From the MD's Desk

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

Warm greeting to all

I am greatly rejoiced to meet you all through this journal publication.

Our institution has been in the forefront of the academic research and innovative treatment methods. It's been more than a year all the students and staff of Adhiparasakthi dental college have joined hands to fight against COVID-19.

Combating this invisible force our staffs and students in the varying climatic conditions wearing PPE and risking all uncertainty were treating all the dental ailments and performing regular dental procedures following COVID protocols prescribed.

Our institution has implemented various safeguards in the campus to prevent COVID transmission. We are prescreening our patients, staff, students for COVID symptoms before we permit them to come into our facilities, we do not allow unnecessary visitors and maintain social distancing in our clinics and waiting rooms. Our dental team members wear enhanced PPE including face shields, N95 mask, hair covers, disposable gowns. We have isolation rooms to treat high risk patients.

I would like to congratulate all the staff and students 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.

Best wishes to all.

Principal's Message

Dr.S.Karthiga kannan
Principal

Greetings to all,

I am very happy to communicate to you all. At the outset I would like to express my gratitude to the management of ACMEC trust for entrusting this responsibility on me.

Publishing a journal is a pride for any educational institution, which serve as a platform for the students, faculties and researchers to showcase their work. I came to know the editorial team strives hard to bring all issues on time; as we believe being punctual helps to establish a reputation for JOCDR.

I wish all the best for the editorial team for their further endeavor's and congratulate all the authors for their publication of articles. Your continuous efforts would bring more publications from researchers from national and international level.

Good luck.

EDITORIAL

CRITICAL APPRAISAL TOOLS

Clinicians and researchers frequently use standard critical appraisal tools to evaluate the quality and utility of published research reports. Design-specific tools contain items that address methodological issues that are unique to the research design.

Critical appraisal worksheets to help you appraise the reliability, importance and applicability of clinical evidence.

Critical appraisal is the systematic evaluation of clinical research papers in order to establish:

1. Does this study address a clearly focused question?
2. Did the study use valid methods to address this question?
3. Are the valid results of this study important?
4. Are these valid, important results applicable to my patient or population?

One of the prominent critical appraisal tools is Joana briggs institute critical appraisal tools. The Joanna Briggs Institute (JBI) is an independent, international, not-for-profit researching and development organization based in the Faculty of Health and Medical Sciences at the University of Adelaide, South Australia (https://joannabriggs.org/).

Hence, it also develops many critical appraisal checklists involving the feasibility, appropriateness, meaningfulness and effectiveness of healthcare interventions.

1. Checklist for Analytical Cross-Sectional Studies
2. Checklist for Case Control Studies
3. Checklist for Case Reports
4. Checklist for Case Series
5. Checklist for Cohort Studies
6. Checklist for Diagnostic Test Accuracy Studies
7. Checklist for Economic Evaluations
8. Checklist for Prevalence Studies
9. Checklist for Qualitative Research
10. Checklist for Quasi-Experimental Studies
11. Checklist for Randomized Controlled Trials
12. Checklist for Systematic Reviews
13. Checklist for Text and Opinion

By using these tools, we can assess the Risk of bias and other errors in various study designs.

Dr. K. Prabhu
Editor - in – Chief

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

1. 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 : jocdrassoeditor@gmail.com

Journal of Contemporary Dental Research

Vol.3 | Issue 1 | January - June 2021

Contents

COMPARATIVE EVALUATION OF CLEANING EFFICACY OF R-ENDO RETREATMENT SYSTEM OBTURATED WITH TWO DIFFERENT CORE MATERIALS AND SEALERS AN IN VITRO STUDY.

[1]Dr. Bharath .N, [2],Dr. Hemasathya. B, [3]Dr. Ohm Nijandhan. K, [4]Dr. Sowmiya .T, [5]Dr. Sathish .S, [6]Dr. Sujith .R

[1]Professor, Department of Conservative Dentistry and Endodontics, Adhiparasakthi Dental College and Hospital, Melmaruvathur

[2]prof and head, Department of Conservative Dentistry and Endodontics, Adhiparasakthi Dental College and Hospital, Melmaruvathur

[3,4,5,6]Senior Lecturer, Department of Conservative Dentistry and Endodontics, Adhiparasakthi Dental College and Hospital, Melmaruvathur

Keywords :

CBCT, Resilon-Epiphany, ProTaper retreatment system. R-Endo.

Corresponding Author :

Dr.Bharath .N

Professor, Department of Conservative Dentistry and Endodontics, Adhiparasakthi Dental College and Hospital, Melmaruvathur

Contact No. +919444792260

Email. drbharathn@apdch.edu.in

ABSTRACT

Aim:

The aim of this present in vitro study was to evaluate the cleaning efficacy of two retreatment files system obturated with two different obturation systems using CBCT

MATERIALS AND METHODS :

Sixty mesial roots of mandibular molars were prepared and obturated as per the standard protocols. Initial CBCT analysis was done to assess the total volume of filling material in the canals (in mm3) with Image J software.In GroupI obturation was done with AH plus sealer retreatment was performed with ProTaper retreatment system. GroupII obturation was done Resilon Epiphany retreatment was performed with ProTaper retreatment system. In group III obturation was done with AH plus sealer retreatment was performed with R-Endo system. In group IV obturation was done with Resilon-Epiphany retreatment was performed with R-Endo system Second CBCT analysis was done to assess the volume of remaining filling material in the canals after retreatment procedures.

RESULTS :

The values obtained were statistically analyzed using SPSS (version 22.0). There was no significant difference in the coronal and middle third. R-Endo group was found have significant difference in the removal of filling material in the apical portion of the root canal with P value <than0.05.

CONCLUSION :

R-Endo and ProTaper-R retreatment systems were equally effective in removing filling material from the root canals in coronal and middle thirds of root canal system. R-Endo Retreatment systems performed slightly better than the ProTaper R in the apical portion of root canal system.

CLINICAL SIGNIFICANCE :

Success in endodontic retreatment procedures plays a major role establishment of aseptic environment and removal of residual bacteria and filling materials. Clinical challenges include management of debris generated along with access cavity refinement.

INTRODUCTION :

Endodontic success is multifactorial in nature. The success of Primary root canal treatment ranges between 93%-97%while the success of secondary endodontic treatment is compromised due to clinical and microbial factors .1-3The strategies to manage the above includes periradicular surgery, implant and extraction.45The necessity of endodontic retreatment is predominant among the clinicians due to improved diagnostic skills, novel treatment strategies and its long-term success.6-7

The challenge faced by the clinician relies on the complete removal of obturation materials along with micro-organisms. The preparation for retreatment is similar to that of primary endodontic treatment focussing on two stages. The coronal conditioning preludes the re preparation of canal.

In Contemporary endodontic practise the advances in NITI rotary instruments and sealers chemistry has shown new horizons in Retreatmentodontics. The usage of resin and bio ceramic sealers has improved the bonding between the root dentin and the core obturation material. The removal of above materials has a clinical significance in retreatment procedures.

Inadequate removal of the previous filling material due to improper access compromises the disinfection procedures by restricting the access of antimicrobial agents in the critical and complex areas of root canal system.8

Filling remnants increases the risk of infection leading to the persistence of periradicular inflammation. Thus the clinician's foremost priorities while performing retreatment is to thoroughly clean and disinfect the canal.9

Instrument design has a significant role in success of removal of filling materials. Variety of instruments such as Hfiles10ultrasonic system11laser12, Gates Glidden drills13and RotaryProTaperUniversal retreatment files14 and reciprocating NiTi system have been employed for the above purpose.15,16

The efficacy, adaptability, safety, respect for the root canal anatomy, fracture resistance are the major factors that governs the selection of armamentarium for the retreatment procedures. The ability of file system to induce less dentinal defects plays an important role in the success of retreatment procedures

The time required for the removal of materials indirectly acts as a measure to assess the efficacy of instruments. Gates Glidden drills have greater efficacy but its use is limited to coronal third.17, 18, 19

ProTaper retreatment system has unique properties such as high resiliency, cutting efficiency with maintenance of canal morphology and shorter working time. The negative cutting angle with absence of radial land engages the soft and resilient GP and exerts an efficient cutting action.20, 21

R-Endo [micro mega] system comes with a set five file system and features exclusive for retreatment. The system has four mandatory instruments Re[25 size,0.12 taper]for establishing the coronal flare and removal of coronal filling material followed by usage of R1[25 size,0.08 taper],R2[25 size,0.06 taper],R3[25 size,0.04 taper] and one optional instrument Rs [30 size,0.04 taper] aids in effective removal of filling materials.

The design feature includes a triangular cross section with three evenly spaced cutting edges and absence of radial land and inactive apical tip are the features of this file system.22, 23

Irrespective of the retreatment technique and instruments complete removal of root canal filling is not possible in the apical third of the root canal system.24

The core materials and sealers employed for the obturation plays a key role in the success of root canal procedure. This acts as a double edged sword and the advantage of having a complete seal becomes a trouble in case for retreatment procedures.

Gutta-percha has been used as gold standard core material and resin sealer as sealer has good integration with the root canal system various other obturation material has been employed one among this Resilon-Epiphany which acts in mono bloc concept.

Rotary file system has been used for retreatment cases through special design features which allows it to adapt and "scout "the canal for removal of root canal filling remnants.25

Removal of residual filling material for retreatment procedure depends on multiple factors which can be related to the material and technique.

Residual filling material left after retreatment can be assessed by various methods. Cone Beam Computed Tomography (CBCT) has an advantage of non-invasive, lower radiation dosage with limited field of view and good spatial resolution in all planes.26

The aim of this study was to evaluate cleaning efficacy of ProTaper R and R-Endo retreatment files obturated with AH Plus/ GuttaPercha and Resilion-Epiphany obturation system using Cone Beam Computed Tomography.

The objective of this study was to assess the amount of residual filling material left in the apical third of root canal during retreatment procedures using CBCT and time required for filling material using Stopwatch.

Materials and Methods :

Sixty mesial roots of mandibular molars were prepared and obturated as per the standard protocols. Initial CBCT analysis was done to assess the total volume of filling material in the canals (in mm3).

In GroupI obturation was done with AH plus sealer retreatment was performed with ProTaper retreatment system. GroupII obturation was done Resilon-Epiphany retreatment was performed with ProTaper retreatment system. In group III obturation was done with AH plus sealer retreatment was performed with R-Endo system. In group IV obturation was done with Resilon-Epiphany retreatment was performed with R-Endo system

Second CBCT analysis was done to assess the volume of remaining filling material in the canals after retreatment procedures. Image J software used for the analysis in the current study.

The time required for removal was recorded using a stop clock for all the groups tested in this study. Obturation was limited to 10mm from the apex for standardization. The coronal cavity was sealed with temporary filling. Initial CBCT of all the specimens were taken to ensure the completeness of obturationand represented in Figure 1.

All specimens were stored at 37˚C at 100 % humidity for 2 weeks before commencing the retreatment procedure. Second CBCT analysis was done to assess the volume of remaining filling material in the canals after retreatment procedures and represented in Figure2 and 3 ProTaper R and R-Endo retreatment system respectively.

The amount of residual gutta-percha/sealer on the canal walls in the coronal, middle and apical levels was imaged and with Image J software connected to cone beam computerized tomography Analysis of remaining filling material using CBCT was done as follows.

Percentage of filling material Volume of filling material removed after retreatment[b] / Total volume of filling material[a] removed after retreatment

Time for retreatment; The time required to achieve complete gutta-percha removal was noted for each instrumentation technique. The time elapsed was calculated from the entry into the root canal till the completion of the filling removal. This was calculated with help of a stopwatch.

Results :

Data obtained were tabulated in a MS Excel sheet and analysed statistically using SPSS software (version 22). Data obtained were assessed for normality using Shapirowilk test and found to be normally distributed (p>0.05). Hence parametric test –Independent Samples T test was employed to assess the statistical significance between two file system namely R-Endo Retreatment files and Pro Taper –R File System.

The mean percentage of filling material removed by R-Endo Retreatment files and ProTaper-Rfiles at coronal third is 90.1780 and 89.4625 respectively and it was not statistically significant (p> 0.05) represented inTable1.

The mean percentage of filling material removed at middle third using ProTaper-R Retreatment file and R-ENDO file is 87.2420 and 85.7414 respectively and it was not statistically significant (p>0.05) represented in Table1.

The mean percentage of filling material removed by R-Endo Retreatment files and ProTaper-R files at apical third is 85.6990 and 81.2321 respectively and it was statistically significant [p]0.05) represented in Table1

The outcome of R-ENDO group was represented Table2. There was increase in removal filling material volume from 90-96% in the coronal third, 87- 95% in the middle third. and it was not statistically significant (p>0.05) represented in Table2

The mean percentage of filling material removed by R-Endo Retreatment files found to be 85- 94% at the apical third and represented in Table2.

The outcome of ProTaper-Rgroup was represented in Table3; There was increase in removal filling material volume from 89- 97% in the coronal third, 85- 96% in the middle third and it was not statistically significant (p>0.05) represented in Table3

The mean percentage of filling material removed by ProTaper R Retreatment files was found to be 81- 93% at the apical third. All these were found to be statistically significant (p> 0.05) represented in Table3

The usage two different obturation system was a major parameter evaluated in our study.

Time required for removal for obturation material were represented in Table 4.

Discussion :

The clinical success of retreatment relies on the multifactorial in nature. The predominant causes of failure of primary endodontic treatment includes incomplete removal of old filling material and leakage associated with disintegration of hermetic seal established between the root dentin and the filling material which acts as least resistance pathway and contributes to the endodontic failure.

The successful management of endodontic failure relies on the elimination of previously untreated areas of root canal system. one of the objective of retreatment procedure includes refinement of primary access cavity to enhance the complete removal of necrotic tissue or remnant bacteria from root canal.15

The conventional methods for removal of gutta –perch with or without solvents leads to incidence of iatrogenic errors such as postoperative pain and found to be time-consuming particularly when the filling material is highly condensed.16

Canal curvature was included as criteria for the removal of filling materials since it's difficult to clean it as it increases the chance of Instrument separation.18,19Mesial canals mandibular first molar were used in this study to assess the retreatment efficacy of rotary and reciprocating files respectively.

Mesial root was sectioned from the tooth prior to instrumentation to standardize the working length (10 mm) and volume of filling material across the samples.

The advantage of rotary NiTi instruments includes improved efficacy, cleaning ability and safety. The instrument design related parameters to execute the current objective includes the cutting edge, cross section, taper, size of working tip, space for escape of cutting debris, Material properties, cutting edge angles, Pitch of the instrument They were originally designed for the root canal preparation nessciates special design modification for performing retreatment20-24

In this study removal of filling efficacy were assessed at various levels which include coronal, middle and apical third of root canal system. The retreatment has to be performed in phases and necessitates the usage of materials in a sequential manner. This can be mastered after identifying the correct sequence of material usage and to be given utmost care for harvesting the success.

In apical third R-Endo retreatment files performed better than Pro Taper –R Systems. The mean percentage of filling material removed by R-Endo Retreatment files and ProTaper-R files at apical third is 85.6990 and 81.2321 respectively.

The mean percentage of filling material removed by R-Endo Retreatment files found to be 85- 94% at the apical third and represented in Table2.

The mean percentage of filling material removed by ProTaper R Retreatment files was found to be 81- 93% at the apical third. All these were found to be statistically significant (p> 0.05) represented in Table3

Residual filling material removal is aided by the employment of novel finishing instrument XP Endo finisher which improves the retreatment efficacy and maximise the area covered by irrigating solutions.[25]

The usage of XP Endo finisher along with R-Endo lead to increase in removal filling material in the range of 85- 94% at the apical third and were found to be statistically significant. The usage of XP Endo finisher in the apical third and were found to be statistically significant (p> 0.05).

Numerous methods have been used to assess efficiency for measuring the residual filling material available in the root canal. The advantage of CBCT as an investigation tool is non-invasive which has tended us to assess the efficacy of retreatment technique.[26]

Gutta-percha was universally accepted as obturation material and AH plus sealer was employed to seal the space between the dentinal wall and the core obturation material interface due to its good sealing ability.[27-31]

Solvent was not used in the current study to eliminate the hindrance of residual material which clogs during the cleaning process. Continuous rotary movement and presence of Spirals with negative cutting angle, absence of radial land produces a screwing effect and maximizes the cutting action of ProTaper retreatment files necessary for the removal of filling material and superficial dentin.[32]

The operational factors such as Speed and torque along with cross- sectional design of R-Endo retreatment files was found to be better than the Pro Taper R Retreatment system might be attributed for better efficacy from the apical third.[33]

XP Endo finisher expands inside the canal at the body temperature generates adequate force to displace the residual filling material present in the inaccessible areas. Additionally, it improves irrigant action of NaOCl by creating turbulence inside the canal.34

In the present study results using the XP- Endo finisher instrument were encouraging because the volume of remaining filling material was significantly reduced. Hence it can be advocated to combine retreatment files in order to get best possible retreatment. ProTaper system has progressive taper and lengths enables them to cut and pull the GP in to the file flutes and directing it toward the coronal direction.35It has aggressive cutting action which removes a substantial amount of radicular dentin in a relatively shorter period.[36]

The role of obturation system is essential for success of primary root canal treatment and the efficiency of instrument can be validated based on the removal of pre-existing filling material that is the reason for us to subject the obturation to two different types of obturation systems.

The percentage of root filling material obturated with Resilon-Epiphany had more remnants compared to the gutta percha and AH Plus sealer irrespective of instrument employed for action. This might be attributed to the interaction between the substrate and filling materials.

Our study was designed in such a way that time required for removal of filling material was included as criteria for assessment of efficacy of removal of filling. The previous studies by Imura et al. has reported the maximum time for removal of filling material was established as 20 min.

Limitations of the study :

Future studies can focus on the performance of on removal efficacy of bacteria with novel evaluation strategies such as CLSM and molecular methods for residual infection assessment as investigation tool. Requires the employment of more clinical trials on humans for valid and reliable parameters for evaluation with promising outcomes

Conclusion :

Within the limitations of this invitro study it can be concluded that R-Endo and ProTaper-R were equally effective in removing filling material from the root canals in coronal and middle third of the root canal system.R-Endo Retreatment systems performed slightly better than the ProTaper-R in the apical portion of root canal system. Additional finding observed in our study was that removal of Gutta percha and AH Plus Sealer was easier than the Resilon and Epiphany Obturation System.It requires further studies with more sample size to substantiate the above results. The outcome of retreatment is multifactorial in nature careful selection of armamentarium along with technique plays a vital role in removal of filling material which is the initial step in retreatment procedures further disinfection and infection control protocol along with Restoration of the lost tooth structure plays a key role outcome of the retreatment.

Figure1:

CBCT Images of Obturated Root Canal systems - Sagital View

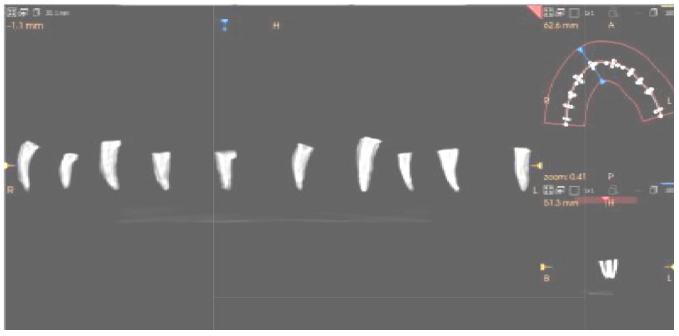


Figure2 : CBCT images of root canals after retreatment with ProTaper R Sagital view

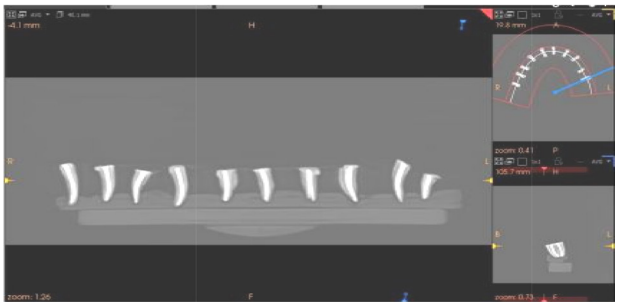


Figure 3 : CBCT images of root canals after retreatment with R-Endo Sagital view

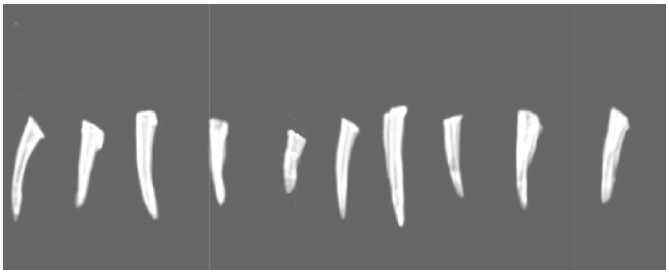


Table1: Comparative efficacy of different retreatment systems at various levels of root canal system.

Various Levels	Retreatment systems used	Mean	Standard deviation	P value
Coronal third	R-Endo	90.1780	2.93005	0.497
	ProTaper-R	89.4625	1.43801	
Middle third	R-Endo	87.24420	2.59495	0.318
	ProTaper-R	85.7414	3.81818	
Apical third	R-Endo	85.6990	4.05287	0.029
	ProTaper-R	81.2321	4.33793	

Table2 represents the percentage of root filling material removed using R-Endo retreatment system.

Various Levels	Sealers tested	Mean	Standard deviation	P value
Coronal third	Gutta percha and AH Plus	96.4420	0.53831	0.3420
	Resilon-epiphany	90.1780	2.93005	
Middle third	Gutta percha and AH Plus	95.8130	1.19138	0.2910
	Resilon-epiphany	87.2420	2.59495	
Apical third	Gutta percha and AH Plus	94.9360	1.73079	0.0100
	Resilon-epiphany	85.6990	4.05287	

Table3 represents the percentage of root filling material removed using ProTaper retreatment System.

Various Levels	Sealers tested	Mean	Standard deviation	P value
Coronal third	Gutta percha and AH Plus	97.2554	0.92176	0.3160
	Resilon-epiphany	89.4625	1.43801	
Middle third	Gutta percha and AH Plus	96.4677	1.24083	0.2453
	Resilon-epiphany	85.7414	3.81818	
Apical third	Gutta percha and AH Plus	93.0203	2.81274	0.0120
	Resilon-epiphany	81.2321	4.33793	

Table4 represents the time required for the removal of different root filling materials.

Si no	Instrument type	Sealer type	Mean time [Mins]
1	Pro Taper -R	Gutta percha and AH Plus	12.5
2	R-Endo	Gutta percha and AH Plus	6.8
3	Pro Taper -R	Resilon-epiphany	14.1
4	R-Endo	Resilon-epiphany	9.7

REFERENCES;

1. Sjögren UL, Hägglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. Journal of endodontics. 1990 Oct 1;16(10):498-504.
2. Friedman S, Mor C. The success of endodontic therapy healing and functionality. CDA J. 2004 Jun;32(6):493-503.
3. Wilcox LR, Van Surksum R. Endodontic retreatment in large and small straight canals. Journal of endodontics. 1991 Mar 1;17(3):119-21.
4. Lin LM, Skribner JE, Gaengler P. Factors associated with endodontic treatment failures. Journal of endodontics. 1992 Dec 1;18(12):625-7.
5. Torabinejad M, Corr R, Handysides R, Shabahang S. Outcomes of nonsurgical retreatment and endodontic surgery: a systematic review. Journal of endodontics. 2009 Jul 1;35(7):930-7.
6. Blanchard SB, Almasri A, Gray JL. Periodontal-endodontic lesion of a three-rooted maxillary premolar: report of a case. Journal of periodontology. 2010 May;81(5):783-8.
7. Ruddle CJ. Nonsurgical endodontic retreatment. CDA Journal. 2004 Jun:1-4.
8. Siqueira JF, Lopes HP. Treatment of endodontic infections. London: Quintessence; 2011 Jan 31.
9. Ricucci D, Siqueira Jr JF, Bate AL, Ford TR. Histologic investigation of root canal–treated teeth with apical periodontitis: a retrospective study from twenty-four patients. Journal of endodontics. 2009 Apr 1;35(4):493-502.
10. Barrieshi-Nusair KM. Gutta-percha retreatment: effectiveness of nickel-titanium rotary instruments versus stainless steel hand files. Journal of Endodontics. 2002 Jun 1;28(6):454-6.
11. Bernardes RA, Duarte MA, Vivan RR, Alcalde MP, Vasconcelos BC, Bramante CM. Comparison of three retreatment techniques with ultrasonic activation in flattened canals using micro-computed tomography and scanning electron microscopy. International endodontic journal. 2016 Sep;49(9):890-7.
12. Farge P, Nahas P, Bonin P. In vitro study of a Nd: YAP laser in endodontic retreatment. Journal of Endodontics. 1998 May 1;24(5):359-63.
13. Medeiros JB, Gabardo MC, Moraes SH, Faria MI. Evaluation of four gutta-percha removal techniques for endodontic retreatment. RSBO Revista Sul-Brasileira de Odontologia. 2014;11(4):340-5.
14. Bhagavaldas MC, Diwan A, Kusumvalli S, Pasha S, Devale M, Chava DC. Efficacy of two rotary retreatment systems in removing gutta-percha and sealer during endodontic retreatment with or without solvent: A comparative in vitro study. Journal of conservative dentistry: JCD. 2017 Jan;20(1):12.
15. Saad AY, Al-Hadlaq SM, Al-Katheeri NH. Efficacy of two rotary NiTi instruments in the removal of gutta -percha during root canal retreatment. Journal of Endodontics. 2007 Jan 1;33(1):38-41
16. de Carvalho Maciel AC, Zaccaro Scelza MF. Efficacy of automated versus hand instrumentation during root canal retreatment: an ex vivo study. International Endodontic Journal. 2006 Oct;39(10):779-84.
17. Bodrumlu E, Uzun Ö, Topuz Ö, Semiz M. Efficacy of 3 techniques in removing root canal filling material. Journal of the Canadian Dental Association. 2008 Oct 1;74(8).
18. Schirrmeister JF, Wrbas KT, Schneider FH, Altenburger MJ, Hellwig E. Effectiveness of a hand file and three nickel-titanium rotary instruments for removing gutta-percha in curved root canals during retreatment. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2006 Apr 1;101(4):542-7.
19. Gergi R, Sabbagh C. Effectiveness of two nickel-titanium rotary instruments and a hand file for removing gutta-percha in severely curved root canals during retreatment: an ex vivo study. International Endodontic Journal. 2007 Jul;40(7):532-7.
20. Colombo AP, Fontana CE, Godoy A, De Martin AS, Kato AS, Rocha DG, Pelegrine RA, Bueno CE. Efectiveness of the waveone and ProTaper D systems for removing gutta-percha with or without a solvent. Acta Odontológica Latinoamericana. 2016 Dec;29(3):262-7.
21. Berutti E, Chiandussi G, Paolino DS, Scotti N, Cantatore G, Castellucci A, Pasqualini D. Canal shaping with WaveOne Primary reciprocating files and ProTaper system: a comparative study. Journal of endodontics. 2012 Apr 1;38(4):505-9.
22. Berutti E, Paolino DS, Chiandussi G, Alovisi M, Cantatore G, Castellucci A, Pasqualini D. Root canal anatomy preservation of WaveOne reciprocating files with or without glide path. Journal of endodontics. 2012 Jan 1;38(1):101-4.
23. Zuolo AS, Mello Jr JE, Cunha RS, Zuolo ML, Bueno CE. Efficacy of reciprocating and rotary techniques for removing filling material during root canal retreatment. International Endodontic Journal. 2013 Oct;46(10):947-53.
24. Özyürek T, Demiryürek EÖ. Efficacy of ProTaper Next and ProTaper Universal Retreatment systems in removing gutta-percha in curved root canals during root canal retreatment. Journal of Istanbul University Faculty of Dentistry. 2017 Apr 1;51(2):7-13.
25. Alves FR, Marceliano-Alves MF, Sousa JC, Silveira SB, Provenzano JC, Siqueira Jr JF. Removal of root canal fillings in curved canals using both reciprocating single-or rotary multi-instrument systems and a supplementary step with the XP-Endo Finisher. Journal of endodontics. 2016 Jul 1;42(7):1114-9
26. Michetti J, Maret D, Mallet JP, Diemer F. Validation of cone beam computed tomography as a tool to explore root canal anatomy. Journal of endodontics. 2010 Jul 1;36(7):1187-90
27. İriboz E, Sazak Öveçoğlu H. Comparison of ProTaper and M two retreatment systems in the removal of resin-based root canal obturation materials during retreatment. Australian endodontic journal. 2014 Apr;40(1):6-11.
28. Clinton K, Himel VT. Comparison of a warm gutta-percha obturation technique and lateral condensation. Journal of endodontics. 2001 Nov 1;27(11):692-5.
29. Dummer PM, Lyle L, Rawle J, Kennedy JK. A laboratory study of root fillings in teeth obturated by lateral condensation of gutta-percha or Thermafil obturators. International endodontic journal. 1994 Jan;27(1):32-8.
30. Kontogiannis TG, Kerezoudis NP, Koz yrakis K, Farmakis ET . Removal abilit y of MTA - , bioceramic - , and resin -based sealers from obturated root canals, following XP – endo Finisher R file: An ex vivo study. Saudi Endodontic Journal . 2019 Jan 1;9(1):8 .

31. Kim H, Kim E, Lee SJ, Shin SJ. Comparisons of the retreatment efficacy of calcium silicate and epoxy resin–based sealers and residual sealer in dentinal tubules. Journal of endodontics. 2015 Dec 1;41(12):2025-30.
32. Alves FR, Marceliano-Alves MF, Sousa JC, Silveira SB, Provenzano JC, Siqueira Jr JF. Removal of root canal fillings in curved canals using either reciprocating single-or rotary multi-instrument systems and a supplementary step with the XP-Endo Finisher. Journal of endodontics. 2016 Jul 1;42(7):1114-9.
33. deAzevêdo Rios M, Villela AM, Cunha RS, Velasco RC, De Martin AS, Kato AS, da SilveiraBueno CE. Efficacy of 2 reciprocating systems compared with a rotary retreatment system for gutta -percha removal . Journ al of endodontics. 2014 Apr 1;40(4):543 -6 .
34. Silva EJ, Belladonna FG, Zuolo AS, Rodrigues E, Ehrhardt IC, Souza EM, De-Deus G. Effectiveness of XP-endo Finisher and XP-endo Finisher R in removing root filling remnants: a micro-CT study. International endodontic journal. 2018 Jan;51(1):86-91
35. Kaşıkçı Bilgi I, Köseler İR, Güneri PE, Hülsmann M, Çalışkan MK. Efficiency and apical extrusion of debris: a comparative ex vivo study of four retreatment techniques in severely curved root canals. International Endodontic Journal. 2017 Sep;50(9):910-8.
36. Çiçek E, Koçak MM, Koçak S, Sağlam BC. Comparison of the amount of apical debris extrusion associated with different retreatment systems and supplementary file application during retreatment process. Journal of conservative dentistry: JCD. 2016 Jul;19(4):351.

EFFICIENCY OF DIFFERENT METHODS OF MIXED DENTITION ANALYSIS: PROBABILITY BASED METHOD VS FORMULA BASED METHOD.

[1]Dr.Selvabalaji.A, [2]Dr.Vasanthakumari A, [3]Dr.Vivek. K, [4]Dr.Preethi Archana, [5]Dr.R.Nattiya, [6]Dr.R.Prabhavathy.
[1,3]Reader, [2]Prof & HOD, [4]senior lecturer, [5,6]CRRI
Department of Pediatric and Preventive Dentistry
Adhiparasakthi Dental College and Hospital.

Keywords :

Interceptive Orthodontics, Mixed Dentition Analysis, Space Maintenance

Corresponding Author :

Dr.Selvabalaji.A
Reader, Department of Pediatric and Preventive Dentistry
Adhiparasakthi Dental College and Hospital.

ABSTRACT

The mixed dentition analysis is a useful and valuable tool in preventive and interceptive orthodontic treatments. It is believed that a large number of malocclusion starts during the mixed dentition stage, which spans at an interval from 6 to 12 years of life. Among different types of mixed dentition analysis Moyer's prediction table and Bachmann's and Trankmann's equations are taken into considerations. Hence this study was an attempt to compare three different types of mixed dentition analysis methods (Moyer's Vs Bachmann's and Trankman's methods).This study aims at evaluating the efficiency of three different mixed dentition analysis methods for the population in Melmaruvathur. Mean of predicted values for maxillary arch was observed to be higher than mandibular arch. Our results indicate that Moyers prediction chart was significantly different from Bachmanns and Trankmanns formulas ($P<0.05$). Statistically significant differences was found between probability based method and formula based methods. Thus,we cannot replace one method with the other method.

INTRODUCTION:

The mixed dentition analysis is a useful and valuable tool in preventive and interceptive orthodontic treatments[1].Mixed dentition analysis is the stage where both primary and permanent teeth present. It is believed that a large number of malocclusion starts during the mixed dentition stage, which spans at an interval from 6 to 12 years of life. Many of these malocclusion may be reduced in severity or even eliminated entirely by timely prevention. This analysis makes it possible to calculate the mesiodistal (MD) width of unerupted permanent canines and premolars and assess the presence of adequate space to align these teeth on the dental arch for reducing the occurrence of crowding[2].

It is important to analyse the space required for the unerupted canine and premolar before the eruption in the dental arch using mixed dentition analysis as they helps in treatment planning. An accurate mixed dentition analysis is one important criterion in determining whether the treatment may involve serial extraction, guidance of eruption, space maintenance, space regaining or just periodic observation the patient[3]. Various methods have been developed for the prediction of the mesio-distal widths of unerupted canines and premolars, based on the dimensions of erupted permanent teeth using prediction tables, formulas and a combination of these. Radiographic methods are not commonly employed due to demerits of exposure and image distortion in children. Among different types of mixed dentition analysis Moyer's prediction table and Bachmann's and Trankmann's equations are taken into considerations, since they do not require radiographs, cost-effective, ease of calculation and less time consuming[4]. Hence, this study was an attempt to compare three different types of mixed dentition analysis methods (Moyer's Vs Bachmann's Vs Trankmann's and to predict the most accurate method. As stated by Balilt and Lavelle, the tooth size change according to the sex and show variations within a population[3].

AIM OF THE STUDY:

This study aims at evaluating the efficiency of three different mixed dentition analysis methods for the population in Melmaruvathur.

MATERIALS AND METHODS:

The present study was conducted in Adhiparasakthi Dental College and Hospital. The subjects forthis study were randomly selected from the department of Pedodontics and Preventive Dentistry (out patient). This cross-sectional study has a sample size of 20 subjects between the age group of 8-12 years of both genders (10 boys and 10 girls) with a mean age of 9.5 years. Informed consent were obtained from the patients (parents and guardians).

The ethical approval for this study was obtained from the Ethical Committee Board Adhiparasakthi Dental College and Hospital

INCLUSION CRITERIA:

1. No history of orthodontic treatment.
2. Mixed dentition in both jaws.
3. Patient should be free from systemic disease.
4. Intact mesiodistal surfaces of crowns

EXCLUSION CRITERIA:

1. Active caries or restoration.
2. Anomalies regarding number, size and structure of teeth.

Impressions were taken using high quality impression material and casts were immediately prepared using high quality dental plaster. Dental casts without distortions were used in this study(Fig 1).The mesiodistal measurement of mandibular incisors were taken by measuring the greatest distance between the contact points on the proximal surfaces using digital caliper(Fig 2, 3)set on the dental casts of the children. Then the expected mesiodistal width of the maxillary and mandibular canine and premolars were calculated using Moyer's mixed dentition analysis for both the gender along with Bachmann's and Trankmann's methods.

Two investigators performed the measurement of the required space, according to the three methods under evaluation.

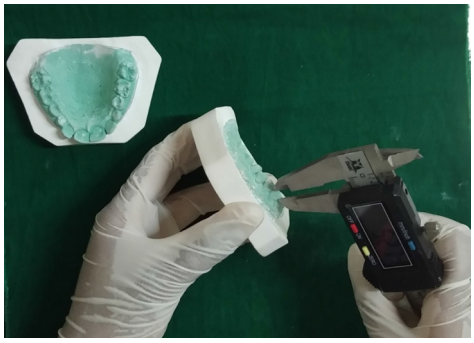
After 15 days, measurements were repeated and each of them was performed twice in sequence to calculate the repeatability and reproducibility conditions and to avoid the systemic errors for each method. The inter-examiner calibration was performed against another examiner, who also repeated the same procedure.

FIGURE 1 : Measuring the arch length using arch wire.

FIGURE 2 : Digital caliper

FIGURE 3 :

Measuring the mesiodistal width of Mandibular incisors using Digital Caliper.



MOYERS METHOD(1988):

Sum of mandibular incisors- 31+32+41+42 (FDI system) – is calculated to predict the mesio – distal width of unerupted permanent canines and premolars at various probability levels (5% to 95%).

As the 75% level gives more relative value ,it is used to predict the space required for unerupted canines and premolars

BACHMANN'S METHOD(1986):

The space required for unerupted canine and premolar is calculated with the following regression and equation.

Maxilla = 0.81× (22) +0.54× (26) +0.56× (32) +6.98

Mandible = 0.71× (22) +0.39× (26) +0.86× (32) +6.96

Where

22 represents mesiodistal dimension of upper left lateral incisor.

26 represents mesiodistal dimension of upper left first permanent molar.

32 represents mesiodistal dimension of lower left lateral incisor.

TRANKMANN'S METHOD(1990):

Boys: Maxilla = 0.93X + 5.50 Mandible = 0.94X + 5.06

Girls: Maxilla = 0.99X + 4.47 Mandible = 0.96X + 4.43

Where X represents sum of mesiodistal dimension of lateral incisor and mesiodistal dimension of first permanent molar of respective quadrant of each patient.

STATISTICAL ANALYSIS:

Table 1: Age

AGE (in years)	Number (n)	Frequency(%)
8	5	25
9	7	35
10	3	15
11	3	15
12	2	10
Total	20	100

Table 2: t test (Gender):

Methods	Jaw	Male (mean ±SD in mm)	Female (mean ±SD in mm)	t value	p value
Moyer's	Maxilla	22.19±0.98	22.76±0.74	1.446	0.160
	Mandible	22.1±0.86	22.54±0.64	1.295	0.212
Bachmann's	Maxilla	21.42±0.97	22.20±1.25	1.563	0.136
	Mandible	21.09±0.95	21.72±1.20	1.303	0.209
Trankmann's	Maxilla	20.70±1.09	20.621±1.14	0.165	0.871
	Mandible	21.22±1.02	21.33±1.89	0.169	0.868

The dimensions of both maxillary and mandibular permanent canine and premolars were greater in males than in females and the difference was significant statistically.

Table 3: t test (Method):

	Moyer's (mean ±SD in mm)	Bachmann's (mean ±SD in mm)	Mean difference in mm	t value	p value
Maxilla	22.48±0.90	21.81±1.61	0.67	2.035	0.049*
Mandible	22.32±0.77	21.40±1.01	0.92	3.044	0.004*

Mean of predicted values for maxillary arch was observed to be significantly higher as compared to mandibular arch ($p<0.05$).There is significant differences between these two methods.

Table 4: t test

	Moyer's (mean ±SD in mm)	Bachmann's (mean ±SD in mm)	Mean difference in mm	t value	p value
Maxilla	22.48±0.90	21.28±1.48	1.19	3.105	0.004*
Mandible	22.32±0.77	20.66±1.09	1.66	5.544	<0.001*

Mean of predicted values for maxillary arch was observed to be significantly higher as compared to mandibular arch ($p<0.05$).There is significant differences between these two methods

Table 5: ANOVA

	Moyer's (mean± SD in mm)	Bachmann's (mean ±SD in mm)	Trankmann's (Mean±SD in mm)	F value	p value
Maxilla	22.48±0.90	21.81±1.16	21.28±1.48	5.003	0.010*
Mandible	22.32±0.77	21.40±1.01	20.66±1.09	13.782	<0.001*

Mean of predicted values for maxillary arch was observed to be significantly higher as compared to mandibular arch ($p<0.05$).There is significant differences between these three methods.

Comparison of probability method and formula based method:

There is significant difference between these two methods.

DISCUSSION:

The present study was an attempt to establish the validity of Bachmann and Trankmann et al equations for mixed dentition analysis in comparison with Moyer's prediction table. This cross sectional study was undertaken on a sample of children between the age group of 8- 12 years of age, in and around Melmaruvathur

In this study, children with the mean age of 9.5 years were included (table-1)

The results of unpaired t tests showed that there were statistically significant difference in the tooth widths between males and females . The mean mesiodistal toothwidths of males were generally greater than females in both maxillary and mandibular arches ($p<0.05$) (table 2)which was in correlation with the study done by Garg, et al.[1]

The results of unpaired t test also shows that Moyer's prediction table is significantly different from Bachmann's formula method.(table-3)

The results of unpaired t test also reveals that Moyer's prediction table is significantly different from Trankmann's formula method.(table-3)

The results ANOVA test shows that these three methods are significantly different from each other. Formula based methods are significantly different from probability based method(table-5) by Legovic et al[9].

An early assessment of available space may permit an early intervention and minimize development of malocclusion.[6] Prediction of M-D widths of the unerupted canines and premolars is an essential part of the tooth size –arch length analysis during the mixed dentition period. Improper space analysis lead to negative decision for extraction,which can affect the patients facial profile[7].

Use of digital caliper with a standard error of ± 0.03mm has shown to be more accurate to measure tooth dimension[1,6,7,8]

Different racial and ethnic groups can have variations in the tooth and facial characteristics. Racial and gender specific mixed dentition space analysis require revision or validation once every generation(approximately 30 years) because of changing trends in malocclusion and tooth size.[9,10] The accurate width of an unerupted tooth is important for correct diagnosis of a case. Neither overestimation nor underestimation of width should be done for an accurate treatment plan.[4,9,11,12,]

Moyer's prediction was not applicable in all races because it was based on the North American population, and tooth dimensions and craniofacial characteristics differ among populations of various ethnicities, racial origins, genetics and gender.[13,14,15,16]This is in agreement with several researchers who have provided different regression analysis for prediction.[17.18] Revision in racial- and gender-based space analysis is required once in every generation because of the changing trends in malocclusion and tooth size.[19.20]

Our results indicate that Moyers prediction chart was significantly different from Bachmanns and Trankmanns formulas.

CONCLUSION:

There is significant difference in tooth size between males and females. Statistically significant differences was found between probability based method and formula based methods. Thus,we cannot replace the one method with the other method.

REFERENCES:

1. Hunter WS. Application of analysis of crowding and spacing of the teeth. Dental Clinics of North America. 1978 Oct 1;22(4):563-77.
2. Moyer RE. Handbook of orthodontics. 4th ed. Chicago: Year Book; 1998. pp.235–239.
3. Garg S, Pathak A, Kaur S. Mixed Dentition Analysis: Applicability of Three Non-Radiographic Methods for Patiala Population.2017.
4. Kommineni NK, Reddy CV, Chandra NS, Reddy DS, Kumar AK, Reddy MV. Mixed dentition analysis–Applicability of two non-radiographic methods for Chennai school children. Journal of International Society of Preventive & Community Dentistry. 2014 May;4(2):133.
5. Bhatnagar A, Chaudhary S, Sinha AA, Manuja N, Kaur H, Chaitra TR. Comparative evaluation and applicability of three different regression equation-based mixed dentition analysis in Northern Uttar Pradesh population. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2018 Jan 1;36(1):26.
6. Baheti K, Babaji P, Ali MJ, Surana A, Mishra S, Srivastava M. Evaluation of Moyer's mixed dentition space analysis in Indian children. Journal of International Society of Preventive & Community Dentistry. 2016 Sep;6(5):453.
7. Srivastava B, Bhatia HP, Singh R, Singh AK, Aggarwal A, Gupta N. Validation of Tanaka and Johnston's analysis in western UP Indian population. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2013 Jan 1;31(1):36.
8. Asiry MA, Albarakati SF, Al-Maflehi NS, Sunqurah AA, Almohrij MI. Is Tanaka-Johnston mixed dentition analysis an applicable method for a Saudi population. Saudi Med J. 2014 Sep 1;35(9):988-2.
9. Legović M, Novosel A, Škrinjarić T, Legović A, Mady B, Ivančić N. A comparison of methods for predicting the size of unerupted permanent canines and premolars. The European Journal of Orthodontics. 2006 Oct 1;28(5):48590
10. BOTERO P, Cuesta DP, Agudelo S, Hincapie C, Ramírez C. Assessment of moyers and tanaka-johnston mixed dentition analyses for the prediction of mesiodistal diameters of unerupted canines and premolars. Revista Facultad de Odontología Universidad de Antioquia. 2014 Dec 1;25(2).
11. Brito FC, Nacif VC, Melgaço CA. Mandibular permanent first molars and incisors as predictors of mandibular permanent canine and premolar widths: Applicability and consistency of the method. American Journal of Orthodontics and Dentofacial Orthopedics. 2014 Mar 1;145(3):393-8.
12. Doris JM, Bernard BW, Kuftinec MM. A biometric study of tooth size and dental crowding. American journal of orthodontics. 1981 Mar 1;79(3):326-36.
13. Phillips RW, editor. 4th ed. Philadelphia: W. B. Saunders; Elements of Dental Materials: For Dental Hygienists and Assistants; 1984.pp. 52–72.
14. Axelsson G, Kirveskari P. Crown size of permanent teeth in Icelanders. Acta Odontologica Scandinavica. 1983 Jan 1;41(3):181-6.
15. Zilberman O, Huggare J, Parikakis KA. Evaluation of the validity of tooth size and arch width measurements using conventional and three-dimensional virtual orthodontic models. The Angle Orthodontist. 2003 Jun;73(3):301-6.
16. Nance HN. The limitations of orthodontic treatment: I. Mixed dentition diagnosis and treatment. American Journal of Orthodontics and Oral Surgery. 1947 Apr 1;33(4):177-223.
17. 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. Journal of Indian Orthodontic Society. 2015 Mar;49(1):3-9.
18. Bernabé E, Flores-Mir C. Are the lower incisors the best predictors for the unerupted canine and premolars sums? An analysis of a Peruvian sample. The Angle orthodontist. 2005 Mar;75(2):202-7.
19. 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= Journal of Sichuan University. Medical science edition. 2008 Jul 1;39(4):658-0.
20. Galvão MD, Dominguez GC, Tormin ST, Akamine A, Tortamano A, Fantini SM. Applicability of Moyers analysis in mixed dentition: A systematic review. Dental press journal of orthodontics. 2013 Dec;18(6):100-5.

PATIENTS ATTITUDE TOWARDS THE DENTAL SERVICES PROVIDED BY A DENTAL HOSPITAL IN MELMARUVATHUR, TAMIL NADU

[1]Dr. Rajeswary .K, [2]Dr. Kalaivani . S, [3]Ms. Deepa .M

[1]Reader, Department of Public Health Dentistry, Adhiparasakthi Dental College and Hospital, Melmaruvathur
[2]Senior Lecturer, Department of Public Health Dentistry, Adhiparasakthi Dental College and Hospital, Melmaruvathur
[3]Intern, Adhiparasakthi Dental College and Hospital, Melmaruvathur

Keywords :
Dental Services, Patient Attitude, Patient Satisfaction

Corresponding Author :
K.Rajeswary
Reader, Department of Public Health Dentistry
Adhiparasakthi Dental College and Hospital, Melmaruvathur
Email : drrajeswaryk@apdch.edu.in

ABSTRACT

BACKGROUND :

The feedback on patient's attitude about the dental services delivered at the hospital serves as an essential tool for continual improvement in the quality of car provided. The main objective of this study was to assess the patients' attitude towards the dental services provided by a dental hospital in Melmaruvathur, Tamil Nadu.

Materials and Methods :

A 9 item self-administrated questionnaire with 5- point Likert scale options strongly agree, agree, neutral, disagree and strongly disagree was distributed to outpatients to assess the patient attitude.

Results :

A total of 200 patients were assessed with a mean age of 37.50±10.9 years. The study participants considered professionalism (25.5%) and good communication (25%) to be the most liked qualities of the dentist. The most disliking qualities of a dentist as perceived by the study participants were long treatment duration (28.5%), poor communication skills (19.5%) and irregularity of the dentist (19.5%). Many patients either agreed (42.5%) or strongly agreed (21%) that they were satisfied with the dental treatment provided. The majority of the study participants (53%) felt that distance to reach a dental clinic is not an issue.

Conclusion:

Although the majority of participants in the study are satisfied with the services provided care should be taken care on the treatment duration and communication skills of the dental care provider.

INTRODUCTION:

Patients' attitude towards the health care providers in particular about dentists is a cumulative effect of life experiences and events[1]. Patient satisfaction is an individual patient's appraisal of the extent to which the care provided has met his/her expectation and preferences, as it could facilitate further regular visits and patient compliance[2-4.] Understanding these attitudes helps dentists to render dental care in a better way and helps the public to overcome the fear of dental treatment. Due to advancements in dental materials and techniques, dental services are now provided in a more friendly environment.[5-8] nd most dental professionals are honestly interested in rendering quality care, making the dental visit a comfortable and non-stressful experience for their patient. Also nowadays patients are more informed and have more awareness about dental aspects and they also demand good quality services and their expectations are high and satisfying them is becoming very difficult, satisfaction surveys serve as an important tool in measuring the quality of health services provided and paves the way for the dentist to make improvements in handling them.[9-12] Health care providers worldwide also consider patient satisfaction as a basic concern of their practice the previous studies research articles on patient satisfaction towards the dental care was available for other different population in India and Tamilnadu and no such data available for population in and around Melmaruvathur, Tamilnadu and also to improve the utilization of dental services by the people the present study was conducted.

MATERIALS AND METHODS:

A cross-sectional questionnaire survey was conducted from December 2020 to February 2021 among the outpatients attending a dental college at Melmaruvathur. Ethical clearance for the study was obtained from the institutional review board of Adhiparasakthi Dental College, Melmaruvathur. Based on the previous study, the sample size was determined to be 200. The outpatients who had received dental treatment in the hospital were randomly chosen to participate in the present study. The patients who could not adequately respond by themselves were excluded. The questionnaire for the study was developed first in English language and later it was translated into local language Tamil by the literature expert. The questionnaire was validated and pretested before the start of the study. A bi-lingual (English and vernacular language Tamil), 9 item questionnaire which included demographic details and attitude of patients towards dental treatment was distributed to the patients during regular clinic hours. A written informed consent was obtained from the patients to participate in the study. The level of patient's attitude towards the dental treatment and the dental treatment provider, time taken for meeting their need and the transportation facility to visit the hospital was addressed using a 5 point Likert scale with options strongly agree, agree, neutral, disagree and strongly disagree. The data were entered in a Microsoft Excel spreadsheet and statistical analysis was done using SPSS version 20. Descriptive statistics was done and the distribution of the study population was expressed in percentage.

RESULT:

A total of 200 patients participated in this study. Among them, 93 (46%) were males and 107 (54%) were females (Graph 1). The participant's ages ranged from 18 to 65 years with a mean age of 37.50±10.9 years. The age distribution of study participation is shown in table 1.

Graph 1: Distribution of study participants based on gender

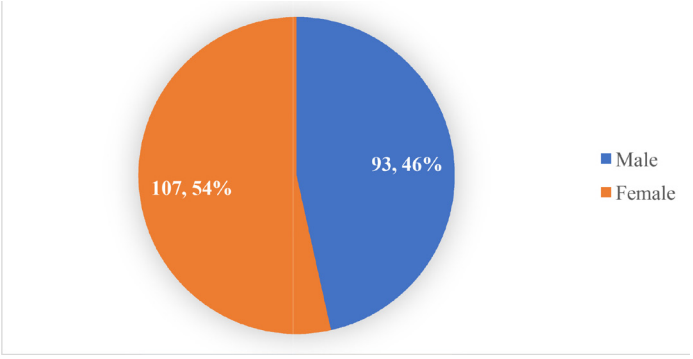


Table 1: Distribution of study participants based on age

Age group	Number of participants (%)
18 to 25 years	28 (14)
26 to 35 years	66 (33)
36 to 45 years	59 (29.5)
46 to 55 years	34 (17.5)
56 to 65 years	13 (6.5)

The study participants considered professionalism (25.5%) and good communication (25%) to be the most liked qualities of the dentist. The most disliking qualities of a dentist as perceived by the study participants were long treatment duration (28.5%), poor communication skills (19.5%) and irregularity of the dentist (19.5%). Table 2 describes the distribution of study participants based on their criteria for selecting a dentist, the most liked and disliked qualities of the dentist. The majority of the study participants (53%) felt that distance to reach the dental clinic is not an issue (Graph 2).

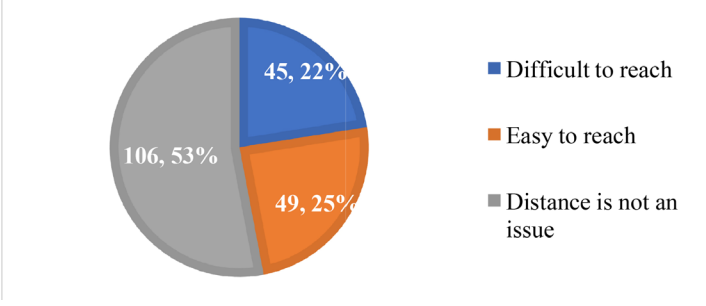
Table 2:

Distribution of study participants based on their criteria for selecting dentist, the most liked and disliked qualities of the dentist

Quality of dentist		Number (%)
Most important criteria for selecting a Dentist	Quality and efficiency of work	20 (10)
	Dentist care and attention	32 (16)
	Performs painless procedure	55 (27.5)
	Good communication skills	56 (28)
	Experience	24 (12)
	Others	13 (6.5)
Most liked qualities of a dentist	Caring	26 (13)
	Professionalism	51 (25.5)
	Good communication	50 (25)
	Reasonable charges	39 (19.5)
	Painless care	34 (17)
Most disliked qualities of a dentist	Poor communication	39 (19.5)
	Expensive, charges more	29 (14.5)
	Taking more time for finishing the procedure	57(28.5)
	Painful injection	36 (18)
	Others	39 (19.5)

Graph 2:

Distribution of study participants based on transportation



Around 54% of the study participants agreed that their dentist took enough time to listen to their concerns. A neutral response was obtained from more than half of the study population (53.4%) regarding the long waiting hours during the dental visit. The majority of the study population (56.5%) disagreed that their dentist took a long time for treatment. Many patients either agreed (42.5%) or strongly agreed (21%) that they were satisfied with their dental treatment. The experience of patients with dentist is described in Table 3.

Table 3:

Distribution of study population based on their experience with the dentist

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	N(%)	N(%)	N(%)	N(%)	N(%)
The dentist took enough time to listen to my concern	0	5 (2.5)	35 (17.5)	107 (53.5)	53 (26.5)
I have to wait long hours to visit the dentist	1 (0.5)	64 (32)	107 (53.5)	21 (10.5)	7 (3.5)
The dentist takes a longer time to provide treatment	4 (2)	113 (56.5)	28 (14)	49 (24.5)	6 (3)
I felt satisfied with the treatment provided	8 (4)	9 (4.5)	56 (28)	85 (42.5)	42 (21)

Discussion

The present study was conducted to elicit the public attitude toward the dental services provided at Melmaruvathur which will help us to improve the quality of health services and to develop new services at the dental hospital based on patients' views.

The issues that can affect to achieve patient satisfaction with dental care provided are technical competence, interpersonal factors, convenience, costs and facilities. For delivering highquality health care a good doctor-patient relationship is also important. Sometimes the patient does not want to undergo treatment again in the hospital is because of dissatisfaction with the services and skills of the dental care providers in the hospital. This dissatisfaction/ discomfort of the patients not only affects his/her opinion but also creates resistance for referrals. So understanding the patient's attitude can help us to know the individual needs of the patient and make necessary changes in the health care delivery.

The results of this study found that most important criteria for selecting the dentist is a good communication skill and performing a painless procedure were good communication skill was considered as an important interpersonal factor of dentist for dental patient satisfaction which was supported by the studies conducted by Murtomaa, Strauss et al, Madan et al, Farah S. Tashkandi et al, Vaidyanathan S et al. [4,13,16]

32.5% of respondents disagreed that they have to wait long hours to visit the dentist, which shows nearly 70% of them felt that they have to wait for a long time for getting treatment which was similar to the study conducted by Bhat N et al, Nagappan et al, Madan et al in India.[14,15,18]

In a study conducted by Hashim R, almost 57% of the participants felt that the dental clinic was too far to reach were as in the present study only 22% felt the difficulty to reach the dental health center.[17,18]

Conclusion :-

Although the majority of participants in the study are satisfied with the services provided, the focus should be made on certain criteria like treatment duration, communication skills and long waiting hours. Improvements in these areas will make the change in the dental attendance to the dental hospital by the public.

References :

1. Ravindranath NS, Manikyam A. Public attitude towards dentists and dental services in Bangalore city, India. J Indian Assoc Public Health Dent 2014;12:100-5.
2. Shrestha A, Doshi D, Rao A, Sequeira P. Patient satisfaction at rural outreach dental camps – A one year report. Rural Remote Health 2008;8(3):891.
3. Handelman SL, Fan-Hsu J, Proskin HM. Patient satisfaction in four types of dental practice. J Am Dent Assoc 1990;121:624-30
4. Vaidyanathan S, Sai Susmitha, Rajkumar M et al. Patient satisfaction with dental services at a rural health care center: A questionnaire survey. Journal of International Oral Health 2015; 7(10):62-64.
5. Tashkandi FS, Hejazi LO, Lingawi HS. Patients' satisfaction with dental care services provided by educational dental hospital. Int J Health Sci Res. 2017; 7(6):135-142
6. Iqbal W, Faran F, Yashfika A B, Shoro F N. Evaluation of Dental Care through Patient Satisfaction Feedback – A Cross Sectional Study at Dental Institute of OJHA Hospital, Karachi, Pakistan. Adv Dent & Oral Health. 2018; 8(4): 555743.
7. Alajlan A , Alhoumaidan A, Ettesh A, Doumani M. Assessing Knowledge and Attitude of Dental Patients regarding the Use of Dental Implants: A Survey Based Research. Int Journal of Dentistry. 2019: 1-5.
8. Ali DA. Patient satisfaction in dental healthcare centers. Eur J Dent 2016;10:30914.
9. Keerthiga Devi R, Vinita Mary A, Kesavan R et al .Patient satisfaction from dental services provided by dental college and hospital. Drug Invention Today. 2020; 13(2):144-148.
10. Tabassum N, Ahmed S, Alshammari Y et al. Patient's attitude towards dental treatment: Treatment plan versus patient willingness. IJDR 2017; 2(3): 73-75 .
11. Ohrn K, Hakeberg M, Abrahamsson KH. Dental beliefs, patients' specific attitudes towards dentists and dental hygienists: a comparative study. Int J Dent Hygiene 6, 2008; 205–213.
12. Lee K T, Chen C M, Huang S T. Patient satisfaction with the quality of dental treatment provided by interns. Jounal of Dental Sciences 2013; 8:177-183.
13. Othman N, Razak IA. Satisfaction with school dental service provided by mobile dental squads. Asia Pac J Public Health 2010;22:415-25
14. Madan K, Zahra F. Factors affecting Patient Satisfaction among those attending an out patient department in Chennai City, India. JIAPHD 2008;12:15-20.
15. Bhat N, Sultane P, Chhabra S, Choudhary S, Sen N, Thakker J, Patel D, Joshi R. Assessment of Patient Satisfaction toward Dental Care Services of Patients visiting Dental Schools in Udaipur, Rajasthan. Int J Oral Care Res 2017;5(1):17.
16. Kasani K, Srivastava BK, Jain V, Chinna S. Evaluation of Patient's Satisfaction with Dental Services Received by Private Dental Clinics and Dental Institutions Among (18-45) Years Aged People of Bangalore City. Arch of Dent and Med Res 2018;4(1):30-43
17. Hashim R. Patient satisfaction with dental services at Ajman University, United Arab Emirates. East Mediterr Health J 2005 Sep-Nov;11(5-6):913-921.
18. N Nagappan, Joseph John Patient satisfaction with the dental services offered by a dental Hospital in India JIAPHD; 2014; 12(4):297-301.

ESTIMATION OF SALIVARY - AMYLASE LEVEL IN DEPRESSIVE INDIVIDUALS UNDER ANTI-DEPRESSANT THERAPY- AN OBSERVATIONAL STUDY

[1]Dr.Lakshman .VL, [2]Dr.Umamaheswari .G, [3]Dr.Thilagavathy .N, [4]Dr.Prasannakumar . D

[1]Senior Lecturer, [3] Professor and HOD, Department of Oral Medicine and Radiology, Adhiparasakthi Dental College and Hospital, Melmaruvathur

[2,4] Private Practitioner

Keywords :

Sialochemistry, Depressive disorder, Depression, Neurophysiology, Autonomic Nervous System (ANS), Norepinephrine

Corresponding Author :

Dr.Lakshman

Senior Lecturer,
Department of Oral Medicine and Radiology,
Adhiparasakthi Dental College and Hospital, Melmaruvathur

ABSTRACT:

INTRODUCTION:

Depression is a mental disorder that is pervasive and affects people all around the World. In India, about 1 in 5 peoples is affected by depressive disorders. Autonomic Nervous system affected by depressive disorder can affect the salivary composition since salivary secretion is controlled by the sympathetic and parasympathetic innervations. Alteration in the salivary composition can affect oral health and makes them vulnerable to oral infection.

Aim: To study the sialochemical alteration in depressive individuals.

Materials & Methods:

A total 100 subjects- Group I (normal individuals) & Group II (depressive individuals). Depression level was assessed with Hospital Anxiety & Depression scale (HADS).Whole unstimulated saliva was collected and subjected to sialochemical analysis (Sodium, Potassium, Chloride, Total protein, Urea, Salivary amylase, Calcium, pH).

Result:

The Parameters were statistically analyzed using Parametric t-test and showing statistically significant raised levels in salivary α-amylase, total protein, sodium, chloride, calcium and there were no statistical difference in salivary pH, urea & potassium levels. KEYWORDS: Sialochemistry, Depressive disorder, Depression, Neurophysiology, Autonomic Nervous System (ANS), Norepinephrine

INTRODUCTION:

Depression is a common affective disorder, affects more than 350 million peoples all around the world [1] and it could be second most common disease in the world by the year 2020.[2] In India about 1 in 5peoples are affected by depressive disorders.[3]

Depression in the early stages induces various adaptational physiologic responses. Chronic depression leads to hyperactivity of Hypothalamus-Pituitary-Adrenal axis (HPA) as well as Sympathetic-Adrenal-Medullary (SAM) system and make them more vulnerable to various diseases such as hypertension, diabetes, cardiovascular diseases and salivary gland dysfunction. [4,5] Salivary gland function is controlled by both sympathetic and parasympathetic innervations and in depression, both sympathetic and parasympathetic system get affected which leads to altered salivary function,[5,6] this could reflect in altered salivary composition also.[7]

Salivary gland dysfunction could be altered salivary composition or secretion may leads transient inconvenience to severe impairments of oral health such as mucositis, burning sensation, altered taste sensation, dental caries, periodontal diseases and oral candidiasis.[8,9]

Sialochemistry – an emerging diagnostic tool that can provides qualitative information on certain important parameters of saliva which are used for diagnosis and research purpose.[10] Various studies analyzed sialochemical alteration in depressed patient under antidepressant therapy,[11,12,13,14] But sialochemical profile in depressive individuals not under medication was not assessed widely. Hence present study was carried out to analyze sialochemical alteration in depressive individuals not under medication compared to healthy controls.

MATERIALS & METHODS:

This observational ex-vivostudy was conducted in the Department of Psychiatry over a period of 6 months between January- June 2016.The study proposal was approved by Institutional review board & Institutional ethical committee.

Patient selection criteria & Tool used:

A total of 100 subjects between the age range of 18-50 years were included in the study. Subjects with systemic disorders such as Diabetic mellitus, Hypertension, Auto immune disorders etc., or under any other medication that alters salivary secretion, and radio/chemotherapy in head and neck region in the last 6 months were excluded from the study.

Suspected Depressive patients were thoroughly examined by the Clinical Psychiatrist. Based on the depression & anxiety assessment by using, HADS (developed by zigmond AS and Snaith RP [15] and clinical history, patients were diagnosed as depressive & non-depressive individuals.

The study groups were categorised as follows:

- Group I: Non-depressive patients with HADS value D≤8 and A≤8) (40 samples).
- Group II: Depressive patients before taking medication (with HADS value D≥8 and A≥8) (40 samples)
- Group III: Same group II patients who have been on SSRI antidepressants for two months.

Sample Collection and processing

Unstimulated whole salivary samples were collected between 8am-12 pm (to avoid circadian variations), based on spitting method illustrated by Navazesh M.[16] The individuals were instructed to refrain from eating, drinking (except water), tooth brushing, practice physical exercises or be under great physical stress for at least one hour prior to sample collection. The subjects were instructed to wash their mouths thoroughly with de-ionized water allow to sit in a relaxed position for 5 minutes and allow saliva to accumulate in the mouth and then to expectorate through a sterile plastic container usually once every 60 seconds over a period of 5 minutes. Collected sample was then transported to the Biochemistry laboratory. Salivary samples were centrifuged at 3200 rpm for 10 minutes, supernatant fluid was collected. Spectrophotometric analysis of salivary α-amylase was done by International Federation of Clinical Chemistry (IFCC) approved method, using a Hitachi 902 autoanalyzer.

Statistical Analysis:

The analysis was carried out using SPSS version 21.0. Mean and Standard Deviation (SD) were used for describing the data. Unpaired t-test was used to compare the salivary parameters between the Groups I and II and Paired t-test was used to compare the salivary parameters between the Group II and III.

RESULT:

The following observations were tabulated along with statistical analysis [Table1].

Chart 1: Showing comparison of mean value of study parameter among group I, II &III.

[Table-1] reveals statistical significant differences in the unstimulated salivary amylase levels (p=0.001) between group I (38.55±23.55) & group II (67.29±55.03)

DISCUSSION:

During the past few decades, an increasing number of investigators in the field medicine & dentistry are finding that saliva as a potential diagnostic tool in wide range of diseases and clinical situations, because of its easy availability and non-invasive collection. This reflects the marked proliferation in information on salivary physiology and salivary chemistry. Human diseases having global impact include cancer, cardiovascular diseases, depression, metabolic, and neurological diseases. Diagnosing these disease conditions is becoming challenging and thus requires supplementing clinical evaluation with laboratory testing (1)

Sialochemistry- an emerging diagnostic tool

in many systemic and oral diseases, it is a useful means of chronologically, monitoring quantitative changes of chemicals that are present in Saliva. Whole saliva is a complex fluid containing an entire library of hormones, proteins, enzymes, antibodies, antimicrobial constituents, and cytokines.(2) The mechanism of entry of these constituents from the blood into the saliva is by transcellular, passive intracellular diffusion and active transport, or paracellular routes by extracellular ultra-filtration within the salivary glands or through the gingival crevice. Sialochemistry can be required to reveal the differentiation between normal and abnormal function of the glands, Information about gland dysfunction and its effects on the oral environment, clues to homeostatic fluctuations as a result of circulatory, innervatory, or hormonal modification [17-19].

Since we came to know that depression and SSRI antidepressant drug which affect the autonomic nervous system would be predicted to cause changes in saliva secretion rate or drug-induced oral dryness (xerostomia) and alteration in salivary composition. The present study was conducted, to assess quantitative changes in Salivary α- amylase of whole unstimulated saliva of Depressive individuals (new diagnosed patients) and same patient after 2 month of anti depressant therapy (SSRI groups of drugs), based on the turn over cycle of salivary gland cells is 60-120 days[20] the time period required for manifestation of symptoms in a patient would be expected to take that long.

In present study we found that there is statistically significant (p=0.03) raised in salivary alpha amylase concentration in depressive individual (not under medication) compared to normal dividuals which should be taken into consideration. This could explained by, Autonomic nervous system getting affected during stress/ depression could reflect by release of catecholamines such as dopamine, norepinephrine, and epinephrine can be measured in blood, whereas alpha-amylase from acinar cells of salivary gland, which are innervated by sympathetic and parasympathetic branches of the ANS, can be detected in saliva(3,17) which was being utilized in selection of parameter (α- amylase) as a biomarker in our study.

Vineetha R et al revealed that increase in salivary alpha amylase during psychosocial stress may be explained on the basis of physiological response to stress. An increased allostatic load due to large HPA and SAM responses to repeated stress might render a subject vulnerable to various diseases; from the common cold to cardiovascular diseases in the long run. Chronic stress is also proposed to be a contributing factor in the manifestations and flare ups of several oral pathologies including lichen planus, recurrent aphthous ulcerations, burning mouth, atypical facial pain and xerostomia.(5)The effects of increased level of salivary amylase revealed by Scannopieco et al, showed that raised level of salivary amylase that promoted adhesion of oral Streptococci and have role in dental plaque and caries formation. (21)

There was no statistical significance noticed in SSRI [P=0.27] . did not produce much alteration in salivary composition and most of the altered parameters noticed in depressive individuals were stabilized and reverted back to the normal baseline value of the healthy individuals after two month course of SSRI.

In the present study SSRI was the prescribed drug, since it does not have much effect on salivary gland secretion due to absence of serotonin receptor,[22] Hence theses alteration in salivary α-amylase levels might be due to the reestablishment of homeostasis by SSRI. Almeida P del V et al., in 2008,[12] Veen G et al., in 2013[13] and Milton BA et al., in 2014 in their studies compared the sialochemical alteration of various antidepressant drugs like TCA, TeCA & SSRI and found that SSRI did not show much significant sialochemical alteration.[14]However further studies with large sample size and estimation of gland specific sialochemical analysis has to be initiated to add more information to the existing scientific evidence.

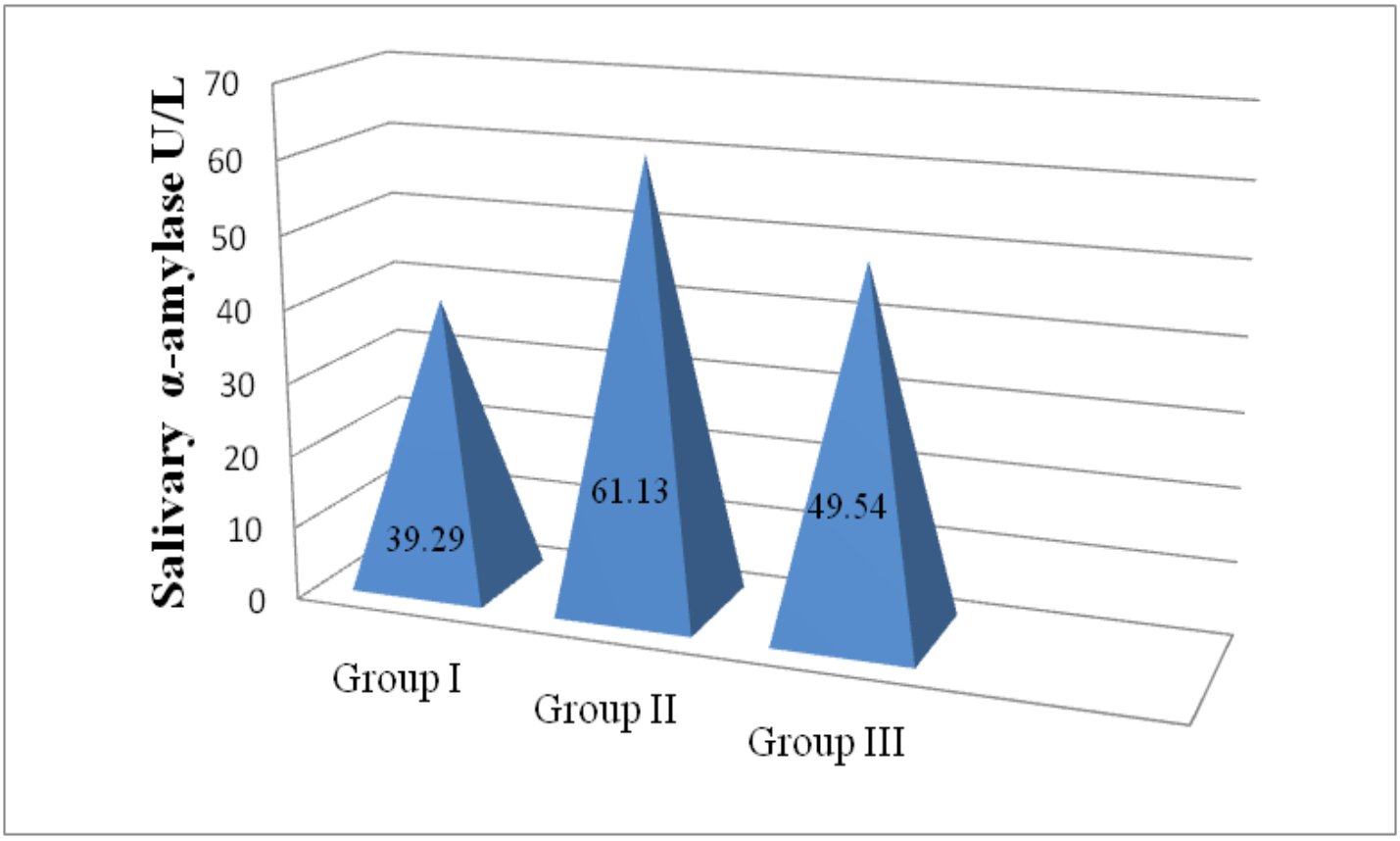
Table 1: Showing Statistical value comparison between group I &group II

S.No	Mean ± Standard Deviation		95% Confident Interval		df Degree of Freedom	t value	p value
	Group I	Group II	Lower	Upper			
1	39.29 ± 23.44	61.13 ± 56.02	2.574	41.11	52.25	2.27	0.03*

Table 2: Showing Statistical value comparison between group II &group III

S.No	Mean ± Standard Deviation		95% Confident Interval		df Degree of Freedom	t value	p value
	Group II	Group III	Lower	Upper			
1	61.13 ±56.02	49.54 ±28.52	-9.21	32.38	1.13	39	0.27

Chart 1: Comparison of Salivary α-amylase mean value among study groups



CONCLUSION:

Depressive patients have the risk of developing salivary gland hypofunction probably to a higher extent, this could reflect with altered salivary composition. Sialochemical analysis of depressive patient (not under medication) show significant alteration in the salivary composition which includes salivary alpha amylase, total protein, sodium, chloride, calcium The patients with altered salivary may experience numerous sequelae including xerostomia, taste changes, altered nutrition, oral microbial population shifts, high dental caries risk, and oral mucosal changes. So it is necessary to evaluate the oral health status of depressive individuals by periodic monitoring of sialochemical value and helping them by providing proper prophylactic and interventional therapy to restore oral health status.

DECLARATION OF INTEREST: None

REFERENCES:

1. Marcus M, Yasamy MT, Ommeren MV, Chisholm D, Saxena S. A global public health concern. Depression. WHO, 2012; 6–8.
2. Murray CJL, Lopez AD. The Global Burden of Disease: A Comprehensive Assessment of Mortality and Disability from Diseases, Injuries and Risk Factors in 1990 and Projected to 2020. Geneva, Switzerland; World Health Organization, 1996.
3. Indran NR. 26,00,00,000 Indians suffer from mental health disorders. Indian news & times. [Cited 2016 October 12]. Available from: http://www.indiannewsandtimes.com/2015/05/06/260000000-indians-suffer-mental-health-disorders/
4. Hasler G. Pathophysiology of depression: do we have any solid evidence of interest to clinicians? World Psychiatry. 2010; 9(3):155–61.
5. Vineetha R, Pai K-M, Vengal M, Gopalakrishna K, Narayanakurup D. Usefulness of salivary alpha amylase as a biomarker of chronic stress and stress related oral mucosal changes - a pilot study. J Clin Exp Dent. 2014; 6(2):e132–7.
6. Vreeburg SA, Hoogendijk WJG, Derijk RH, Dyck R Van, Smit JH, Zitman FG, et al. Salivary cortisol levels and the 2-year course of depressive and anxiety disorders. Psychoneuroendocrinology. 2013; 38(9):1494–502.
7. Löfgren CD, Wickström C, Sonesson M, Lagunas PT, Christersson C. A systematic review of methods to diagnose oral dryness and salivary gland function. BMC Oral Health. 2012; 12(1):29.
8. Daryani D, Gopakumar.R Xerostomia , its Association with Oral Manifestation and Ocular Involvement : A Clinical and Biochemical Study. JIAOMR 2011;23:513–7.
9. Tiwana M, Uppal B, Sachdeva J, Talole S, Mahajan M, Koshy G, et al. Whole saliva physico biochemical changes and quality of life in head and neck cancer patients following conventional radiation therapy: A prospective longitudinal study. Indian J Cancer. 2011; 48 (3):289.
10. Mandel ID: Sialochemistry in disease and clinical situations affecting salivary glands. Crit Rev Clin Lab Sci 12: 321-366, 1980
11. Glen A I M, Ongky GC, Robinson K.. Diminished membrane transport in manic depressive psychosis and recurrent depression. Lancet.1968; 2:241.
12. de Almeida Pdel V, Grégio AM, Brancher JA, Ignácio SA, Machado MA, de Lima AA, et al. Effects of antidepressants and benzodiazepines on stimulated salivary flow rate and biochemistry composition of the saliva. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008; 106(1):58-65.
13. Veen G et al. Evening salivary alpha-amylase, major depressive disorder, and antidepressant use in the Netherlands Study of Depression and Anxiety (NESDA) Psychiatry Res. 2013 Jun 30;208(1):41-6.
14. Milton BA, Bhambal A, Nair P. Sialochemical Analysis : Windfall to the Oral Physician (A Hospital-based Clinical Cross-Sectional Study in Depressive Disorders). Journal of International Oral Health. 2014; 6(3):82-89
15. Zigmond AS, Snaith RP .The Hospital Anxiety and Depression Scale. Acta Psychiatrica Scandinavica. 1983; 67(6) :361–370
16. Navazesh M. Methods for collecting saliva. Ann N Y Acad Sci.1993; 694:72-77.
17. Lee JM, Garon E, Wong DT, Salivary diagnostics, Orthodontics and Craniofacial Research. 2009; 12(3): 206–211.
18. Mittal S, Bansal V, Garg S, Atreja G, Bansal S, The diagnostic role of Saliva-a review, Journal of Clinical and Experimental Dentistry 2011; 3(4):e314–e320.
19. Suddick RP, DowD FJ. Mechanisms of secretion of fluid and electrolyte in salivary gland. Transactions of the Nebraska Academy of Sciences and Affiliated Societies.1972; 360.
20. Vissink et al. Clinical management of salivary gland hypofunction and xerostomia in head and neck cancer patients: successes and barriers Int J Radiat Oncol Biol Phys. 2010; 78(4): 983–991.
21. Scannapieco FA, Torres G, Levine MJ. Salivary α-amylase: role in dental plaque and caries formation. Crit Rev Oral Biol Med. 1993; 4(3):301–7.
22. Mornstad H, von Knorring L, Forsgren L, Holmgren S: Longterm effects of two principally different antidepressant drugs on saliva secretion and composition. Scand J Dent Res. 1986; 94: 461-70.

Angiolymphoid Hyperplasia with Eosinophilia – A rare case report

[1]Vinodhini T S, [2]Saravanan T, [3]Mathan Mohan A, [4]Sudhakar Venkatachalapathy, [5]Balaguhan Balasubramanian, [6]Kirthika Natarajan

[1]**Assistant Professor,** [2]**Professor & Vice Principal,** Department of Oral Medicine and Radiology, Karpaga Vinayaga Institute of dental sciences
[4]**Professor & Head** Department of Orthodontics and Dentofacial Orthopedics, Adhiparashakthi Dental College & Hospital
[3]**Professor & Dean,** [5]**Professor & Head** Department of Oral and Maxillofacial surgery, Karpaga Vinayaga Institute of dental sciences
[6]**Assistant Professor** Department of Conservative Dentistry & Endodontics, Karpaga Vinayaga Institute of dental sciences

Keywords :

Angiolymphoid hyperplasia; Eosinophilia; Lymph nodes; Kimura's disease

Corresponding Author :

Vinodhini T S, Assistant Professor,
Department of Oral Medicine and Radiology,
Karpaga Vinayaga Institute of dental sciences, GST Road, Chinna Kolambakkam, Palayanoor, Madurantakam,
E mail: vinodhinisudhakar@gmail.com

Abstract

Angiolymphoid hyperplasia with eosinophilia(ALHE) is a rare idiopathic condition characterised by isolated or diffuse grouped nodules in the head and neck region, particularly in the periauricular region. The oral mucosa is the less involved site. Kimura's disease, which shares many characteristics with ALHE, should be distinguished. Histologic findings could point to more aggressive angiomatous neoplasms such as angiosarcoma or malignant angioendothelioma. In this article, we present a case of ALHE in the skin of the face, periauricular region of the scalp, and oral mucosa of an adult male with clinical, classical histopathological features, as well as interesting doppler ultrasound (USG), computed tomography (CT), and magnetic resonance imaging (MRI) findings. It is necessary for dental surgeons to be aware of this condition and its management.

Introduction

Angiolymphoid hyperplasia with eosinophilia (ALHE) is a rare benign skin disease with approximately 85% cases occurring in preauricular region, forehead or scalp. It rarely regresses spontaneously, but there are no reports of metastatic spread.[1] Though a benign neoplasm it may be persistent and difficult to eradicate.[2]

Case Report

A thirty-seven year old male patient reported to the department with the complaint of gradually increasing asymptomatic swelling of face since one year [Fig.1]. His medical history was non-contributory except for history of scarring allopecia of scalp since five years for which no treatment was undertaken. Patient had the habit of chewing pan masala for 3 years and has quit the habit since 6 months.

Fig. 1- Frontal View

Clinical examination revealed a diffuse swelling in right side of face measuring 13 x 11.5cm causing sinking of right eye and in left measuring 6 x 5cm. The skin over the swelling was normal in colour, shiny and stretched except below the lower eyelid where it showed a slightly reddish hue. Multiple small subcutaneous nodules were present in preauricular, postauricular and occipital region [Fig.2].

Fig. 2 - Subcutaneous nodules at the back of the neck

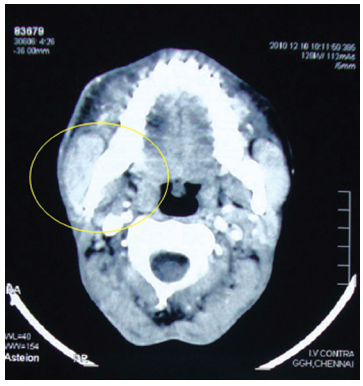
Submandibular, post-auricular, suboccipital, axial and inguinal lymphnodes were enlarged bilaterally and non-tender. Intraoral examination revealed greyish white discolouration in right and left buccal mucosae with areas of erythema and hyperpigmentation. A palpable firm to hard non-tender mass is felt on the right buccal mucosa opposite the premolars and molars measuring approximately 4 x 3 cm of which the patient was unaware [Fig.3].

Fig. 3 - Right buccal mucosa showing areas of erythema & hyperpigmentation

A provisional diagnosis of benign tumour of soft tissue and a differential diagnosis of rhabdomyoma, fibromatosis, Kimura's disease, lymphoma and vascular lesion in face was made.

Patient's routine blood investigations were within normal limits. He tested negative for HIV. OrthoPantomoGram revealed no abnormality. Doppler ultrasonography of face and neck revealed soft tissue nodules of mixed echogenicity with increased vascularity in preauricular, postauricular and occipital region and enlarged lymphnodes in bilateral submandibular, submental, post-auricular and suboccipital region. Contrast-enhanced computed tomography (CT) demonstrated heterogenous enhancing subcutaneous mass [Fig.4].

Fig.4 - Contrast enhanced computed tomography showing heterogenous enhancing subcutaneous mass

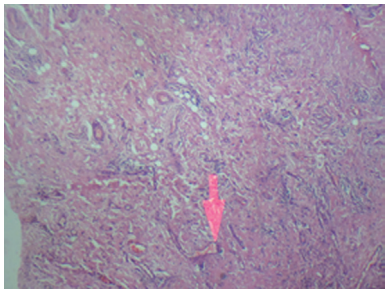


Magnetic resonance imaging (MRI) of face revealed lymphadenopathies in submental, bilateral submandibular and upper/deep cervical regions; diffuse ill-defined subcutaneous thickening over face (around mandible, maxillary, eyelids and posterior neck region); no intra-orbital/ intracranial extension [Fig.5].

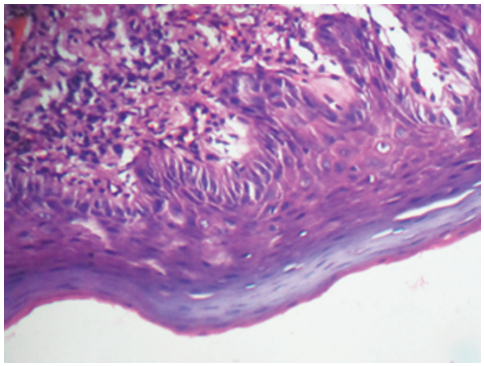
Fig. 5 - Ill-defined subcutaneous thickening over face

Soft tissue incisional biopsy from right buccal mucosa stained with hematoxylin and eosin showed numerous proliferating blood capillaries of varying size and shape, lined by distinct epitheloid endothelial cells with uniform ovoid nuclei and intracytoplasmic vacuoles. Perivascular inflammatory cell infiltrate composed primarily of lymphocytes[Fig. 6].All these characteristic features were suggestive of angiolymphoid hyperplasia.

Fig. 6 - Histopatology- Haematoxylin and Eosin



Low power view shows numerous proliferating blood capillaries lied by epitheloid endothelial cells (original magnification x 4)



B.High power view shows perivascular lymphocytic inflammatory cell infiltrate (original magnification x 40)

The patient was treated with 10mg of prednisolone b.i.d for one month [Fig.7]. On follow up the lesion drastically regressed in size. Dose was tapered & stopped after 2 months.

Fig. 7 - Post-treatment- After oral administration of 10mg b.i.d prednisolone -1 month

Discussion

ALHE is a benign vascular lesion [1] with dermal and subcutaneous nodules that can be disfiguring [3]. Wells and Whimster were the first to describe it in 1969 [4]. Similar lesions have been described as pseudo or atypical pyogenic granuloma by Wilson-Jones and Bleehen [5]. The term "epithelioid hemangioma" was proposed by Enzinger and Weiss [6]. ALHE appears in the third and fourth decades [2], with a slight Caucasian and female predominance. Lesions are usually circumscribed masses in the subcutaneous tissue or dermis that appear as small, dull red papules or nodules, 2–3 cm in diameter, mostly in the vicinity of ear. The trunk, extremities, genitalia, lips, and oral mucosa are less commonly involved sites. In 20% of cases, multiple lesions appear. They are usually asymptomatic, but when compressed, they can become pruritic or painful. The involvement of the skin of the face, scalp, and mucosa in our case created a diagnostic dilemma.

Lymphadenopathy affects between 5% and 20% of patients. Though uncommon, extracutaneous involvement has been reported in deep soft tissues, salivary glands, orbit, bone, lymph nodes, colon, heart, and lungs. [3] Eosinophilia is frequently absent in peripheral blood, and IgE levels are normal. [7]

Our case showed clinical similarities to Kimura's disease because of large subcutaneous nodules, Asian male patient and lymph node involvement. In contrast, there was no eosinophilia in peripheral blood and in tissues.

Aetiology of ALHE remains unknown. It is considered as a benign neoplastic proliferation or reactive hyperplasia of vascular tissue that develops in response to trauma, infections, renin or hyperestrogenic states (pregnancy or oral contraceptives). Kempf et al speculated that at least a subset of these lesions could be a benign or low-grade malignancy T-cell lymphoproliferative disorder. [3] Ramchandani PL et al. proposed arterio-venous shunt as an etiopathogenesis. [8]

Differential diagnosis includes haemangioma, lymphoma, sarcoma, angiosarcoma, haemangioendothelioma, Kimura's disease, cavernous hemangioma, angiomatous lymphoid hamartoma, persistent insect bite reaction and dermatofibroma.

A vascular mass has previously been documented on ultrasound as a characteristic of ALHE, which matches our finding of soft tissue with mixed echogenicity and enhanced vascularity. Contrast-enhanced CT revealed a heterogeneous enhancing subcutaneous mass, whereas Rebecca S. Cornelius et al reported a brightly enhancing subcutaneous mass. Calhoun et al. made a single reference to MRI features, mentioning a lack of visible feeding vessels. [9] MRI of the patient's face revealed multiple lymphadenopathies and diffuse ill-defined subcutaneous thickening over the face, with no obvious feeding vessels in our case.

In the absence of treatment, lesions may progressively worsen or spontaneously improve. [1] There are no specific therapy options in the literature. Because of the risk of spontaneous involution, it's best to wait 3 to 6 months before starting treatment. Only symptomatic or disfiguring lesions necessitate therapy. Although surgical excision is the primary treatment, due to multi-lobulated and poorly defined lesions, recurrences occur in 33 percent to 50 percent of cases. Mohs micrographic surgery with thorough margin assessment is a superior alternative. Other treatment options include radiotherapy, shave excision with electrodessication, cryotherapy, laser therapy, and topical, systemic, or intralesional corticosteroids.[3] Intralesional interferon-2a, indomethacin, farnestil, pentoxyfylline, isotretinoin, and chemotherapeutics such as vinblastine, mepolizumab, and imiquimod have all been shown to be successful in some instances. [3, 10]

Because of huge size and multiple site involvement, our patient have been given 10mg of prednisolone (oral) b.i.d for one month followed by tapering dose. On follow up the lesions showed visible reduction in size.

Conclusion:

ALHE presents both a diagnostic and therapeutic challenge . There is a wide range of potential therapies, yet most of them lack adequate data. Although the condition is rarely fatal on its own, it frequently causes disfiguring lesions that have a negative impact on the patient's quality of life. This necessitates more study and attempts to develop an effective treatment and a unified therapeutic approach.

References

1. Arnander MWT, Anderrson NG, Schonauer F. The ultrasound halo sign in angiolymphoid hyperplasia of the temporal artery. Br J Radiol 2006;79:e184-e86
2. Ozlem Karabudak, Oktay Taskapan, Onder Bozdogan, Bilal Dogan. Angiolymphoid hyperplasia with eosinophilia: Atypical appearance in an older patient. Indian J Dermatol 2008;53:144-5
3. Fouad El Sayed, Rola Dhaybi, Alfred Ammoury, Myrna Chababi. Angiolymphoid hyperplasia with eosinophilia: efficacy of isotretinoin?. Head & Face Medicine 2006;2:32-6
4. Wells GC, Whimster IW. Subcutaneous angiolymphoid hyperplasia with eosinophilia. Br J Dermatol. 1969;81:1-5
5. Wilson-Jones E, Bleehen SS. Inflammatory angiomatous nodules with abnormal blood vessels occurring about the ears and scalp (pseudo or atypical pyogenic granulomas). Br J Dermatol. 1969;81:804-16
6. Enzinger FM, Weiss SW. Soft tissue tumors. St. Louis: CV Mosby; 1983. p.391-7
7. Pedro Leonardo Briggs. Kimura disease is not angiolymphoid hyperplasia with eosinophilia: clinical and pathological correlation with literature review and definition of diagnostic criteria. An Bras Dermatol. 2006;2:167-73
8. Ramchandani PL, Sabesan T, Hussein K. Angiolymphoid hyperplasia with eosinophilia masquerading as Kimura disease. Br J Oral Maxillofac Surg. 2005; 43: 249-52
9. Rebecca S. Cornelius, Paul W. Biddinger, Jack L. Gluckman. Angiolymphoid hyperplasia with eosinophilia of the head and neck. AJNR. 1995;16:916-18
10. Oh CW, Kim KH. Is angiolymphoid hyperplasia with eosinophilia a benign vascular tumor? A case improved with oral isotretinoin. Dermatology. 1998; 197:189-9

PROSTHETIC MANAGEMENT OF PAPILLON–LEFEVRE SYNDROME: A CASE REPORT

[1]Dr. Muthu Annamalai, [2]Dr. Prabhu, [3]Dr. Sakshi Madhok
[1]Post Graduate Student, [2]Professor and HOD, [3]Reader
Department of Prosthodontics, Adhiparasakthi dental college and hospital, Melmaruvathur

Keywords :

Papillon–Lefèvre syndrome, periodontitis, Cathepsin, Palmoplantar keratoderma

Corresponding Author :

Dr. Muthu Annamalai
Post Graduate Student
Department of Prosthodontics,
Adhiparasakthi dental college and hospital, Melmaruvathur

ABSTRACT

Papillon–Lefèvre syndrome is an exteremly rare inherited genetic autosomal recessive disorder, Characterized by hyperkeratosis of palmar and plantar regions which is also known as "Palmoplantar keratoderma", aggressively progressing periodontitis leading to premature loss of deciduous and permanent teeth. The condition is linked to mutations of the cathepsin C gene. It results from alteration of the CTSC gene that regulates production of an enzyme known as cathepsin C. The condition can occur in siblings born of consanguineous marriages. The case report describes the prosthetic management of a rare case affected with Papillon–Lefèvre syndrome with family history of consanguineous marriage of the parents. The treatment comprised oral prophylaxis, scaling and root planning followed by Rehabilitation with complete removable overlay denture in both the arches with neutral zone concept was planned.

INTRODUCTION

Papillon–Lefèvre syndrome (PLS) is Characterised by hyperkeratosis of palmar and plantar regions with aggressively progressing periodontitis leading to premature loss of deciduous and permanent dentition. PLS is also known as keratoris palmoplantaris with periodontopathia. It was first described by two French physicians Papillon and Lefevre in 1924 (1). The world-wide prevalence of the condition is extremely rare which is approximately 1–4 per million (Nagy et al., 2014)(2). The cause of PLS appears to be genetic in most cases due to consanguineously married parents, The condition is characterized by mutations affecting the cathepsin C gene (CTSC) on chromosome 11q14 (3)(4). The typical presentation of Papillon Lefevre syndrome is aggressive periodontitis and hyperkeratosis. Patients usually report two episodes of aggressive periodontitis: the first one around three years of age, leading to the loss of primary teeth, the second around fifteen years of age, resulting in the loss of permanent teeth(5)(6). And also characterised by the development of dry scaly patches of palms, feet and rarely involves other areas of the body. It is clinically characterised around the age of 1 to 5 years.

Genetically Papillon-Lefèvre syndrome is inherited in an autosomal recessive pattern. This syndrome occurs due to alterations of the CTSC gene that regulates production of an enzyme known as cathepsin C. Till now, approximately 75 different mutations have been reported on the CTSC gene. Among these mutations, 85% were present in homozygous form, while 15% were detected in a compound heterozygous form. Among the homozygous mutations, 50% were missense, 25% nonsense, 23% frameshift mutations, and 2% were other types of mutations (2). Genes provide commands for creating proteins, which plays a critical role in various functions of the body. When a gene is altered, the protein product may be faulty, inefficient, or absent. Depending upon the functions of the particular protein, this can affect many organ systems of the body.

A CASE REPORT:

An 18 year old male patient reported to the department of prosthodontics, Adhiparasakthi dental college and hospital, Melmaruvathur with the chief complaint of difficulty in mastication for past 10 years. Patient history revealed that the onset of the cutaneous lesion of PLS appeared at the age of 6 months. Her teeth had erupted normally but later on they became mobile and exfoliated. She also claimed that her deciduous dentition was lost completely before the age of five. The patient's medical history showed that he was undergoing a dermatological treatment for the "hyperkeratosis of his palms and soles".

The patient's family history revealed that her parents were consanguineously married and her twin sister had no similar problem and she is perfectly healthy. The patient was otherwise normal and did not show any signs of systemic illness. General examination revealed that the patient was malnourished and anaemic. Extra-oral examination of the patient did not show any significant changes. Examination of the palms and soles showed crustation, cracking, and deep fissuring, focal areas of keratinization on dorsum surface of his hands and feet, pigmented scales and deep fissuring (FIGURE 2).

Intraoral examination revealed the only remaining teeth are 18,28,38,48 (FIGURE 1). Edentulous regions appeared normal and non-tender to palpation. The edentulous ridge of maxilla and mandible showed knife edged residual ridge (atwoods class IV). On radiographic examination (Panoramic radiograph) displayed floating of remaining teeth with slight horizontal and vertical bone loss in 18,28,38,48, but clinically stable, were retained to aid denture retention (FIGURE 3). Based on the history and clinical features, diagnosis of Papillon-Lefevre syndrome was confirmed. A written informed consent form was signed by the patients parents after having discussed the treatment planning. Rehablitation with dental implants was not possible because of insufficient bone width and length. CBCT imaging revelled inadequate bone width and length, (FIGURE 4) and no evidence of any intracranial calcifications. For rehabilitation of oral function, aesthetics and phonetics, A conventional removable compete denture prosthesis overlaying the erupting 3rd molar with neutral zone technique was considered as the treatment option. The remaining teeth were clinically stable

was retained to aid denture retention. Considering Muller De Van statement, "The preservation of that which remains is of utmost importance and not the meticulous replacement of that which has been lost", to simplify the treatment plan and considering the age of patient and ongoing growth any extensive surgical options and extraction were avoided.

PROSTHETIC MANAGEMENT:

A primary impression was made using alginate (Algitex, DPI, Mumbai) and primary cast was poured using plaster of Paris. Border moulding was done using green stick compound (DPI Pinnacle) and definitive impression was made using light bodied addition silicone material (FIGURE 5). Then the master cast was poured using dental stone (FIGURE 6). Conventional Jaw relation procedures were carried out to establish proper vertical dimension and horizontal relation (FIGURE 7). Then the recordings were articulated in mean value articulator. To record neutral zone, the lower occlusal rims with base was removed and a new denture base with stainless steel retentive wire loops were fabricated (FIGURE 8). These loops aid in retention of low fusing greenstick compound. The position of the wire loops were evaluated intra orally for buccolingual interference in tongue or buccal mucosa. Prior to record the mandibular neutral zone impression, the maxillary occlusal rim is inserted to support the facial muscles and allow the tongue to be placed comfortably on the palatal contours during function. Recording the neutral zone in functional form by asking the patient to perform all functional movements like swallowing, speech, grinning, pout and pursing the lips etc., (FIGURE 9). After 5 to 10 min the set impression was removed from the mouth. The neutral zone record was reoriented in the tentative jaw relation record in articulator (FIGURE 10). An index is made by using silicone putty to preserve the neutral zone (FIGURE 11A). The compound record was replaced with modelling wax with putty index as a guide (FIGURE 11B) and teeth were arranged in neutral zone (FIGURE 11C). And evaluated for occlusion, phonetics, aesthetics, speech and fit was confirmed intraorally. Denture was processed in heat cure acrylic resin. Adequate relief was provided in the intaglio surface of denture over the tooth region, silicon adhesives painted and a permanent soft liner was adapted to occupy the space between denture and tooth region. The denture was delivered (FIGURE 12) and post insertion instructions given to the patient. Patient was absolutely satisfied with aesthetics and function of denture during followup visits. Frequent follow up of the patient was advised to adjust and reline the denture in case need arises

DISCUSSION:

Papillon-Lefèvre syndrome (PLS) is an extremely rare genetic disorder that typically observed from approximately one to four years of age (7). In 1924, Papillon and Lefèvre reported the case of two siblings, who were the offsprings of a first cousin mating, and the condition described in their paper characterised two hallmarks which were generalized aggressive periodontitis accompanied by severe alveolar bone destruction, leading to early loss of deciduous and permanent dentitions prematurely and diffuse transgradient palmoplantar keratosis. During the process of development and eruption, the deciduous teeth proceed normally with normal sequence at expected ages and with the teeth being of normal form and structure, but their eruption is associated with gingival inflammation and subsequent rapid destruction of the periodontium. The resulting periodontitis is usually unresponsive to traditional periodontal treatment modalities. After exfoliation of deciduous and permanent teeth, the inflammation subsides and gingiva appears healthy(1). Additional findings include increased susceptibility to systemic and cutaneous infections, such as skin abscesses, furunculosis, hidradenitis suppurativa, and respiratory tract infections. Patients may also sustain nail dystrophies, follicular hyperkeratosis, intra-cranial calcifications, and malodorous hyperhidrosis, Radiographic findings involves a classic presentation of "floating in air appearance" of remaining teeth (8). The exact cause of PLS is not known, but it is believed as an autosomal recessive disorder with a gene frequency of 0.001. Genetic analysis has mapped the major gene locus to chromosome 11q14.1- q14.3 with mutation and loss of function of cathepsin C gene in the homozygotes of PLS. The major risk factor of PLS is associated with Consanguinity (9), and various articles published in the litrature supported the occurence of PLS cases in the same family (10)(11)(12). There is no ultimate treatment exists for the prevention or management of periodontitis associated with this syndrome. Inspite, a strict oral hygiene maintenance, scaling and root planning along with suitable antibiotic therapy may improve the situation(13). It can adversely affect growing children psychologically, socially, and aesthetically.

To distinguish between PLS and other syndromes associated with palmoplantar hyperkeratosis; evidence of severe, aggressive, and early-onset destructive periodontitis has to be noted. Differential diagnosis with Related syndromes include Haim-Munk syndrome, Prepubertal periodontitis, palmoplantar keratoderma, Unna-Thost syndrome, Schopf-Schulz-Passarge syndrome, Mal de Meleda. All the above conditions show periodontal destruction and premature loss of teeth.

Haim-Munk syndrome (HMS) is also known as "palmoplantar keratoderma with periodontitis and arachnodactyly and acroosteolysis" or "Cochin Jewish disorder" which is associated with severe, aggressive, and early onset periodontitis and it is unique to PLS. It manifests with scaly, red, and thickened patches of the skin of soles of the feet and palms of the hands, pes planus (flat foot), arachnodactyly (a peculiar deformity of terminal phalanges of hands and feet), acroosteolysis, onychogryphosis (atrophic changes of nails), Also shows radiographic deformity of fingers, and recurrent abscess formations (14). In this case report there is no skeletal deformity on radiographic examination.

Prepubertal periodontitis is similar to PLS, characterized by localized or generalized rapidly progressive early-onset periodontitis. The radiographic findings revels alveolar bone loss in prepubertal periodontitis, but it is differentiated from PLS by the absence of associated palmoplantar keratoderma. In contrast, palmoplantar keratoderma is seen in Unna-Thost syndrome and Meleda disease, which presents with skin manifestations but not the oral changes. Schopf Schulz Passarge syndrome is a rare inherited disorder characterized by the development of dry scaly skin on the palms of the hands and the soles of the feet (palmoplantar keratosis), fragile nails, and the development of cysts on the eyelids(15).

In this case report, the final diagnosis of PLS was confirmed by a thorough clinical evaluation that includes a detailed patient history, clinical evaluation of characteristic physical findings and radiological assessment. The treatment was planned with a multidisciplinary team approach involving paediatricians,

periodontists, dermatologists, prosthodontists and psychologists. The dermatological manifestations are often treated with topical lubricants, keratolytic agents, such as salicylic acid or lactic acid, corticosteroids and antibiotics.

According to Muller De Van statement, "The preservation of that which remains is of utmost importance and not the meticulous replacement of that which has been lost" Extraction of the remaining teeth was avoided in this case. The treatment comprised oral prophylaxis, scaling and root planning followed by rehabilitation with complete removable overlay denture in both the arches with neutral zone concept was planned. Neutral zone technique was recorded due to extensively resorbed mandibular ridge. Treatment may be more favourable if it is started during the eruption and maintained during the development of the permanent teeth.

CONCLUSION:

Papillon–Lefèvre syndrome can badly affect the aesthetic, functional, psychological and social well-being of the patient at early age. A multidisciplinary approach is imperative for the care of patients with PLS. The primary aim of the case was to achieve functional and aesthetic rehabilitation with good prognosis. The dermatological presentations are often treated with topical lubricants, corticosteroids, keratolytic agents, such as salicylic acid or lactic acid and antibiotics. A proper oral hygiene with concomitant use of chlorhexidine mouth rinses should also be recommended to patients in order to slow the aggressive progression of periodontitis of remaining tooth.

FIGURE 1:

Intraoral examination: Missing permanent teeth in upper and lower arches, remaining only the third molars.

FIGURE 2:

Keratinization involving the soles of feet and palms with Sharply demarcated hyperkeratotic and scaly plaques on dorsal surfaces of the hands

FIGURE 3:

Orthopantomograph showing severe loss of alveolar bone in both arches and missing permanent teeth in upper and lower arches, remaining only the third molars.

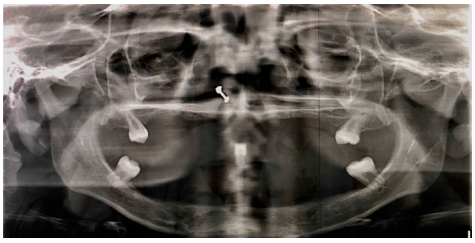


FIGURE 4: A 3D view of CBCT imaging shows a classic presentation of "floating in air" appearance

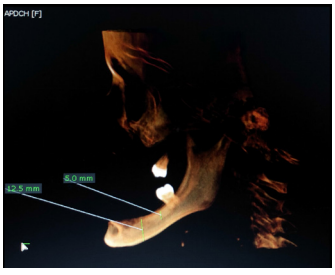


FIGURE 5:

Border moulding made using greenstick compound and secondary impression made using light body addition silicone

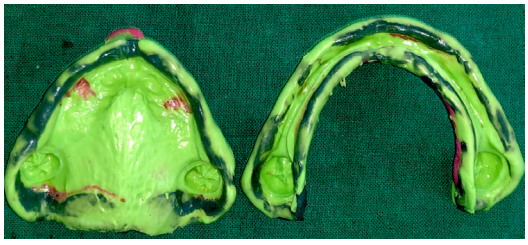


FIGURE 6: Master cast

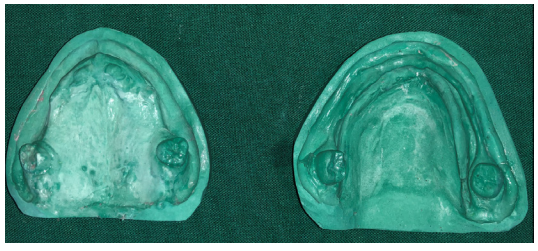


FIGURE 7: Jaw relation

FIGURE 8: retentive loops for recording Neutral zone

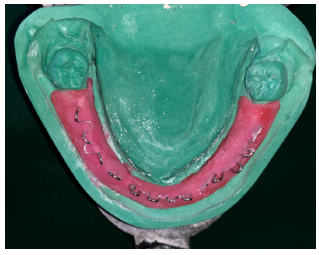


FIGURE 9:
Neutral zone recorded in low fusing green stick compound

FIGURE 10:
mounted cast with mandibular neutral zone record.

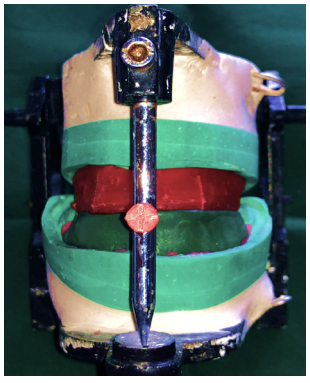


FIGURE 11:
A) Buccal and lingual Silicone Putty index of the neutral zone
B) Compound occlusal rim replaced with modelling wax
C) Teeth arrangement in Neutral zone using putty index as guide

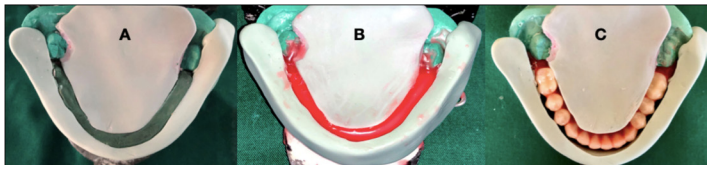


FIGURE 12: Denture insertion

FIGURE 13: Pre operative

FIGURE 14: Post operative

REFERENCES:

1. Papillon MM, Lefevre P. Two cases of symmetrically familial palmar and plantar hyperkeratosis (Meleda disease) within brother and sister combined with severe dental alterations in both cases. Bull Soc Fr Dermatol Syphiligr. 1924;31(2):82-7.
2. Nagy N, Vályi P, Csoma Z, Sulák A, Tripolszki K, Farkas K, Paschali E, Papp F, Tóth L, Fábos B, Kemény L. CTSC and Papillon–Lefèvre syndrome: detection of recurrent mutations in H ungarian patients, a review of published variants and database update. Molecular genetics & genomic medicine. 2014 May;2(3):21728.
3. Hart TC, Hart PS, Bowden DW, Michalec MD, Callison SA, Walker SJ, Zhang Y, Firatli E.Mutations of the cathepsin C gene are responsible for Papillon Lefevre syndrome. Journal of medical genetics. 1999 Dec 1;36(12):881-7.
4. Hart PS, Zhang Y, Firatli E, Uygur C, Lotfazar M, Michalec MD, Marks JJ, Lu X, Coates BJ, Seow WK, Marshall R. Identification of cathepsin C mutations in ethnically diverse PapillonLefèvre syndrome patients. Journal of medical genetics. 2000 Dec 1;37(12):927-32.
5. Lundgren T, Renvert S. Periodontal treatment of patients with Papillon Lefèvre syndrome: a 3-year follow-up. Journal of clinical periodontology. 2004 Nov;31(11):933-8.
6. Fardal O, Drangsholt E, Olsen I. Palmar plantar keratosis and unusual periodontal findings. J Clin Periodontal 1998;25:181–4, PMID: 9495618.
7. Haneke E. The Papillon-Lefèvre syndrome: Keratosis palmoplantaris with periodontopathy. Human genetics. 1979 Sep 1;51(1):1-35.
8. Abou Chedid JC, Salameh M, El-Outa A, Noujeim ZE. Papillon-Lefèvre Syndrome: diagnosis, dental management, and a case report. Case reports in dentistry. 2019 Apr 21;2019.
9. Shah AF, Tangade P, Agarwal S. Papillon–Lefevre syndrome: Reporting consanguinity as a risk factor. The Saudi dental journal. 2014 Jul 1;26(3):12631.
10. Pareek SS, Al-Aska AK. Papillon-Lefevre Syndrome: A Report of Six Cases in One Family. International journal of dermatology. 1986 Dec;25(10):638-41.
11. Kord Valeshabad A, Mazidi A, Kord Valeshabad R, Imani E, Kord H, Koohkan M, Sayinar Z, Al-Talib K. Papillon-Lefevre syndrome: a series of six cases in the same family. International Scholarly Research Notices. 2012;2012.
12. AlBarrak ZM, Alqarni AS, Chalisserry EP, Anil S. Papillon–Lefèvre syndrome: a series of five cases among siblings. Journal of medical case reports. 2016 Dec;10(1):1-6.
13. Ahmed B. Prosthodontic Rehabilitation of Papillon Lefevre Syndrome. J Coll Phys Surg Pak JCPSP. 2014 May 1;24(Suppl 2):S132-4.
14. Haim S, Munk J. Keratosis Palmo-Plantaris Congenita, With Periodontosis, Arachnodactyly And A Peculiar Deformity Of The Terminal Phalanges. British Journal Of Dermatology. 1965 Jan;77(1):42-54.
15. Brad WN, Douglas DD, Carl MA, Ferry EB. Chapter 4— Periodontal diseases. In Neville's textbook of oral pathology (3rd ed). Elsevier: St. Loius 2009;176781

MANAGEMENT OF DRUG INDUCED GINGIVAL ENLARGEMENT

[1.]Dr. Baalagopal.S , [2]Dr.Priyadurga.K , [3]Dr.Santhiya.R, [4]Dr.Parthiban, [5]Dr.Pradeep kumar.Y, [6]Dr. Sivasankari.T

[1,2,3]Post Graduate Student, [4] Reader, [5]Professor and HOD, [6]Professor
Department of Periodontics

Adhiparasakthi Dental College and Hospital, Melmaruvathur

Keywords :

Gingival enlargement, Gingivectomy

CORRESPONDING AUTHOR

Dr. Sivasankari.T
Professor, Department of Periodontics
Adhiparasakthi Dental College and Hospital, Melmaruvathur

CO-CORRESPONDING AUTHOR

Dr.Pradeep kumar.Y
Professor and HOD, Department of Periodontics

Adhiparasakthi Dental College and Hospital, Melmaruvathur

ABSTRACT

Gingival enlargement can occur by taking certain medications, leading to problems in speech, eating, masticatory functions and aesthetics. Anticonvulsants, calcium channel blockers and immunosuppressants are the most reported medications resulting in gingival enlargement.Appearance of gingival enlargement is clinically and histologically similar in these three drugs. Although their primary tissue is not similar, a review of the literature reveals their identical pharmacological mechanisms at cellular level and similar behavior in the secondary target tissue like gingiva. They are different in risk factors such as bacterial plaque, doses, patient age and gender, prescription and host genetics. This literature review evaluates the clinical appearance and histology, drug mechanisms, side effects, risk factors and treatment by these three drugs separately and in combination.

INTRODUCTION:

A common symptom of gingival diseases is gingival enlargement or overgrowth. Different forms of gingival enlargement exist based on etiologic factors and pathological changes, including autoimmune, drug-induced, and neoplastic enlargements, as well as enlargements associated with diseases or systemic disorders like plasma cell gingivitis and pyogenic granuloma [(1).] The position of plaque is a point of contention. According to some research, plaque is essential for the development of gingival enlargement, and the unreported plaque in edentulous areas backs this up. However, George Sam et al. found that gingival enlargement was associated with low inflammatory symptoms and good oral hygiene, casting doubt on the existence of bacterial plaque as a prerequisite [(2)]. Anticonvulsants, immunosuppressants, and calcium channel blockers are most common drugs linked to gingival enlargement[(2,3)]

Gingival enlargement caused by different medications has identical clinical and microscopic characteristics [(1).] Enlargement usually begins with interdental papillae, which are berry-like, rigid, light yellow, springy, and have a fine lobulated surface that does not bleed in the absence of inflammation. However, poor oral health often leads to secondary inflammation in the swollen gingiva, causing the gingiva to bleed. Gingival epithelium has acanthosis nigricans and swollen rete peg; thick collagenous masses, increased number of fibroblasts, and fresh blood vessels amorphous matrix connective tissue can be seen histopathologically.

ANTICONVULSANTS:

These are medications that are used to treat seizures.

Phenytoin ,valproic acid phenobarbitone, vigabatrin,an carbamazepine are commonly used anticonvulsants. Gingival enlargement was registered in 50% of phenytoin users, 5% of phenobarbitone users, and only 1% of the rest (4). The majority of studies have been performed on phenytoin because of the high incidence of phenytoin-associated gingival enlargement. Non-epileptic seizure regulation in head injuries, Reye's syndrome, neurotic pains, and dysrhythmias immune to lidocaine, procainamide are among the conditions for which phenytoin is prescribed (5). Because of its efficacy, low cost, and widespread availability, phenytoin is the medication of choice (6). Kimball was the first to record phenytoin-related gingival enlargement in 1939

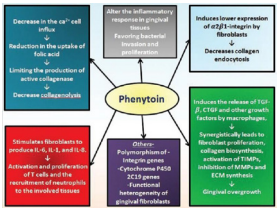
CLINICAL APPEARANCE:

- Gingival enlargement caused by phenytoin appears within 2-3 months and peaks after 12- 18 months
- Diffuse swelling of interdental papillae and coalesce leaving nodular appearance
- More in maxillary and mandibular anterior teeth

HISTOLOGY:

There is fibroblast proliferation histologically, but the fibroblast to collagen ratio is close to normal tissue [(2).]

Mechanisms of Action and Pathogenesis:



IMMUNOSUPPRESSANTS:

- The immunosuppressant cyclosporine has been known as a cause of gingival enlargement with 25-30% prevalence in adults and over 70% in children (4).
- Cyclosporine is administered to prevent transplant rejection and treat autoimmune diseases.
- Cyclosporine-induced gingival enlargement was first reported in 1983 by Rateitschak

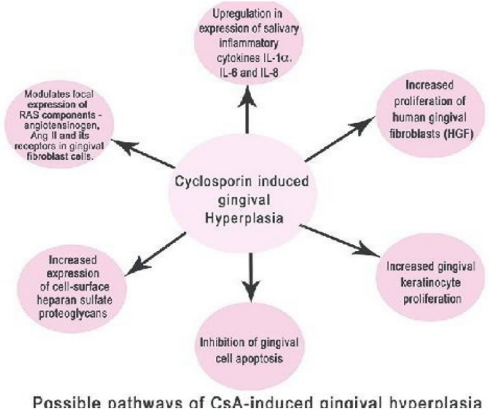
Clinical Appearance:

Pebbly or papillary cyclosporine-induced gingival enlargement is associated with the presence of hyphal candida invading the gingival epithelium. The gingiva of people taking cyclosporine is more hyperemic and more prone to bleeding on probing than that of people taking phenytoin.

Histopathology:

Gingival enlargement caused by cyclosporine is frequently seen in connective tissue, secularization, and focal inflammatory cells, especially plasma cells [7]. It is currently believed that gingival enlargement is caused solely by epithelial acanthosis and extracellular matrix aggregation, and that the connective tissue does not change in size[8].

Pathogenesis:



Possible pathways of CsA-induced gingival hyperplasia

CALCIUM CHANNELS BLOCKERS:

Nifedipine, felodipine, verapamil, diltiazem, amlodipine, and isradipine are calcium channel blockers. Gingival enlargement has been documented in patients taking nifedipine (6-15%), diltiazem (5-20%), verapamil (less than 5%), felodipine, and amlodipine (rarely), and isradipine (not yet) (4).Calcium channel blockers are used to treat cardiovascular disorders including hypertension, angina pectoris, coronary artery spasm, and arrhythmia by lowering the heart's workload, lowering systemic vascular resistance, increasing smooth muscle vasodilation, and lowering heart rate [2, 4]. In 1984, Lederman was the first to record Nifedipine-induced gingival enlargement.

Clinical Changes :

- Clinical changes appear 1-3 months after administration. Edentulous areas have not been seen however; it can affect the mucosa around the implant.
- Clinically the gingival enlargement resembles the enlargement caused by phenytoin in colour, texture

Changes in histopathology:

Gingival epithelial proliferation was found to be more responsible for gingival enlargement than connective tissue proliferation in Barak's study [9].

Pathogenesis:

- Stimulates cell proliferation & synthesis
- Stimulates - interleukin II - T cells / metabolites of testosterone– gingival fibroblasts- cellular proliferation and synthesis
- Calcium-dependent inhibitory effect on T cells -increase susceptibility to bacterial infection
- As compared to the polarized amlodipine, the lipophilic nifedipine penetrates the cells quickly

CONTRACEPTIVES:

Lynn was the first to record gingival enlargement linked to contraceptives in 1967. Contraceptives are not reported to cause gingival enlargement, despite case reports. The cumulative dosage will be 6-15 times higher than expected after a few months of administration, and the effects will vanish until the administration is stopped [11].

ERYTHROMYCIN:

An erythromycin-induced gingival enlargement was identified in one study [12]. Given the widespread use of erythromycin, however, this cannot be used to establish erythromycin as a gingival enlargement inducer.

RISK FACTORS:

1. Not all patients are at risk.
2. Studies have shown that there exceeds responders and non-responders
3. Some of the factors responsible for prevalence & severity of the gingival overgrowth

1. Age
2. Sex
3. Concominant medication
4. Drug variables
5. Genetic predisposition

Age:

1. Early studies on prevalence of phenytoin induced gingival overgrowth shown that teenagers, younger age, patients with poor oral hygiene are more prone to develop
2. Cyclosporin induced gingival enlargement in children was higher 52% when compared to the adults - (Daley 1994)
3. Calcium channel blockers – age is not applicable

Sex:

1. Hassell in 1981shown that phenytoin has no predilection.
2. Cyclosporine frequently affects male than females.
3. Calcium channel blocker affects male three times more than females.

Concomitant medication:

Nifedipine + cyclosporine increases prevalence not severity

Drug variables:

- Drug dosage
- Duration
- Serum concentration
- Salivary concentration

Dosage:

- Poor predictor
- More related to dose related to body's weight
- Baseline or threshold concentration- varies from individual to individual

Type of preparation:

Salivary concentration:

- Studies have shown that Phenytoin & Cyclosporine salivary concentration positive with gingival enlargement.
- High levels of nifedipine sequestered in the GCF, but only the plasma concentration of nifidipine was identified as the risk factor for the severity of the gingival changes

Genetic factors:

- Genetic predisposition - metabolism of phenytoin, cyclosporine and nifidipine - metabolized by hepatic cytochrome p450 enzymes
- Cytochrome p450 genes -polymorphism which results in interindividual variation in enzyme activity.
- This inherited variation in metabolism offending drug may influence the patient's serum and tissue concentration - gingival response, cytochrome 450 variation as risk factor
- Genetic marker has been investigated in relation to enlargement is the HLA
- One study reported that patient who expressed HLA DR1 are afforded some degree of protection against enlargement while HLA DR2 may increase the development of overgrowth
- HLA-B37 has been identified in patients – protective in preventing overgrowth

MANAGEMENT:

Treatment is determined by the medication used and the patient's clinical characteristics, and it can include non-surgical procedures as well as surgical treatments as a drug substitute.

Phase -I Therapy:

Oral hygiene guidance, scaling and root planing, systemic antibiotics such as azithromycin and metronidazole, as well as chlorhexidine 2 times a day are all non-surgical treatment.

Phase II Therapy:

It includes gingivectomy/gingivoplasty or periodontal flap surgery

The surgical procedure used is determined by the size of the gingival enlargement, the presence of bone defects, and the distance between the pseudo pocket and the mucogingival base. Gingivectomy is indicated when there are less than six teeth involved, no bone abnormalities, and far pseudo pocket and mucogingival bases. Surgery, laser diode, carbon dioxide, or argon may all be used to replace gingivectomy. More than six teeth, bone lesions, and gingivectomy result in the removal of a significant amount of keratinized tissue are all signs of periodontal flap. The suggested post-operative follow-up is once in every three months for the first six months. Recurrence occurred in 40% of nifedipine and cyclosporine-induced gingival enlargements after 18 months. Early age, gingivitis, and a lack of frequent visits are all risk factors for recurrence. Chlorhexidine 0.12% twice a day will help avoid recurrence after surgery

Management by non surgical periodontal therapy followed by oral hygiene maintenance and administration of systemic antibiotics[13]:

Pre -op images **Post -op images**

Drug substitution:

Calcium channel blocker - Nifedipine is replaced with Isradipine, Captopril , Enalapril

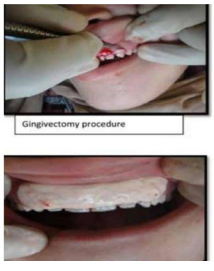
Phenytoin : Phenobarbital, Primidone, Carbamazepine ,Valproic acid Cyclosporin : Tacrolimus , Azathioprine

Management by laser:[14]

Pre -op

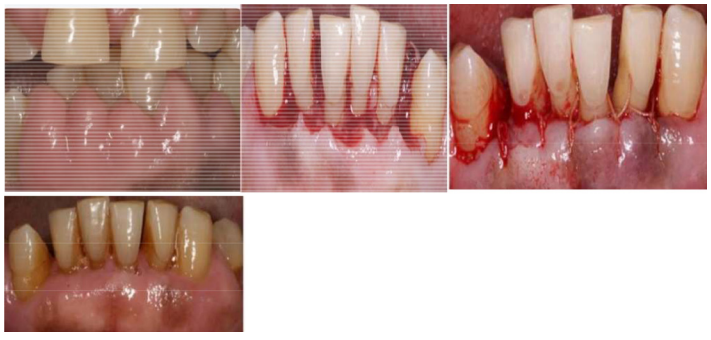
Post -op

Management by gingivectomy: [15]



Management by flap procedure:[16]

Pre -op and intra -op:



Post-op

Conclusion:

Gingival enlargement is multifactorial and complex in nature, which may be in response to various interaction between host and environment. Gingival overgrowth considerably reduce the quality of life and may result in serious emotional and social problems due to esthetics and function. Hence the prevention and treatment based on the understanding the cause and underlying pathologic changes

REFERENCES:

1. Newman T, Takei HH, Klokkevold P. Carranza. Carranza's clinical periodontology.
2. Taleghani F, Sheikhnejad H, Shidfar S, Hamzelouie E, Zohri Z. Drug induced gingival enlargement. J Chem Pharmaceutic Res. 2016;8(1):439-6.
3. Sam G, Sebastian SC. Nonsurgical management of nifedipine induced gingival overgrowth. Case reports in dentistry. 2014 Aug 3;2014.
4. Kataoka M, Kido JI, Shinohara Y, Nagata T. Drug-induced gingival overgrowth—a review. Biological and Pharmaceutical Bulletin. 2005;28(10):1817-21.
5. Taleghani F, Sheikhnejad H, Shidfar S, Hamzelouie E, Zohri Z. Drug induced gingival enlargement. J Chem Pharmaceutic Res. 2016;8(1):439-6.
6. Taleghani F, Sheikhnejad H, Shidfar S, Hamzelouie E, Zohri Z. Drug induced gingival enlargement. J Chem Pharmaceutic Res. 2016;8(1):439-6.
7. Hassell TM, Hefti AF. Drug-induced gingival overgrowth: old problem, new problem. Critical Reviews in Oral Biology & Medicine. 1991 Jan;2(1):103-37.
8. Pisanty S, Shoshan S, Chajek T, Maftsir G, Sacks B, BenEzra D. The effect of cyclosporin A (CsA) treatment on gingival tissue of patients with Behcet's disease. Journal of periodontology. 1988 Sep;59(9):599 603.
9. Barak S, Engelberg IS, Hiss J. Gingival hyperplasia caused by nifedipine: Histopathologic findings. Journal of periodontology. 1987 Sep;58(9):639-42.
10. Wahlstrom E, Zamora JU, Teichman S. Improvement in cyclosporine-associated gingival hyperplasia with azithromycin therapy. New England Journal of Medicine. 1995 Mar 16;332(11):753-4.
11. Brunet L, Miranda J, Farré M, Berini L, Mendieta C. Gingival enlargement induced by drugs. Drug safety. 1996 Sep;15(3):219-31.
12. Brunet L, Miranda J, Farré M, Berini L, Mendieta C. Gingival enlargement induced by drugs. Drug safety. 1996 Sep;15(3):219-31.
13. Nonsurgical Management of Amlodipine Induced Gingival Enlargement – A Case Report." International Journal of Dental Sciences and Research 2.6 (2014):137-140.
14. Saleem M, Deepa D. Management of amlodipine-induced gingival enlargement by diode laser. J Curr Res Sci Med 2016;2:49-52
15. Surgical management of gingival enlargement: a case series,int j cur res rev | vol 6 • issue 15 • august 2014
16. Surgical Management of Drug-Induced Gingival Overgrowth (DIGO) Using A Periodontal Resective Flap Procedure: A Case Report -Adv Dent & Oral Health 9(5): ADOH.MS.ID.555775 (2018)

ADENOID CYSTIC CARCINOMA OF MAXILLA - A CASE REPORT

[*]Dr. Nalinkumar .S, [1]Dr. Durairaj.D, [2]Dr. Sureshkumar .G, [3]Dr. James Antony Bhagat .M,

[3]Dr. Raj Prakash .B, [4]Dr. Nathiya .B, [4]Dr. Annapoorani .D

[1]Post Graduate Student, [1]Professor & HOD, [2]Professor, [3]Reader, [4]Senior Lecturer, Department of Oral and Maxillofacial Surgery

Adhiparasakthi dental college and hospital, Melmaruvathur

Keywords :

Adenoid cystic carcinoma, Weber Fergusson Incision, Maxillectomy, Perineural Spread.

Corresponding Author :

Dr. Nalinkumar .S,

Post Graduate Student,

Department of Oral and Maxillofacial Surgery

Adhiparasakthi dental college and hospital, Melmaruvathur

Abstract

Adenoid cystic carcinoma is a rare malignant tumour of oral cavity which arises from minor salivary gland and commonly present in palate. Common reason for late recurrence is distinct metastasis and perineural invasion. So that patient has to be kept under long term followup. Here we reported a case of adenoid cystic carcinoma of right palate with involvement of maxillary sinus. Discussed about Histopathological types and it's prognosis. The aim of the report is to present a case of Adenois cystic carcinoma with a clinical presentation of palatal swelling and how it was managed clinically.

INTRODUCTION

Adenoid cystic carcinoma (ACC) is a rare malignant tumour of oral cavity and maxillofacial area which was first described by Theodar Bilroth in 1856 as "cylindroma." It mostly affects the minor salivary gland with a reported incidence of 2-4 % of all malignant tumours of the head and neck . Histopathologicaly, composed of small basaloid cells arranged in solid, tubercular, cribriform pattern.[1,2,3] Even though it appears as a benign lesion, it potentially has local invasion with late recurrence and distant metastasis. The prognosis of the disease depends on tumour size, histopathological nature, stage, neural invasion, lymph node involvement and margin status.[4] Surgical resection with clear margins is currently considered as the standard of care for a vast majority of patients with minor salivary gland tumors including ACCs. The aim of this report is to present a case of ACC with a clinical presentation of palatal swelling and how it was managed clinically.

CASE REPORT

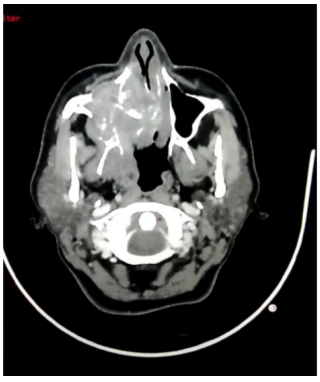
A 38 years old female patient reported to the Department of Oral and Maxillofacial Surgery with chief complaint of swelling in the right side of upper jaw for past 1 month, the swelling is slow growing with gradually increasing in size , difficulty during mastication and in phonation. The patient did not have any significant medical history, and there was no history of fever and unexplained weight loss since the observation of the swelling by the patient

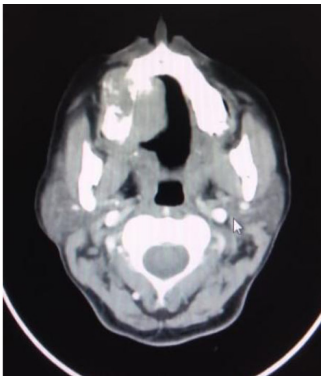
Intra oral examination revealed hard diffuse swelling measuring 6*5cm in the palate extending anteriorly from 13 to 18 region posteriorly . Medially the swelling crossed the midline. On the buccal aspect a localized swelling measuring 2*3 cm which is hard in consistency attached to the submucosa and underlying bone with Obliteration of buccal vestibule noted in {noted in repeated} relation to 15 – 18 region.{Fig:1a} Tender on palpation in the right zygomaticomaxillary buttress region, paraesthesia over the right nasolabial fold, skin appear normal and pinchable. Lymph node examination wasn't significant in relation to Level I to IV nodes . Orthopantomograph revealed moth eaten radiolucency in the right maxilla involving alveolus, maxillary sinus with root resorption seen in right second premolar and right second molar. (Fig 1b)

Fig: 1a- Swelling seen in the right side of the hard palate, Fig: 1b- radiolucency seen in the right maxillary alveolus , maxillary sinus with root resorption seen in right second premolar and right second molar.

CECT reveals radiopaque mass involving the entire right maxillary sinus with extensive bony erosion of right anterior wall of maxilla maxillary alveolus, right lateral wall of nose, posterior wall of maxilla with intact pterygoid plates and the radiopaque mass crossing the midline.{Fig: 2a, 2b}

Fig : 2a, 2b- Cross section of CECT of head and neck reveals radiopaque mass in the right maxillary sinus with bony erosion of right maxilla, right lateral wall of nose. Radiopaque mass crossing the midline.





SURGICAL PROCEDURE

Incisional biopsy was done under local anaesthesia. Crevicular incision was placed from 13 to 17 with the releasing incision placed well over the sound alveolus of maxilla in relation to 13. Mucoperiosteal flap elevated and biopsy done from tumor mass within the maxillary sinus. Complete destruction of the lateral maxillary wall was evident. Biopsy report revealed histologically as Adenoid cystic carcinoma.

Counselling was given about the disease status, long term follow up and need for adjuvant radiotherapy was explained to the patient. Planned for resection of right maxilla and palate with 1 to 1.5 cm clearance around the tumor. After all routine preoperative investigations, preanesthetic fitness ,consent was obtained and the patient was taken up for surgery under general anesthesia. Left naso-endotracheal intubation done under GA. Standard surgical draping procedure followed. 2% lignocaine with 1:80000 adrenaline was injected in the right buccal vestibule, infra orbital region. Using BP blade no. 15, the Weber–Fergusson's incision with Dieffenbach's modification is placed. Upper lip is divided along the left philtrum column and incision continued along the base of the nose following the anatomical margins of the nose. Lateral to the nose beyond the alar cartilage the nasal bone was palpated and the incision was placed over the nasal bone such that the flap margins rest on sound bone after the surgical resection. Since the infra orbital rim was planned to be preserved the lateral extension was placed as a standard infra orbital incision.{Fig 3a,3b} Intraorally incision splits into buccal extension and palatal extension. Palatal incision is placed based on the amount of surgical clearance planned, a margin of 1 to 1.5 cm was planned making sure not to invade into the tumor while resection. Buccal incision placed along the vestibular margin with careful dissection along the posterior maxilla such that tumor is not invaded into.

Fig 3a-Incision marking of Weber–Fergusson's incision with Dieffenbach's modification, Fig 3b- tumor lesion in the right maxillary region, Fig 3c – reveals the tumour resected maxilla.

Then radical surgery was done to remove the lesion in the area of right maxilla, maxillary sinus, with preservation of floor of the orbit{Fig 3c,4a,4b}. Then the lesion was sent to histopathological study. Fabricated palatal obturator was placed in position to maintain the facial width {fig 4c} and as a temporary barrier to separate the nasal cavity, maxillary sinus from the oral cavity. The defect was almost filled with a impression compound which was adapted to the contours of the defect and fixed to the obturator by means of the stainless steel hooks embedded within the obturator. Histopathological report shows the lesion is cribriform type and has clear margin. Then the patient was referred to radiotherapy due to the possible neural spread which is charecteristic of ACC.

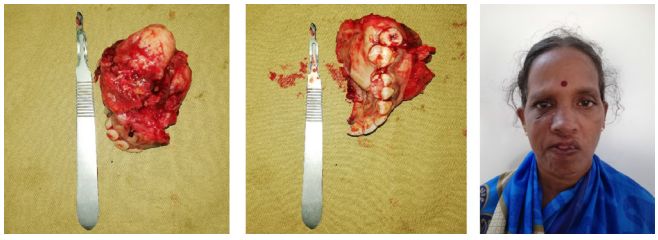


Fig 4a, 4b - lesion resected from the midface, Fig 4c -Post op profile picture of patient taken after 4weeks

DISCUSSION

ACC is a rare malignant neoplasm of salivary glands of the head and neck region. However, although major and minor salivary glands are affected by this tumor, 50%–70% of cases are presented in minor salivary glands [2, 3]. ACC affects both males and females, without any gender predilection, especially in their fifth to seventh decades of life [4]. Although a study by Gill and Frattali, 2015, reported slight female predominance, Gondivkar et al., 2011, mentioned that there was no gender predominance. [6,7]

The histopathological subtypes of ACCs are classified into 3 distinct patterns: tubular/tubuloductal, cribriform, and solid subtype. The cribriform subtype is the most common whereas the solid subtype is the least common. Prognosis of the solid subtype is the worst whereas that of the tubular subtype is the better.The tubular subtype is difficult to interpret because some physicians believe it to be similar to the cribriform subtype in behavior. The cribriform subtype contains clusters and nests of epithelial cells with holes (spaces) whereas the solid subtype contains tumor cells arranged in nests with larger basaloid cells, pleomorphism, and prevalent mitoses. All 3 types have a tendency for perineural invasion.[8]

Garden AS et al., studied the influence of positive resection margins and nerve invasion in 198 patients of adenoid cystic carcinoma. They stated that perineural invasion is associated with an increased rate of local failure.[9]

Avery CME et al., conducted a retrospective study of 15 cases of adenoid cystic carcinoma about the influence of combined treatment on adenoid cystic carcinoma and concluded that combination treatment with both surgery and radiotherapy has improved the control of local disease.[10]

Beckhardt RN et al., over a period of 46 years reviewed 116 malignant minor salivary gland tumors and stated that grade 3 tumor histology, tumor size greater than 3 cm, perineural invasion, bone invasion and positive surgical margins were associated with decreased survival. Salivary gland tumours are best to have late recurrences.[11]

In summary, ACC located in the palate is usually detected and diagnosed at an advanced stage. Achieving a microscopically complete resection for patients with ACC of intraoral minor salivary gland is surgically challenging. An elective neck dissection is suggested for patients with clinically positive lymph nodes or locally advanced tumours, especially those undergoing

microvascular reconstruction. An initial tumour size >4 cm and positive surgical margins have a significant impact on tumour recurrence.[12,13]

Based on these recommendations treatment was planned for wide local resection aiming for negative histological margins, radiotherapy for potential control of tumor spread via neural invasion and long term follow up was adviced.

Conclusion

Adenoid cystic carcinoma is a characteristic tumor of minor salivary glands with most common site of occurrence in the hard palate, with the involvement of maxillary sinus causing worsening of its prognosis. A combination of surgery followed by radiotherapy is highly recommended to control the local disease and limit distant metastasis. However long term follow up is required.

REFERENCES:

1. S. He, P. Li, Q. Zhong et al., "Clinicopathologic and prognostic factors in adenoid cystic carcinoma of head and neck minor salivary glands: A clinical analysis of 130 cases," American Journal of Otolaryngology, vol. 38, no. 2, pp. 157–162, 2017.
2. B. Monteiro, R. Grempel, D. Gomes, G. Godoy, and M. Miguel, "Adenoid cystic carcinoma mimicking an oroantral fistula: a case report," International Archives of Otorhinolaryngology, vol. 18, no. 2, pp. 221–225, 2014.
3. Rahmani K, Taghipour Zahir S, Baghi Yazdi M, Navabazam A. Aggressive adenoid cystic carcinoma of maxillary sinus in a 43-year-old male: Rare case report and review of literature. Case reports in medicine. 2017 Sep 28;2017.
4. N. S. Chundru, R. Amudala, P. Thankappan, and C. Nagaraju, "Adenoid cystic carcinoma of palate: a case report and review of literature," Dental Research Journal, vol. 10, no. 2, pp. 274–278, 2013.
5. M. F. Andrade, P. R. De Faria, S. V. Cardoso et al., "Adenoid cystic carcinoma of the maxillary sinus: a clinical-pathological report of 10 years of experience from a single institution," International Journal of Oral and Maxillofacial Surgery, vol. 43, no. 11, pp. 1313–1318, 2014.
6. K. S. Gill and M. A. Frattali, "An unusual presentation of adenoid cystic carcinoma," Case Reports in Otolaryngology, vol. 2015, Article ID 826436, 4 pages, 2015.
7. S. M. Gondivkar, A. R. Gadbail, R. Chole, and R. V. Parikh, "Adenoid cystic carcinoma: a rare clinical entity and literature review," Oral Oncology, vol. 47, no. 4, pp. 231–236, 2011.
8. Kato H, Kanematsu M, Sakurai K, Mizuta K, Aoki M, Hirose Y, Kawaguchi S, Fujita A, Ikeda K, Kanda T. Adenoid cystic carcinoma of the maxillary sinus: CT and MR imaging findings. Japanese journal of radiology. 2013 Nov 1;31(11):744-9.
9. Garden AS, Weber RS, Morrison WH, Ang KK, Peters LJ. The influence of positive margins and nerve invasion in adenoid cystic carcinoma of the head and neck treated with surgery and radiation. Int J Radiat Oncol Biol phys 1995; 32 (3): 619-26.
10. Avery CME, Moody AB, McKinna FE, Taylor J, Henk JM, Langdon JD. Combined treatment of adenoid cystic carcinoma of the salivary glands. Int J Oral Maxillofac Surg 2000; 29: 277-79.
11. Bechardt RN, Weber RS, Zane R, Garden AS, Wolf P, Carrrillo R, Luna MA. Minor salivary gland tumors of the palate: Clinical and pathologic correlates of outcome. Laryngoscope 1995; 105(11): 1155-60.
12. He JF, Lin Y, Wang B, Zhu WY, Wei D, Zhu HY. Analysis of the clinicopathological characteristics and prognosis of adenoid cystic carcinoma of the intraoral minor salivary glands: a retrospective study of 40 cases. International journal of oral and maxillofacial surgery. 2021 Apr 1;50(4):444-50.
13. Moratin J, Ledermann A, Schulz AD, Metzger K, Ristow O, Hofele C, Engel M, Hoffmann J, Freier K, Lang K, Adeberg S. Neck involvement and disease recurrence in adenoid cystic carcinoma of the minor salivary glands: the role of surgery in primary and progressive disease. International Journal of Oral and Maxillofacial Surgery. 2021 Apr 1;50(4):423-30.

SHORT COMMUNICATION - "ANTIBIOTIC STEWARDSHIP – AN INDIAN DENTAL PERSPECTIVE"

[1]Dr.Ravisankar.B, , [2]Dr.Umesh.K , [3]Dr.Muthukaruppaiah, [4]Dr.Sangeeta, [5]Dr.Dheeptha Sri.S

[1]Post Graduate Student Department Of Public Health Dentistry , Best Dental Sciences College And Hospital Madurai

[2]Head Of The Department, Departmentof Public Health Dentistry , Best Dental Sciences College And Hospital Madurai

[3]Professor Departmentof Public Health Dentistry , Best Dental Sciences College And Hospital Madurai

[4]Chavan Reader Department Of Public Health Dentistry , Best Dental Sciences College And Hospital Madurai

[5]Clinical Practitioner Aadhee Dental Care, Pollachi

CORRESPONDING AUTHOR

Dr.Ravisankar.B

Best Dental Sciences College And Hospital

Ultra Nagar, Madurai 625104

Phone:+919566034661

Email: Ravisure35@Gmail.com

Keywords :

Antimicrobial resistance, Antibiotic stewardship, Dentistry.

Conflicts of interest and Funding

All the authors exhibit no conflicts of interest and funding for the research.

ABSTRACT

India has a huge burden of dental diseases and management of some of these warrants by use of antibiotics. However over the counter sale and misuse of antibiotics in situations when they are not needed still persists as a result the field of dentistry also experiences a fear of rising trend in antimicrobial resistance in clinic, hospitals and communities which is a major public health crisis looming large. In order to find a solution for developing resistance an effective infection control and antimicrobial stewardship program are pivotal in reducing the antimicrobial resistance burden in all health care settings including the dental practice. This paper analyses the possible solutions to overcome the barriers and promote effective implementation of Antibiotic Stewardship programs in dentistry.

ABBREVIATIONS

1. Centre for Disease Control and Prevention (CDC)
2. Antimicrobial stewardship (AMS)
3. Antimicrobial Stewardship Program (ASP)
4. Antimicrobial Microbial Resistance (AMR)

Globally the emergence of antimicrobial resistance exists as a challenging factor due to the lack of new antibiotics in a streamline and impact of infections caused by multidrug resistant pathogens1. Wide spread of antimicrobial resistance threatens to push back to the pre antibiotic era and it should therefore be a wakeup call for all the health care personnel including the dentists. Antimicrobial resistance increases the cost of health care with lengthier stays in hospitals and more intensive care and also is considered to mutilate the gains of Millennium Development Goals at risk and endangers achievement of the Sustainable Development Goals. Antimicrobial resistant-microbes are found in people, animals, food, and the environment (in water, soil and air). They can spread between people and animals, including from food of animal origin, and from person to person. Poor infection control, inadequate sanitary conditions and inappropriate food-handling encourage the spread of antimicrobial resistance. Microorganisms that develop antimicrobial resistance are sometimes referred to as superbugs2. The Centre for Disease Control and Prevention (CDC) estimates more than two million people are infected with antibiotic-resistant organisms, resulting in approximately 23000 deaths annually3.

Antimicrobial stewardship (AMS) refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobials by promoting the selection of the optimal antimicrobial regimen, dose, duration of therapy and route of administration4. The aim of the stewardship program is to achieve optimal clinical outcomes related to antimicrobial use with minimal toxicity and other adverse events; reduce health care costs for infections and limit the selection for antimicrobial strains. It is considered as one of the key strategies to prevent the emergence of antimicrobial resistance and decrease preventable healthcare-associated infections. The antimicrobial stewardship criterion requires that all healthcare services have an Antimicrobial Stewardship Program (ASP) in practice5.

In India development of AMR is because of wide-spread irrational use of antibiotics, poor infection control practices in hospitals, deficient sanitation, over-the-counter availability of drugs, poor compliance and frequent self-medication by patients, and the lack of monitoring by the government. Realizing the seriousness of the situation and to increase awareness regarding AMR, the World Health Organization declared that the theme for World Health Day, 2011, should focus on combating drug resistance4.

A survey of infection control programs in hospitals in India revealed that ASP was not available in more than 50% of the hospitals. Epstein JB et al in his survey found that dentists account for 7% of all antibiotic prescriptions in the world, with each dentist estimated to write an average of 4-5 prescriptions per week. Even though, this is small when compared to the number of prescriptions issued by medical specialists, antibiotics are among the most frequently prescribed drugs by dentists, who can therefore be said to significantly contribute to the global consumption of antibiotics. It has also been reported that dentists overuse or misuse antibiotics due to reasons such as lack of knowledge regarding the indications of antibiotics, for convenience, and to meet patients' expectations. Such irrational use paves the way for the development of antibiotic-resistant oral microbial flora6. Investigations has shown that oral microbes like Streptococcus spp, Prevotella spp, Haemophillus spp, Porphyromonas gingivalis, Aggregatibacter actinomycetem comitans and Actinomyces have developed resistance to Beta lactam, Cephalosporins and also Broad spectrum antibiotic groups. However beta lactamase antibiotics are still effective towards the oral microorganisms and metronidazole towards the anaerobes these antimicrobials should

be prescribed only in selected situations and preferably preceding with a culture sensitivity test to prevent the resistance developed against these drugs7.

This indicates that the time has come to stop the irrational use of antibiotic drugs in dental practices. When the source of infection is removed that hindrances the oral cavity the prescription of antibiotics should become less. Dentist must be aware before prescribing the drug and dosage about the evidence of systemic spread of the infection through investigations. Antimicrobial stewardship program implementation in Indian Dentistry has few barriers like lack of funding and human resource, lack of information technology, higher priorities, lack of awareness of administration and prescriber opposition8 (Fig 1).

Table 1 summarises the potential solutions to the above barriers in implementing ASP in Indian dentistry.

Any program to be successful requires community participation and also the health care professionals should commit themselves to explain the prescription to all the patients encountered. Education for the people about the over the counter sale adverse effects, use of medications provided only by the qualified persons, to avoid sharing of antibiotic drugs and never repeat the medications after the validity of the prescription gets over. The public should be strictly discouraged from self medication practices and from availing the over counter sale. This practice of prudent use of antimicrobials is termed as 'antimicrobial stewardship' and it is the need of the hour. A record of the antibiotics that have been prescribed has to be maintained, and signs of resistance among patients must be looked for and identified. A standard infection control protocol has to be maintained at all levels4.

Successful implementation of AMS requires dedicated partnership involving all members of AMS team and community healthcare providers to ensure that right drug is provided to the right patient, in the right time, in the right dose, by right route with minimal or no harm to the patient and future patients.

Concluding, implementation of AMS in dental practices and community health care facilities is of utmost importance in India. There is a need for encouraging research to assess impact of various components of AMS such as evaluation of educational activities, prescription practices, quantitative and qualitative antimicrobial use indicators, newer diagnostic tools, antimicrobial resistance patterns and health care expenditure.

LIST OF FIGURES AND TABLES

Figure 1 Barriers In Implementation of AMS in Dentistry

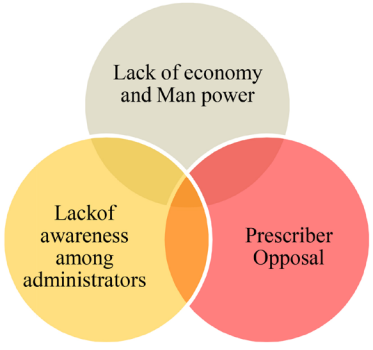


Table 1: Barriers in Implementation of AMS activities in Indian Dentistry and potential solutions.

Sno	Barriers	Solutions
1	Lack of economy	a) Simple clinical protocols development. b) Formulary restriction. c) Antibiotic cycling. d) Public private partnerships to give training and offer
		community surveillance studies.
2	Lack of Man power	a) Implementation of Infectious disease study protocols in Post graduate curriculum. b) Public private partnerships to involve dentist in remote and resources constrained settings. c) Active involvement of clinical pharmacist and clinical microbiologist.
3	Lack of awareness among administrators	a) Providing information and organizing discussions and workshops for clinical practitioners. b) Involving dentist in educational and program planning. c) AMS as a requirement for approval and renewal processes. d) Wider sharing of surveillance data on Antimicrobial resistance. e) AMS as a part of accreditation process.
		a. Prescriber education adapted to their background with separate divisions for Undergraduates, Postgraduates and Clinical practitioners. b. Evidence based guidelines c. Standard Antibiotic prescription chart which
4	Prescriber Opposal	includes diagnosis and incorporation of antimicrobials indications. d. Restricting fixed doses in combinations unless approved to be therapeutically beneficial e. Prescription audits f. Frequent reminders through electronic mailing services and Short Messaging Services (SMS). g. Use of innovative applications for education, information and evaluation purposes.

References

1. Walia, K. et al. Antibiotic stewardship activities in India: Current scenario International Journal of Infectious Diseases, Volume 21, 214
2. World Health Organization website: https://www.who.int/en/news-room/factsheets/detail/antimicrobial-resistance (Accessed on 26th July 2019).
3. Centers for Disease Control and Prevention. Core elements of antibiotic stewardship programs. Available at http://www.cdc.gov/getsmart/healthcare/implementation/core-elements.html Accessed on July 4, 2014
4. Mani G, Annadurai K, Danasekaran R. Antimicrobial Stewardship: An Indian Perspective. Online J Health Allied Scs. 2014;13(2):12. Available at URL: http:/www.ojhas.org/issue50/2014-2-12.html
5. McNeill V, Cruickshank M, Duguid M. Safer use of antimicrobials in hospitals: the value of antimicrobial usage data. MJA 2010;193(8): S114-S117
6. Epstein JB, Chong S, Le ND. A survey of antibiotic use in dentistry. J Am Dent Assoc 2000;131:1600-9
7. Ready D, Bedi R, Spratt DA, Mullany P, Wilson M. Prevalence, proportions, and identities of antibiotic-resistant bacteria in the oral microflora of healthy children. Microb Drug Resist 2003;9:367-72.
8. Manjunath B C . Antibiotic stewardship among dentists: The need of the hour Indian J Dent Res 2013 24:155-6.

SELF LIGATING BRACKETS IN ORTHODONTICS

[1.]Dr.S.Aswini Soundharya, [2.]Dr.Deepak Baskaran.T.B, [3.]Dr.V.Sudhakar, [4.]Dr.C.Ananda Devi, [5.]Dr.S.Muruganandam, [6.]Dr.G.Pandi

[1,2,6]Postgraduate student, [3]Professor and Head of the Department, [4] Reader, [5]Senior Lecturer

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

Keywords :

Self ligation, Damon, Speed

CORRESPONDING AUTHOR

Dr.V.Sudhakar
Professor and Head of the Department
Department of Orthodontics and Dentofacial Orthopedics,
Adhiparasakthi Dental College and Hospital, Melmaruvathur

ABSTRACT:

The speciality of Orthodontics has been evolving continuously since it's advent in the 19th century. Numerous bracket systems have been developing one after another in the aim of eliminating the drawbacks of each bracket system. Angle first developed the edgewise appliance, since then various bracket systems have been evolved. Self ligating bracket system is a bracket system which was first developed in 1935, though it has existed for a long period of time, this system has recently gained it's popularity. This review article gives a brief idea of the self ligating bracket system from it's evolution till the latest advancement developed in this system explaining the design, uniqueness and advantages of each and every design.

INTRODUCTION:

The speciality of Orthodontics has been evolving continuously since it's advent in the 19th century. Number of bracket systems were developed one after another in the aim of eliminating the drawbacks of each bracket system. Angle first developed the edgewise appliance, since then various bracket systems have been evolved. Self ligating bracket system is a bracket system which was first developed in 1935, though it has existed for a long period of time, this system has recently gained popularity. Self-ligating brackets, as the name implies needs no elastic or wire ligature as they have an inbuilt metal labial face, which can be opened and closed. Brackets of this type have existed for a surprisingly long time in orthodontics – the Russell Lock edgewise attachment being described by Stolzenberg in 1935.[1]Based on the bracket and arch wire interaction self ligating brackets have been classified into active and passive self ligating brackets

ACTIVE SELF-LIGATING BRACKETS:

The active type has a spring clip that encroaches on the slot from the labial/buccal aspect and presses against the archwire providing an active seating force on the archwire and ensuring engagement. [2]. Examples: In-Ovation, GAC International, SPEED, Time brackets.

Passive self- ligating brackets:

In the passive type, the clip does not press against the archwire. A sturdy latch / door entraps the archwire providing more room for the same. Examples: Damon, SmartClip, Oyster ESL

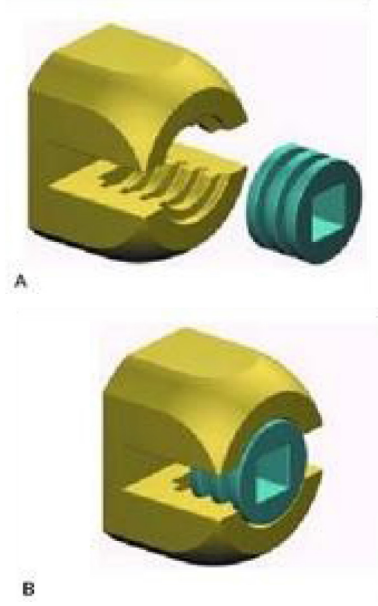
Advantages of self-ligating brackets:[3]

- Secure and robust ligation, requires less chair side assistance. There is reduced friction between bracket and archwire.
- Enhanced efficiency and ease of use
- Reduced overall treatment time
- Efficient alignment of severely irregular teeth
- Better plaque control and anchorage conservation
- Safe and more secure to the operator and patient.

Russell lock edgewise attachment:

To begin with Self-ligating sections were presented in the mid-1930s as the Russell attachment by Newyork orthodontic pioneer Dr. Stolzenberg1. The section had a flat head screw situated cozily a roundabout, threaded opening in the face of the bracket that allows for quick and Simple arch wire changes. Flat screw could be tightened or loosened with a little watch repair screw driver to get the desired tooth movement (Fig.1). Loosening the screw made the framework passive and permitted bodily translation on a round wire while tightening it made it active and gave root torquing on a square or a rectangular wire.

Figure 1: Russell attachment (A).open (B) close positions



Edgelock bracket:

The first modern passive self-ligating section (Edgelok-Ormco) was presented in the early 1970's which had a round body with a rigid labial sliding cap. An uncommon opening device was utilized to move the slide occlusally for archwire inclusion. At the point when the cap was shut over the archwire with Finger Pressure, the section opening was changed over to a tube. The inflexibility of this external fourth divider rendered the section "passive" in its transaction with the archwire. (Fig. 2)

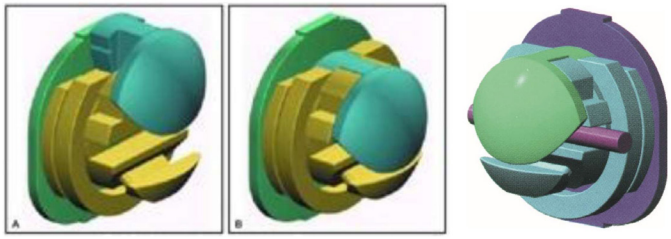


Figure 2: Edgelok appliance (A).open (B) close positions (C) With Arch Wire in place

Mobil-Lock brackets:

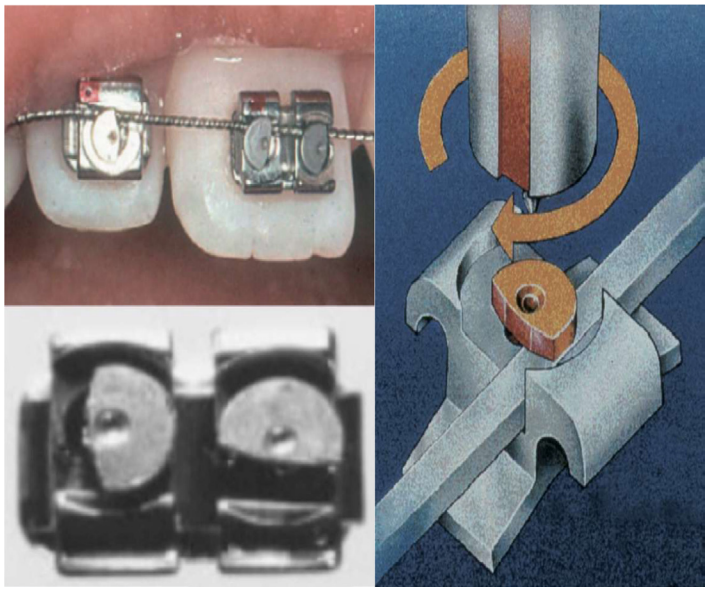


Figure 3: Self ligating –Mobil-Lock brackets

Mobil-Lock brackets (Forestadent Bernhard Foerster GmbH,)(Figure: 3) had a rotating cam that was turned with a "screwdriver," thus covering part of the labial surface of the slot. The wire could be tightly or loosely engaged by the degree of rotation of the cam. This ability to selectively lock a tooth to the archwire to prevent its movement is certainly theoretically desirable, but no other bracket has incorporated this feature. These brackets were well engineered by the standards of the day, but a major limitation was the narrowness of the resulting labial face of the slot. This gave very poor rotational control to the extent that upper incisor brackets were given twin cams to increase the effective bracket width. Another problem was the difficulty of access to open and close premolar brackets with the straight "screwdriver." [4]

Speed bracket

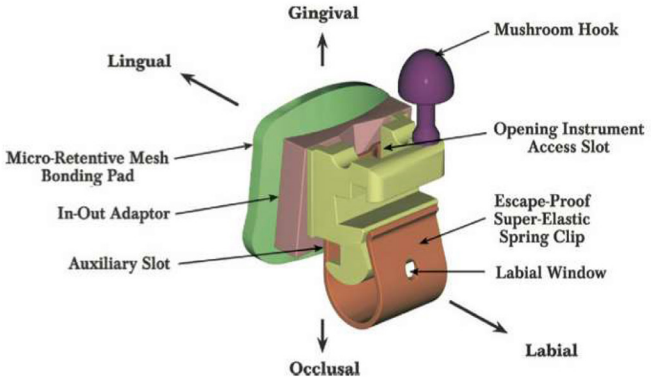


Figure 4: Self ligating – SPEED brackets

SPEED (Figure: 4) is a fully pre-adjusted miniaturized edgewise appliance developed in 1980 that uses superelastic nickel titanium and are specifically designed for each tooth.[4]

In the SPEED bracket system the arch wire is retained in the arch wire slot by means of a built-in, escape-proof, flexible spring clip. Unlike the traditional edgewise bracket, it requires no ligature tie, thus ostensibly reducing the frictional force generated by the more-established elastomeric or steel-tie ligature systems.

Activa bracket :

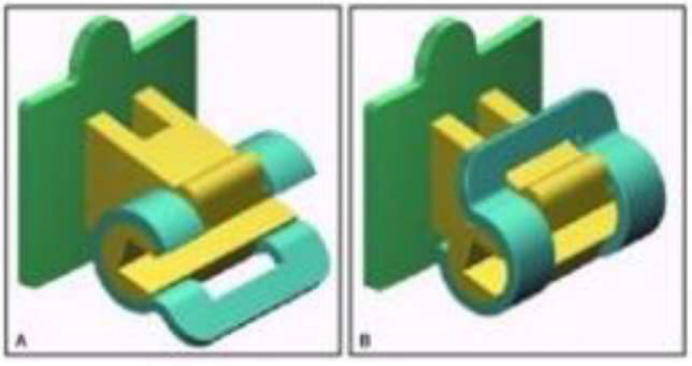
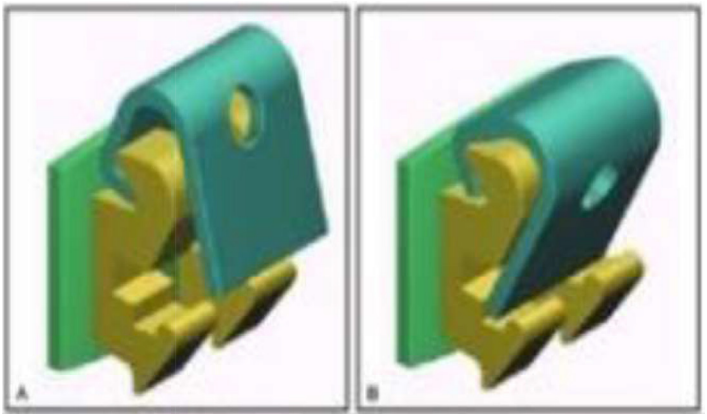
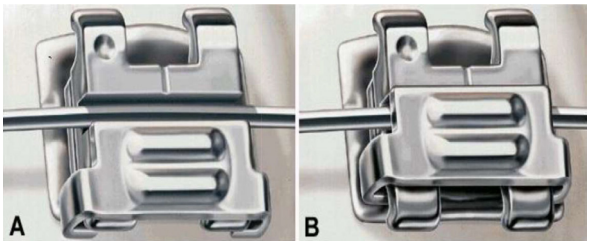
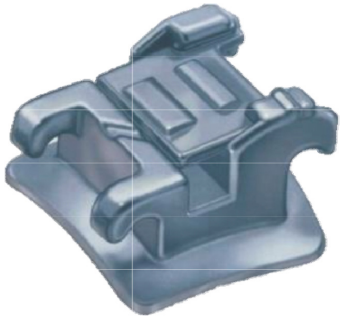
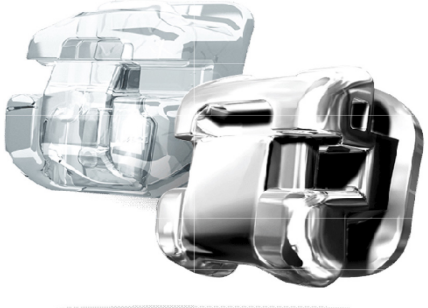


Figure 5:

Self ligating – Activa bracket (A) Open (B) Close



Damon generation	Image	Feature
Self ligating Damon SL bracket	Figure 7(A) Open (B) Close 	It had a slide, which moved vertically on the labial surface of a twin tie-wing bracket. The slide clicked into a positive open or shut position and opened in a downward direction in both jaws to give a full view of the slot.
Self ligating – Damon2 bracket		Vertical slide activity and U-shaped spring to control the opening and closing, however, put the slide inside the shelter of the tie-wings metal. Injection molding manufacture prevents breakage of door.[8]
Damon 3 Semi esthetic bracket		Upper tie wing and tooth colored composite resin base. Vertically placed chair molded clip behind the slide. Slide is shut with finger pressure. Opened with an exceptional opening apparatus.[9]
Damon 3MX brackets (2005)		Vertical slot behind the archwire slot into which preassembled click in auxiliary hooks can be added to any brackets as required.[10]
Damon Q bracket – Aesthetic and Metal variants		Smaller in all measurements than their predecessors. Horizontal and vertical slot. Spintec cool–opening tool. Damon Aesthetic bracket is a translucent passive self-ligation bracket with no metal insert. Bracket body and slide are made of strong polycrystalline alumina (PCA), an inert material impervious to staining. A NiTi spring shields the slide from isolating from the bracket.

Twinlock bracket:

In 1998, Dr. Jim Wildman4 developed TwinLock bracket. Its flat, rectangular slide, housed between the tie wings of an edgewise twin brackets. Passive slide moved gingivally with finger pressure to entrap the arch wire in a passive configuration & it is moved occlusally into the slot-open position with a universal scaler. Additional benefits include improved hygiene and patient comfort, smooth and clean labial surface. Drawback include mobility of the slide during opening and closing obsolete its commercial achievement (Fig.8).

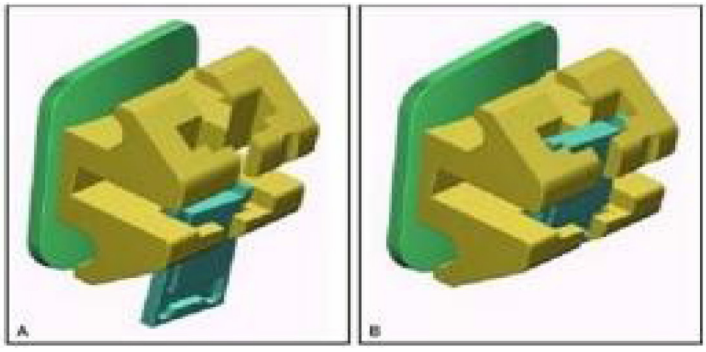


Figure 8: TwinLock bracket (A) Open (B) Close positions

GAC-In-Ovation bracket

Figure 9: Self ligating GAC In-Ovation

These brackets are introduced by Micheal C Alpern in 2000. These are very similar to speed brackets in concept and design, but are of:[11]they are manufactured with injection moulding technique with active cobalt chromiun clip with improved torque expression.horizontzl slotin the occlusal wings used to engage uprighting springs .super mesh base enchances retention .

In-Ovation Brackets

Self ligating bracket	Image	Feature
In-ovation R		Brackets are narrow in width than in-ovation brackets. This increase benefit of their use in small tooth, lower anteriors. impacted tooth, partially erupted tooth
In-ovation C Bracket		Esthetic innovation brackets
Innovation L MTM		With these lingual braces indirect bonding of anterior teeth (3-3) can be carried out
In-Ovation X (2017)		streamlined shape and a diminished profile and occlusal impression. There is an updated encased clip system and shut gingival bracket base will decrease the calculus develop that can hinder with clip function[Figure 29]. [14,17]

Gestenco Oyster Brackets:

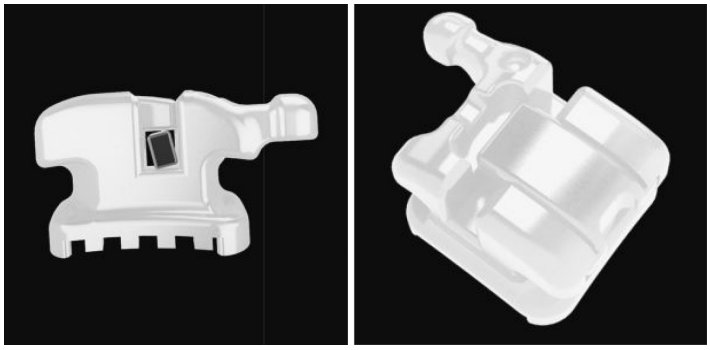


figure 10

This was the first translucent self ligating Bracket which was introduced in 2001. The Oyster bracket is semi-translucent polycarbonate bracket and it resists discoloring as it is made from strong, fiber glass reinforced composite polymer S. Use of Super elastic and Beta arch wires are strongly recommended. The unique snap-on cap allows arch wires to be placed easily, since the cap is convertible, it can be removed if necessary and the bracket will function as a regular twin. Mushroom Hook is present for auxiliary attachment. Its drawback was high friction that is equivalent to Conventional stainless steel brackets.

Adenta Evolution Brackets:

Figure 11: Adenta Evolution lingual bracket

It is developed by Dr. Hatto Loidl and C. Schendell (2001). Unlike many other self ligating brackets that only lock closed and no longer play a role, the Adenta self ligating lingual bracket was designed with non- locking rotating clip resulting in unique flexibility. Customized to hold even a non-situated wire safely with simply the appropriate measure of pressure, consistently pushing the archwire to the base of the bracket slot. This steady pressure delivers the torque, angulation and in-out control required to complete your cases rapidly and productively. Slot for horizontal arch wire inclusion in the front and one of a kind processed really One- piece bracket outline. Smooth round edges giving most noteworthy patient comfort and oral hygiene. The self- ligating clip is utilized as a bite plane quickening bite opening (Fig. 11)

Lancer Praxis Glide Brackets:

Figure 12:Lancer Praxis Glide Bracket

It is developed by Dr. Robert Lokar and team of Lancer Orthodontic engineers is truly an innovative low friction hybrid twin system, are manufactured using the latest robotic Technology. Praxis Glide is a proven torque-in-the base twin bracket, with a removable multiplanar clip. PraxisTSTM bracket is the latest mid aesthetic appliance now offered by LANCER (Fig. 12).bracket design and, low profile and ergonomics enhances levelling and aligning phase of orthodontic treatment .

Smart clip:

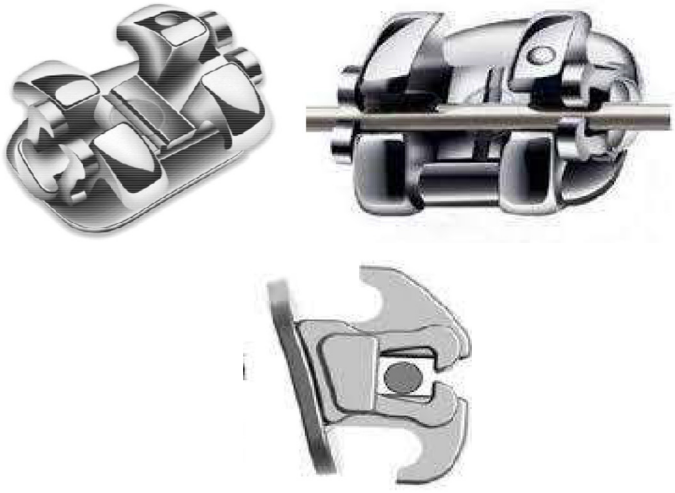


Figure 13: Self ligating – Smart Clip

It is introduced and developed (3M Unitek) by Gary L. Weinberger in 2004(Figure: 13). It consists of two nickel titanium clips, i.e., mesial and distal tie wings that open and close through elastic deformation of the material when the arch wire exerts a force on the clip. The bracket contains no moving door or latch. The feature of no moving doors or latches can eliminate problems such as sticking, spontaneous opening, or plaque build-up that are associated with other types of self-ligating brackets.[12]

Discovery brackets

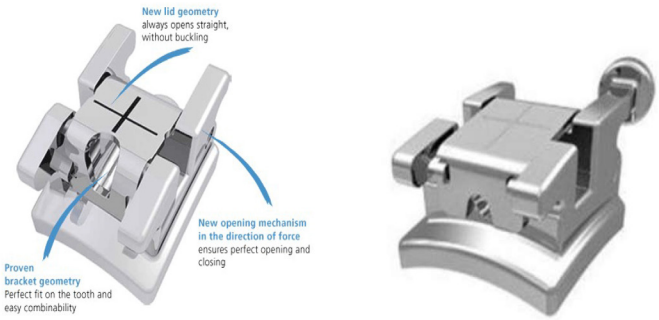


Figure 14: Self ligating – Discovery bracket

It is developed by Dentaurum in 2007 using CAD– CAM technology [Figure 20].[13]The design includes an integrated friction brake that prevents the cover closing accidentally when changing the arch. The computer-aided design of the cover also guarantees that the closure mechanism has the required reliability. Minimal size with easy locking mechanism and revised bracket geometry to ensure that the lids always open straight preventing buckling of the lid.

Functional And Cosmetic Excellence (FACE) Evolution system:

Face evolution incorporates a new concept into orthodontic biomechanics. It has 2 prescriptions. The working prescription comprises the temporary use of specific tubes and brackets in certain situations, in order to facilitate the achievement of certain tasks. The finishing prescription is the standard face evolution prescription, allowing for a good finish in a high percentage of cases, without the need to bend the archwires,

Double Slot Bracket (2014):

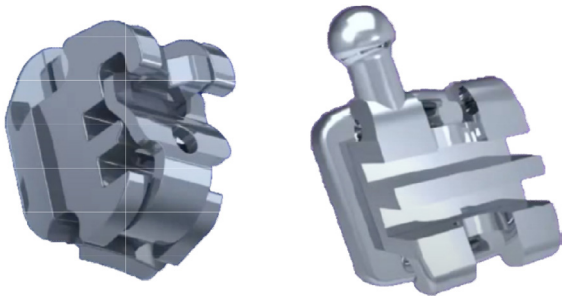
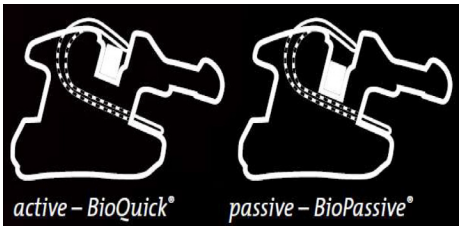


Figure 15: (a) Self ligating – Double slot bracket, (b) Conventional double slot bracket

Prof. Chune Avruch Janovich and Prof. Temístocles Uriate Zucchi developed the bracket in 2009 and patented it in 2014. The new bracket concept was designed with the intention to reduce anchorage demands for specific mechanics. There are two slots: The interactive slot and the passive slot. The bracket provides diverse options to choose from the slots depending upon the type of tooth movement and interaction with the slot.

Face evolution	Image	Fetures
Active system BioQuick® active Brackets		gives more control during later treatment stages, provides better three-dimensional control and fills the slot to produce a torque force that correctly positions the root and the crown
hybrid system BioQuick® + BioPassive® Brackets		Hybrid system provides the clinician with the best combination of low friction and control, especially in cases with extractions.
QuicKlear® III Brackets QuicKlear® III + BioPassive® Brackets		QuicKlear III self-ligating version with flexible metal clip. Wide and interactive clip, offers a high degree of angulation, rotation and torque control. • Translucent ceramic: Developed by us, less obvious for your patients.esthetic • The clip is inconspicuous, made up of chrome-cobalt

Carriere SLX self-ligating bracket system (2014)

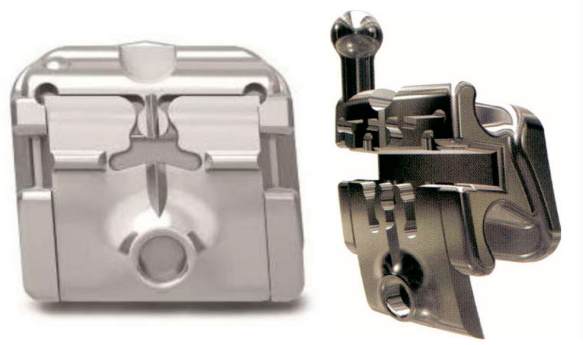


Figure 16: Self ligating – Carriere SLX (A) Close (B) Open

The new Carriere SLX Self-Ligating Bracket system from Henry Schein Orthodontics offers an advanced variant of the Damon solution with enhancements in bracket arrangement, torque control, and accuracy finishing. The bracket includes an amazingly low profile and occlusally opening doors; visual signs including six horizontal and five vertical references are intended to help guarantee exact bracket arrangement [Figure 27].[17]

Empower 2 (2016)

Figure 17: Self ligating - Empower 2 Bracket

An overhauled variant of Empower self-ligating bracket system, now known as Empower 2. New highlights incorporate micro-etched bonding pads, intended to enhance bond strength by 15%–30% over different bases, and a thicker clip to expand [Figure 17]. Engineered from the ground up for performance and beauty, the polycrystalline material is formulated to deliver uncompromising strength. Empower 2 Clear brackets are designed using state-of-the-art CAD modeling and computerized simulation resulting in improved mechanical strength

Conclusion:

The valuable combination of low friction, secured full bracket engagement, rotational control with the self ligating slot acting as the fourth slot wall, less chair side time has equally improved the compliance of the patient and efficiency of the appliance leading to a effective treatment outcome, though future developments of the self ligation brackets warrant more research to support and substantiate their claims of effectiveness against the conventional fixed appliance.

References

1. Ankita Jangde "Self Ligating Brackets From Past to Present: An Update."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 7, 2018, pp 30-43.
2. Stolzenberg J: The Russell attachment and its improved advantages. Int J Orthod Dent Child 21:837-840, 1935
3. Harradine NWT: Self-ligating brackets: where are we now? J Orthod 2003;30:262-273
4. Nigel Harradine The History and Development of Self-Ligating Brackets Seminars in Orthodontics, Vol 14, No 1 (March), 2008: pp 5-18 5
5. Wildman, A.J.; Hice, T.L.; Lang, H.M.; Lee, I.F.; and Strauch, E.C. Jr.: Round Table: The Edgelok bracket, J. Clin.Orthod.1972; 6:613-623
6. Harradine NWT: Self-ligating brackets: where are we now? J Orthod 2003;30:262-273
7. Hanson, G.H.: JCO Interviews on the SPEED bracket, J. Clin. Orthod. 1986;20:183-189
8. Nigel T Harradine, David J Birnie: The clinical use of Activa self-ligating bracket. Am J Orthod Dentofacial Orthop 1996; 109:319-28.
9. Wolfgang Heiser. A new orthodontic philosophy. J Clin Orthod 1998; 35: 44-53
10. Dwight H. Damon. It begins with the face. www.Ormco.com

    Dwight H. Damon. New generation bracket for improved function. www.Ormco.com.
11. GAC. Self-Iigating braces.www.gacintl.com.
12. S. Geron, Self-Ligating Brackets in Lingual Orthodontics, Seminars in Orthodontics, Vol 14, No 1 (March), 2008: pp 6472
13. Aus: Ludwig, Self-Ligating Brackets in Orthodontics, Current Concepts and Techniques 2012
14. Georg Thieme Verlag KG Trevisi and Bergstrand: The SmartClip Self-Ligating Appliance System; SeminOrthod2008;14:87-100. [15]. Why Self Ligation? www.americanortho.com.
15. Cabriolet the clear hybrid, self-ligating ortho appliance, www.gestenco.com.
16. Saini P, Sharma H, Kalha AS, Chandna AK. The current evidence and implications of lingual orthodontics. J Indian Orthod Soc 2016;50:S4-9.
17. Sensation™ Active Ceramic Self-Ligating Bracket System, www.orthotechnology.com.
18. Khatri JM, Sawant SS, Naidu NR, Vispute SS, Patankar KA. An update on orthodontic brackets – A review. Int J Orthod Rehabil 2020;11:136-44.
19. Kakadiya A, Tandon R. Recent advancements in orthodontic brackets – A review: Indian Journal of Orthodontics and Dentofacial Research, July-September 2017;3(3):129-135.
20. Almuzian M, Gardner A. Adult Orthodontics Part 2: Advances in Treatment. Ortho Update 2014;7:114-117

SALIVARY BIOMARKERS – A NOVEL DIAGNOSTIC TOOL IN ORAL AND SYSTEMIC DISEASES

[1]Dr. Devika. K.V, [2]Dr. Shamala Ravikumar .S, [3]Dr. Dhivya .K, [4] Dr. Dinakaran . J

[1]Postgraduate Student, Department Of Oral And Maxillofacial Pathology, Adhiparasakthi Dental College And Hospital, Melmaruvathur

[2]Professor & Hod, Department Of Oral And Maxillofacial Pathology, Adhiparasakthi Dental College And Hospital, Melmaruvathur

[3]Reader, Department Of Oral And Maxillofacial Pathology, Adhiparasakthi Dental College And Hospital, Melmaruvathur

[4]Reader, Department Of Oral And Maxillofacial Pathology, Adhiparasakthi Dental College And Hospital, Melmaruvathur

Keywords :

saliva, biomarkers, diagnosis, research

CORRESPONDING AUTHOR

Dr.Devika.K.V

Postgraduate, Department of oral and maxillofacial pathology, Adhiparasakthi Dental College and Hospital , Melmaruvathur

E-mail address : devsvidhyan@gmail.com

ABSTRACT

Biopsies and blood examinations are invasive methods for diagnosis and prognosis monitoring, whereas saliva investigations remain a non-invasive method and promotes patient comfort. Early diagnosis of diseases can significantly influence therapeutic intervention, prognosis, survival rates and recurrence. Advancement in the field of research accelerated the discovery of numerous biomolecules in saliva such as oncogenes, tumor suppressor genes, growth factors, cytokines, DNA, mRNA, enzymes etc. which could be a novel biomarker in screening and diagnosing different physiological and pathological conditions. Hence, saliva has gained huge recognition and has become a promising subject of research in the recent years. Salivary biomarkers are detected using molecular techniques such as DNA arrays, polymerase chain reaction, liquid chromatography etc. Discovery of these biomarkers offers unique opportunities to utilize oral fluids in diagnostics. This review article intends to discuss various salivary biomarkers and its correlation with the oral and systemic disease.

INTRODUCTION

Salivary glands secrete saliva, an essential biological fluid that has been used in diagnostics dated beyond 2000 years.[1] The properties of saliva has been analyzed using various biological and physiological methods over a century.[1] Saliva being a multifunctional fluid, aids in lubrication and binding of food, digestion, antimicrobial activity, defence, antioxidation etc.[1] Ninety nine percentage of human saliva is comprised of water and the remaining are proteins and inorganic substances.[2,3] It has been postulated that the permeable and vascular nature of salivary glands permits easy exchange of blood derived molecules through transcellular (active or passive transport) or paracellular (extracellular ultrafiltration) route to the acinar cells of salivary glands and thereby alterations of these molecules due to disease conditions are easily reflected in saliva.[2]

Saliva contains molecules like proteins, metabolites, DNA, mRNA, growth factors etc., other than the usual components secreted by the salivary gland that can be associated with the oral or systemic disease. Thus, saliva has been proven to be an essential fluid capable of indicating the current health status of an individual. The salivary sample collection remains affordable, simple technical skills for collection, painless and easy to transport to laboratory, hence it could be a potential substitute to blood testing. Pursuing future research in this field might help in establishing biomarkers that are clinically acceptable that facilitates diagnosis and prognosis of oral and systemic diseases throughout the body. This review highlights several salivary biomarkers reported in the detection of oral and systemic diseases (Figure:1).

BIOMARKERS

WHO defined biomarker as "almost any measurement reflecting an interaction between a biological system and a potential hazard, which may be chemical, physical, or biological. The measured response may be functional and physiological biochemical at the cellular level or a molecular interaction".[4] In accordance with the National Institute of Health (NIH) Biomarkers Definitions Working Group in 1998, referred to biomarkers as "a characteristic that is objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacologic responses to a therapeutic intervention".[4] Identifying biomarkers in saliva and its consideration in clinical practice can be a major breakthrough in oral diagnostics.

SALIVAOMICS

The term "Salivaomics" refers to transcriptome, proteome, genome, microbiome and metabolome (Figure:2).[5,6] It has been reported that human saliva contains 70% of human genome and 30% of genome of oral microorganisms.[5] Salivary proteins are more than 2000 in number with extensive biological functions and the term "proteome" is used to describe all the proteins in the oral cavity.[5] The term "proteomics" refers to the study of proteomes and Polyacrylamide gel electrophoresis is used primarily to assess protein expression.[5,6] The study of all genomes (DNA) of an individual organism is called as "genomics".[6] Metabolomes refers to the small endogenous metabolites like carbohydrates, thiols, nucleic acids, vitamins, lipids, aminoacids etc. within the biologic system and the study of metabolomes are being referred to as "metabolomics".[5,6] Metabolomes are usually identified using Liquid chromatography–mass spectrometry (LC-MS).[5] Transcriptome is a term used to describe the complete sets of transcripts in the cell and their quantity being related to a particular stage of development or physiological condition.[7] Microarray and Reverse transcriptase polymerase chain reaction were used chiefly to detect mRNA and

microRNA in saliva.[5] Microbiome refers to the microbiota and dysbiosis leads to numerous oral diseases.[5] Roughly about 19000 microroganisms have been detected in saliva and 16S ribosomal RNA (rRNA) gene sequencing and polymerase chain reaction (PCR) are the very popular molecular biology techniques used in the detection of microorganisms.[5,6]

SALIVARY BIOMARKERS IN ORAL DISEASES

ORAL CANCER

Oral cancer has been reported to be the sixth most common cancer worldwide with an average five year survival rate of 60%.[5,8] Oral cancer is more prevalent in India due to the excessive consumption of tobacco among people in our country.[5] The key to good prognosis is early diagnosis and treatment. Numerous researches showed that when compared to healthy controls, an increased salivary sodium, calcium, phosphate, magnesium, albumin, MMP-2, MMP-9 and LDH levels and decreased amylase, potassium levels were observed in saliva of OSCC patients.[9] Using molecular, genomic, proteomic, metabolomic, transcriptomic, and phenotypic techniques, numerous promising biomarkers have been detected in oral cancer, some of them being oncogenes like c-Fos, c-myc and c-Jun, tumor supressor genes such as p16, p53, cytokines like TGF-β1, IL-1β, IL-6, IL-8 and TNF-α and also growth factors like EGF, VEGF, and Insulin-like growth factor 1 (IGF). Also matrix metalloproteinases like MMP1, MMP2, MMP9, epithelial-mesenchymal transition markers like β- catenin, E-cadherin and N-cadherin, cytokeratins like CK13, CK14 and CK16 and miRNA molecules are being detected.[10]

Elevated salivary levels of carcinoembryonic antigen (CEA), defensin-1, osteopontin and cluster determinant-44 (CD44) also serve as biomarkers in oral cancer.[11] An accuracy of 81% was reported in the detection of OSCC using salivary biomarkers such as calcium-binding protein P, S100, IL-8, IL-1β and H3 histone, family 3A.[8] Immunoglobulins like IgA, IgG were found to be elevated in both oral potentially malignant and malignant lesions contributing as a prognostic biomarkers in the early diagnosis of oral cancer.[11] Nagler R et al., found an elevated level of salivary Cyfra 21-1(cytokeratin 19 fragment) and CA125 levels in OSCC patients.[12] Marttila E et al., in their study observed an significant rise in Acetaldehyde (ACH) and N-nitrosamine secreted by the species of Neisseria and Candida in the saliva of tobacco smokers suggesting its genotoxicity in the pathogenesis of OSCC.[13] It was concluded from the pilot study by Chai RC et al., that HPV-16 can facilitate early detection of pre-cancerous lesions if it is isolated in salivary oral rinse of patients with Head and Neck Squamous cell carcinoma.[14] Thus, saliva being an indispensible tool in the diagnosis of oral potentially malignant and malignant diseases is noteworthy and numerous researches are pursuing to detect yet more salivary biomarkers in the future.

ORAL POTENTIALLY MALIGNANT DISORDERS

Shetty SR et al., in their study observed a decrease in salivary and serum ascorbic acid level which may be utilized for the excessive collagen production as the histopathological grades of oral submucous fibrosis (OSMF) progress.[15] Elevated salivary levels of zinc, iron and manganese were observed in patients with OSMF.[16] A study by Kishor B. Raja et al., provided evidences of increased salivary copper concentrations of heavy arecanut users, suggesting an important role of salivary copper in the pathogenesis of OSMF.[17] TNF-α was reported to be raised in severe dysplasia and also used to assess the transformation of oral potentially malignant disorder, leukoplakia to oral squamous cell carcinoma (OSCC).[18] Also an elevated level of salivary miR-21 was detected in oral dysplasia which could serve as an efficient diagnostic biomarker in the early diagnosis and screening of oral cancer.[19] Mehdipour et al., in their study of oral lichen planus (OLP) patients concluded that elevated salivary miR-21 levels and declined miR-125a levels may indicate poor prognosis.[20] Also, in the same study, an elevated salivary miR-31 levels were observed in patients diagnosed with dysplastic OLP and OSCC compared to patients with nondysplastic OLP. [20] Hence, it was concluded that salivary miR-31 levels may be a prognostic indicator in malignant transformation.[20] Though several salivary biomarkers have been reported so far, establishing a reliable diagnostic biomarker in oral potentially malignant and malignant disorders with high specificity constitute a biggest challenge for the researchers.

DENTAL CARIES

Dental caries is a multifactorial infectious disease of oral cavity.[21] There exists no specific salivary parameter or a test with high sensitivity and specificity to identify caries-prone individuals.[21] Bacterial tests, flow rate and buffering capacity of saliva are some of the salivary tests which have gained popularity in dental clinical practice and may be indicated to assess patients' caries risk.[21] Dental caries is caused predominantly by microorganisms such as Streptococcus mutans and Lactobacillus.[21] Till date, literature has not revealed any threshold of these bacteria indicating caries risk.[21] It has been reported that in the mixed dentition, microbes such as Capnocytophaga sputigena, Tannerella, Selenomonas infelix, Campylobacter showae, Leptotrichia hofstadii etc. serve as biomarkers to assess the prognosis of caries.[21] Yang et al in their study, employed 16S rRNA technology and observed an increase in the genus of Prevotella in the caries microbiota.[22]

PERIODONTAL DISEASE

Salivary biomarkers are detected in each phase of periodontal disease such as inflammatory phase, collagen degradation phase and bone turnover phase.[8] During the phase of inflammation, an increased level of prostaglandin E2 (PGE2), interleukin-1 (IL-1), interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α) were reported.[8] IL-1, TNF-α and Receptor activator of nuclear factor kappa-B ligand (RANKL) were found to be increased as the disease progress.[8] Hendek M.K et al in their study found a significantly elevated level of procalcitonin (ProCT), calcitonin precursor protein in the saliva of patients with periodontal disease.[23] Procalcitonin, produced chiefly by the C cells of the thyroid gland is a pro-inflammatory and a cytokine-like mediator protein.[23] C-reactive protein (CRP) produced by the liver were also reported to be detected in saliva during periodontal inflammation.[23] Other characteristic biomarkers elevated in periodontal disease are matrix metalloproteinases such as MMP-8, MMP-9 and MMP-1. These proteinases are secreted by osteoclasts and polymorphonuclear leukocytes and are responsible for the breakdown of bone and connective tissue in periodontal diseases.[8,24] Also, in periodontal diseases, proteins like lactoferrin, histatin, fibronectin, cystatins and growth factors like Epidermal growth factor (EGF), Vascular endothelial growth factor (VEGF) were also found to be raised.[24] Elevated levels of microorganisms like Campylobacter rectus, Porphyromonas gingivalis, Aggregatibacter actinomycetemcomitans, Prevotella intermedia, Eikenella corrodens, Treponema denticola, Fusobacterium nucleatum, etc can also be identified in saliva of patients with periodontitis correlating its role in the pathogenesis.[25]

AUTOIMMUNE DISORDERS

Vesiculobullous disorders are autoimmune disorders characterized by the presence of autoantibodies directed against specific adhesion molecules in the epithelium.[3] They are prevalent in 0.2 to 3 out of every 100,000 people.[3] According to Hallaji et al., saliva of patients with pemphigus showed 70% and 94% sensitivities to salivary desmoglein 1 and desmoglein 3. In case of pemphigoid an elevated salivary concentration of BP180 NC16a, IgA and IgG have been detected.[3] Ganzetti et al. in his study using ELISA reported a significant rise in salivary TNF-α, TGF-β1, monocyte chemoattractant protein MCP-1, and IL-1β levels in psoriasis patients.[26] IL-1β increases the level of matrix metalloproteinases resulting in tissue destruction and this explains why there is resorption of alveolar bone and periodontitis in psoriasis patients.[26]

SYSTEMIC DISEASES

A) Diabetes mellitus

Altered flow and composition of saliva in patients with diabetes, a metabolic disease caused by insulin resistance, defective insulin secretion or its action has been well documented in the literature.[27] Elevated levels of α-2-macroglobulin and HbA1c were also elevated in type-2 diabetes mellitus patients.[27] Saliva can also be used as a tool in the estimation of the blood glucose level in patients with diabetes mellitus.[28] Abdolsamadi H et al., in their study hypothesized that salivary melatonin could be used as a biomarker in the diagnosis of diabetes mellitus and periodontal disease.[29]

B. Cardiovascular disease

Cytokines like IL-6, IL-1β, TNF-α and PGE2 were found to be significantly raised in the saliva of patients with both atherosclerosis and periodontitis.[27] Salivary C-reactive protein (CRP) was reported to be a predictive biomarker in Acute myocardial infarction.[27] Other significant biomarkers detected in saliva of acute myocardial infarction patients are Myoglobin (MYO), Creatine phosphokinase MB (CK-MB), Myeloperoxidase (MPO), Cardiac troponin I (cTnI), brain natriuretic peptide (NT-proBNP), Exosomal miRNA, IL-6, MMP-8, MMP-9, tissue inhibitor of MMP-8 (TIMP-1), soluble intercellular adhesion molecule (sICAM-1) etc.[30]

C. Neurodegenerative disorders

Salivary proteins like Aβ (β amyloid), tau, a-Syn (alpha synuclein) and DJ-1(deglycase) were reported to be the biomarkers in neurodegenerative disorders like Parkinson's disease and Alzheimer's disease.[8] Studies have reported reduced lactoferrin, an antimicrobial peptide to be a reliable salivary biomarker in Alzheimer's disease.[8] Elevated salivary levels of acetylcholinesterase (AChE) and pseudocholinesterase (PChE) were also found in Alzheimers disease.[11] An elevated level of HO 1(Heme Oxygenase-1) level was detected in saliva of patients with Parkinson's disease,.[8]

D. Renal and liver diseases

Salivary nitrite, sodium, chloride, uric acid,lactoferrin, cortisol, and alpha-amylase were reported to be the biomarkers in patients diagnosed with end-stage renal disease.[31] A rise in salivary IgA, IgG, CRP and nitric oxide (NO) were noted in chronic renal failure patients in a study conducted by PallosD et al.[32] Elevation of salivary phosphate level was reported to be a reliable marker compared to serum phosphate in the detection of hyperphosphatemia in Chronic renal failure and haemodialysis patients.[33] Salivary urea and creatinine level were reported to be significantly raised in chronic kidney disease (CKD) patients.[34] Alanine aminotransferase (ALT), Gamma glutamyltransferase (GGT) and aspartate aminotransferase (AST) were reported to be the salivary liver function markers that can be used to monitor the prognosis of deaddiction.[35]

INFECTIONS

Saliva can also be used to screen viral hepatitis, malaria, and dengue fever.[2] Recent studies have revealed the presence of antibodies in saliva following the infection with hepatitis A, B, and C viruses.[2] IgG antibodies directed against specific Plasmodium falciparum antigens in malaria and IgA antibodies specific to dengue virus can also be detected in saliva.[2] Antibodies are found in the saliva of patients infected with Candida albicans, Toxoplasma gondii, and Schistosoma mansoni.10 Immunoglobulins, calprotectin, mucins, histatins, basic proline rich proteins and peroxidases level in saliva were also reported as biomarkers in the detection of fungal infections.[31] A sensitivity of 99.3% and specificity of 99.8% in the screening of HIV and HSV-2 was observed using saliva-based enzyme-linked immunosorbent assay (ELISA).[2]

RECENT ADVANCEMENT IN SALIVARY DIAGNOSTICS

One of the major drawbacks of saliva is that it has low sensitivity and specificity. Recently, the development of electrochemical biosensors was reported to be highly specific over other diagnostic technology like PCR in detecting nucleic acids and protein.[36] UCLA Collaborative Oral Fluid Diagnostic Research Center developed technologies like nano and micro electro mechanical systems (MEMS). These biosensors that detects biomolecules such as mRNA & DNA, proteins are considered as major advancement in the salivary diagnostics.[36] One such microfluid biosensor is "Oral Fluid Nano Sensor Test" (OFNASET) or lab on-a-chip (LOC) device, an automatic handheld device used to detect the biomarkers such as RNA and protein in saliva of oral cancer patients.[37] OFNASET contains two important components - capture and detector probes.[37] The capture probe and detector probe in OFNASET functions in binding the target to the sensor and simultaneously detecting the signal.[37] Technological advancements in salivary diagnostics will prompt the discovery of rapid testing devices with great sensitivity and specificity

CONCLUSION

Saliva when compared to other body fluids, is beneficial in establishing early diagnosis of various diseases. A major pitfall of a five year survival in 60% of cases with OSCC, necessitates early diagnosis. Hence, apart from the invasive routine tissue biopsy, a noninvasive quick sampling of established salivary biomarkers may prolong patient survival. Although numerous biomarkers have been reported in the literature, a biomarker with high specificity in diagnosing oral and systemic diseases is still challenging and requires elaborative research in the future.

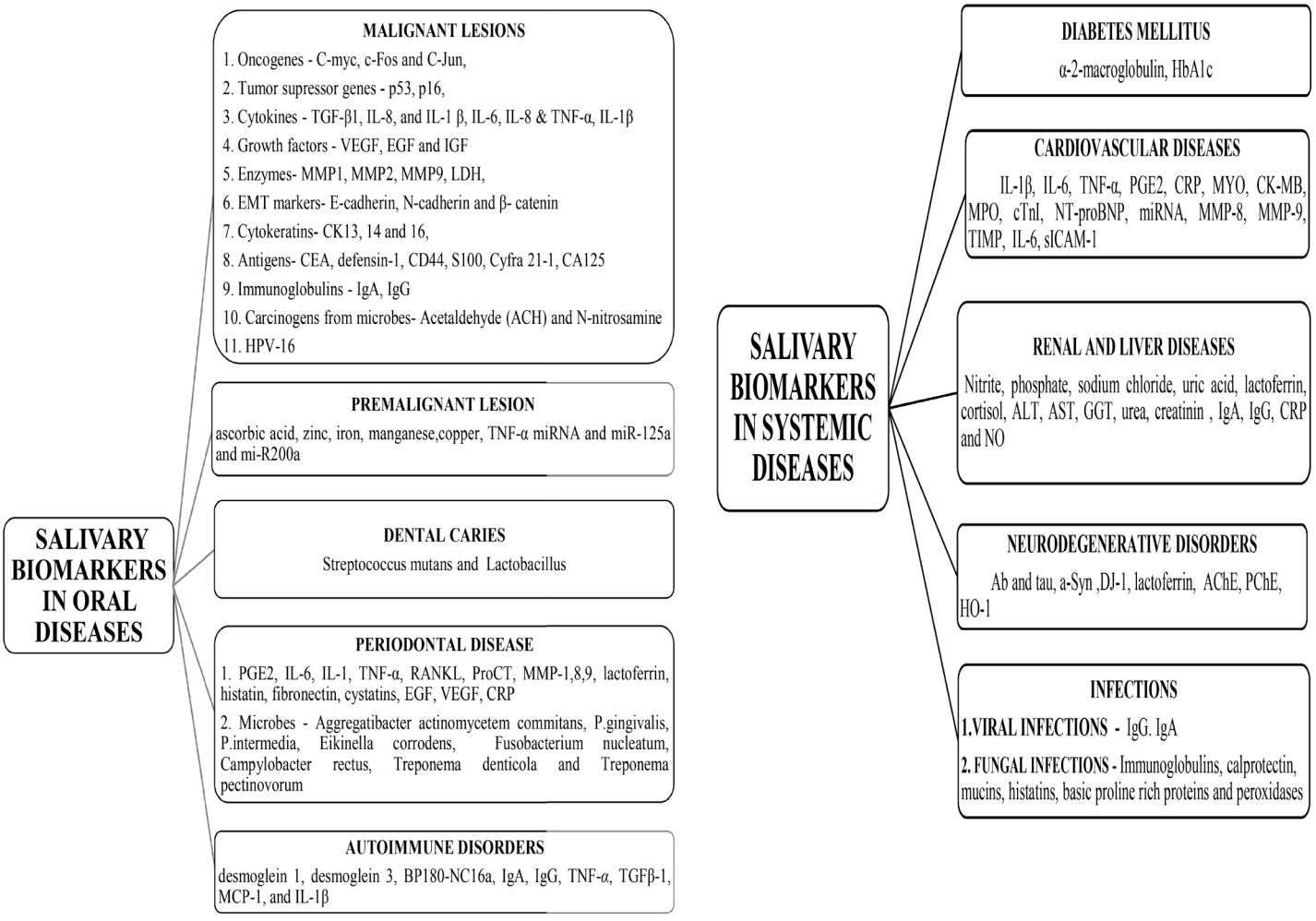


Figure 1

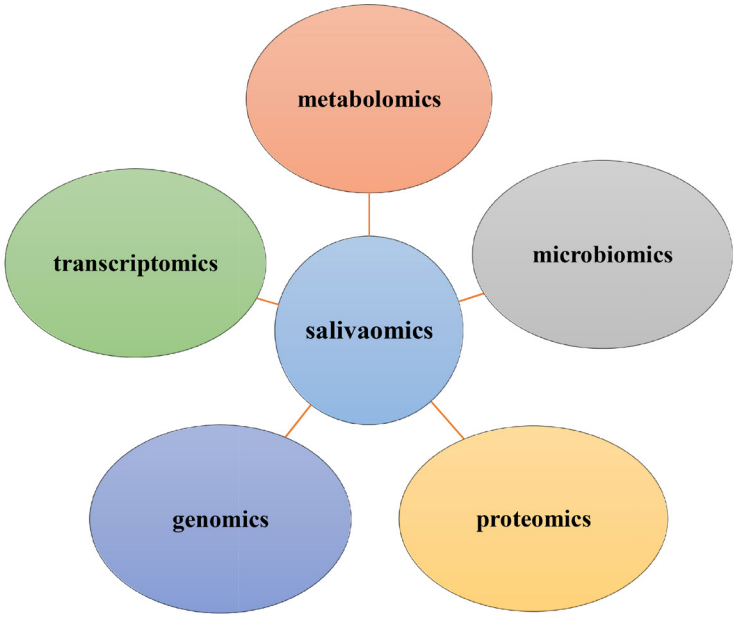


Figure 2

REFERENCES

1. Tiwari M. Science behind human saliva. Journal of natural science, biology, and medicine. 2011 Jan;2(1):53.
2. Yoshizawa JM, Schafer CA, Schafer JJ, Farrell JJ, Paster BJ, Wong DT. Salivary biomarkers: toward future clinical and diagnostic utilities. Clinical microbiology reviews. 2013 Oct 1;26(4):781-91.
3. Lorenzo-Pouso AI, Pérez-Sayáns M, Bravo SB, López-Jornet P, García-Vence M, Alonso-Sampedro M, Carballo J, García-García A. Protein-based salivary profiles as novel biomarkers for oral diseases. Disease Markers. 2018 Jan 1;2018.
4. Strimbu K, Tavel JA. What are biomarkers?. Current Opinion in HIV and AIDS. 2010 Nov;5(6):463.
5. Martina E, Campanati A, Diotallevi F, Offidani A. Saliva and oral diseases. Journal of Clinical Medicine. 2020 Feb;9(2):466.
6. Koneru S, Tanikonda R. Salivaomics-A promising future in early diagnosis ofdental diseases. Dental research journal. 2014 Jan;11(1):11.
7. Wang Z, Gerstein M, Snyder M. RNA-Seq: a revolutionary tool for transcriptomics. Nature reviews genetics. 2009 Jan;10(1):57-63.
8. Roi A, Rusu LC, Roi CI, Luca RE, Boia S, Munteanu RI. A new approach for the diagnosis of systemic and oral diseases based on salivary biomolecules. Disease markers. 2019 Feb 17;2019.
9. Ghosh S, Singh P, Nambiar KS, Haragannavar VC, Augustine D, Sowmya SV, Rao RS. Role of salivary biomarkers in the diagnosis of oral cancer: Mini review. Journal of Medicine, Radiology, Pathology and Surgery. 2018 May 1;5(3):7-10
10. Malamud D. Saliva as a diagnostic fluid. Dental Clinics. 2011 Jan 1;55(1):15978.
11. Rai V, Pai VR, Kedilaya HP, Vijayakumar T. SALIVARY TUMOR MARKERS-A REVIEW. International Journal of Pharmaceutical, Chemical & Biological Sciences. 2013 Jul 1;3(3).
12. Nagler R, Bahar G, Shpitzer T, Feinmesser R. Concomitant analysis of salivary tumor markers—a new diagnostic tool for oral cancer. Clinical Cancer Research. 2006 Jul 1;12(13):3979-84.
13. Marttila E, Uittamo J, Rusanen P, Lindqvist C, Salaspuro M, Rautemaa R. Acetaldehyde production and microbial colonization in oral squamous cell carcinoma and oral lichenoid disease. Oral surgery, oral medicine, oral pathology and oral radiology. 2013 Jul 1;116(1):61-8.
14. Chai RC, Lim Y, Frazer IH, Wan Y, Perry C, Jones L, Lambie D, Punyadeera C. A pilot study to compare the detection of HPV-16 biomarkers in salivary oral rinses with tumour p16 INK4a expression in head and neck squamous cell carcinoma patients. BMC cancer. 2016 Dec;16(1):1-8.
15. Shetty SR, Babu S, Kumari S, Shetty P, Vijay R, Karikal A. Evaluation of micronutrient status in serum and saliva of oral submucous fibrosis patients: A clinicopathological study. Indian journal of medical and paediatric oncology: official journal of Indian Society of Medical &Paediatric Oncology. 2012 Oct;33(4):224.
16. Okade AR, Hallikeri KS, Trivedi DJ. Salivary estimation of copper, iron, zinc and manganese in oral submucous fibrosis patients: A case-control study. Clinical Cancer Investigation Journal. 2015 May 1;4(3):302.
17. Raja KB, Hazarey VK, Peters TJ, Warnakulasuriya S. Effect of areca nut on salivary copper concentration in chronic chewers. Biometals. 2007 Feb1;20(1):43-7.
18. Deepthi G, Nandan SR, Kulkarni PG. Salivary tumour necrosis factor-α as a biomarker in oral leukoplakia and oral squamous cell carcinoma. Asian Pacific journal of cancer prevention: APJCP. 2019;20(7):2087.
19. Ali S, Abdelkawy M, Ali S, Rashed L. miR-21 and TAC as Salivary Biomarkers for Oral Dysplasia. Advanced Dental Journal. 2020 Oct 1;2(4):209-17.
20. Mehdipour M, Shahidi M, Manifar S, Jafari S, Abbas FM, Barati M, Mortazavi H, Shirkhoda M, Farzanegan A, Rankohi ZE. Diagnostic and prognostic relevance of salivary microRNA-21,-125a,-31 and-200a levels in patients with oral lichen planus-a short report. Cellular Oncology. 2018 Jun 1;41(3):329-34
21. Gao X, Jiang S, Koh D, Hsu CY. Salivary biomarkers for dental caries. Periodontology 2000. 2016 Feb;70(1):128-41.
22. Teng F, Yang F, Huang S et al. Prediction of early childhood caries via spatialtemporal variations of oral microbiota. Cell Host Microbe 2015; 18 (3): 296306.
23. Hendek MK, Erdemir EO, Kisa U. Evaluation of salivary procalcitonin levels in different periodontal diseases. Journal of periodontology. 2015 Jun;86(6):8206.
24. Patil PB, Patil BR. Saliva: A diagnostic biomarker of periodontal diseases. Journal of Indian Society of Periodontology. 2011 Oct;15(4):310.
25. Ravishankar PL, Mithra D, Chakraborty P, Kumar A. Chairside diagnostics in periodontics. SRM Journal of Research in Dental Sciences. 2017 Apr 1;8(2):78.
26. Ganzetti G., Campanati A., Santarelli A., et al. Involvement of the oral cavity in psoriasis: results of a clinical study. British Journal of Dermatology. 2015;172(1):282–285.
27. Zhang CZ, Cheng XQ, Li JY, Zhang P, Yi P, Xu X, Zhou XD. Saliva in the diagnosis of diseases. International journal of oral science. 2016 Sep;8(3):1337.
28. Satish BN, Srikala P, Maharudrappa B, Awanti SM, Kumar P, Hugar D. Saliva: A tool in assessing glucose levels in Diabetes Mellitus. Journal of International Oral Health: JIOH. 2014 Apr;6(2):114
29. Abdolsamadi H, Goodarzi MT, Motemayel FA, Jazaeri M, Feradmal J, Zarabadi M, Hoseyni M, Torkzaban P. Reduction of melatonin level in patients with type II diabetes and periodontal diseases. Journal of dental research, dental clinics, dental prospects. 2014;8(3):160.
30. Abdul Rehman S, Khurshid Z, HussainNiazi F, Naseem M, Al Waddani H, Sahibzada HA, Sannam Khan R. Role of salivary biomarkers in detection of cardiovascular diseases (CVD). Proteomes. 2017 Sep; 5(3):21.
31. Malathi N, Mythili S, Vasanthi HR. Salivary diagnostics: a brief review. International Scholarly Research Notices. 2014; 2014.
32. Pallos D, Leao MV, Togeiro FC, Alegre L, Ricardo LH, Perozini C, Ruivo GF. Salivary markers in patients with chronic renal failure. Archives of oral biology. 2015 Dec 1; 60(12):1784-8.
33. Savica V, Calo L, Santoro D, Monardo P, Granata A, Bellinghieri G. Salivary phosphate secretion in chronic kidney disease. Journal of renal nutrition. 2008 Jan 1; 18(1):87-90.
34. Pandya D, Nagrajappa AK, Ravi KS. Assessment and correlation of urea and creatinine levels in saliva and serum of patients with chronic kidney disease, diabetes and hypertension–a research study. Journal of clinical and diagnostic research: JCDR. 2016 Oct; 10(10):ZC58.
35. Honnamurthy JB, Shivashankara AR, Avinash SS, Mathai JP, Malathi M. Use of salivary liver function markers for the prognosis of deaddiction in alcohol dependent non-smokers and smokers: A before and after study. International Journal of Clinical Biochemistry and Research. 2018 Mar 15; 5(1):35-40.
36. Gau V, Wong D. Oral fluid nanosensor test (OFNASET) with advanced electrochemical-based molecular analysis platform. Annals of the New York Academy of Sciences. 2007 Mar;1098(1):401-10.
37. Daniel GS, Thiruppathy M, Aswath N, Narayanan SR. Lab on a Chip: Conquer disease at the earliest. Journal of pharmacy & bioallied sciences. 2018 Apr;10(2):106.