal orifice.50

 $\clubsuit$  Modified Bow Clamps:  $\checkmark$  Extended Bow Clamps: These clamps have bows that are extended so that the bow lies more distally than that of a standard clamp. The Dentsply HW pattern or the Ash AD patterns are examples of these clamps. They can be especially helpful if preparation of the distal surface of a clamped tooth is necessary. The modified bow lies a sufficient distance behind the clamped tooth to allow good access to the distal surface with a handpiece.26 ✓ Another type of modified bow clamps is designed to deal with the problems encountered when a clamp has to be placed on third molars. The difficulty here is that the bow of conventional clamps will often prevent them being seated properly due to interference between the clamp bow and the ramus of the mandible. One type of clamp specially designed to meet this problem has the bow offset to one side. The bow lies offset to the palatal side, so avoiding the ramus. This means that these clamps will be suitable for only one side of the mouth and have to be made in left and right handed pairs. The most commonly used are:17 Front teeth -IVORY # 6, IVORY # 9, IVORY # 90N, IVORY # 212S, IVORY # 15 Premolars - IVORY # 1, IVORY # 2, IVORY # 2A Molars that are incompletely erupted or already prepared for full crown- IVORY # 7, IVORY # 14 Asymmetrical molars, in particular the second and third IVORY # 10, IVORY # 11 IVORY # 12A, Rubber dam isolation 47 IVORY # 13A Wingless, to be used when the wings obstruct the working field -IVORY # W8AIVORY # 26N The clamps are modified to improve their grip and allow a more precise fit. NEWER

## ADVANCES IN RUBBER DAM CLAMPS

(A)Clamp with long guard extension- Clamp with long guard extension has a larger wing which is used for retraction of the tongue. These clamps retract and protect the cheek and tongue along with isolation. They can be used with gauze or cotton rolls just for the retraction of tongue and cheek.17 Fig 17: Clamp with long guard extension Rubber dam isolation 48



Fig 17: Clamp with long guard extension

(B) Tiger clamp – These are clamps with serrated jaws. These serrations increase the stabilization of the clamp on the partially erupted or broken teeth.17 Fig 18: Tiger clamp



Fig 18: Tiger clamp

(C) S-G (Silker-Glickman) clamp- S-G clamp is a clamp with anterior extension which allows for retraction of the dam around a severely broken down tooth and the clamp itself is placed on a tooth proximal to the one being treated. It is made from durable cast stainless steel, which is autoclavable, corrosion resistant, flexible and long lasting. It is ideal clamp for rubber dam placement around the tooth with minimal tooth structure.17 Fig 19: S-G clamp Rubber dam isolation 49



Fig 19: S-G clamp

(D) Super clamp- It comes with a pre-cut rubber dam material designed to fit the clamp. It is very simple to use, quick and easy to place.

### **OTHER ANCHORING DEVICES**

The proximal contact may be sufficient to anchor the dam on the tooth farthest from the posterior retainer (in the isolated field), thereby eliminating the need for a second retainer.5

♦ The Schultz Clamp Series resembles the 212 clamp, but are split in half Facio- lingually making them a gingivally retracting clamp with one bow only. Their use & attachment is very similar to that of 212 clamps, but they are especially useful when a second bow cannot be accommodated due to a lack of space or limited access.5 Rubber dam isolation 52 Fig 20: Schultz clamp



Fig 20: Schultz clamp

◆ Cervical Retracting Clamps may be single or double bowed, but the jaws with their blades are movable, even after attaching the clamp to the tooth. By moving these blades apically, the gingiva can be retracted more apically or vice ver





Fig 23: Cervical retracting clamps

◆ Some clamps have long guard extensions which retract & protect the cheek & tongue. Some even have tube like, perforated extensions which hold cotton rolls in the adjacent sulci<sup>5</sup>

◆ A Piece of cut rubber dam, if wedged between the contacting teeth, can be used to anchor the dam, especially proximal to the most anteriorly isolated tooth. The cut piece of dam material is first stretched, passed through the contact, and then released.<sup>5</sup>

◆ Interceptal rubber, if it is of sufficient dimension and is placed between the intact teeth or properly restored teeth, will be very effective locking mechanism against rubber dam displacement.<sup>5</sup> Rubber dam isolation <sup>53</sup>

◆ Dental Tape or Floss is not indicated to anchor the rubber dam, if the gingiva and surrounding periodontium are not at

same horizontal level circumferentially. However, if the gingival crest is at the same level on all tooth surfaces, and will be in contact with the dental floss or tape (e.g. after considerable gingival recession), we can use dental floss or tape, tied around the neck of the tooth, to retain the dam apically. <sup>38</sup>



Fig 24: a.Clove-Hitch knot. b. Surgeon's Twist

Rubber dam isolation <sup>54</sup> The ends of a surgeon's knot can be cut, and then the whole knot held by the cotton pliers, turned away from the field of operation. If operation is in the mesial surface of the ligatured tooth, the knot should be near the septum distally. For double ligatures, use Wedelstaedt tie.<sup>3</sup>



Fig 25: Surgeon's Knot and Wedelstaedt Tie

Floss does not hold the dam as far away from the teeth palatally as clamps do so provide less access to the lingual surface of an anterior tooth  $^{35}$ 



Fig 26: Floss with figure of 8 ligature in anterior tooth

Figure of eight ligature retention is a running ligature that is crisscrossed interproximally. It serves to retain the rubber dam and ensures that the edges of the dam material remain inverted throughout the duration of treatment.<sup>53</sup>

♦ A dental floss (tape) tied around Bead from a necklace, a rubber polishing disc, or a piece of cylindrical rubber which could be an anesthetic carpule rubber plunger or any piece of rubber or cork with the same dimension. It can be wrapped or tied around the axial surface(s) to lock Rubber dam isolation <sup>55</sup> the dam apical to the rubber cylinder. This could be used when there are no holding convexities on the axial surfaces of a terminal anchoring tooth.<sup>37</sup> Orthodontic Elastomeric Ligatures: These are commonly known as Alastiks /Anchorings.

#### Toggle Rubber Dam Retainer:

It is made from remnants of chain elastic and the rubber plungers of local anesthetic carpules. The central link of the chain is stretched and see-sawed interproximally until it snaps past the contact area.<sup>55</sup> Rubber dam isolation<sup>56</sup>



Fig 28: Toggle rubber dam retainer



Fig 29:Wedgets placed interproximally

♦ Modeling Compound: Low-fusing modeling compound is sometimes used to secure the retainer to the tooth to prevent retainer movement during the operative procedure. If used, the compound must not cover the holes in the retainer in order to have ready access to the retainer for rapid removal with forceps, if necessary.5 Use of modelling compound either red or green is recommended.<sup>32</sup>

♦ The clamp is positioned approximately on the tooth and held in position with a finger until stabilization is completed.32 A compound stick is held over low alcohol flame and rotated and moved back and forth so that the length to be softened is heated evenly.  $1 - 1\frac{1}{2}$  inches of compound stick are gradually softened to chewing gum consistency.2.2

♦ Rubber Bands: A small piece of ordinary office-size rubber band may be used to retract the rubber dam comfortably and

hold the gingival region to the contact point, in lieu of additional clamps.3

✤ Wooden Wedges placed between teeth, can be used to immobilize the interceptal rubber. Sometimes they can be used alone to anchor the dam at its most anterior end. Also, they can be utilized to momentarily anchor the dam if the anchoring clamp is displaced or dislodged.

#### **RUBBER DAM PUNCH**

It is a punch for making holes in the dam and is characterized by a rotating metal disc, which bears five or six holes of different sizes, and a sharp pointed plunger. When the handles of the punch are pressed, the plunger should rest in the center of the hole. If not, the plunger tip would get damaged and its cutting ability ruined. This is commonly seen as an incompletely cut hole. The holes are of different sizes according to the size of different teeth. Use the particular hole suggested for that particular tooth, otherwise a tight seal will not be possible or the dam may tear during its placement.1 These are used to make round holes of different diameters (0.7 - 2 mm) on the rubber dam, depending on the tooth to be isolated. greater pressure being required to punch holes in the rubber dam.

### **RUBBER DAM FORCEPS**

The rubber dam retainer forceps is used both for placement and removal of the retainer from the tooth. This instrument is a modified forceps which retracts the jaws of a clamp away from each other, allowing the clamp to overcome the occlusal diameter of the tooth and to be seated apical to the height of contour. Each clamp has holes or grooves in each of its jaws to accommodate the forceps. Specialized clamp forceps were developed.5 One of the earliest to grip the jaws of the clamp rather than the bow was the Elliot design first described in 1878. Fig 31:A:-In the closed position the beaks slide freely in and out of the holes of the clamp. B:- While spread apart to engage a tooth in the open position, each of the beaks, now at an angle, is engaged by the metal edges, which will not release it. Rubber dam isolation 63 If predominant with most of the clamps, the beaks of the forceps should be carefully reduced in diameter with an abrasive wheel. If only an occasional clamp is involved the holes can be enlarged.5 The three types differ essentially in their tip design. The University of Washington design provides a definite stop which positively prevents jamming of the instrument tip in the hole in the clamp jaw. It also resists tilting of the clamp while held in the forceps. This can be a disadvantage when a tooth is tilted and it is necessary to angle the clamp on the clamp forceps to fit the tooth correctly.26 Fig 32: Pointed tips of clamps The Stokes and Ivory patterns have both notched and pointed tips which engage the holes in the clamp jaws, and differ only in the shape of the forceps arms near the tips.26 the holes of a rubber darn clamp, allow a range of Rubber dam isolation 64 rotation for the clamp so that it may be positioned on teeth that are mesially or distally angled. 32 Ivory-Type Forcep Stabilizers Near The Tip Stokes-Type Forcep Tip of Stokes Forcep Fig 33: Types of rubber dam forceps The Stokes and University of Washington pattern forceps have an additional feature in having a flattened area on the outside of the forceps arms near the tips. This allows clamps to be placed or removed by inserting the forceps arms through the clamp bow instead of using the Rubber dam isolation 65 holes in the jaws. The flattened areas on the forceps arms locate the clamp bow

and prevent the clamp slipping off.26 Most forceps have a second groove slightly distant from the tip, which may be used to remove the rubber dam clamp without re-engaging the holes.46 If the beaks of the forceps are at a  $45^{\circ}$  angle to the shaft, it will be difficult if not impossible in some cases to release the clamp when desired, especially in molar wing clamps and in the Ivory No. 9 or Ash No. 9 wing clamps. This difficulty can be overcome by having the angle of the beaks at  $60^{\circ}$  to the shaft, as in case of the Cleve- Dent & Ash forceps. 57 Either of these types of clamp forceps will serve the practitioner well, and selection should be based on personal preference. The Ivorytype forceps are probably the most popular because of cost.32 The working life of clamp forceps is limited only by the wear that occurs to the forceps tips. After many years of use the clamps may start to slip off the retaining grooves near the tips. When this happens the only solution is replacement of the forceps.8 Sterilization of rubber dam forceps can be by steam or dry heat.26

Methods for grasping the clamp.2

A: Clamp forceps under ordinary conditions fit into these holes. The clamp should be free to wobble, thereby assuring easy release of the forceps.

B: These holes in the wings are not intended for the forceps and serve little purpose.

C: A mesially tilted lower molar may require this position of the forceps to spread the jaws for placement.

D: Grasp of clamp for reverse application. Rubber dam isolation 66 Fig 34: Methods of grasping a clamp

## LUBRICANT

Before positioning the dam, it is advisable to lubricate the inner surface well with Vaseline or more simply soap, so that the sheet will slide better over the contours of the teeth, more easily overcome contact areas and close tightly around cervix of the tooth.17 Vaseline or petroleum jelly should also be applied on the patient's lips and corners of the mouth to avoid constant irritation from the rubber dam and cracking of the skin.

### **RUBBER DAM NAPKINS**

Rubber dam napkins provide direct contact between the rubber dam sheet and the patient's cheek. By absorbing the saliva that accumulates beneath the dam by capillary action, they facilitate Rubber dam isolation 68 treatment. Their use is not mandatory; however, they are particularly indicated in cases of allergy to the rubber of the dam17 The rubber dam napkin, placed between the rubber dam and the patient's skin, has the following advantages:3,5 1. It prevents skin contact with rubber to reduce the possibility of allergic reactions in sensitive patients. 2. It absorbs any saliva seeping at the corners of the mouth. 3. It acts as a cushion. 4. It provides a convenient method of wiping the patient's lips on removal of the dam. 5. The additional comfort which the patient experiences aids in reducing the stimulated flow of saliva. 6. It increases the patient's confidence in the operator and in his technical and manipulative skills. 7. It prevents the debris associated with operative procedures from falling beneath the clothing of the patient. 8. It aids in preventing pressure marks often created by design of cervical clamp for tension of the rubber dam across the face.

## HOLE SIZE & POSITION

Successful isolation of the teeth and maintenance of a dry, clean operating field largely depend on hole size and position in the rubber dam.58 Holes should be punched by following the arch form, making adjustments for malpositioned or missing teeth. Most rubber dam punches have either five or six holes in the cutting table. Ivory punch has six hole sizes, numbered 1 through 6 from smallest to largest. Hole sizes recommended are 5 for clamped molars; 4 for other molars: 3 for premolars, canines, and maxillary central incisors, and 2 for lateral incisors and mandibular central incisors.54 If the size of hole required is larger than can be found on the punch, then two or three overlapping holes can be cut. These guidelines are for teeth which have not been clamped.

## PLACEMENT & REMOVAL OF RUBBER DAM12

Following are the steps for placing the rubber dam: a. Prior to rubber dam application, the area to be isolated b. must be clean. With dental floss determine proximal contact area for ease of passage of rubber dam. c. Rubber dam clamp must be stable upon the teeth and not cause damage to the teeth, to any restoration present in the teeth. Rubber dam clamp forceps carry the clamp to the lingual cervical region first and then are rotated to carry it to the buccal cervical region of the tooth. By this method, four point contacts of the clamp with the cervical area of the tooth are formed. d. A rubber dam sheet is selected and position of the holes to be punched is established. Holes punched through the rubber dam should be of the small enough size to permit a snugness around the neck of the tooth and large enough to avoid the possibility of tearing during application of rubber dam. Spacing present between the two holes should be sufficient to Rubber dam isolation 71.

## **REMOVAL OF RUBBER DAM**

 $\succ$  Cut away tied thread or tape from around the neck of the teeth.

> Stretch the rubber dam facially and pull the septal rubber away from the gingival tissue and the tooth. Free the dam from the interproximal space, but leave the rubber dam over the anterior and posterior anchor teeth.

> The pressure holding the clamp on the tooth is released slowly. Once the retainer is removed by the operator, release the dam from the anchor tooth and remove the dam and frame simultaneously. Rubber dam isolation 72

> Wipe the patient's lips with napkin immediately after the dam and frame are removed. Before removal of the rubber dam, rinse and suction away any debris that may have collected to prevent its falling into the floor of the mouth during the removal procedure. If a saliva ejector was used, remove it at this time. First remove any wedges, rubber strips or floss ligatures that have been used on non- anchor teeth. Wedges are removed from buccal. It is usually easier to remove the most distal ligature first. 8 The ligature should always be removed in the incisal or occlusal direction and not by pulling it at right angles to the long axis of the tooth. Preferably one end should be held in a direction parallel to the long axis of the tooth & pulled past the contact.47 Using a scaler to cut the floss ligatures helps to avoid injury to the gingival tissues because it is usually difficult to cut

a tight ligature with scissors.30 While the teeth are still dry, it is excellent practice to apply a fluoride solution or gel. The gel, especially, will usually lubricate the rubber so that it may easily slip up over the teeth without cutting the septa. An eye-dropper may be used to inject the gel around the teeth.27 Step 1: Cutting the Septa - Stretch the dam facially, pulling the septal rubber away from the gingival tissues and tooth. Protect the underlying soft tissue by placing a fingertip beneath the septum. Clip each septum with blunt-tipped scissors, freeing the dam from the interproximal spaces, but leave the dam over the anterior and posterior anchor teeth. To prevent inadvertent soft tissue damage, curved nose scissors are preferred. Begin cutting the septum posteriorly & working forward.3 The curved blade of the suture shears should be placed beneath the septum, pointing outwards for cutting.3 Some operators prefer sharp crown & collar scissors & Quimby scissors. Scissors used for cutting rubber dam should be sharp or they will frustrate the operator. A finger placed under the rubber will prevent cutting the patient's underlying tissues with the scissors. If impression compound was used, it may be split with a sharp chisel Rubber dam isolation 73 & dislodges with the pressure.4,32 Step 2: Removing the Retainer- Engage the retainer with retainer forceps. It is unnecessary to remove any compound, if used, because it will break free as the retainer is spread and lifted from the tooth. While the operator removes the retainer, the assistant releases the neck strap, if used, from the left side of the frame. The last clamp on is the first clamp off.57 Fig36: Suture shears Step 3: Removing the Dam- Once the retainer is removed, release the dam from the anterior anchor tooth and remove the dam and frame simultaneously. While doing this, caution the patient not to bite on newly inserted amalgam restorations until the occlusion can be evaluated. Frame may be removed before taking of the rubber dam, because the tension of the frame on the rubber could make it fly off the tooth and propel a shower of debris into the operator's face.38 Step 4: Wiping the Lips- Wipe the patient's lips with the napkin immediately after the dam and frame are removed. This helps to prevent saliva from getting on the patient's face and is comforting to the patient.47 Step 5: Rinsing the Mouth & Massaging the Tissue - Rinse the teeth and mouth using airwater spray and the high-volume evacuator. To enhance circulation, particularly around the anchor teeth, massage the tissue around the teeth that were isolated. Warm water can be used to douche the gums & kneaded to restore circulation.27 Rubber dam isolation 74 Step 6: Examining the Dam - Lay the sheet of rubber dam over a light-colored flat surface or hold it up to the operating light to determine that no portion of the rubber dam has remained between or around the teeth. Such a remnant will cause gingival inflammation, gingival abscess or even significant loss of periodontal support. If there is any doubt, it is helpful to use transillumination for the final evaluation of the gingival tissues.18 Fig37: Removal of rubber dam Rubber dam isolation 75.

# RECENT ACCESSORY TO RUBBER DAM CUSHEES:-

These are soft thermoplastic cashew shaped nodules which are grooved on their inner surface and act as rubber dam clamp cushions. It is slipped over the tooth attachment blade of clamp prior to clamp application. It increases patient comfort through elimination of contact of steel clamp with gingiva or tooth enamel, and thus helps to protect natural tooth structure and costly restorations. It also enhances rubber dam seal to limit leaking from above or below the dam and reduces clamp slippage. They are sterilizable and reusable. They are available in two sizes: yellow for anterior and bicuspid clamps and blue for molar clamps.17,59 Wedgets (Hygenic): These are stretchable elastic stabilizing cords made from natural latex rubber and used as a rubber dam retainer. These are faster and easier method of retaining the rubber dam than using conventional clamps. It is placed like dental floss over the rubber dam in the interproximal areas of the teeth, holding the rubber dam in position. It reduces patient trauma and discomfort caused by metal clamps. They are especially used in the isolation of anterior teeth.17,59 Fig 38: Cushees Fig39: Wedget



Fig 23: Cushees



Fig24: Wedgets

## CONCLUSION

In order to attain excellence in service, we must utilize the best preventive and therapeutic methods and apply the most efficient and operational techniques available. Up-to-date knowledge of concepts and developments and competence in the application of research findings are factors necessary for self-development and through self-improvement, the achievement of excellence of service becomes a potentially reachable objective. Thus, the health professional must continually broaden his knowledge, increase his understanding, and perfect his biologic, physical, scientific, social, behavioral and technical skills.

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# Management of Oral Mucocele with Soft Tissue Laser: - A Case Report.

#### Abstract

Mucocele is one of the most common minor salivary gland lesions of the oral cavity, which is benign in nature and mainly occurs due to a mucous accumulation. It can be broadly classified into extravasation and retention types. These lesions are commonly seen in children and young adults and mostly associated with history of trauma. Extravasation mucocele is most frequently seen on the lower lip followed by the floor of the mouth and buccal mucosa. There are various treatment modalities available for management of these lesions ,which ranges from conventional surgical removal, laser ablation, cryosurgery, sclerotherapy, micro-marsupialization and intra lesional injection of sclerosing agent or corticosteroid . In pediatric patients, the treatment sequence follows starting from a more conservative and non-invasive approach as it helps in behavior management with lesser chairside time.

Keywords: Mucocele; Soft tissue laser (biolase); Minor salivary glands.

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# INTRODUCTION

The mucocele is a Latin word consists of "muco and coele", "muco" meaning mucous and "coele" meaning cavity. Mucocele is one of the most common minor salivary gland lesions of the oral cavity which occurs due to a mucous accumulation.<sup>1</sup> It can be broadly classified into extravasation and retention types. Extravasation mucocele mainly occurs due to a damage salivary gland duct while retention mucocele is formed due to a decrease or absence of glandular secretion that is produced by blockage of minor salivary gland ducts.<sup>2</sup> Mucocele is commonly associated with history of trauma. It has Rapid appearance, present on specific location, bluish in colour, soft in consistency and transparent cystic swelling.

Extravasation mucocele is most frequently seen on the lower lip followed by the floor of the mouth and buccal mucosa.<sup>3</sup> The incidence of oral mucocele is 2.5 lesions per 1000 patients .<sup>4</sup> There are various treatment modalities which include conventional surgical removal, laser enucleation, cryosurgery, sclerotherapy, micro-marsupialization and intra lesional injection of sclerosing agent or corticosteroid but out of which surgical removal of lesion most frequently done.<sup>5</sup> In child patients, the treatment options follows starting from more conservative and non-invasive approach as it helps in behaviour management of child with lesser chair side time.

This case report highlights on the management of mucocele of lower lip in a 7-year-old male child treated with soft tissue laser (Biolase).

#### **CASE REPORT**

A 7-year-old male child presented to the Department of Paediatric and Preventive Dentistry, MMDCH, Darbhanga, with the chief complaint of swelling in left side of lower lip since 6 months. The child gives the history of trauma on the lower lip due to lip biting. Intraoral examination revealed that swelling was present in the inner aspect on left side of lower labial mucosa irt 73&74, approximately 1.2 cm in diameter with round to oval shape. The lesion is well-defined, transparent, non tender, non-reducible, soft in consistency, fluctuant on palpation and bluish in colour. The medical history of patient was nonsignificant. Routine blood investigations were done, values were in normal range. The case was diagnosed as a mucocele on the basis of trauma and clinical findings. The treatment was planned i.e. surgical enucleation to be done with soft tissue laser (Biolase). The patient and parents was explained about the procedure and informed consent was obtained. The lesion was anesthetized with local infiltrative anesthesia.

Surgical enucleation of lesion was done with soft tissue laser (Biolase), there was no need of suture. Parents were instructed to come for regular follow-up. Patient regularly viewed at monthly interval for 2 months and no recurrence was noted till now.



Figure 1: Preoperative intraoral photograph



Figure 5: Post-operative follow-up after 2-months



Figure 2: Postoperative intraoral photograph



Figure 3: Enucleated remnant of lesion



Figure 4: Post-operative follow-up after 7-days

Mucoceles are very common lesions of oral cavity that can affect both children and young patients with the prevalence of 2.5 lesions per 1000 population.<sup>6</sup> The diagnosis of oral mucocele is mainly based upon its clinical features such as location, history of trauma, rapid appearance, size, bluish-colour and consistency. These are very important factors that should be considered before making a confirmatory diagnosis.<sup>7</sup> Palpation of swelling can helps in correct differential diagnosis. Lipomas and tumors of minor salivary glands present no fluctuation while cysts, mucoceles, abscess and haemangioma presents fluctuation.8 There are various treatment modalities which include conventional surgical removal, laser ablation, cryosurgery, micro-marsupialization and intra lesional injection of sclerosing agent or corticosteroid but out of which surgical removal of lesion most frequently done. Corticosteroid injection has also been used in the treatment of painful and recurrent oral mucocele as corticosteroids promote shrinkage of the dilated salivary ducts or act like a sclerosing agent.9 In the present case report, Surgical enucleation of lesion was done with soft tissue laser (Biolase).

# CONCLUSION

Mucocele is a very common minor salivary gland lesion of the oral cavity mainly due to a mucous accumulation. There are various treatment modalities which include conventional surgical removal, laser ablation, cryosurgery, micromarsupialization and intra lesional injection of sclerosing agent or corticosteroid but out of which surgical removal of lesion most frequently done. In paediatric patients, the treatment sequence follows, more conservative and non-invasive approach as it helps in behaviour management of child with lesser chair side time. Thus surgical enucleation of lesion with soft tissue laser is best option for paediatric patients.

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# **Prosthodontic management of hemi-mandibulectomy by guiding flange appliance-A Case Report**

#### Abstract

Segmental or marginal resection of mandible due to presence of benign and malignant tumor is very common. Due to altered action of muscles and contracture of scar tissue there is altered physiological position and movements of mandible. Mandibular discontinuity defects present a major challenge to the rehabilitation team and to maxillofacial prosthodontist. After resection there is discontinuation of mandible which destroys balance and symmetry leading to altered mandibular movements and deviation of residual fragments towards the defective side. Therefore to prevent these complications of mandibulectomy a definitive prosthesis is given known as mandibular guide flange which is an acrylics plate joint to maxillary teeth to guide the mandibular movement.

This case report describes prosthodontic management of a patient who has undergone hemi-mandibulectomy with mandibular guide flange prosthesis .To aid in moving the mandible normally without deviation during functions like speech and mastication.

**Keywords:** Hemi-mandibulectomy, Guide flange, Squamous Cell Carcinoma, Removable Prosthesis, Palatal ramp.

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# **INTRODUCTION**

The most common malignant tumour of the oral cavity is Squamous cell carcinoma (SCC). It develops in all parts of the oral cavity; the high-risk areas are the floor of the mouth, posterolateral margin and base of the tongue.<sup>1</sup> In case of oral SCC

attached to the mandible, a unilateral, elective, modified supraomohyoid neck dissection is recommended.<sup>2</sup> But too

extensive surgery, involving the resection of the mandible, negatively influences the patient's quality of life,<sup>3</sup> the most crucial pitfalls of hemimandibular resection patients is facial disharmony and deviation of mandible towards resected side due to unilateral muscle mass removal, which leads to altered maxillomandibular relationship, difficulty in mastication, swallowing and speech. Increasing the force of closure leads to rotation of the remaining mandible in the frontal plane. There are various methods and materials used to restore the defect. The prosthodontic treatment includes a mandibular prosthesis with a guiding flange on the non resected side is most acceptable method used to prevent the mediolateral deviation. It reduces the deviation but cannot repeat or maintain the same positing during mastication. Guiding Flange made up of acrylic polymers lacks the principles of Removable Partial Denture design can affect the longevity of the remaining teeth. Initial restoration of the resected area using maxillofacial prosthesis as well as the guiding flange helps to restore the esthetic, form and function which psychologically boost the moral of the patient and enhance the quality of life.This case report describes prosthodontic management of a patient with guiding flange of mandible with a palatal ramp on the maxillary prosthesis who has undergone a hemi-mandibulectomy.

#### **CASE REPORT**

A 56-years-old male patient reported to the Department of Prosthodontics, Crown and Bridge at Rama Dental College Hospital & Research Centre, Kanpur, with a chief complaint of difficulty in mastication and speech. He had an unilateral discontinuity of mandible on the right side due to surgical resection for squamous cell carcinoma. The surgery was performed 10 months back followed by radiation therapy. The surgical procedure was not immediately followed by any reconstructive procedure. Extraoral examination showed facial asymmetry with mandibular deviation to the right side (Fig-1). Clinical examination revealed severe deviation of the mandible towards the resected side, with lack of proper inter occlusal contact between the maxillary and the mandibular teeth. Intra oral examination showed missing teeth in the right side of maxilla and mandible and missing second molar in 2nd quadrant(Fig.2,3,4). A maxillary and mandibular impression was made by using irreversible hydrocolloid using sectional impression trays as the mouth opening of the patient was very restricted. The casts were poured in dental stone. Auto polymerizing acrylic material was used to make the base plate over the cast. Modelling wax was adapted over the base plate to record the patients centric relation and also the palatal ramp was manipulated for smooth gliding movement of the mandible for proper inter-cuspation on the non affected side (Fig.5). Care was taken to preserve the indentations

of the opposing maxillary teeth on buccal-surface for guiding the mandible in a final definite closing point during mastication. This procedure was repeated until the wax hardened. The design included the guiding flange on the lingual side. Blocking out the guiding flange sufficiently would not traumatize the teeth and the gingiva when the patient closes his mouth. The wax ramp with plate was kept back on the cast and was mouted on the articulator. The second molar of the  $2^{nd}$  quadrant was replaced by acrylic teeth for efficient mastication . C clasp was attached for the retention purpose on the prosthesis. The final prosthesis was fabricated in heat cure acrylic material and was inserted in patient mouth after finishing and polishing(Fig.6,7). The patient reported no discomfort after 3 months of follow up with increased masticatory efficiency(Fig.8).



Fig.1. Patient frontal view with resected mandible and deviation of mandible towards resected side.



Fig.2. Intraoral view of the mandible on non resected side



Fig.3. Intraoral view of resected side with restricted mouth opening.



Fig.4.Intra oral view of maxillary arch.



Fig.5.Modelling wax attached to the base plate to record the centric relation and formation of palatal ramp.



Fig.6.Final guiding flange prosthesis made up of heat cure



Fig.7.Final prosthesis placed in patient mouth.



Fig.8.Little or no deviataion after prosthesis placement.

Rehabilitation in cancer patients should be taken under consideration from the time of diagnosis in complete and comprehensive treatment plan. Depending upon the situation and extent of the tumor within the mandible, various surgery modalities like marginal, segmental, hemi, subtotal. or total mandibulectomy are often performed.<sup>4</sup> Deviation of mandibular remaining segment(s) because of loss of mandibular continuity causes rotation of the mandibular occlusal plane inferiorly. Mandibular deviation toward the defect side occurs primarily due to the loss of tissue involved within the surgical resection.<sup>4</sup> A vertical extension from the palatal aspect of a maxillary prosthesis extends to contact the buccal surface of the opposing mandibular teeth. This extension maintains the mandible within the proper mediolateral position for vertical chewing, but little, if any, lateral movement is feasible. When a segment of the mandible is removed, immediate reconstruction is typically recommended to enhance both facial symmetry and masticatory function. Although techniques for plastic surgery and prosthodontic rehabilitation have advanced, quite 50% of reconstructed head and neck cancer patients still report impaired masticatory function.<sup>5,6</sup> The GFP are often considered a training sort of prosthesis. If the patient can successfully repeat the mediolateral position, the GFP can often be discontinued.7 GFP support is not different from any other removable prosthesis, the natural teeth and the residual alveolar ridge being the primary sources. Multiple retentive clasps in wide areas of the arch would be the best and simplest approach, but actual placement would be determined by the position of the teeth. Retentive elements should not be rigid than necessary, but can be rigid with a decreasing number of teeth.8

# CONCLUSION

Guiding flange prosthesis may be used as a device to train the & allow the mandible to close in optimum occlusal relationship for achieving maximum masticatory efficiency. Early prosthodontic intervention permits better occlusal contacts. With the increase in time, repositioning of mandible to reduce deviation becomes complicated. Various modalities has been facilitated for supporting the closure of mandible by restricting unopposed muscle action. However, it is important to look for the advantages and disadvantages before applying anv technique. Meticulous observation and care is imperative for maximum benefit to the patient for favorable rehabilitation outcome. Our main aim was fabrication of interim training device to guide the mandible in unaided maximum occlusal contacts. The success of hemi-mandibulectomy rehabilitation depends on the character of surgical defect, patient's cooperation and prosthetic management with early physiotherapy program. The presence of teeth in both the arches creates a far better proprioceptive sense and therefore the prosthesis which re-educates the mandibular muscles to re-establish a suitable occlusal relationship will control the opening and shutting of the mandibular movements adequately and repeatedly.

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# **Restoration of missing anterior teeth with FRC bridge in single visit: A Case Report**

#### Abstract

There are different types of treatment options, ranging from dental implant to conventional bridges are available for the replacement of congenitally or traumatically missing permanent anterior teeth. Restoration of the missing teeth is one of the major challenges faced by the dentists. Fiber-reinforced composite (FRC) bridge can offer better option to conventional treatment plan in replacing a missing permanent anterior tooth in young age patients until a more definitive prosthesis can be provided at the end of the growth period. FRC bridges are reversible, easy, minimally invasive and a single visit treatment procedure.

The purpose of this case report is to replace missing teeth with fixed FRC bridge in a 16 years old girl as an interim treatment option.

**Keyword:** Fiber-reinforced composite, minimally invasive, Metalfree restorations, single visit

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# INTRODUCTION

Patients with missing teeth in esthetic region requires immediate attention for restoration of teeth for esthetic and functional reasons. Missing tooth in the anterior region could be due to trauma, surgical extraction or due to developmental disturbances. Tooth loss may have a disastrous impact on patients' psychology because of esthetic and functional inabilities. Some of the principal factors during replacement a missing tooth are minimal invasion, aesthetics, biomimetic function, and cost, considering all these factors a clinician should seek materials and techniques that enable them to provide a restoration that are minimally invasive and direct(chairside) fabrication of teeth.

The fiber-reinforced composite (FRC) bridges represent the better option to conventional metal bridges prosthesis because FRC bridges can be made chairside (directly) or indirectly using avulsed tooth, an artificial tooth, or by a direct composite resin tooth build up. Fiber reinforced composites (FRC) have unlocked a new perspective in the world of cosmetic dentistry by making composite resin bridges possible and these can be a good alternative to conventional prosthetic procedures.

# A CASE REPORT

A 16-year-old female patient reported with lost upper front teeth (maxillary left central and lateral incisors (figure 1.a & b)) in the department of prosthodontics, crown, and bridge at Mithila minority dental college & hospital. The girl's medical history revealed no specific problem. Her dental history indicated a traumatic accident few days back. In this case, traditional FPD was avoided due to patient's young age, and due to her financial condition. The plan is to replace the missing tooth with an implant-retained prosthesis later date.Fiber Reinforced

Composite FPD was selected to provide better esthetics, and a conservative fixed treatment for the patient.

#### **CLINICAL PROCEDURES**

Primary impression with alginate impression material was taken and a diagnostic cast was made. A diagnostic wax up was fabricated (figure 2). And a putty index (figure 3) was made from the cast to build composite teeth (figure 4). The shade of final veneered composite resin was selected using composite shade guide, Lingual preparation was done in the patient's mouth on abutment teeth. Resin fiber material (figure 5) was taken out from the package, length of the fiber was selected from edentulous space and cut into the measured length and adapted on the lingual surface of prepared abutment teeth. After application of acid etchant gel (37% phosphoric acid gel), the gel was rinsed thoroughly and gently air dried. Adhesive resins were applied to the tooth surface. Flowable composite resin was applied on the bonding surfaces prior placing the resin fibers. The flowable composite was light cured after fibers were press tightly against the tooth surface. The flowable composite was used to seal the space between the enamel surface and fibers. Fiber framework was fully covered with a thin layer of flowable composite resin. And then pontic is adapted on the resin fiber framework by using flowable composite and light cured unit. Incisal guidance was adjusted with the help of articulating paper. Post operative view (figure 6. a & b)



Fig1.a pre-operative extraoral view



Fig. 3 putty index made



Fig.1.b pre- operative intraoral view



Fig.4 composite built up tooth



Fig. 2 mock up



Fig.5 Resin fiber



Fig. 6 a. post operative intraoral view



Fig. 6 b. post operative smiling view

Fiber-reinforced composite (FRC) has brought a new material into the dentistry of metal-free, adhesive esthetic dentistry<sup>6</sup>. In the case of FRC bridge prosthesis, the framework can be supported from both ends to provide better biomechanical flexibility and bonding of the FRC framework.

Although, in the case of mobile abutment teeth, it is recommended to support resin-bonded FRC FPD from only one end. In the cantilever prosthesis, care has to be taken to secure adequate rigidity of the FRC framework to resist bending forces during functional movement. Adequate rigidity is achieved by increasing the cross-sectional diameter of the connector. Fibers of the FRC framework should cover as large surface area on the abutment's teeth and, in the anterior area, should be placed close to the incisal edge to eliminate the dislodging forces<sup>3</sup>.

Although resin-bonded FRC FPDs are most commonly used in the anterior and premolar regions, preferably than molars, recent laboratory investigations have suggested that ideally designed FRC FPD made on unprepared abutment teeth can provide better load-bearing capacity for the FPD than conventional porcelain-fused to metal FPD. so, the development of the technologies and materials in FRC may allow alternatives for directly made molar replacements<sup>3</sup>.

Even in case of single tooth replacement FRC are applied as temporary restoration in anterior region, it is possible to apply it as permanent prosthesis, in patients for whom right indication is established. The advantages of the fiber reinforced adhesive bridges include short-term application, aesthetic application, no undesired color as no metal construction material was available, and no harms upon the abutment teeth as performed with minimal invasive method. Its disadvantages include fracture risk during functional movements.

# CONCLUSION

The important factors like toughness, wear-resistance and esthetic, of fiber material gives a new alternative for short-span composite bridge fabrication with the use of FRC's. FRC bridge fabrication technique suggests a new treatment option for the replacement of a missing anterior tooth. It restores esthetic and function as well as it is more comfortable than a removable prosthesis, nonirritating, and hygienic too. Generally, it does not require any reduction of tooth and could be modified, repaired, or removed from teeth without any iatrogenic problem. It can be considered as a long-lasting provisional treatment if implant therapy is to be used in future.

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# **Immediate Implant Placement to the rescue in the Esthetic Zone: A Case Report**

#### Abstract

Restoration of teeth within the esthetic zone is a great challenge for dental practitioners. Traditional gold standard accepted protocol for implant placement comes with a ready length of 12 months or longer to permit total socket healing. Overall reduced remedy length and minimal number of surgical interventions in implant dentistry is desired by patients and clinicians. Moreover, following extraction of tooth, the processes of modeling and remodeling leads to pronounced resorption of the various components of the alveolar ridge which may be a huge challenge. Newer treatment protocols have been introduced wherein implants are placed at the time of extraction of the tooth, or soon after, before significant bone resorption occurs, referred to as immediate implants.

This case report describes the procedure of placement of implant immediately in the mandibular anterior teeth region after immediate extraction.

**Keyword:** Immediate implant placement; Atraumatic extraction; Fresh extraction sockets; Esthetic zone, Primary stability; Osseointegration.

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# INTRODUCTION

Success rate of endosseous implant therapy has repeatedly been reported at a of 95 % or better in the mandible (Para symphyseal region), but still the public utilization of endosseous implant therapy has not exceeded  $5 \%^1$ . Traditional guidelines for implant therapy advise a 2-3-month period of socket remodeling after tooth extraction and an additional 3-6 months of load-free healing, which is essential for osseointegration. Moreover, following tooth extraction alveolar ridge resorption has been an unavoidable phenomenon. Post-extraction, predictable bone loss is accelerated in the first 6 months with as much as 40% of the alveolar height and 60% of the alveolar width loss, which continues at a rate of 0.25% to 0.5% per year2. Therefore, reducing the amount of time required to complete implant therapy has been an obvious area of focus. Immediate implant loading, improving implant surface technology and immediate placement of an endosseous implant after extraction of a natural tooth are some of the approaches to achieve this goal.

Alternative protocols such as immediate implant placement can be used at the time of extraction which has many advantages, such as preservation of crestal bone, reduction in the number and complexity of surgical procedures, reduction in the edentulous period, and thereby increasing patient acceptance. Due to preference of shortened overall treatment period and minimum number of surgical interventions immediate implant placement has been widely encouraged and accepted by clinicians as well as patients

The purpose of this article is to present a case of periodontally compromised mandibular anterior teeth associated with bone loss using immediate implant placement.

# A CASE REPORT

A 23-years-old non-smoking male patient reported to the department of prosthodontics of Mithila Minority dental college and hospital with the chief complaint of mild discomfort on biting and tooth mobility in the mandibular anterior region. He additionally complained of unaesthetic appearance due to missing right and left mandibular central incisor and gingival recession [Figure 1A and B]. Patients medical records were noncontributory. Intraoral examination revealed gingival recession in mandibular region in relation to 32 and 42 with grade 3 mobility and having hopeless prognosis.

Various treatment options were discussed with the patient. Immediate implant placement after tooth extraction of 32 and 42 was decided as the final treatment plan as per patient's desire of reduced number of surgical procedures and overall treatment time,

Informed consent was obtained and surgical phase was initiated with administration of local anesthesia (lidocaine with epinephrine 1:100,000). Tooth extraction was performed as atraumatic as possible. [Figure 2]. The extraction socket was debrided thoroughly with caution. Implant bed preparation was done after standard protocols using incremental sharp spiral drills and copious chilled saline and parallelism was checked using paralleling pins[Figure 3]. Following socket debridement, an implant of  $3.3 \times 11.5$ mm (Swiss medical, Israel) was placed in 32 and  $3.3 \times 10$ mm (Swiss medical, Israel) in 42 position [Figures 4 A and B] according to the manufacturer's protocol. Adequate primary stability was obtained when placed with a torque driver at 35 Ncm. Interrupted sutures were placed and temporary restoration was given[Figure 5]. Post operative instruction were given and patient was recalled for follow up after 6 months.

Second stage surgery was done and healing cap was placed [Figure 6 and 7]. After 2 weeks prosthetic phase was performed [Figure 8 to 13]. The patient was satisfied with the esthetic and functional outcome [Figure 14].



Fig1.a Pre-operative intraoral view



Fig.1.b Pre-operative radiograph



Fig. 2 Extraction socket of tooth



Fig. 3 Paralleling pin placed after initial osteotomy



Fig.4.a Implant placed in 32, 42 position



Fig.4.b Implant placed in 32, 42



Fig. 5 Provisional restoration



Fig. 6 Second stage surgery performed



Fig. 7 Healing cap placed



Fig. 8 Gingival collar formed



Fig. 9 Castable abutment checked intraorally



Fig. 10 Impression coping placed



Fig. 11 Gingifast placed in addition silicone Impression



Fig. 12 Castable abutment placed



Fig. 13 Screw retained metal ceramic prosthesis fabricated



Fig. 14 Final prosthesis placed

The loss of a tooth especially when in the esthetic zone can be emotionally difficult<sup>3</sup>. The concept of "Immediate implants" offers the opportunity to achieve better and faster functional results.

Reduction in alveolar bone begins following tooth extraction, and it is usually accompanied by reductions in both the quality and quantity of hard tissue<sup>4</sup>. Immediate implant placement following extraction can eliminate the waiting period for healing of the socket and this may also reduce the bone resorption that normally occurs following the loss of a tooth.

Immediate implant placement in fresh extraction socket usually results in a gap between the occlusal part of an implant and bone walls. For complete osseointegration, synthetic bone substitutes, membranes, or a combination of these can be used to achieve bone formation in such defects<sup>3,5</sup>. However, many clinical studies have indicated that osseointegration of immediately placed implants in the extraction sockets can be achieved without bone augmentation procedures, and with a success rate comparable to that of delayed implant placement. According to Schrott et al a minimum torque of 30 Ncm is indicated for immediate loading with a minimum stability ratio (ISQ) between 50 and 62 and an implant of length 8 to 11 mm is indicated<sup>6</sup>. In this case report, an insertion torque of 35 N was obtained to achieve required primary stability with the placement of a 10 mm long implant.

It is very important to determine if the immediate provisionalization is possible on same day of the surgery or not. Also, there is greater esthetic and functional demand from patients which can be satisfied using non-functionally loaded immediate provisionalization which is adjusted to clear all occlusal contacts in centric and eccentric movements<sup>7</sup>.

#### CONCLUSION

The benefits of immediate implant include reduction of morbidity, reduction of alveolar bone resorption, preservation of gingival tissues and papilla in the esthetic zone, overall reduction of treatment cost and time with minimal surgical intervention. Extraction socket act as a guide and thereby helps to easily determine the appropriate parallelism and alignment relative to the adjacent and opposing residual dentition.

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Interdisciplinary Management of anterior spacings in a patient with congenitally missing teeth with Orthodontics, combined with Periodontal surgery and Fixed prosthesis-A Case Report.

#### Abstract

Periodontal problems might lead to occlusal abnormalities which may require orthodontic correction also orthodontic treatment of adult patients is most frequently just one component of a more complex treatment involving several dental disciplines. This paper presents an orthodontic case of a large (5 mm) maxillary midline diastema and congenitally missing incisors. A combined orthodontic, periodontic and prosthodontic approach involving frenectomy, fixed prosthesis and fixed appliances was used to close the space.

**Keywords:** Maryland bridge, Anterior spacing, Peg laterals, Midline diastema, Fixed prosthesis, Frenectomy.

# INTRODUCTION

The most common aesthetic complaint of patients is maxillary anterior spacing or Diastema.<sup>1</sup> Higher prevalence of midline diastema with maxilla than mandible has been reported in literature. The etiology of midline diastema is multifactorial. Thick labial frenulum being the major etiology, other factors are mesiodens, microdontia, lateral incisor agenesis, lateral incisors of peg shape, cysts in the midline region, habits such as tongue thrusting, sucking or digits and/or lips, genetics, developmental dental anomalies, dental-skeletal discrepancies, maxillary incisor proclination, and imperfect aggregation of the interdental septa which can lead to diastema.<sup>2,3</sup> Diastema closure by esthetic treatment presents a challenge in clinical practice.

Tooth Agenesis is the congenital absence of one or more of the normal complement of teeth and is one of the most frequent alterations of the human dentition. Although, Tooth Agenesis does not represent a serious public health problem, it may cause both speech and masticatory dysfunction as well as aesthetic and functional problems <sup>4,5</sup>

The maxillary lateral incisor is the second most frequently missing tooth after the mandibular second premolar even though Muller et al. found that maxillary lateral incisors experience the most agenesis (not including third molars). Agenesis of the maxillary lateral incisor is also linked with anomalies and

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syndromes such as agenesis of other permanent teeth, microdontia of maxillary lateral incisors (peg laterals), palatally displaced canines and distal angulations of mandibular second Premolars<sup>6,7</sup>. The management of missing lateral incisor requires an integrated multidisciplinary approach<sup>8</sup>. Generally the choice between space opening with tooth replacement and space closure with canine substitution relies on several parameters to be considered before treatment planning.

In case of unilateral tooth agenesis, space opening is often recommended to improve the aesthetics of patients and preserve smile symmetry. On the contrary, in case of bilateral agenesis, space closure and space opening could be both performed.<sup>9</sup>

One prosthetic option for replacing the missing lateral incisor is a resin bonded (Maryland bridge), cantilevered bridge, or fullcoverage bridge. Some benefits to these restorations include being less invasive than an implant, they can be completed in a growing individual, and there is more freedom with the space requirements when compared to the minimum of 6 mm required for an implant.

#### CASE 1

**Diagnosis and Treatment Plan:** A 15-years-old female presented reported to the Department of Orthodontics and Dentofacial Orthopedics with a chief complaint of forwardly placed upper front teeth and gapping in the lower front teeth.

















Figures 1: Pre-treatment Extraoral and Intraoral photographs





Figures 2: Pre-treatment lateral cephalogram and opg

The patient was in good general health and had no history of any other systemic disease. No facial trauma or parafunctional habits were reported. The extraoral and intraoral photographs of the patient are reported in Figures 1.

On extra oral examination patient had symmetric face with mesocephalic head, mesoprosopic facial form, convex facial profile, incompetent lips with interlabial gap of 4 mm. Intraoral examination showed class I molar relationship bilaterally, peg shaped lateral incisor wrt 22, missing 32,42, over jet of 7mm, 20% overbite, scissor bite wrt 15 with spacing in maxillary and mandibular anteriors.

Study model showed bilateral class I molar and canine relation with good posterior intercuspation. There is a spacing between 11-12, 21-22, generalised spacing in lower anteriors. Scissor bite wrt 15, rotation wrt 14,15,24(distopalatal rotation), mesiolingual rotation wrt 44,45.

The panoramic radiograph indicated presence of included upper and lower third molars and congenitally missing 32 and 42. (Figure 2). cephalometric analysis demonstrated a skeletal Class I antero-posterior discrepancy with average growth pattern. Maxillary incisors were proclined, the upper incisor to NA was 10 mm and 42°. Mandibular incisors were tipped labially, lower incisor to NB was 8 mm and 38° (Table 1).

Table: 1

VARIABLE	PRETREAT MENT	NORMAL	POSTTREATMENT
Sagittal skeletal relationship			
SNA	79°	82°±2°	79°
SNB	76°	80°±2°	76°
ANB	3°	2 ° ± 2 °	3°
Dental Base Relationship			
Upper incisor to NA (mm/deg)	42 °,10mm	22 °, 4mm	35°, 7mm
Lower incisor to NB (mm/deg)	28°,5mm	25 ° /4mm	28°,5mm
Upper incisor to SN plane	123 🗆	102 ° ±2 °	114°
Lower incisor to mandibular plane angle(IMPA)	110□	90 °	110°
Dental Relationship			
Inter-incisal angle	95 🗆	131°±5°	102°
Lower incisor to APog line	5mm	1±2mm	5mm
Vertical skeletal relationships			
Maxillary – mandibular planes angle	25 🗆	25°	25°
SN plane – mand plane Jarabak ratio	31°	32°	31°
Maxillary length-(effective)	40mm	43mm	40mm
Mandibular length – effective (McNamara)	67mm	66mm	67mm
Soft tissues:			
Upper lip to Ricketts E plane	1mm	-1 to -2	0mm
Lower lip to Ricketts E plane	1mm	-1 to -2	1mm
Nasolabial angle	88°	102°±4°	89°

#### **TREATMENT OBJECTIVE**

The treatment objectives were as follows:

- 1. Correction of peg shaped lateral incisor
- 2. Achieve ideal alignment of upper and lower arch
- 3. Correction of proclination
- 4. Maintain class I molar relationship on both sides
- 5. Achieve an esthetic soft tissue profile

A multidisciplinary approach was discussed which included the patient, orthodontist, Prosthodontist, restorative dentist and dental technician and following treatment plan was agreed upon as a team:

- To crown build up on maxillary peg shaped lateral incisor.
- To restore the mandibular lateral incisor with Maryland Bridge.

#### TREATMENT PROGRESS

titanium arch wire in upper and lower arch.

Treatment progresses without extraction with Pre-adjusted edgewise MBT prescription brackets ( $0.022 \times 0.028$  inch slot,) were bonded in the maxillary and mandibular teeth. Leveling and alignment were initiated with 0.014inch nickel

Anchorage in this stage was reinforced using lace backs and bend backs in both the arches Patient was progressively shifted to heavier arch wires  $0.019 \times 0.025$  inch stainless steel wires.

The maxillary anteriors were consolidated with a 009" stainless steel ligature wire and a composite stops (Figure 3) was placed between the maxillary central incisors and canines on the left side to gain sufficient space for the crown build up on the lateral incisors.

It was observed that the space in the Mandibular arch was insufficient for the replacement with prosthesis for two teeth. Therefore an open coil NiTi spring (Figure 3) was placed between the Mandibular central incisors to gain sufficient space for a two teeth prosthesis.

A 009" stainless steel ligature wire was used to consolidate the Mandibular teeth from the molars to the central incisors bilaterally so as to prevent the relapse of the space gained through the open coil spring. The 0.016" Niti wires were replaced with 019x025" Niti wires and then .019x.025" Stainless steel wires for the expression of Tip and Torque. After space was gained and the teeth were properly aligned, crowns build up were done for the maxillary lateral incisor on the left side. This was done as proper shade matching could not be achieved because of presence of metal brackets on the adjacent teeth.

Once the spaces has been maintained between the mandibular central incisors the patient was prepared for an Maryland bridge replacement for the lower lateral incisors. It was observed that there was insufficient space apically to place two prosthesis to replace the two missing teeth, so it was decided to place three unit bridges i.e., Maryland bridge.



Figures 3: Treatment progress

# RESULT

The soft tissue profile was pleasing, peg shaped lateral i.e.,22 was successfully reshaped along with the Maryland bridge (Figure 4) in replacement of lateral incisors with an ideal overjet and overbite, and proper interdigitation of the posterior teeth were achieved. Fixed retainer was placed in upper and lower arch. Cephalometric soft tissue values were improved and are given in table1. The extraoral and intraoral photographs showed a stable occlusion and esthetic smile.

# DISCUSSION

Missing lateral incisors are not very uncommon; however, very few case reports describe the management of missing lower incisors in conjunction with orthodontics and prosthetics. This is a unique case where the patient reported with peg shaped maxillary lateral incisor and missing lower lateral incisors. Space was created and crown build up was done in upper lateral incisor on left side. Although two teeth were missing, due to insufficient space in the region at the site of prosthesis placement, it was decided to place a three unit bridge, Maryland bridge. This Maryland bridge would facilitate the replacement of both the missing lower incisors.

# CONCLUSION

The choice of treatment option in patients having missing incisors depends on various factors that need careful treatment planning with a multidisciplinary approach as the space is present in the esthetic region of the jaw. Space closure with Maryland bridge seems less costly and less invasive, treatment can be completed relatively in a short period of time.

















Figures 4: Post-treatment Extraoral and Intraoral photographs.





Figures 5: Post-treatment lateral cephalogram and opg.

#### CASE 2

A 14-year-old patient reported to the Department of orthodontics and dentofacial orthopedics with chief complaint of unesthetic smile due to gap in the upper and lower front tooth region. On extraoral examination (Figure 6) he had a mesoprosopic face, orthognathic profile, symmetric face, competent lips and average smile line. Patient's medical history did not reveal any systemic diseases. On intraoral examination, he presented with class I molar relationship. Intraorally proclined upper and lower anteriors with an overjet of 2mm, midline diastema (5mm) The maxillary labial frenum was thick and inferiorly attached (papilla penetrating) (Fig. 6). It was diagnosed as having a major influence on the midline diastema. A simple blanch test was performed and positive blanching of the papilla was noted, It was decided to perform surgical (labial frenectomy), root canal treated wrt 46 and missing 41(Figure 6) with available space of 6mm.

The cephalometric analysis indicates class I relation with ANB angle of 3°, and proclined upper and lower anteriors UI-SN and LI-MP is 118°, 115° respectively with acute nasolabial angle i.e.,84°.

The panaromic radiographs radiographs revealed a missing central incisor in the right side, root canal treated wrt 46 and the presence of all third molars. The overall bone level was within normal limits (Figure:7)

The aim of the treatment was to close the median diastema and restoring spaces from congenitally missing central incisors with fixed prosthesis.

Treatment alternatives for restoring spaces resulting from congenitally missing central incisor include removable partial dentures, conventional fixed bridges, resin-bonded bridges, autotransplantation, orthodontic repositioning of canines to close the edentulous space, and single-tooth implant.<sup>10,11</sup> Although adjacent teeth may have to be repositioned orthodontically to create adequate space for any prosthesis.

A full set of orthodontic records including radiographs, models and clinical photographs are recommended for the diagnosis of congenitally missing laterals and to planning of the preprosthetic orthodontic alignment. A diagnostic set-up model is also beneficial for planning of treatment and esthetics for patient motivation.<sup>12,13</sup>

Participating clinicians, orthodontist and prosthodontist should determine the patient's treatment plan collaboratively and communicate throughout the course of treatment to ensure all aspects of treatment are considered and the overall treatment objectives are achieved.<sup>14</sup>

A multidisciplinary approach was discussed which included the patient, orthodontist, Periodontist, Prosthodontist, restorative dentist and dental technician and following treatment plan was agreed upon as a team:

- Diastema closure between the central incisor.
- To restore the mandibular central incisor with fixed prosthesis.















Figures 6: Pre-treatment Extraoral and Intraoral photographs.





Figures 7: Pre-treatment lateral cephalogram and opg.

# TREATMENT PROGRESS

Orthodontic treatment started with pre-adjusted Edgewise appliance with .022 inch by .028 inch MBT bracket in upper and lower arches and molars were banded. Initial alignment and leveling was done with .014 niti wire in upper and lower arch, then sequentially arch wires were changed upto .019 x .025'' stainless steel archwire to level and express the prescription of the brackets.

The case was then referred to department of periodontology for frenectomy wrt 11 and 21(Figure 8). Temporary crown was placed between 31 and 42 to maintain the space in order to replace a single congenitally missing tooth and treatment is undergoing (Figure 9).



Figures 8: Frenectomy



Figures 9: Treatment progress

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# **Guidelines for Author**

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**Editorial policy-** The Editorial board reserves the right to make changes that may clarify or condense papers where this is considered desirable. All articles on submission will undergo *plagiarism check* by the VIPER detection software and also online to prevent duplicity. Cases suspected with the plagiarism will be rejected and intimated to the corresponding author.

**Type of submission-** Original Research, Case Series, Reviews and Letters to the editor.

**Covering letter-** First author must sign covering letter indicating full responsibility for paper submitted along with the contributor's form duly signed by all authors.

**Title page-** The title page should carry the type of manuscript, title of the article, name of the authors with academic qualification and institutional affiliation, name of the department(s) and institution(s) to which the work should be attributed. Name, address, phone numbers, and e-mail address of all authors and contributor responsible for correspondence about the manuscript.

**Manuscript-** All submissions must be submitted in Microsoft Word compatible format. Specification such as font size 12 and style Times New Roman, Double spaced should be followed. Avoid use of outline form (i.e. Numbered and bulleted sentences or paragraphs). It should contain title page, abstract, keywords, introduction, material and methods, results, discussion references, tables and figures and legends for tables, figures and graphs.

**Abstract and key words-** The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured with subsections, Statement of problem, Purpose, Materials and Method, Results and Conclusions. Avoid abbreviations and manufacturing information. Below the abstract provide 5-6 Keywords.

**Introduction-** It should briefly review the current state of knowledge strictly concerning topic of paper. It should also make statement on the reason for undertaking the study and what's the aim to achieve.

**Materials and Method-** It should be described giving sufficient relevant information to permit the work to be repeated. Statistical analysis method, if used should be specified.

Ethics- When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation & informed consent was obtained. Research involving animal/s must follow published guidelines for use of laboratory animals (www.icmr.nic.in/animal ethics).

**Results-** Present the results in logical sequence in the text, tables, and illustrations. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations.

Discussion- Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. Include in the Discussion section the implications of the findings and their limitations, including implications for future research. Relate the observations to other relevant studies. In particular, contributors should avoid making statements on economic benefits and costs unless their manuscript includes economic data and analyses. Recommendations, when appropriate, may be included. The last paragraph of the discussion should begin -In conclusion, and then the conclusions should be drawn.

**References-** Conform to Vancouver style as a set forth in \_Uniform Requirements of Manuscripts Submitted to Biomedical Journals<sup>4</sup>. References should be numbered in order in which they appear in text and these numbers should be inserted above the lines on each occasion the author is cited.

**Tables-** Each should be typed double spaced on separate sheet, having underlined title followed by a legend if any in Microsoft Word Format.

**Figures-** Digital images of high quality (Resolution of 300 dpi) should be submitted. Special features should be indicated by arrows or letters in contrast with the background. Legends to all photos should be typed on separate sheet paper.

**Letter to the Editor-**Should be short, decisive observation. They should not be preliminary observations that need a later paper for validation. Up to 400 words and 4 references.

**Financial Disclosure/ Conflict of Interest-** Author/s are required to disclose any conflict of interest including direct or indirect financial interests that they may have in the materials or subject matter used in the manuscript.