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Vande Mataram**

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Dr. Bibhuti P. Sinha
Director
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Foreword

A year ago, Department of Dentistry, Indira Gandhi Institute of Medical Sciences had started the issue of their first Dental Journal and I am proud to say that it is flourishing and among the best of its kind. The dream that many have worked upon has become a successful reality. I congratulate the Editorial Team and each person involved in its initiation.

The Journal comprises of a culmination of ideas and innovations ranging from developing technologies to safe and efficient methodologies practised in the field of Dentistry. Authors and researchers from different fields have contributed to create an interdisciplinary publication, of which this is the 2nd issue. I hope the DJIGIMS team continues to push towards excellence and the Journal motivates education, evolution and efficiency in its field.

Dr. Bibhuti P. Sinha
Director, IGIMS
Patron, DJIGIMS





Prof. (Dr.) Ashutosh Biswas
Ex-Director & Chief Patron
IGIMS, Patna

Foreword

Greeting from IGIMS

It is matter of great pleasure and pride that the department of dentistry is publishing 2nd issue of Dental Journal of Indira Gandhi Institute of Medical Sciences (DJIGIMS), I am sure this issue will be the reflection of research, innovation and development in the various field of Dental sciences. I am also very optimistic that publication of this journal will go a long way in enriching the knowledge of students and academicians.

I take the opportunity to congratulate the Journal Committee members, Editorial/Advisory board members and all the authors for their immense commitment and contribution.

I convey my best wishes to all.

A handwritten signature in blue ink, appearing to read 'Ashutosh Biswas', with a long horizontal stroke extending to the right.

Prof. (Dr.) Ashutosh Biswas
Ex-Director, IGIMS
Chief Patron, DJIGIMS



Prof. (Dr.) A.K. Sharma
Chief PGIDER, IGIMS, Patna

From the Pen of Editorial Chairman

Season 'greetings

Team DJIGIMS feels pleasure in bringing 2nd issue of this journal. This is now 6 months old and had under gone lots of teething troubles and finally it's before you with untiring efforts of the editorial board. I hope this will go a long way to serve, fulfill the needs and expectations of contributors. Hurdles bring strength to struggle which leads to success and we should always work with this motto and passion that

हार नहीं मानूँगा, रार नई ठानुँगा

With best wishes and regards

Prof. (Dr.) A.K. Sharma
Editorial Chairman, DJIGIMS, Patna





Dr. Nimmi Singh

Associate Professor, PGIDER, IGIMS, Patna

From the Pen of Editor in Chief

It is with great pride that the DJIGIMS Editorial Team brings to your desks, the second edition of our acclaimed Dental journal. On behalf of the entire team, I extend a warm welcome to all readers. Taking this opportunity, I would like to extend my gratitude to all those who have contributed to this journal; our authors, editors, reviewers for lending their informative experience and knowledge. Moreover I am indebted to the supportive readership for helping to make this journal a success in its first year. DJIGIMS is strengthened by the selfless augmentation of all those involved.

The journal is committed to advancement in dental sciences, upliftment of standard care and promotion of improved research and education. DJIGIMS helps refining skills by providing an important and open platform for exchange of knowledge between researchers. We publish review articles, research papers, case studies and survey papers from eminent authors, national and international in a wide range of fields.

Oral health forms an integral part of bodily healthcare and we at DJIGIMS aim to explore the upcoming methodologies and progress in this field. Lastly, I would request all readers and contributors to keep supporting this initiative and ensuring the continuity of this noble Dental journal.

A handwritten signature in blue ink, appearing to read 'N Singh', with a horizontal line underneath.

Dr. Nimmi Singh

Editor in Chief, DJIGIMS, Patna



CONTENTS

ORIGINAL ARTICLE

- A COMPARATIVE STUDY OF THE CLINICAL EFFICIENCY OF A CHEMO MECHANICAL AGENT, BRIX-3000, ROUND BUR FOR CARIES REMOVAL. AN IN VIVO STUDY** 15

Sameer Makkar, Akanksha Sood, Shabnam Negi, Jyotsana Sikri

- ATTITUDE TOWARDS COVID-19 IN DENTAL COLLEGE POPULATION: A CROSS SECTIONAL STUDY** 21

Archana Sudheer, Aparajita Tiwari, Anjali Kumari, Amit Kumar Singh, Kumar Anand, Nitesh Pandey

- IMPROPER POSITION A PERPLEXING PROBLEM - A QUESTIONNAIRE STUDY** 26

Palak Choudhary, G.C. Shivakumar, Sahana S., Nimmi Singh, Prashant Mishra

- AWARENESS AND KNOWLEDGE OF TOBACCO ASSOCIATED RISK OF ORAL CANCER AMONG DENTAL PATIENTS: A SURVEY BASED QUESTIONNAIRE STUDY** 31

Poonam Tomar Rana, Kuldeep Singh Rana, Kratika Mishra

- A NEW APPROACH FOR PLANNED UPPER INCISOR POSITION - AN OBSERVATIONAL PROSPECTIVE STUDY"** 37

Prema Anbarasu, S. Saravana Kumar, Indra Annamalai

REVIEW ARTICLE

- POTENTIAL BIOLOGICAL AGENTS INVOLVED IN BIOTERRORISM - OBSERVATIONS FROM A DENTAL PERSPECTIVE** 43

Deepak Viswanath, Vikram Singh, Palini Pradhan

- NEWER GINGIVAL RETRACTION MATERIALS: A REVIEW** 52

Neha Vaidya, Komal Kishlay, Sumit Kumar Roy, Pooja Rani

CASE REPORT

- PROSTHODONTIC MANAGEMENT OF KNIFE-EDGE RIDGE USING CUSTOMIZED PREFABRICATED METAL MESH CUSTOM TRAY IMPRESSION TECHNIQUE** 59

Arpit Sikri, Jyotsana Sikri, Nimmi Singh, Poonam Bali, Neeraj Mittal

- AN IMPACTED SUPERNUMARY TOOTH: A STARTLING PRESENTATION** 69

Smita Lahane, Rashmi Rokade, Aditee Karkade, Abhay Kulkarni

- ELASTIC TRACTION TREATMENT FOR THE MANAGEMENT OF CHRONIC DISLOCATION OF BILATERAL MANDIBULAR CONDYLE - A REPORT OF 2 CASES** 73

Subia Ekram, Chandmani Tigga, Virendra Kumar Prajapati, Om Prakash

- A SPECTRA OF FACIAL AND AURICULAR ANOMALY: BRACHIAL ARCH SYNDROME** 77

Pratiksha Hada, Sakshi Sharma, Vikram Singh, Shivam Dubey





A COMPARATIVE STUDY OF THE CLINICAL EFFICIENCY OF A CHEMO MECHANICAL AGENT, BRIX- 3000, ROUND BUR FOR CARIES REMOVAL. AN IN VIVO STUDY.

Sameer Makkar¹, Akanksha Sood², Shabnam Negi³, Jyotsana Sikri⁴

ABSTRACT :

AIM: To compare and evaluate the effectiveness of caries removal using two methods: a chemo mechanical agent, Brix3000 and conventional rotary instruments. This study also compared the difference in pain and discomfort caused by both the methods.

METHODOLOGY: Owing to the power of the study, forty young participants aged between 20-30yrs, were enrolled in this study. The patient with a deep Class I carious lesion extending upto middle third of dentin and no symptoms were selected. The patients were randomly divided into 2 groups: Group I Brix3000 (n=20), Group II conventional method (n=20). Complete caries was excavated in both groups and then analyzed with tactile assessment. The parameters assessed were: pain, discomfort level throughout the procedure and mean time required for the treatment.

RESULTS: The study showed that conventional rotary instrumentation method required significantly less time for caries removal ($p = .001$). but resulted in statistically higher pain score ($p = .002$) and discomfort to the patient as compared to the BRIX3000.

CONCLUSION: These findings suggest that BRIX3000 is an excellent treatment option for caries removal with the same effectiveness and less trauma than the conventional method, inspite of it taking a longer time to remove the caries.

KEYWORDS: Caries removal, minimally invasive dentistry, BRIX3000, chemo mechanical agents.

INTRODUCTION :

Dental caries is a very common global health problem.¹ Dental caries may be defined as a bacterial disease of calcified tissues of teeth and is characterized by demineralization of the inorganic and destruction of the organic substance of the tooth. Histologically, carious tissue is divided into four distinct zones, three of which are clinically visible. The necrotic zone and contaminated zone containing microbial biofilm comprise the outer layer, which can be recognised clinically as soft mineralized tissue of the tooth. The microbial load in this necrotic zone is extremely high. The next zone is the demineralization zone, which has very few microorganisms, few nutrients, and an anaerobic atmosphere. Clinically,

this zone is associated with leathery dentine. Finally, the translucent zone of a firm, softer dentine is found near the pulp. This zone is characterised by demineralization and the absence of microorganisms because microbial flora cannot penetrate this depth. As the caries process progresses, the dentin also experiences mineral loss and bacterial invasion, which in return produces secondary dentin to protect the pulp.²

Dental caries can be superficial or deep.³ Deep caries is defined as radiographic evidence of caries reaching the inner third or inner quarter of dentine with a risk of pulp exposure. Recent research on carious tissue management supports less invasive strategies.

Living pulp is vital for the maintenance of tooth homeostasis. A conservative approach can lead to a favorable diagnosis and help avoid injury due to iatrogenic causes.⁴ The conventional method for

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caries removal involves use of high-speed rotary instruments, which have proven to be effective since ages. However, it is an invasive technique and it comes along with several drawbacks: over preparation of cavities, sensitivity, pain and possible damage to pulp tissue due to elevated temperature and pressure on the pulp. Fear and anxiety due to the noise created by rotary instruments and the need for anesthesia significantly affect the cooperation of the patient in the dental clinic. These factors are driving forces in the development of alternative techniques that can overcome the shortcomings of the traditional method.⁵ Most often, such situations not only make the patient delay the dental treatment but also sometimes avoid it altogether, which can result in caries progression.

Minimally invasive dentistry is one with a more conservative approach and was developed through the use of a chemo-mechanical removal caries allied to the preservation of dental tissue.⁶

It propagates the use of prevention of extension and has gained popularity with technological improvements in tools for tooth preparation and with development of new adhesive systems.⁷

Chemo-mechanical caries removal (CMCR) agents were introduced in the 1970s and have the ability to dissolve softened tissue which can then be removed by manual excavation of carious dental tissues. The first CMCR material was introduced in 1975, called the GK 101, it was composed of a 5 % sodium hypochlorite (NaOCl) solution.⁸ Habib, Goldman, and Kronmann, observed that alone, a 5 % sodium hypochlorite solution could cause damage to tissues and hence launched Caridex which was 5 % sodium hypochlorite (NaOCl) in combination with sodium hydroxide, sodium chloride, and glycine.⁹ It did not show good results due to the need for large volume of solution, instability and complex equipment to be used, thus generating a high cost.

Towards the end of 1990s, a solution called Carisolv, was developed which contained 0.95 % sodium hypochlorite solution alongwith three amino acids (leucine, lysine, and glutamic acid).¹⁰ The reaction of

NaOCl with amino acids led to degradation of collagen found in the demineralized portions of the carious lesion, thus neutralizing aggressive behavior in healthy tissues and allowing the rapid removal of caries. Its disadvantages were that it had a short shelf life, needed to be kept refrigerated, had a bad odor and required specially designed curettes for the removal of infected dentin, which increased the cost of the procedure.¹⁰

Papain, a protein extracted from papaya, containing gel was introduced in 2003 and was called Papacarie. It is easy to apply, does not require any elaborate equipment. Papain is responsible for dissolution of minerals from the exposed collagen in the dentin, softening the infected dentin further, which in turn aids in excavation using non-cutting instruments and without anaesthesia and rotary instruments.¹¹

BRIX-3000, a papain-based chemico-mechanical agent was introduced in 2012, alongwith a proteolytic enzyme which is collected from fruits of green papaya and leaves latex. This is available in gel form contained in a tube.¹¹ It is bioencapsulated by EBE technology, which helps the gel to maintain an ideal pH to contain the enzymes in inactivated form and deliver them when proteolysis of the collagen is required. Also it is known that there are no side effects of Brix3000, even if it is left in the cavity for longer because the enzyme will only work on the infected tissue and it will be inactive when it comes into contact with healthy tissue due to the presence of alpha-1 antitrypsin antiprotease.¹¹

The objective of this study was to compare a chemical-mechanical removal of caries lesion using the enzymatic gel BRIX-3000 and the conventional method of caries removal, using No2/4 round burs.

METHODOLOGY:

A randomized controlled single-blinded clinical trial with forty samples. Keeping in mind the significance of power of this study a sample of 40 was selected for this study. Forty patients participated in the trial, and each was informed of the treatment procedure and a signed consent obtained from them. Forty permanent molars with Class 1 cavitated carious lesions were

selected. Digital x-rays were utilized in standardizing the depth of caries in the selected teeth. The selection was based on the extent of the carious lesion and required caries to extend into the middle third of dentine.

Digital X-rays were taken for each tooth before selecting each sample into the trial. Once accepted into the trial, the samples were randomly divided into two groups, Group 1 where Brix3000, a chemomechanical agent was used to remove caries and Group 2 where conventional method, round bur No. 2/4 was used for caries removal.

Group 1 (n=20): The tooth to be treated was isolated with cotton rolls and saliva ejectors. BRIX3000 was applied to the cavitated lesion and left in the tooth for 2 minutes. A stopwatch was used to standardise the time. A spoon excavator was thereafter used to remove material along with infected dentin using a pendulum movement, without applying any pressure. BRIX3000 was applied until the gel after removing from the cavity looked similar to the gel contained in the syringe. The whole procedure was timed until the carious lesion was visually and tactilely determined to be removed (Figure1).

Group 2 (n=20): The tooth to be treated was isolated with rubber dam. Caries was removed using conventional method with low speed round bur No 2/4. Burs used in each sample were new having the same ISO size and same operator performing caries excavation in all the cases. After the confirmation of complete removal of decay by the blinded investigators, the teeth were restored with glass ionomer cement and composite using sandwich technique.

Wong-Baker FACES pain rating scale was used in this study to determine the level of pain after excavating caries with both the methods. The subjects chose the scale's face that best described how they felt throughout the procedure that they underwent. They were also enquired about the level of discomfort they felt and were asked to select one of three options: No discomfort or anxiety, mild discomfort or anxiety and Severe discomfort or anxiety. Along with this, a record

of number of applications of BRIX3000 done per tooth, for the removal of carious lesion, was also maintained. The results were then compared and analysed.



Wong- Baker FACES pain scale Reference

RESULTS:

Forty young participants were enrolled in this study (20 Female and 20 Male) with a mean age of 26.45 ± 1.73 (Table 1). Descriptive results of the time required for caries removal showed that on an average, BRIX3000 required 5.7 minutes to remove all carious tissues which was longer than the time required by conventional rotary instrumentation method which was 3.1 minutes. Pairwise comparison using Mann-Whitney U test showed that the conventional rotary instrumentation method required significantly less time for caries removal as compared to Brix 3000, p=.001 (Table 2). The frequency and descriptive results, including the mean rank of the Wong-Baker scale for the evaluated groups, are reported. The Mann Whitney U test showed statistically higher pain score differences in the conventional rotary instrumentation method compared to Brix 3000, p=.002 (table 3). Also, it was observed that higher discomfort was seen with conventional rotary instrumentation method compared to Brix 3000, although the difference was not statistically significant, p = .007 (Table 4).

GROUPS	SEX		MEAN AGE +- SD	RANGE
	MALES	FEMALES		
BRIX3000	10	10	26.15 +- 2.121	22-30
Conventional method	10	10	26.15 +- 1.350	25-29
TOTAL	20	20	26.76 +- 5.810	16-35
P value	1.000	.901		

Table 1: Characteristics of enrolled patients.



	GROUP	MEAN RANK	SUM OF RANK	p value
Pain Grade	BRIX 3000	6.65	69.00	
	Conventional Bur	14.35	141.00	.002

Table 2: Mann Whitney U test to analyze the differences in Wong Baker scale between the evaluated groups

		Group		p value
		BRIX 3000	Conventional Bur	
Discomfort	MD Count	8	14	.007
	ND Count	12	0	
	SD Count	0	6	

Table 3 : Mann Whitney U test to analyze the differences in discomfort level between the evaluated groups

GROUP	MINIMUM	MAXIMUM	MEAN TIME TAKEN +_ SD	P value
BRIX3000	5.0	7.0	5.750+- .8250	.001
Conventional method	1.0	5.0	3.1+-1.3703	

Table 3 : Mann Whitney U test to analyze the differences in discomfort level between the evaluated groups

DISCUSSION :

Minimally Invasive Dentistry (MID) is a concept of maximum preservance of the healthy tooth structure during dental treatment. For success, the dental surgeon must be aware of the difference between conservation and elimination of tooth structure. MID isa conservative approach.¹² However, the most commonly used technique to remove caries is through the conventional methods: use of rotary hand piece with low-speed burs.

A lot of reluctance is seen among patients seekingh dental treatment due to the pain and/or discomfort caused due to conventional cavity preparation methods. Besides, the frequent need for local anaesthesia, to control the pain caused with rotary instruments during caries removal in deep carious lesions, is a potential factor for discomfort and pain.¹³ Rotary instruments are the greatest triggers for fear and anxiety, which are two most common reasons for avoidance or postponement of dental treatment.

Rotary instrumentation has many disadvantages, as it is comparatively more invasive, the sound and feel of

rotary instrumentation is much to the patient's dislike, and it could be potentially harmful to pulpal tissue due to excessive cutting.¹³ Vibration, sound, and discomfort induced by mechanical method of caries removal have shown to have an overall unpleasant treatment experience and were, the triggers for a more uncooperative behaviour during treatment.¹⁴ On the other hand, alternative methods such as CMCR agents has shown to result in higher acceptance and a more comfortable treatment experience.

Chemomechanical methods provide a good line of treatment for more conservative removal of caries.¹⁴

There have been several recent studies concentrating on chemo-mechanical caries removal agents (CMCR) as an MID method for excavating carious dental tissues.^{16,17,18} In the present study, comparison between a CMCR agent (Brix 3000) and a conventional rotary instrumentation methods was carried out for the acceptance of the technique and the time required to remove caries in subjects enrolled in the study. Each patient enrolled in the present study was evaluated after excavating the caries. Tactile assessment was done to assess the effectiveness of caries removal in this study. Visual and tactile detection of caries is a verified method according to many systematic reviews and studies.

Methods of caries detection, such as caries detection dyes may cause unnecessary removal of sound tooth structure, as they can stain the organic matrix of less mineralized dentin, including sound dentin at dentin-enamel junction (DEJ).¹⁶ In a study by Sadasiva et al., the tactile method of detecting caries was found to be as efficient as caries dye or laser fluorescence in evaluating remaining dentinal caries.^{17,18} In another study by Banerjee et al., it was reported that the use of dyes is not recommended in lesions which extend upto the middle third of dentin or deeper, due to the inadvertent risk of over cutting which might often result in pulpal involvement which could have been avoided otherwise.¹⁹ Therefore, the tactile method of detection is considered to be more conservative than others as one of the most important aims of using CMCR in dentistry is to conserve as much dental

tissues as possible.¹⁵

Furthermore, many factors can affect the results in the excavation of caries such as the operator, the excavator and softness of carious dentin.^{20,22} So, in order to have a standardized protocol, a single practitioner performed excavation of caries for all teeth with the same type of hand excavator.

Face scales are being used predominantly for pain measurement since the 1980s.²¹ Many studies have evaluated different scales to assess the validity and reproducibility of the scale that makes it applicable in researches. Wong-Baker FACES pain rating scale is composed of six faces of pain rated 0-10, in which the subject is instructed to point to the face that represents his/her level of discomfort during treatment. Two blinded examiners helped in deciding the health of remaining dentin within each cavity.

Chemo-mechanical caries removal was significantly slower compared to the conventional method. This finding was consistent with the invitro study done by Kitsahawong et al., which showed that the meantime for caries removal using Papacarie was significantly higher than the conventional method.²³ The mean pain score, obtained by this study, was significantly higher with the use of conventional method as compared to CMCR. These findings are in accordance and comparable with Singh et al., who demonstrated less pain sensation than conventional methods using Papacarie which has a mode of action that involves the removal of dead infected dentin through the degradation of proteoglycan matrix.²⁴ Kleinknecht et al. reported that dental anxiety mainly results from invasive dental procedures such as "injections" and "drilling", while these are not needed with the use of CMCR agents.²⁵

Limitations of this study are the dependence on manual detection of caries only and the small sample size. Also, since the same operator excavated in all cases, there could be an operator bias. So, further studies are required to check the overall efficiency of the material.

CONCLUSION:

Within the limitations of this study, it was concluded

that BRIX3000 is an efficient replacement to conventional caries removal method despite of its longer working time. Although it cannot completely replace the conventional drilling method, it seems to be a promising CMCR agent having lower pain score and discomfort compared to conventional drilling method. However, further studies should be conducted to clarify the real scope of BRIX3000 in clinical practice.

REFERENCES:

1. Elamin A, Garemo M and Gardner A. Dental caries and their association with socioeconomic characteristics, oral hygiene practices and eating habits among preschool children in Abu Dhabi, United Arab Emirates - the NOPLAS project. *BMC Oral Health* 2018;18:104. doi: 10.1186/s12903-018-0557-8.
2. Bjørndal L (2018) Caries pathology and management in deep stages of lesion formation. In: Bjørndal L, Kirkevang L-L, Whitworth J, 3. edn. *Textbook of Endodontology*. Oxford; UK: Wiley Blackwell. pp. 61-78. <https://doi.org/10.1111/iej.13128>
3. Ismail, A. I., Sohn, W., Tellez, M., Amaya, A., Sen, A., Hasson, H., & Pitts, N. B. (2007). The International Caries Detection and Assessment System (ICDAS): an integrated system for measuring dental caries. *Community Dent Oral Epidemiol*, 35(3), 170-178. <https://doi.org/10.1111/j.1600-0528.2007.00347.x>
4. Chandra S, Krishna G. *Grossman's endodontic practice*. 13th edition. Lipincott: Williams and Wilkins; 2010:310-330
5. Muppa, R., Bhupatiraju, P., Duddu, M., Penumatsa, N. V., Dandempally, A., & Panthula, P. (2013). Comparison of anxiety levels associated with noise in the dental clinic among children of age group 6-15 years. *Noise & health*, 15(64), 190-193. <https://doi.org/10.4103/1463-1741.112371>
6. Rosenberg J. M. (2017). *Minimally Invasive Dentistry: A Conservative Approach to Smile Makeover*. *Compend Contin Educ Dent (Jamesburg, N.J.)*; 38(1), 38-42. PMID: 28054792
7. Osborne, J. W., & Summitt, J. B. (1998). Extension for prevention: is it relevant today?. *Am. J. Dent*, 11(4), 189-196. PMID: 10388375
8. Ansari G, Beeley J, Fung D. Chemomechanical caries removal in primary teeth in a group of anxious children. *J. Oral Rehabil*. 2003;30(8):773-779. <https://doi.org/10.1046/j.1365-2842.2003.01119.x>
9. N. Elkhoolany, K. Abdelaziz, N. Zaghloul, N. Aboulenine, Chemo-mechanical method: a valuable alternative for caries removal, *J Minim Interv Dent* 2(4) (2009) 248-260.
10. Dhamija N, Pundir P. A Review on Agents for Chemomechanical Caries Removal. *Sch J Dent Sci J Dent Sci* 2016;3(9):264-268. doi:10.21276/sjds.2016.3.9.5
11. Maragakis GM, Hahn P, Hellwig E. Chemomechanical caries



- removal: a comprehensive review of the literature. *Int Dent J*. 2001;51(4):291-299. <https://doi.org/10.1002/j.1875-595x.2001.tb00841.x>
12. Mm J, Nk B, A P. Minimal intervention dentistry - a new frontier in clinical dentistry. *J ClinDiagn Res*. 2014;8(7):ZE04-ZE8. <https://doi.org/10.7860/JCDR/2014/9128.4583>
 13. Creugers NH. Weefselbesparendetandheelkunde. Eenrevolutionair concept? [Minimal invasive dentistry. A revolutionary concept?]. *Ned TijdschrTandheelkd*. 2003;110(6):215-217. PMID: 12852055
 14. Maragakis GM, Hahn P, Hellwig E. Chemomechanical caries removal: a comprehensive review of the literature. *Int Dent J*. 2001;51(4):291-299. <https://doi.org/10.1002/j.1875-595x.2001.tb00841.x>
 15. Brennan DS, Balasubramanian M, Spencer AJ. Treatment of caries in relation to lesion severity: implications for minimum intervention dentistry. *J Dent*. 2015;43(1):58-65. <https://doi.org/10.1016/j.jdent.2014.10.009>
 16. Ammari MM, Moliterno LF, Hirata Júnior R, Séillos MC, Soviero VM, CoutinhoFilho WP. Efficacy of chemomechanical caries removal in reducing cariogenic microbiota: a randomized clinical trial. *Braz Oral Res*. 2014;28:S1806-83242014000100242. <https://doi.org/10.1590/1807-3107bor-2014.vol28.0031>
 17. Sontakke P, Jain P, Patil AD, et al. A comparative study of the clinical efficiency of chemomechanical caries removal using Carie-Care gel for permanent teeth of children of age group of 12-15 years with that of conventional drilling method: A randomized controlled trial. *Dent Res J (Isfahan)*. 2019;16(1):42-46. PMID: 30745918
 18. Sadasiva K, Kumar KS, Rayar S, Shamini S, Unnikrishnan M, Kandaswamy D. Evaluation of the Efficacy of Visual, Tactile Method, Caries Detector Dye, and Laser Fluorescence in Removal of Dental Caries and Confirmation by Culture and Polymerase Chain Reaction: An In Vivo Study. *J Pharm Bioallied Sci*. 2019;11(Suppl 2):S146-S150. https://doi.org/10.4103/JPBS.JPBS_279_18
 19. Banerjee A, Kidd EA, Watson TF. In vitro validation of carious dentin removed using different excavation criteria. *Am J Dent*. 2003;16(4):228-230. PMID: 14579874
 20. Wong DL, Baker CM. Pain in children: comparison of assessment scales. *PediatrNurs*. 1988;14(1):9-17. PMID: 3344163
 21. G.V. V Gopikrishna, Instruments and equipments, in: V. Gopikrishna (Ed.), *Preclinical Manual of Conservative Dentistry*, Elsevier, India, 2011, pp. 37-104
 22. C. Ganesh, V. Gopikrishna, R. Prakash, D. Kandaswamy, A. Parameswaran, Evaluation of nanoleakage following deproteinization of dentin using varying concentrations and application times of sodium hypochlorite solution and gel-an in vitro confocal laser scanning microscope study, *J Conserv Dent*. 8 (1) (2005) 27.
 23. S. Singh, D.J. Singh, S. Jaidka, R. Somani, Comparative clinical evaluation of chemomechanical caries removal agent Papacarie® with conventional method among rural population in India-in vivo study, *Braz. J. Oral Sci*. 10 (3) (2011) 193-198
 24. Maru VP, Kumar A, Maru VP, Kumar A, Badiyani BK, Sharma AR, Sharma J, Dobariya CV. Behavioral changes in preschoolers treated with/without rotary instruments. *J IntSocPrev Community Dent*. 2014;4(2):77-81. doi:10.4103/2231-0762.139427
 25. Maru VP, Kumar A, Badiyani BK, Sharma AR, Sharma J, Dobariya CV. Behavioral changes in preschoolers treated with/without rotary instruments. *J IntSocPrev Community Dent*. 2014;4(2):77-81. doi:10.4103/2231-0762.139427

ATTITUDE TOWARDS COVID-19 IN DENTAL COLLEGE POPULATION: A CROSS SECTIONAL STUDY.

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ABSTRACT :

Introduction : In this COVID -19 pandemic dentists are at high risk of cross-infection. The dental practice is a source of cross contamination in the absence of adequate preventive measures. As COVID -19 is highly contagious and use of air rotors adds to air born route for transmission and dentist's proximity to the oropharyngeal area of the patient, a dental professional is always at higher risk. Therefore all the dental students and professionals should be competent with knowledge and must be aware of precautionary methods, social distancing, sanitization and vaccination.

Aim: The present study is aimed to assess the attitude towards COVID-19 in dental college population

Materials & Methods : This study was conducted among 200 participants, the faculties and students in a dental college. A ten questions multiple choice questionnaire form was prepared on effect of COVID-19 on participant's life and distributed among the participants who were divided into two groups as faculty & students, in the dental college and their response was tabulated and analyzed.

Results : The results of this study suggested that majority of participants of both the groups strictly followed precautionary measures, followed social distancing, taken both the doses of vaccination and showed positive attitude towards prevention of further spread of corona virus.

Conclusion: The participants in this study seemed to be aware of the detrimental effects of COVID-19 and had good knowledge, attitude and selfcare practice, which are necessary in preventing the spread of COVID-19.

KEYWORDS: COVID-19, precautionary measures, Attitude, Detrimental effects.

INTRODUCTION :

Corona virus disease is an infectious disease. It is caused by single-stranded RNA viruses.¹ Severe Acute Respiratory Syndrome Corona virus-2 (SARS-CoV-2) is the name officially given to Corona virus by WHO. because the virus is thought to be genetically related to the coronavirus. It was also responsible for the SARS outbreak of 2003.² This virus is reported to cause multiple respiratory diseases, such as common cold, pneumonia, organ failure, and even death.³ Its transmission occurs through infectious respiratory tract secretions through direct and indirect routes. Direct transmission occurs through a coughing, sneezing, or droplet inhalation, while indirect transmission occurs through oral, nasal, eye or mucous membrane contact.⁴ In this COVID -19

pandemic dentists are at high risk of cross-infection due to dental procedures. The first COVID-19 positive dentist was reported in China where the infection is said to be originated from, and eventually other health professionals were tested COVID positive.⁵ The dental practice is a potential source of cross contamination in absence of adequate preventive measures.⁶ Use of air rotors adds to air born route for transmission and as dentist deals with the oropharyngeal area of the patient a he or she is always at higher risk of infection. Therefore, all the dental students and professionals should be competent with knowledge of transmission of COVID-19 and must be aware of precautionary methods, social distancing, sanitization and vaccination.⁷ An offline multiple choice questionnaire survey was conducted in a dental college among the faculties and students to know their awareness and attitude towards COVID-19.

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MATERIALS AND METHODS : This cross-sectional study was conducted among 200 participants, the faculties and students of dental college from december 30th till 4th of January 2022, just before the lockdown in the state of Bihar. Ethical clearance was taken from the institution Ethical committee, Buddha Institute of Dental Sciences under Ref. No.245/BIDSH/1-Dec-2021. A written informed consent was taken from each participant in the study. This study followed the ethical standards of the Helsinki Declaration of 1975, as revised in 2008. The designed study was offline. It was preferred for its convenience. All the faculties and the interns of the dental college were included in this study. The sample size of 200 participants was taken using the formula, $N = 2 \left[\frac{P(1-p)Z^2}{(ME)^2} \right]$, where P = percentage of study sample, Z= confidence interval, ME= margin of error.

A ten questions multiple choice questionnaire form was prepared and distributed among the participants in the dental college. The questions are based on extent of Effect of COVID -19 on the participant's life, following precautionary measures, following social distancing, following Fumigation and sanitization, and about participant's vaccination status. Participants are asked to mark only one response out of the three choices for each question. All the filled questionnaire forms are collected and the data are tabulated in a table and analyzed.

Statistical analysis : All the tabulated data were analyzed using SPSS software version 23 and chi square test is used. Output measures were presented as frequency and percentage.

RESULTS : A total of 200 participants participated in the study. No response in the filled questionnaire form was excluded or found having missing information. There were 65(32.5%) Faculties and 135(67%) student participants in the study, out of them 45 were males and 155 were females.[Table 1]. Percentage was shown in. [Figure 1]. Suggested 24.4% male faculties and 75.6% male students participated and 34.8 % female faculties and 65.2% female students participated in the study.

About the extent of effect of COVID-19 on the study

group, 40 Faculties responded, due to COVID-19 they were effected to large extent, 23 to some extent and 2 not at all. Among Students 90 responded that they were effected to large extent, 35 to some extent and 10 were not effected at all. Chi square value is 2.932. The P value is 0.204. No statistical difference present between the study groups. [Table 2] Percentage of effect of COVID-19 in study group. [Figure 2]. Demonstrated clearly the extent of COVID effect participants experienced in both the groups.

Regarding following precautionary measures in Faculty group 57 participants responded that they were strictly following all the precautionary measures. 7 followed it sometimes and 1 participant followed not at all. In the student group 127 followed strictly, 7 followed sometimes and 1 followed not at all. Chi square value is 2.427. The P value is 0.297. No statistical difference present between groups. [Table 3]. Percentage of precautionary measures followed by the participants. [Figure 3] Suggested majority of the participants of both the groups followed it strictly. Participants following social distancing, among Faculties 28 were strictly following it 36 to some extent and 1 not at all. Among Students 80 followed strictly, 52 to some extent and 2 not at all. Chi square value is 4.949. The P value is 0.084. No significant difference noted between the study groups. [Table 4]. Percentage showed 43% faculties and 59.2% students followed social distancing strictly, 55.3% faculties and 38.5% students followed it to some extent and 1.7% faculties and 2.3% students did not follow social distancing at all. [Figure 4].

Responses for following Fumigation and Sanitization, in Faculty group 63(97%) followed it regularly, 1(1.5%) followed it sometimes and 1(1.5%) not at all. Among students 98(72.5%) followed regularly, 36(26.6%) sometimes and 1(0.9%) not at all. Chi square value is 18.48. The P value is <0.001, which is statistically significant. [Table5]. Statistical difference was present between the groups taken in the study. Percentage in [Figure 5]. Showed 97% faculties and 72.5% students followed fumigation and sanitization regularly. 1.5% faculties and 26.6% of students

followed it sometimes. 1.5% faculties and 0.9% students followed not at all.

Responses for Attitude towards vaccination in the study group in the faculties 36 (55.3%) have completed second dose, 28 have taken first dose and 1 participant was not vaccinated. Among students 83 participants have completed the second dose, 51 have taken first dose only and 1 person was not vaccinated at all. Chi square value is 0.8652. The P value is 0.648815 which is non significant. No statistical difference were noted between the groups. [Table 6]. Percentage of vaccination status. [Figure 6]. Showed majority of the participants in both the groups had taken both the doses of vaccination.

Participants	Males	Females	Total
Faculty	11 (24.4%)	54 (34.8%)	65 (32.5%)
Student	34 (75.6%)	101 (65.2%)	135 (67.5%)
Total	45 (100%)	155 (100%)	200 (100%)

Table 1: No. of Male and Female participants in the study

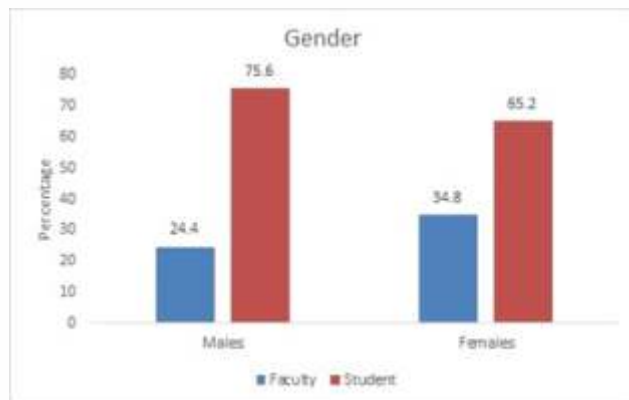


Figure 1: Percentage of male and female participants in the study.

Effect of COVID - 19	Faculty	Student	Chi square	P value
Large extent	40 (61.5%)	90 (66.6%)	2.932	0.204
Some extent	23 (35.3%)	35 (25.9%)		
Not at all	2 (3.2%)	10 (7.4%)		

Table 2: Effect of COVID -19 on the study group

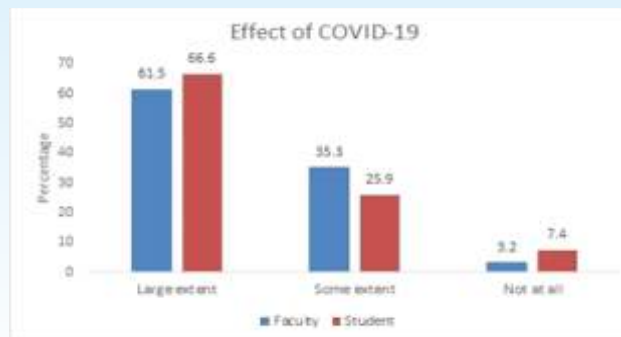


Figure 2: Showing percentage of effect of COVID-19 in study groups.

Precautionary measures	Faculty	Student	Chi square	P value
Strictly following	57 (87.8%)	127 (94.0%)	2.427	0.297
Follow sometimes	7 (10.7%)	7 (5.1%)		
Not at all	1 (1.5%)	1 (0.9%)		

Table 3: Precautionary measures followed by the participants.

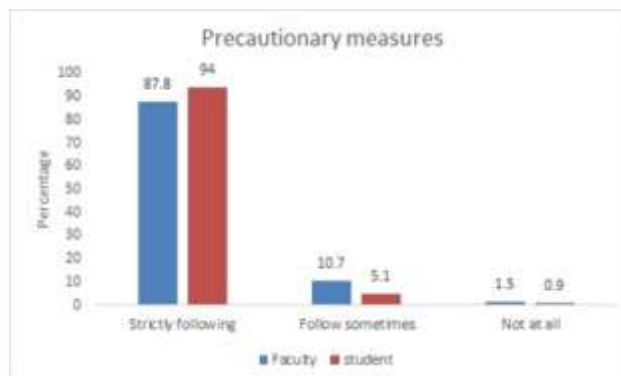


Figure 3: Precautionary measures followed by the participants.

Social Distancing	Faculty	Student	Chi square	P value
Strictly Following	28 (43.0%)	80 (59.2%)	4.949	0.084
Some extent	36 (55.3%)	52 (38.5%)		
Not at all	1 (1.7%)	2 (2.3%)		

Table 4: Participants following social distancing.

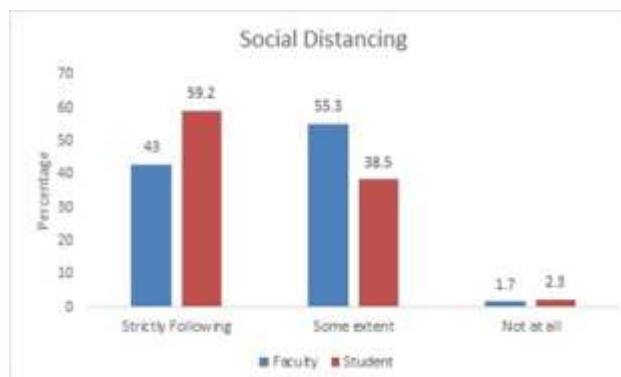


Figure 4: Social distancing followed by participants.

Fumigation and Sanitization	Faculty	Student	Chi square	P value
Sometimes	1 (1.5%)	36 (26.6%)	18.4807	<0.001
Regularly	63 (97%)	98 (72.5%)		
Not at all	1 (1.5%)	1 (0.9%)		

Table 5: Participants following fumigation and sanitization.

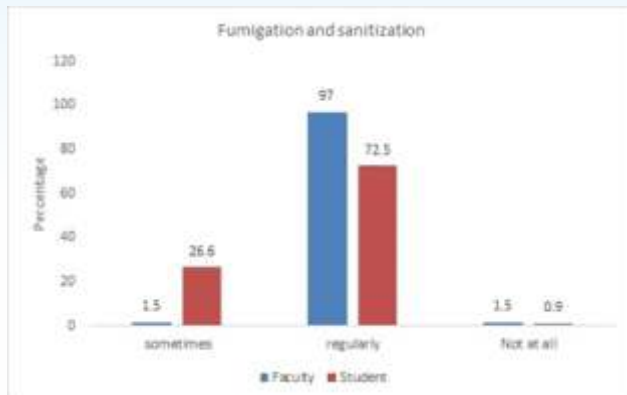


Figure 5: Fumigation and sanitization followed by participants.

Vaccination	Faculty	Student	Chi square	P value
First dose	28 (43%)	51 (37.7%)	0.8652	0.648815
Second dose	36 (55.3%)	83 (61.4%)		
Not at all	1 (1.7%)	1 (0.9%)		

Table 6: Attitude towards vaccination in the participants .

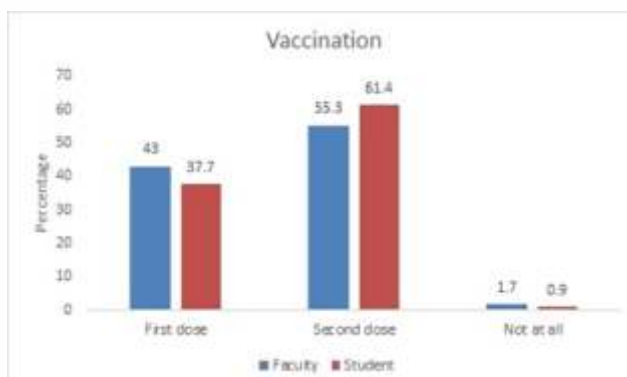


Figure 6: Attitude towards vaccination in participants.

DISCUSSION:

The outbreak of COVID-19 pandemic has created a lot of change in lives of dental professionals who are at increased risk to get infected in the line of duty. Therefore awareness regarding the pathogen and ways of preventing infection is very much required in safeguarding self while managing asymptomatic people.⁸ Dentistry is an important stream of healthcare and although Dentists are not in the forefront of COVID care, dental professionals have a very important role in society. Knowledge, attitudes,

preventive practices are very important, as they help in adopting and practicing safety guidelines for the betterment of the professional as well as to the patient they are attending to.⁹

The results of this study suggested that majority of participants of both the groups strictly followed precautionary measures, followed social distancing, taken both the doses of vaccination and showed positive attitude towards prevention of further spread of corona virus. This was in accordance with the literature of previous study conducted by Hsin Chung Cheng et al, Shanthy Vanka et al.^{6,2} who investigated the impact of COVID-19 on the knowledge, attitude and behaviors of infection control among dentists and found that the use of PPE, hair caps, and protective eye mask or face shields was also greatly improved during the COVID-19 pandemic. The same results were also found regarding the practice of table surface disinfection and keeping the treatment table clear when not in use. This finding is consistent with our study as there were greater number of participants following fumigation, and social distancing. Ruba M. Mustafa et al, Almulhim Basim et al.^{7,4} conducted a study on Dentist's Knowledge, Attitudes, and Awareness of Infection Control Measures during COVID-19 Outbreak and found that the prevention measures ranging from social distancing and hand washing to protective equipment, including surgical masks, face shields, gowns, and gloves are important protection measures for dental professionals. This finding is consistent with our study. A Study conducted by Boukhobza et al⁸ on the covid-19 pandemic and its impact on knowledge, perception and attitudes on dental students provided an overview of the student's perceptions of the novel virus and attitudes to infection control because lack of knowledge or faulty attitudes can put the dental staff and the patients safety and health at risk and might affect the functioning of the health care system. This study finds good general knowledge on COVID-19 among dental students which is consistent with our study. Nawaf Labban et al.⁹ in his study concluded that dental

providers globally require a constructive attitude towards infection control measures in order to begin addressing the complex issues of how they would explain to patients and other staffs about what treatments were allowable and what new protocols were needed to enhance everyone's safety in relation to the severity of the disease, according to this study dental professionals have positive attitude and good knowledge about transmission-based precautions. This result is consistent with our study as most of our participants showed positive attitude towards following transmission based precautionary measures.

The present study clearly indicates that the knowledge on viral pathogenesis and safety practices was high in the participants irrespective of whether they were students or faculties. The results suggested that all the participants being healthcare professionals were aware that coronavirus outbreak is going to continue for a long time and virus cannot be completely eradicated and that will continue to exist in society.⁴ Participants showed positive attitude towards taking all the precautionary measures and getting all the dosage of vaccination and they are not afraid of this pandemic and they have accepted this as a new normal.¹⁰

CONCLUSION :

The participants of the present study seemed to be aware of harmful effects of COVID-19. They showed positive precautionary approach towards it. The results of the study indicate that the participants had good knowledge, attitude and self-care practice, which are necessary in preventing the spread of COVID-19.

Limitations : Small sample size was taken as this study was performed in a dental college. This survey was on a convenience sample and the results may not be generalized to all dentists in this country. Same study could be done on large scale with large sample size among different dental colleges across the country. Parameters such as age, marital status were not assessed in this survey. In further studies different parameters could be taken under consideration.

Future prospects : To study on large sample size about COVID-19 on lifestyle and attitude for a better world for everyone.

REFERENCES :

1. Adhershitha AR, Viswambharan P, Rodrigues SV. Awareness and attitude toward COVID-19 among the students of a rural tertiary care center and dental college: A cross-sectional study *Int J Prev Clin Dent Res* 2020;7:99-103.
2. Vanka S, Vanka A, Wali O. Knowledge, Attitude and Practices on COVID-19 among Patients Attending a Private Dental College in Jeddah *J Clin Diag Res* 2020;14:43-46.
3. Jaiswal RS, Kanathila H, Patil AG. Novel corona virus (Covid-19) knowledge, attitude and practice amongst dental postgraduate students to prevent the spread of infection - A cross sectional pan India survey study *J Evolution Med Dent Sci* 2021;10:2176- 2180.
4. Almulhim B, Alassaf A, Alghamdi S, Alroomy R, Aldhuwayhi S, Aljabr A, Mallineni SK Dentistry Amidst the COVID-19 Pandemic- Knowledge, Attitude, and Practices Among the Saudi Arabian Dental Students *Front Med* 2021; 8:654524.
5. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J. A novel corona virus from patients with pneumonia in China, 2019 *N Engl J Med* 2020;382:727-33.
6. Cheng H, Chang Y, Liao S. The impact of COVID-19 on knowledge, attitude, and infection control behaviors among dentists *BMC Oral Health* 2021;584.
7. Mustafa R, Alshali R, Bukhary D Dentists Knowledge, Attitudes, and Awareness of Infection Control Measures during COVID-19 Outbreak. A Cross-Sectional Study in Saudi Arabia *Int J Environ Res Public Health* 2020;17:9016.
8. Boukhobza S, Ritschl V, Stamm T, Bekes K. The COVID-19 Pandemic and Its Impact on Knowledge, Perception and Attitudes of Dentistry Students in Austria: A Cross-Sectional Survey *J Multidiscip Healthc* 2021;14:1413-1422.
9. Nawaf L, Afnan F, Alfouzan, Nouf A, Hanan N, Sara T, Shahad H. COVID-19 Pandemic Driven Knowledge, Attitude, Clinical Practice, Distress Reactions, and Post-Traumatic Growth of Dental Care Providers in Riyadh City, Saudi Arabia: A Cross-Sectional Study *TODENTJ* 2021:748-759.
10. Hoyte T, Kowlessar A, Mahabir A, Khemkaran K, Jagroo P, Jahoor, S. The Knowledge, Awareness, and Attitude Regarding COVID-19 among Trinidad and Tobago Dentists. A Cross-Sectional Survey *Oral* 2021;1:250-260.



IMPROPER POSITION A PERPLEXING PROBLEM – A QUESTIONNAIRE STUDY.

Palak Choudhary¹, G.C. Shivakumar², Sahana S.³, Nimmi Singh⁴, Prashant Mishra⁵

ABSTRACT :

Background: Dentists have a high prevalence of work-related musculoskeletal issues, and the incidence of numerous illnesses has increased dramatically over the last two decades. In dentistry, the overall frequency of musculoskeletal problems ranges from 63 to 93 percent. Various researches have been conducted to document stress levels and health-related behaviors of dentists in other countries, but data on this topic is scarce in our country.

Methods: This survey was conducted among 154 dentists from various specialties of dentistry who had at least one musculoskeletal issue in the previous 12 months. Demographic data, work history, risk factors, and ergonomic awareness with job task specifics were all collected using a standardized questionnaire. MS Excel was used to enter data, while SPSS version 18 was used to analyze it.

Results: More than 63 % and 47 % of the participants reported pain and discomfort in at least one body region in the last 12 months and the last 7 days respectively. The major affected part was neck, followed by lower back, shoulders and hands / wrists.

Conclusion: This survey found that there is a high prevalence of MSDs and WMSDs among dentists. Hence, Ergonomic awareness, health promotion, medical treatment and physiotherapy exercise need to be integrated with the professional practice for dentists.

KEYWORDS: Ergonomics, dentists, musculoskeletal pain, physical activity, work place.

INTRODUCTION :

"Health" is defined by the World Health Organization as "a condition of complete physical, mental, and social well-being, not only the absence of sickness or infirmity." When employment is linked to health risks, it can lead to occupational sickness, which can influence not only one's physical, psychological, and social well-being, but also one's job capacity, resulting in absences and early retirement¹. Dentists are responsible for the diagnosis, prevention, and management of oral problems, thus the profession is not without risks. Dentists are predisposed to a variety of occupational hazards due to the nature of their clinical work².

Infections such as HIV and viral hepatitis; percutaneous exposure accidents, dental materials, radiation, and noise; musculoskeletal diseases; psychological issues and dermatitis; respiratory illnesses; and eye injuries are just a few examples. Musculoskeletal disorders (MSDs) have been the most commonly documented among these³.

WRMSDs (work-related musculoskeletal diseases) are a sequence of micro traumatic events that collect in the body as a result of workplace and employment characteristics, with the potential to evolve into a more significant musculoskeletal injury in the future³. MSDs, or musculoskeletal disorders, are described by the Centers for Disease Control and Prevention (CDC) as injuries and disorders of the soft tissues (muscles, tendons, ligaments, joints, and cartilage) and neurological system⁴.

Because to risk factors such as physical conditions of the environment, psychological factors, faulty

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equipment design with unsuitable anthropometric requirements, and unavailability of hazardous postures, dentists are the recruits most prone to MSDs⁴. The primary goal for clinicians is to achieve maximum comfort at work by following ergonomic principles. Ergonomics, or "human factors," is a "science of work" derived from the Greek words "ergon" (labor) and "nomos" (rules). Its main goal is to reduce the risk of (WRMSDs) through planning, creating, reviewing, and assessing projects, jobs, tools, and systems, which can be accomplished by taking a neutral stance. This concept focuses on preserving the natural curves of the spine, as proper joint alignment and muscle balance are regarded to be essential for a healthy musculoskeletal system⁵. Because improper ergonomic practices put dentistry at risk, progress is needed in terms of productivity, work engineering, appropriate machinery and tool designs, substitution/modification of equipment and processes, good working practices, better work organization, and individual factor modification⁵. Also, while minimal intervention may be necessary, the current scenario indicates that a lack of understanding of MSDs, as well as insufficient studies, has an impact on dental professions and slows the stream's progress. As a result, the goal of this survey is to look into MSDs among Peoples University dentists in terms of symptoms and risk factors, as well as to help avoid and mitigate their harmful effects, as the null hypothesis is that there will be no pain among the dentists surveyed.

METHODOLOGY:

A cross-sectional survey of People's University dentists was done with the agreement of the Head of Institute and ethical clearance from the ethical board committee. On the day of the study, 200 questionnaires were sent to dentists who indicated their agreement to participate, and 154 dentists responded. The study's specifics were described, and written informed consent was requested. Demographic information, work-related load, musculoskeletal complaints, and self-adopted pain

management measures were all included in the questionnaire. The validity and reliability of the questionnaire were evaluated before to the start of the study, with a kappa statistic value of 87 percent. SPSS software was used for statistical analysis, and statistical significance was defined as a p value of less than 0.05.

RESULTS:

The present study had a response rate of 77%, 154/200 respondents. The average age range being 26-50 yrs of (79%) of the participants whereas (30%) were below 25yrs.(90%) dentists were right handed of which 97% had low back problem, while the remaining (10%) were left handed. More than half of the participants had experienced musculoskeletal symptoms in past 12 months most frequently with neck (72%), lower back/ pelvis (40%), shoulder /arm (40%) and wrist/hand (18%) respectively (Table 1). There was more than two and three region involvement in 41.5% and 12.9% respectively (Table 2). Half of the dentists were involved in clinical practice and had a work experience of less than 5yrs (63%), of which majority had problems in neck (69%) and shoulder (41%) (Table 3). Very less were aware of the Ergonomic principles.

Neck	111/154	72%
Lower back/ pelvis	62/154	40%
Shoulder /arm	62/154	40%
wrist/hand	29/154	18%

Table1: Region of symptoms

	Neck	back	shoulder	Wrist
Teaching	66.6%	44.4%	38.8%	11%
Clinical	69.5%	36.55	41.4%	25.6%
Both	88.8%	44.45	38.8%	11.1%

Table 2: Work category Vs region of symptom

	Neck	Back	Shoulder	Wrist
<5yrs	72%	41%	37.7%	27.5%
5-10yrs	66.6%	41.6%	47.2%	5.5%
>10yrs	80%	30%	40%	0%

Table 3: Clinical experience Vs region of symptom

DISCUSSION:

Dental surgeons are frequently listed among the



professionals at risk of MSDs due to prolonged uncomfortable or strained postures at work and a failure to take preventive measures⁶. Repetitive movements, extended static postures, and inadequate alignment, according to Karwaski et al⁷, may be to blame for the symptoms. On the other hand, Ratzen et al⁸ linked the appearance of these symptoms to the recurrent use of static postures, which typically require more than half of the body's muscles to contract in order to keep the body motionless while resisting gravity. These, in turn, are hypothesized to set off a chain of events that could result in pain, injuries, or the loss of a dentist's profession.

In addition, when compared to previous studies, the response rate for surveys conducted on dentists was greater (77%). Previously, an 88% response rate was recorded⁹. According to several research, the prevalence of MSDs among dentists ranges from 63 percent to 93 percent worldwide⁶⁻¹⁰. In line with earlier studies¹¹, more than half of the dentists in the current study reported pain and discomfort in at least one portion of their body in the previous 12 months.

The participants in the study ranged in age from 26 to 50 years old, which was similar to the findings of Nihar Sultana et al⁸ (28-62 years) and Yemineni et al¹⁰ (28-62 years) (35.7 yrs). In line with other studies¹⁰, in which the majority of participants were right-handed (89.2%), 90% of dentists in our study were right-handed, with 97% of them having low back difficulties. (63%) of dentists had been in the field for less than 5 years, and the majority had reported MSDs, which was similar with Jianru Yi et al² findings. On the other hand, Anna Kierklo et al¹¹ discovered that the average number of years spent in the dentistry profession was 16.

In addition, 31 percent of dentists have been in practice for more than 20 years, and 23.74% have been in the profession for 11-15 years. While 15.53% has experience ranging from 1 to 5 years and 6 to 10 years¹¹. Harutunian K et al¹⁰ discovered a significant link between lack of physical activity and the number of afflicted regions, with two regions in 42% of the

sample and more than two in 22% of the sample in our study. Lack of regular physical activity and work-related stress could be the culprits.

According to the research, the majority of dentists had issues with the Neck (26 % -83.8 %), 1,8,10,12, while others had issues with the Lower Back (30 % -80 %) ^{1,8,10,11,12} followed by shoulder (18.9% -72.4%) ^{1,8,11,12} and wrist (26 % -49.7%) ^{8,11-15} respectively.

15-16 % of participants reported experiencing paresthesia, pain, or difficulties with movement in the hip/thigh, ankles/foot, knees, feet, or elbows in the previous 12 months, which matches the findings of Emmuanuel et al¹⁶ and Kierklo A¹⁷. Only 19 % of the respondents were aware of the correct ergonomic posture in clinical practice, which was consistent with Madaan V et al¹¹ and Kanteshwari K, et al¹³ who reported that fewer than half of the participants were informed, showing that a huge percentage of dentists are unaware.

As therapy modalities, dentists should choose particular exercises and yoga to improve the health and integrity of the spinal column, as well as stretching exercises for the hands, head, and neck, and maintaining appropriate working posture. As stated by Alshammari F et al¹⁸, occasional pauses and working in indirect vision should also be conducted as precautionary measures to ease pain and prevent injuries. However, only 5% of the participants in this study stated that they did stretching activities. Also, only 31% of people engaged in regular physical activities, the most popular of which were yoga, walking, and badminton.

66.2 % of respondents, on the other hand, made no steps to avoid such issues¹⁰. This was supported by our research, which found that 65 % of dentists did not take any preventive steps. As a result, several ergonomic elements that should be considered include upper-limb supports, the use of large-handled devices, and working with a mechanically adjustable chair with an adjustable backrest. Use of indirect vision and proper patient positioning in the dental chair are also important to minimize awkward or forced neck postures. Proper illumination, as well as

technologies like magnifiers and microscopes, can assist reduce tiredness and increase productivity.

Musculoskeletal disease has a multifactorial etiology due to the inclusion of biomechanical, individual, and psychological factors associated to labor. As a result, the preventive strategy must be multifaceted, rather than focusing solely on ergonomics. As a result, any significant study on musculoskeletal problems among dentists should include a review of preventive interventions.^{19,21}

However, despite feeling musculoskeletal discomfort, the professionals in this study did not take steps to prevent or alleviate the symptoms. Only 33.8 % of them claimed to have taken some preventive measures. Even while the key preventive measures should be changing posture, taking breaks, and stretching between subsequent patients - although these procedures were very rarely used by our subjects - these actions were not the best answer.²⁰⁻²³

The results collected in this study hint toward the inappropriate working habits and lack of fundamental knowledge of ergonomics among the surveyed dentists. Findings imply that the risk of MSDs can be minimized by raising alertness of these concerns among dentists. Students should be educated about ideal working postures and healthy work habits from the beginning of their undergraduate studies as a preventive approach to avoid such issues in their future careers.

CONCLUSION :

The most common reason for early retirement in dentists globally is musculoskeletal disorders. Understanding potential risk factors is crucial to preventing musculoskeletal problems. Many, if not all, dentists and faciomaxillary surgeons attribute their neck pain and/or radiculopathy to normal dental procedures, which are rather typical symptoms among dentists. Due to ill health, many dentists may take several sick breaks, change occupations, or even retire. MSDs are the most common cause of ill health retirements in the latter group, accounting for 55 % of all ill health retirements.

REFERENCES:

1. Batham C, Yasobant S. A risk assessment study on work-related musculoskeletal disorders among dentists in Bhopal, India. *Indian J Dent Res* 2016; 27:236-41.
2. Gambhir RS. Primary care in dentistry - An untapped potential. *J Family Med Prim Care*. 2015; 4(1):13-8.
3. Karjalainen A. International statistical classification of diseases and related health problems (ICD-10) in occupational health. Geneva: World Health Organization, Sustainable Development and Healthy Environments, Protection of the Human Environment, 1999.
4. Kursun S, Evirgen S, Akbulut N, Oztas B, Vaizoglu BA. Work characteristics and musculoskeletal disorders among postgraduate dental students: A pilot study. *J Musculoskelet Pain*. 2014; 22(1):62-7.
5. AdhithyaKalluri, Manjunath P Puranik and Uma SR. Musculoskeletal disorders in dental workplace: A comprehensive review *International Journal of Applied Dental Sciences* 2018; 4(3): 140-145
6. Ratzon NZ, Yaros T, Mizlik A, Kanner T. Musculoskeletal symptoms among dentists in relation to work posture. *Work*. 2000; 15:153-8
7. Sultana N, Mian MA H, Rubby MG, Banik P C. Musculoskeletal Disorders in Dentists: A Systematic Review *Update Dental College Journal* Vol. 7 No. 2 | October 2017
8. Sultana N, Prof. MA H Mian, Dr. Rubby MG. Risk and Exposure of Musculoskeletal Disorders among Dental Surgeons Working in Dhaka City. *Update Dental College Journal (UpDCJ)*: Vol-9, Issue-1; April-2019
9. Szymańska J. Disorders of the musculoskeletal system among dentists from the aspect of ergonomics and prophylaxis. *Ann Agric Environ Med*. 2002; 9:169-73.
10. Yemineni BC, Mahendran J, Nasina J, Jayamathi, Dhanyabhiram. Prevalence of musculoskeletal disorders in dental professionals of Andhra Pradesh, India. *International Journal of Contemporary Medical Research* 2018; 5(3): C7-C10
11. Kierklo A, Kobus A, Jaworska M, Botuliński B. Work-related musculoskeletal disorders among dentists - a questionnaire survey *Ann Agric Environ Med* 2011, 18, 79-84
12. Kursun S, Evirgen S, Akbulut N, Oztas B, Vaizoglu BA. Work characteristics and musculoskeletal disorders among postgraduate dental students: A pilot study. *J Musculoskelet Pain*. 2014; 22(1):62-7
13. Feng B, Liang Q, Wang Y, Andersen LL, Szeto G. Prevalence of work-related musculoskeletal symptoms of the neck and upper extremity among dentists in China. *BMJ open*. 2014; 4(12):e006451
14. Botha P, Chikte U, Esterhuizen T. Self-reported musculoskeletal pain among dentists in South Africa: A 12-month prevalence study. *SADJ*. 2014; 69(5):208-13.



15. Barghout NH, Al-Habashneh R, Al-Omiri MK. Risk factors and prevalence of musculoskeletal disorders among Jordanian dentists. *Jordan Med J.* 2011; 45(2):195-204.
16. Emmanuel C, Obembe AO, Bamidele S. Work-Related Musculoskeletal Disorders among Health Workers in a Nigerian Teaching Hospital. *TAF Prev Med Bull.* 2012 ;11:583-8
17. Kierklo A, Kobus A, Jaworska M, Botuli?ski B. Work-related musculoskeletal disorders among dentists -a questionnaire survey. *Ann Agric Environ Med* 2011, 18, 79-84
18. Alshammari F, Alsubaie GF. Prevalence of back and neck pain amongst dentists. *Journal of Advanced Medical and Dental Sciences Research* |Vol. 8|Issue 4| April 2020
19. Sultana N 1, Mian M A H 2, Rubby M G 3, Banik P C 4. Musculoskeletal Disorders in Dentists: A Systematic Review Update *Dental College Journal* Vol. 7 No. 2 | October 2017
20. Al Shammari G A A, Al-Esawi S R, Taher A, Albujeer A H. Magnetic Resonance Imaging (MRI) finding of Cervical Spine Derangement (CSD) among Iraqi Working Dentists the *Open Dentistry Journal*, 2020, Volume 14.
21. Shivakumar G C, Sahana S, Sabyasachi S: Ergonomics in Dental Practice: *Journal of Indian Association of Public Health Dentistry.*2010; 16: 1-7.
22. Brown J, Burke F, Macdonald E, Gilmour H, Hill K, Morris A, et al. Dental practitioners and ill health retirement: causes, outcomes and reemployment. *British dental journal* 2010; 209(5): E7-.
23. Hodacova L, Sustova Z, Cermakova E, Kapitan M, Smejkalova J. Self-reported risk factors related to the most frequent musculoskeletal complaints among Czech dentists. *Ind Health* 2015; 53(1): 48-55.

AWARENESS AND KNOWLEDGE OF TOBACCO ASSOCIATED RISK OF ORAL CANCER AMONG DENTAL PATIENTS: A SURVEY BASED QUESTIONNAIRE STUDY

Poonam Tomar Rana¹, Kuldeep Singh Rana², Kratika Mishra³

ABSTRACT :

Background: India ranks second in the world in tobacco production and of great import from the public health perspective, ranks third in tobacco consumption. It is estimated that the current global pattern of tobacco use will lead to the premature deaths of 250 million children and adolescents, most of them in developing countries. Therefore the aim of the present study was to assess the levels of awareness, knowledge about signs and risk factors of oral cancer.

Methods: This hospital based cross sectional study was done to assess the awareness and knowledge of oral cancer in a population attending the dental out patient department of Index institute of dental sciences Indore. All the patients of the age of 18 years and above who was willing to participate were included in the study.

Results: A total 300 questionnaires were analyzed , out of which male were 198 and female were 102 . Among them 93 patients were indulged in the habits of smoking and 176 of them were chewing smokeless form of tobacco. The habit of both smoking and smokeless tobacco was seen in 31 patients. When assessed for the prevalence according to the gender males were indulged predominantly in smoking than female. More than half of the subjects 178 were aware of related risk of development of oral cancer when compared gender wise male were more aware of harmful effect of oral cancer than females.

Conclusion : This study concluded that the dental patients still had a lack of awareness regarding the risk of oral cancer, early signs and symptoms and the benefits of detecting this disease at an early stage.

KEYWORDS: Smoking, Smokeless form of tobacco, Tobacco consumption, Awareness, oral cancer.

INTRODUCTION :

One of the leading causes of morbidity is tobacco and premature death though ironically it is preventable.¹ Tobacco has got deleterious effects on all systems of the human body and inspite of knowing this fact; it is used mainly because of addiction².

Tobacco was introduced in India by the Portuguese some 400-500 year ago since then its use is continued to rise in India. Out of 1.1 billion smoker worldwide, 182 million (16.6%) of them live in India.³ 275 million adults consume different tobacco products.⁴

India ranks second in the world in tobacco production and of great import from the public health perspective, ranks third in tobacco consumption.⁵ It is estimated that the current global pattern of tobacco use will lead to the premature deaths of 250 million children and adolescents, most of them in developing countries. In India, the World Health Organization has predicted a rise in mortality in excess of 1.5 million annually by the year 2020.^{5,6}

Smoking, alcohol use, smokeless tobacco's, and human papillomavirus infections are a major risk factors, with an attributable risk of oral cancer due to both tobacco and alcohol.^{7,8}

Oral cancer is a growing concern in many countries specially in developing countries (Philip et al., 2013)⁹, comprising 3% of all cancers in men and 2% of all cancers in women (Warnakulasuriya, 2009)¹⁰. In 2012, the incidence of lip and oral cavity cancers was

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reported to be 2.2 in men and 1.8 in female, and the mortality rate was estimated 0.68/100000 in Iran (Ferlay et al., 2012)¹¹.

Oral cancer cases are mostly investigated only in the advanced stages, due to lack of public awareness about the signs, symptoms, and risk factors, along with negligence by patients themselves because of these lesions in initial stage not interrupt in normal masticatory functions or the absence of knowledge for early detection by healthcare providers are believed to be responsible for the delay in identifying the potentially malignant oral disorders.^{12,13} The habit of tobacco smoking has spread throughout the world and, as a major source of morbidity and mortality, is a serious public health problem.¹⁴ Future projections suggest that tobacco will kill more than 8 million people worldwide each year by the year 2030, with 80% of these premature deaths occurring in low- and middle-income countries.¹⁵ Tobacco smoking have many detrimental impacts on general health and it well known tobacco smokers die 10 years earlier than non-smokers.^{16,17} There is an increase in tobacco smoking because of easy availability of cheap tobacco products, lack of strong tobacco control regulations and weak enforcement of regulations. Primary level prevention can be one method of promoting smoking cessation. Early clinical presentation and early diagnosis can be achieved by the reinforcement of awareness on oral cancer; additionally decreasing the risk factors and early detection of signs and symptoms can also make oral cancer reduction achievable^{18,19}. Situation of rural area around Index Institute of Dental Sciences is not good and there is lack knowledge about the tobacco smoking and its hazardous effect. Most of the cases, exposure level begins after being reported to the institute. In this regards the aim of this study was to estimate the Prevalence of tobacco use and awareness of risks among patients visiting in dental college.

OBJECTIVE OF THE STUDY:

The aim and objective of the present study was to assess the levels of awareness, knowledge about signs and risk factors of oral cancer, and attitudes

towards early diagnosis and treatment among dental outpatients.

MATERIALS AND METHODS:

This hospital based cross sectional study was done to assess the awareness and knowledge of oral cancer in a population attending the dental outpatient department of Index Institute of Dental Sciences Indore. All the patients of the age of 18 years and above who was willing to participate were included in the study. Face to face interviews of 300 patients was carried out by a trained dentist, between the period of January 2021 to September 2021. Both males and female genders were included in the study.

Patients visiting Tobacco cessation centre of the institute during the study period were interviewed. There were 198 Male and 102 Female. The patients mainly come from rural area around the institute. Patients who consented to be interviewed were included in the study. Patients not willing to participate and with cognitive impairment were excluded from the study. The questionnaire consisted of 13 relevant questions including demographic information, habits, their smoking behavior, awareness and extent of knowledge about the risk factors and sign of oral cancer. A single interviewer interviewed all the study participants. The patient's awareness of oral cancer was assessed by asking questions like if they had ever heard of mouth and throat cancers. The questions regarding risk factors and patient's assumption of oral cancer were Closed ended.

The tobacco usage variables provided information about smoking and smokeless tobacco. Current smokers were defined as those who smoked daily, past smokers those who had stopped smoking but smoke daily previously, and occasional smokers were those who smoked from time to time.

The questionnaire constructed was then sent to a peer expert committee for checking its content and validity. Following this necessary corrections and modifications were done and was made ready to use in the research. Personal interviewing method was employed which used a pretested series of questions.

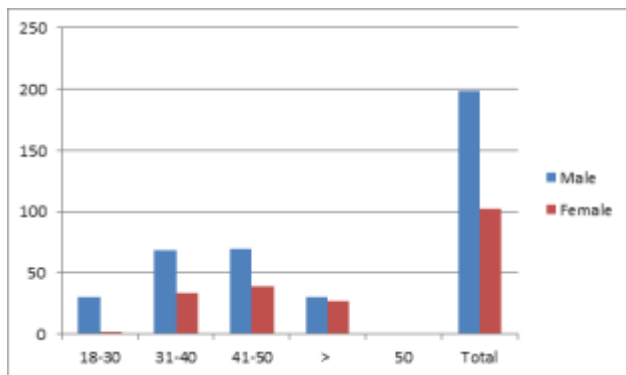
Verbal consent was obtained from all study participants prior to the administration of the questionnaire and a questionnaire was translated to the patient's local language by the interviewer to assure better understanding.

The responses from the questionnaires reported by means of counts and percentages and graphically presented. The SPSS software (version 20) was used to analyze response. Prior permission from Institutional ethical committee was taken before starting the study. After data collection, the investigator answered patient's queries regarding tobacco use and its ill effects and all were motivated to stop the use of tobacco in any form.

RESULT :

Age- group	Male	Female
18-30	30	02
31-40	68	34
41-50	70	39
> =50	30	27
Total	198	102

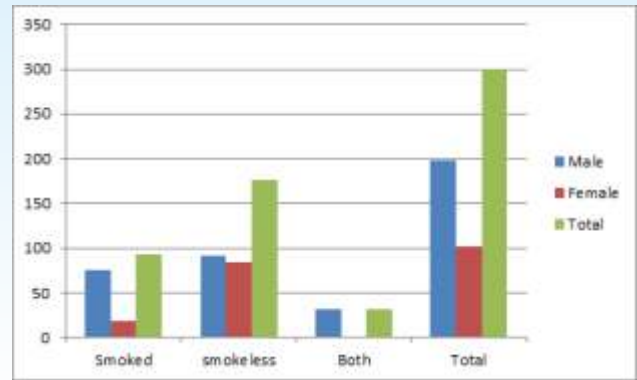
Table .1 Age -gender distribution of study population.



Graph 1 Age -gender distribution of study population.

Form of Tobacco Used	Male	Female	Total
Smoked	75	18	93
smokeless	92	84	176
Both	31	0	31
Total	198	102	300

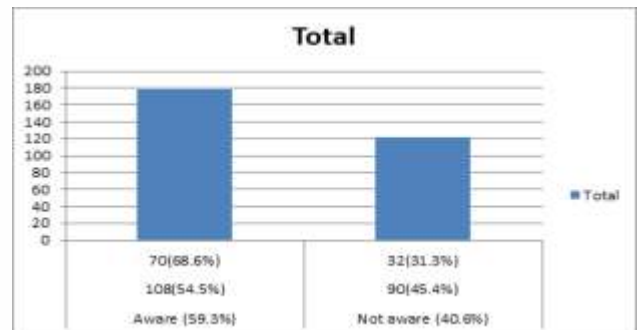
Table 2. Distribution of study participants based on form of tobacco used



Graph 2- Distribution of study participants based on form of tobacco used

Gender	Aware (59.3%)	Not aware (40.6%)
Male	108(54.5%)	90(45.4%)
Female	70(68.6%)	32(31.3%)
Total	178	122

Table 3. Awareness of tobacco associated risk of oral cancer



Graph 3-Awareness of tobacco associated risk of oral cancer

RESULT :

A total 300 questionnaires were analyzed, out of which male was 198 and female was 102 (table.1) among them 93 patients were indulged in the habits of smoking and 76 of them were chewing smokeless form of tobacco. (Table 2).

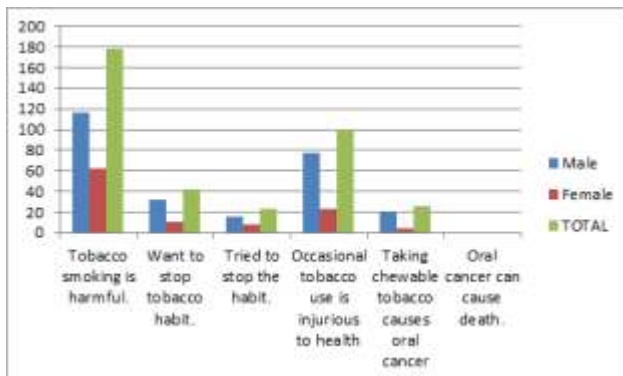
The habit of both smoking and smokeless tobacco was seen in 31 patients (Table 2) When assessed for the prevalence according to the gender males were indulged predominantly in smoking than female. The irony was that in consumption of any form of tobacco males were significantly involved in outrageous members the females.

More than half of the subjects 178 were aware of related risk of development of oral cancer. (Table 3) if compared gender wise male were more aware of harmful effect of oral cancer than females.

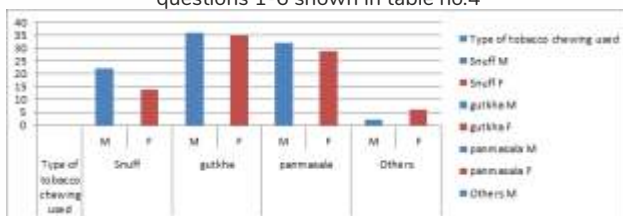


Questionnaire (Responses in Yes)	Male		Female		TOTAL			
1. Tobacco smoking is harmful.	116		62		178			
2. Want to stop tobacco habit.	32		10		42			
3. Tried to stop the habit.	15		8		23			
4. Occasional tobacco use is injurious to health	77		23		100			
5. Taking chewable tobacco causes oral cancer	21		4		25			
6. Oral cancer can cause death.	0		0		0			
7. Type of tobacco chewing used	Snuff		gutkha		panmasala		Others	
	M	F	M	F	M	F	M	F
	22	14	36	35	32	29	2	6
8. At what age tobacco started in any form	M		F		M		F	
	10-20yrs		21-30yrs		31-40yrs		Above 40	
	50	0	98	10	78	48	10	6
	M	F	M	F	M	F	M	F
9. Type of smoking tobacco used.	Cigarette		beedi		Pipe		Cigar	
	25	0	34	6	6	3	10	9
10. Duration of tobacco use	M		F		M		F	
	<= 5 yrs		6-10 yrs		11-20 yrs		>20 yr	
	53	33	70	36	42	18	33	15

Table .4 Responses to queries put across the patients.



Graph 4 showing graphical representation of patients from questions 1-6 shown in table no.4



Graph 5 showing graphical representation of patients from questions 7 shown in table no.4

DISCUSSION :

The main cause of oral cancers in India is tobacco and alcohol, which are consumed in various forms. The lack of knowledge among the public has been considered to be a significant barrier in the early detection of oral cancer.

The International Agency for research on cancers is expecting an Epidemic of Oral cancer by 2030. This can be largely attributed to the culturally used risk factors, like pan and tobacco. This study was designed to investigate and document the understanding of Oral cancer among the dental patients visiting index institute of dental sciences.

The results of the present study shows that 40.6% of the study participants in this study had never heard of oral cancer and unaware about the signs, symptoms and complications of oral cancer which was in accordance with the study by Park et al.²¹ and Shah et al.²² and research in Turkey revealed that 60.7% of participants had never heard of oral cancer (Peker and Alkurt²³ This study demonstrated general lack of knowledge about (Oral Cancer) among the participants which is not a satisfactory rate compared with oral cancer awareness in most of other studies. In Sri Lanka (Ariyawardana and Vithanaarachchi, 2005),²⁴ South India (Srikanth Reddy., 2012),²⁵ and Gorakhpur city in India (Agrawalet al., 2012)²⁶ 95%, 60.2% and 90% of the respondents had heard of oral cancer, respectively.

Questionnaire used in this study

1. Do you think the tobacco smoking is harmful.?
2. Do you want to stop tobacco habit.?
3. Type of tobacco chewing used ?
Snuff, gutkha, panmasala others
4. At what age tobacco started ?
10-20y 21-30y 31-40y nd above
5. What is the type of smoking tobacco used. ?
Cigarette, beedi, pipe, cigar
6. Duration of tobacco use?
<= 5 yrs 6-10 yrs 11-20 yrs more than 20 yr
7. Have you ever tried to stop the habit.?
8. Duration of stopping the habit.?
Not stopped <6month 6month to 1 yr > 1 yr
9. Reason of stopping the habit?
10. Is tobacco smoking is harmful to you.?
11. Do you think occasional tobacco use is injurious to health?
12. Taking chewable tobacco causes oral cancer?
13. Oral cancer can cause death?

CONCLUSION :

This study concluded that the dental patients still had a lack of awareness regarding the risk of oral cancer, early signs and symptoms and the benefits of detecting this disease at an early stage. Efforts should be made to create awareness about the oral cancer and to control tobacco use in the country by improving the number and quality of services.

REFERENCES:

1. World Health Organization, Tobacco free Initiative. <http://www.whoindia.org/SCN/Tobacco/Report/03-chapter-04.pdf>
2. Gupta PC. The public health impact of tobacco. *Current Science*. 2001 Sep 10;475-81.
3. BJMK, Soumya M, Jagadish BD, PraveenKumar M, Varun SC. A Study on Tobacco Cessation by Clinical Pharmacist. *Indian Journal of Pharmacy Practice*. 2013;6(1).
4. Implementation and Challenges. *Indian J Public Health*. 2011;55:220-7 *Pharmacy Practice*. 2013;6:36-40
5. Sabnis R, Sahu K, Thakur D, Surana S, Mazhar H, Pandey S. Urban and rural disparity in tobacco use and knowledge about oral cancer among adolescents: an epidemiological survey on 12 and 15-year school going students. *Journal of International Society of Preventive & Community Dentistry*. 2016

- Dec;6(Suppl 3):S226.
6. Kumar PM, Poorni S, Ramachandran S. Tobacco use among school children in Chennai city, India. *Indian journal of cancer*. 2006 Jul 1;43(3):127.
7. Ariyawardana A, Vithanaarachchi N. Awareness of oral cancer and precancer among patients attending a hospital in Sri Lanka. *Asian Pac J cancer prev*. 2005 Jan 1;6(1):58-61.
8. Monteiro LS, Salazar F, Pacheco J, Warnakulasuriya S. Oral cancer awareness and knowledge in the city of Valongo, Portugal. *International journal of dentistry*. 2012 Aug 7;2012.
9. Philip PM, Parambil NA, Bhaskarapillai B, Balasubramanian S. Evaluation of a specially designed tobacco control program to reduce tobacco use among school children in Kerala. *Asian Pacific Journal of Cancer Prevention*. 2013;14(6):3455-9.
10. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. *Oral oncology*. 2009 Apr 1;45(4-5):309-16.
11. Ferlay J, Soerjomataram I, Ervik M, et al (2013). GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. Available from: <http://globocan.iarc.fr>, accessed on day/month/year.
12. Khan S. Oral cancer awareness and screening perception among dental patients in Karachi, Pakistan. *EC Dental Science*. 2019;18:1104-8.
13. Formosa J, Jenner R, Nguyen-Thi MD, Stephens C, Wilson C, Ariyawardana A. Awareness and knowledge of oral cancer and potentially malignant oral disorders among dental patients in far North Queensland, Australia. *Asian Pacific Journal of Cancer Prevention*. 2015;16(10):4429-34.
14. Wald NJ, Hackshaw AK. Cigarette smoking: an epidemiological overview. *British medical bulletin*. 1996; 52:3-11.
15. WHO report on the global tobacco epidemic, 2011: warning about the dangers of tobacco. Geneva: World Health Organization; 2011 (whqlibdoc.who.int/publications/2011/9789240687813_eng.pdf)
16. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking: 50 years' observations on male British doctors. *BMJ* 2004; 26:1519-33. DOI: 10.1136/bmj.38142.554479.
17. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med* 2006;3(11):e442. DOI: 10.1371/journal.pmed.0030442.
18. Babiker TM, Osman KA, Mohamed SA, Mohamed MA, Almahdi HM. Oral cancer awareness among dental patients in Omdurman, Sudan: A cross-sectional study. *BMC Oral Health*. 2017 Dec;17(1):1-9.
19. Hashim R, Abo-Fanas A, Al-Tak A, Al-Kadri A, Ebaid YA. Early detection of oral cancer-dentists' knowledge and practices in the United Arab Emirates. *Asian Pacific journal of cancer prevention: APJCP*. 2018;19(8):2351.
20. Riaz F, Nazir HA, Tariq H, Sohail H, Khattak SG, Ali H. Risk factors of oral cancer in Lahore, Pakistan: A case control



- design. Proceeding SZPGMI Vol. 2015;29(1):47-54.
21. Park JH, Slack?Smith L, Smith A, Frydrych AM, O'Ferrall I, Bulsara M. Knowledge and perceptions regarding oral and pharyngeal carcinoma among adult dental patients. Australian dental journal. 2011 Sep;56(3):284-9.
 22. Shah SP, Praveen BN. Awareness of oral cancer in rural Bangalore population: A questionnaire based study. International Journal of Scientific Study. 2014;1(6):14-6.
 23. Peker I, Alkurt MT. Public awareness level of oral cancer in a group of dental patients. J Contemp Dent Pract. 2010 Mar 1;11(2):049-56.
 24. Ariyawardana A, Vithanaarachchi N. Awareness of oral cancer and precancer among patients attending a hospital in Sri Lanka. Asian Pac J Cancer Prev, 2005; 6, 58-61.
 25. Reddy BS, Doshi D, Reddy MP, Kulkarni S, Gaffar A, Reddy VR. Oral cancer awareness and knowledge among dental patients in South India. Journal of Cranio-Maxillofacial Surgery. 2012 Sep 1;40(6):521-4.
 26. Agrawal M, Pandey S, Jain S, Maitin S. Oral cancer awareness of the general public in Gorakhpur city, India. Asian Pacific Journal of Cancer Prevention. 2012;13(10):5195-9.

A NEW APPROACH FOR PLANNED UPPER INCISOR POSITION – AN OBSERVATIONAL PROSPECTIVE STUDY"

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ABSTRACT :

Background: The profile of the patient is judged many a times by the position of the anterior teeth. Maxillary incisor labiolingual inclination and anteroposterior position play an essential role in the esthetics of the smiling profile. Hence the aim of the present study is to determine the planned incisor position in relation to the third palatal rugae an immutable landmark in the oral cavity

Materials and methods: The study group consists of 80 participants consisting of 40 males and 40 females who satisfied the Andrew's six keys of occlusion. The impression of the upper dental arch was made using alginate impression material and the study casts were prepared with dental stone. The rugae pattern was marked on the study cast and the horizontal distance between the third palatal rugae to the incisal edge of upper incisor was measured using digital offset centerline Vernier caliper. The profile photograph of the participants was taken to verify skeletal class I relationship. The data collected were statistically analyzed using SPSS program.

Results: The measured value between third rugae and incisal edge was 16-20 mm for females and 19-21mm for males. Therefore the planned incisor position for females is between 16-20 mm and 19-21mm for males.

Conclusion: Knowing the ideal distance between the maxillary incisors and the third palatal rugae will help the orthodontist to plan the final anteroposterior position of the maxillary incisors during treatment.

KEYWORDS: Incisor Position, Palatine Rugae, Ideal Profile.

INTRODUCTION :

Although orthodontic treatment is based mainly on occlusal relationships, great attention has been paid in achieving optimal facial profile esthetics. In recent times, orthodontic treatment mechanics give importance to the upper incisor position and rest of the teeth are aligned in accordance with the position of the central incisors¹. The profile of the patient is judged many a times by the position of the anterior teeth. Maxillary incisor labiolingual inclination and anteroposterior position play an essential role in the esthetics of the smiling profile².

Malocclusion due to proclined incisors is the most common complaint among patients seeking orthodontic treatment. The treatment of severely proclined anterior teeth usually, requires a reduction in tooth material in the form of extraction of first

premolars and with controlled movement of teeth leads to a normal facial profile esthetics³. With the advent of improved orthodontic and surgical techniques, emphasis has shifted more towards envisioning an ideal position of upper incisors as the starting point in the planning of the treatment. In modern orthodontics, there has been changes in the goals of orthodontics to focus more on facial proportions and the effects of the teeth position and occlusion on facial harmony and appearance.

Determination of ideal incisor position is a challenge to the orthodontist, since over retraction of incisors results in dishd in faces and under retraction will also not provide appreciable improvement in facial esthetics. Hence, evaluation of Ideal Position of Maxillary central Incisors in relation to stable anatomic reference point in patients is of utmost importance.

Palatal rugae appear during the third month of intrauterine life and occupy most of the length of palatal shelves. These structures form a series of

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anatomical folds on the anterior part of the palatal mucosa, behind the incisive papilla on each side of the median palatal raphe⁴. The number varies from 4 to 6 on each side, and they appear before the fusion of the palatine shelves⁵. It is used in various fields such as sex determination, orthodontics and forensic odontology⁶. Palatal rugae also refer to a series of transverse ridges on the anterior part of the palate and these are present on both the sides of the mid-palatal raphe and behind the incisive papilla. Palatal rugae can be used to evaluate the dental movements in orthodontics.

Palatal rugae imparts a special role in the Orthodontics, they are used as stable reference landmarks for the superimposition of pre- and post-treatment cephalometric tracings⁷. They can be used in the identification of submucosal clefts and also to assess the amount of anteroposterior tooth movement post treatment.

Shukla et al, compare the stability of palatal rugae before and after orthodontic treatment and concluded that the lateral part of third palatal rugae were the most immutable and that it could be used as a reference to evaluate the change in teeth position during orthodontic treatment⁸. Hence the aim of this study is to determine the ideal upper incisors position in relation to third palatal rugae in patients with normal occlusion and normal facial profile.

MATERIALS AND METHODS:

This cross sectional study protocol was reviewed and approved by Institutional Human Ethics Committee(450/IHEC/3-19) dated 19-04-2019. The duration of the study was about 2 yrs from June 2019 to June 2021. The study participants include Undergraduate and postgraduate dental students, medical students, nursing staff, patient attendants etc. All the participants were explained about the study and that were screened to meet the inclusion criteria.

The inclusion criteria are the following:

1. Age ranging from 18-30 years.
2. Participants possessing all the (Andrews) six

keys of occlusion.

3. Had harmonious and well balanced facial profile.
4. No H/o orthodontic treatment.
5. Those willing to participate in the study.

The exclusion criteria are the following:

1. Participants with any dentofacial syndromes.
2. Participants with facial asymmetry.
3. Participants with TMJ problem or ankylosis.

The sample size was determined by a previous study by Andrews LF in 2001 14 was calculated to be N = 80, with 95% power at 5% - error. Eighty participants consisting of 40 males and 40 females satisfying both the inclusion and the exclusion criteria were selected for the study. The study was explained and a written consent was obtained from each of the participants. The impression of the upper dental arch of the selected participants was taken with high quality alginate impression material and the study casts were prepared in high quality dental stone. The rugae patterns was marked on the study cast using a pencil (Fig 1).



Fig-1 Study cast to measure the palatal rugae - upper incisal horizontal distance

Digital offset centerline Vernier caliper is used for measuring the distance between the third palatal rugae and the incisal edge of upper incisor. A horizontal line is drawn from end of the lateral part of the third Palatine rugae to the mid palatal raphe. Then the distance between the point marked on the midpalatal raphe and the upper incisal edge is measured using digital offset centerline vernier caliper. In addition the profile photograph of the participants was taken to confirm class I skeletal

relationship. The distance from the end of the lateral part of the Palatine rugae and the incisal edges are measured for all the participants and is included in the statistical analysis.

STATISTICAL ANALYSIS AND RESULT :

Data was analyzed using SPSS (version 22.0; SPSS, Inc., Chicago, IL, USA). Descriptive statistics, including means, medians, standard deviations, range and 95% CI for mean,were calculated. Student t test is used to find out the statistical significant. Frequency distribution analysis was done for each group (both males and females).

The measurement of the distance between the lateral part of the Palatine rugae and incisal edge of all the participants was recorded. The measured value between third rugae and incisal edge for female was 16 mm for 10 participants, 18 mm for 21 participants, 20 mm for 9 participants(fig. 2) and the measured value between third rugae and incisal edge for Male was 19 mm for 7 participants, 20 mm for 22 participants, 21 mm for 11 participants (fig. 3).

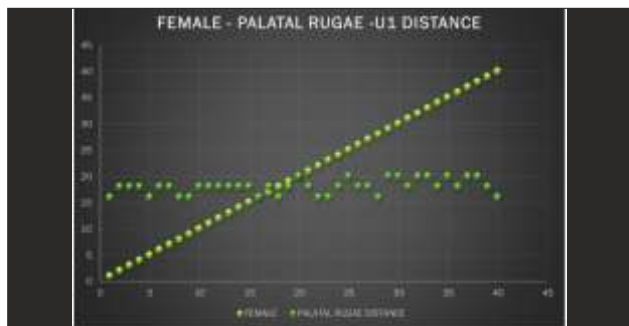


Fig. 2 : Measured value palatal rugae -U1- female

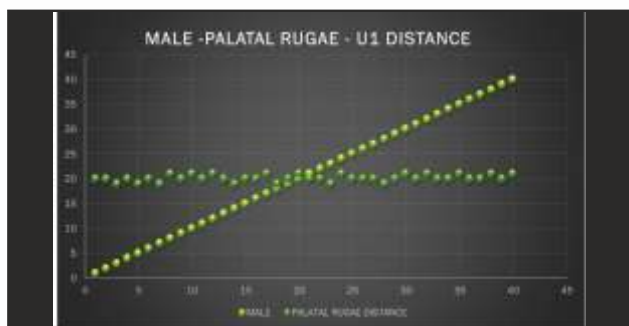


Fig. 3: Measured value palatal rugae -U1- male

The statistical analysis shows 18 mm for females and 20 mm for males to be a significant value and can be

considered as a standardized value for determining the planned upper incisor position (fig. 4, 5).

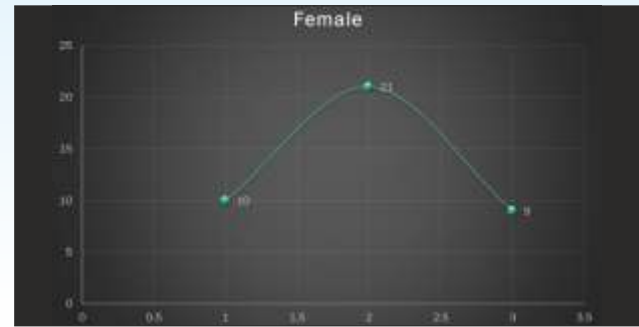


Fig.4: Frequency distribution value - female



Fig.5: Frequency distribution value - male

DISCUSSION :

This is a prospective observational study to determine the ideal incisor position in relation to Lateral part of third palatal rugae. Determination of the correct maxillary incisor position is very important in developing treatment plans for orthodontic patients. The AP position of the maxillary central incisors can be evaluated clinically using the palatal rugae as reference. The AP position of the maxillary central incisors between the male and female in the participants was found to be statistically significant. On average the palatal rugae distance to the maxillary central incisors in the male and female group were identified as 20 mm and 18 mm respectively. This study showed how the stable third palatal rugae can be used to evaluate the AP position of the maxillary central incisors.

Different approaches have been suggested to evaluate the maxillary incisor position, including traditional lateral cephalometric radiograph analysis and soft-tissue analysis.

Edward Ellis and Mcnamara et al⁹, evaluated upper incisor position using N-pog and they found a significant correlation. Arnett et al¹⁰ developed a soft tissue cephalometric analysis tool where they evaluated the planned incisor position for different soft tissue conditions which included lip thickness and lip support. Holdaway et al¹¹ first suggested maxillary incisors as best teeth for esthetic prognosis as they determine upper and lower lip postures. Riedel et al¹² first used N-pog as a reference line to evaluate the incisor position in place of A-pog as point A is a highly variable point. Nasion is also a variable point but it is more reliable than point a as maxilla is most affected by malocclusion. Alvarez A et al¹³ was not convinced regarding the stability of conventionally used landmarks to determine incisor position. He introduced A-line to assess the incisor position in untreated class I subjects and concluded that ideal tooth position is seen when the A-line touches or passes within 1mm of facial surface of maxillary central incisor. Andrews et al¹⁴, popularized the use of forehead landmark to assess the antero-posterior position of the upper incisors and found marked correlation between the forehead inclination and the prominence and position of upper central incisor position.

Adams M. et al¹⁵ evaluated photographs to compare the antero-posterior relationship of the maxillary central incisors to forehead in adult white males and found that the incisor was positioned between forehead facial axis and glabella. Similar study was done by will Alan Andrews et al¹⁶ in adult white females and concluded with similar results. Michael A. Webb and colleagues¹⁷ have evaluated upper incisor position as a determinant of ideal soft tissue profile and concluded that the incisors were positioned between forehead facial plane and forehead midpoint plane. More recently El Asmar R et al.¹⁸ evaluated the ideal position of the maxillary incisor relative to upper lip thickness.

Thus increased importance was given to anterior teeth position especially the incisor position to plan or to assess the Esthetic profile of the patient. The use of

skeletal landmarks and intracranial reference lines to determine the ideal anteroposterior position of the maxillary incisors can be unreliable because of errors in identification of these landmarks and the variability in the position of intracranial reference lines between individuals. In addition, good facial harmony can exist within a wide range of cephalometric values and positioning the upper incisors according to skeletal guidelines may not necessarily result in a pleasing soft tissue profile Soft tissue landmarks such as the nose, lips and chin may not accurately reflect the position of the maxillary incisors because of the variability in their thickness and length.

In the present study we have evaluated that the incisor position using a stable landmark in the oral cavity, which is lateral part of third palatal rugae. Palatal rugae also refer to a series of transverse ridges on the anterior part of the palate that are present on both the sides of the mid-palatal raphe and behind the incisive papilla. Palatal rugae can be used to evaluate the dental movements in orthodontics. This imparts them a special role in the orthodontics, they are used as stable reference landmarks for the superimposition of pre- and post-treatment cephalometric tracings⁸. They can be used in the identification of submucosal clefts and also to assess the amount of anteroposterior tooth movement posttreatment.

shukla et al⁸, compare the stability of palatal rugae before and after orthodontic treatment and conclude the lateral part of third palatal rugae were the most immutable and that it could be used as a reference to evaluate the change in teeth position during orthodontic treatment.

Different methods for the evaluation of palatal rugae on dental cast using Optocom software, Reflex metrograph, photographs and photocopies of dental cast have been used in the past for the evaluation of palatal rugae. Each of these methods requires a sophisticated instrument, device or software that is not acquired by many investigators and clinicians.

Kapali et al and Moran et. al¹⁹ used slide Vernier caliper to measure palatal landmarks. Digital Vernier caliper was used in the current investigation as it is user-

friendly and can be used directly on dental cast; therefore, does not require cast digitization and particular expertise.

The AP positions of the maxillary central incisors were strongly associated with the stable landmarks used in this study and strongly correlated with palatal rugae distance in adult with good facial harmony.

The results of this study indicate that the palatal rugae distance can be used as a landmark to estimate the ideal position of maxillary central incisor in study cast. Using the palatal rugae distance as a primary landmark for AP incisor positioning avoids the potential pitfalls of relying on cephalometric analysis or repose soft tissue analysis.

Borderline cases have mild to moderate tooth size arch length discrepancy. The discrepancy is not much so that one can easily opt for extraction, and it is also not very less so that one can start the case without extraction. Because non extraction treatment can protrude the incisors and extraction can land up in dished in face. Therefore there is great divergence of opinion in the treatment of such patient. This dilemma of extraction or non extraction always troubles the orthodontist and requires a careful diagnosis. Palatal rugae can be considered reliable landmark to determine the ideal incisor position clinically and help us to determine how much retraction of incisors are required especially in borderline cases. Many studies have been done to identify the ideal incisor position with various hard and soft tissue cephalometric analysis. But Palatal rugae is one of the stable landmark in determining the upper incisor position both clinically in patient's and laboratory using models in orthodontics. This study will help us to determine the planned incisor position in extraction case. This analysis we developed can be an adjunct tool along with the other analysis to determine the planned upper incisor position.

CLINICAL SIGNIFICANCE OF THE STUDY

The findings from this study can be incorporated into routine orthodontic record taking, diagnosis and treatment planning. The inclusion of a study casts with the Palatal rugae and maxillary incisors distance

to the set of diagnostic records as well as clinical evaluation of the smiling facial profile will allow achieving ideal position of maxillary central incisors in the face.

It is a quick and simple way to analyze a critical soft tissue landmark (palatal rugae) and hard tissue landmark (maxillary central incisor). Generic norms are created and specified to a patient.

The future study is to Compare and correlate the various factors those determining the upper incisor position by cephalometric analysis (U1 - NA= 4mm) and our palatal rugae- upper incisal distance analysis as well as to analyze and compare the results in post orthodontic treatment model with greater sample size.

CONCLUSION :

The results of the study led to the following conclusions:

Knowing the ideal distance between the maxillary incisors and the third palatal rugae (considered to be the stable anatomic landmark) will help the orthodontist to plan the final anteroposterior position of the maxillary incisors during treatment planning.

It will also be helpful to avoid over retraction of incisors during extraction orthodontic treatment which adversely affect the facial esthetics.

This study will help to clinically evaluate the incisor position during treatment progression. The present study gave clinical applicability of palatal rugae distance to determine ideal incisor position. Also the mean linear value to determine position of upper incisor in the inclusion population of male & female was 20mm and 18 mm respectively.

REFERENCES :

1. McLaughlin RP, Bennett JC, Trevisi HJ. Systemized orthodontic treatment mechanics. 2001 25-93
2. Cao L, Zhang K, Bai D, Jing Y, Tian Y, Guo Y. Effect of maxillary incisor labiolingual inclination and anteroposterior position on smiling profile esthetics. The Angle Orthodontist. 2011 Jan;81(1):121-9.
3. Hoggan BR, Sadowsky C. The use of palatal rugae for the assessment of anteroposterior tooth movements. American Journal of Orthodontics and Dentofacial Orthopedics. 2001 May 1;119(5):482-8.



4. Hauser G, Daponte A, Roberts MJ. Palatal rugae. *Journal of anatomy*. 1989 Aug;165:237.
5. Lee JM, Miyazawa S, Shin JO, Kwon HJ, Kang DW, Choi BJ, Lee JH, Kondo S, Cho SW, Jung HS. Shh signaling is essential for rugae morphogenesis in mice. *Histochemistry and cell biology*. 2011 Dec;136(6):663-75.
6. English WR, Robison SF, Summitt JB, Oesterle LJ, Brannon RB, Morlang WM. Individuality of human palatal rugae. *Journal of forensic science*. 1988 May 1;33(3):718-26.
7. Sivaraj A. Significance of palatal rugae in orthodontics. *Journal of Orofacial Research*. 2013;202-9.
8. Shukla D, Chowdhry A, Bablani D, Jain P, Thapar R. Establishing the reliability of palatal rugae pattern in individual identification (following orthodontic treatment). *The Journal of forensic odonto-stomatology*. 2011 Jul;29(1):20.
9. Ellis III E, McNamara Jr JA. Cephalometric evaluation of incisor position. *The Angle Orthodontist*. 1986 Oct;56(4):324-44.
10. Arnett GW, Jelic JS, Kim J, Cummings DR, Beress A, Worley Jr CM, Chung B, Bergman R. Soft tissue cephalometric analysis: diagnosis and treatment planning of dentofacial deformity. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1999 Sep 1;116(3):239-53.
11. Holdaway RA. A soft-tissue cephalometric analysis and its use in orthodontic treatment planning. Part II. *American journal of orthodontics*. 1984 Apr 1;85(4):279-93.
12. Riedel RA. An analysis of dentofacial relationships. *American Journal of Orthodontics*. 1957 Feb 1;43(2):103-19.
13. Alvarez AT. The A line: a new guide for diagnosis and treatment planning. *Journal of Clinical Orthodontics: JCO*. 2001 Sep 1;35(9):556-69.
14. Andrews LF. Syllabus of the Andrews orthodontic philosophy. *Syllabus of the Andrews orthodontic philosophy*. 2001 124-159.
15. Adams M, Andrews W, Tremont T, Martin C, Razmus T, Gunel E, Ngan P. Anteroposterior relationship of the maxillary central incisors to the forehead in adult white males. *ORTHODONTICS: The Art & Practice of Dentofacial Enhancement*. 2013 Mar 1;14(1).
16. Andrews WA. AP relationship of the maxillary central incisors to the forehead in adult white females. *The Angle Orthodontist*. 2008 Jul;78(4):662-9.
17. Webb MA, Cordray FE, Rossouw PE. Upper-incisor position as a determinant of the ideal soft-tissue profile. *Journal of clinical orthodontics: JCO*. 2016 Nov;50(11):651-62.
18. El Asmar R, Akl R, Ghoubril J, El Houry E. Evaluation of the ideal position of the maxillary incisor relative to upper lip thickness. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2020 Aug 1;158(2):264-72.
19. Christou P, Kiliaridis S. Vertical growth-related changes in the positions of palatal rugae and maxillary incisors. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2008 Jan 1;133(1):81-6.

POTENTIAL BIOLOGICAL AGENTS INVOLVED IN BIOTERRORISM – OBSERVATIONS FROM A DENTAL PERSPECTIVE

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ABSTRACT :

Bioterrorism can be described as the intentional use of microbiological agents or their toxins as weapons in a wide sense. The intentional release or dissemination of a biological warfare agent (BWA), such as bacteria, viruses, rickettsiae, fungi, or biological toxins, is considered bioterrorism. Terrorists and military services are drawn to BWAs because of their unique qualities, which make them ideal for use as warfare agents. Several elements influence the success of a bioterrorism attack. Two major criteria are the type of BWA and the target population.

KEYWORDS: Bioterrorism, Biocrime, Epidemic, Pathogens, Biological Agents

INTRODUCTION :

Recent instances have made public health officials painfully aware of the significance of detecting bioterrorism quickly and properly. Because bioterrorism is difficult to foresee or prevent, it is critical to have dependable platforms in place to quickly detect and identify bioterrorism agents in order to limit the proliferation and widespread use of these agents and protect public health.¹ These platforms must be sensitive, specific, and capable of detecting a wide range of pathogens directly from complicated sample matrices, including modified or previously uncharacterized agents. Recent laboratory prototype device inventions have been reviewed and commercialised. Various commercial assays that use biochemical, immunological, nucleic acid, and bioluminescence processes to identify biological threat substances are currently available. DNA aptamers, biochips, evanescent wave biosensors, cantilevers, living cells, and other new technologies have recently been created to identify bioterrorism agents.¹

Bioterrorism and Bio-crime :

Bioterrorism, according to the CDC, is defined as the

intentional release of viruses, bacteria, or other agents with the intent of causing illness or death in humans, animals, or plants. Bioterrorism is motivated by ideological, religious, or political ideas and seeks to cause casualties, terror, societal disruption, or economic damage. Terrorists, also known as non-state actors, are responsible for it. Terrorists usually strive to achieve their objectives by instilling fear and violence. This terror could potentially be caused by bioterrorism.²

Last but not least, there's biocrime. This refers to the use of a biological toxin to kill or make sick a single person or a small group of people for the purpose of extortion or revenge, rather than political, ideological, religious, or other views. For example, a frustrated hospital laboratory employee used ricin to get rid of a partner in 1996, or a disgruntled hospital laboratory employee used *Shigella dysenteriae* to make pastries as a gift for her colleagues in 1996. The assassination of Hungarian dissident Georgi Markov in London in 1978 with a ricin laced pellet inserted through an umbrella could be classified as a biocrime. However, because the murder was very certainly intended to send a message to other dissidents on behalf of the KGB, one may argue that this is an example of state-driven BW.²

Types of Agents :

These agents are usually found in nature, but they could be changed or altered to boost their capacity to cause disease, make them resistant to current medications, or spread more easily.

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Category	Definition of Category	Disease	Organism(s)/Agent(s)
A	Organisms that pose a threat to national security are classified as high-priority agents because they: <ul style="list-style-type: none"> • Can easily be distributed or transmitted from person to person • Causes significant mortality and has the potential to have a major public health impact • Can generate public panic and communal disruption • Make public health preparedness a priority. 	Anthrax Botulism Plague Smallpox Tularemia Viral Hemorrhagic Fevers	Bacillus Anthracis Clostridium botulinum toxin Yersinia pestis Variola major Francisella tularensis Filoviruses Arenaviruses
B	Agents with the second highest priority are those who: <ul style="list-style-type: none"> • Require specific laboratory diagnostic capability increases and better disease surveillance • Result in moderate morbidity rates and low mortality 	Brucellosis Epsilon toxin Food safety threats Glanders Melioidosis Psittacosis Q fever Ricin toxin Staphylococcal Enterotoxin B Typhus fever Viral encephalitis Water safety threats	Brucella species Clostridium perfringens Salmonella species, Escherichia coli O157:H7, Shigella, and so forth Ricinus communis (castor beans) Ricin communis Staphylococcus aureus Rickettsia prowazekii Alphaviruses (eg, Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis) Vibrio cholerae, Cryptosporidium parvum and so forth
C	Emerging pathogens, which could be developed for mass dispersion in the future, are the third highest priority agents, because of: <ul style="list-style-type: none"> • Availability • Ease of manufacture and transmission • High risk of morbidity and mortality, as well as serious health consequences 	Infectious diseases that are on the upsurge	Nipah virus Hantavirus Tick-borne hemorrhagic fever viruses Tick-borne encephalitis viruses Yellow fever Multidrug-resistant tuberculosis

Adapted from Centers for Disease Control and Prevention. Bioterrorism Agents/Diseases.

Available at: <http://www.bt.cdc.gov/agent/agentlist-category.asp>. Accessed January 14, 2013.

Ref: Christian MD. Biowarfare and bioterrorism. Crit Care Clin. 2013 Jul;29(3):717-56. doi: 10.1016/j.ccc.2013.03.015. PMID: 23830660; PMCID: PMC7127345.

The agents listed in Table 1 were chosen because they have been weaponized for warfare or have been utilised in bioterrorism. These agents are the most likely to have a major impact and are hence the best suited.²

TABLE 1. SELECTED BIOLOGICAL AGENTS POTENTIALLY INVOLVED IN BIOTERRORISM

Disease	Agent	Organism persistenc	Infective dose	Human to human transmiss ion	Infectivity	Incubati on period	Symptom	Mortality	Treatment
Anthrax	Spores of Bacillus Anthracis	Spores are extremely stable and can survive in soil for up to 40 years.	8000-50,000 spores	No	-	1-6 days	Fatigue, fever, malaise, cough, mild chest discomfort, respiratory distress, shock	High	Ciprofloxacin or doxycycline
Brucellosis	Genus Brucella	It will take 6 weeks. To 10 weeks in the dust. In the soil or in the water	10-100 organisms	No	-	5-60 days	Fever, headache, malaise, chills, sweating, myalgia, arthralgia, depression	5% if left untreated	Doxycycline + Rifampicin
Glanders	Burkholderia mallei	Highly stable	Unknown	Although uncommon, it is conceivable	-	10-14 days	Pulmonary form: cough, chest pain,		
Melioidosis	Burkholderia pseudomallei	Highly stable	Unknown	Although ncommon, it is conceivable.	-	10-14 days	fever, rigors, sweating, pleuritis		
Plague	Yersinia pestis	In soil, it can last up to a year, although it is only viable for 1 hour after aerosol release.	100-20,000 organisms	High	Patients can be contagious for up to three days after beginning treatment.	1-6 days	High fever, headache, malaise, chest pain, cough, haemoptysis, dyspnoea, stridor, cyanosis		
Q-fever	Coxiella burnetii	heat and drying resistant, and it lasts for weeks to months.	1-10 organisms	Although uncommon, it is conceivable.		7-41 days	Fever, chills, headache, malaise, fatigue, anorexia, weight loss, endocarditis (as presenting symptom of chronic disease)		
Salmonellosis	Genus Salmonella	resistant to heat up to 57-60°C	Unidentified	Faecal-oral transmission	In faeces for up to 4-5 weeks	6-48 days	Nausea, vomiting, mucopurulent or bloody diarrhoea, abdominal cramps, headache, maculopapular exanthema	<1%	

Shigellosis	Genus Shigella	2-3 days on average, up to 17 days in favorable conditions, several hours on contaminated hands	10-100 organisms	Faecaloral transmission	There is a lot of excretion in the faeces during the acute phase;	1-7 days	Fever, abdominal cramps, diarrhoea, haemorrhagic colitis	<1%	
Tularemia	Francisella tularensis ssp. tularensis	Years in frozen meat, weeks in water, soil, or carcasses	10-50 organisms	No	without antibiotic medication, it can extend up to 4 weeks.	1-25 days	Fever, chills, myalgia, arthralgia, headache, nausea, vomiting, diarrhoea, sore throat	<1%	
Smallpox	Variola virus: Variola major	In dust and cloth, it can last up to a year.	10-100 organisms	Yes, Close contact is required for transmission.	It is mostly infectious within the first week after the rash emerges.	4-19 days 2-6 days	Severe headache, high fever, extreme prostration, backache,		
				No			chest and joint pains, anxiety, exanthema, maculopap		
Venezuelan Equine Encephalitis	Alphavirus, (Venezuelan equine	Unstable in its surroundings	10-100 organisms		-		ular rash that becomes vesicular Malaise, spiking fevers, rigors, headache, myalgia, nausea,		

Ref: Jansen HJ, Breeveld FJ, Stijns C, Grobusch MP. Biological warfare, bioterrorism, and biocrime. Clin

Microbiol Infect. 2014 Jun;20(6):488-96. doi: 10.1111/1469-0691.12699. PMID: 24890710; PMCID: PMC7129974.

IDENTIFICATION OF SPECIFIC DISEASES ASSOCIATED WITH BIOTERRORISM

This section gives an overview of the clinical and investigative data that can help in diagnosis of diseases. Laboratory testing, particularly microbiological studies, are essential for any biological diagnosis. The required specimens and assays for diagnosing possible bioterrorism agents are listed in Table 2. However, like with many elements of critical care, it's crucial not to rely on technology too much.

TABLE 2 : CLINICAL SPECIMENS AND TESTS FOR DIAGNOSING POTENTIAL AGENTS OF BIOTERRORISM

AGENTS	CLINICAL SPECIMEN	AGNOSTIC TESTS	CHARACTERSTIC LAB FEATURES	BIOSAFETY LEVEL
Bacillus anthracis	Nasal swab Feces Lesion exudate A and C sera	Culture (nonhemolytic on 5% sheep blood agar, 35C, 18-24 h) FA Gammaphage anti-PA ELISA PCR and RT-PCR Capsule demonstration Immunochromatography	Gram-positive bacilli Spore-forming Nonhemolytic	2

Yersinia pestis	Nasal swab Sputum Bubo aspirate Blood A and C sera	Culture (5% sheep blood agar, chocolate agar, Casman blood agar, cystine heart blood agar, or MacConkey agar. 35C, 24-48 h) FA PCR RAD	Gram-negative coccobacilli Bipolar staining Nonlactose fermenter	2
Brucella sp	Whole blood Bone marrow A and C sera	Culture (tryptose agar with 5% bovine sera, Thayer-Martin, chocolate agar with VCNT, 35C, 5%-10% CO ₂ , 10 d) FA PCR	Gram-negative coccobacilli Aerobic Nonmotile Nonfermenter	2
Burkholderia sp	Whole blood A and C sera Lesion exudate	Culture (5% sheep blood agar, MacConkey agar. 35C, 24-48 h) PCR	Gram-negative bacilli Motile (except Burkholderia mallei)	2
Francisella tularensis	Nasal swab A and C sera	Culture (glucose cystine heart blood agar, thioglycolate, 35C, 48- 72 h) FA PCR	Gram-negative Obligate aerobe	2
Botulinum toxin	Nasal swab A and C sera	Immunoassay	150 kDa protein neurotoxin	2
Ricin	Nasal swab A and C sera	Mouse neutralization	66 kDa protein toxin	2
SEB	Nasal swab urine A and C sera	Antigen serology immunoassays	23-29 kDa protein superantigens	2
Variola virus	Nasal swab Throat swab Lesion exudate A and C sera	Antigen serology immunoassays Viral culture* Electron microscopy PCR	Brick morphology	4
VEE Virus	Nasal swab Throat swab A and C sera	Viral culture Virus neutralization RT-PCR	Enveloped RNA Virus	2
VHF Virus	Nasal swab A and C sera	Viral culture* RT-PCR	Enveloped RNA Virus	4

Abbreviations: A and C sera, acute and convalescent sera; ELISA, enzyme-linked immunosorbent assay; FA, fluorescent antibody; PA, protective antigen; PCR, polymerase chain reaction; RAD, rapid antigen detection kit; RT-PCR, real-time PCR; VCNT, vancomycin, colistin sulfate, nystatin, and trimethoprim; VEE, Venezuelan equine encephalitis.

* Not recommended except by qualified laboratory with appropriate biosafety equipment.

Adapted from Pavlin JA, Gilchrist MJ, Osweiler GD, et al. Diagnostic analyses of biologic agent-caused syndromes: laboratory and technical assistance. Emerg Med Clin North Am 2002;20(2):331-50; with permission.

DIAGNOSIS:

The most difficult phase in the response is likely to be diagnosing or identifying a bioterrorism event. There are two components to identifying a bioterrorism event:

1. Identifying that multiple episodes of disease were

caused by a purposeful rather than natural phenomenon, and

2. Diagnosing the precise organism or substance that caused the illness. Depending on the conditions, they could happen in any order.

Recognizing a cluster of patients usually necessitates a level of situational awareness that is beyond the capabilities of a single doctor, and is usually only accessible by a regional, state, or federal public health agency, depending on how far dispersed the cases are.³

IDENTIFICATION OF A BIOTERRORISM EVENT VERSUS AN EPIDEMIC

Features that suggest a bioterrorism event rather than an epidemic

1. A curve that indicates a point source (common source) outbreak or an extended source rather than a naturally propagated (transmitted) source.
2. Determination of a group of cases (large numbers



of patients from a similar geographic area with similar symptoms)

3. Case fatality is high and occurs quickly.
4. A substantial number of casualties within the first 48 to 72 hours following the strike (suggesting a microorganism attack) or within minutes to hours (suggesting a biological attack) (suggesting an attack with a toxin)
5. People who were indoors had a lower attack rate than those who were outside.
6. An extremely high proportion of respiratory involvement in disorders that usually result in a nonpulmonary condition when acquired naturally.
7. The distribution of casualties is coordinated with the direction of the wind.
8. A disease that is extremely uncommon in the area.
9. The onset of an illness classified as A, B, or C.
10. A rise in the number of sick or dead animals of various species in a specific geographic area.
11. Witness to an attack or the development of a suitable delivery method a Less trustworthy, because if a building's ventilation system was employed to spread the agent, the reverse may be true.

Data from Karwa M, Bronzert P, Kvetan V. Bioterrorism and critical care. *Crit Care Clin* 2003;19(2):280; and NATO Handbook on the Medical Aspects of NBC Defensive Operations, Part II-Biologic. Washington, DC: US Department of Defense, Department of the Army; 1996.

CHARACTERISTICS OF THE EPIDEMIC OF FEAR AND PANIC

Even when the agents cause low levels of death and physical morbidity, biological weapons attacks can have major emotional and societal consequences in a variety of ways. One of the initial mental impacts is a great deal of social and psychological suffering, particularly fear of biological agents, even when they aren't employed. This reaction can be attributed to a number of factors, including biological agents' invisibility, the likelihood that the agent can be disseminated through personal contact, the

uncertainty around the magnitude of biological weapons' dangers, and so on. Exposure to any extreme stressor, whether natural event manmade, is, on the other hand, a risk factor for a variety of long-term social and mental issues.⁴

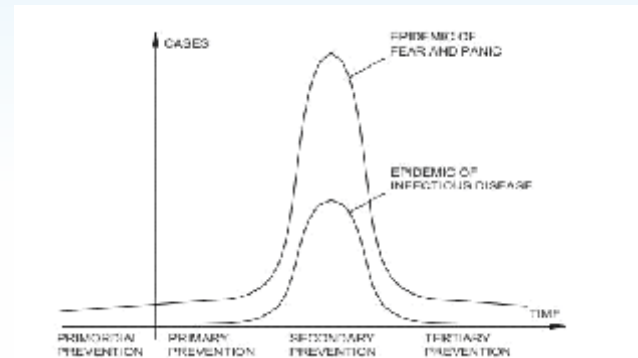


Fig 1 - Phases and levels of prevention of the epidemic of infectious disease and the epidemic of fear and panic.

Ref: V. Radosavljevic et al Bioterrorism-Types of epidemics, new epidemiological paradigm and levels of prevention; *Journal of royal institute of Public Health* 121, 549-557; Elsevier; 2007

The epidemics of infectious disease and fear and panic are clearly depicted in Fig 1 with their numerical (number of cases) and chronological dimensions, as well as their zones of activity at each prevention level, emphasising the importance of primordial and primary prevention.⁴ It allows us to distinguish between the two types of epidemics in order to plan intervention strategies. At the individual and group level, the anticipation phase confronts fear, anxiety, and a probable lower level of panic and somatization. Activities aiming to minimise the anticipation phase of the fear and panic epidemic should be included at the primary and primary prevention levels.⁴

The second phase of the fear and panic epidemic happens at the same time as the infectious disease epidemic. People are interested in initiatives like as rescuing and helping because they are facing a real threat of infection. In this period, secondary prevention actions are recommended.⁴

Long after the attack, the level of anxiety and panic, as well as unpleasant mental health signs and symptoms, somatization, and grief, is greatly enhanced in the third phase. For the entire community, this is a time of great vulnerability. This is the time to

take comprehensive tertiary preventative measures.⁴ Finally, we would like to contrast an infectious disease epidemic with a fear and panic epidemic induced by a bioterrorism attack (Fig. 1). Fear and panic epidemics begin at a higher level than infectious illness epidemics, have a significantly higher amplitude, and endure much longer due to the anticipation phase. While an infectious disease epidemic can last weeks or months, a fear and terror epidemic can endure months, if not years, and take on the characteristics of a pandemic.⁴

SURGICAL INDICATIONS AND THERAPY

There are no particular indications for surgical management of any bioterrorism pathogens, with the exception of perhaps cutaneous anthrax. Surgical debridement has been utilised primarily for injectable anthrax, even in the event of anthrax.³

SUPPORTIVE CARE AND RESPONSE

Basic care of the individual patient and the response to a mass casualty event are two aspects of supportive care for victims of bioterrorism. Despite increased awareness of the threat of bioterrorism after 2001, many hospitals are still unprepared for biological attacks. According to a study of UK emergency departments (EDs), 24% lacked isolation facilities, and just 61 percent had departments with independent ventilation systems, permitting the unit to be isolated from the rest of the hospital.³

The Task Force for Emergency Mass Critical Care offers hospitals with instructions for preparing for and managing mass critically sick casualties in the event of a bioterrorism strike. These guidelines should be familiar to critical care physicians, and they should be prepared to respond in such situations, because if they are not, all of their talents and knowledge for treating individual patients will be useless when the system gets overwhelmed.³

Individual patient support can be divided into three groups according on the type of agent involved: bacterial, viral, or toxin. Bacterial and viral pathogens commonly cause sepsis with vascular leak, especially in the event of VHF, as well as varying degrees of systemic inflammatory response.³

Supportive therapy for patients exposed to bio-toxins in bioterrorism incidents differs depending on the toxin. The primary support necessary in the case of botulinum toxin exposure is mechanical breathing, hydration, and nutritional support until the paralysis resolves. Both ricin and mycotoxins function at the cellular level, and while supportive therapy should be tried, they may be ineffective in changing patient outcomes. In the case of mycotoxins, the administration of steroids as part of supportive care may be beneficial.³

EXACT ROLE FOR DENTISTRY?

Dental surgeons can play a critical part in the planning of a bioterrorism strike and its subsequent response, resulting in a positive outcome. Local demands could be immediate and massive in the event of a significant bioterrorism strike. As hospitals grow overburdened, alternative locations for providing health care will be needed, and dentist offices and hospitals may be able to serve that demand.⁶

In general	In specific
Preparation for a bioterrorism attack	Treatment of craniofacial injuries
Immediate response towards an attack	Administration of anaesthesia
Diagnosis and monitoring	Starting intravenous lines
Referrals	Providing Cardiopulmonary resuscitation &
Triage	Other Resuscitation Support measures.
Immunizations	Dentists trained in forensic odontology can work closely with local Disaster Mortuary Operational Response Teams(DDMORTs)
Infection control	Do Local Surveillance to know about the spread of the disease apart from the original site of attack.
Medical case augmentation	

Table 3: Thus a dentist/dental surgeon can work towards⁷
 Ref: Yogeshwari , Agarwal A, Aeran H. The role of a dental surgeon during a bioterrorism attack. Int J Oral Health Dent 2020;6(2):66-70

Therefore, the prime role of the dentists are as follows:

Assistance during an attack: Depending on the community's needs and available resources, dentists and other dental workers may be able to assist during the initial few days of a potential bioterrorist strike. These can range from individually packaging pharmaceuticals to providing a major percentage of primary medical treatment in a sequestered region if doctors are unavailable due to disability or death.⁷

Surveillance and Notification: Disease surveillance systems are essential not just for detecting an outbreak early on, but also for monitoring the outbreak's scope and progress and determining when it is over. Gathering information from contact tracing



and exposure source investigations, as well as information on important medicine, medical equipment availability, and managing corpses, would be necessary for managing a significant outbreak.⁷

It may be difficult to identify the real perpetrator of a bioterrorist strike since diseases employed as weapons in bioterrorist operations have an incubation time before clinical signs appear. Dentists are a great monitoring resource because they may recognise and report typical intraoral or cutaneous lesions to public health authorities when they occur. These may also be able to discover unusual patterns of staff or patient cancellations or missed appointments that aren't explained by known local factors.⁷

Referral: Dentists might refer worrisome conditions to experts for confirmation, treatment, or both. Immunizations, triage facilities, improved medical care, decontamination, and infection control are all important areas to focus on.⁷

DENTIST OR A DENTAL SPECIALIST ROLE IN DIAGNOSING OR CURBING BIO TERRORISM

Recognizing the urgency to establish dentistry's participation in a bioterrorist attack, the American Dental Association (ADA) held a workshop in June 2001 that was attended by renowned bioterrorism experts. It was one of the first attempts to get a consensus on the function of dentistry in these situations. The American Dental Association and the US Public Health Service co-sponsored a seminar in March 2003 on "Dentistry's Role in Responding to Bioterrorism and Other Catastrophic Events."⁸

Organized dentistry and dental educators must work together to establish training programmes that take advantage of dentists' medical and scientific knowledge as well as clinical patient care skills. Programs to teach general dentists in emergency preparedness and to train trainers to train other health-care professionals in emergency response and public health awareness are already in the works.⁸

Dentists can actually shield themselves, their patients, and the community by providing a trustworthy and scientifically correct source of information before, during, and after a biological emergency. Dentists can operate as sentinels for early detection of illness

outbreaks, whether they arise spontaneously or as a result of the actions of individuals with malicious intent, given to their understanding of fundamental medicine and particular competence in oropharyngeal diseases.⁸

Local dental societies and individuals must issue an invitation to incorporate community dental assets into local emergency response plans, bringing not just the dentist's talents but also the skills of well-trained ancillary people. Most cities' dispersed dental office distribution patterns make them ideal candidates for community-based distribution or immunisation centres, potentially alleviating some of the pressure on hospitals and medical centres.⁸

Dentists may be required to give care outside of the typical boundaries specified by state dental health care acts if they are fully integrated into disaster response operations. Training, certification, scope of service, and liability protection for appropriately trained responding dentists must be discussed by dental academia, organizational dentistry, state legislators, and federal and state politicians.⁸

If the necessity arises, dental offices equipped with highly valued equipment will be able to serve as regional auxiliary hospitals. Educational programmes on potential biological weapons, as well as continuing education courses, should be designed as part of the dentistry school knowledge.⁷

Incorporating Bioterrorism Training into the Dental Curriculum

The following are three basic strategies for incorporating terrorist training into the pre-doctoral dentistry school curriculum:⁹

1. In the first scenario, a new course or courses/study material should be added to the dental curricula to overcome the gap of knowledge and willingness.
2. Bioterrorism training can also be smoothly included into existing likewise only as a new chapter can be added to the already existing courses. Also, Different parts of identifying and diagnosing related newer methods of training can be introduced into the curriculum in this scenario without interrupting the curriculum's framework.
3. The third scenario, we can merge the above two

methods.

CHALLENGES AND CONSIDERATIONS

Regional heterogeneity, administration of the fundamental scientific curriculum, and cost considerations are all obstacles to introducing bioterrorism training into the dentistry school curriculum.⁹

First, while a terrorism attack can certainly occur throughout the country, certain regions are more likely to face such an event than others. Dental schools in regions less likely to be the target of an attack may be less interested in devoting curriculum time to training dental students to respond to an attack. Incorporating training into the current curriculum, rather than creating new courses, may provide the best option for dental schools located in more likely target areas, yet barriers may remain at dental schools in rural and other areas considered unlikely to be prime targets of terrorism.⁹

Second, in institutions where the basic sciences are taught in a separate school or in conjunction with the medical school, incorporating emergency response and bioterrorism training into the existing curriculum may necessitate an extra effort of coordination and cooperation.⁹

Finally, implementing changes into the curriculum can necessitate a large investment of time and money. Allocating the necessary resources to the establishment of a terrorism training curriculum may prove problematic in a time when dental schools are suffering major funding constraints. All potential funding sources, including grants, must be thoroughly investigated. It should also be explored developing an exportable package that could be supplied to dental institutions and used to instruct dental students.⁹

CONCLUSIONS:

Bioterrorism, or BW, isn't a new threat, and it's not going away anytime soon. Given the technological obstacles and limits imposed by the necessity to work in secret, the possibility of a successful bioterrorist assault is minimal, and more likely at the low-technology end of the spectrum than at the high-technology end. Even if the number of casualties is

likely to be low, the impact of a bioterrorist assault can be significant, affecting many lives and causing significant direct and indirect costs. As a result, it is better to be prepared to deal with the ramifications.

The role of dentistry in reacting to bioterrorism and other catastrophic occurrences is changing and could include a variety of activities. Local emergency response planners should be made aware of the services the dental profession can provide, and dental resources should be integrated to strengthen the disaster response capacity of community health care systems, according to organised dentistry, local dental societies, and interested individuals.

REFERENCES:

1. Karapetis, Steve & Nikoleli, Georgia-Paraskevi & Bratakou, Spyridoula & Nikolelis, Dimitrios & Tzamtzis, Nikolaos & Psychoyios, Vasilios & Psaroudakis, Nikolas. (2016). Biosensors for Security and Bioterrorism: Definitions, History, Types of Agents, New Trends and Applications. 10.1007/978-3-319-28926-7_1.
2. Jansen HJ, Breeveld FJ, Stijnis C, Grobusch MP. Biological warfare, bioterrorism, and biocrime. *Clin Microbiol Infect*. 2014 Jun;20(6):488-96. doi: 10.1111/1469-0691.12699. PMID: 24890710;PMCID: PMC7129974
3. Christian MD. Biowarfare and bioterrorism. *Crit Care Clin*. 2013 Jul;29(3):717-56. doi: 10.1016/j.ccc.2013.03.015. PMID: 23830660;PMCID: PMC7127345.
4. V. Radosavljevic et al Bioterrorism-Types of epidemics, new epidemiological paradigm and levels of prevention; *Journal of royal institute of Public Health* 121, 549- 557; Elsevier; 2007
5. P. Kantor et al. (Eds.) Mining Candidate Viruses as Potential Bio-terrorism Weapons: ISI 2005, LNCS 3495, pp. 60 -71, 2005.
6. Yogeshwari , Agarwal A, Aeran H. The role of a dental surgeon during a bioterrorism attack. *Int J Oral Health Dent* 2020;6(2):66-70
7. Managing Bio-Disaster: Role of Dentist | Manohar Parrikar Institute for Defence Studies and Analyses; July-December 2019; Volume: 12 Issue: 4; IDSA
8. Flores S, Mills SE, Shackelford L. Dentistry and bioterrorism. *Dent Clin North Am*. 2003 Oct;47(4):733-44. doi: 10.1016/j.cden.2003.08.003. PMID: 14664462.
9. Jacqueline EChmar et al Incorporating Bioterrorism Training into Dental Education: Report of ADA-ADEA Terrorism and Mass Casualty Curriculum Development Workshop, *Journal of Dental Education*, Volume 68, Number 11, November 2004.



NEWER GINGIVAL RETRACTION MATERIALS: A REVIEW

Neha Vaidya¹, Komal Kishlay², Sumit Kumar Roy³, Pooja Rani⁴

ABSTRACT :

The factors responsible for the longevity and aesthetics of a restoration are intimately linked to the gingival and periodontal tissues. The placement of any restoration placed in close proximity to the gingival tissues requires adequate access and isolation, for which various gingival retraction methods and materials are available. These are classified broadly as mechanical, chemo-mechanical, cordless and surgical techniques. This review focuses on the rationale behind gingival retraction and a discussion of the newer modalities developed in this regard.

INTRODUCTION :

During various procedures like impression or luting of the restorations, multiple challenges can surface. Moisture control plays a pivotal role for any dental procedure- direct or indirect. This is achievable only in case of effective isolation techniques. Numerous problems are faced in operative dentistry. These can range from the limiting influence of all the associated muscles to other hindrances manifested due to limited vision and isolation, which can be a result from of crevicular fluid, saliva and gingival bleeding during tooth preparation to receive a restoration. The retraction of the gingival tissue is a long-established technique. It can be defined as the process of deflection of the marginal gingiva away from a tooth. Gingival retraction is aimed at accessibility of the impression material beyond the abutment margins and also to provide enough space for the impression material to be thick enough. This is because thickness of material has been found to affect its tear resistance. The present clinical condition will dictate the gingival retraction technique being used. Hemorrhage and its magnitude may incline towards a specific retraction technique.

NEED FOR GINGIVAL RETRACTION

- To widen the gingival sulcus in order to provide access for impression material to reach the

subgingival margins and to record adequately the finish line.

- Helps in obtaining the perfect die with accurate margins, which helps in margin placement and contouring of the restoration.
- Helps in blending of the restoration with the unprepared tooth surface.
- Helps in placement and finishing of the margins on the prepared tooth.
- During cementation it helps in easy removal of cement without tissue damage.
- It helps the dentist in visually assessing the marginal fit and any caries if present.
- In situations when it is necessary to extend the restoration below the gingival margin to enhance retention.
- To enhance access and to prevent damage to the soft tissue during cavity preparation procedure, it may be desirable to carry out some degree of gingival retraction prior to commencement of preparation

METHODS FOR GINGIVAL RETRACTION :

1. Mechanical

- Copper Bands
- Retraction Cord
- Rubber Dam
- Retraction crown/sleeve

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2. Chemico-Mechanical
● Gingival retraction cord
➤ Retraction cord with hemostatic
➤ Retraction paste with hemostatic

Surgical
● Gingival retraction cord
➤ Retraction cord with hemostatic
➤ Retraction paste with hemostatic
➤ Surgical

Method which is used most commonly for retraction of gingival is retraction cord (can be combined with different chemical solutions and gels with astringent or hemostatic action). Other commonly used methods include electro-surgical units, soft tissue diode lasers and retraction pastes. A combination of these techniques can also be used. Although gingival cord is more readily used, but it can damage the delicate epithelial lining of the sulcus and underlying connective tissues.^{9,10}

Hence, focus is being shifted to newer methods for gingival retraction. Some of them include:

EXPASYL :

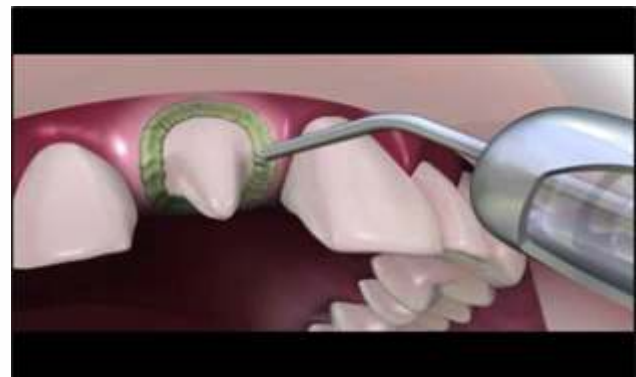
- Expasyl (Kerr Corporation, Orange, CA) is a clay-like material that is dispensed from a syringe apparatus through a narrow needle-like tip.
- It is available in vials and dispensed directly into the sulcus with a heavy-duty delivery gun loaded with a syringe. Expasyl has no chemical or setting reaction. It does not go through an expansion phase.
- The material is left in place for up to 2 min and is then rinsed off with an air/water syringe. The sulcus is then ready for the impression. The material contains aluminum chloride, a potent hemostatic agent. Hence, no violation occurs to

the gingival complex.

- Gingival recession is also not encountered. After removal of Expasyl, sulcus is clean which reduces artifacts during making of digital CAD/CAM impressions. It provides the best outcome of chemical choices available.

Compositions:

- Kaolin 66.75%
- Aluminum chloride 6.54%
- Oil of lemon 0.33%
- Water 25.36%
- Colorant 1.02%
- pH = -3.



Advantages:

- Minimal or no physical damage to the gingival tissues.
- Time saving in situ actions where multiple teeth are being impressed
- Minimal cost
- Predictable hemostasis is achieved.

DISADVANTAGES:

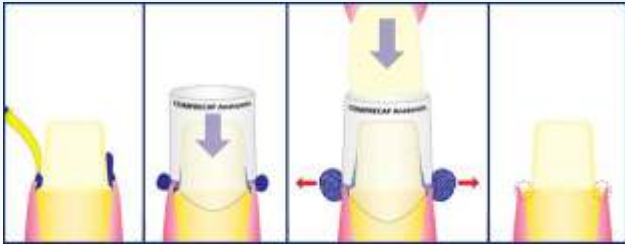
- More expensive
- Inhibits set of polyvinyl siloxane and polyether impressions
- Less effective with very subgingival margins.

MAGIC FOAM CORD :

- Magic foam cord is a new non-hemostatic method.
- It is a vinyl polysiloxane material designed for retraction of the gingiva.
- The material is syringed around the margins of tooth preparation and pressure is maintained using a cap.



The material expands, and after 5 min, impression can be made. The material expands (160%) after 5 min



Advantages:

1. Less traumatic to tissues than retraction cord
2. Color of foam makes it easy to see during use
3. Easy to remove material from preparation and sulcus
4. Adequate working time.
5. Perfect retraction of the Sulcus, stops bleeding without invasive materials or techniques
6. Easier to use (same as impression making). Flows directly into the Sulcus. No need for technique sensitive application technique.
7. Astringent is not required - no need to rinse
8. More efficient - when doing multiple preparations

Disadvantages:

1. No hemostasis provided
2. Expensive when compared to cord
3. No improvement in speed or quality of retraction compared to cord
4. Less effective on subgingival margins
5. Intraoral tips too large to inject material adequately into the sulcus.

MATRIX IMPRESSION SYSTEM :

Matrix impression system is a new system in which impression procedure includes three steps:

- First, a matrix of polyether occlusal registration elastomeric material is done over the prepared tooth.
- The retraction cord is removed and a definitive impression is recorded in the matrix using a high viscosity elastomeric impression material.
- After the matrix impression is positioned, medium viscosity elastomeric material is loaded in an impression tray and is seated over the matrix and

remaining teeth to create impression of the entire arch.

The design of the matrix also forces the high viscosity impression material along the preparations and into the sulcus. The matrix impression system uses three impression materials of different viscosities.

Advantages:

1. Eliminates chances of tearing of the sulcus
2. Cleans blood and debris from the sulcus area
3. Delivers impression material in the gingival sulcus slowly and with more accuracy and speed
4. Holds the sulcus open for an increased time.

Disadvantages:

Increased chairside time.



- (a) Tooth surface after final preparation. Clean the tooth surface and ready for impression.
- (b) (c) Cut off 1 to 2mm of the impression tip to apply bite registration material to fill the margin area and cover the teeth.
- (d) Wait until the bite registration material setting, remove it carefully.



- a) The figure shows how does the bite registration material adapts on the tooth and fills the gingival margin. b) There are three critical features while trimming the matrix.



a) After trimming the matrix, use the air-water spray to clean the dust off. b) This figure shows the appearance of the finished matrix.



a) b) Apply light body or medium body impression material onto teeth and inside the matrix. c) Place the matrix onto the abutment teeth. d) Pick-up impression with stock tray and medium body PVS.



a) b) The final impression result and close-up view. c) The working cast and die. d) The final result of the anterior six crowns.

ADVANTAGES:

1. Eliminates chances of tearing of the sulcus
2. Cleans blood and debris from the sulcus area
3. Delivers impression material in the gingival sulcus slowly and with more accuracy and speed
4. Holds the sulcus open for an increased time.

DISADVANTAGES:

Increased chairside time.

MEROCEL STRIPS:

- Merocel is a new retraction material to displace gingiva with no tissue injury before making impression.
- Merocel retraction strips are synthetic material, which are specifically chemically extracted from a polymer hydroxylate polyvinyl acetate that creates a net-like strip without debris or free fragments.
- Placement of Merocel retraction technique does not require use of local anesthesia.
- Merocel retraction strip provides very excellent gingival retraction when compared to conventional retraction cord.
- The porous and sponge-like microstructure of Merocel produces a dry field for the impression to accurately capture the details. The absence of fibers decreases the risk of postoperative problems.

Advantages:

1. It is shaped easily
2. It effectively absorbs oral fluids
3. The sulcus is clean without the presence of any debris.



- A gingival finish line is prepared within the intracrevicular space. A 2 mm thick Merocel retraction strip is inserted
- The patient is asked to maintain pressure on the artificial crown for 10 to 15 minutes. The Merocel retraction strips tend to expand with absorption of selected oral fluids, exerting pressure on



surrounding tissues to provide gingival retraction.

- The material in the intracrevicular space is removed and an impression is made.

GINGITRAC :

- Gingitrac is a paste system that uses a syringe to apply the paste around the margins.
- The syringe is preloaded with the paste.
- The paste contains aluminum sulfate as an astringent. If necessary, a hemostatic agent can be applied before its use.
- The cap is first filled with the paste and then placed over the tooth for 5 min. The paste is applied with a syringe in the sulcus.
- For impressions of more than one tooth, a plastic tray is used to carry a firm paste matrix over which the Gingitrac paste is syringed.
- The tray is then positioned and removed after 3-5 min. For both single and multiple tooth preparations, retraction of gingiva is by pressure application. The paste is removed prior to impression making.



Advantages:

1. Easier to express from automix gun
2. Longer shelf life
3. Faster setting time
4. Controls oozing of blood
5. Removal is fast and easy
6. Materials slip cleanly out of sulcus without trauma.

STAY PUT :

- Stay put combines the advantages of both an impregnated and braided cord with the adaptability of an ultrafine copper filament. Aluminum chloride hexahydrate is used for

impregnation. Nonimpregnated stay put cord is also available which can be impregnated with hemostatic agent as needed.

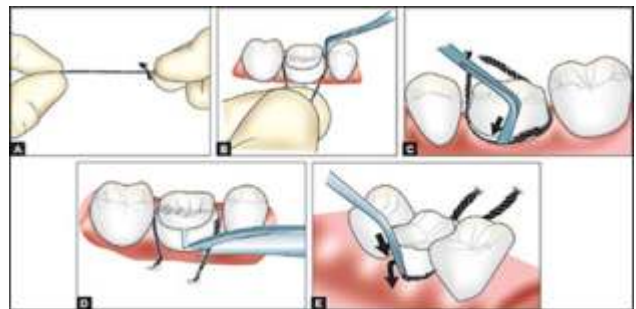
- The pliable core is so effective that the cord is not only easy to place in the sulcus but it stays there.

Features & Benefits:

1. Can be preformed
2. Does not unravel
3. Easily adapted
4. Stays in sulcus
5. No overlapping required

Advantages:

1. Hemostasis is fast
2. Possible to be preshaped
3. Pliable and can be adapted
4. Relatively safe for cardiac patients.



Direction to use stay put:

- Cut Stay-put to the required length.
- Stay-put can be soaked in any gingival retraction solution of your choice.
- Place the center of the cord into the sulcus.
- Leave the non-impregnated cord for at least 5 minutes in the sulcus.
- When using GINGIVA LIQUID allow 1-3 minutes for the liquid to take effect.
- Remove the cord directly before taking the impression

G-CUFF :

- It is a disposable plastic collar launched by Canadian company, named Stomatotech, for the purpose of retraction of gingiva.
- It is first inserted on the apical end of the abutment

after which the abutment should be engaged to the implant.

- The plastic collar is found between the apical part of the abutment and the gingival soft tissue.
- The plastic collar should be drawn out and then removed permanently after retrieving the impression from the mouth.



Clinical view of implant fixture after removal of cover screw



Application of G-Cuff™ at 21 implant sites for peri-implant soft tissue retraction. implant fixture, G-Cuff™, and abutment form a single unit

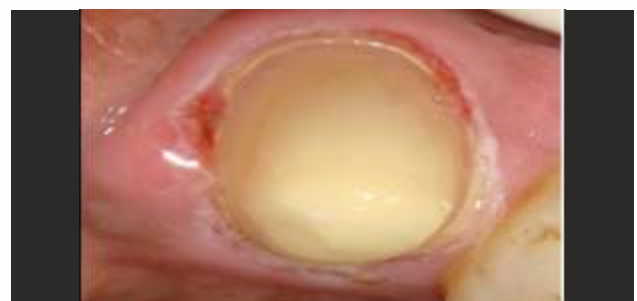


Removal of G-Cuff™ after soft tissue retraction at 21 implant sites



Clinical view of peri-implant soft tissue at 21 regions after retraction with G-Cuff™

LASER :



- Use of lasers is adjunctive in fixed prosthodontics. The laser produces minimal damage of collateral tissue when laser energy of the correct wavelength is used.
- Neodymium: yttrium-aluminum-garnet lasers are

not used as their use can result in loss of bone.

- Erbium: yttrium-aluminum-garnet (Er: YAG) lasers are fairly safe to use as they penetrate soft tissues minimally. CO2 lasers are used around implants. The primary chromophore for CO2 lasers is H2O. These lasers take in less energy close to metal implant surfaces, producing less temperature increases (<3°C) and less collateral damages. The soft-tissue structure is not altered by these lasers.

Advantages:

1. Excellent hemostasis is provided by CO2 laser
2. There is reduced shrinkage of tissue
3. There is comparatively less pain and the sulcus is also sterilized.

Disadvantages:

1. Er: YAG lasers are not good for producing hemostasis
2. CO2 laser provides no tactile feedback, leading to risk of damage to junctional epithelium.

CONCLUSION:

- Finish line exposure in fixed prosthodontics is no longer difficult. Various advanced materials are available for gingival retraction. Using these materials, we can definitely improve the quality of impressions in fixed prosthodontics. Furthermore, the procedure can be relatively painless, quick, and atraumatic. The selection of material has to be carefully done by the operator. Since gingival retraction is an integral part of clinical practice, the clinician should make an effort to utilize different methods and products available for retraction of gingival tissues in various clinical scenarios. Sometimes a combination of methods may be needed, and some things may work for one clinician and not for another. The effort put into the appropriate retraction of gingival tissues pays off in terms of longevity of restorations, better margins and aesthetics.

REFERENCES:

1. Baba NZ, Goodacre CJ, Jekki R, Won J. Gingival displacement for impression making in fixed prosthodontics: Contemporary principles, materials, and techniques. *Dent Clin North Am* 2014;58:45-68.
2. Rajambigai MA, Raja SR, Soundar SI, Kandasamy M. Quick, painless, and atraumatic gingival retraction: An overview of advanced materials. *J Pharm Bioallied Sci.* 2016 Oct;8(Suppl 1): S5-S7.
3. Alraheam IA, Donovan T. The segmental impression technique: A straight solution to a difficult problem. *J Prosthet Dent.* 2019 Nov 19, Epub ahead of print
4. Kamath r, Sarandha DL and Gulab Chand Baid (2011). *Advances in Gingival Retraction.* IJCD 2(1).
5. Parker S. (2004). The use of lasers in fixed prosthodontics. BDS, LDS RCS, MFGDP Private Practice, 30, East Parade, North Yorkshire, Harrogate, HG1 5LT, UK. *Dental Clinics of North America* 48 971-998.
6. GingiTrac™ [Internet]. Centrix Dental. Available from: <https://www.centrixdental.com/gingitrac-retraction-system.html>. [cited 2018 Dec 06].
7. Gus J and Livaditis DDSA (1998). The matrix impression system for fixed prosthodontics. *Journal of Prosthetic Dentistry* 79 208-16.
8. Nevins M and Skurow HM (1984). The intracrevicular restorative margin, the biologic width and the maintenance of the gingival margin. *International Journal of Periodontics & Restorative Dentistry* 4 31-49.

PROSTHODONTIC MANAGEMENT OF KNIFE-EDGE RIDGE USING CUSTOMIZED PREFABRICATED METAL MESH CUSTOM TRAY IMPRESSION TECHNIQUE

Arpit Sikri¹, Jyotsana Sikri², Nimmi Singh³, Poonam Bali⁴, Neeraj Mittal⁵

ABSTRACT :

Knife-edge ridge is a form of an alveolar ridge primarily caused by lateral resorption i.e. bone resorption on the buccal as well as lingual areas at a faster pace. It is usually a common clinical finding affecting the mandibular edentulous ridges; in particular, the mandibular anterior region. It can be attributed to a number of reasons i.e. the etiology is similar to the multifactorial etiology of the residual ridge resorption. The treatment options or management of knife-edge ridge generally includes a surgical and a non-surgical approach. The non-surgical approach involves the fabrication of conventional removable dentures using various modified impression materials & techniques. Prosthetic management of the patients with knife-edge ridge is a testing situation for the prosthodontist. The basic principles of retention, support, and stability are important in defining the success of a complete denture; the same can be affected in unconventional situations like knife-edge ridge. The incorporation of the conventional impression techniques may lead to an unstable and an unsatisfactory denture. Therefore, various impression materials & techniques have been proposed in literature to overcome such issues. This case report portrays an innovative and practical yet simple modified impression technique utilizing the incorporation of a customized prefabricated metal mesh into the custom tray i.e. single step impression technique using polyvinyl siloxane as the impression material of choice for managing the knife-edge ridge situation in the mandibular arch and ultimately ensuring a well-fitting prosthesis.

KEYWORDS: Cu-Sil overdenture, Customized metal mesh impression tray, Knife-edge ridge, Modified custom tray, Sharp residual ridge, Thin ridge

INTRODUCTION :

Tooth loss is inevitable and occurs more frequently due to caries and periodontal disease. A number of secondary factors also play a vital role in loss of tooth structure¹. As a part of physiological process, for example, in ageing, tooth loss becomes a regular picture. After the loss of tooth structure, the alveolar bone or the residual alveolar ridge tends to undergo remodelling, including wound repair and long-term Residual Ridge Resorption (RRR)². RRR or bone resorption is a common, chronic, progressive,

irreversible, incapacitating, debilitating, and a complex biophysical process that occurs in every patient³.

Residual ridge resorption is a term used for the diminishing quantity and quality of the residual ridge after the teeth are extracted (GPT 9)⁴. It is a complex process and a common occurrence following the extraction of teeth. It is most striking during the initial period of tooth loss, resulting in a slower but continuous rate of resorption thereafter⁵. The factors influencing the rate of resorption are divided into anatomic, metabolic, functional, and prosthetic factors⁶. The mean ratio of maxillary anterior RRR to mandibular anterior RRR is 1:4.2, indicating a higher RRR in mandible than in maxilla⁷.

The unique phenomenon of RRR can be attributed to continuous activity of osteoclasts at the surface of residual alveolar bone and occurs at a differential rate for each individual. The resorption occurring at a fast

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pace over the crest of the ridge leads to a flattened ridge⁸. On the contrary, a swift resorption of the residual ridge occurring at the buccal or the lingual areas can lead to sharp or knife-edge ridges⁹.

The replacement of the missing teeth and associated alveolar structures with a prosthesis helps to primarily achieve the objectives of a complete denture (CD) i.e. restoration of esthetics, function, and phonetics¹⁰. The success or performance of the complete denture relies on an accurate impression making and reproduction of the entire functional denture bearing as well as the limiting areas, easily achievable in conventional situations. Such a record helps to achieve maximum retention, support, and stability, which are the important pillars for a successful complete denture¹¹.

Impression making is the most basic and the most important requirement for a successful CD; both esthetically and functionally. Unfortunately, in unconventional situations i.e. a knife-edge or sharp denture bearing area, certain problems or complications may arise. The main problem encountered in patients with knife-edge ridge is pain under the dentures, which is generally chronic and persistent in nature. The pain may be severe; particularly, in function i.e. during mastication¹². Moreover, complete dentures fabricated over the sharp ridges can cause chronic irritation, soreness over the underlying edentulous residual ridges, and discomfort to the patient¹³. Wedging of the mucoperiosteum and the mucosa between the sharp, rigid spines of the ridge, and the rigid material of the prosthesis during mastication or occlusion produces irritation and pain. According to Goodsell¹⁴, razor-like or saw-tooth shaped ridges are one of the most frequent causes of discomfort from the dentures. Landa¹⁵ also listed the occurrence of denture failures as quite frequent when the mandibular ridge is thin and sharp. This may lead to difficulty in attaining the basic principles of retention, support, and stability in CD and becomes an arduous challenge for the prosthodontist in managing such situations¹⁶.

Knife-edge ridge is a form of a residual alveolar ridge

primarily caused by buccolingual resorption i.e. swift lateral resorption of both the buccal as well as the lingual alveolar ridge areas¹⁷. It is usually a common clinical finding in the edentulous individuals and particularly affects the mandibular edentulous ridges i.e. mandibular anterior region¹⁸. The prevalence was found to be 89% in the mandibular edentulous region. The remaining patients had sharp ridge in the maxillary anterior region & the same has been attributed to immediate upper dentures¹⁹. As per the literature, the sharp residual ridge is rather a frequent problem among the edentulous patients who have worn dentures for long periods²⁰.

In this location, the ridge frequently resorbs more rapidly on the labial and the lingual surfaces than it does at the crest, leaving a razor-thin wedge of bone. Knife-edge ridge can also be termed as a sharp residual ridge, razor thin ridge, saw tooth shape, thin, wiry, and sharp spiny ridge²¹.

A number of reasons may be attributed to the development of the knife-edge ridges. A combination of factors contribute to bone resorption, with the amount of resorption, and the relative importance of each factor varying with the patient. Etiological agents²² deemed significant include: (1) nutritional insufficiency of the diet, (2) endocrine functions, (3) tissue resistance to stress, (4) traumatic factors (dentures, etc.), (5) systemic diseases, and (6) disuse. The influence of genetic factors does not seem to have been studied. Inadequate dentures do not necessarily cause residual ridge changes in otherwise healthy individuals. On the other hand, ridge resorption probably cannot be controlled completely by ideal prosthetic procedures in a patient in whom the systemic disease or the pathologic conditions of the denture-bearing tissues exist. Immediate dentures are often an ultimate cause of sharp ridges. Moreover, it has been found that the postmenopausal women have a greater tendency to develop the knife-edge ridge in the mandibular region. Local bone destruction due to periodontal disease prior to tooth extraction, improper alveolar bone surgical procedures at the time of tooth extraction, lack of follow-up, and proper

correction of changing tissue conditions, may be the factors that contribute to bone resorption²³.

Management of the knife-edge ridge involves various treatment approaches or options. Broadly, such modalities may include a surgical and a non-surgical approach²⁴. The surgical modality includes the pre-prosthetic surgery, which may lead to surgical trauma along with destruction of the stabilizing bone. The other treatment approach involves implant retained fixed or removable prosthesis. This involves the dental implant taking support from the underlying bone. In addition to this, the thin bone structure may be removed prior to implant placement for better adaptation of the same. Different sizes of implant fixtures may be required due to difficulty in determining the accurate ridge before the osteotomy. The limitations of the surgical as well as implant intervention include patient's will to undergo the surgical treatment, age and medical condition of the patient, time involved in completion of the procedure, inconvenience, discomfort, risk of surgical complications, dental implant failures, predictability of the treatment, and economics involved²⁵. The non-surgical or the prosthodontic approach involves the conventional prosthodontics without the surgical intervention. This involves fabrication of a complete denture over the knife-edge ridge using appropriate impression materials and techniques. Apart from the various impression approaches, balancing of the occlusal forces is also employed²⁶.

The present case report describes an innovative and practical yet simple modified impression technique utilizing the incorporation of a customized prefabricated metal mesh into the custom tray i.e. single step impression technique using polyvinyl siloxane as the impression material of choice for managing the knife-edge ridge situation in the mandibular arch and ultimately ensuring a well-fitting prosthesis.

CASE REPORT :

A 25-year old partially edentulous male patient reported to the Department of Prosthodontics, Crown & Bridge and Oral Implantology, with a chief

complaint of difficulty in eating food due to missing teeth, since 2 years previously. Patient had insignificant past medical history. Past dental history of the patient revealed that the patient was not wearing any prosthesis.

Radiographic examination revealed root canal treatment done in 22, 24, 38, and 48. Intraoral examination revealed that the patient was partially edentulous with only 18, 22, 24, and 28 present in the maxillary arch and 38 and 48 present in the mandibular arch [Figure 1].

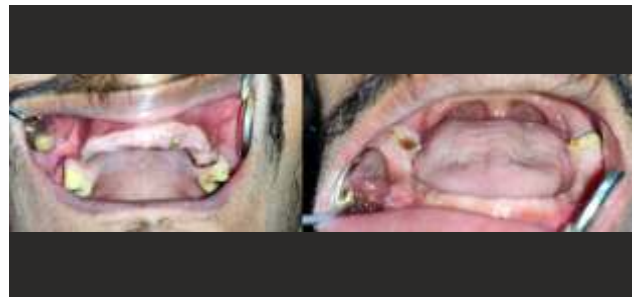


Figure 1 - Partially edentulous maxillary & mandibular edentulous ridge

The patient was informed about various treatment options i.e. surgical intervention, implant supported fixed and removable prosthesis, and conventional prosthodontic rehabilitation. As there was minimal crown portion of the tooth w.r.t. 22, 24, 38, and 48, which could not be taken as an abutment for the fixed prosthesis, it was decided to retain the roots which were not infected, hence non-vital root submergence treatment was planned for the patient. After explaining the various prosthetic treatment options to the patient and keeping in view his non-willingness for the surgical modalities along with his financial constraints, a final treatment plan was chosen for the patient. This included fabrication of a maxillary Cu-Sil overdenture i.e. a combination of maxillary Cu-Sil denture w.r.t. 18 & 28 as abutment teeth with an overdenture using submerged non-vital roots w.r.t. 22 & 24 and mandibular overdenture using submerged non-vital roots w.r.t. 38 & 48. The present case report involves an innovative and practical yet simple modified impression technique utilizing the incorporation of a customized prefabricated metal

mesh into the custom tray i.e. single step impression technique using polyvinyl siloxane as the impression material of choice for managing the knife-edge ridge in the mandibular arch. Informed consent was taken from the patient.

PROCEDURE:

The preliminary steps of complete denture fabrication remained the same.

1. Diagnostic impressions were made using additional silicone putty (GC Flexceed Putty, GC Corporation, Tokyo, Japan). This was followed by preliminary impressions of the maxillary and the mandibular arches using additional silicone putty & light body (GC Flexceed Putty & Light Body, GC Corporation, Tokyo, Japan) [Figure 2] in a single step. The elastomeric impression using putty & light body was preferred over the other conventional impression materials due to better reproduction of the details.



Figure 2 - Preliminary impressions - maxillary & mandibular

2. This was followed by fabrication of a primary cast using type II dental plaster (GypRock plaster, Rajkot, Gujarat, India). The outline of the knife-edge ridge area was marked over the preliminary cast [Figure 3].

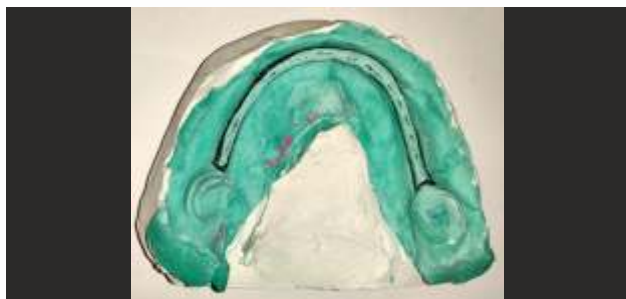


Figure 3 - Outline of the knife-edge ridge area - mandibular preliminary cast

3. A proper relief & spacer was planned & designed using an innovative method. This involved the application of an additional silicone putty (GC Flexceed Putty, GC Corporation, Tokyo, Japan) as a spacer in comparison to the conventionally used wax spacers.
4. After the adaptation of the putty spacer, a prefabricated metal mesh (MAARC - CE Reinforcement Golden Mesh, Shiva Products, Thane, India) was customized (cut into a small section) and adapted over the area of knife-edge ridge [Figure 4]. This was followed by fabrication of custom (individual) trays using autopolymerizing acrylic resin (DPI RR Cold Cure, Dental Products of India, Mumbai, India). The occlusal surface of the mandibular individual tray shows the customized prefabricated metal mesh in place [Figure 5].



Figure 4 - Prefabricated metal mesh (customization & adaptation) - mandibular



Figure 5 - Custom tray (mandibular) - customized prefabricated metal mesh in place

5. Border moulding was performed using low fusing green stick compound (Pinnacle Tracing Sticks, Dental Products of India, Mumbai, India). Even after the border moulding, the customized prefabricated metal mesh was intact without any

distortion [Figure 6]. Putty spacer was removed from the individual tray after the final border moulding [Figure 7]. The customized prefabricated metal mesh mandibular individual tray was evaluated in the patient's mouth [Figure 8]. Final impressions were made using medium body polyvinyl siloxane elastomeric impression material (Aquasil Ultra Medium, Dentsply India Pvt Ltd, Mumbai, India). The occlusal surface of the mandibular individual tray signified that the final impression was properly flown from the customized prefabricated metal mesh area [Figure 9].



Figure 6 - Border moulding (mandibular) - customized prefabricated metal mesh in place



Figure 7 - Putty spacer removal after completion of border moulding



Figure 8 - Customized prefabricated metal mesh custom tray - evaluation in patient's mouth



Figure 9 - Final impression (mandibular) - occlusal aspect of the individual tray

6. Beading and boxing of the final impressions was done to retrieve well-formed master casts. Definitive casts were poured using type IV gypsum product i.e. die stone (GypRock Dental Stone Class IV, Rajkot, Gujarat, India).
7. After the definitive casts were obtained, temporary denture bases and occlusal rims were fabricated.
8. Orientation jaw relation was recorded using facebow (Hanau™ Springbow, Whip Mix, Kentucky, USA) followed by transfer to the semiadjustable articulator (Hanau™ Wide-View, Whip Mix, Kentucky, USA).
9. Tentative jaw relations were carried out following the facebow transfer. After recording the centric jaw relation record, the casts were mounted in a semiadjustable articulator. The artificial teeth were adjusted and teeth arrangement was done following the ideal principles.
10. Waxed-up trial denture was assessed intra-orally, to verify the function, fit, and esthetics, before its processing. This was followed by proper sealing of the trial denture base to the definitive casts followed by de-articulation from the articulator.
11. The flasking & the dewaxing procedures were carried out in the conventional manner for both the arches.
12. After the application of tin foil substitute (DPI Heat Cure Cold Mould Seal, Dental Products of India, Mumbai, India), a prefabricated metal mesh (MAARC - CE Reinforcement Golden Mesh, Shiva Products, Thane, India) was selected and adapted

to the master cast. The already adjusted prefabricated metal mesh was checked on the maxillary cast for any last minute corrections in its adaptation; and the denture was packed, pressed, and processed in the conventional manner (DPI Heat Cure, Dental Products of India, Mumbai, India).

13. The processed dentures were retrieved and cleaned using an ultrasonic cleaner.
14. The dentures were finished, polished, and tried in the patient's mouth for evaluation of appropriate esthetics and occlusion [Figure 10]. After the necessary occlusal corrections, the prostheses i.e. maxillary Cu-Sil overdenture and mandibular overdenture were delivered [Figure 11].

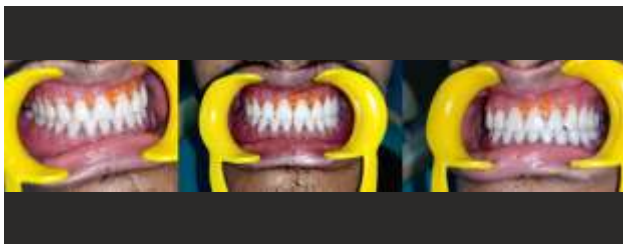


Figure 10 - Maxillary Cu-sil overdenture & Mandibular overdenture - in patient's mouth



Figure 11 - Maxillary Cu-sil overdenture & Mandibular overdenture - occlusal surface & intaglio surface

15. Patient was given instructions following the insertion of the complete dentures. Patient was evaluated after 3 recall visits i.e. after 24 hours, 1 week, and 1 month, respectively. Patient was satisfied with the esthetics, phonetics, and function of the removable prostheses.

DISCUSSION:

The main objectives of complete denture rehabilitation involves the restoration of function, appearance, comfort, and maintenance of the overall health of the patient. An accurate impression making

is an important factor determining the stability and retention of the prosthesis. This can be very well achieved in the conventional situations²⁷.

In unconventional situations i.e. in case of knife-edge ridge, due to lateral resorption, the residual ridge becomes thin in the buccolingual direction than in the vertical direction. Moreover, in some situations, the residual alveolar ridge may become resilient and may be replaced by an excessively movable soft tissue. This means that the flabby tissue can sometimes overly an atrophic and a knife-edge mandibular ridge²⁸.

Patients with knife-edge ridge usually complain of pain associated with the dentures and even can point the same to the offending site. In addition to this, patients also complain of chronic, persistent soreness under the dentures; particularly, during mastication or when clenching the teeth. Dentures often lack adequate stability and retention due to improper tissue changes or repeated relief of the basal surface of the denture. Occlusal relationships are generally poor. Tissues in the affected area are usually inflamed, hyperplastic, flabby, and tender to palpation. However, many of the sharp, painful ridges are covered with normal-appearing mucous membrane. Ridges should always be palpated when examining a mouth for possible new dentures²⁹. The production of pain by pressing the fingers on the ridge should arouse the suspicions of the dental surgeon. Meticulous diagnosis and treatment planning involving proper medical and dental history, the clinical examination, and the radiographic interpretation, ultimately contribute towards the diagnosis of the knife-edge residual ridge. The greatest aid in detecting sharp bony projections on the crest of the residual ridge is the radiographic interpretation. Three types of sharp residual ridges occur with greater frequency and can be classified according to their radiographic appearance³⁰. These are: (1) the saw-tooth ridge, (2) the razor-like ridge, and (3) the ridge with discrete large spiny projections. However, this classification is academic because all of these types can produce pain under the dentures. Any

related medical condition must be evaluated in relation to their effect on the oral structures. Before the definitive dental treatment can be successful, a medical consultation and treatment of systemic diseases must be carried out. Radiographic evaluation shows a clear, well-defined outline of thin ridge with cortical layer covering the cancellous bone³¹.

Various treatment modalities can be used to effectively manage the knife-edge ridges. These include the surgical and the non-surgical approach. The surgical approach includes surgical correction of the ridge to create a smooth denture-bearing surface, which can sustain a normal masticatory load without pain. Bearl³² states, "Any effort to replace a functional and aesthetic part of the human anatomy depends directly on the foundation on which it rests." This statement could involve the surgical removal of the sharp edges of the ridge. In patients in whom enough of the ridge would remain after surgery to provide adequate stability and retention of the prostheses, surgical removal of the sharp projections is definitely the treatment of choice. However, as many patients have suffered severe residual ridge atrophy, surgical treatment may leave them without any ridge. For these patients, relieving the cast or full denture over sharp ridge regions may be a temporarily effective compromise. Bolender and Swenson³³ reported a successful vestibular extension procedure. This surgical technique could be used in patients who do not have adequate ridges after removing sharp projections to recreate ridge conditions conducive to stability and retention of the prosthesis. Thoma³⁴ suggested implanting tantalum gauze or gelatine sponge on the labial aspect of the sharp ridges, especially those with undercuts, to regenerate new fullness and eliminate the need for bone removal. The use of silicone rubber has been reported for ridge extension procedures. Ridge augmentation using bone grafts can be used as an additive measure both during surgery and during placement of dental implants, but the treatment outcome remains unpredictable and debatable.

This makes the non-surgical or the prosthodontic

approach as the choice of treatment modality. According to M.M. DeVan³⁵, "the preservation of what remains is important rather than the meticulous replacement of what has been lost". The management of the unconventional knife-edge denture bearing area becomes a herculean task for the prosthodontist. Appropriate impression technique and material needs to be selected by a prosthodontist to record the knife-edge ridge in an undisplaced form with maximum retention, support, and stability. In addition to the impression making, it is critical to properly orient the occlusal plane, select a suitable occlusal scheme, and provide balanced occlusion in the patient. This can be achieved using face-bow transfer followed by arrangement of the teeth in a semi-adjustable articulator. The incorporation of improperly oriented occlusal plane along with the defective occlusal contacts will lead to instability of the complete denture³⁶.

The other strategies may include creating relief on the cast or in the denture over the painful regions to distribute the masticatory load all around³⁷. The relief of the prosthesis above the sharp ridge can temporarily relieve pain. However, additional soft tissue usually proliferates to fill the space created inside the denture base. The increase in the mass of hyperplastic tissue tends to reduce the stability of the prosthesis, which can lead to a further resorption. Once again, the soft tissues are wedged between the sharp bone and an unyielding prosthesis, and the soreness returns. Tissue conditioners or soft liners are generally used for the abused and the irritated tissues. The use of soft lining materials were later discouraged due to the hygiene and maintenance issues. Moreover, it is a temporary solution for managing the knife-edge ridge situations³⁸.

A plethora of impression techniques have been discussed in literature for overcoming the problem of the knife-edge ridge. Such techniques included the controlled-pressure impression technique & differential pressure impression technique. To simplify and overcome the limitations of the existing impression techniques, a novel impression technique



was developed. This involved the incorporation of a customized prefabricated metal mesh into the mandibular custom tray and impression making using a single step impression technique with polyvinyl siloxane impression material. The aim of this technique is to produce loading onto alternative areas (buccal shelf area) and relieve the mucosa over the sharp bony ridge from the load. The areas that are capable of bearing the load should be preferentially loaded. Those areas that are incapable of load bearing should have their loads reduced³⁹.

The differential pressure technique is associated with cutting away the impression over the sharp residual ridge with a scalpel followed by a larger perforation or numerous perforations. The controlled pressure impression technique was primarily advocated for the unemployed lower ridges. This involves relief over the mid crest area followed by impressions. The present technique overcomes the shortcomings associated with the primitive techniques used for recording the knife-edge ridges⁴⁰.

The main aim of using the customized prefabricated metal mesh in the custom tray was avoidance of scalpel blade to trim the impression over the sharp ridge and avoidance of multiple perforations or escape holes by the operator. There may be a significant error associated with the creation of escape holes depending on the operator. Further, the dimensions of the escape holes may vary, hence disrupts the standardization of the impression technique. Metal mesh itself acts as a standardized approach to create multiple escape holes in providing relief, and acts as a scaffold for supporting the impression material while setting and pouring the cast. The present technique also employed a single stage impression technique involving a single customized impression tray, which can be easily fabricated. Such a technique can be easily executed. Conversely, a two-tray impression technique is more time consuming and may lead to step formation during impression making.

The impression material used in the present technique was polyvinyl siloxane because of its shorter setting

time, easy mix, adequate tear strength and viscosity, extremely high accuracy, absence of any distortion on removal, ready availability, and good dimensional stability. It is definitely better over the other contemporary materials. The limitations associated with zinc oxide eugenol impression material are messiness and a variable setting time due to temperature and humidity. Eugenol is irritating to the soft tissues. This material is not elastic and can fracture in the presence of undercuts.

The technique described in this paper is not very complex i.e. it is easy to master and is easily completed and well managed even by a general dental practitioner. Moreover, neither extra time nor additional clinical visits are needed for this specialized impression technique and further the construction of a complete denture. The chairside time is minimum and the number of appointments are similar to a conventional complete denture. No extra armamentarium and auxiliary personnel is required for the impression technique. It is definitely an economical procedure.

Certain issues may be associated with this technique. This involves the tricky adaptation of the customized prefabricated metal mesh and difficulty in controlling the thickness of the impression material. In the present technique, an innovative putty spacer design was used to overcome the issues associated with the wax spacer. The incorporation of putty spacer ensures its easy removal from the metal mesh already incorporated in the custom tray prior to impression making. This is unlike in case of a conventional wax spacer, where it is difficult to remove the same; particularly, when a tin foil barrier is not used.

The advantages of the current impression technique definitely outweigh its limitations. This technique can also be employed in other unconventional edentulous ridge situations; in particular, the flabby ridge area. The modified tray design is a patient friendly approach and offers an undisplaced impression of the knife-edge ridge area with convenience.

In the present case report, the "tooth preservation" concept has been revisited. This can be proved with

the prosthodontic rehabilitation modalities i.e. Cu-Sil overdentures. Cu-sil like dentures are aimed at preserving the remaining natural teeth and have a positive effect on retention and stability of the dentures. It gives the patient psychological satisfaction of retaining the natural teeth. Moreover, the over-dentures using the non-vital submerged roots help in preservation of the remaining tooth structure along with its proprioception, preservation of the alveolar bone, and additional support to the dentures apart from the mucosa.

CONCLUSION :

Management of a patient with knife-edge ridge is an arduous task and presents difficulty in fabrication of a complete denture. The other treatment options i.e. surgery and implants may be effective but not always feasible in the elderly. Conventional impression-taking techniques pose a great challenge to the prosthodontist resulting in fabrication of a prosthesis with compromised retention and stability. CD patients can be prevented from developing sharp residual ridges and subsequent pain under the prosthesis by: (1) appropriate trimming of the alveolar ridges during extraction, (2) control of systemic disease, (3) counselling for proper diet, and (4) frequent periodic examination of dentures and oral tissues with adequate treatment of harmful conditions when present. The incorporation of the unconventional impression techniques i.e. modified impression techniques and relatively newer impression materials helps to record the knife-edge ridges effectively. Thus, the use of the modified impression technique using customized prefabricated metal mesh single custom tray and polyvinyl siloxane impression material provides an alternative, effective, and promising approach for the management of patients with knife-edge ridges.

REFERENCES :

1. Allen, P.F., McCarthy, F., 2003. Complete Dentures from Planning to Problem Solving. Quintessence. Publishing, London, pp. 123-133.
2. Atwood D. A. Reduction of residual ridges: a major oral disease entity. *J Prosthet Dent*, 26 (1971) 266.

3. Atwood, D. A.: A Cephalometric Study of the Clinical Rest Position of the Mandible. Part II. The Variability in the Rate of Bone Loss Following the Removal of Occlusal Contacts, *J Prosthet Dent*.1957; 7:544-552.
4. The Glossary of Prosthodontic Terms: Ninth Edition. *J Prosthet Dent*. 2017 May;117(5S):e1-e105.
5. Pietrokovski J. The residual edentulous arches--foundation for implants and for removable dentures; some clinical considerations. A review of the literature 1954-2012. *Refuat Hapeh Vehashinayim* (1993). 2013 Jan;30(1):14-24, 68.
6. Tallgren A. The Continuing Reduction of the Residual Alveolar Ridges in Complete Denture Wearers: A Mixed-Longitudinal Study Covering 25 years. *J Prosthet Dent*. 1972; 27: 120-32.
7. J. L. Cawood and R. A. Howell." A classification of the edentulous jaws. *Int. J. Oral Maxillofac. Surg*. 1988; 17:232-236
8. Campbell RL. A comparative Study of The Resorption of the Alveolar Ridges in Denture-Wearers and non-Denture-Wearers. *J Am Dent Assoc*. 1960;60:143-5
9. Carlsson GE. Responses of Jaw Bone to Pressure. *Gerodontology*. 2004;21:65-70
10. Lammie, G. A.: Reduction of the Edentulous Ridges, *J. Pros. Dent*. 10:605-611, 1960.
11. Ortman, H. R.: Factors of Bone Resorption of the Residual Ridge, *J. Pros. Dent*. 12:429-440, 1962.
12. Sobolik, C. F.: Alveolar Bone Resorption, *J. Pros. Dent*. 10:612-619, 1960.
13. Weinmann, J. P.: Bone Formation and Bone Resorption, *Oral Surg., Oral bled. Sr Oral Path*. 8:1074-1078, 1955.
14. Goodsell, J. O. : Surgical Aids to Intraoral Prosthesis, *J. Oral Surg*. 13:8-34, 1955.
15. Landa, J. S.: Practical Full Denture Prosthesis, ed. 2, Brooklyn, 1958, Dental Items of Interest Publishing Co., p. 42.
16. Collett, H. A.: Oral Conditions Associated With Dentures, *J. Pros. Dent*. 8:591-599, 1958.
17. Swenson, M. G.: Complete Dentures, ed. 3, St. Louis, 1953, The C. V. Mosby Company, p. 334.
18. Quirk, G. P., and Hinds, E. C.: Oral Surgery for Dental Prosthesis, *D. Clin. North America*, pp. 723-733, 1959.
19. Roger A. Meyer; Management of denture patients with sharp residual ridges. *J Pros. Dent*; may-june, 1966; 16(3) 431-37.
20. Weinmann, J. P.: and Sicher, H.: Bone and Bones, ed. 2, St. Louis, 1955, The C.V. Mosby Company.
21. Sheldom Winkler , essential of complete denture prosthodontics. A.I.T.B.S. Publishers and distributors 2nd edition 2000.
22. Atwood, D. A.: Some Clinical Factors Related to Rate of Resorption of Residual Ridges, *J. Pros. Dent*. 12:441-450, 1962.
23. Nishimura I, Szabo G, Flynn E, Atwood DA. A local



- pathophysiologic mechanism of the resorption of residual ridges: prostaglandin as a mediator of bone resorption. *J Prosthet Dent* 1988;60:381-S.
24. Nishimura I, Hosokawa R, Atwood DA. The knife-edge tendency in the mandibular residual ridges in women. *J Prosthet Dent* 1992;67:820-6.
 25. van Wouern N, Kellerup G. Symptomatic osteoporosis: a risk factor for residual ridge reduction of the jaws. *J Prosthet Dent* 1992;67:656-60.
 26. Dassebaum DK, Nummikoski PV, Triplett RG, Langlais RP. Cross-sectional radiography for implant site assessment. *Oral Surg Oral Med Oral Pathol* 1990;70:674-8.
 27. Modica F, Fava C, Benecch A, Preti G. Radiologic-prosthetic planning of the surgical phase of the treatment of edentulism by osseointegrated implants: an in vitro study. *J Prosthet Dent* 1991;65:541-6.
 28. James, R A et al. "Computer tomography (CT) applications in implant dentistry." *The Journal of oral implantology* 1991;17(1):10-5.
 29. Williams MY, Mealey BL, Hallmon WW. The role of computerized tomography in dental implantology. *Int J Oral Maxillofac Implants* 1992;7:373-80.
 30. Kraut RA. Utilization of 3D/Dental software for precise implant site selection: clinical reports. *Implant Dent* 1992;1:134-9.
 31. Poon CK, Barss TK, Murdoch-Kinch CA, Bricker SL, Miles DA, Van Dis ML. Presurgical tomographic assessment for dental implants. I. A modified imaging technique. *Int J Oral Maxillofac Implants* 1992;7:246-50.
 32. BEAR SE. Surgical preparation of the mouth for a prosthesis. *J Oral Surg (Chic)*. 1958 Jan;16(1):3-19.
 33. Bolender, C. L., and Swenson, R. D.: Cephalometric Evaluation of a Labial Vestibular Extension Procedure, *J. PROS. DENT.* 13:416-431, 1963.
 34. Thoma, K. H.: *Oral Surgery*, ed. 4, St. Louis, 1963, The C. V. Mosby Company, p. 352.
 35. Devan MM. Basic principles in impression making. 1952. *J Prosthet Dent*. 2005 Jun;93(6):503-8.
 36. Traxler M, Ulm C, Solar P, Lill W. Sonographic measurement versus mapping for determination of residual ridge width. *J Prosthet Dent* 1992;67:358-61.
 37. Boucher, 1., J.: Injected Silastic in Ridge Extension Procedures, *J. Pros. Dent.* 14:460-464, 1964
 38. Teitelbaum S L. Osteoclasts: what do they do and how do they do it? *the American Journal of Pathology*, vol.170, no.2, pp. 427-435, 2007
 39. Souza D. Oral Health Care - Prosthodontics, Periodontology, Biology, Research and Systemic Conditions
 40. Kreisler M, Behneke N, Behneke A, d'Hoedt B. Residual ridge resorption in the edentulous maxilla in patients with implant-supported mandibular overdentures: an 8-years retrospective study. *Int J Prosthodont.* 2003;16:265-300.

AN IMPACTED SUPERNUMARY TOOTH: A STARTLING PRESENTATION

Smita Lahane¹, Rashmi Rokade², Aditee Karkade³, Abhay Kulkarni⁴**ABSTRACT:**

Supernumerary dentition has been found to occur in various areas of the head and neck. Though they are frequently found along the dental arch. This case report details an impacted ectopic supernumerary molar tooth. Here, we present an unusual, accidental case of impacted ectopic supernumerary tooth at angle of mandible of 60-year-old male. Radiographically, OPG and CT scan revealed a benign appearing tooth like structure at the angle of mandible on right side.

KEYWORDS: Ectopic Tooth, Supernumerary Tooth, OPG, CT Scan.

INTRODUCTION:

Tooth eruption is a process in which the forming tooth migrates from its intraosseous location in the jaw to its functional position within the oral cavity. Various eruption problems arise during the transitional period of tooth eruption and ectopic eruption is one of them.¹ In ectopic eruption the tooth does not follow its usual route. The entity is been occasionally discovered in unusual orientations or at a distance from their normal anatomic position. The etiology of ectopic eruption can be due to disturbance of the differential growth pattern of the individual. Different tissues and organs grow at different rates and at different times. A delicate balance normally exists between the timing and rate of growth. Differential growth is the origin for normal and harmonious completion of various physiologic processes including the eruption of teeth. Whenever this balance is distressed, whether due to congenital factors or environmental interferences, an abnormal situation develops. It is, therefore, obvious that whatsoever the etiological factor, a disturbance in the balance between the rate of jaw growth, the rate of eruption of the first molars, and/or sizes of the teeth produces ectopic eruption¹⁶. Ectopic and supernumerary teeth have been rarely described in non-

dental and non-oral sites⁸ such as in mesial, distal apically, palatally from the normal position and rarely in the orbit, maxillary antrum, nasal cavity, nasal septum, mandibular condyle, coronoid process, palate, and chin.² Mandibular molars are commonly involved, specially third molars, which are impacted far away from their original sites. In most cases, conditions such as dentigerous cysts or nasal and maxillofacial symptoms may associated with ectopic teeth. In the present study, we report a case of an ectopic mandibular molar located at the angle of mandible with OPG and Cone Beam Computed Tomography (CBCT) that seems to have been displaced by neither cyst nor tumor and not associated with any pathology³.

CASE REPORT:

A 60-year-old male patient visited the Department, complaining of pain in the right upper and lower back teeth region. After intraoral examination, he diagnosed as trigeminal neuralgia involving right side of face maxillary and mandibular division after Diagnostic block testing with 2% of plain xylocaine and prescribed Tab Carbamazepine 200 mg twice daily and on follow-up visits showed improvement in the complaints. The panoramic radiograph of the patient shown an impacted and displaced tooth at the right angle of mandible. Tooth was identified as ectopic, as third molar was on position and other two molars were existed on the right side. Patient has no signs & symptoms for the same.

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Panoramic radiograph showing a tooth like structure located at the angle of mandible.

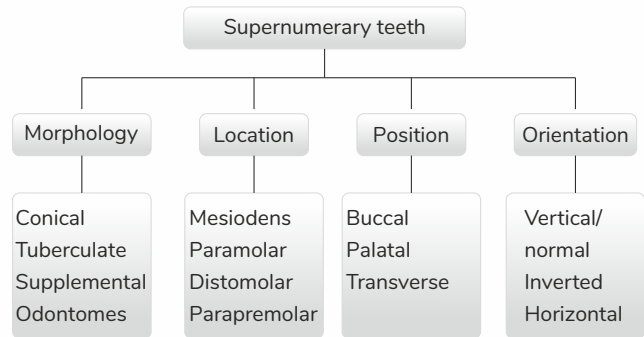
Further was investigated with Cone Beam Computed Tomography (CBCT) that has shown tooth morphology like structure at the angle of mandible of size approx. 18x 8.5 mm lingually 6.3 mm away from mandible suggestive of ectopic distomolar.



DISCUSSION:

Supernumerary tooth or an addition to the regular number of teeth is a rare developmental variance that can occur in any area of the dental arch. This occurrence is also known as hyperdontia and can occur in solitary or multiple form, may be unilateral or bilateral, and affect one or both jaws and have a remarkable predilection for maxilla over mandible. These teeth are more dominant among men than women in a proportion of 2:1.5 the frequency of supernumerary teeth in deciduous dentition is 0.3% to 0.8% and 1.5% to 3.5% in the permanent dentition⁴. They are most commonly located in the maxilla, the anterior medial region, where 80% of all supernumerary teeth are found. More infrequently, they can be located in the inferior premolar zone, superior distomolar zone, superior premolar, superior canine zone, inferior distomolar, and inferior incisor⁶. Numerous supernumerary teeth are frequently present when a syndrome is involved. Yusof et al suggested that it may be occasional to find

multiple supernumerary teeth without an associated syndrome. Communal syndromes showing multiple supernumerary teeth along with other conditions include Gardiner's syndrome, cleft lip and palate and cleidocranial dysostosis¹². The meticulous etiology of supernumerary teeth is unknown, however, numerous theories have been hypothesized to try to explain their presence: the phylogenetic theory as a regression to the anthropoids whose dental formula had more teeth, an abnormal reaction to a local traumatic episode, the autonomic recessive inheritance or linked to the X chromosome, environmental factors, dichotomy of the tooth germ and the theory of hyperactivity of the dental lamina, are the most accepted¹⁰. Supernumerary teeth classified based on morphology (conical, tuberculate, supplemental, and Odontomes), location (Mesiodens, Paramolar, distomolar, and Parapremolar), position (buccal, palatal, and transverse), orientation (vertical or normal, inverted, transverse, or horizontal)¹¹.



The presence of supernumerary teeth is a common dental anomaly, but the occurrence of Paramolars and Parapremolar is relatively uncommon. Supernumerary teeth can be asymptomatic and are diagnosed as an incidental finding during radiographic examination. On the other hand, Ectopic supernumerary tooth may be asymptomatic or existing with a variety of signs and symptoms, such as rhinorrhea, nasal obstruction, nasal congestion, pain, nasal bleeding, chronic inflammation, persistent discharge and crusting, septal abscess and fistula formation, and external nasal deviation. These symptoms can be established, recurrent, and impasse to systemic therapy with antibiotics and

corticosteroids⁹. In present study we advise follow up for the ectopic distomolar at the angle of mandible. The frequency of Mesiodens (47 - 67%), premolar (8-9%), distomolar (26%), Paramolars (15%), lateral incisor (2.05%), and canine (0.40%).^{6,7}

Effects of supernumerary teeth on the developing dentition differ. There may be no effect of supernumerary tooth or they discovered accidentally on radiograph. Crowding may be apparent due to an increased number of erupted teeth. Failure of eruption of adjacent permanent teeth is the most recurrent occurrence and occurs in 30 to 60 per cent of cases. The supernumerary or adjacent teeth may be displaced and ectopic eruption of either is not uncommon¹². Dentigerous cysts are the most common jaw lesion in this category (65%) mostly impacted third molar, followed by calcifying epithelial odontogenic tumors (52% - 60%) predominantly impacted third molar and calcifying odontogenic cysts (10% - 20%) predominantly impacted canine, The maximum incidence of association with an impacted tooth was seen for unicystic ameloblastomas (50% - 80%) predominantly impacted third molar, adenomatoid.

Odontogenic tumors (73%) predominantly impacted canine, odontomas, and dentigerous cysts (65%)¹⁵. The association of a dentigerous cyst with supernumerary teeth constitutes only 5-6% of all dentigerous cysts¹². The cysts related with these teeth can persist for years without symptoms and may be detected only by routine imaging⁸. In other cases, patients become symptomatic with signs of sinus disease such as swelling, facial pain, nasolacrimal duct obstruction and headache. Moreover, a large maxillary cyst can cause orbital and sinonasal symptoms¹³.

Conclusion:

The most frequently impacted supernumerary teeth are maxillary canines and mesiodens. They are more

common in males than females. In our case the site of impacted supernumerary tooth is unusual which is at the angle of mandible on right side and it is not associated with any pathology and was asymptomatic. It is rare to ensue and careful investigation needed to rule out this findings.

REFERENCES:

1. Syed M. Y, Sarasvati N, Uloopi K. S. Ectopic eruption - A review and case report Contemporary Clinical Dentistry | Jan-Mar 2011 | Vol 2 | Issue 1 | Page 3-7.
2. K. Törenek,1 H. M. Akgül,1 and I. S. Bayrakdar2 Ectopic Premolar Tooth in the Sigmoid Notch Volume 2016, Article ID 6426523, 3 pages
3. Jinfeng Liu1, Mo Zhou1, Qitong Liu2, Xiaolin He1 and Ningyu Wang1 Process of ectopic tooth formation in the maxillary sinus: follow-up observation of one case journal of International Medical Research 2019, Vol. 47(12) 6356-6364
4. Kritika Jangid1, Sheeja Saji Varghese2, Nadathur Doraiswamy Jayakumar3 Ectopic Supernumerary Tooth at the Anterior Nasal Spine- A Developmental Glitch Journal of Clinical and Diagnostic Research. 2015 Nov, Vol-9(11): ZJ01-ZJ02
5. Ata-Ali F, Ata-Ali J, Peñarrocha-Oltra D, Peñarrocha-Diago M. Prevalence, etiology, diagnosis, treatment and complications of supernumerary teeth. J Clin Exp Dent. 2014;6(4):e414-e418. Published 2014 Oct 1. doi:10.4317/jced.51499.
6. Nayak, G.; Shetty, S.; Singh, I.; Pitalia, D. Paramolar-A supernumerary molar: A case report and an overview. Dent. Res. J. 2012, 9, 797-803.
7. Fernández-Montenegro P, Valmaseda-Castellón E, Berini-Aytés L, GayEscoda C. Retrospective study of 145 supernumerary teeth. Med Oral Patol Oral Cir Bucal 2006;11:E339-4
8. Saleem, T., Khalid, U., Hameed, A. et al. Supernumerary, ectopic tooth in the maxillary antrum presenting with recurrent haemoptysis. Head Face Med 6, 26 (2010). <https://doi.org/10.1186/1746-160X-6-26>
9. Becca Taylor, AS, Leciél Bono, RDH-ER, MS and JoAnn R. Gurenlian, Managing Supernumerary and Ectopic Teeth. J multidisciplinary care. Oct 11, 2021
10. Díaz A, Orozco J, Fonseca M. Multiple hyperodontia: Report of a case with 17 supernumerary teeth with non syndromic association. Med Oral Patol Oral Cir Bucal. 2009 May 1;14(5):E229-31
11. Sreekanth Kumar Mallineni1,2 Supernumerary Teeth: Review of the Literature with Recent Updates Hindawi Publishing Corporation Conference Papers in Science Volume 2014, Article ID 764050, 6 pages <http://dx.doi.org/10.1155/2014/764050>.
12. Kaushal Mahendra Shah,1 Amol Karagir,1 Shridevi Adaki,2 Channaveer Pattanshetti1 Dentigerous cyst associated with



- an impacted anterior maxillary supernumerary tooth . BMJ CaseRep 2013. doi:10.1136/bcr-2012-008329.
13. Abbie Naus¹ , Stephen Hernandez¹ , Anne C. Kane¹ , and Daniel W. Nuss¹ Odontogenic Cyst From an Ectopic Supernumerary Tooth Impacted in the Orbital Floor Journal of Advanced Oral Research 10(2) 165-169, 2019
 14. Jiang Q, Xu GZ, Yang C, Yu CQ, He DM, Zhang ZY. Dentigerous cysts associated with impacted supernumerary teeth in the anterior maxilla. Exp Ther Med. 2011 Sep;2(5):805- 809. doi: 10.3892/etm.2011.274. Epub 2011 May 18. PMID: 22977579;PMCID:PMC3440772.
 15. Mortazavi H, Baharvand M. Jaw lesions associated with impacted tooth: A radiographic diagnostic guide. Imaging Sci Dent. 2016;46(3):147-157. doi:10.5624/isd.2016.46.3.147
 16. Yaseen SM, Naik S, Uloopi KS. Ectopic eruption - A review and case report. Contemp Clin Dent. 2011;2(1):3-7. doi:10.4103/0976-237X.79289.

ELASTIC TRACTION TREATMENT FOR THE MANAGEMENT OF CHRONIC DISLOCATION OF BILATERAL MANDIBULAR CONDYLE – A REPORT OF 2 CASES

Subia Ekram¹, Chandmani Tigga², Virendra Kumar Prajapati³, Om Prakash⁴

ABSTRACT :

Temporomandibular joint (TMJ) dislocation is an uncommon but debilitating condition of the facial skeleton. Temporomandibular joint (TMJ) dislocation is a common problem faced in outpatient setting by maxillofacial surgeons and dentist. Chronic recurrent TMJ dislocation is a challenging situation to manage. Though the chronic dislocation of bilateral condylar of mandible is not very common, but if it occur to the patient, there is no fixed noninvasive protocols to manage it. This study is an attempt to establish the noninvasive treatment protocols for further studies with larger sample size.

KEYWORDS: TMJ Dislocation. Chronic Dislocation

INTRODUCTION :

True TMJ dislocation is a condition in which condylar processes are displaced from glenoid fossa anterior to the articular eminence. TMJ dislocation is a very painful distressing and a restless condition in which patient had problem in closing and opening the mouth and also inability to chew the food properly. It is an uncommon condition which can happened for a variety of reasons including extreme mouth opening during yawning (46%), trauma to the mandible, dental treatments, anti-emetic medications, systemic diseases such as Ehlers-Danlos, Marfan syndromes, Steinert's disease, Meige's syndrome, endotracheal intubation and some psychogenic/neurologic disorders.¹⁻² TMJ dislocations can be subdivided into acute, chronic or recurrent type.³ In acute situations, it requires manipulation by another individual to reduce to its normal position. If the reduction of acute dislocation is delayed, the chronic condition will be encountered where manual reduction usually is insufficient and may require surgical intervention. The recurrent dislocation is a condition where repeated episodes of dislocation take place and it may be self-reducing or needs manual reduction.⁴⁻⁵ The term

"acute" refers to untreated dislocation up to 72 hours from the time since it got dislocated.⁶⁻⁷ Acute dislocation presenting within 2 weeks is readily reducible by Hippocrates maneuver (The manual reduction method is performed by first pressing the mandible downward, then backward, and finally upward). After 2 weeks, spasm and shortening of the temporalis and masseter muscle occur and reduction becomes difficult to achieve manually leading to "chronic protracted Dislocation". Chronic, protracted dislocation may be left unperceived, undiagnosed/misdiagnosed and untreated for days, weeks, months to even years and developed into a "longstanding" condition. Spontaneous anterior TMJ dislocation is not a common condition, with a reported annual incidence of 5.3 per 1000,000 patients who present to the emergency department.⁸ The aim of treatment should be directed towards returning the condyles to their original position and conservative methods should be the first line of choice. Early conservative reduction by Hippocrates maneuver with or without local anaesthetics and sedatives is the best treatment. Reduction using this method can be achieved in most cases. Once the condylar head has been reduced, a period of functional restriction is advocated. Muscle relaxants may also be prescribed. In many instances, however, a tendency toward redislocation requires use of a chin strap/face-lift bandage.

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CASE REPORT:

Case 1

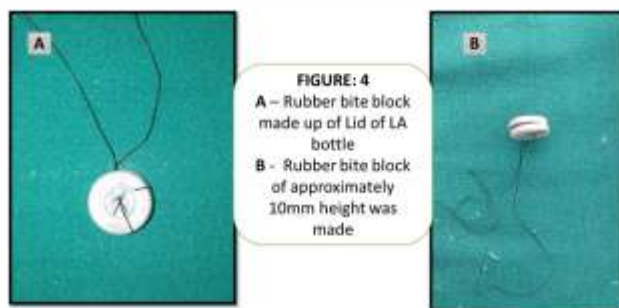
An 18-year-old Male patient was referred to the Department of Oral and Maxillofacial Surgery, RIMS Dental Institute, with a chief complaint of RTA with locking of lower jaw and being unable to close his mouth. History revealed that the patient had trauma 1 month back. The patient had no prior history of TMJ dislocation and fracture. On examination, an anterior open bite of 20 mm, a notable preauricular depression and a restricted range of mandibular motion were observed. 3D CT FACE Scan revealed bilateral TMJ dislocation (the patient reported with the radiographs). On Intraoral examination prominent gonial angle with blunting of articular eminence is also seen. The diagnosis of chronic recurrent TMJ dislocation was made based on clinical examination, radiographic investigations, it was observed that the mandibular condyle had developed a pseudoarticulation anterior to the articular eminence. Then decided for the managed conservatively by placing upper and lower arch bars along with Bilateral posterior rubber bite block of approximately 10mm height was made with rubber lid of LA bottles used in our centre (Figure 4). The rubber bite block was inserted in first molar region bilaterally, with their strings outside so that they can be retrieved after dislodgement if it occur. Class II elastic traction was applied on either side with anterior box elastic with green orthodontic elastics. After 3 weeks, the elastics and the posterior rubber bite blocks were removed but the upper and lower arch bars were retained for 3 more weeks (Figure 1 & 2). The patient never got his joints dislocated in these 3 weeks, and finally the arch bars were removed. Conservative approaches should be attempted initially, surgical treatment can be used only after these have failed.



Case 2

A 27 years old Male patient was reported to our department who had bilateral TMJ dislocation after trauma. Duration for dislocation was one and half months. Same criteria was applied for the manual reduction. But manual reduction was Unsuccessful in this case too. Then planning for conservative management for the reduction (Figure 3). The diagnosis of Chronic Recurrent TMJ Dislocation was made based on clinical examination, radiographic investigations, and case history. In asepsis condition, part preparation was done with 5% povidine iodine. Local infiltration was given with Lignocaine 2% with Adrenaline 1:100000. First Erich arch bar was cut to the appropriate size for each jaw. Both ends of the wire was pass through the first interproximal space from the buccal to the lingual side, keeping one wire above and the other beneath the arch bar. The wires was crossed over in the lingual space and passed through the second interproximal space from the lingual to the buccal surface. The wire was fixed in both jaws with the help of 26 gauge prestretched stainless steel. This procedure was continued until the last tooth on the other side was reached and again the wires was twisted around the bar. Bilateral posterior rubber bite block of approximately 10mm height was made with rubber lid of LA bottles used in our centre. The rubber bite block was inserted in first molar region bilaterally. Routine NSAIDs with muscle relaxant was used. During inter arch elastic traction, if

required we was use 2mg of midazolam IV to reduce the anxiety and get muscle relaxation during the procedure with all precaution.



DISCUSSION :

Long-standing TMJ dislocation usually occurs when a case of acute dislocation is left untreated or is inadequately treated. On the basis of the clinico radiological evaluation, Akinbami[17] classified TMJ dislocation into the following three types:

- Type I The head of the condyle is directly below the tip of the eminence
- Type II The head of the condyle is in front of the tip of the eminence
- Type III The head of the condyle is high up in front of the base of the eminence.

The TMJ dislocation has an incidence of about 3% of all dislocations throughout the body.⁹ The diagnosis of TMJ dislocation is often clinically based. The most common clinical symptom is the inability to close the mouth i.e. "open lock". Typical signs and symptoms seen in patients with TMJ dislocation include inability to occlude, anterior cross bite, prominent preauricular depressions, drooling of saliva, lip incompetency and

mandibular pain. The aim of treatment should be directed towards returning the condyles to their original position and conservative methods should be the first line of choice.¹⁰ However, diagnosis is confirmed by radiographic evaluation. The conservative method included use of various sclerosing agents like alcohol, sodium tetradecyl sulfate, autologous blood transfer, sclerotherapy, botulinum toxin injection, or a combination thereof, Injection of the lateral pterygoid muscle with botulinum toxin. In case of chronic protracted dislocation, elastic rubber traction with arch bar fixation with elastic bands are useful to achieve the reduction.¹¹ Temporomandibular joint recurrent dislocation treatment still remains debated. Some patients could be successfully treated by conservative approach, but nonresponders have to be addressed by surgery, which results to be mandatory in 5% of cases.¹² As the duration of dislocation increases, the joint cavity fills with connective tissue, cartilaginous changes occur, adhesions develop between joint surfaces, and there is shortening of the masticatory muscles. Temporalis muscle fibrosis and impingement of the coronoid have also been reported to increase the difficulty of reduction. Due to continuous traction by elastics, the joint ligaments and shortened muscles were stretched, repositioning the condyle in the glenoid fossa. Even if this kind of management is time consuming and require frequent follow-up, the method is safe as compared to inherent risks of surgery under general anaesthesia. The method is especially suitable patients with poor financial status and in government hospital setups where the patients need to wait for several weeks to months for a surgery date, further deteriorating their condition. In cases of failure to reduce, Initially try all the conservative treatments first, surgical treatment can be used only after these have failed.

CONCLUSION :

In conclusion, there is no consensus regarding the treatment of long-term TMJ dislocation, from above discussion we conclude that long standing TMJ dislocations up to six months and more can be

reduced with ease with the help of this simple & versatile mechanical method by avoiding major surgical intervention. We suggest the use of a mechanical method to pull down the superiorly displaced condyle below the articular eminence followed by a maneuver to guide it posteriorly towards the glenoid fossa. Continuous traction using elastics in achieving a complete repositioning of the condyle back into the fossa. Further studies with large series are needed in order to reach an agreement concerning the definition and the most appropriate treatment protocol for long-term TMJ dislocation. Surgical management of TMJ dislocation may not always be feasible due to various factors like patient co-morbidities, lack of operating theater, lack of surgical skill, financial status, etc. Thus, it is important to have a knowledge of various conservative methods of reduction in our armamentarium.

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REFERENCES:

1. Harstall R, Gratz KW, Zwahlen RA. Mandibular condyle dislocation into the middle cranial fossa: a case report and review of literature. *J Trauma Acute Care Surg.* 2005;59(6):1495-1503
2. Guven O. Inappropriate treatments in temporomandibular joint chronic recurrent dislocation: a literature review presenting three particular cases. *J Craniofac Surg.* 2005;16(3):449-452
3. Chausse J-M, Richter M, Betlex A. Deliberate, fixed extraarticular obstruction: treatment of choice for subluxation and true recurrent dislocation of the temporomandibular joint. *J CranioMaxillofac Surg.* 1987; 15:137-140.
4. Van Der Kwast W. Surgical management of habitual luxation of the mandible. *Int J Oral Surg.* 1978; 7(4):329-332.
5. Sheppard IM, Sheppard SM. Subluxation of the temporomandibular joint. *Oral Surg Oral Med Oral Pathol.* 1977;44(6):821-829.
6. Thomas ATS, Wong TW, Lau CC. A case series of closed reduction for acute temporomandibular joint dislocation by a new approach. *Eur J Emerg Med.* 2006;13:72-75.
7. Sensoz O, Ustuner ET, Celebioglu S, Mutaf M. Eminectomy for the treatment of chronic subluxation and recurrent dislocation of the temporomandibular joint and a new method of patient evaluation. *Ann Plast Surg.* 1992; 29(4):299-302.
8. Oliphant R, Key B, Dawson C, Chung D. Bilateral temporomandibular joint dislocation following pulmonary function testing: a case report and review of closed reduction techniques. *Emerg Med J.* 2008;25(7):435-436.
9. Pillai S, Konia MR. Unrecognized bilateral temporomandibular joint dislocation after general anesthesia with a delay in diagnosis and management: a case report. *J Med Case Rep.* 2013;7:243.
10. Wijmenga JPH, Boering G, Blakestijn J. Protracted dislocation of the temporomandibular joint. *Int Oral Maxillofac Surg* 1986;15:380-388.
11. Singh A, Sharma, N, Pandey A, Verma V, Singh S. Temporomandibular joint dislocation. *N J Maxillofac Surg.* 2015;6(1):16.
12. Cascone P, Ungari C, Paparo F, Marianetti T, Ramieri V, Fatone M. A New Surgical Approach for the Treatment of Chronic Recurrent Temporomandibular Joint Dislocation. *Journal of Craniofacial Surgery.* 2008;19(2):510-512.

A SPECTRA OF FACIAL AND AURICULAR ANOMALY: BRACHIAL ARCH SYNDROME

Pratiksha Hada¹, Sakshi Sharma², Vikram Singh³, Shivam Dubey⁴

ABSTRACT :

Hemifacial microsomia (HFM) is a congenital facial deformity involving the structures derived from first and second pharyngeal arches like temporomandibular joint, mandibular ramus and body, muscles of mastication, ear and sometimes facial nerve. HFM is the second most common developmental craniofacial anomaly after cleft lip and palate, which usually occurs unilaterally, but also may occur bilaterally. In the present article, we have reported a case of HFM in an 18 year old female with unilateral facial hypoplasia and deformed ear.

KEYWORDS: Condylar hypoplasia, hemifacial microsomia, microtia, unilateral hypoplasia

INTRODUCTION :

Hemifacial microsomia (HFM) is a condition characterized by underdevelopment of the first and second branchial arch structures. Hemifacial microsomia (HFM) was first used by Gorlin to refer to patients with unilateral microdontia, macrostomia, and failure of formation of the mandibular ramus and condyle.¹ It is the second most common craniofacial malformation after cleft lip and palate. Goldenhar syndrome is considered a variant of this condition that additionally includes epibulbar dermoids and vertebral anomalies. The reported incidence cases of HFM are about 1 in 5600 live births. During the development of the jaw, the neural crest cells migrate to the first pharyngeal arch from the posterior mesencephalic fold and from the first rhombomeres, which gives rise to the skeletal maxillo-mandibular component.² Damage or disruption of these neural crest cells result in HFM and some related syndromes.

CASE REPORT :

An 18yrs old female patient reported to the department of oral medicine and radiology with a chief complaint of difficulty in mouth opening since childhood. Patient's mother gave no history of forceps delivery or any trauma. On general examination, patient was moderately built and well nourished,

cooperative, well oriented to time, place and person, with normal gait and all the vitals were within normal range. Family history was non-contributory.

On detailed extraoral examination- there is evident facial asymmetry due to mandibular hypoplasia, deviated chin with fullness of face on left side (figure 1a), as well as malformed ear on same side (figure 1 b). The eye, ala of nose and corner of mouth is placed at a higher level on right side. TMJ movements are palpable on right side while lateral excursion movements were restricted.

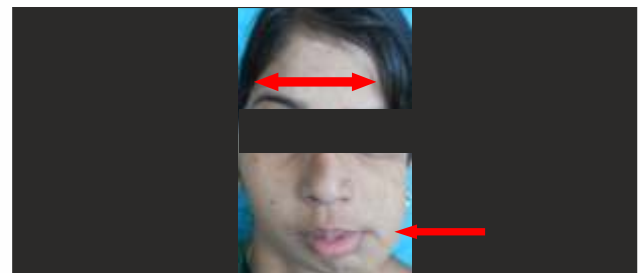


Figure 1(a)



Figure 1(b)

Mandible is deviated on left side during mouth opening along with shifting of midline, distance from chin to angle of mandible is more on right side (90mm) (figure 2) as compared to left side (75mm) (figure 3)

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similarly distance from tip of nose to outer canthus of eye is more on right side (74mm) (figure 4) as compared to left side (54mm) (figure 5). On palpation tenderness was absent on preauricular region bilaterally, muscles of mastication were also non tender.



Figure 2



Figure 3

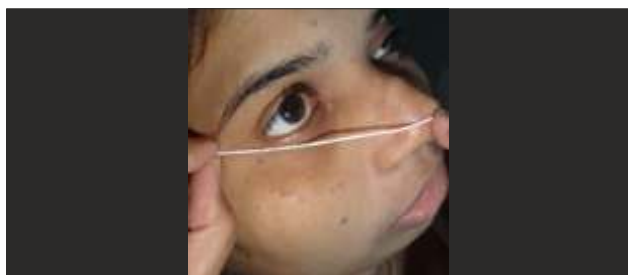


Figure 4

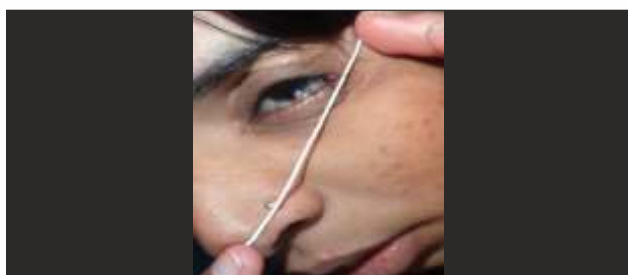


Figure 5

Intraoral examination revealed midline deviation, mesial tilt in vertical axis (figure 6), crowding in upper and lower anteriors and angles class I molar relation on right side and angles class II molar relation on left

side. (figure 7,8)

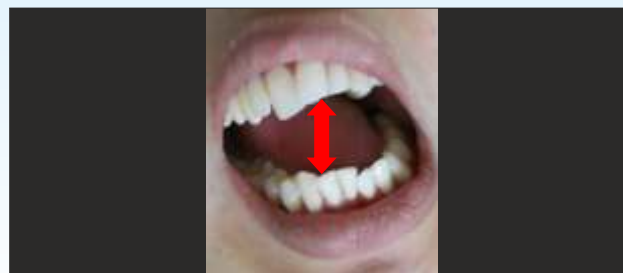


Figure 6



Figure 7



Figure 8

On the basis of history and clinical examination, a provisional diagnosis of Unilateral ankylosis of left temporomandibular joint was given. The differential diagnosis considered were hemifacial microsomia, hemifacial atrophy and condylar hypoplasia.

The patient was subjected to panoramic radiograph (OPG) and computed tomography (CT scan). OPG revealed left side mandibular hypoplasia, short ramal height and width, small condylar head, reduced height of mandible, reduced depth of sigmoid notch and prominent antegonial notch. (figure 9) CT scan showed reduced height of left orbit and maxillary sinus with deviated mandible, prominent antegonial notch and small mandibular condyle (figure 10,11). Thus final diagnosis of Hemifacial microsomia involving left side of face was made. Orthognathic surgery for maxillary and mandibular hypoplasia

along with orthodontic treatment was proposed.



Figure 9

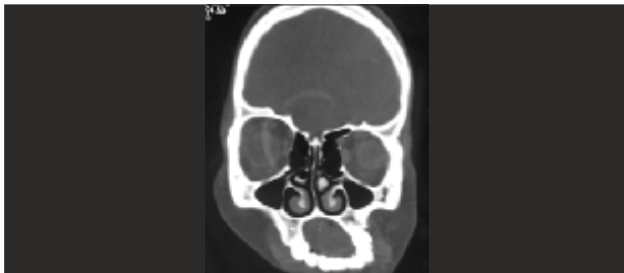


Figure 10



Figure 11

DISCUSSION :

The facial deformity caused by hemifacial microsomia is a congenital condition in which the lower half of face is unilaterally under-developed and does not catch-up with the normal growth during childhood. Until now the cause of hemifacial microsomia has been uncertain, although it has mainly been considered to be a developmental abnormality.^{1,3} The condition seems to have a multifactorial origin and is heterogenous in its clinical appearance.

Synonyms for HM include "otomandibular-dysostosis" or first and second brancial arch syndrome". The two most frequently used classifications are the skeletal-auricular-soft tissue (SAT) and the orbital asymmetry-mandibular-hypoplasia-earmalformation-nerve dysfunction-soft tissue (OMENS) deficiency.⁴

In 48% of the cases, the condition is a part of a larger syndrome such as Goldenhar syndrome.⁵ In our case, there was evident facial asymmetry due to mandibular hypoplasia on left side and deviated chin with fullness of face on the left side. There was malformed ear on the left side. Intraorally, tooth size discrepancies, tooth agenesis, supernumerary teeth, malocclusion, enamel and dentine malformations, delayed tooth development and eruption may be present. In this case there was crowding in upper and lower anteriors, class I molar relation on right side and class II molar relation on left side.

Radiographically, OPG and CT scan reveals aplasia or hypoplasia of the mandibular body, ramus and condyle and hypoplastic maxillary and zygomatic bones. In the case reported here, OPG revealed left side mandibular hypoplasia, short ramal height and width, small condylar head and prominent antegonial notch. CT scan revealed reduced height of left orbit and maxillary sinus. Based upon the clinical and radiographic findings, a final diagnosis of HFM was made. The differential diagnosis of HMF include Pierre Robin Syndrome, Treacher Collin Syndrome and Parry Romberg Syndrome.

Management of HFM is a multidisciplinary approach, with the goal to improve facial symmetry and functioning.⁶ Considering the age and growth of the individual, the treatment can be broken down into various age segments.⁷ In our case the age of the patient was 18years, orthognathic surgery along with orthodontic treatment was proposed.

CONCLUSION :

The first step in treating the patients with HFM, is an accurate diagnosis. Many of the craniofacial anomalies can be misdiagnosed, although the treatment of some of these anomalies is like HFM.^{2,8} Decision making for treatment planning of patients with HFM, is highly dependent on the severity of the deformity and patient's age.⁹ In mild grades of the anomaly, functional therapy can improve facial and occlusal symmetry in young ones, but in more severe grades, imposition of orthopedic treatment, may be undesirable and waste of time. Early surgical

interventions to encourage the growth in the affected condyle may be helpful in severe cases, however, consultation with the surgeon is advised to determine the outcome of the treatment.^{5,10}

REFERENCE :

1. Taysi K, Marsh JL, Wise DM. Familial hemifacial microsomia. *Cleft Palate J* 1983;20:47-53.
2. Rollnick BR. Oculoauriculovertebral anomaly: variability and causal heterogeneity. *Am J Med Genet Suppl* 1988;4:41-53.
3. Fraser FC, Ling D, Clogg D, Nogrady B. Genetic aspects of the BOR syndrome brachial fistulas, ear pits, hearing loss, and renal anomalies. *Am J Med Genet* 1978;2:241-52.
4. Yovich JL, Stranger JD, Grauaug AA, Lunay GG, Dawkins RL, et al. Goldenhar syndrome occurring in one of triplet infants derived from in vitro fertilization with possible monozygotic twinning. *Fertil Embryo Transfer* 1985;2:278-32
5. Lawson K, Waterhouse N, Gault DT, Calvert ML, Botma M, Ng R. Is hemifacial microsomia linked to multiple maternities? *Br J Plast Surg*. 2002;55(6):474-8. [PubMed: 12479420]
6. Saddiwal R, Hebbale M, Nisa SU, Sane V. Hemifacial microsomia? A case report and review of literature. *Int J Adv Health Sci* 2014;1:9?12.
7. Kapur R, Kapur R, Sheikh S, Jindal S, Kulkarni S. Hemifacial microsomia: A case report. *J Indian Soc Pedod Prev Dent* 2008;26(Suppl 1):S34?40.
8. Mielnik-Blaszczak M, Olszewska K. Hemifacial microsomia? Review of the literature. *Dent Med Probl* 2011;48:80?5.
9. Chaudhari SY. Craniofacial microsomia: A rare case report. *J Oral Maxillofac Radiol* 2013;1:70?4.
10. Choudhary SH, Kale LM, Mishra SS, Swami AN. Hemifacial microsomia: A rare case report. *J Indian Acad Oral Med Radiol* 2015;27:603-7.