From the MD's Desk



Dr. T.Ramesh, M.D., Correspondent

I am extremely glad that the third edition of our college journal is being published.

The journey of last 15 years of this institution has seen an exponential growth in terms of technological advances, academic felicitations, alumni success, and overall development of the institution.

The constant pursuit of quality education, global competency and practice of recognized standards and methodologies has won the institution the present acclaim and recognition.We strive to achieve excellence in all spheres, be it at a professional level or in an individual level.

Our college has always been on a forefront in organizing conferences, conventions, publishing academic journals, to encourage the exchange of scientific ideas amongst the students and faculty.

Journals have become deeply embedded in academic infrastructure. The academic journal is still perceived as an important and robust method of publishing scientific ideas, despite innovations in communication. The articles are often selective and specialised in their coverage.

The importance of journals in academic life goes beyond providing a means of communication and a permanent record. Journal articles are the final output of most research. A researcher's performance and productivity are judged largely on the number of publications as well as where they appear.

My appreciation goes to all the contributors to make our college journal a masterpiece of academic and scientific excellence.

Best wishes to all.

Principal's Message



Dr. A.Vasanthakumari, M.D.S., Principal

Warm Greetings to everyone!

It is a moment of pride and honour to accomplish our effective contribution for Dental fraternity and Dental literature through our journal of contemporary Dental Research (JOCDR). It is an almost privilege for the institution to witness the ever ending guidance and unconditional support by our beloved correspondent sir, without whom this milestone achievement wouldn't have been possible. Periodic evolution in Dental sciences, constant improvement and refinement in day today Dental practice and newer innovations in Dental delivery is our motto.

The primary aim of the college journal is to provide a platform for students, research scholars, academicians and researchers to publish their innovative research ideas as well as original research findings and attain their recognition in the Dental literature

It is our ongoing mission to advance dental medicine and promote dental sciences by publishing highquality papers relevant to everyday dental practice and motivate young researchers, to support their efforts in making the first steps in the world of scientific publications so that they can become the great future of dentistry.

A heartfelt appreciations and congratulations to the students, faculties and other contributors, whose papers are published in this issue of the journal and simultaneously encourage all the students to contribute their research papers and articles for the successive issues of the Journal.

Our focus is to provide a wholesome development, which covers not only the best possible academic and research environment for our graduating students but also make them competent enough to take care of society with a humanitarian touch aiming at 'Service above Self'

MESSAGE FROM EDITOR -IN - CHIEF



Dr. K. Prabhu Editor - in – Chief

To achieve and promote excellence in publications and applied research, our college has taken the initiative to publish staff and students research papers and articles through the college journal. The December 2020 issue of The Journal of contemporary dental research brings even more research content. There is a total of 10 articles of which there are 3 original research papers, 3 case reports, and 4 review articles.

I would like to take this opportunity to express my sincere gratitude to the reviewers and members of the editorial board for their collective effort and dedication to The Journal of contemporary dental research. We have been extremely happy to receive the insights and reviews performed for the Journal, which in many cases have substantially improved the quality of our published articles. Our main focus will be to continue publishing high-quality research articles that help the professionals in our fraternity to navigate today's complex care environment. I thank all of our submitting authors who have toiled in the production of their work and have made this issue possible.

PATRON

HIS HOLINESS ARUL THIRU. BANGARU ADIGALAR, FOUNDER PRESIDENT – ACMEC TRUST THIRUMATHI V. LAKSHMI BANGARU, VICE PRESIDENT – ACMEC TRUST DR. T. RAMESH, M.D., CORRESPONDENT, APDCH

Editorial Board Chairman

Dr. A. Vasanthakumari, Professor and HOD, Department of Pediatric and Preventive Dentistry Principal

Chief Editor

Dr. K. Prabhu, Professor, Department of Prosthodontics

Associate Editors

Dr. James.M, Reader, Department of Oral and Maxillofacial Surgery Dr. Rajeswary.K, Reader, Department of Public Health Dentistry

Assistant Editors

Dr. Sakthidaran Dr. Ramesh Karthick Dr. Kalaivani Dr. R.Sujith

thick

Editorial Board Advisors

Dr. N. Thilagavathy - Professor and HOD, Department of Oral medicine and Radiology Dr. Durairaj D, Professor and HOD, Department of Oral and Maxillofacial Surgery Dr. Shamala Professor and HOD, Department of oral pathology and microbiology
Dr. V. Sudhakar, Professor and HOD, Dept of Orthodontics and Dentofacial Orthopedics Dr. Hemasathya, Professor and HOD, Dept of Conservative Dentistry and Endodontics

Design & Artwork

Mr. S.Gopalakrishnan & Mr. D.Palanivelu OM SAKTHI OFFSET PRESS, MELMARUVATHUR

Copyright Although every possible care has been taken to avoid any mistake and this publication is being sold on condition and understanding that the information it contains are merely for guidance and reference and must not be taken as having the complete authority. The Institution and The Editors do not owe any responsibility for any action taken on the basis of this publication. The copy rights on the material and its contents vests exclusively with the publisher. Nobody can reproduce or copy the prints in any manner.

INSTRUCTION TO AUTHORS

Submission of Manuscripts:

Covering letter

- Signed by all contributors
- Source of funding mentioned
- Conflicts of interest disclosed

Authors

- Last name and given name provided along with Middle name initials (where applicable)
- Author for correspondence, with the e-mail address provided
- Number of contributors restricted as per the instructions
- Identity not revealed in the paper except the title page (e.g. name of the institute in Methods, citing the previous study as 'our study', names on figure labels, name of the institute in photographs, etc.)

Presentation and format

- Double spacing
- Margins 2.5 cm from all four sides
- Page numbers included at the bottom
- Title page contains all the desired information
- Running title provided (not more than 50 characters)
- Abstract provided (structured abstract of 250 words for original articles, unstructured abstracts of 250 words for review articles and unstructured abstracts of about 150 words for all other manuscripts excluding letters to the Editor)
- Keywords provided (three or more)
- Introduction
- Headings in title case (not ALL CAPITALS)
- The references cited in the text should be after punctuation marks, in superscript with a square bracket.
- References according to the journal's instructions, punctuation marks checked
- Send the article file without 'Track Changes'

Language and grammar

- Uniformly British English
- Write the full term for each abbreviation at its first use in the title, abstract, keywords and text separately unless it is a standard unit of measure. Numerals from 1 to 10 spelled out
- Numerals at the beginning of the sentence spelled out
- Check the manuscript for spelling, grammar and punctuation errors
- If a brand name is cited, supply the manufacturer's name and address (city and state/country).
- Species names should be in italics

Tables and figures

- No repetition of data in tables and graphs and in text
- Actual numbers from which graphs drawn, provided
- Figures necessary and of good quality (colour)
- Table and figure numbers in Arabic letters (not Roman)
- Labels pasted on back of the photographs (no names written)
- Figure legends provided (not more than 40 words)
- Patients' privacy maintained (if not permission taken)
- Credit note for borrowed figures/tables provided
- Write the full term for each abbreviation used in the table as a footnote

References

References should be numbered consecutively in the order in which they are first mentioned in the text (not in alphabetic order). Identify references in text, tables, and legends by Arabic numerals in superscript with square bracket after the punctuation marks. References cited only in tables or figure legends should be numbered in accordance with the sequence established by the first identification in the text of the particular table or figure. Use the style of the examples below, which are based on the formats used by the NLM in Index Medicus. The titles of journals should be abbreviated according to the style used in Index Medicus. Use complete name of the journal for non-indexed journals.

Articles in Journals

 Standard journal article (for up to six authors): Parija S C, Ravinder PT, Shariff M. Detection of hydatid antigen in the fluid samples from hydatid cysts by co-agglutination. Trans. R.Soc. Trop. Med. Hyg.1996; 90:255–256.

Books and Other Monographs

Personal author(s): Parija SC. Textbook of Medical Parasitology. 3rd ed. All India Publishers and Distributors. 2008.

Chapter in a book: Nesheim M C. Ascariasis and human nutrition. In Ascariasis and its prevention and control, D. W. T. Crompton, M. C. Nesbemi, and Z. S. Pawlowski (eds.). Taylor and Francis,London, U.K.1989, pp. 87–100.

Electronic Sources as reference

Journal article on the Internet: Parija SC, Khairnar K. Detection of excretory Entamoeba histolytica DNA in the urine, and detection of E. histolytica DNA and lectin antigen in the liver abscess pus for the diagnosis of amoebic liver abscess. BMC Microbiology 2007, 7: 41.doi:10.1186/1471 2180-7-41.

Journal e-mail-id for e-submission : jocdr@apdch.edu.in

Journal of Contemporary Dental Research

Vol.2 | Issue 2 | July - December 2020

Contents

1.	HAIR TRANSPLANT SURGERY AND ORAL & MAXILLOFACIAL SURGEON A SURGICAL TIE UP. A SPECIALITY OF INTEREST IN VARIOUS MINDS Dr.Raj Prakash. B, Dr.Durairaj. D, Dr.Suresh Kumar. G, Dr.James Antony Bhagat. M	-	7
2.	GRANULAR CELL AMELOBLASTOMA - A CASE REPORT AND REVIEW Dr. Rathi Vadhana.S, Dr.Saranya.V, Dr. Shamala Ravikumar. S, Dr.Annapoorani. D	-	10
3.	PATIENT COMPLIANCE WITH REMOVABLE ORTHODONTIC RETAINER – A QUESTIONNAIRE STUDY Dr. Lavanya.R, Dr.Sudhakar. V, Dr.Ramya.R, Dr.Ananda Devi.C, Dr.Sakthidaran, Dr.Muruganandam	-	14
4.	ASSESSMENT OF EFFICACY AND RELIABILITY OF TWO MIXED DENTITION ANALYSIS- MOYERS AND TANAKA JOHNSTON – A INVITRO STUDY Dr. Vivek. K, Dr. Vasanthakumari.A, Dr. Jaiganesh.I, Dr. A. Selvabalaji, Dr. Preethi Archana. S, Dr. Eswari. R	-	18
5.	PERIPHERAL PAIN RECEPTORS AND PURINERGIC SIGNALING PATHWAY IN PERIODONTAL TISSUES Dr. Santhiya Rengaraj, Dr.Pradeepkumar, Dr.Baalagopal, Dr.Sivasankari, Dr.Sathish Kumar.K, Dr.Priyadurga	-	21
6.	BARRIERS FOR UTILIZATION OF ORAL HEALTH CARE SERVICES AMONG RURAL POPULATION – AN INDIAN OUTLOOK Dr. Kalaivani. S, Dr. Rajeswary. K, Dr. Veena Dharani. S	-	25
7.	RADIX ENTOMOLARIS AND PARAMOLARIS: AMINI REVIEW AND CASE SERIES WITH CLINICAL IMPLICATIONS Dr.Majumder Gayatri, Dr.Adhikari HD, Dr. Niyogi Abhijit, Dr. Rajmohan Sujith	-	29
8.	A STUDY OF RELATIONSHIP BETWEEN AGE, GENDER AND TOOTH SHADE VALUE IN POPULATION OF MELMARUVATHUR, KANCHEEPURAM DISTRICT, TAMIL NADU Dr.Kirubakaran.A, Dr. Prabhu.K, Dr. karthick.V.C, Dr. Ramesh Karthick, Dr. Sonia abraham, Dr. Jitin Varghese mathew	-	32
9.	CONE BEAM COMPUTED TOMOGRAPHIC IMAGING – ANATOMY OF MAXILLOFACIAL REGION Dr. Lakshman.VL, Dr. Thilakavathy.N, Dr. Prasanna Kumar.D, Dr. Umamaheswari.G, Dr. Bharathi.K	-	35
10.	LOST DENTIN REDEFINED WITH "BIODENTINE" - A CASE SERIES Dr. Venkatesan Sudhakar, Dr. Thangavel Vaibhavi, Dr. Vellingiri Kanagapriyaa, Dr. Bahavathi Ananthan Hemasathya, Dr. Senthil Kumar R	-	39

HAIR TRANSPLANT SURGERY AND ORAL & MAXILLOFACIAL SURGEON A SURGICAL TIE UP. A SPECIALITY OF INTEREST IN VARIOUS MINDS

Dr.Raj Prakash. B¹, Dr.Durairaj. D², Dr.Suresh Kumar. G³, Dr.James Antony Bhagat. M⁴

¹⁴Reader, Department of Oral and Maxillofacial Surgery, Adhiparasakthi Dental College and Hospital, Melmaruvathur.
²Professor and Head, Department of Oral and Maxillofacial Surgery, Adhiparasakthi Dental College and Hospital, Melmaruvathur.
³Professor, Department of Oral and Maxillofacial Surgery, Adhiparasakthi Dental College and Hospital, Melmaruvathur.

Keywords :

Hair transplant surgery, Oral & Maxillofacial Surgeons, Raw area

Corresponding Author :

Dr.Raj Prakash

Department Of Oral & Maxillofacial Facial Surgery

Contact No. +919894730166

Email. sirdoctor77g@gmail.com

INTRODUCTION:

Hair transplantation is one of the most rapidly evolving procedures in aesthetic surgery, accompanied by regular improvement in techniques ⁽¹⁾. Hair transplantation refers to a surgical technique in which the hair of the posterior scalp, which is not affected by hormones, is extracted, separated into hair follicle (HF) units, and transplanted into a hair-deficient area of the scalp. This minimally-invasive surgery is mainly used to treat hair loss in men. According to the International Society of Hair Restoration Surgery, the global market for hair transplantation has increased by 76% from 2006 to 2014^{(2,14}). Oral & maxillofacial surgeons practice in hair transplant surgery has found to be increased in the recent decade^(3, 15,). The harvest of hair graft has been in speculation which was clarified by DCI India in response to an RTI query, the Dental Council of India, issued a reply dated December 15, 2015. that 'As per revised MDS regulations 2007 notification, a qualified oral maxillofacial surgeon is eligible to harvest rafts and free flaps from the distant sides(sic) such as fibula, ilium and radial forearm. A copy of the relevant pages (59-62) of Revised MDS Course Regulations 2007 is enclosed herewith (16).

HISTORY OF HAIR TRANSPLANT :

Transplantation of hear-bearing grafts has been done with varying success since the early 1800s. The possibility of successful hair transplantation in animals was demonstrated as early as 1804 or 1818 by Baronio. In 1939 a Japanese dermatologist, Okuda (4,5), first described the use of small full-thickness grafts for the correction of alopecia of the scalp, eyebrow, and moustache areas in severely burned patients. Because of World War II, his work did not become recognized outside Japan until many years later. The principles of hair transplantation to treat male pattern baldness were first described by Orentreich ⁽⁶⁾ in 1959. It was Orentreich who introduced the concept of donor dominance that was further developed in the mid -1950s. Even nowadays the main principles of hair transplantation remain the same. In most of the countries, the hair transplantation is a surgical procedure and only surgeons can perform it. There are different medical specialties interested in the field of hair microsurgery: Oral and Maxillofacial Surgeons, Facial Plastic Surgeons, General Plastic Surgeons, ENT, Dermatologist,

ABSTRACT

Hair transplant surgery is the specialty surgery long performed by Plastic surgeons and General surgeons in yester years. This article sites various methods and tie up of Oral & Maxillofacial surgeons involved in this raw area in the recent decade



and in some circumstances even Neurosurgeons (to treat scars on the scalp)⁽¹²⁾.

ANATOMY OF HAIR :

Hair arises from the scalp; each hair arises from a follicle consisting of epidermis that has invaginated the dermis to form a sleeve-like structure. The base of the follicle is intimately associated with the dermal papilla, and hair is the product of interaction and communication between dermis and epidermis. The hair shaft consists of Keratinocytes that are compacted and cemented together. The final product is remarkably strong and resistant to the extremes of nature.

The site of attachment of the arrector pili muscle and the sebaceous gland act as anatomical boundaries separating the hair follicle into three parts:

- 1. The bulb, which extends from the base of the follicle to the insertion of the arrector pili muscle
- 2. The isthumus, which extends from the to the insertion of the arrector pili muscle to the sebaceous duct
- 3. The infundibulum, which runs from the insertion of the entrance of the sebaceous duct to the follicular ostium.

Each terminal hair consists of either two or three elements depending on weather it is sufficient size and caliber to develop a central core or medulla. If present, this central medulla, which arises from hair matrix cells, may occur intermittently along the hair. It is encased by the hair cortex, which forms the major part of the hair shaft and contributes most to the color and the mechanical properties of hair. The cortex is in turn encircled by the hair cuticle, a shield that protects the hair cortex is responsible for the texture of hair ⁽⁷⁾.



PATHOPHYSIOLOGY :

Androgenetic alopacia is the most common form of Baldness. Androgenetic alopecia is further classified as Male and Female pattern baldness under which numerous authors Beek (1950), Hamilton (1951), Ogata (1953), Settee (1970), have given classification and the most widely accepted among them is Norwood's (1975) classification of Male & Female pattern Baldness¹³. The clinical

onset of baldness in both men and women is generally around the age of 30 to 40 years. A strong family history is one of the best indicators of male pattern baldness or androgenic alopecia, which is the most common cause of hair loss. An autosomal dominant genetic linkage is believed to cause this hair loss. Male pattern baldness may begin in the teen years, and becomes more common with increasing age. It is known that the male hormone, testosterone, gets converted to another male hormone, 5-dihydroxytestosterone (5-DHT), in the hair follicles. Under the influence of 5-DHT, hair follicles in the front and the top of the scalp begin to become more fine over the years in genetically susceptible men. Hair growth also gets restricted and eventually the hair disappears completely. Like most tissues, hair undergoes a continuous turnover throughout life. Hair follicles are replaced periodically, and at any given time, they are in one of three stages of their growth cycle. The actively growing stage (anagen phase) is followed by a brief period of morphological change or the involution stage (catagen phase). This is then followed by a resting stage (telogen phase). In normal human beings, the total number of scalp hair is usually 100,000. Hair grows at the rate of 1-2 cm every month and the duration of the anagen phase is 2-4 years while that of the telogen phase is 100 days. Approximately 40-100 hairs are shed daily; this rate increases in late summer and early autumn, and decreases in late winter or early spring, due to the effects of temperature. Norwood has classified baldness into seven stages. In women, the frontal hairline is usually spared and baldness in females has been classified separately by Ludwig⁽¹⁾. Alopecia, the term for generic hair loss, involves a diminution of visible hair. There are numerous types of alopecia. The most common form of surgically treatable alopecia is androgenic alopecia (AGA). Throughout time, the presence of scalp hair has represented attributes of health, vigor, vitality, and strength. Accordingly, loss of hair in men (MAGA, or male pattern androgenic alopecia) and especially women (FPHL, or female pattern hair loss) can have significant psychosocial effects (8).

SURGICAL TREATMENTS IN HAIR TRANSPLANT :

In contemporary practice, follicular units can be obtained either through strip excision of the donor scalp with subsequent microscopic tissue dissection ⁽⁹⁾ or by removal using a technique called follicular unit extraction (FUE) ⁽¹⁰⁾.

STRIP EXCISION :



This is the first and foremost procedure in Hair restoration surgery. In this method the donor site i.e. the back of the head is prepared and a strip of hair along with subcutaneous tissue is excised and hair follicles are implanted in the front region. In preparation for the strip harvest, the selected area of donor hair is trimmed to 4- to 5-mm length and the patient is positioned in a lateral decubitus position. An ellipse of donor scalp is outlined, and following the administration of local anesthesia, tumescent saline solution is infiltrated and graft is harvested as a patch. The entire harvested area is then closed directly with sutures. The important drawback of this method is donor site morbidity ⁽⁹⁾.

FOLLICULAR UNIT EXTRACTION :

Follicular unit extraction is an alternative method of donor harvest. This technique is essentially a refined "micropunch grafting" version of the older punch graft technique. Using the current technique of FUE, 1 FU is removed at a time. There are several techniques and instruments to perform FUE. These include manual, power-assisted, and automated methods (10). Follicular unit extraction comprises approximately 22% of all hair restoration donor harvest procedures performed, as reported in a worldwide poll of hair restoration surgeons (11). To extract FUs with FUE, the punch must be aligned with the direction of emergence of the hair shaft, which must remain in the center of the punch. The use of high-power magnification glasses (4-5x) is important because they make greater precision possible in the extraction. With modern punches, the hair must be cut to a length of 1 to 2mm to see the angle of emergence; however, new punches not yet available commercially are being developed to permit extractions with long hair. The angle of emergence of the hair changes depending on the area of extraction. The hair emerges at a more acute angle in the temporal region and at the borders of the scalp. One of the recommended techniques to make the follicle adopt a more vertical position and thus facilitate extraction is to inject saline solution (tumescence) immediately prior to incision with the punch⁽²⁰⁾. The depth to which the punch should be introduced varies depending on whether a sharp, blunt, or hybrid punch is being used. Sharp punches are usually introduced to a depth of 2.5 to 3mm; deeper than this (below the level of insertion of the arrector pili muscle), the deeper segments of follicles in anagen diverge, increasing the risk of transection. Blunt and hybrid punches, because of their greater dissecting and lesser cutting effects, can be introduced deeper (>4mm) with less risk of transection. However, blunt punches have a higher risk of pushing the graft into the dermis (buried grafts).

ADVANTAGES & DISADVANTAGES :

One of the novelties of FUE has been the possibility to extract FUs from other body areas. This is useful in patients in whom the donor area of the scalp has a low density of FUs, as often occurs in patients who have undergone a number of previous transplants. The area of body hair most commonly used is the beard, especially the submandibular region. Other areas from which follicles can be extracted are the chest, abdomen, pubis, legs, and axillas ^(18,19). One undeniable disadvantage of FUE is that the procedure is very laborious and demanding on the surgeon. Depending on the surgeon's expertise, it can take 1.5 to 3hours to obtain 1000 grafts using FUE, making this is a very surgeon-dependent technique. Most surgeons limit sessions of FUE to a maximum of 1500 to 2000FUs per day so as not to excessively prolong operating times⁽¹⁷⁾. In the experience of the authors, when 2000 or more FUs need to be extracted, it is preferable to do this on 2 consecutive days not only to limit operating times but also to minimize potential damage to the grafts.



CONCLUSION :

Hair restoration surgery has developed into a highly sophisticated subspecialty that offers significant relief to patients with hair loss. This aspect of cosmetic surgery is a very welcome addition to a traditional aesthetic practice and serves as a tremendous source for patient satisfaction and internal cross-referral. The results of hair restoration are natural, enduring, and are performed with a very high level of patient safety. This degree of refinement has been established through an improved understanding of hair biology and physiology as well as the incorporation of standard microsurgical techniques. The combination of different surgeries based on patient selection is necessary since each has its uniqueness. Recent advances in technology have made hair replacement surgery a viable option for many people but we must utilize this technique prudently. It is very important to form a team because one individual cannot perform the entire procedure single handedly. Fine tuning and accuracy in all steps of the surgery are essential to get good results. No compromise should be made with proper lighting in the operating room and with the quality of the instruments. A comfortable ambience in the operating room and use of audio-visual entertainment break the monotony, both for the patient and the surgical team. Ideally the transplant surgeon should know and be able to perform the 2 techniques (FUE and

strip) to be able to use the most appropriate one for each patient and not the most convenient one for the surgeon. The most interesting advantages of FUE compared to FUT are the reduction in postoperative discomfort in the donor area and the lower visibility of the pinpoint scars. The main disadvantages of FUE are that it is more laborious, leading to longer operating times, and its long learning curve.

REFERENCES:

- 1. Hair transplantation surgery IJPS.org. Indian J Plast Surg Supplement 2008 Vol 41. Pages S56 – S63
- 2. Needle Transportable Semi-Automatic Hair Follicle Implanter and Image Based Hair Density Estimation for Advanced Hair Transplantation Surgery Appl. Sci. 2020, 10, 4046; doi:10.3390/app10114046. www.mdpi.com/journal applsci.
- The Future of Maxillofacial Surgery as a Specialty of Dentistry. J Maxillofac Oral Surg. 2017 Mar; 16(1): 1–2.Published online 2017 Jan 16. doi: 10.1007 s12663-017-0995-x. PMCID: PMC5328881
- Okuda S. Klinische und experimentelle Untersuchungen über die Transplanatation von lebenden Haaren. Jpn. J. Dermatol., 40–537, 1939.
- okuda S. Clinical and experimental studies of transplantation of living hairs. Jpn. J. Dermatol. Urol., 46:136–138, 1939.
- Orentreich N. Autografts in alopecias and other selected dermatological conditions. Ann. N.Y. Acad. Sci., 83:463,1959
- 7. Handbook of diseases of the hair and scalp. Rodney P.R.Dawber, Rodney D.Sanclair, Cedric C.Banfield.
- Hair Restoration Surgery: The State of the Art. James E. Vogel, MD; Aesthetic Surgery Journal 33(1) 128–151 – 2013
- 9. Bernstein RM, Rassman WR. Follicular transplantation: patient evaluation and surgical planning. Dermatol Surg. 1997;23:771-784
- Uebel CO. Micrografts and minigrafts: a new approach for baldness surgery. Ann Plast Surg. 1991;27(5):476-487
- 11. International Society of Hair Restoration Surgery. 2011 Practice Census Results. Geneva, IL: International Society of Hair Restoration Surgery; July2011
- 12. Hair Restoration Surgery: an Up-to date for Maxillofacial Surgeons. Essentials of Oral and Maxillofacial Surgery. http://austinpublishinggroup.com/ebooks
- Classifications of Patterned Hair Loss: A Review. J Cutan Aesthet Surg. 2016 Jan-Mar; 9(1): 3–12. doi: 10.4103/0974-2077.178536 PMCID: PMC4812885 PMID: 27081243
- 14. ISHRS 2015 Data: Hair Transplants Up 76% from 2006. Available online: https://www.plasticsurgerypractice.com/client-objectives/rejuvenation/hair transplant/ishrs-2015-data-hair-transplants-76-2006 (accessed on 23 October 2019).
- Laskin DM. The past, present, and future of oral and maxillofacial surgery JOral Maxillofac Surg. 2008;66:1037–1040. doi: 10.1016/j.joms.2007.11.037.
- Jagannathan M. Privileges. Indian J Plast Surg. 2016;49:1–2. doi: 10.4103/0970 0358.182256
- OrsS,OzkoseM,OrsS. Follicular unit extraction hair transplantation with micromotor: Eight years' experience. Aesthetic Plast Surg. 2015; 39:589---96.
- Umar S.The transplanted hairline: Leg room for improvement. Arch Dermatol. 2012;148:239---42.
- 19. Umar S. Body hair transplant by follicular unit extraction: My experience with 122 patients. Aesthetic Surg J. 2016;36:1101---10.
- 20. Zontos G, Rose PT, Nikiforidis G. A mathematical proof of how the outgrowth angle of hair follicles influences the injury to the donor area in FUE harvesting Dermatol Surg. 2014;40: 1147---50.

GRANULAR CELL AMELOBLASTOMA - A CASE REPORT AND REVIEW

Dr. Rathi Vadhana.S¹, Dr.Saranya.V², Dr. Shamala Ravikumar. S³, Dr.Annapoorani. D⁴

PG student¹, Senior lecturer², Professor & Head³, Department of Oral and Maxillofacial pathology, Adhiparasakthi Dental College and Hospital Senior lecturer⁴, Department of Oral and Maxillofacial Surgery, Adhiparasakthi Dental College and Hospital.

Keywords :

Ameloblastoma, odontogenic tumours, granular cells, lysosomes.

Corresponding Author :

Dr.Rathi Vadhana.S

PG student

Department of Oral and Maxillofacial pathology,

Adhiparasakthi Dental College &

Hospital

Melmaruvathur - 603319

Email: apdchoralpath@gmail.com

ABSTRACT

Ameloblastoma is a benign epithelial odontogenic tumor which is considered as locally aggressive lesion. Although it is the most common odontogenic neoplasm, it accounts for only 1% of all jaw tumors. Granular Cell Ameloblastoma (GCA) is a rare variant with a unique histopathology accounting for 3%–5% of ameloblastomas. It is characterized by the presence of large masses of granular cells located within the follicles. The transformation of lesional epithelial cells into granular cells is due to a dysfunctional status of neoplastic cells or degenerative process in a long-standing lesion. Studies have revealed that cytoplasmic granularity is caused by lysosomal overload. Reports found in the literature suggests that this lesion is usually found exclusively in the posterior region of the lower jaw.

This is a case report of a 32yr old male patient highlighting its clinical, radiological and unique microscopic features with a review from literature for a better understanding about this rare entity. Granular Cell Ameloblastoma is considered as a rare entity with a high incidence of recurrence and metastasis.

INTRODUCTION:

The term "AMELOBLASTOMA" was coined by Churchill in 1934 and it is the second most common odontogenic neoplasm. ^[1] Odontogenic tumours are epithelial or mesenchymal in origin derived from remnants of the tooth forming apparatus. ^[2] These tumors comprise a complex group of lesions of diverse histopathological subtypes and clinical behavior.^[3] Ameloblastoma is a true benign neoplasm with a particular tendency to arise from enamel organ type tissue and does not undergo differentiation to the point of enamel formation.^[1,3] It is a locally aggressive and an invasive tumor.^[4] involving all areas of the jaw bones especially the mandible where the molar-angle region being the most affected site.^[1,5] Ameloblastoma is of significant concern due to its high incidence rate among all odontogenic tumors and its infiltrative and recurrence potential combined with its varieties of histopathological patterns.^[6,7] It accounts for only 1% of all odontogenic tumours.^[8] The tumour occur in three different clinic radiographic situations as conventional solid or multicystic about (86%) of all cases; unicystic about (13%) of all cases; and peripheral/ extraosseous; about (1%) of all cases.^[8,9] The ameloblastoma, is said to be of varied origin and they may be originated from cell rests of enamel organ, epithelium of odontogenic cysts, disturbances of developing organ, basal cells of surface epithelium and heterotrophic epithelium in other parts of the body.^[10] The current World Health Organization (WHO) classification of odontogenic tumors divides ameloblastoma into four types: solid/multicystic, extraosseous/ peripheral, desmoplastic, and unicystic types.[11]Granular cell ameloblastoma is one of the histological patterns comprised in the solid/multicystic type of ameloblastoma.^[12,13] They are uncommon lesions accounting for about 3-5% of all histologic subtypes of ameloblastoma.^[7,12] The presence of granular cell ameloblastoma was first described by Krompecher in 1918 and because of their foamy appearance he referred to them as pseudoxanthomatous cells.^[12] This type of ameloblastoma appears to be aggressive and

several cases have been reported as metastasizing lesions.^[1] This article is a case report and review of literature enhancing the features of Granular cell ameloblastoma.



Fiure1: swelling in posterior mandibular region

RADIOGRAPHIC FINDINGS :

OPG showed an expansile radiolucent lesion in left posterior mandible from the roots of first molar extending posteriorly till the base of coronoid and condylar process, inferiorly to the base of mandible and roots of first and second molar were resorbed. Third molar was found completely impacted [Figure 2].



Figure 2: Radiolucent lesion extending in posterior mandible

Axial cuts of computed tomographic image showed radiolucent lesion in left mandibular posterior region eroding the lingual cortex, expansion and thinning out of buccal cortex [Figure3]



Figure 3: CT image showing radiolucent lesion in left mandibular posterior region

Based on clinical and radiographic findings, a provisional diagnosis of Impacted 38 associated with Odontogenic tumor ? was given. Incisional biopsy was done under LA and the specimen was submitted for histopathological study to the Department of Oral and Maxillofacial Pathology. Received one bit of greyish white soft tissue measuring about 0.3cmx2cmx0.4cm in 10% Neutral Buffered Formalin (NBF) for histopathological processing. The tissue was fixed, processed and stained with Hematoxylin & Eosin (H&E)

HISTOPATHOLOGICAL FINDINGS :

An area of the soft tissue section reveals stratified squamous cystic lining epithelium with basal cell layer showing hyperchromatic and polarized nuclei with sub nucleolar vacuolization [Figure4]. The suprabasal layer resembles stellate reticulum like cells. The connective tissue seems to be fibrocellular revealing numerous follicles of odontogenic epithelium with peripheral palisading polarized cells and central stellate reticulum like cells [Figure 5]. In most of the follicles, the cytoplasm of the central cells appear polygonal and reveals coarse eosinophilic granules [Figure 6]. The connective tissue also reveals numerous capillaries and few chronic inflammatory cells like lymphocytes and mostly plasma cells [Figure 7]. The center of few follicles reveal cystic degeneration. With the above findings, the final diagnosis was given as GRANULAR CELL

AMELOBLASTOMA.



Figure 4: Under low power magnification (10 x) basal cell showing dark and polarized nuclei.



Figure 5: Under high power magnification (40x) Central cells exhibiting eosinophilic granules.



Figure 6: Under high power magnification (40x) Stellate Reticulum like cells and central cells with



Figure 7: Under low power magnification (10x) Connective tissue showing inflammatory cells and blood capillaries

DISCUSSION :

Ameloblastoma is a true neoplasm of enamel organ tissue type ^[1] It is the most common odontogenic neoplasm affecting the jaws accounting for 1% of all tumors of the maxilla and mandible and 11% of all odontogenic tumors.^[14] According to Robins, the tumour is described as unicentric, nonfunctional, intermittent in growth, anatomically benign and clinically persistent. ^[11] It is chiefly a lesion of adults, showing an approximately equal prevalence from 3rd to 7th decade with a peak incidence in the 4th and 5th decade of life. The tumor is rarely reported in children and has no significant gender predilection. It is found predominantly involving the posterior region and the angle of the mandible.^[15, 16] Clinically they manifest as a bony hard swellings that may assume very large dimensions if left untreated. The tumor seems to be painless, slow growing, exhibiting facial deformity, malocclusion with occasional paresthesia of the affected region.^[17,18]

Radiologically, ameloblastomas are present as an expansile uniloculated or multiloculated osteolytic lesion.^[19] when the radiolucent loculations are large with thin internal septations which gives the classic "soap bubble" appearance and smaller loculations gives a 'honey comb' appearance.^[15,18] The internal septations represent differential cortical resorption, rather than true compartmentalization of tumor tissue.^[18] The periphery of the lesion is usually smooth and in the advanced lesions expansion and thinning of the cortical plates may be seen.1 They may also be associated with root resorption of adjacent teeth.^[18] According to clinical and radiographic features, ameloblastomas are classified into conventional solid or multicystic, extraosseous or peripheral, and unicystic types.^[3]

The ameloblastoma has a distinctive microscopic appearance characterised by the presence of peripheral columnar cells with hyperchromatic, reversely polarised nuclei, arranged in a palisaded pattern and central stellate reticulum like cells. ^[2] The six histological variants of ameloblastoma are follicular, plexiform, acanthomatous, desmoplastic, granular and basal cell. ^[1,5] The follicular and plexiform patterns are the most common histopathological subtypes and the less common subtypes include the acanthomatous, granular cell, desmoplastic, and basal cell.^[15]

The Granular Cell Ameloblastoma is a locally aggressive tumor with a high frequency of recurrence and potential to metastasize ^[10,14] It is mostly found as a combination of different histological patterns, and they usually resemble the follicular type, but the epithelium, particularly in the central areas of the tumour islands, forms sheets of large eosinophilic granular cells.^[5,20] It shows a slightly higher rate of recurrence of about 33.3% when compared with other common variants.^[10,14]

GCA are characterized by groups of numerous granular cells, which have abundant cytoplasm filled with coarse eosinophilic granules.^[4] The cytoplasmic granules have been identified ultrastructurally as lysosomal aggregates.^[21] These granular cells are formed by transformation of lesional epithelial cells to represent aging or degenerative changes in long-standing lesions. ^[6,22] The granular cells usually form the central mass of the epithelial tumor islands and cords. The periphery of the islands consists of nongranular columnar cells.^[23] The granular cells may be large, round, cuboidal, columnar or polyhedral and the cytoplasm is densely packed with acidophilic granules and frequently demonstrate well-defined borders but, in some instances, form a syncytium.^[8,21] The nuclei are generally pyknotic and eccentrically displaced with bulky cytoplasm filled with coarse eosinophilic granules indicating that there is an apoptotic process taking place ^[8,16] The granules are about 1 µm in size and giant granules are upto 30 µm in diameter that are rarely seen and they are present with diverse features such as finger-print-like membranous structures, myelin figures, small particles, granules, vesicles, lattice structures, and crystalloids representing different materials and stages of digestion of the lysosomal contents.^[22] Granular cells are a transitional or matured phase in the life cycle of ameloblastomas, starting with normal stellate reticulum like cells, leading to production of granules and finally leading to degeneration and

formation of cystic areas.^[7] Ara SG et al suggested that the reason for granularity is due to lysosomal overload.^[6] The cells are rich in lysosomal granules, in which there is marked transformation of the cytoplasm, usually of stellate reticulum-like cells, so that it takes a very coarse, granular, and eosinophilic appearance.^[16] Hartman in 1975 supported the ageing phenomenon and from his study he observed that with increasing age more of unnecessary components gets deposited in the cytoplasm of tumour cells and the ability of the lysosomes to digest these components decreases and hence this granular change is thought to be due to a dysfunctional status of lysosomes in the tumour cells.^[6,17] Increased apoptotic cell death of neoplastic cells and associated phagocytosis by neighboring neoplastic cells leads to cytoplasmic granularity. ^[6,10] The nature of granular cells, is considered to be metabolic and another reason for granularity is the degenerative process, based on the increased expression of death signaling molecules.^[4,6] Taneeru et al and Ara et al suggested these cells as autophagosomes. Though the synthesis of signaling molecules such as β -catenin and Wnt-5a is upregulated in the granular cells, their transportation or secretion is impaired. Thereby resulting in accumulation within the granular cells.^[6,16,24] Differential diagnosis of GCA are Granular cell odontogenic tumour, Granular cell myoblastoma, Congenital epulis of new born.^[5,6] The morphology of all granular cells is similar, but their origins are different. As per histogenesis, granular cell ameloblastoma is epithelial, while others appear to be of mesenchymal origin.^[6,7] The granular appearance of the tumor cells can be seen in various otherodontogenic oral lesions, such as central and peripheral granular cell odontogenic tumor, granular cell ameloblastic fibroma, central granular cell odontogenic fibroma, calcifying epithelial odontogenic tumor, granular cell odontogenic cystand other lesions like Oncocytoma [2,7,22]. The granular cells are positive for periodic acid-Schiff, diastase resistant and PAS with diastase-positive for cytoplasmic granules. [6,8,16] Immunohistochemical expression seems to be positive for certain markers for example cytokeratin, CD68, BH3, Fas antigen, FasL, Caspase 3, alpha-1-antichymotrypsin, antitrypsin, keratins, as well as acid phosphatase and various oxidative enzymes^[6,16,22,23] and certain markers show negative expression those being vimentin, S-100 protein, Desmin, Bcl-2, acid phosphatase, caspase 9, protease activating factor 10, α -naphthyl acetate, β -glucuronidase, desmin, neuronspecific enolase, and CD15 indicating epithelial origin and cytoplasmic lysosomal aggregation and not of mesenchymal, myogenic or neurogenic origin.[8,22,25]

CONCLUSION:

GCA is a rare tumor having specific histopathological findings with granular cells. This tumor can be differentiated from the other histological subtypes for which histopathological study is the only scope as the tumor has a high recurrence rate. Though the recurrence rate is 33.3%, they may rarely behave in a malignant fashion giving rise to metastasis. It has been reported that GCA metastasizes to lymph nodes, lungs and cervical vertebrae. Hence a better understanding about the molecular pathogenesis of the tumor would help to improve the diagnosis and therapeutic procedures.

REFERENCES:

- Sivapathasundharam B. Shafer's Textbook of Oral Pathology E-book. Elsevier Health Sciences; 2020 Jul 15.
- 2) Arora S et al. Granular cell ameloblastoma: A case report with a brief note on review of literature. Egypt J EarNose Throat Allied Sci (2014)
- Cadavid AMH, Teshima THN, Pinto CAL, Camillo CMC, Lourenço SV. Ameloblastoma with distinctive granular cell pattern: an 8 case study. Autops Case Rep [Internet]. 2018;8(4):e2018052.
- 4) Jahanshahi G, Arzhang E, Derisavy S, Davoodi L, Shakeri S. Granular cell type of ameloblastoma. Dent Res J 2018;15:224-7 5) Hoyos AM, Teshima THN, Dias CD, Pinto CAL, Coutinho-Camillo CM and Lourenço SV. Granular Cell Ameloblastoma: Retrospective Clinical and Histopathological Findings of Case Series and Review of Literature. Austin J Dent. 2018; 5(5): 1118
- Kulkarni D, Ingale Y, Ingale M, Ajabrao BN, Mayank M, Kulkarni A. Granular cell ameloblastoma: A rare case report and review of literature. Indian J Dent Res 2018;29:830-5
- Jansari TR, Samanta ST, Trivedi PP, Shah MJ. Granular cell ameloblastoma of mandible. Indian J Pathol Microbiol 2014;57:305-7
- Kattimani V, Sumanti J, Prasad LK (2015) Granular Cell Ameloblastoma: A Case Report and Literature Review. J Dent Probl Solut 2(2): 031-033.
- Waldron CA (2002) Odontogenic cysts and tumors. In: Neville BW, Damm DD, Allen CM, Bouquot JE, editors. Oral and maxillofacial pathology. 2nd ed. Pennsylvania: Saunders; p 589-642.
- Babu NA, Sankari SL, Anitha N, Mohideen G. Aggressive granular cell ameloblastoma: Report of a rare case. J Pharm Bioall Sci 2015;7:S276-8
- 11) Matsushita Y, Fujita S, Kawasaki G, Hirota Y, Rokutanda S, Yamashita K, Yanamoto S, Ikeda T, Umeda M. Granular cell ameloblastoma: Case report of a particular ameloblastoma histologically resembling oncocytoma. Pathology international. 2015 Jan;65(1):43-7.
- 12) Cranin AN, Bennett J, Solomon M, Quarcoo S. Massive granular cell ameloblastoma with metastasis: report of a case. Journal of oral and maxillofacial surgery. 1987 Se 1;45(9):800-4.
- 13) Gardner DG, Heikinheimo K, Shear M, Philipsen HP, Coleman .H. Ameloblastoma. In: Barnes L, Eveson JW, Reichart P, Sidransky D, eds. World Health Organization Classification of Tumors, Pathology and Genetics of Head and Neck Tumors. Lyon: IARC Press, 2005; 296–300.
- 14) Ghandhi D, Ayoub AF, Pogrel MA, MacDonald G, Brocklebank LM, Moos KF. Ameloblastoma: A surgeon's dilemma. J Oral Maxillofac Surg 2006;64:1010-4.
- Neville, Regezi JA, Sciubba JJ, Jordan RCK. Oral pathology: clinical pathologic correlations. 4th ed. St. Louis, Missouri: WB.Saunders; 2003: 267–274
- 16) Hunasgi S, Koneru A, Chauhan DS, Guruprasad Y. Rare giant granular cell ameloblastoma: a case report and an immunohistochemical study. Case reports in dentistry. 2013;2013.
- 17) N. Nikitakis, F. Tzerbos, K. Triantafyllou, C. Papadimas, and A. Sklavounou, "Granular cell ameloblastoma: an unusual histological subtype, report and review of literature," Journal of Oral and Maxillofacial Research, vol. 4, no. 1, pp. 1–8, 2010 18) Sharma S, Hasan R, Kumar S, Shivamurthy A, Shetty T. Cytology of Granular Cell Ameloblastoma of Jaw: A Rare Case Entity. Int J Sci Stud 2015;3(1):224-226
- Regezi S. Jordan. Oral pathology clinical pathologic correlations. Saunders. 2003:256-7.
- 20) Cawson RA, EL O. Cawson's essential of oral pathology and oral medicine 8th ed. London: Churcill Livingstone. 2010:277-90.
- 21) Reichart PA, Philipsen HP. Odontogenic tumors and allied lesions. Quintessence Pub.; 2004 Jan.
- 22) Yogesh TL, Sowmya SV. Granules in granular cell lesions of the head and neck: A review. ISRN Pathology. 2011;2011.

- 23) Thakur M, Bande C, Mohale D, Tekchandani V, Gupta R. Granular Cell Type Ameloblastoma - Recurrence in a Peripheral Location: A Rare Case Report. IJSS Case Reports & Reviews 2015;1(11):74-75
- 24) Taneeru S, Guttikonda VR, Yeluri S, Madala J. Granular cell ameloblastoma of jaw – Report of a case with an emphasis on its characterization. J Clin Exp Dent 2013;5:e154-6
- 25) G. H. Kumamoto and K. Ooya, "Immunohistochemical and ultrastructural investigation of apoptotic cell death in granular cell ameloblastoma," Journal of Oral Pathology and Medicine, vol. 30, no. 4, pp. 245–250, 2001.

PATIENT COMPLIANCE WITH REMOVABLE ORTHODONTIC RETAINER – A QUESTIONNAIRE STUDY

Dr. Lavanya.R¹, Dr. Sudhakar.V², Dr.Ramya.R³, Dr.Ananda Devi.C⁴, Dr.Sakthidaran⁵, Dr.Muruganandam⁶

¹Postgraduate student, ²Professor and Head of the Department, ³Reader, ^{4,5,6}Senior Lecturer

Department of Orthodontics and Dentofacial Orthopedics, Adhiparasakthi Dental College and Hospital, Melmaruvathur

Keywords :

Patient compliance, Removable Orthodontic Retainers

Corresponding author :

Name: Dr.Lavanya.R

Final year Postgraduate student,

Department of Orthodontics and Dentofacial Orthopedics, Email : lavanlash@gmail.com

Linan . iavainasit@ginan.com

ABSTRACT

OBJECTIVE

The objective of this questionnaire study is to assess the level of compliance in patients wearing removable orthodontic retainers and to evaluate the difficulties faced by the patients

MATERIALS AND METHODOLOGY

Patients who underwent treatment for Class I bimaxillary protrusion, and extraction treatment requiring Hawley's retainer and Begg's wrap-around retainer were included in

INTRODUCTION:

The success of orthodontic treatment is reliant on several factors, including accurate and individualized diagnosis, appliance selection, and fabrication, duration of wear, and most importantly the compliance of the patient. The major factor that influences Orthodontic treatment outcome is the stability of the treatment and the type of retention that is followed. Removable orthodontic retainers have been widely used for retention following orthodontic treatment.

To achieve successful orthodontic treatment results, removable retainers should be worn for a prescribed duration and it is known that patient adherence in wearing their devices is particularly important for optimal therapeutic progress.^[1]

Patient compliance is of crucial importance for successful outcomes in orthodontic treatment, especially when removable retainers are used.^[2,3] Haynes defined Compliance as the extent to which a person's behavior (in terms of taking medications, following diets, or executing lifestyle changes) coincides with medical or health advice.^[4] Factors such as personal mentality, selfesteem, optimal doctor-patient relationship, cost of the appliance, maintenance, and type of appliance used have a potential influence on the compliance of the patient.^[3,5]

Lack of patient compliance can result in undesirable treatment outcomes. Therefore it is necessary to assess the compliance of the patient. Compliance can be assessed by direct and indirect measurements. Direct measurement of objective compliance

the study. A questionnaire comprising of 16 questions were distributed after 1 month wear time of removable retainers for 100 patients over a period of 6 months. The response was recorded and analyzed.

RESULTS :

Analysis of this questionnaire investigation using descriptive statistics revealed that most of the patients were comfortable with the removable orthodontic retainer and only about 9% of the patients were not comfortable with the removable retainer. About 64% of the patients had initial discomfort during the first week of appliance wear and later got accustomed to the appliance.

CONCLUSION :

The present study concluded that about 91% of the patients were comfortable wearing removable retainer appliances. Only very few patients have reported having difficulty during mastication, speech, or during removal and insertion. About 64% of the patients have experienced initial discomfort during the first week of use of the appliance. Careful fabrication of the removable retainer, along with proper post insertion instructions to the patient has a major influence on the patient compliance and outcome of the treatment.

refers to timing devices that are incorporated into the removable appliance.^[6] Indirect measurements are subjective compliance judgments or estimates by the patient and orthodontists.^[7]

The willingness of the patient to wear a removable appliance is mainly influenced by their age, gender, maturity, motivation, the type of appliance used, and also the esthetic improvement as promised. Patient compliance for the removable orthodontic retainer is more important and its objective assessment necessitates the problems encountered by the patient and measures to overcome the difficulties in wearing the removable appliance.

Hence a questionnaire study was conducted to identify the patient compliance in wearing a removable retainer and the difficulties that are encountered by the patient.

AIM & OBJECTIVE

The study aims to assess the level of compliance in patients wearing removable orthodontic retainers.

The purpose of the study was to determine the effects of appliance fabrication and motivation to the patients as a factor on patient's compliance who seek orthodontic treatment at Adhiparasakthi Dental College and Hospital, Melmaruvathur

MATERIALS AND METHODOLOGY

Patients who reported to the Department of Orthodontics and Dentofacial Orthopedics, Adhiparasakthi Dental College and Hospital, Melmaruvathur and treated with the fixed orthodontic appliance and who require Hawley's retainer or Begg's wrap-around

retainer for retention were chosen for the questionnaire study. This study included 100 patients who reported to the department over Patients who underwent treatment for a period of 6 months. Class I bimaxillary protrusion, and extraction treatment requiring Hawley's retainer and Begg's wrap-around retainer in the age group from 19 to 28 years were included in the study. Hawley retainer consists of an acrylic base plate, labial bow (0.028-inch stainless steel) fitted from canine to canine for retaining the position of anterior teeth and Adams clasps (0.028-inch stainless steel) adapted on posterior teeth for retention. Begg's wrap-around retainer (0.028-inch stainless steel) consists of a labial bow that extends till the last erupted molar and curves around to end in acrylic plate. Carefully fabricated removable retainers were delivered to the patients, wherein appliance wear time was standardized by asking the patients to report the wear time of appliance after 1 week in an unbiased manner. A review of removable retainers was also done

after 1 - month interval and the patients were asked to report the total time of appliance wear during the 1-month interval.

Patients were asked to fill out the questionnaire comprising of 16 questions which included the comfort of the appliance, difficulties faced during appliance wear, and maintenance.

A total of 100 filled questionnaires were collected from the patients during their 1-month review appointment and the data were tabulated and analyzed with descriptive statistics.

Parameters considered were the mean compliance of the overall sample and differences ascribable to wearing appliance every day, temporary stopping of wearing appliance, discomfort, difficulty in mastication, difficulty in removing and inserting appliance, bruxism after using the appliance, gagging, pain or ulcer during wearing of the appliance, preference of fixed over the removable appliance, cleaning appliance after every meal, observation interval and awareness of being monitored.

S.no	Questions	Options				
1	Are you feeling comfortable with the removable retainer?	Yes No				
2	Are you wearing the appliance every day?	Day and night Only day Only night				
3	Have you temporarily stopped wearing the appliance?	Yes No				
4	What is the reason for the cessation of wearing the appliance?	Irritation Gagging Discomfort				
5	Irritation Gagging Discomfort	Yes No				
6	Do you have any difficulty in mastication?	Yes				
7	Have you felt any difficulty in removing and inserting the appliance?	Yes No				
8	Do you have bruxism after using the appliance?	Yes No				
9	Do you think that wearing an appliance will maintain teeth alignment?	Yes No				
10	Have you felt gagging while wearing the appliance?	Yes No				
11	Do you have any pain or ulcer while using the appliance?	Yes No				
12	What steps have you followed to get rid of those discomforts?	Visited dentist Get used to it None				
13	Do you Prefer fixed retainer over removable retainer:	Fixed retainer Removable retainer				
14	Do you clean the appliance after every meal?	Yes No				
15	What method do you use for cleaning the appliance?	Brush Cotton				
16	Do you have any discomfort during the first week of use of the appliance?	Yes No				

TABLE 1: THE QUESTIONNAIRE

RESULTS

A total of 100 completed questionnaires were included in the study and the results were tabulated and analyzed with descriptive statistics.

About 91% of the patients were comfortable in wearing removable appliance and about 21% of patients wear the appliance both during day time and night time whereas 30% wears during day time and 46% wears only during night time.

About 18% of the patients have temporarily discontinued appliance wear of which 54% of patients have discontinued because of irritation, and 46% of patients due to discomfort of the appliance.

The discomfort experienced during the speech was about 5% and during mastication was about 4%. About 43% of patients experienced gagging during appliance wear.

During appliance insertion and removal, 86% of patients did not show any difficulty but 14% of the patients had some discomfort.

Pain experienced during the wearing of removable retainer was about 20% in which 67% of patients visited dentists, 29% of patients accustomed to it.

About 87% of the patients felt that wearing appliance adds to the increased efficiency of orthodontic treatment outcome. In this study, 61% of patients preferred fixed retainers over removable retainers.

Maintenance and cleaning of the removable appliances are done by 96% of the patients in which 64% of the patients used brush and 36% of patients used cotton as a cleaning aid for removable appliance.

About 64% of the patients had initial discomfort during the first week of appliance wear.

FIG 1: PATIENTS RESPONSE TO THE QUESTIONNAIRE



FIG 2: APPLIANCE WEAR TIME BY THE PATIENT



FIG 3: REASON FOR TEMPORARY CESSATION OF APPLIANCE WEAR

Reasons for temporary cessat ion of appliance wear



FIG 4: AWARENESS REGARDING STABILITY WHILE WEARING RETAINERS





FIG 5: APPROACH TAKEN BY THE PATIENTS TO AVOID THE DISCOMFORT DURING APPLIANCE WEAR



FIG 6: METHOD USED BY THE PATIENTS TO CLEAN THE APPLIANCER

METHOD OFCLEANING APPLIANCE



DISCUSSION:

The present study assessed the compliance of patients with removable retention appliances in a reasonable sample and for a limited period of time with accuracy. To minimize the selection bias, all the patients who entered our department within the 6 months period of time for removable orthodontic retainers were selected for our questionnaire study.

Several independent experimental studies have now confirmed that most patients do not adhere to the long standard wear time's prescribed.^[8] Our study showed that about 46 % of our patients preferred night-time wear, which has no statistical significance according to the randomized clinical trial conducted by Shawesh et al. in which the duration of appliance wear for labial segment irregularity or crowding was studied. Appliance wear during night time for 1 year and full-time wear for 6 months followed by night time wear for 6 months were both equally effective.^[11]

According to a prospective evaluation by Mohamed Khan, speech impairment was considered as one of the reasons for poor patient compliance especially during the first week of appliance wear. But in our study, 95% of the patients felt comfortable during speech probably due to proper appliance fabrication.^[12] In our study, about 18% of the patients have temporarily stopped wearing the appliance in which gagging, discomfort, and irritation were considered as the reason behind the temporary cessation.

Since Hawley's retainer does not cover the occlusal surfaces, they are less vulnerable for a breakdown under stress during mastication; therefore about 86% of patients have not experienced any difficulty during removal and insertion of the appliance.^[13]

About 67% of patients have visited the dentist as an approach to avoid the discomfort, whereas 29% of patients got accustomed to the appliance which shows the effectiveness of the post-insertion instructions that are given to the patient.

Studies have observed that the combination between a mechanical and a chemical method reduced significantly the presence of microorganisms from removable appliances compared with other methods.[14,15] This is insignificance with our study where 64% of the patients use toothbrush as a mechanical aid in cleaning the removable orthodontic appliance.

The compliance of a specific type of appliance was not tested in the present study because of sample size considerations. Patients wear appliances for considerably less time than the duration that is self-reported. Compliance may be increased when patients are aware of monitoring; however, further research is required to identify effective interventions and possible barriers in order to improve removable orthodontic appliance compliance.^[9]

Frequently, patient education programs are used in an attempt to achieve this goal. Yet, increasing patient knowledge has not had a reliable positive effect on behavior.^[10]

CONCLUSION

The present study concluded that about 91% of the patients were comfortable wearing removable appliances. Only very few patients have reported having difficulty during mastication, speech, or during removal and insertion. About 64% of the patients have experienced initial discomfort during the first week of use of the appliance. Careful fabrication of the appliance is considered as the main factor that influences patient compliance in wearing a removable retainer. Also, awareness regarding appliance wear should be properly insisted on the patients, as this acts as a motivation for the patients. Adequate motivation of young patients would also increase the compliance of removable appliances.

REFERENCES:

- 1. Casutt C, Pancherz H, Gawora M, Ruf S. Success rate and efficiency of activator treatment. The European Journal of Orthodontics. 2007 Dec 1;29(6):614-21.
- Pratt MC, Kluemper GT, Hartsfield Jr JK, Fardo D, Nash DA. Evaluation of retention protocols among members of the American Association of Orthodontists in the United States. American Journal of Orthodontics and Dentofacial Orthopedics. 2011 Oct 1;140(4):520-6.
- 3. Haynes RB. Determinant of compliance: The disease and the mechanics of treatment. Compliance in health care. 1979.
- Mortensen MG, Kiyak HA, Omnell L. Patient and parent understanding of informed consent in orthodontics. American Journal of Orthodontics and Dentofacial Orthopedics. 2003 Nov 1;124(5):541-50.
- Schäfer K, Ludwig B, Meyer-Gutknecht H, Schott TC. Quantifying patient adherence during active orthodontic treatment with removable appliances using microelectronic wear-time documentation. European Journal of Orthodontics. 2015 Feb 1;37(1):73-80.
- Sahm G, Bartsch A, Witt E. Micro-electronic monitoring of functional appliance wear. The European Journal of Orthodontics. 1990 Aug 1;12(3):297301.
- Egolf RJ, BeGole EA, Upshaw HS. Factors associated with orthodontic patient compliance with intraoral elastic and headgear wear. American Journal of Orthodontics and Dentofacial Orthopedics. 1990 Apr 1;97(4):336-48.
- Schott TC, Ludwig B. Microelectronic wear-time documentation of removable orthodontic devices detects heterogeneous wear behavior and individualizes treatment planning. American Journal of Orthodontics and Dentofacial Orthopedics. 2014 Aug 1;146(2):155-60.
- Al-Moghrabi D, Salazar FC, Pandis N, Fleming PS. Compliance with removable orthodontic appliances and adjuncts: A systematic review and meta-analysis. American journal of orthodontics and dentofacial orthopedics. 2017 Jul 1;152(1):17-32.
- Gross AM, Samson G, Dierkes M. Patient cooperation in treatment with removable appliances: a model of patient noncompliance with treatment implications. American journal of orthodontics. 1985 May 1;87(5):392-7.
- Shawesh M, Bhatti B, Usmani T, Mandall N. Hawley retainers full-or parttime? A randomized clinical trial. The European Journal of Orthodontics. 2010 Apr 1;32(2):165-70.
- Khan KA, Ibrahim SN, Hamid BA. A Prospective Evaluation of Speech Distortion among Patients Wearing Hawley Retainer Using Acoustics Approach. J Dent Health Oral Disord Ther. 2017;6(2):00194.
- Pratt MC, Kluemper GT, Lindstrom AF. Patient compliance with orthodontic retainers in the postretention phase. American Journal of Orthodontics and Dentofacial Orthopedics. 2011 Aug 1;140(2):196-201.
- 14. Salas MM, Lamas RR, Cenci TP, Lund RG. How are children and adolescents cleaning their orthodontic appliances? A cross-sectional study in private schools. Brazilian Journal of Oral Sciences. 2014 Mar;13(1):34-6.
- Peixoto IT, Enoki C, Ito IY, Matsumoto MA, Nelson-Filho P. Evaluation of home disinfection protocols for acrylic baseplates of removable orthodontic appliances: A randomized clinical investigation. American Journal of Orthodontics and Dentofacial Orthopedics. 2011 Jul 1;140(1):51-7.

Assessment of efficacy and reliability of two mixed dentition analysis - Moyers and Tanaka Johnston – A Invitro study

Dr. Vivek.K¹, Dr.Vasanthakumari.A², Dr.Jaiganesh.I³, Dr.Selvabalaji.A³, Dr. Preethi Archana.S¹, Dr.Eswari.R¹

¹Senior lecturer, ²Principal, Professor and Head of the Department, ³Reader,

Department of Pediatric and Preventive dentistry, Adhiparashakthi dental college and hospital, Melmaruvathur, Chengalpattu dist.

Keywords :

Mixed dentition, Canine and Premolars, Model analysis

Corresponding author :

Name: Dr.Vivek.K

Senior lecturer,

Department of Pediatric and Preventive dentistry

Email: pedoapdch2016@gmail.com

ABSTRACT

Aim: To assess the efficacy and reliability of two commonly used mixed dentition analysis – Moyers and Tanaka Johnston in Tamil population.

Materials & Methods:

Fifty children aged 11-14 years were recruited. Upper and lower impressions were made to prepare the study casts. The sum of the mesiodistal width of mandibular 4 incisors was measured from the

INTRODUCTION:

The mixed dentition period is a critical period for the prevention or interception of any developing malocclusion. Early diagnosis and successful treatment of dento-alveolar discrepancies can help in achieving the goal of occlusal harmony, function and dento-facial aesthetics.^[1] The method of mixed dentition analysis is a diagnostic tool that allows to quantify crowding and to predict dentoalveolar discrepancy by identifying the available and necessary space for teeth not yet erupted. Several methods have been developed for estimating the mesiodistal widths of unerupted teeth. The development of these methods was based on the data derived from the population of various descents.^[2] Therefore, the accuracy of these prediction methods may be in question when applied to other population groups because it has been well established in the literature that tooth sizes vary considerably between the racial groups.^[3] Hence, this study was an attempt to compare two types of mixed dentition analysis methods (Moyers, and Tanaka Johnston) and to determine the most applicable method for boys and girls of Tamil population.

Therefore, the aim of this study was to assess the efficacy and reliability of mixed dentition analysis – Moyers and Tanaka Johnston in Tamil population.

MATERIALS AND METHODS:

This study is a cross-sectional study, done with 50 Children (25 males and 25 females) of age group 11-14 years with the mean age of 12.5 years reporting to the Department of Pediatric & Preventive Dentistry. Information sheets regarding the study were provided to the parents and consent forms were duly signed by the

casts and was used to assess the predicted mesiodistal width of the canine and the premolars using Moyer's 75th probability level and Tanaka Johnson Model analysis. The sum of the mesiodistal width of canine and premolars were also calculated from the casts and the actual values were noted. The data were summarized as mean and standard deviation and the values were compared using paired 't' test. p value of <0.001 was considered statistically significant.

RESULTS:

Comparison of mean differences between both the analysis and the actual value showed statistical significance for both the arches among both the genders.

CONCLUSION:

Moyer's and Tanaka Johnson Model analysis overestimated the mesiodistal width of the canine and premolars when compared to the actual value. Therefore, the applicability of both the analysis is questionable in Tamil speaking population.

parents. The recruitment was restricted to the children who had all the permanent teeth erupted except for second and third molars, who had no congenital craniofacial anomalies and no previous history of orthodontic treatment, who had intact dentition with no proximal caries or age-related attrition. The most important criterion is that the parents of the subjects should be of Tamil speaking community.

Dental impressions were made with irreversible hydrocolloid alginate impression material and were poured immediately with dental stone to avoid any dimensional changes.

The mesiodistal dimensions of the mandibular permanent central and lateral incisors, the maxillary and mandibular permanent canines and the first & second premolars were measured using a digital caliper with a resolution of 0.01 mm.

Using the sum of the mesiodistal dimensions of the mandibular central incisors, Moyer's and Tanaka Johnson mixed dentition arch analysis was carried out and the predicted mesiodistal dimensions of the permanent canines and premolars were calculated. Predicted mesiodistal dimensions of permanent maxillary and mandibular canines and premolars were obtained from Moyer's probability table at the 75th percentile. The actual mesiodistal dimensions of the canine and premolars were also calculated. All the data were tabulated and statistical analysis was performed for comparing the actual and predicted values.

The statistical analysis were performed using the SPSS version 20 software. Data were summarized as Mean \pm standard deviation (SD). The predicted and the actual values as paired observations

were compared using paired t-test (two-tailed test). Pvalue of <0.001 was considered statistically significant.

RESULTS:

The mean and standard deviation of the sum of predicted mesiodistal width of maxillary canine and premolars as assessed by Moyer's analysis 75th percentile and Tanaka and Johnston analysis along with the mean and standard deviation of sum of the actual value of the mesiodistal width of the maxillary canine and premolars are tabulated in Table 1.

Table 1: Mean and Standard Deviation of the sum of Mesiodistal width of maxillary canine and premolars gender-wise

Method	Gender								
	Males			Females					
	N	Mean	SD	Ν	Mean	SD			
Moyer's Analysis (75th Percentile)	25	20.99	0.623	25	21.26	0.489			
Tanaka and Johnston Analysis	25	21.09	0.687	25	21.33	0.481			
Actual Value	25	19.23	1.364	25	19.39	0.142			

The mean differences of mesiodistal width of maxillary canine and premolars for both males and females between both the analysis and the actual value were found to be significant (p<0.001), as shown in Table 2.

Table 2: Comparison of mean differences between both the analysis and the actual value genderwise in the maxillary arch

Gender	Method	Mean + SD	'ť test	p-value
Males	Moyer's Analysis - Actual Value	1.751 +1.129	12.456	0.000*
	Tanaka and Johnston - Actual Value	1.854 +1.112	12.675	0.000*
Females	Moyer's Analysis - Actual Value	1.875 +0.926	15.876	0.000*
	Tanaka and Johnston - Actual Value	1.943+ 0.734	15.987	0.000*

*Significant: p< 0.001

The mean and standard deviation of the sum of predicted mesiodistal width of maxillary canine and premolars as assessed by Moyer's analysis 75th percentile and Tanaka and Johnston analysis along with the mean and standard deviation of the sum of the actual value of the mesiodistal width of the maxillary canine and premolars are tabulated in Table 3.

Table 3: Mean and Standard Deviation of the sum of Mesiodistal width of mandibular canine and premolars gender-wise

Method		Gender								
	Males			Females						
	N	Mean	SD	N	Mean	SD				
Moyer's Analysis (75th Percentile)	25	20.78	0.656	25	20.44	0.543				
Tanaka and Johnston Analysis	25	20.74	0.687	25	20.72	0.490				
Actual Value	25	19.00	1.238	25	18.97	0.974				

The mean differences of the mesiodistal width of mandibular canine and premolars for both males and females between both the analysis and the actual value were found to be significant (p<.001), as shown in Table 4.

Table 4: Comparison of mean differences between both the analysis and the actual value genderwise in the mandibular arch

Gender	Method	Mean + SD	'ť test	p-value
Males	Moyer's Analysis - Actual Value	1.778 +0.896	14.066	0.000*
	Tanaka and Johnston - Actual Value	1.740 +0.882	15.635	0.000*
Females	Moyer's Analysis - Actual Value	1.474 +0.796	17.806	0.000*
	Tanaka and Johnston - Actual Value	1.754+ 0.734	17.987	0.000*

*Significant: p< 0.001

DISCUSSION:

Prediction of the correct mesiodistal width of unerupted cuspids and bicuspids during the mixed dentition period is of utmost clinical importance for early diagnosis and treatment planning.

Commonly used non-radiographic model analysis namely Moyer's analysis and Tanaka Johnston analysis are based on dimensions of teeth of white North American children, but their reliability in various populations has been proven to be unreliable due to variation in tooth dimensions in different racial and ethnic groups.[4,5] Therefore, this study was conducted to assess the efficacy and reliability of the two most commonly used mixed dentition analysis in children within the age range of 11-14 years, of Tamil speaking population in South India.

In this study, the age group of 11-14 years was selected because, this is the age when the permanent teeth newly erupt in the oral cavity thereby present with minimal alteration in the mesiodistal tooth width due to proximal caries, attrition or restoration. The data is also tabulated gender-wise (i.e) for males and females separately so as to note if any differences are found among them. Though few studies showed differences in the mean mesiodistal width of canines and premolars among males and females,[4,6,7,8]such a difference was not seen in this study as inferred fromtables1& 3.

In this present study, both Moyer's and Tanaka Johnson analysis are overestimating the sum of the mesiodistal dimensions of the canine and premolars when compared to the actual sum of the mesiodistal width of the canine and premolars. This is applicable for both the arches and in both the genders. This mean difference is also statistically significant as can be inferred fromtables 2 & 4.

The reliability of Tanaka Johnson model analysis has been tested not only in world-wide population but also in various races of Indian population. Various world-wide studies have reported the overestimating property of the Tanaka Johnson analysis[6,8,9,10], which is similar to the present study, except the one conducted in Thai population^[11], which has reported that Tanaka Johnson analysis was underestimating the mesiodistal sizes of the cuspidsand bicuspids.

Numerous studies have been done to test the reliability of Moyer's analysis on various population all around the world^[6,8,9,10,11,12,13], which reported a wide range of variability in the applicability of Moyer's analysis. Many studies have also been done to test the applicability at different percentiles.

Indian studies testing the applicability of Moyer's also show a wide range of variability based on secular trends. This variability was not only among population but also showed variability among both genders in the same population. Studies performed on Nellore^{[14],} North-eastern part of Karnataka^[15], Kodava[16] & Bengali^[2] populations reported that 75% of probability level showed overestimation of the values, which is in accordance with this study. On the contrary to this study, a study conducted on Nalgonda population^{[17],} showed that 75% probability level was reliable for them. This difference in the result can be attributed to the numerous diversified races and ethnic groups living in India.

The limitation of this study is that the sample size is very small to generalize the result to all the Tamil speaking population in South India. Further studies are required to be conducted on Tamil population to generalize the findings and to formulation population specific regression equations.

CONCLUSION :

Moyer's mixed dentition analysis at 75th percentile and Tanaka Johnston method significantly overestimated the mesiodistal widths of the permanent canine and premolars of children of Tamil speaking population in South India. The efficacy and reliability of Moyer's and Tanaka Johnson analysis for Tamil population showed 60% probability level to be reliable for males and 65% probability level were reliable for females. However, further studies are required with a higher sample size for formulating a specific regression equation for Tamil speaking population for accurately predicting the mesiodistal width of the unerupted permanent canine and premolars.

REFERENCES:

- Mittar M, Dua VS, Wilson S. Reliability of permanent mandibular first molars and incisors widths as predictor for the width of permanent mandibular and maxillary canines and premolars. Contemp Clin Dent 2012;3(Suppl 1):S8-12. doi: 10.4103/0976-237X. 95094.
- Dasgupta B, Zahir S. Comparison of two non-radiographic techniques of mixed dentition space analysis and evaluation of their reliability for Bengali population. Contemp Clin Dent 2012;3 (Suppl 2):S146-50.
- 3. Stanley MG, Arthur BL, Arline W. Evidence for a secular trend in tooth size over two generations. Arch Oral Biol 1967;12:503-4.
- Arslan SG, Dildes N, Kama JD, Genc C. Mixed-dentition analysis in a Turkish population. World J Orthod 2009;10:135-40.
- Srivastava B, Bhatia HP, Singh R, Singh AK, Aggarwal A, Gupta N. Validation of Tanaka and Johnston's analysis in western UP Indian population. J Indian Soc Pedod Prev Dent 2013;31:36-42.
- Al-Khadra BH. Prediction of the size of unerupted canines and premolars in a Saudi Arab population. Am J Orthod Dentofacial Orthop 1993;104:369-72.
- Kamatham R, Vanjari K, Nuvvula S. Applicability of Moyers' and Tanaka Johnston's mixed dentition analyses for predicting canine and premolar widths in south Indian population – A cross sectional study. J Orofac Sci 2017;9: 52-7.
- 8. Nik Tahere H, Majid S, Fateme M, Fard K, Javad M. Predicting the size of unerupted canines and premolars of the maxillary and mandibular quadrants in an Iranian population. J Clin Pediatr Dent 2007;32:43-7.
- Buwembo W, Kutesa A, Muwazi L, Rwenyonyi CM. Prediction of width of un-erupted incisors, canines and premolars in a Ugandan population: A cross sectional study. BMC Oral Health 2012;12:23. doi: 10.1186/1472-6831-12-23
- Diagne F, Diop-Ba K, Ngom PI, Mbow K. Mixed dentition analysis in a Senegalese population: Elaboration of prediction tables. Am J Orthod Dentofacial Orthop 2003;124:178-83.
- 11. Jaroontham J, Godfrey K. Mixed dentition space analysis in a Thai population. Eur J Orthod 2000;22:127-34.
- Wang Y, Li Y, Wang J, Zhao ZH. A comparison of methods for predicting the dentition space for Chinese population. Sichuan Da Xue Xue Bao Yi Xue Ban 2008;39:658-60, 672.
- Verzì P, Leonardi M, Palermo F. Mixed dentition space analysis in a eastern Sicilian population. Minerva Stomatol 2002;51:327-39.
- Kamatham R, Vanjari K, Nuvvula S. Applicability of Moyers' and Tanaka– Johnston's mixed dentition analyses for predicting canine and premolar widths in south Indian population – A cross sectional study. J Orofac Sci 2017;9: 52-7.
- 15. Dhanu G , Anitha G, Havale R , Shrutha SP. Evaluation of the reliability of mixed dentition analysis on a sample population from the Northeastern part of Karnataka, India: A comparative study. RGUHS National Journal of Public Health 2016;1(4):135-42.
- Ramesh N, Reddy MS, Palukannu B, Shetty B, Puthalath U. Mixed dentition space analysis in kodava population: A comparison of two methods. J Clin Diagn Res 2014;8:ZC01-6. doi: 10.7860/JCDR/ 2014/10001.4777.
- Kondapaka V, Sesham VM, Neela PK, Mamillapalli PK. A comparison of seven mixed dentition analysis methods and to evaluate the most reliable one in Nalgonda population. J Ind Orthod Soc 2015;49:3-9.

PERIPHERAL PAIN RECEPTORS AND PURINERGIC SIGNALING PATHWAY IN PERIODONTAL TISSUES

Dr. Santhiya Rengaraj¹, Dr.Pradeepkumar², Dr.Baalagopal¹, Dr.Sivasankari³, Dr.Sathish Kumar.K¹, Dr.Priyadurga¹ ¹Post Graduate,Department of Periodontics, Adhiparashakthi dental college and hospital, Melmaruvathur, Chengalpattu dist, Tamilnadu. ²Professor and HOD, Department of Periodontics, Adhiparashakthi dental college and hospital, Melmaruvathur, Chengalpattu dist, Tamilnadu. ³Redaer Department of Periodontics, Adhiparashakthi dental college and hospital, Melmaruvathur, Chengalpattu dist, Tamilnadu.

Keywords :

Periodontal pain, Receptors, Purinoreceptors, TENS

Corresponding author :

Dr.Pradeepkumar.Y

Professor and HOD,

Department of Periodontics

Adhiparashakthi dental college and hospital,

Melmaruvathur

Email:perio@apdch.edu.in

INTRODUCTION:

"Pain is a more terrible lord of mankind than even death itself. In 1931, Dr. Albert Schweitzer (The French medical missionary) -The chore of medicine was to preserve and restore patients' health and minimize their suffering. Pain is universally understood as a pointer of disease, and it brings the patient to the physician recognition. The word pain is derived from a Greek – Poin means Penalty: Latin – Poena (punishment from god). The purinergic signaling is involved in a wide range of physiological processes that impact dental systems, including bone remodeling, neuronal signaling, inflammation, epithelial transport, and stem cells.

DEFINITION

International Association for the Study of Pain (IASP) says that Pain is "An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage⁽¹⁾.

BENEFITS OF PAIN SENSATION

Pain sensation different from other sensations because its purpose is not to inform the brain about the stimulus quality, but rather, it indicates physically damaging. Though the pain is unpleasant, it is useful in the following ways. It makes one aware of a harmful agent in close contact with the body. It causes the individual to react to remove the pain stimulus to prevent further damage to the tissues. Pain receptors are non-adaptable receptors: therefore, they keep the person apprised of damaging stimulus as long as it persists. Thus pain sensation has a protective function^{(1).}

PAIN CLASSIFICATION²

- 1. Based on Duration: acute and chronic
- 2. Based on Intensity: mild, moderate, severe
- 3. Clinical types- Somatic pain, Visceral pain, Referred pain, Radiating pain, Projected pain
- 4. Qualitative types- Fast and Slow pain

PAIN RECEPTORS AND STIMULI

NOCICEPTORS are receptors of Pain to indicate that they

ABSTRACT

Pain is a widely accepted consequence of various periodontal conditions and surgical procedures and represents one of the major concerns for both patients and dentists. It is commonly known that the perception of dental Pain is due to an inflammatory reaction that involves different molecular mechanisms. Peripheral pain mechanisms associated with odontogenic and periodontal painful conditions are similar to the mechanisms observed in all other body parts. Purinergic signaling refers to how purines and pyrimidines mediate cellular responses following stimulation of specific receptors. The dental research community's recent interest in purinergic signaling fits, given the overlapping focus on inflammation and Pain.

respond to noxious stimuli. These noxious stimuli can be damaging or potentially damaging mechanical, chemical, and thermal (5). Nociceptors refer to a particular type of free nerve ending of two nerve fibers, A-delta myelinated nerve fibers and C unmyelinated nerve fibers.

TYPES OF NOCICEPTORS

- 1. Somatic nociceptors free nerve endings of A-delta & C fibers
- 2. Visceral nociceptors Little evidence for specialized pain receptors in viscera. Visceral Pain occurs mainly when maximum tension occurring on the nerve endings, especially in the smooth muscles. The mechanism behind is that stretch receptors on stimulation will produce a response as Pain. E.g., Pain due to uterine contractions during childbirth or Pain due to colic of alimentary, biliary, or urinary tracts.

PAIN STIMULI:

Activated by three types of noxious stimuli mechanical, thermal, chemical

- Mechanical and Thermal stimuli: Tends to elicit fast Pain. Fast, sharp Pain is usually felt in most of the superficial tissues. It also can elicit slow Pain.
- Chemical stimuli: Usually tend to elicit the slow suffering type of Pain. Chemical mediators act on nociceptors and cause pain sensation. Chemical mediators of Pain include K+, ATP, ADP are released following cell death; Bradykinin and Leukotrienes are released from mast cells; Serotonin releasedfrom platelets; Histamine from mast cells; Prostaglandins are mediators of Pain, fever & inflammation. These are synthesized by enzyme cyclooxygenase induced in peripheral tissues by cytokines, growth factors, and other inflammatory stimuli. PG & substance Penhances the sensitivity of pain endings but does not directly excite them. A nociceptive nerve terminal activates the axon reflex and releases Substance p and Calcitonin gene related peptide from other terminals of the same nociceptive nerve fibers.

FEATURES	A-DELTA FIBERS	C-FIBERS
NUMBER	LESS	MORE
MYELINATED	Myelinated	Unmyelinated
DIAMETER	2-5um	0.4-1.2um
CONDUCTION VELOCITY	12-30m/s	0.5-2m/s
SPECIFIC STIM- ULUS	Most sensitive is pressure	Most sensitive to chemical agents like local anesthesiaHistamine, Kinins, Prostaglandins.
IMPULSE CONDUCTION	Conduct impulses only in response to noxious stimuli (fast component of pain)	Conduct impulses in response to thermal &mechanical stimuli and slow component of pain
SENSITIVITY TO ELECTRICAL STIMULUS	More	Less

MECHANISM OF PAIN TRANSMISSION

Subjective experience of pain arises by four distinct processes ${\rm Fields}^{(1)}$



TRANSDUCTION

In response to noxious stimuli, the free nerve endings of c fibers and A-delta fibers release chemical mediators from the damaged cells like prostaglandin. These chemical mediators activate the nociceptors to the various noxious stimuli. The impulses are generated.

TRANSMISSION

The pain impulse is transmitted from transduction through the nociceptors to the dorsal horn in the spinal cord. From the spinal cord to the brain stem and thalamus via two main nociceptive ascending pathways, Involves the transmission of signals between thalamus to the somatosensory cortex.

MODULATION

Pain involves activating or inhibiting the transmission of pain impulses in the spinal cord. The multiple, complex pathways involved in the modulation of pain can lead to either an increase in the transmission of pain impulses (excitatory) or a decrease in transmission (inhibition)

Vol-2 | Issue - 2 | July - December 2020

PERCEPTION

The result of the neuronal activity of pain transmission is the perception of Pain and where Pain becomes multiple conscious experiences. When the painful stimuli are transmitted to the brain stem and thalamus, multiple cortical areas are activated, and responses are elicited.

THEORIES OF PAIN

SPECIFIC THEORY: DECARTERS 1664, MULLER 1840

Pain occurs due to stimulation of nociceptors with transmission by nerves directly to the brain. However, concepts of specific nerve ending are no long tenable. The Krause and Ruffini endings are absent from all hairy skin dermis, so, indeed, these structures cannot be receptors for cold and warmth.

INTENSITY THEORY: ERB, 1874

Pain is produced when any sensory nerve is stimulated beyond a specific limit. Pain is supposed to be a nonspecific sensation and depends only on high-intensity stimulation. However, the trigeminal system provides an example against this theory. In trigeminal neuralgia, the patient can suffer excruciating Pain from a stimulus no more significant than a gentle touch provided it is applied to the trigger zone. Although this theory is not accepted, it remains true to say that stimulation is a factor in causing Pain.

PATTERN THEORY: GOLDSCHIEDER, 1920

The noxious stimuli produce a pattern of signals which are essential for pain recognition. The precise nerve impulse pattern entering the CNS will be different for different sites and will vary for different persons because of normal anatomical variations.

GATE CONTROL THEORY: MELZACK & WALL 1965

According to this theory, the pain stimuli transmitted by afferent pain fibers are inhibited by GATE CONTROL MECHANISM located at the spinal cords posterior gray horn⁽³⁾. Gate is open – Pain is felt: Gate is closed - Pain is suppressed.

If spinal cord gates are not closed, pain signals reach the thalamus through the lateral spinothalamic tract. These signals are processed in the thalamus and sent to the sensory cortex. Perception of Pain occurs here once the brain determines the severity and extent of Pain. To minimize this brain sends messages back to the spinal cord to close the gate by releasing pain relievers such as opioids. Now the pain stimulus is blocked. GATING is controlled by the activity of large fibers à inhibits (closes) A β and small fibers à facilitate (opens)





SIGNIFICANCE :

The gating of pain at the spinal level forms the basis for relief of pain. Techniques like Enough rubbing, massage techniques, application of ice packs, acupuncture and transcutaneous electric nerve stimulation (TENS) are believed to produce their analgesic effect through this system.

DENTAL PAIN

Sensory nerve fibers of the periodontium originate in the trigeminal ganglion. Inflammatory mediators stimulate sensory nerve fibers. These nerve fibers release neuropeptides like Neurokinin A, Substance P, Calcitonin gene-related peptide.

Periodontal pain is predominantly carried by C fibers and it is relatively localized and therefore extends less than pain originating in the tooth pulp.

DENTAL PAIN PATHWAY

FIRST ORDER NEURONS

First-order neurons are the cells in posterior nerve root ganglia, which receive the pain sensation impulses from pain receptors through their dendrites. These impulses are transmitted to the spinal cord through the axons of these neurons.

Fast Pain→Aδ fibers-Marginal nucleus

Slow pain→C fibers-SubstantiaGelatinosa of Rolando

SECOND ORDER NEURONS

Neurons of MN &SGR form the second-order neurons. Fibers from these neurons ascend in the form of the lateral spinothalamic tract

THIRD ORDER NEURONS

Third-order neurons of pain pathway are the neurons in the Thalamic nucleus, Reticular formation, Tectum, Gray matter around the duct of Sylvius, Axons from these neurons reach the sensory area of the cerebral cortex, and some formation reaches the hypothalamus.

PURINERGIC SIGNALING AND PAIN

Purinergic receptors, also known as purinoreceptors, are a family of plasma membrane molecules that are often found in all mammalian tissues which are receptors for both ATP and adenosines(4).Purinergic receptors are divided into two main types, named P1 and P2 receptors. P1 receptors respond predominantly to the nucleoside adenosine. P2 receptors are primarily activated by nucleotides and are further divided into the P2X family of ionotropiccations and the P2Y family of G-proteincoupled receptors. A total of 14 active homo- or heterotrimers P2X receptors (P2X1-P2X7, P2X1/2, P2X1/4, P2X1/5, P2X2/3, P2X2/6, P2X4/6, and possibly P2X4/7) assembled from different subunits had been reported5. Using in situ hybridization immunohistochemistry (ISHH), mRNA expression for P2X2, 3, 4, 5, and 6 receptors had been detected in dorsal root ganglia (DRG) neurons, in which P2X2 and P2X3 receptors were expressed preferentially by C-fiber neurons. In contrast, the majority of P2X5 and P2X6 receptors were preferentially expressed by A-fiber neurons. Significantly, P2X receptors' expression is also detected in nociceptive primary sensory neurons, peripheral nociceptive nerve fibers, and their free endings extending throughout the epidermis. The eight mammalian P2Y receptors differ in their optimal agonist, and these receptors are P2Y1, P2Y2, P2Y4, P2Y6, P2Y11, P2Y12, P2Y13, and P2Y14.

ATP IN PERIODONTIUM:

ATP act as a neuronal modulator and transmitter in synaptic transmission. ATP has a role in the pathophysiology of gingival epithelial cells and periodontal ligaments. Purinoreceptors responsible for pain transduction belong to the P2X receptor family, a group of ligand-gated non-selective cation channels using ATP as an agonist(5). Upon binding to P2X receptors, ATP opens the pore of channels permeable to Na+, K+, and Ca2+ that depolarize the membrane potential, enhance the excitability and induce spikes nociceptive neurons(1). ATP initiated action potentials in nociceptive neurons from periodontium linking purinergic signaling and the P2X3 receptor to Pain anywhere in the body. By targeting P2X3 development of new P2X3 antagonists may be of benefit in the treatment of oral pain. The receptor may be involved in the effects of traditional analgesics.





ATP in periodontal ligaments links mechanical strains to osteopontin and RANKL(Receptor activator of nuclear factor kappa-B ligands). Extracellular ATP is implicated in the stimulation of the RANKL in PDLs following stimulation of the P2Y1R. RANKL is central to the activation of osteoclast(6). Upregulation of both osteopontin and RANKL suggests that the release of ATP following mechanical strain on PDL cells could alter the periodontium's homeostasis by altering bone resorption.

ASSESSMENT OF PAIN:

Comprehensive history taking (subjective reports)

Physical examination

Evaluation of psychological status

Rating scales and multidimensional scales can assess the severity of Pain.

UNIDIMENSIONAL TOOLS :

Visual analog scale (VAS)

The simple descriptive pain intensity scale

Numerical rating scales(NRS)

Verbal rating scale

Pain thermometer

MULTIDIMENSIONAL TOOL

McGill Pain Questionnaire

Brief Pain Inventory

The Neuropathic pain scale

The Oswestry disability index

MANAGEMENT OF PAIN

GOALS OF THERAPY

To decrease the subjective Intensity.

To reduce the Duration of pain complaints.

To decrease the potential for conversion of acute pain

to chronic persistent pain syndrome.

Improve the patient's quality of life and ability

to perform activities of daily living

PHARMACOLOGICAL MANAGEMENT

Local anesthesia-Bind to the interior of the axonal membrane and prevent depolarization and thus propagation of action potential⁽⁸⁾.

Non-opioid analgesics-Prevent the formation of prostaglandin from arachnoidic acid by inhibiting cyclooxygenase enzyme⁽⁷⁾.

Opioids-Exert their analgesic effect through actions on several specific receptors (mu, kappa, lambda)

Muscle relaxants -Act by blocking Na channels.

NMDA antagonist- Block NMDA receptors

NON PHARMACOLOGICAL MANAGEMENT

Physiotherapy (knee pain syndromes)

Psychological therapy : Counseling, Behavioral modification training, Stress reduction training, Relaxation training, Distraction, Hypnosis

Stimulation therapy – Acupuncture and Transcutaneous electrical nerve stimulation, Palliative care involves the alleviation of symptoms but does not cure the disease

CONCLUSION

The global burden of health problems and its co-morbid conditions may be reduced when Pain is understood as a disease. It also decreases the undertreatment and misdiagnosis of Pain. Given the number of agonists, antagonists, and modulators under development, it is likely that, shortly, purinergic receptors will become key pharmacological targets for managing oral Pain.

REFERENCES:

- Black JA, Cummins TR, Plumpton C, Chen YH, Hormuzdiar W, Clare JJ, Waxman SG. Upregulation of a silent sodium channel after peripheral, but not central, nerve injury in DRG neurons. JNeurophysiol. 1999 Nov 1;82(5):277685.
- 2. Woolf CJ, Bennett GJ, Doherty M, Dubner R, Kidd B, Koltzenburg M, Lipton R, Loeser JD, Payne R, Torebjork E. Towards a mechanism-based classification of pain? Pain 1998;77:227–9.
- Djouhri L, Lawson SN. Aβ-fiber nociceptive primary afferent neurons: a review of incidence and properties in relation to other afferent A-fiber neurons in mammals. Brain Res Rev. 2004 Oct 1;46(2):131-45.
- Burnstock G. A basis for distinguishing two types of purinergic receptor. Cell membrane receptors for drugs and Hormones: a multidisciplinaryapproach. New York: Raven Press. 1978;107-18.
- North RA. Molecular physiology of P2X receptors. Physiol Rev. 2002 Oct;82(4):1013-67.
- Wongkhantee S, Yongchaitrakul T, Pavasant P. Mechanical stress induces osteopontin via ATP/P2Y1 in periodontal cells. J Dent Res. 2008 Jun;87(6):5648.
- Cohen MJ, Schecter WP. Perioperative pain control: a strategy for management. SurgClin. 2005 Dec 1;85(6):1243-57.
- Butterworth JF, Strichartz GR. Molecular Mechanisms of Local Anesthesia Review. Anesthesiol. 1990 Apr 1;72(4):711-34.

BARRIERS FOR UTILIZATION OF ORAL HEALTH CARE SERVICES AMONG RURAL POPULATION- AN INDIAN OUTLOOK

Dr. Kalaivani. S¹, Dr. Rajeswary. K², Dr. Veena Dharani.S³

^{1,3}Senior Lecturer, ²Reader,

Department of Public Health Dentistry, Adhiparasakthi Dental College and Hospital, Melmaruvathur, Chengalpattu district, Tamil Nadu.

Keywords :

Utilization, Barriers for Oral Health, Perceived Need,

Correspondence :

Dr.S.Kalaivani,

Department of Public Health Dentistry, Adhiparasakthi Dental College and Hospital,

Melmaruvathur, Chengalpattu district, Tamil Nadu.

E-mail:phd@apdch.edu.in

INTRODUCTION:

Oral health is interconnected with general health. Oral health knowledge and utilisation of dental services are considered to be essential for health-related behaviour.1Utilisation is the actual attendance made by the people at health-care facilities to receive care. It is one of the important tools for oral health policy decisionmaking.2 A vast number of factors influence utilisation of dental services such as demographic, behavioral, socio-economic, cultural, and epidemiogical factors.3 The attitude of people towards their own teeth and the attitude of dentists providing dental care play a vital role in determining the oral health condition of the population. Recent advances are impressive in both dental technology and in the scientific understanding of oral diseases, yet significant disparities remain in the rates of dental disease and access to dental care among different sub-groups of the population.⁴

The oral diseases impact the economic growth of a society and can catastrophically affect the quality of life of an individual and hence diminish his/her contribution toward the welfare of the nation.5India is one of the largest democratic nations with around one billion people and about 60-70% of Indian population reside in rural areas.6Though India is making rapid progress in many sectors like Finance and Information Technology (IT), oral health care utilisation receives only minimal attention.4Most of the times, rural population is unable to reap the benefits compared to urban population due to various factors. The present paper focuses on the barriers to utilization of dental care facilities by the Rural Indian population.

Factors facilitating utilization of oral health services

Oral healthcare utilisation is influenced by need-related factors, supply-induced factors and structures of the health care system. Oral health care in India is delivered through various establishments like Governmental and Non-governmental organisations. Majority of dental services in India is being provided by the private dental

ABSTRACT

Utilization is the actual attendance made by the people at health-care facilities to receive care. It is one of the important tools for oral health policy decisionmaking. This review paper focuses on the barriers for the utilization of dental services in the Rural Indian population . Oral health care is delivered through various establishments like Governmental and Non-governmental organizations in India. Individual barriers for utilization of dental services mainly admitted are the lack of oral health knowledge and perceived need, fear for dental treatment, economy and time constraint. Dental profession related barriers are that dentist are clustered in urban area and a meagre number available in rural region. In context to social aspect cultural attitudes and values also play a important role in utilization Hence, the determinants of utilization by rural population should be addressed to improve the access to oral health care.

practitioners, followed by non-governmental organizations.3The review by Padminee et al5cited that a huge difference exists in the number of government sector dentists throughout the nation.

Among the utilization of oral health services model, the most widely acknowledged model is the Behavioral Model of Health Services Use (BM) developed by Ronald M. Andersen. This is a multilevel model that incorporates both individual and contextual determinants of health services use7as shown in

Figure1: Andersen's Health behaviour model



FIGURE 1: ANDERSEN'S HEALTH BEHAVIOUR MODEL

Classification of barriers to utilization of oral health services

A barrier could be any individual and/or organizational factor that can impede a person from performing an action. The barriers for utilisation of dental services have been classified by the Federation Dentaire Internationale⁸ as shown in





Figure 2: Barriers for utilisation of dental services have been classified by the Federation Dentaire Internationale INDIVIDUAL FACTORS

People's choices to seek oral health services are also based on a range of demand and supply factors. In a study among residents in Jeppinamogaru, Mangalore by Poudyal et al,⁹ majority (60.7%) of the study population did not prioritize oral health. In another study by Gill et al,⁶ around 68% of the study subjects from rural areas of Jhansla and Banur, Punjab had never visited a dentist. The individual factors include certain other subcategories like perceived need, income, fear and anxiety, oral health knowledge, lack of access.

AGE

The utilization pattern of dental services varies among different age groups. The study by Kakatkar et a¹⁴, Punitha et al,¹⁰ Fotedar et al,¹¹ the younger age group visited dentist more than other age groups. On the contrary, the study by Kakade et al¹² reported that maximum dental visits were made by elderly study population in the Nilambur village, Maharashtra. This could be because the older age group had more missing teeth component leading to problems in chewing food. The young age group had "fear" and "cost" barriers which prevented them from visiting a dentist.¹²

PERCEIVED NEED

Perceived oral health need is the individual's own judgment about the necessity or benefits of the service which he/she is prepared to acknowledge. Sometimes, there may not be a perceived need, even though there is a definite clinical need. The study by Poudyal et al⁹ in Mangalore has reported that around 61% of the respondents stated that they did not have any problem in their teeth. The studies by Fotedar et al¹¹ and Gill et al⁶ in North India have reported the respondents believed that oral diseases are not serious or life threatening. The previous studies by Kakatkar et al,⁴ Fotedaret al,¹¹ Nagarjuna et al,¹³ Subramani et al,¹⁴ Bommireddy etal¹⁵ have shown that majority of the study population visited dentist when there is any oral symptom or pain or dental emergency. Fotedar et al11 and Nagarjuna et al¹³ have reported that 62.5% and 60% of the respondents respectively believed that there is no need to visit a dentist unless there is pain. The presence of pain is the main motivating factor to seek dental treatment in most population.¹⁶

FEAR AND ANXIETY

Fear and anxiety about dental procedures are common factors leading to non-utilization of oral health services.^{4,17} Fear of pain and injection was also found to be one of the barriers to utilization of dental services. In the study by Kakatkar et al,434.4% of the study population in Debari village, Udaipur had fear of the painful dental procedures. The noise of the dental drill during treatment was also identified as the reason for poor utilization of dental services.

Dental anxiety and fear would have been derived from prevailing community beliefs or personal negative dental experiences and have not changed over time even after the advances in dental equipments, procedures and preventive measures.¹⁸ The studies by Kakatkar et al,⁴ Fotedar et al¹¹ and Nagarjuna et al¹³ showed that females had greater fear of dentists and so they have lower dental visit rates compared to males

ORAL HEALTH KNOWLEDGE

An individual could seek conventional dental service, traditional or self-medication dependent on the available oral health information, attitude, self-perceived need and financial resources.¹⁹A strong evidence of correlation exists between oral health knowledge and better oral health practice has been shown by Fotedar et al,¹¹ Nagarjuna et al,¹³in which a positive association was found between toothbrushing frequencyand utilization of dental services. Limited awareness about the dental diseases and treatment modalities could be responsible for low level of access to dental care. This is evident in the studies by Jain et al,²⁰ Subramani et al¹⁴ where around 65% of subjects were unaware of dental problems.

SOCIO-ECONOMIC FACTORS

Low socio-economic conditions are associated with lesser likelihood of going for a dental visit.^{12,14} Inadequate income could limit people's choices and priorities which is co ordinance with studies conducted in Debari, Udaipur by Kakatkar et al.⁴

The cost of dental treatment is another important barrier for utilization of oral health services as shown by Nagarjuna et al¹³ and Kadaluru et al¹⁶ where the respondents did not visit a dentist due to high cost of dental treatment. In India, specific dental insurance plans are not common, thereby reducing the dental visits.21In another study by Fotedar et al¹¹ and Deolia et al,²² finance is not a barrier because dental care was provided at minimal cost by the nearby dental college and government health sectors.

In a study done in Shimla, the respondents with higher education showed higher dental visits than others with lower education. This indicates the impact of education on high health consciousness, which in turn stimulates preventive behaviour such as regular visits for a check-up.¹¹ The study conducted in Debari, Udaipur by Kakatkar et al⁴ found that the higher education group believed the expense of treatment to be less restrictive than the lower education group.

Occupation is a product of education and a determinant of income to a great extent. In a study by Kiyak et al, it was found that blue collar workers were only half as likely as other occupational groups to have made dental visits in the past year, but were 2.5 times more likely to have had an extraction at their last visit than those in managerial or professional occupations.²³

HEALTH SYSTEM FACTORS

The study by Kothia et al has stated that manpower, money and material resources are being planned inappropriately in our country, and thus hampering the oral healthcare delivery in India.²⁵ India spends around 3% of its Gross National Product (GNP) for healthcare which is lower than WHO recommendation of 5% GNP.⁵

UNEQUAL GEOGRAPHICAL DISTRIBUTION OF DENTISTS

Significant differences exist in the distribution of oral health services, accessibility, utilization, and outcomes between urban and rural areas of both developing and developed countries. It is estimated that 80 percent of dentists are serving in urban areas which comprises only 20 percent of total Indian population.²⁶ The people living in rural areas are forced to travel to the nearest jurisdiction where dental care is available.²⁰

In the review article by Padminee K et al, Karnataka was found to have the highest number of dentists followed by Tamil Nadu, Andhra Pradesh, Maharashtra, Punjab, Kerala and the least number of dentists were present in Jharkhand. Some North Eastern states have no record of the number of registered dentists. Government dentists were higher in West Bengal whereas Goa and Mizoram had the least number of dentists from government sector.⁵

TRANSPORTATION SYSTEMS

Transportation is an important factor to access health facilities, especially in rural areas and when people are dependent on public transport. Access to dental care will be limited if services are located too far from patients or in places that are not easily accessible. In a study by Jain et al,20 72% of the subjects explained that travelling to the dentist is too difficult and 56% thought that lack of adequate transport to dental care facilities is one of the major barriers to access dental services. The study by Nagarjuna et al13in Nellore also showed that distance is one of the barriers as reported by 27% of the study population.

The study by Subramani et al¹⁴ reported that 27% of the study participants in Poonjeri, Mamallapuram, considered transport as a barrier in accessing dental care. This was because the respondents worked for daily wages and so visiting a dentist might lose them a whole or part of their earnings for the day leading to low dental attendance. The study conducted by Deolia et al²² in the rural areas of Maharashtra cited that a dentist is available near 47.4% of study population and 41.6% of them have received dental treatment. In another study in Shimla by Fotedar et al,¹¹ long distance of the dentist was less restrictive among the younger age group (25-35 years), higher education group and the high socio economic group.

ADMINISTRATIVE FACTORS

High patient satisfaction was associated with friendly and understanding service providers, and that a service delivery point's good reputation often encourages users to return, which promotes access, utilization and service continuity.²⁷

TIME

The amount of time that the patient spends at the health facility or time taken to reach a dental clinic is also a barrier in utilization. Most respondents in the previous studies by Gill et al,6Poudyal et al,⁹ Fotedar et al,¹¹ Kakade et al,¹² Subramani et al¹⁴ and Randhawa et al²⁸ reported that lack of time was a major barrier to utilize dental services. The amount of waiting time at the dental office is another barrier for oral health care services as reported by Kakade et al.¹²

CULTURAL FACTORS

Cultural diversity plays an important role in influencing the oral habits in India. In many cultures, the esthetic appearance of teeth may be important, but having "healthy" teeth and gums is not related to the appearance in a direct way.²⁰

Medicinal plants play an essential role in primary oral healthcare, some of commonly used medicinal plants include the clove which has been used in India and China, for over 2,000 years to control both tooth decay and counter bad breath. ¹⁷ In the study by Deolia et al²² among rural population in Maharashtra, around 52.1% of the study population have tried home remedies for dental problems.

ADDRESSING THE BARRIERS IN THE FUTURE

- Assessing the oral disease burden in each Indian state will help to redistribute dental man power and minimise the geographic imbalance. A comprehensive range of oral health services could be provided appropriate to the needs of the target population.
- Need-based workforce planning and optimal resource allocation to the rural population who have more dental needs.
- Provision of governmental insurance schemes or any other alternate financial method for dental care, in place of out-of-pocket expenditure to improve the buying power of patients.
- Altering the oral health determinants which enhance effective delivery of dental services.
- The dental institutions can establish satellite centres or provide mobile dental services to provide oral healthcare services to the people in remote areas.
- Integration of oral health into general health services and educating people about basic oral care methods.
- The professional bodies can collaborate with the Indian government in planning and improving access to oral health care services.

CONCLUSION

Despite the increase in oral disease burden and need for dental treatment, less number of people actually visit the dentist in a year. Use of oral health care services is comparatively lower than visiting physician or hospital because people perceive the oral conditions not be not life threatening. Utilization of oral health services can be greatly influenced by many factors like lack of oral health knowledge, level of education, fear of dental procedures or lack of perceived need to seek services unless in pain, type of oral health services offered in facilities, poor access to oral health services, high cost of dental treatment, unequal geographical distribution of dentists. Throughout India, regional variations of oral diseases and cultural attitudes and values constitute an important role in utilization. Hence, the determinants of utilization by rural population should be addressed to improve the access to oral health care services and promote oral health.

REFERENCES:

- Ashley FP. Role of dental health education in preventive dentistry. In: Murray JJ, editor. Prevention of Dental Disease. 3rd ed. Oxford: Oxford University Press; 1996.
- 2. Maserejian NN, Trachtenberg F, Link C, Tavares M. Underutilization of dental care when it is freely available: A prospective study of the New England children's amalgam trial. J Public Health Dent 2008;68:139-48.
- Gambhir RS, Brar P, Singh G, Sofat A, Kakar H. Utilization of dental care: An Indian outlook. J Nat SciBiol Med. 2013;4(2):292–7.
- Kakatkar G et al. Barriers to the Utilization of Dental Services in Udaipur, India. JDent (Tehran) 2011;8(2):81-9.
- Padminee K, Anusha R, Lakshmi K, Madan Kumar PD. Geographic disproportions in dental workforce distribution and its impact on oral disease burden: An Indian perspective. SRM J Res Dent Sci 2020;11:76-81.
- Gill M, Pal K, Gambhir RS. Oral hygiene practices, attitude, and access barriers to oral health among patients visiting a rural dental college in North India. J Dent Res Rev 2014;1:114-7.
- Andersen R. A behavioral model of families use of health services. Research Series no. 25. Chicago: Center of Health Administration, University ofChicago;1968.
- Cohen LK. Converting unmet need for care to effective demand. Int Dent J 1987;37:114-6.
- Poudyal S, Rao A, Shenoy R, Priya H. Utilization of dental services in a field practice area in Mangalore, Karnataka. Indian J Community Med 2010;35:424-5.
- Punitha VC, Sivaprakasam P. Oral hygiene status, knowledge, attitude and practices among rural children of Kanchipuram district. Ind J Multidiscip Dent 2011;1:115-9.
- 11. Fotedar S, Sharma KR, Bhardwaj V, Sogi GM. Barriers to the utilization of dental services in Shimla, India. Eur J Gen Dent 2013;2:139-43.
- 12. Nagarjuna P, Reddy VC, Sudhir KM, Kumar RK, Gomasani S. Utilization of dental health-care services and its barriers among the patients visiting community health centers in Nellore District, Andhra Pradesh: A cross-sectional, questionnaire study. J Indian Assoc Public Health Dent 2016;14:4515.
- Kakade SP, Hegde-Shetiya S, Shirahatti RV, Agrawal D, Mahuli A, Mittal-Mahuli S. Dental care utilization pattern and barriers encountered toward seeking oral health care services among the residents of Nimbut village, Maharashtra, India. J Dent Res Rev 2017;4:63-6.
- Subramani P, Nagappan N. Perceived and normative needs, utilization of oral healthcare services, and barriers to utilization of dental care services at peripheral medical centre: Poonjeri, Mamallapuram, India. J Dent Res Rev 2017;4:58-62.
- Bommireddy VS, Pachava S, Viswanath V, Talluri D, Ravoori S, Sanikommu S. Oral health care-seeking behaviors and influencing factors among south Indian rural adults: A cross-sectional study. J Indian Assoc Public Health Dent. 2017;15:252–7.
- Kadaluru UG, Kempraj VM, Muddaiah P (2012). Utilization of oral health care services among adults attending community outreach programs. Indian J Dent Res 23:841-2.
- 17. Agbor MA, Naidoo S. Knowledge and practice of traditional healers in oral health inthe Bui Division, Cameroon. J Ethnobiol Ethnomed 2011;7:6.
- Ajayi DM, Arigbede AO. Barriers to oral health care utilization in Ibadan, SouthWest Nigeria. African Health Sciences 2012;20(4):507-13.

- Lee W, Kim SJ, Albert JM, Nelson S. Community factors predicting dentalutilization among older adults. J Am Dent Assoc 2014;145(2):150–8.
- Jain A, Bhaskar DJ,Agali RC, Gupta V. Barrier to Oral Health Care DeliverySystem in India. Heal Talk 2013:5(3);35-6.
- Singh S, Shah V, Dagrus K, Manjunatha B, Kariya PB, and Shah S (2015). Oral HealthInequality and Barriers to Oral Health Care In India. EJDTR;4(1):242-5.
- Deolia SG, Kela KS, Sawhney IM, Sonavane PA, Nimbulkar G, Reche A. Evaluation of oral health care seeking behaviour in rural population of central India. J Family Med Prim Care 2020;9:886-91.
- Kiyak HA, Reichmuth M. Barriers to and enablers of older adults' use of dentalservices. J Dent Educ 2005;69:975-86.
- 24. Kronfol NM. Access and Barriers To Health Care Delivery In Arab Countries: a review. EMHJ 2012;18(12):1239-46.
- Kothia NR et al. Assessment of the Status of National OralHealth Policy in India. Int J Health Policy Manag 2015;4:575-81.
- Gupta JP, Sood AK. Contemporary Public Health: Planning Policy Management. 1st ed. New Delhi: Apothecaries Foundation; 2005.
- Stewart M et al. The impact of patient-centered care on outcomes. J Fam.Pract 2000. 49:796-804.

RADIX ENTOMOLARIS AND PARAMOLARIS: AMINI REVIEW AND CASE SERIES WITH CLINICAL IMPLICATIONS

Dr.Majumder Gayatri¹, Dr.Adhikari HD², Dr. Niyogi Abhijit³, Dr. Rajmohan Sujith⁴

Assistant Professor¹, Department of Conservative Dentistry and Endodontics, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal, India. Professor and HOD²,Department of Conservative Dentistry and Endodontics, Dr.R.Ahmed Dental College And Hospital, Kolkata, West Bengal, India. Professor³, Department of Conservative Dentistry and Endodontics, Dr.R.Ahmed Dental College And Hospital, Kolkata, West Bengal, India. Senior Lecturer⁴, Adhiparasakthi Dental College And Hospital, Melmaruvathur

Keywords :

Endodontic treatment, mandibular molar, anatomical variations, radix entomolaris, radix paramolaris.

Correspondence :

Dr.Gayatri Majumder, Department of Conservative Dentistry and Endodontics, Haldia Institute of Dental Sciences and Research, Haldia, West Bengal, India.

E-mail: gayatri.majumder@gmail.com

INTRODUCTION :

For successful endodontic therapy, complete in-depth knowledge of the morphology of root canal systems and its variation from normal is essential. Root canal anatomy is complex and highly unpredictable. So, inadequate knowledge about these variations might lead to an unsuccessful endodontic therapy. So, successful endodontic treatment depends on the location of the canals; through chemomechanical debridement followed by three-dimensional obturation with perfect fluid seal. ^[1,2,3] The first mandibular permanent molar is the earliest tooth to erupt and it is the one most frequently in need of endodontic treatment. The majority of mandibular first molars have two roots, mesial and distal with two mesial and one distal canal.^[4,5] Many variations have also been described. Fabro-Campos reported the ² presence of three mesial canals while Strener reported three distal canals. ^[6,7] Again three roots in mandibular first molar were mentioned in literature by Carabelli, known as Radix Entomolaris(RE) located in distolingual position(Carabelli 1984) and is called as Radix Paramolaris(RP) when located on the mesiobuccal side.^[8]

MORPHOLOGY

Carlsen and Alexanderson classified RE based on the location of its cervical part into four types.[9-11] Type A–Distally located cervical part with two normal distal root components Type B Same as Type A; however, only one normal distal root component Type C–Mesially located cervical part Type AC–Central location between mesial and distal root components.

De Moor et al.n classified RE-based on the curvature in buccolingual orientationinto three types.^[12] Type I–Refers to a straight root/root canal Type II–Refers to an initially curved entrance which continues as a straight root/root canal Type III Refers to an initial curve in the coronal third of the root canal, and a second buccally oriented curve starting from the middle to apical third. Recently, Wang et al. gave another classification for RE depending on its radiographic appearance.^[13]

Type 1: Presents the most identifiable radiographic image²

Type 2: A large beam angulation is necessary mesially or distally for their identification

ABSTRACT

The root canal treatment of a mandibular molar with aberrant canal configuration can be diagnostically and technically challenging. These case series focus mainly on the diagnosis and management of variable root canal anatomies like Radix entomolaris and paramolaris in mandibular molars.

Type 3: Identification becomes extremely difficult because of the overlap of the adjacent distobuccal root

Carlsen and Alexanderson classified RP based on the location of its cervical part into two types.[14] Type A–Refers to an RP in which the cervical part is located on the mesial root complex Type B–Refers to an RP in which the cervical part is located centrally, between the mesial and distal root complexes.

Song JS et al. (2010) further added two more newly defined variants of RE $^{\scriptscriptstyle [15]}$

- 1. Small type: length shorter than half of the length of the distobuccal root.
- 2. Conical type: smaller than the small type and having no root canal within it.

INCIDENCE AND PREVALENCE

Anatomical studies have shown some association between the presence of a RE in the first permanent molar and some ethnic groups.RE has a frequency of less than 5% in white Caucasian, African, Eurasian, and Indian populations while it appears to be commonly present in races of mongoloid traits such as the Chinese,

Eskimos, and Native American population with a frequency of 5-30%. [16-19] The bilateral occurrence of RE is reported at around 50-67%.[20] RP is comparatively very rare than the RE. African population has a prevalence rate of 1.5-3% and the Indian population has around 2% prevalence rate for RP. According to Visser prevalence rate of RP is 0% for the first mandibular molar,0.5% for the second, and 2% for the third molar.^[21]

ETIOLOGY

According to Calberson et al. (2007), the etiology behind the formation is still unclear but it could be related to external factors during osteogenesis. Racial genetic factors can also influence the profound expression of a particular gene that can result in a more profound phenotypic manifestation.^[22]

RADIX ENTOMOLARIS

CASE 1

A female patient aged 22 years old reported with a chief

complaint of pain in the lower right posterior tooth region of the jaw for the last 15 days. Clinically the lower right molar tooth had occlusal deep caries and was tender on percussion. The mobility of the tooth was within the physiologic limit. IOPAR showed occlusal radiolucency approaching the pulp space and periapical radiolucency near the apical third of the distal root. The tooth was tested with a pulp tester which elicited as a negative response. The diagnosis was finalized as symptomatic apical periodontitis and RCT was recommended.

RCT procedure was initiated under local anaesthesia by giving inferior alveolar nerve block with rubber dam isolation. The access cavity was prepared. Canal orifices were located by using DG-16 explorer (Dentsply, United Kingdom).

Initially, two mesial canal orifices (MB & ML) and one distal (DB) were located and on further exploration, another canal on the distolingual part of the pulpal floor was located. The presence of extra root (Radix Entomolaris) was confirmed by type-2 radiographic image (Carlsen,1991) and CBCT.

Working length determination was done with apex locator and confirmed with radiograph.

Cleaning and shaping were performed with Protaper Gold(Dentsply, Maillefer, and swiss made CH-1338 Ballaigues)in the distobuccal canal up to F2 and other canals were prepared with Hyflex CM files (Coltene Whaledent) up to 25/0.04 in the crown down technique. Canals were irrigated sequentially with 5.25% Sodium Hypochlorite and 17% EDTA during instrumentation and finally with normal saline. Calcium Hydroxide intracanal medicament was placed as dressing in the first visit. In the next visit, after 10 days, irrigation was done, canals were dried with paper points, mastertone selection was done with radiograph and obturation with laterally condensed gutta-percha and Apexit-plus sealer(Ivoclar Vivadent). Post Endodontic restoration was done with composite.





A 29 years old male patient reported with a chief complaint of pain in the lower left back teeth region for the last 7 days. On clinical examination, there was a broken class 1 restoration and the tooth was tender on percussion in relation to #36. Pulp tester elicited a negative response. IOPAR showed coronal radiolucency approximating pulp space with periodontal ligament space widening at the apical third of the roots. The tooth was diagnosed

with chronic apical periodontitis. RCT was started. The location of extra orifice and type 2 radiograph indicated the presence of RE which was confirmed with CBCT. RCT was completed with standard protocol.



5.obturation **RADIX PARAMOLARIS** CASE 3

A 38 years old male reported with the chief complaint of pain in the lower right back tooth region for the last 1 month. On clinical examination, severe occlusal attrition and a deep class 1 cavity were discovered in relation to #46. Tooth showed a negative response to vitality testing and was tender on percussion.

6. cbct - coronal view

IOPAR showed coronal radiolucency approaching the pulp space. Diagnosis of Symptomatic apical periodontitis was made and RCT was recommended. During RCT, the location of the additional orifice on the mesiobuccal aspect and CBCT confirmed the presence of RP. The RCT was completed as per the standard protocol.





2.working length

1.pre operative radiograph





5. cbct - coronal view

3.mastercone

4.obturation

DISCUSSION

The clinical success of root canal therapy depends on the clinical triad of diagnosis, adequate chemomechanical preparation, and 3D obturation. So, the first step of the endodontic triad, i.e., a correct diagnosis is one of the most important steps for successful endodontic therapy. There are various methods to locate additional canals, such as - clinical inspection of tooth crown and analysis of cervical morphology of the roots utilizing periodontal probing. -Good illumination, use of magnifying loupes, microscopes. -knowledge of the law of symmetry, law of orifice location, visualizing the dentinal map, and canal bleeding points. - using

instruments like an endodontic explorer, path finder, DG 16 probe, and micro opener. -Champagne effect: bubbles produced by remaining pulp tissue in the canal while using sodium hypochlorite in pulp chamber. -An extra cusp (tubercular paramolar) or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity.

Advanced imaging techniques can aid to locate and confirm additional canals in the case of multirooted teeth. These techniques include digital radiography, fiber -optic illumination, dental endoscopy and orascopy,micro-computed radiography (CT), visualization endograph using Ruddle's solution, and magnetic resonance microscopy.^[13,23,24] with the help of advanced modalities it is easier to detect RE but these are an expensive and inconvenient tool. Hence conventional and digitalized radiography would suffice for the diagnosis of RE/RP.^[25] In the present case series, the variation in distal root anatomy was identified through careful reading of angled IOPA radiographs. The pre-op radiograph was taken with conventional angulation and the second working length with a mesial shift of approximately ²⁰ degrees. This buccal object rule has been also called

same lingual, opposite buccal rule/Clark's rule/Walton's projection. ^[23,25] An additional root appears as a shadow or thin radiolucent line in the radiograph.So, minimum of two angulated diagnostic radiographs are a must to avoid any iatrogenic mistake. The most important basic principle for a successful root canal therapy is the principle of 'Straight-line access. ^[26] As the orifice of radix entomolaris is distolingually located, the shape of the access cavity should be modified from classical triangular form to trapezoidal or rectangular form in order to better locate the orifice of the distolingual root.

Sometimes the canal orifice of RE or RP could be occluded by secondary or calcified dentine. When searching for hidden canals, we should keep in mind that condary dentin is generally whitish or opaque, whereas the chamber floor is darker and grey in appearance. Clinicians should also be cautious about extra gauging and perforation while searching for extra canals

Therefore, visual access and superior control during access procedures make a convenient tool in such cases.^[27] Thus, the knowledge of the location of additional roots and root canal orifices, initial exploration with smaller files, radiographs for working length and curvature determination, proper glide path preparation before using rotary files are the different step by step actions that should be taken to avoid or overcome procedural errors during RCT and reduces the incidence of retreatment.

CONCLUSION:

The complexity of the root canal system often poses a challenge to the clinician. Failure to identify the RE or RP can affect the prognosis of endodontic treatment. Ability to correctly interpret the radiograph, careful inspection of the pulp chamber floor, and use of recent concepts in access cavity preparation along with the sound knowledge of the variable anatomy of the root canal are very important for the clinician to locate and treat the root canals in case of radix entomolaris or paramolaris.

REFERENCES:

- Segura-Egea JJ, Jimenez-Pinzon A, Rios-Santos JV. Endodontic therapy in a 3-rooted mandibular first molar: Importance of a thorough radiographic examination. J Can Dent Assoc 2002;68:541-4.
- Tu MG, Huang HL, Hsue SS, Hsu JT, Chen SY, Jou MJ, et al. Detection of permanent three-rooted mandibular first molars by cone-beam computed tomography imaging in Taiwanese individuals. J Endod 2009;35:503-7.
- Haapasalo M, Shen Y, Qian W, Gao Y. Irrigation in endodontics. Dent Clin North Am 2010;54:291-312.
- Vertucci FJ. Root canal anatomy of the human permanent teeth. Oral Surg Oral Med Oral Pathol 1984;58:589-99.
- Barker BC, Parsons KC, Mills PR, Williams GL. Anatomy of root canals. III. Permanent mandibular molars. Aust Dent J 1974
- 6. Fabra-Campos H (1989) Three canals in the mesial root of mandibular first permanent molars: a clinical study. Int Endod J 22: 39-43.;19:408-13.
- 7. Stroner WF, Remeikis NA, Carr GB (1984) Mandibular first molar with three distal canals. Oral Surg Oral Med Oral Pathol 57: 554-557.
- 8. Bolk L. The importance of endodontics in maxillary and mandibular molar root canals. J Can Dent Assoc 1994;60:527-32.
- Carlsen O, Alexandersen V. Radix entomolaris: identification and morphology. Scand J Dent Res 1990;98:363-73.
- Grossman LI. In: Endodontic Practice. 11th ed. California: Lea and Febiger; 1987. p. 145-78.
- Ingle JI, Bakland LK, Endodontic cavity preparation. In: Endodontics. 5th ed. B.C. Decker: Elsevier Inc; 2002. p.405-510.
- De Moor RJ, Deroose CA, Calberson FL. The radix entomolaris in mandibular first molars: an endodontic challenge. Int Endod J 2004;37:789-99.
- Wang Q, Yu G, Zhou XD, Peters OA, Zheng QH, Huang DM. Evaluation of x-ray projection angulation for successful radix entomolaris diagnosis in mandibular first molars in vitro.J Endod 2011;37:1063-8.
- Carlsen O, Alexanderson V. Radix paramolaris in permanent mandibular molarsIdentification and morphology. Eur J Oral Sci 1991;99:189-95.
- Song JS, Choi HJ, Jung IY, Jung HS, Kim SO (2010) The prevalence and morphologic classification of distolingual roots in the mandibular molars in a Korean population. J Endod 36: 653-657.
- 16. Tratman EK (1938) Three-rooted lower molars in man and their racial distribution. British Dental Journal. 64: 264-274.
- 17 Curzon ME, Curzon JA (1971) Three-rooted mandibular molars in the Keewatin Eskimo. J Can Dent Assoc (Tor) 37: 71-72.
- Turner CG 2nd (1971) Three-rooted mandibular first permanent molars and the question of American Indian origins. Am J Phys Anthropol 34: 229-241.
- 19. Yew SC, Chan K (1993) A retrospective study of endodontically treated mandibular first molars in a Chinese population. J Endod 19: 471-473.
- 20. Agarwal M, Trivedi H, Mathur M, Goel D, Mittal S. The radix entomolaris and radix paramolaris: An endodontic challenge.J Contemp Dent Pract 2014;15:496-9.
- 21. Visser JB. Beitrag zur Kenntnis der Menschlichen Zahnwurzelformen. Hilversum: Buchdruckerei Rotting; 1948. p. 49-72
- 22. Ribeiro F.C.Consolaro A.Importancia clinica y antropologica de la raiz distolingual en los molars inferiores permanentes.Endodoncia. 1997; 15: 72-78
- Weine FS, editor. Access cavity preparation and initiating treatment. In: Endodontic Therapy. 3rd ed. St. Louis, USA: The C.V. Mosby Company; 1982. p. 207-55.
- 24. Reuben J, Velmurugan N, Kandaswamy D. The evaluation of root canal morphology of the mandibular first molar in an Indian population using spiral computed tomography scan: an in vitro study. J Endod 2008;34:212-5.
- Ingle JI, Heithersay GS, Hartwell GR. Endodontic diagnostic procedures. In: Ingle JI, editor. Endodontics. 4th ed. Philadelphia: Lea and Febiger; 1994. p.123-7.
- 26. Calberson FL, De Moor RJ, Deroose CA (2007) The radix entomolaris and paramolaris: clinical approach in endodontics. J Endod 33: 58-63.
- 27 Fava L. Incidence of radix entomolaris in the Indian population-An in-vitro and in-vivo analysis. J. Int Oral Health 2011;5:35-46.

A STUDY OF RELATIONSHIP BETWEEN AGE, GENDER AND TOOTH SHADE VALUE IN POPULATION OF MELMARUVATHUR, KANCHEEPURAM DISTRICT, TAMIL NADU

Dr.Kirubakaran.A², Dr. Prabhu.K¹, Dr. karthick.V.C², Dr. Ramesh Karthick², Dr. Sonia abraham²,

Dr. Jitin Varghese mathew²

¹Professor, ²Senior lecturer,

Department of Prosthodontics, Adhiparasakthi dental college and Hospital, Melmaruvathur, Tamilnadu, India.

Keywords :

Shade selection, Tooth shade, Vitapan shade guide

Correspondence :

Dr.Kirubakaran.A,

No.48, 53rd Street, 9th Avenue Ashok Nagar, Chennai - 83

E-mail: kiruba82us@gmail.com

ABSTRACT

Background and Objective : Color of teeth is undoubtedly one of the most important factors considering patient's satisfaction with the quality of their restoration especially anterior region of the mouth. This study was aimed at determining the difference in tooth shade value, in accordance with age & gender among the population of

INTRODUCTION:

Natural teeth are known to possess different shades of their surface1. It has been found that aging process has a profound effect on the shade of teeth in that teeth becomes darker and less translucent with advanced age 2.The word "aesthetic" meaning concerned with beauty/appreciation of beauty is regularly used in dentistry to describe the artificial teeth replacement.Increasing dental awareness among the general population in developing countries has led to increased demand for esthetic restoration. Hence,it becomes all the more pertinent now,more than ever before,to provide restorations which defy detection3.

Selection of tooth shade based on natural anterior teeth is influenced by many factors.Light under which the shade is viewed is a major factor4.Clinical skill of the operator and shade guide systemused,play an important role in shade selection process5. Staining due to various factors both extrinsic and intrinsichave a direct impact on altering tooth shades6. Some extrinsic factors are diet, smoking,xerostomia, and restorations. Intrinsic factors include congenital defects of enamel or dentin such as amelogenesis and dentinogenesis imperfecta. Environmental factors include tetracycline staining, traumaticinjury, dentalcaries and aging.

Inspite of all factors mentioned above, the selection of artificial tooth shade to replace missing teeth is relatively simple procedure when few natural anterior teeth remain7.A perception among dentists has been that individuals with darker skin color have lighter shades of teeth. This perception is commonly explained by the illusion of gender contrast between skin color and tooth shade.

Age of the patient was found to have a definite relation to tooth shade value. This relation has been collaborated by many studies which have shown darker tooth shade values with an increase

Melmaruvathur, Tamil Nadu and testing the hypothesis that tooth shade value is influenced by age and gender of the individual.

Methodology:

A total of 250 individuals aged 16 to 65 of both genders divided into 5 groups participated in this study. A Vitapan classical shade guide was chosen due to availability to examine either the maxillary right and left central incisor in natural daylight. Tooth shades were categorized according to value, participant's age and gender. Categorical modeling with chi-square analysis was used to analyze the data.

Result: Significant tooth shade difference was discovered among the subjects with age. Younger subjects have lighter shade and the older subjects have darker shades and there was no significant difference between tooth shade value and gender.

Conclusion: Within the limitation of the study, tooth shade values are lighter in younger individuals and darker in older individuals and no significant relationship between tooth shade and gender.

in age and vice versa.Gender is yet another factor, significantly associated with tooth shade values. Men are more likely to present with darker tooth shade values whereas women of the same age group were more likely to show lighter tooth shade values8.

Precise color communication is integral to the development of esthetic harmony and overall restorative success9. The study of color is an integral part of esthetic dentistry, cosmetic and esthetic dental outcomes are essential to meet patient's high expectations and positively influence their self-esteem10. The Munsell Color Order System is the system that best serves the needs of the dental profession in its attempt to visualize and organize color. It is based on a three-dimensional model in which each color is comprised of three attributes of hue, value and chromal1 .Attractive restorative and prosthodontic outcomes begin with a consistent buccal shape and silhouette that reflect light12.The perceived color of natural tooth depends on the illuminating light source, critical to translucency, opalescence, and fluorescence13.Various studies have been conducted to establish a relationship between age, the gender of the individual with tooth shade values. Contrasting results have been reported. One of the reasons for varying results can be attributed to the ethnic origin of study samples. Hence a study was conducted to find the relationship between tooth shade value, age, and gender.

METHODOLOGY:

The study consisted of a sample size of 250 individuals belonging to both gendersin the age range of 16 – 65yrs. Tooth shade of completely erupted permanent maxillary left or right central incisor were recorded using Vitapan classic shade guide. 250 subjects divided into 5 groups. 50 in each group having both genders in each group.

GROUPS	RANGE OF PATIENT'S AGE IN YEARS
GROUP – A	16 TO 25 YEARS
GROUP – B	26 TO 35 YEARS
GROUP – C	36 TO 45 YEARS
GROUP – D	46 TO 55 YEARS
GROUP – E	56 TO 65 YEARS

Table 1: Groups Vs Range of Patient's Age in Years

Table-1 shows number of groups and range of patient's age in

respective groups

Bright colors are removed from the working field. If the patient

RESULT :

Table 2: Correlation of Tooth Shade Vs Age

is wearing bright clothing, it is prudent to cover the patient with a neutral color. Any dark color lipstick is to be removed because it could affect shade matching. The tooth is cleaned by using prophylaxis paste prior to shade selection and shade comparison is viewed not more than 5 - 7 seconds to avoid eye fatigue. Clinician is at a distance of 28-33 cm from the patient during shade selection. Shade is determined when the teeth are most hydratedbecause enamel dehydration reduces its translucency by 82% misleading the clinician. Shade comparison is done in between 10am and 2pm because at this time color temperature is around 5500K and then under color corrected light to ensure the accuracy of the match^{14.} During the shade comparison, shade tabs are placed either above or below the tooth to be matched and not adjacent to the tooth to avoid the binocular effect. Always, the value is analyzed first, followed by chroma and then hue^{15.}

AGE GROUP	A1	A2	A3	A3.5	A4	B1	B2	B3	B4	C1	C2	C3	C4	D2	D3	D4
GROUP-A 16 – 25 years	15	13	1	0	0	9	4	0	0	6	1	0	0	1	0	0
GROUP- B 26 – 35 years	22	6	0	0	0	10	8	0	0	4	0	0	0	0	0	0
GROUP- C 36 – 45 years	11	4	4	0	0	12	8	0	0	8	2	1	0	0	0	0
GROUP- D 46 – 55 years	9	1	2	1	2	5	5	4	4	6	5	2	0	2	2	0
GROUP- E 56 – 65 years	1	1	1	2	4	4	5	4	7	9	5	2	1	3	1	0

TABLE 3: CORRELATION OF TOOTH SHADE VS GENDER

GENDER	Shade A	Shade B	Shade C	Shade D
Male	60(24%)	52(20.8%)	21(8.4%)	3(1.2%)
Female	49(19.6%)	50(20%)	25(10%)	4(1.6%)

Diagram 1: Correlation Age vs Tooth shade

CORRELATION BETWEEN AGE VS TOOTH SHADE



Diagram1: shows correlation between age versus shade where 16 to 35 years of age having A shade. 36 to 45 years of age have B shade whereas 46 to 55 years of age having A shade and 56 to 65 years of age having C shade.

Discussion:

Chi-square statistical test demonstrated that younger subjects 16-35 have lighter tooth shades than the older age groups. Table 2 shows that shade A is common for 16-35 years and 46-55 years shade B is common for 36-45 years and shade C is common for 56-65 years. It predicts that as the age progresses the shade of the teeth diminishes because of gradual reduction of pulp chamber with compensatory deposition of secondary dentin which is supported by studies done by Hasegawa et al16 and Jahangiri et al17. The secondary dentin is harder, less permeable and darker in color. The progressive loss of enamel thickness due to wear and tear lead to darker dentin color dominating the tooth shade18.It has also been reported that the amorphous organic and inorganic pigments deposition in dentin and dentin-enamel junction, resulting in more saturated dentin chroma2 .The increased redness in elder subjects is ascribed to occlusal wear and loss of translucency with exposed dentin island19. Table 3 shows more no of males(24%) having A shade than females(19.6%).Shade B,C,D are approximately having a common distribution between both genders.

Clinical significance :

Shade matching is critical in prosthetic and esthetic dentistry. Understanding patient and dentist perception of the attractiveness of a smile with the important role-played by age and gender of the patient, may help clinicians to better identify teeth shade, helping delivery of tailored prostheses and esthetic restorations.

Conclusion:

The result of this observational study suggests that there is a significant relationship between tooth shade and age and no significant relationship between tooth shade and gender. Based on the relationships, age may be a useful guide for the selection of tooth shade in removable and full mouth reconstruction to achieve a more natural appearance, especially among the younger and older individuals. Within the limitation of the study, the advancing age leads to darker and more yellow teeth and significant change in tooth color was observed in the age group above 50 years.

REFERENCES :

- Hassan AK. Effect of age on color of dentition of Baghdad patients. East Mediterr Health J 2001; 6:511-3.
- Morley J. The esthetic of anterior tooth aging. CurrOpinCosmet Dent1997; 4:35-9.
- Sumanth K, Veeraganta, Ravichandra C.Savadi et al, Differences in tooth shade value according to age, gender and skin color: A pilot study. The journal of Indian Prosthodontic Society 2015;15:138-141.
- Park JH, Lee YK, Lim BS. Influence of illuminants on the color distribution of shade guide J.Prosthet Dent 2006; 96:402-11.
- D Gonzalo Diaz, William M, Johnston et al, Estimating the color of maxillary central incisors based on age and gender. J prosthet Dent 2008 aug 100 (2) 93-98.
- Watts A, Addy M, Tooth discoloration and staining. A review of the literature. Br Dent J 2001; 190: 309 -16.
- Sellen PN, Jagger DC, Harrison A, The selection of anterior teeth appropriate for the age and sex of the individual. How variable are dental staff in their Choice? J oral Rehabilitation 2002; 29:853-7.
- JahangiriL ,Reinhardst SB, Mehra R , Mathewson P, Relationship between tooth shade value and skin colour. An observational study, J Prosthet Dent 2002; 87: 149-52.
- Mukut Seal, Pratim Talukdar et al, Color noticing: A review of conventional and contemporary dental color working system. International journal of Oral care and Research 2014;2:49-50.
- Freedman G. Buyer's guide to cosmetic imaging systems. Cosmetic imaging creates projection of restorative treatment. Dent today 2009; 28(7); 134-8.
- Munsell AH. A color notation. 11th edn. Baltimore: Munsell Color Co., Inc. 1961.
- 12. Glick KL, color management of cosmetic restorations. CurrOpincosmet Dent 1995: 36-40.
- VillarroelM ,Fahl N, Desousa Am , De Oliveria OB , Direct esthetic restorations based on translucency and opacity of composite resins. J EsthetRestor Dent 2011; 23 (2) 73-87.
- 14. Chu SJ. Fundamental of color; shade matching and communication in esthetic dentistry. Quintessence publishing co. Inc 2004
- MeyenbergKH, Dental esthetics; a European perspective. J Esthetic Dent 2011; 23(2):73-87.
- 16. HasegawaA, Ikeda I, Kawaguchi S. Color and translucency of in vivo natural central incisors. J Prosthet Dent 2000; 83:418 23.
- Jahangiri L, Reinhardt SB, Mehra R, Matheson P. Relationship between tooth shade value and skin color: An observational study. J Prosthet Dent 2002; 87:149 52.
- Ten bosch JJ, Coops JC.Tooth color and reflectance as related to light scattering and enamel hardness.J Dent Res 1995;74(1):374-80.
- Hasegawa A,Motonomi A,Ikeda I et al,Color of natural tooth crown in Japanese people.Color Res Appl2005;25(1):43-48.

CONE BEAM COMPUTED TOMOGRAPHIC IMAGING – ANATOMY OF MAXILLOFACIAL REGION

Dr. Lakshman.VL¹, Dr. Thilakavathy.N², Dr. Prasanna Kumar.D³, Dr. Umamaheswari.G⁴, Dr. Bharathi.K⁵

Professor & HOD², Senior lecturer^{1,3} Department of Oral Medicine and Radiology, Adhiparasakthi dental college and hospital, Melmaruvathur. Private Practitioner^{4,5}

Keywords :

CBCT, Multiplanar imaging, Maxillary arch, Mandibular arch

Correspondence :

Dr.VL.Lakshman, Senior lecturer Department of Oral Medicine and Radiology, Adhiparasakthi dental college and hospital, Melmaruvathur. Email : omrapdc@gmail.com

INTRODUCTION:

Although nothing can replace history and physical examination when evaluating patients, the use and evolution of non-invasive technology for imaging areas not visible to the human eye has become a bigger part of the diagnostic process. ^[01]

It was not until CT (Computed tomography) scan technology became available for dental applications that the three-dimensional (3-D) properties of the jawbones and vital structures became apparent. The advent of 3-D reconstruction using CT or cone beam CT (CBCT) empowers clinicians with tools to simulate implant placement, bone grafts, or orthognathic surgical procedures in a true and accurate virtual environment.^[02]

Technological advances in computing power, sensor technology, and reconstruction algorithms have merged and resulted in the introduction of a CBCT (also known as volumetric imaging).^[03]

IMAGING CHALLENGES:

The main challenge in CBCT imaging and diagnosis is the lack of familiarity experienced by most dental professionals with the concept of multiplanar imaging that is offered by this new and exciting technology. Dentists and specialists, with only a few exceptions, have a wide experience in using the traditional dental imaging modalities and the comfort level in their diagnostic skills with these modalities is high. These imaging modalities have been taught for several decades in the dental schools and in other training courses. (Figure 1)



ABSTRACT :

The main challenge in CBCT (Cone beam computed tomography) imaging and diagnosis is the lack of familiarity experienced by most dental professionals with the concept of multiplanar imaging that is offered by this new and exciting technology. Diagnostic imaging in different planes is a new concept and may require a different view of imaging data. It is remembered that multiplanar imaging or reformatting is the ability to generate images in different planes, flat or curved. It is strongly recommended that to take advantage of the CBCT images in full, the diagnostician should be able to understand and apply the concept of multiplanar reformatting to the highest degree.

Figure 1: Multiplanar imaging and reformatting. Axial (A),coronal (B), and sagittal (C) sections of the head. The approximate tomographic plane is shown in the three-dimensional images (blue line).

Diagnostic imaging in different planes is a new concept and may require a different view of imaging data. It is remembered that multiplanar imaging or reformatting is the ability to generate images in different planes, flat or curved. This ability is offered only by some contemporary imaging modalities, such as CBCT, medical CT, MRI, ultrasound and others. Because a volume of data has been acquired and stored by CBCT, these data can be reformatted and realigned and several different types of images can be synthesized in anyway the diagnostician requires. With multiplanar imaging, the diagnostician or operator can recreate images in different planes (flat or curved) with simple functions. This increases the diagnostic efficiency in the hands of the knowledgeable individual in an unparalleled way.

ANATOMICAL LANDMARKS UNDER VARIOUS SECTIONS:

Cross sectional images are generated perpendicular to the arch form of the maxilla or mandible. The maxillary sinus is pyramidal in shape low – density (black or dark structure). The appearance of healthy air cavities in the maxillary sinuses is dark as air accentuates x rays minimally. The thin cortical outline of the buccal and medial sinus walls can be identified in the above images. The medial wall of the maxillary sinus borders the sinus cavity from the nasal cavity.

Further inferior in the same image, a cross section of the mandibular molar region and the long axis of the mandibular bone can be identified. The mandibular teeth are not always parallel with the long axis of the mandibular bone in the cross section. The cortical outline of the mandibular bone appears to be much thicker than that of the maxilla. (Figure 2) Moreover, the submandibular gland fossa sometimes is more prominent than others. Significant anatomic structures, such as the lingual artery, are passing nearby The mandibular canal is identified into the mandibular bone.



Figure 6: Axial image at the level of the maxillary alveolar ridge. The white lines correspond to the respective sections: odontoid process of axis (ODP) and second cervical vertebra. (A) Cross sectional images in the molar region: the buccal (B), labial (Lab), lingual (L), or palatal (P) aspect of the alveolar bone is marked on the images. FOM, floor of mouth; INC, inferior nasal concha; INF, inferior nasal meatus; MC, mandibular canal; MS, maxillary sinus; OC, oral cavity; SGF, submandibular gland fossa; T, tongue. The green arrows indicate the hard palate, and the yellow arrows indicate the zygomatic process of the maxilla. (B) Premolar region: MS, maxillary sinus; INC, inferior nasal concha; INF, inferior nasal meatus; OC, oral cavity; T, tongue; FOM, floor of mouth; MF, mental foramen. The green arrows indicate the hard palate. (C) Central incisor region: the buccal (B), (Lab), (L), or (P) aspect of the alveolar bone is marked on the images. ANS, anterior nasal spine; OC, oral cavity; T, tongue. The green arrows mark the hard palate, the yellow arrows show the nasopalatine canal, and the red arrows show the lingual foramina.

The cross-sectional images in the premolar locations are viewed by examining more anteriorly; the maxillary sinus becomes narrower. In this cross section, the anterior opening of the mandibular canal, this is the mental foramen. There is considerable variation in the appearance of the mental foramen and its emergence angle into the buccal aspect of the mandibular bone.

The cross section along the midline of the maxilla and the mandible, and some different anatomic structures are seen in the above image The nasopalatine canal starts from the floor of the nasal cavity (inferior meatus) with dual foramina (superior foramina). It carries branches of the nasopalatine nerve, which exit the canal through the incisive foramen and spread to the anterior aspect of the hard palate. (Figure 3) The nasopalatine canal may vary in dimensions, and also may pose a limitation in placing implants in this aesthetic zone, the anterior maxilla. ^[04]



Figure 3: A series of cross-sectional images in the mandibular central incisor region. The narrow opening in the lingual mandibular cortex (red arrow) is the lingual foramen, a vascular canal along the midline, through which the terminal branches of the lingual artery enter the mandibular bone.

Additional vascular canals are noted from time to time in the mandibular bone anterior to the premolar locations in a region that generally is considered to be a safe site for implant placement (interforaminal region). These canals often represent accessory lingual foramina that host accessory branches of the lingual artery. Depending on the width, they may also pose limitations for surgical procedures.^[05]

Axial images are excellent for the evaluation of the visible parts of the neck and cervical spine, integrity of the palatal and buccal cortical plates of the maxillary and mandibular dentition, lateral and medial wall of the sinuses, lateral walls of the nasal cavity, anatomic structures in the nasal cavity, zygomatic bones and zygomatic arches, and skull base, for example. (Figure 4)



Figure 4: (Left) Axial CBCT image at the level of the hyoid and C3 vertebra. (Right) Same axial image as the one on the left with some identifiable neck anatomic structures outlined. H, hyoid bone; M, inferior border of the anterior mandible. C3, axial section of the third cervical vertebra; E, epiglottis; F, fatty tissue; GH, geniohyoid muscle; SCM, sternocleidomastoid muscle; S/M, submandibular salivary glands CA, carotid arteries, IJV, internal jugular vein. parts of the patient's neck can be visualized toward the inferior end of the imaging volume. Soft tissue structures are mostly present at that level. The inferior border of the anterior mandible may be sectioned at this level and may be visualized toward the superior border of the image. The hyoid bone and the body and the processes of the C3 to C4 vertebrae are expected to be seen in the same cuts. The soft tissue structures identified in this image include the sternocleidomastoid muscles bilaterally, the geniohyoid muscles, and the submandibular salivary glands. (Figure 5)



Figure 5: (A) Midsagittal cut of the face and neck. C2, second cervical vertebra-axis; C3, third cervical vertebra-axis; C4, fourth cervical vertebra-axis; FS, frontal sinus; NPC, nasopalatine canal; S, sella turcica; SS, sphenoid sinus. The yellow arrows mark the hard palate, and the green arrows mark the soft palate. Coronal (Band sagittal (C) images

In the centre of the image, this semicircular low-density (dark structure) in the middle of the image represents the patient's airway. The airway is separated almost in two halves by a soft tissue structure that is crescent in shape (and sometimes irregular in appearance), the epiglottis.^[06]

Sagittal images of the neck are best for the assessment of the cervical spine and the airway. The cervical spine is only partially visualized in a CBCT scan (C1– C4). The normal (healthy) appearance of the vertebral bodies includes a fairly square body, a thin cortical outline, a cancellous component of homogeneous density, and a fairly symmetric spacing between the vertebrae visible in the scan. The airway is identified as an irregularly shaped, elongated, low-density (dark) area anterior to the cervical part of the vertebral column.(Figure 6) The position of the epiglottis, the laryngeal opening below the epiglottis, and the position of the tongue may have an effect on the diameter of the airway in several locations.



Figure 6: (Left) Axial section at the level of the roots of the maxillary teeth. (Right) Axial section slightly superior to the other one, at the level of the floor of the maxillary sinus. GLPF, greater and lesser palatine foramina; HP, hard palate; MS, maxillary sinus; OC, oral cavity; SF, superior foramina, the starting point of the nasopalatine canal. The green arrows show the pharyngeal opening of the Eustachian tube, which helps in equalizing the pressure between the two sides of the eardrum. The red arrows mark fossa Rosenmu[°] Iler. The torus tubarius (TT).

Apart from the apices of the maxillary teeth, the hard palate, and the floor of the maxillary sinuses, the superior foramina (anteriorly) and the greater and lesser palatine foramina are visualized at that level. The former are the entrance of the nasopalatine canal and are located on the floor of the nasal cavity (inferior meatus), and they host the nasopalatine nerve. The latter serve as the opening to the greater and lesser palatine nerves and vessels that run the hard palate from posterior to anterior just superior to the palatal roots of the maxillary molars in the soft tissue in a palatal mucosa. (Figure7) A deep depression on the lateral walls of the nasopharynx bilaterally is the Eustachian tube, the tube that communicates and balances the air pressure between the inner ear and external ear. Just posterior to the Eustachian tube, separated only by a soft tissue projection (torus tubarius), lies the pharyngeal recess or fossa of Rosenmuller. (Figure 8)



Figure 7: Axial section at the level of the maxillary sinuses Co, mandibular condyle; FO, foramen ovale; FS, foramen spinosum; IO; infraorbital canal; JF, jugular foramen (or jugular fossa); Ma: mastoid air-cells; MNC, middle nasal concha; NL, nasolacrimal duct; SS, sphenoid sinus; ZA, zygomatic arch. The blue arrow indicates the external auditory canal.



Figure 8: Axial section at the level of the maxillary sinuses. MNC, middle nasal concha; PPF, pterygopalatine fossa; SS, sphenoid sinus. The green arrows mark the walls of a thin channel known as the "Vidian canal" or pterygoid canal. The yellow arrows mark the course of the carotid canals, which appear to be converging toward the base of the sphenoid bone.

Axial cuts toward the superior third of the maxillary sinuses show additional important anatomic structures. The dense archedshaped structures seen on the lateral aspect of the face are the zygomatic arches. The anterior junction with the maxilla represents the zygomatomaxillary junction or suture in the anterior corner of the midface bilaterally.

The nasal septum is identified along the midline of the nasal cavity and is not always fully ossified. The middle nasal conchae are two of the osseous processes that separate the nasal cavities in smaller chambers, the meati or turbinates. The two well defined and well-corticated soft tissue content structures in the anterolateral wall of the nasal cavity bilaterally are the nasolacrimal ducts. (Figure 9) The nasolacrimal ducts drain tears from the orbits to the inferior nasal turbinates.



Figure 9: Axial image of the head at level of the orbits. The section depicts the roof of the maxillary sinuses bilaterally (MS) and the ethmoid sinuses (ES) just medial to the maxillary sinuses.

Figure 9 shows the orbits, the ethmoid sinuses, and the sphenoid sinuses. The posterior opening of the orbits at that level is the inferior orbital fissure, which communicates with the pterygopalatine fossa as mentioned previously. The ethmoid sinuses are made up of numerous, small, thin-walled air cells separated by the vomer bone (nasal septum), in the midline. Their complicated anatomy gave them the characterization of the ethmoid labyrinth. The sphenoid sinus is located just posterior to the ethmoid sinuses. These are air cavities that are irregular in shape and size, located just below the base of the sphenoid bone.

It is strongly recommended that to take advantage of the CBCT images in full, the diagnostician should be able to understand and apply the concept of multiplanar reformatting to the highest degree. It is in the dentist's hands to reveal the information related to each diagnostic task. In other words, our diagnostic efficiency is based on our sound knowledge of anatomy and on our skills to retrieve relevant diagnostic information. ^{[07] [08]}

CONCLUSION :

The development and availability of CBCT has created the opportunity to serially examine individuals and acquire accurate 3D anatomic information.

The rapid commercialization of CBCT technology, their advances in software and associated hardware have empowered clinicians in their diagnosis of the oral and maxillofacial region, and capable of providing accurate, submillimeter - resolution images in formats allowing 3D visualization of the complexity of the desired region. CBCT technology allows the dentist to view patient anatomy exceeding conventional 2-D radiology. Interactive software applications allow for improved interpretation of the CT scan data by incorporating tools for identifying vital anatomy, bone topography and quality, preoperative implant placement. CBCT also extends dental imaging from diagnosis to image guidance for operative and surgical procedures.

REFERENCES:

- 1. Thomas SL. Application of cone beam CT in office setting. The Dental Clinics Of North America . 2008;58:753-759.
- Scott D, Ganz. Computer aided design/ computer aided manufacturing applications using CT and cone beam scanning technology. The dental clinics of north America. 2008;52:777-808.
- David C, Hatcher. Cone beam computed tomography: craniofacial airway analysis. Sleep Med Clin 2010;(5):59–70.
- Kalpidis CD, Setayesh RM. Hemorrhaging associated with endosseous implant placement in the anterior mandible: a review of the literature. J Periodontol 2004;75(5):631–45.
- Tepper G, Hofschneider UB, Gahleitner A, et al. Computed tomographic diagnosis and localization of bone canals in the mandibular interforaminal region for prevention of bleeding complications during implant surgery. Int J Oral Maxillofac Implants 2001;16(1):68–72.
- Mupparapu M, Kim IH. Calcified carotid artery atheroma and stroke: a systematic review. J Am Dent Assoc 2007;138(4):83–92.
- Som PM, Curtin HD. Head and neck imaging. 3rd edition. St Louis (MO): Mosby; 1996.
- Harnsberger HR, Wiggins RH, Hudgins PA, et al. Diagnostic imaging head and neck. Manitoba (Canada): Canada Elsevier; 2005.

LOST DENTIN REDEFINED WITH "BIODENTINE" - A CASE SERIES

Dr. Venkatesan Sudhakar¹, Dr. Thangavel Vaibhavi², Dr. Vellingiri Kanagapriyaa³,

Dr. Bahavathi Ananthan Hemasathya⁴, Dr. Senthil Kumar R⁵,

¹Senior Lecturer, ^{2,3}PG student, ⁴MDS, Professor and HOD, ⁵Reader, Department of Conservative Dentistry and Endodontics, Adhiparasakthi Dental college and Hospital, Melmaruvathur.

Keywords :

Vital pulp therapy, Direct pulp capping

Correspondence :

Dr. Thangavel Vaibhavi,

PG student

Department of Conservative Dentistry and Endodontics,

Adhiparasakthi Dental college and Hospital,

Melmaruvathur.

E-mail: vaibhavi2407@gmail.com

INTRODUCTION:

Conservative dentistry and Endodontics play a major role in the preservation and treatment of the pulp dentin complex. Pulp exposure by accidental trauma or mechanical exposure during cavity preparation is a frequently encountered scenario in clinical practice. In such case, the clinician tries his/her best to preserve the vitality of the tooth. Pulp capping is the most conservative procedure for protecting the pulp from future insults, permitting healing and repair. With the introduction of various new materials and clinical protocols, there has been tremendous improvement in the outcome of prognosis.^[1] Biomaterials have a beneficial effect on living cells and interacts with them in a biologically compatible manner.^[2] In 1993, Torabinejad et al introduced Mineral trioxide aggregate (MTA) in dentistry.^[3] It is considered as the first bioactive calcium silicate-based material. This material has been extensively studied and researched.

Biodentine (Septodont, St. Maur-des-Fossés, France), a new biosilicate cement, was recently launched on the dental market as a dentin replacement material and made available in January of 2011.^[4] Biodentine consists of a powder in a capsule and liquid in a pipette. The powder mainly contains tricalcium and dicalcium silicate, the principal component of Portland cement, as well as calcium carbonate. Zirconium dioxide serves as a contrast medium. The liquid consists of calcium chloride as the setting accelerator and water-reducing agent.^[5] Biodentine is a calcium silicate-based material used for crown and root dentin repair treatment, repair of perforations or resorptions, apexification and root-end fillings.

This article illustrates two case reports of young patients with deep carious lesions in permanent first molars and no evidence of pulpal/periapical pathology treated by direct pulp capping with Biodentine on exposure during caries excavation.

CASE REPORT : 1

A 15 Year old female patient reported to the Department of Conservative Dentistry and Endodontics, Adhiparasakthi Dental College and Hospital, Melmaruvathur, Tamil Nadu, India. She reported with the chief complaint of decay in the lower right back

ABSTRACT :

This article is a case series description of successful direct pulp capping of mature mandibular first molars in two young patients with biodentine. The patients were referred with complaint of food impaction and sensitivity to cold beverages on chewing complaints. According to the patients' symptoms, clinical findings, vitality testing and radiographic findings, the patients were diagnosed with Dental Caries /Reversible pulpitis. Treatment included caries removal under rubber dam isolation, capping of exposure sites with biodentine cement, and permanent coronal restoration. At one, and three months follow-up, the teeth were functional, had normal response to cold test, and did not have sensitivity to percussion.

tooth region for the past one month. On clinical examination, there was class I dental caries in 46, no abnormalities in TMJ and soft tissue. During investigation, the tooth had a positive response to the cold test (Endo Frost, Roeko, Germany). Refrigerant spray was used on the middle third of the tooth and four control teeth on the ipsilateral side were tested. The affected tooth showed a similar response as the control teeth. The tooth was not tender on percussion. IOPA {FIG (1a.)} showed radiolucency involving enamel, dentin and approximating the pulp in 46, no widening of PDL space and intact lamina dura and no changes in the periapical area. Definitive diagnosis was made as class I dental caries in 46. After thorough examination, indirect pulp capping was finalised as the treatment plan and was explained to the patient and information consent was obtained. To get adequate anaesthesia, inferior alveolar nerve block (IANB) was given with lignocaine (two percentage) followed by rubber dam application for isolation. Initial cavity preparation was done with round bur in high speed airotor handpiece and the remaining carious dentin was removed with round bur in slow speed handpiece. As the decay was progressing deeper, spoon excavator was used for further caries excavation, at one point accidental pinpoint exposure of pulp tissue occurred, with mild bleeding from the exposure site. Hence the treatment plan was changed to direct pulp capping. Haemostasis was achieved by applying firm pressure with a cotton pellet immersed in NaOCl (one percentage), for one minute. Biodentine[™] was chosen for direct pulp capping. The material was mixed according to manufacturer's instructions, and was applied on the exposure site as direct capping. After twelve minutes, when the material had set, the cavity was restored with a layer of GIC followed by composite restoration. Finishing and polishing was done with a composite polishing kit.

REVIEW:

The patient was asked to report immediately in case of any discomfort, if not after 3 months. The outcome of the performed treatment was evaluated by pulp vitality tests and radiographic evaluation for any periapical changes at 3months interval. At the end of 3 months follow up: Clinically the tooth was asymptomatic. The tooth showed a positive response to the cold test (Endo Frost, Roeko, Germany). Refrigerant spray was used on the middle third of the tooth and four control teeth on the ipsilateral side were tested. The restored tooth showed a similar response as the control teeth. The tooth was not tender on percussion. The radiographic evaluation (FIG. 1g.) showed no periapical changes.



CASE REPORT : 2

An eighteen-year-old female reported to the department of Conservative Dentistry and Endodontics of Adhiparasakthi Dental College, Melmaruvathur. She complained of decay in her lower left back tooth and very rare episodes of discomfort on taking cold food.

On clinical examination, dental caries involving the mesial marginal ridge was found in 36. No abnormalities were detected in TMJ and soft tissue. The tooth responded positively to cold test and EPT. The tooth was not tender on palpation. IOPA showed radiolucency involving enamel, dentin and approximating the pulp in 36. There was no widening of PDL space and intact lamina dura was seen. No periapical lesions were found. Definitive diagnosis was made as dental caries with reversible pulpitis in 36. Based on the symptoms and radiographic findings, indirect pulp capping was planned. Similar to the above case, because of the iatrogenic exposure of pulp during caries excavation, the treatment plan was modified to direct pulp capping. Similar treatment protocol was followed as in the above-mentioned case, for restoration of the tooth with biodentine.

REVIEW:

The patient was contacted over phone after a month due to the patient's inability to report in person. The patient was asymptomatic.

After 3 months interval the outcome of the performed treatment was evaluated by pulp vitality tests and radiographic evaluation for any periapical changes. At the follow up, the patient was asymptomatic. The tooth responded positive for pulp vitality and negative for percussion tests. The radiographic evaluation showed no periapical changes. A layer of calcific barrier formation was evident in the radiographic, below the biodentine layer. No periapical changes were detected radiographically.



Fig2.i

post operative image



Fig.2.k review

DISCUSSION

Direct pulp capping is used for vital pulp exposure due to trauma, or iatrogenic insult to the pulp.^[1] The ultimate objective of any pulp capping is to manage bacteria, arrest progression of caries and stimulate reparative dentin formation. This procedure typically involves arrest of pulpal haemorrhage followed by sealing of exposed pulp. This leads to the preservation of pulpal health, function and viability.^[1]

Calcium hydroxide has been traditionally considered the GOLD STANDARD[6] and most used material. It is known to form the reparative dentin and prevent further demineralisation. The material presents with certain drawbacks. It includes lack of innate adhesive and sealing abilities, poor physical properties, tunnel defects, porosities and dissolution over time.^{[7][8]}

To overcome these deficiencies, emergence of MTA was made in dentistry. MTA is known to be a better viable option for direct pulp capping. The positive attributes of MTA are decreased solubility, high biocompatibility bioactivity, hydrophilicity, radiopacity, good sealing abilities and low toxicity than that of calcium hydroxide .[9][10] This material had overcome the deficiencies of Calcium hydroxide. The significant drawbacks of MTA were 1) technique

sensitivity 2) difficulties in handling procedures 3) longer setting times 4) discolouration $\cdot^{[11]}$

Biodentine has been developed as a dentin substitute or a dentin replacement by the manufacturers. This material overcomes the drawbacks of MTA. Strassler et al. 2011, stated a complete dentinal bridge formation, without the inflammatory pulp response when biodentine is used for pulp capping.^[12] Anushka et al. 2017 compared the nature of dentinal bridge between Calcium hydroxide and biodentine as direct pulp capping agents. A noninflammatory continuous dentinal bridge with adequate thickness (0.58mm) was observed in samples of biodentine when compared (0.17mm) to that of calcium hydroxide.^[13] In our cases too, similar responses were obtained clinically and radiographically. The thickness of the dentin bridge formed needs to be assessed with **CBCT further**.

The overall success rate of biodentine is suggested to be 82.6% when used as in direct pulp capping agent.^[14] The success of direct pulp capping depends on various factors such as age of the patient, type, site and size of the pulpal exposure.^[15] Further long-term clinical research is required to prove the efficacy of Biodentine over other restorative materials.

CONCLUSION

Biodentine is emerging as an interesting material, with a potential of making a major contribution in maintaining the pulp vitality when judiciously selected for direct pulp capping.

REFERENCES:

- 1. Alex G. Direct and indirect pulp capping: A brief history, material innovations and clinical case report. Compend Contin Educ Dent. 2018 Mar;39(3):182-9.
- Tziafas D, Smith AJ, Lesot H. Designing new treatment strategies in vital pulp therapy. J Dent. 2000 Feb 1;28(2):77-92.
- 3. Torabinejad M, Watson TF, Ford TP. Sealing ability of a mineral trioxide aggregate when used as a root end filling material. J Endod. 1993 Dec 1;19(12):591-5.
- 4. Available from:

http://www.septodont.fr/fichiers_upload/biodentinescientificfile.pdf.

- Laurent P, Camps J, De Méo M, Déjou J, About I. Induction of specific cell responses to a Ca3SiO5-based posterior restorative material. Dent Mater. 2008 Nov 1;24(11):1486-94.
- Athanassiadis B, Abbott PV, Walsh LJ. The use of calcium hydroxide, antibiotics and biocides as antimicrobial medicaments in endodontics. Aust. Dent. J. 2007 Mar;52:S64-82.
- Cox CF, Sübay RK, Ostro E, Suzuki S, Suzuki SH. Tunnel defects in dentin bridges: their formation following direct pulp capping. Oper. Dent. 1996;21(1):4-11.
- Khayat A, Abbasi A, Tanideh N. A comparative study of dentin bridge formation following pulpotomy using calcium hydroxide and mineral trioxide aggregate in young dogs. Iran. J. Vet. Res.2004.
- 9. Torabinejad M, Chivian N. Clinical applications of mineral trioxide aggregate. J Endod. 1999 Mar 1;25(3):197-205.
- Tawil PZ, Duggan DJ, Galicia JC. Mineral trioxide aggregate (MTA): its history, composition, and clinical applications. Compend Contin Educ Dent. (Jamesburg, NJ: 1995). 2015 Apr 1;36(4):247-52.
- Child PL, Cannon ML. Pulp capping: improving the prognosis. Dental Town. January 2015:52-56.
- Strassler HE, Levin. Biodentine Tricalcium -silicate cement. Inside Dentistry. 2011;7(10):98-100.
- Jalan AL, Warhadpande MM, Dakshindas DM. A comparison of human dental pulp response to calcium hydroxide and Biodentine as direct pulp-capping agents. J. Conserv. Dent. 2017 Mar;20(2):129.

- Lipski M, Nowicka A, Kot K, Postek-Stefańska L, Wysoczańska-Jankowicz I, Borkowski L, Andersz P, Jarząbek A, Grocholewicz K, Sobolewska E, Woźniak K. Factors affecting the outcomes of direct pulp capping using Biodentine. Clin. Oral Investig.2018 Jun 1;22(5):2021-9.
- Cohen BD, Combe EC. Development of new adhesive pulp capping materials. Dent. Update.1994 Mar 1;21(2):57-62.





Authorised Distributors :





DAMON®SYSTEM right for you?



DAMON Discrete Discre



www.ormcoeurope.com