

E ISSN NO. 2231-2293  
P ISSN NO. 0976-4003  
March 2011  
Issue:1, Vol.:3

Now Indexed with Index Copernicus

# Indian Journal of Dental Sciences

... An Insight into Dentistry

[www.ijds.in](http://www.ijds.in)



An official Publication of HDC and HIDS (H.P)

# Colgate Plax

The mouthwash that gives  
**12-hour** germ protection

- **Significantly Reduces Plaque**
- **Provides up to 67% healthier gums**
- **Helps prevent cavities**
- **Give long lasting fresh breath**



\* Vs a control mouth rinse. Donald R Allen et al. Compend, 19: 20-26, 1998.

**Colgate**

**YOUR PARTNER IN ORAL HEALTH**

[www.colgateprofessional.co.in](http://www.colgateprofessional.co.in)



# Indian Journal of Dental Sciences

E ISSN NO. 2231-2293  
P ISSN NO. 0976-4003

An official publication of HDC and HIDS (H.P.)

## Editorial Board

Chief Patron  
Brig. (Dr.) Anil Kohli  
President-Dental Council of India  
Editor in Chief:  
Dr. Vikas Jindal  
Director-Professor, Department of Periodontics  
Himachal Dental college, Sundernagar, HP, India

Patron  
Dr. V.K. Gupta  
Chairman, Dr Puran Chand Medical Trust  
Assistant Editor  
Dr. Amrinder Tuli  
Senior Lecturer, Deptt of Periodontics  
HDC, Sundernagar, HP, India

## Co-Editors

Dr. Vinod Sachdev  
Principal, Prof and Head, Deptt of  
Pedodontics, HDC, Sundernagar, HP, India  
Dr. Rajan Gupta  
Principal, Prof and Head, Deptt of  
Periodontics HIDS, Paonta Sahib, HP

Dr. Anil Singla  
Director, Prof and Head, Deptt of  
Orthodontics, HDC, Sundernagar, HP, India  
Dr. Bharat Bhushan  
Principal, Prof and Head, Deptt of  
Pedodontics DAV Dental College, Solan

Dr. Jagmohan Lal  
Principal, Prof and Head, Deptt of Prosthodontics  
Bhojia Dental College, Nalagarh, HP  
Dr. Gaurav Gupta  
Director, Prof and Head, Deptt of Prosthodontics  
HIDS, Paonta Sahib, HP

## Editorial Board

Dr. Vimil Sikri  
Principal, Prof and Head  
Endodontics, Govt. Dental  
College, Amritsar, PB, India  
Dr. C S Bal  
Principal, Prof and Head  
Endodontics, Sri Guru Ram Dass  
Dental College, Sri Amritsar, PB, India  
Dr. Abi Thomas  
Principal, Prof and Head, Deptt  
of Pedodontics CDC, CMC,  
Ludhiana, PB, India  
Dr. R L Jain  
Principal, Prof and Head,  
Deptt of Pedodontics Guru  
Nanak Dental College,  
Sunam, PB, India  
Dr. D S Kalsi  
Principal, Prof and Head, Deptt  
of Periodontics, BJS Dental  
College, Ludhiana, PB, India

Dr. Sumeet Sandhu  
Prof and Head,  
Deptt of Oral surgery,  
SGRD, Sri Amritsar, PB, India  
Dr. SC Gupta  
Prof and Head, deptt of  
Community dentistry,  
HDC, Sundernagar,  
HP, India  
Dr. J L Joshi  
Ex-Principal, CDC, CMC,  
Ludhiana, PB, India  
Dr. Kundabala  
Prof and Head, Manipal College  
of dental Surgery, Mangalore,  
Karnataka, India  
Dr. Navneet Grewal  
Prof and Head, Deptt of  
Pedodontics, GDC, Amritsar,  
PB, India

Dr. D K Gautam  
Prof and Head, Deptt  
of Periodontics, HDC,  
Sundernagar, HP, India  
Dr. Abhiney Puri  
Prof and Head, Deptt of  
Oral Pathology, HIDS,  
Paonta Sahib, HP, India  
Dr. Eswar Nagraj  
Prof and Head, Deptt  
of Oral Medicine, SRM  
dental College, Chennai, TN, India  
Dr. Himanshu Aeran  
Director PG studies, Seema  
Dental College, Rishikesh,  
Uttanchal  
Dr. Sameer Kaura  
Associate Prof, BJS Dental  
College, Ludhiana, PB, India  
Dr. Kalwa Pavankumar  
Assistant Prof, Deptt of Periodontics,  
MNR Dental College & Hospital,  
Sangareddy.

## International Editorial Board

Dr. DEEPAK G K, DDS  
Oral and Maxillofacial Surgeon  
Assistant Professor of Surgery  
University of Cincinnati,  
Ohio, USA  
DR. NAVEEN SINGH YADAV  
Associate Professor  
Department of Fixed Prosthodontics  
Faculty of Dentistry  
Garyunis University,  
Libya.

Dr. Manish Valiathan  
Assistant Professor, Department of  
Orthodontics School of Dental  
Medicine Case Western Reserve  
University, Cleveland, Ohio  
Dr. VRINDA SAXENA  
Assistant Professor  
Department of Community  
Dentistry Faculty of Dentistry.  
Garyunis University Libya

Dr. RAJESH GUTTA, MS  
Oral and Maxillofacial Surgeon  
Assistant Professor of Surgery  
University of Cincinnati, Ohio, USA

## Advisors

Dr. I K Pandit  
Dr. JDS Rana  
Dr. Ashu Bhardwaj  
Dr. R S Mann  
Dr. Rajinder Singh  
Dr. N C Rao  
Dr. T P Singh  
Dr. Rajiv Aggarwal

Dr. Ashwani Dholal  
Dr. Mukeh Dhandu  
Dr. A K Dubey  
Dr. S K Khindria  
Dr. Sanjay Tiwari  
Dr. Bhupinder Padma  
Dr. Kamlesh Vasudev  
Dr. Ashu Gupta

Dr. Neeru Singh  
Col (Dr.) B R Cheetal  
Dr. Vinod Kapoor  
Dr. Jaidev S Dhillon  
Dr. Malkiat Singh  
Dr. Pradeep Shukla  
Dr. M.K Sunil

Now Indexed with Index Copernicus,  
Indian Science Abstracts (ISA),  
Open J-Gate, EBSCO, Directory  
of Open Access Journals (DOAJ)



# Indian Journal of Dental Sciences

E ISSN NO. 2231-2293  
P ISSN NO. 0976-4003

## General Information

### The Journal

Indian Journal of Dental Sciences or IJDS (ISSN: Print-0976-4003) is peer-reviewed journal published on behalf of HDC and HIDS(H.P.). The journal publishes information relating to Dental Research. The journal is published quarterly in March, June, September and December.

### Registration, Abstracting and Indexing Information

The journal is Indexed with Index Copernicus, Indian Science Abstracts (ISA), Open J-Gate, EBSCO, Directory of Open Access Journals (DOAJ) and registered with CAB Abstracts, Caspur, Expanded Academic ASAP, Genamics journal Seek, Google Scholar, Hinari, ProQuest, SCOLAR, SIIC databases and Ulrich's International Periodical Directory.

### Information for Authors

There are no page charges for submissions to the journal. Please check <http://www.ijds.in/> for details. All manuscripts must be submitted online at [http://www.ijds.in/online\\_submission.php](http://www.ijds.in/online_submission.php)

### Subscription Information

Copies are sent to the members of IJDS free of cost. A subscription to journal of IJDS comprises 5 issues. Prices include postage. Annual Subscription Rate for non-members

- Institutional:           INR 1800 for India and  
                                  USD 270 for Outside India
- Personal:                INR 1600 for India and  
                                  USD 250 for Outside India

For mode of payment and other details, Please Send Demand Draft in Favour of "Indian Journal of Dental Sciences", payable at Sunder Nagar

Claims for missing issues will be serviced at no charge if received within 60 days of the cover date for domestic subscribers, and 3 months for subscribers outside India. Duplicate copies cannot be sent to replace issues not delivered because of failure to notify publisher of change of address.

The Journal is published and distributed by Himachal Dental College, Sundernagar, H.P. Copies are sent to subscribers directly from the publisher's address. It is illegal to acquire copies from any other source. If a copy is received for personal use as a member of IJDS, one cannot resale or give-away the copy for commercial or library use.

The copies of the journal of the members of IJDS are sent by ordinary post. The editorial board, association or publisher will not be responsible for non receipt of copies. If any member/subscriber wishes to receive the copies by registered post or courier, Kindly contact the publisher's office. If a copy returns due to incomplete, incorrect or changed address of a member / subscriber on two consecutive occasions, the names of such members will be deleted from the mailing list of the journal. Providing complete, correct and up-to-date address is the responsibility of the member/subscriber.

### Advertising Policies

The journal accepts display and classified advertising. Frequency discounts and special positions are available. Inquiries about advertising should be sent to Indian Journal of Dental Sciences Publications,

[www.ijds.in](http://www.ijds.in)

The journal reserves the right to reject any advertisement considered unsuitable according to the set policies of the journal.

The appearance of advertising or Product information in the various sections in the journal does not constitute an endorsement or approval by the journal and or its publisher of the quality or value of the said product or of claims made for it by its manufacturer.

### Copyright

The entire contents of the Journal of IJDS are protected under Indian and international Copyrights. The Journal, however, grants to all users a free, irrevocable worldwide, perpetual right of access to and a license to copy, use, distribute, perform and display the work publicly and to make and distribute derivative works in any digital medium for any reasonable non-commercial purpose, subject to proper attribution of authorship and ownership of the rights. The journal also grants the right to make small numbers of printed copies for their personal non-commercial use.

### Permissions

For information on how to request permissions to reproduce articles / information from this journal, please visit <http://www.ijds.in>

### Disclaimer

The information and opinions presented in the Journal reflect the views of the authors and not of the Journal or its Editorial Board. Publication does not constitute endorsement by the journal. Neither the Journal of IJDS nor its publishers nor anyone else involved in creating, producing or delivering the Journal of IJDS or the materials contained therein, assumes any liability or responsibility for accuracy, completeness, or usefulness of any information provided in the Journal of IJDS, nor shall they be liable for any direct, indirect, incidental, special, consequential or punitive damages arising out of the use of the Journal of IJDS. The Journal of IJDS, nor its publishers, nor any other party involved in the preparation of material contained in the Journal of IJDS represents or warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such material. Readers are encouraged to confirm the information contained herein with other sources.

**It is mandatory for the authors to enclose the duly signed below mentioned declaration and e-mail it along with the manuscript/Available at the website-[www.ijds.in](http://www.ijds.in)**

### (1) Declaration

Title of the article:

To,

The Editor

IJDS, Himachal Dental College,

Sunder Nagar, H.P

Sub: Submission of Manuscript for publication

Dear Sir,

We intend to publish an article entitled "-----"

in your journal as an Case Report/review Article/Original Article.

On behalf of all the contributors I will act as a guarantor and will correspond with the journal from this point onward.

Prior publication nil

Support nil

Conflicts of Interest nil

Permissions nil

We hereby transfer, assign, or otherwise convey all copyright ownership, including any and all rights incidental thereto, exclusively to the journal, in the event that such work is published by the journal.

Thanking you,

Yours' sincerely,

Signature

Corresponding contributor: Dr.-----

**(2) Declaration**

E-mail address:-----

Contributors' form (to be modified as applicable and one signed copy attached with the manuscript)

Manuscript Title: -----

-----

I/we certify that I/we have participated sufficiently in the intellectual content, conception and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript, to take public responsibility for it and have agreed to have my/our name listed as a contributor. I/we believe the manuscript represents valid work. Neither this manuscript nor one with substantially similar content under my/our authorship has been published or is being considered for publication elsewhere, except as described in the covering letter. I/we certify that all the data collected during the study is presented in this manuscript and no data from the study has been or will be published separately. I/we attest that, if requested by the editors, I/we will provide the data/information or will cooperate fully in obtaining and providing the data/information on which the manuscript is based, for examination by the editors or their assignees. Financial interests, direct or indirect, that exist or may be perceived to exist for individual contributors in connection with the content of this paper have been disclosed in the cover letter. Sources of outside support of the project are named in the cover letter.

I/We hereby transfer(s), assign(s), or otherwise convey(s) all copyright ownership, including any and all rights incidental thereto, exclusively to the Journal, in the event that such work is published by the Journal. The Journal shall own the work, including 1) copyright; 2) the right to grant permission to republish the article in whole or in part, with or without fee; 3) the right to produce preprints or reprints and translate into languages other than English for sale or free distribution; and 4) the right to republish the work in a collection of articles in any other mechanical or electronic format.

We give the rights to the corresponding author to make necessary changes as per the request of the journal, do the rest of the correspondence on our behalf and he/she will act as the guarantor for the manuscript on our behalf.

All persons who have made substantial contributions to the work reported in the manuscript, but who are not contributors, are named in the Acknowledgment and have given me/us their written permission to be named. If I/we do not include an Acknowledgment that means I/we have not received substantial contributions from non-contributors and no contributor has been omitted.

Name/Names with Designations

1.-----

2.-----

3.-----

4.-----

5.-----

Acknowledgement: (If Any)



# Indian Journal of Dental Sciences

E ISSN NO. 2231-2293  
P ISSN NO. 0976-4003

## Information For Authors

Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts to Biomedical Journal" developed by International Committee of Medical Journal Editors.

### Types of Manuscripts and Limits

Original articles: Up to 3000 words excluding references and abstract. Case reports: Up to 1000 words excluding references and abstract and up to 10 references.

### Online Submission of the Manuscripts

Articles can also be submitted online from <http://www.ijds.in>

- 1) First Page File: Prepare the title page, covering letter, acknowledgement, etc using a word processor program. All information which can reveal your identity should be here. Use text/rtf/doc/PDF files. Do Not Zip the files
- 2) Article file: The Main text of the article, beginning from Abstract till References (including tables) should be in this file. Do not include any information (such as acknowledgement, your names in page headers, etc.) in this file. Use text/rtf/doc/PDF files. Do not Zip the files. Limit the size to 400 kb. Do not incorporate images in the file. If file size is large, graphs can be submitted as images separately without incorporating them in the article file to reduce the size of the file.
- 3) Images: Submit good quality color images. Each image should be less than 100 kb in size. Size of the image can be reduced by decreasing the actual height and width of the images (keep up to 400 pixels or 3 inches). All images formats (jpeg, tiff, gif, bmp, png, eps, ect) are acceptable; jpeg is most suitable.
- 4) Legends: Legends for the figures/images should be included at the end of the article file.

If the manuscript is submitted online, the contributors' form and copyright transfer form has to be submitted in original with the signatures of all the contributors within two weeks from submission. Hard copies of the images (3 set), for articles submitted online, should be sent to the journal office at the time of submission of a revised manuscript. Editorial office: Dr. Vikas Jindal, Editor in Chief, IJDS, Himachal Dental College, Sundernagar, H.P.

### Preparation of the Manuscript

Text of observational and experimental articles should be divided into sections with headings: Introduction, Methods, Results, Discussion, References, Tables, Figures, Figure legends, and Acknowledgment. Do not make subheadings in these sections.

### Title Page

The title page should carry:

- 1 Type of manuscript (e.g. Original article, Case Report)
- 2 The title of the article, which should be concise, but informative;
3. Running title or short title not more than 50 characters;
4. The name by which each contributor is known (Last name, First name and initials of middle name), with his or her highest academic degree (s) and institutional affiliation;
5. The name of the department (s) and institution (s) to which the work should be attributed;
6. The name, address phone numbers, facsimile numbers and e-mail address of the contributor responsible for correspondence about the manuscript;
7. The total number of pages, total number of photographs and word counts separately for abstract and for the text (excluding the references

and abstract);

8. Source (s) of support in the form of grants, equipment, drugs, or all of these;
9. Acknowledgement, if any; and
- 10 If the manuscript was presented as part at a meeting the organization, place, and exact date on which it was read.

### Abstract Page

The second page should carry the full title of the manuscript and an abstract (of no more than 150 words for case reports, brief reports and 250 words for original articles). The abstract should be structured and state the Context (Background), Aims, Settings and Design, Methods and Material, Statistical analysis used, Results and Conclusions. Below the abstract should provide 3 to 10 key word.

### Introduction

State the purpose of the article and summaries the rationale for the study or observation.

### Methods

The Methods section should include only information that was available at the time the plan or protocol for the study was written; all information obtained during the conduct of the study belongs in the Results Section. Reports of randomized clinical trials should based on CONSORT Statement (<http://www.consort-statement.org>). When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2000 (available at [http://www.wma.net/e/policy/17-c\\_e.html](http://www.wma.net/e/policy/17-c_e.html)).

### Results

Present your results in logical sequence in the text, tables, and illustrations, giving the main or most important finding first. Do not repeat in the text all the data in the tables or illustrations; emphasize or summarize only important observations. Extra or supplementary materials and technical detail can be placed in an appendix where it will be accessible but will not interrupt the flow of the text; alternatively, it can be published only in the electronic version of the journal.

### Discussion

Include Summary of key findings (primary outcome measures, secondary outcome measures, results as they relate to a prior hypothesis); Strengths and limitations of the study (study question, study design, data collection, analysis and interpretation); Interpretation and implication in the context of the totality of evidence (is there a systematic review to refer to, if not could one be reasonably done here and now?, What this study adds to the available evidence, effects on patient care and health policy, possible mechanisms); Controversies raised by this study; and future research direction (for this particular research collaboration, underlying mechanism, clinical research). Do not repeat in detail data or other material given in the introduction or result section.

### 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 square bracket (e.g. [10]). Please refer to ICMJE Guidelines ([http://www.nlm.nih.gov/bsd/uniform\\_requirements.html](http://www.nlm.nih.gov/bsd/uniform_requirements.html)) for more

examples.

1. Standard journal article: Kulkarni SB, Chitre RG, Satoskar RS. Serum proteins in tuberculosis. J Postgrad Med 1960;6:113-20 List the first six contributors followed by et al.
2. Chapter in a book: Phillips SJ, Whisnant JP. Hypertension and stroke. In: Laragh JH, Brenner BM, editors. Hypertension: pathophysiology, diagnosis, and management. 2nd ed. New York: Raven Press; 1995 pp.465-78

#### **Tables**

- Tables should be self-explanatory and should not duplicate textual material.
- Tables with more than 10 columns and 25 rows not acceptable.
- Number tables, in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.
- Explain in footnotes all non-standard abbreviations that are used in each table.
- For footnotes use the following symbols, in this sequence:

#### **Illustrations (Figures)**

- Send sharp, glossy, un-mounted, color photographic prints, with height of 4 inches and width of 6 inches.
- Figures should be numbered consecutively according to the order in which they have been first cited in the text.
- Each figure should have a label pasted (avoid use of liquid gum for pasting) on its back indicating the number of the figure, the running title, top of the figure and the legends of the figure. Do not write on the back of figures, scratch, or mark them by using paper clips.
- Print outs of digital photographs are not acceptable. For digital images send TIFF files of minimum 1200x1600 pixel size.
- Type or print out legends (maximum 40 words, excluding the credit line) for illustrations using double spacing, with Arabic numerals corresponding to the illustrations.

#### **Sending a revised manuscript**

While submitting a revised manuscript, contributors are requested to include, along with single copy of the final revised manuscript, a photocopy of the revised manuscript with the changes underlined in red and copy of the comments with the point to point clarification to each comment. The manuscript number should be written on each of these documents. If the manuscript is submitted online, the contributors' form and copyright transfer form has to be submitted in original with the signatures of all the contributors within two weeks of submission. Hard copies of images should be sent to the office of the journal. There is no need to send printed manuscript for articles submitted online.

#### **Reprints**

Journal provides no free printed reprints.

#### **Copyrights**

The whole of the literary matter in the IJDS is copyright and cannot be reproduced without the written permission.

#### **Checklist**

##### **Manuscript Title**

##### **Covering letter**

- Signed by all contributors
- Previous publication / presentations mentioned
- Source of funding mentioned
- Conflicts of interest disclosed

##### **Authors**

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

#### **Presentation and format**

- Double spacing
- Margins 2.5 cm from all four sides
- Title page contains all the desired information
- Running title provided (not more than 50 characters)
- Abstract page contains the full title of the manuscript
- Abstract provided (about 150 words for case reports and 250 words for original articles)
- Structured abstract provided for an original article
- Key words provided (three or more)
- Introduction of 75-100 words
- Headings in title case (not ALL CAPITALS)
- References cited in square brackets
- References according to the journal's instructions, punctuation marks checked

#### **Language and grammar**

- Uniformly American English
- Abbreviations spelt out in full for the first time
- Numerals from 1 to 10 spelt out
- Numerals at the beginning of the sentence spelt out

#### **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
- Manuscript provided on a floppy (with single spacing)



# Indian Journal of Dental Sciences

Vol. 3, Issue 1, March 2011

E ISSN NO. 2231-2293  
P ISSN NO. 0976-4003

## CONTENTS

### ORIGINAL ARTICLES

- A New Test Material for Whitlock's Castability Test  
Dr. R.Murali, Dr. Abdul Aziz Al Khuraif.....1-3

### CASE REPORTS

- Unemployed Residual Ridge  
Dr. Luthra RP, Dr. Renu Gupta, Dr. Divy Vashisht, Dr. Naveen Sharma, Dr. Ranjan Gupta .....4-5
- Hemisection : Saviour of A Furcation Involved Tooth...  
Dr. Vandana Chhabra, Dr. Ajay Chhabra.....6-8
- Management of Bilateral Maxillary Buccal Canine Impaction with Variable Prognosis : A Case Report  
Dr. Anup Kanase, Dr. Anil Nafria.....9-11
- A Customized Intraoral Radiation Carrier For Edentulous Patient: Clinical Report  
Dr.Jain Deshraj, Dr.Juneja Pankul, Dr. Goel Gaurav.....12-13
- Limited Mouth Opening, A Challenge In Complete Denture Prosthodontics: A Case Report  
Dr. Bhupender Yadav, Dr. Himanshu Aeran, Dr. Mukesh Dhandha, Dr.Chetan Chawla.....14-16
- Insight To Three Dimensional Imaging In Endodontics  
Dr. Ashwani Dobhal, Dr. Anubha Agarwal, Dr. Sonia Gupta .....17-19
- Ceramic Laminate Veneers: A Conservative Approach To Esthetics.  
Dr. Mukesh Dhandha, Dr. Maneesh Srivastava, Dr. Ashwani Dobhal, Dr. Neeraj Sharma.....20-22

### A REVIEW

- "Oral Mucositis: A Sequel to Cancer Therapy" Prevention and Management  
Dr. Raman Kapur, Dr. Ravi Kapur, Dr. Mannat Dogra, Dr. Rajat Kapur.....23-25
- Bruxism/Bruxomania, Causes And Management.  
Dr. Pritpal Singh Gill, Dr. Kamal Kishore Chawla, Dr. Saksham Chawla.....26-27
- "No needles.. No Tears ..Engaging Smiles for Children."  
Dr. Rani Somani, Dr.Iram Zaidi.....28-30
- C-Reactive Protein and Its Role In Periodontitis  
Dr. S. C. Gupta, Dr. Vikas Jindal, Dr. Rambhika Thakuri.....31-32



Dear Colleagues

The Journal is quite fortunate to have many outstanding reviewers, both practitioners and academics. These reviewers work diligently to ensure that the articles appearing in the Journal are a great source of knowledge.

We believe that we have a lot to offer the community in terms of a perspective that is under-represented the world would be a better place if our efforts were more fairly and adequately represented. We believe in the goal of increased understanding and awareness between people of our profession.

The Journal's aim is to publish original, topical and review articles of the highest quality in the field of dental education. The Journal seeks to disseminate widely the latest information on curriculum development, teaching methodologies, assessment techniques and quality assurance in the fields of dental undergraduate and postgraduate education.

The experience and collective wisdom of the authors in this issue provides a rich source of informed opinion for the dental educator.

We are deeply distressed and saddened by reports of the earthquake and tsunami which have left in their wakes immense loss of human lives and untold devastation. We wish to extend our sincerest sympathy and condolences to all those who have been inflicted with loss and bereavements in this natural disaster.

Dr Vikas Jindal  
Editor-in-Chief

## ACKNOWLEDGMENT

We are grateful to our esteemed referees for having posed faith in us and for contributing positively for this journal. We appreciate the time they have taken out for refereeing the articles. It is our attempt to maintain the standard of journal and an attempt to make it reach the international standards

### **To Err is Human**

We have tried our best in designing and printing to provide you correct information.  
But any omission error is highly regretted.

-Printer

## A NEW TEST MATERIAL FOR WHITLOCK'S CASTABILITY TEST

### Abstract

Base metal alloys currently occupy the major portions of the fixed prosthesis alloy market. One of the main problems associated with base metal alloy is their castability. Determining an appropriate method to measure the castability of dental alloy is often controversial. Many different patterns have been used in studies to measure the castability. The purpose of this study was to evaluate the new material used to obtain test pattern for Whitlock's mesh design on the relative castability of alloys commonly used to make ceramometal restorations in our institution. Results suggest that the new material for Whitlock's test pattern is efficient in discriminating among the alloys and Whitlock's test is a valuable laboratory tool for designing new alloys.

### Key Words

Castability, Castability tests, Mesh monitor test, Test patterns, Base metal alloys, Elements.

<sup>1</sup> R.Murali

<sup>2</sup> Abdul Aziz Al Khuraif

<sup>1</sup> Reader, Dept of Prosthodontics  
Sinhgad Dental College and Hospital Pune,  
Maharashtra, India. 91-9623040700  
murallee.dr@gmail.com

<sup>2</sup> Chairman & Head, Dept of Oral Health  
Sciences King Saud University Riyadh,  
Saudi Arabia  
khuraif@yahoo.com

### Address For Correspondence:

R.Murali

Reader, Dept of Prosthodontics  
Sinhgad Dental College and Hospital Pune,  
Maharashtra, India. 91-9623040700  
murallee.dr@gmail.com

Date of Submission : 7-Sep-10

Date of Acceptance : 22-Oct-10

### INTRODUCTION

Baran defines castability as the ability of an alloy to faithfully reproduce the sharp details and fine margin of a wax pattern<sup>1</sup>. Castability plays an important role in selection of an alloy for dental restorations. Castability tests are valuable aid in evaluation of techniques and products during research and development<sup>5</sup>.

Literature reviews suggested various patterns were used to measure the castability of an alloy. The various designs that have been created and proposed over the years include a spiral [Asgar K 1973]<sup>7</sup>, Nylon lines supported to a large cylindrical wax reservoir [Vincent et al 1977]<sup>14</sup>, a spring [Preston et al 1977]<sup>12</sup>, a sphere, a parallel walled cylinder, machined dies [Eden et al 1979]<sup>6</sup>, a blade [Nielsen and Shalitha 1980]<sup>7</sup>, a wedge [Barreto TM et al 1980]<sup>5</sup>, a polyester nylon mesh with equal squares [Whitlock et al 1981]<sup>5</sup>, a saucer [Asgar K and Arafaei 1985]<sup>7</sup>, and modification of nylon mesh concept.

Among the various design, the polyester nylon mesh design suggested by Whitlock is simple, easy to fabricate, can be done with normal equipments available in laboratory and quantitative information of an alloy can be obtained with this test<sup>5,7,12</sup>. Whitlock's castability test is reliable to compare different alloys and to tune the casting process for a given alloy. A square piece of polyester sieve cloth or plastic mesh pattern with a filament diameter of

0.3mm and contains equal squares is used to obtain test patterns for Whitlock's test<sup>5,7,10,11</sup>.

This study was designed to use Retention grid wax pattern instead of polyester sieve cloth or plastic mesh pattern as test patterns to compare the castability of three commonly used base metal alloys for ceramometal restorations in our institution.

### Materials and Methods.

A total of Thirty [30] castings were made with four alloys with different composition. Alloys studied were I bond O2, I bond NF, ME alloy [Table-1].

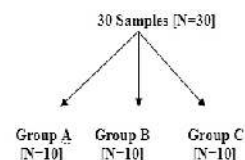
Out of thirty castings ten [10] castings were casted with each of three alloys studied [Flow chart-1].

Table-1 Alloys Studied

| No. | Alloys    | Manufacturer   | Composition  |
|-----|-----------|--|--|
| 1   | ME alloy  | Dentsply MEA and CIS, Surrey, UK. Ref 0937.          | Ni - 62%, Cr- 25%, Mo- 9.5%, Si- 3.5%.                       |
| 2   | I bond O2 | Interdent,Celje, Operkarniska 26, Batch no LOT 61009 | Ni- 65%, Cr- 22.6%, Mo-9.6%, Nb-1%, Si-1%, Fe-0.5%, Ce-0.3%. |
| 3   | I bond NF | Interdent,Celje, Operkarniska 26, Batch no LOT 96903 | Co-63%, Cr-24%, W-8%, MO-3%, Si-1%, Nb-1%.                   |

Flow chart-1

### Grouping

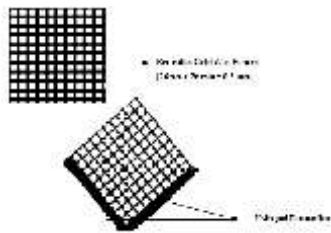


Group A = ME alloy.  
Group B = I bond O2.  
Group C = I bond NF.

The test patterns were made with retention grid wax pattern [Retention Snetze Grids, Dentaurem, Germany, Lot no 0799, 0.no. 110-101-00] measuring 26mm x 26mm x 0.3 mm in diameter [complies with dimensional requirements of ASTM No E-11-70] containing 100 equal squares and 220 segments. A V shaped

runner bar of 26mm length for each leg [2 mm round sprue wax] was used [Fig-1].

**Figure-1 Test Pattern**



After the patterns were sprued, surface tension-reducing liquid were sprayed over the patterns and invested in a carbon free phosphate bonded investment. Care was taken to assure that the top of each pattern was 6mm from the top of the investment<sup>12</sup>. The patterns were placed in a steel ring with one layer of asbestos free ring liner. [This is to permit greater freedom of expansion of the investment<sup>8</sup>. The investment [Intervest K+B speed, Interdent] were mixed according to manufacturer's recommendation under vacuum. All invested patterns were allowed to bench set for 60 minutes before burnout.

To facilitate rapid and clean burnout, the ring was placed on a raised object [Porcelain tooth was used] within the oven; this allows molten wax and gases to escape freely<sup>7,8</sup>. The invested ring was placed in the muffle furnace. The temperature was increased slowly. The casting ring was heat soaked at 950\*c for 60 minutes.

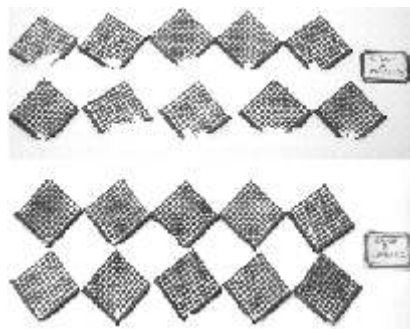
Induction casting machine was used. Separate crucibles were used for each alloy. The alloys were preheated according to manufacturer's instructions. The number of pellets was calculated according to Naylor's wax pattern to alloy weight conversion<sup>8</sup>. The centrifugal arm was balanced [600gms]. After the casting the ring was allowed to bench cool. The castings were devested, after careful devesting the castings were subjected to a uniform sandblasting treatment to remove residual investment particles. The total number of completely cast segments were counted, verified and recorded.

**RESULTS**

The Castings obtained with each alloy are shown in figure-2. The total no of cast-completed segments are recorded for each group and castability value for each sample were calculated by No of cast-completed segments/220 x 100 and tabulated [Table-2]. Mean and standard deviation were estimated for each study group. In Table-3 the mean castability value for each alloy is shown. The table revealed that mean castability value for ME alloy was 81.63%, for I bond O2 93.54% and for I bond NF 95.36%. Mean values were statistically compared by one-way ANOVA, followed by the Scheffe multiple comparison test at the 95% confidence level

[Table-4].

**Fig-2 Whitlock's Test Samples obtained by using retention grid wax pattern**



**Table-2 Castability value [Cv] of three alloys studied**

| Samples | ME Alloy | I bond O2 | I bond NF |
|---------|----------|-----------|-----------|
| 1       | 87.27    | 93.18     | 95.90     |
| 2       | 74.55    | 90.00     | 96.82     |
| 3       | 81.36    | 95.91     | 94.09     |
| 4       | 75.00    | 92.73     | 96.36     |
| 5       | 77.72    | 94.09     | 92.73     |
| 6       | 85.00    | 96.36     | 94.55     |
| 7       | 81.81    | 93.18     | 96.36     |
| 8       | 83.64    | 92.27     | 95.00     |
| 9       | 85.90    | 92.73     | 95.45     |
| 10      | 84.09    | 95.00     | 96.36z    |

**Table-3 Mean Castability value [Cv] of the alloys studied**

| Alloys Studied | Cv     |
|----------------|--------|
| ME alloy       | 81.63% |
| I bond O2      | 93.54% |
| I bond NF      | 95.36% |

**Table-4 Analysis of Variance [Mean values and Standard Deviation {in parenthesis}]**

| Alloys Studied | Castability Value Cv % |
|----------------|------------------------|
| ME alloy       | 81.6340{4.48}          |
| I bond O2      | 93.5450{1.87}          |
| I bond NF      | 95.3620{1.28}          |

**DISCUSSION**

Dental casting alloys should have the capability of being cast in thin sections of appropriate length. Regarding the casting of non-precious ceramic alloys, Asgar discussed the need for a meaningful test to measure an absolute value of fluidity or castability<sup>7,14</sup>. While other factors must be considered in the selection of an alloy for cast dental restorations, castability is of prime importance<sup>4</sup>. With the increased use of non-precious metals for ceramometal restorations, many new alloys have been developed. A simple, easy method of evaluating the castability and to tune the casting procedures of such alloy is often needed. Numerous studies agreed that Whitlock's castability test is best applied to compare different alloys and to improve the casting process for a given alloy<sup>2,5,7,10,11,13</sup>. Traditionally either polyester sieve cloth or plastic mesh is used to fabricate the test patterns for the Whitlock's test. The main problem by using this method is the procedural errors and difficult in standardization of wax patterns fabricated from these materials.

In the present study retention grid wax patterns were used to fabricate the test patterns. The retention grid wax pattern complies with the dimensional requirement of American society for testing and material E 11-70, Uniform filament size, and spacing assured. The test patterns used had the diagonal width of 26mm x 26mm and filament thickness of 0.3 mm, corresponds to the approximate length of three unit fixed partial denture<sup>7</sup>. The use of larger mesh pattern would be likely to result in greater temperature gradients during burnout in the narrowz isothermal zone of commercial burnout furnaces. The temperature gradient will continue during the casting process and may contribute to premature solidification toward the outer areas of the mold cavity. This condition may provide misleading information on true castability. The shape and dimension of wax pattern was chosen to offer a possibility for quantitative analysis of the data<sup>3,7,11,12,13</sup>.

This method of fabricating test patterns may helpful us in reducing procedural errors caused during the fabrication of wax patterns from sieve cloth or plastic mesh and standardization is very easy. It also saves time.

By modifying the traditional method of obtaining the test patterns, this study compared the castability of three base metal alloys with different composition, which are used for ceramometal restorations. The mean castability value of three alloys studied were ME alloy [81.63%], I bond O2 [93.54%], I bond NF [95.36%]. Analysis of variance indicates that there is significant castability difference exists between ME and NF, ME and O2. The greater castability value of O2 and NF might be due to the presence of minor constituents of elements like niobium, Aluminium, tungsten, cerium and the percentage of molybdenum, which is under 5% in NF whereas in the case of ME and O2 it is more than 9%.

The results of this study were in agreement with the studies of Bezzon et al, Jarvis et al, that non-beryllium alloys shows good castability<sup>6,7</sup>. This study also agrees the studies conducted by Hinman et al<sup>5</sup>, Presswood et al<sup>10,11</sup>, Peregrina et al<sup>7,12</sup>, that Whitlock's test is a reliable laboratory test for discriminating among the alloys. Also this study agrees with the results of Okuno et al<sup>9</sup> that the minor constituents like Nb, Al, W, Si, Ce increases the castability value of an alloy and Molybdenum percentage if exceeds beyond 5% it will reduce the castability value.

In this study only the castability of alloys was compared. Further studies are required to evaluate the clinical behaviour of the alloys and the quality of the castings.

#### SUMMARY AND CONCLUSION

A retention grid wax pattern of dimension 26 mm x 26mm x 0.3 mm was used as test pattern to evaluate the castability of three base metal alloys by Whitlock's test. The alloys included two nickel based alloys and one cobalt based alloy. Results of analysis of variance showed that at 95% confidence level there was a significant difference among nickel based alloy [ME] and cobalt based alloy [I bond NF].

Within the limitations of this study, the following points are concluded

1. Retention grid wax pattern is a reliable alternate for polyester sieve or plastic mesh for obtaining test patterns for Whitlock's test.
2. Whitlock's castability test is a valuable laboratory tool for designing new alloys, tuning casting procedures, discriminate among group of alloys.
3. Non-nickel alloy comparatively shows better castability.
4. Minor constituents of elements like Nb, Al, B, W, and Ce are required for better castability of base metal alloys.
5. Non-beryllium alloys shows good castability.

#### REFERENCES

1. Baran GR. The metallurgy of ni-cr alloys for

- fpd. *J Prosthet Dent* 1983; 50:639-50
2. Carreiro AFP et al. Evaluation of the castability of a Co-Cr-Mo-W alloy varying the investing technique. *Braz Dent J* 2005; 16[1]: 50-55.
3. Duncan JD. The casting accuracy of nickel chromium alloys for fixed prostheses. *J Prosthet Dent* 1982; 47[1]: 63-7.
4. Eugene WS. Casting technique for small castings. *Dent Clin North Am* 1965; Mar: 225-40.
5. Hinman RW, Tesk JA, Whitlock RP. A technique for characterizing casting behaviour of dental alloys. *J Prosthet Dent* 1985; 64:134-38.
6. Jenderson MD, Stocks CL. Casting procedures IN: *Dental laboratory procedures volume two*, 2nd Ed; The c.v.mosby company: st Louis, Toronto: 1986.p.219-37.
7. Murali R. A Comparative evaluation of two different castability tests to evaluate the castability of three different base metal alloys. Master's thesis, Dr MGR Medical University, INDIA, 2005.
8. Naylor WP. The fundamentals of spruing, investing and casting IN: *Introduction to metal ceramic technology*. Quintessence publishing co; Illinois: 1992.p.27-42.
9. Okuno O, Tesk JA, Penn R. Mesh monitor casting of Ni-Cr alloys: Elemental effects. *Dent Mater* 1989; 5[5]: 294-300.
10. Presswood RG, Skjonsby HS, Hopkins GA. Base metal alloy for ceramometal restorations. *J Prosthet Dent* 1980; 44[6]: 624-29.
11. Presswood RG. The castability of alloys for small castings. *J Prosthet Dent* 1983; 50[1]: 36-39.
12. Preston JD, Berger R. Some laboratory variables affecting ceramometal alloys. *Dent Clin North Am* 1997; 21[4]: 717-28.
13. Vermilyea SG, Kuffler MJ, Tamura JJ. Casting accuracy of base metal alloys. *J Prosthet Dent* 1983; 50[5]: 651-53.
14. Vincent PF, Stevens L, Basford KE. A comparison of the casting ability of precious and non precious alloys for porcelain veneering. *J Prosthet Dent* 1977; 37[5]: 527-36.

## Unemployed Residual Ridge

### Abstract

The construction of stable, functioning denture on unemployed residual ridges requires all of the prosthodontist's talent. The first thing that most dentists look at is the amount of residual bone that remains. It is important to know that successful dentures can be made even on flat ridges by slight modification in the impression technique and occlusal scheme. This presentation describes a modified impression technique and occlusal scheme used in patient with severe ridge resorption to construct a stable and retentive prosthesis for the purpose of restoring esthetic, function and tissue preservation.

### Key Words

Resorbed, Masticate, Impression, Articulator, Jaw Relations, Lingualize.

<sup>1</sup> Luthra RP, <sup>2</sup> Renu Gupta, <sup>3</sup> Divy Vashisht,  
<sup>4</sup> Naveen Sharma, <sup>5</sup> Ranjan Gupta

<sup>1</sup> Professor and Head  
H P Government Dental College And Hospital  
Shimla. (H P)

<sup>2</sup> Assistant Professor  
H P Government Dental College And Hospital  
Shimla. (H P)

<sup>3,4,5</sup> Senior Lecturer  
H P Government Dental College And Hospital  
Shimla. (H P)

### Address For Correspondence:

Luthra RP  
Dept of prosthodontics  
H P Government Dental College and hospital  
Shimla-171001(HP)

Date of Submission : 13-Dec-10

Date of Acceptance : 05-Jan-11

### INTRODUCTION

The highly resorbed residual ridge is the scourge of prosthodontist's. Swenson stated, "The ideal ridge is one that is broad on its bearing surface and has practically parallel sides"<sup>1</sup>. Seldom are these encountered by prosthodontist's. Deterioration of this ideal ridge is frequently accomplished before it exists, because of multiple factors, which may be local or systemic<sup>2</sup>. So the patients presenting with severe ridge resorption are relatively common today both in private office and teaching institutions. It is the poor retaining and supporting alveolar situation. The greatly increased maxilla-mandibular space further complicates the problem. Our objective is to construct a stable and retentive prosthesis for the purpose of restoring aesthetic, function and tissue preservation. The purpose of this article is to discuss how this can be achieved.

### A Case report:

A 70 year old male patient reported to department of prosthodontics, H P Govt. Dental College Shimla with chief complaint of loose upper and lower completes denture and inability to masticate food. He repeated the complete denture several times but the results were unsatisfactory. On examination it was found that patient had highly resorbed upper and lower ridges (fig 1 & 2), dentures were overextended, bases unstable with high vertical dimension of occlusion. A new denture was planned for this patient utilizing

modified impression technique and occlusal scheme to construct a stable, retentive and well functioning prosthesis.  
Technique<sup>3</sup>:

Fig 1



Fig 2



The main feature of this technique is that it makes use of selective tissue placement impression without the use of any wash material, for making final impression of the flat ridges. The basic

principle<sup>4</sup> is to utilize existing oral anatomy for the best results and prognosis. As stated by Sears "we do not take but we make impression" according to the needs of individual's oral cavity, taking into consideration anatomy, histology and physiology of the supporting and surrounding tissues to accommodate the tissues with variable degree of displaceability and form.

The initial impression (fig 3) was made with

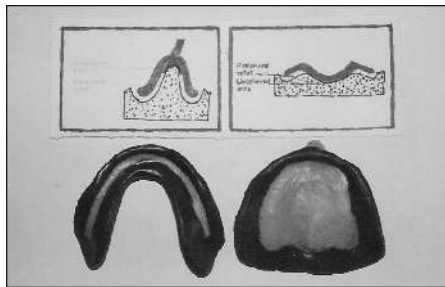
Fig 3



alginate in stock trays to capture the attached mucosa of the ridge crest with less tissue displacement effect. The primary casts were prepared from these alginate impressions. Autopolymerising acrylic resin (DPI India) special trays (fig 4) were prepared on primary casts giving relief on the peripheral borders and slopes of the ridges with single thickness of base plate wax. The peripheral borders of the special tray must be within 3mm of the desired denture periphery to adequately capture the peripheral sulcus area during border molding procedure.

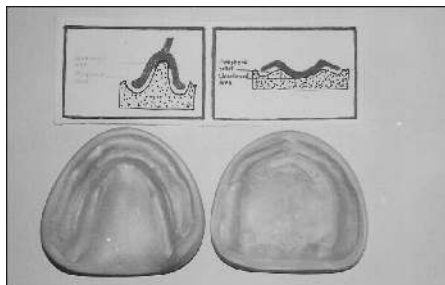
The unrelieved portion of the tray was closely adapted to the primary cast while making special tray, as it is the final impression for that area and no impression material is placed over this area and also it act as a positive stop and seat during border molding procedure.

Fig 4



The relieved area of the tray was functionally border molded with impression compound to capture the movable tissues on the peripheral sulcus area and slopes of the ridges with additional tissue placement effect, as it is the primary supporting and stress bearing area. This functionally border molded tray was the final impression without the use of any wash material.

Fig 5

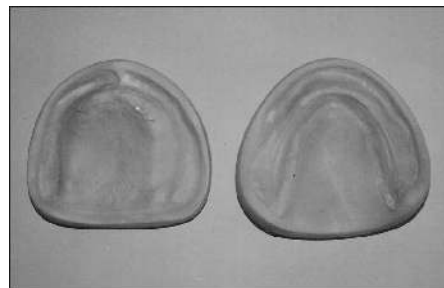


Advantages of this technique are:

1. The degree of retention and stability can be positively predicted prior to the final completion and different areas may be built up and reduced to develop maximum retention and stability through the use of impression compound.
2. The unrelieved portion of the custom tray covers a large area, so it helps in proper placement of the tray in each insertion and provides better stability and support during border molding procedure.
3. The technique offers selective tissue placement impression without the use of any wash impression which saves the cost and clinical time also.
4. The custom tray is rigid, properly contoured for each patient and is practical to use.

The final casts (fig 6) were prepared from these functionally border molded (fig 5) trays and articulated on semi adjustable articulator after recording the vertical and horizontal jaw relation records.

Fig 6



Modifications<sup>6</sup> made in the occlusal scheme were:

1. Incisal guidance was kept minimum taking into consideration aesthetics, phonetics and ridge relation.
2. 33° (anatomic) posterior teeth were used for maxillary denture to obtain the functional efficiency and 10° teeth were used for mandibular denture to prevent the locking of upper and lower denture during functional movements.
3. Bucco-lingual width of posterior teeth was decreased so as to decrease the force per unit area of the ridge.
4. Teeth were placed close to the base to prevent tipping leverage effect.
5. Lingualized concept of occlusion was used to increase the stability, comfort and to lingualize the occlusal forces.

After the trial, denture was fabricated and remounted on a semi adjustable articulator to refine the occlusion and then inserted.

#### POST INSERTION FOLLOW UP:

Patient was observed for one year in the post insertion phase with weekly appointments during 1st month and then regular appointments (three month appointment) up to one year. He was satisfied aesthetically as well as functionally.

Fig 7



#### CONCLUSION:

The basic principle is how to utilize the existing oral anatomy for best results and prognosis. To achieve success nothing can replace good judgement coupled with knowledge of basic fundamental principles. Allen Brewer stated that any of the several techniques and material will work if we understand what we want to capture and create. We should modify our procedures to

cope with the existing oral anatomy presented by each patient<sup>3</sup>. The technique used in this case was very helpful in patients with severe ridge resorption to construct a stable, retentive and well functional prosthesis.

#### REFERENCES:

1. Swenson M. complete denture. 2nd ed. St Louis. C.V Mosby PII: 1947.
2. Douglas C Wendt. The degenerative denture ridge care and treatment. J Prosthet Dent 1974; 477-89.
3. Alexander R Halperin. Mastering the art of complete denture. Quintessence; 1988: p 23-79.
4. Devan MM. basic principle of impression making. J Prosthet Dent 1952; 2-26.
5. Sears VH. Functional impression for rebasing full denture. J Am Dent Assoc 1936; 23:1031.
6. Desrajidins RP. Management of difficult lower denture. J Prosthet Dent 1974; 32: 243.
7. Sheldon Winkler. Essentials of complete denture prosthodontics. 1996: 2nd ed: p 226-27.
8. Boucher. Prosthodontic treatment for edentulous patients. 1997: 11th ed: p 141-82.

## Hemisection : Saviour of A Furcation Involved Tooth...

### Abstract

Traditionally the pathological furcation involvements of a tooth lead to several problems and eventually the loss of the involved tooth was thought to be inevitable if furcation involvement happened to progress to an advanced grade II or grade III type. However, ever since the advent of the hemisection procedure it has shown to be a reliable and viable alternative to extraction in such cases. This has led to its acceptability as a routine endodontic procedure for maintenance of natural dentition. This case study reveals that with the use of this technique, an advanced grade II or grade III furcation involved tooth can be managed and maintained in the oral cavity.

### Key Words

Hemisection, Root Resection, Root Amputation, Furcation Involvement

<sup>1</sup> Vandana Chhabra

<sup>2</sup> Ajay Chhabra

<sup>1</sup> Sr. Lec, SKSS Dental College, Ludhiana.

<sup>2</sup> Professor and Head,  
Bhojia Dental College, Baddi.

### Address For Correspondence:

Vandana Chhabra  
Sr. Lec, SKSS Dental College,  
Ludhiana.

Date of Submission : 9-Nov-2010

Date of Acceptance : 16-Nov-2010

### INTRODUCTION

The term tooth resection denotes the excision and removal of any segment of the tooth or a root with or without its accompanying crown portion<sup>1</sup>. Various resection procedures described are: root amputation, hemisection, radisection and bisection. Root amputation refers to removal of one or more roots of multi-rooted tooth while other roots are retained. Hemisection denotes removal or separation of root with its accompanying crown portion of mandibular molars. Radisection is a newer terminology employed exclusively for removal of roots of maxillary molars. Bisection or bicuspidization is the separation of mesial and distal roots of mandibular molars along with its crown portion, where both segments are retained individually<sup>2</sup>.

Bühler stated that hemisection should be considered before every molar extraction, because this procedure can provide a good, absolute and biological cost saving alternative with good long-term success. In addition, he reported that the failure rates of single-tooth all plastic (titanium) implants and hemisections are not substantially different.

Weine<sup>2</sup> has listed the following indications for tooth resection under endodontic and periodontal indications, as both factors may be responsible either individually or together for the condition.

### Periodontal Indications:-

- Severe vertical bone loss involving only one root of multi-rooted teeth.
- Through and through furcation destruction.
- Unfavourable proximity of roots of adjacent teeth, preventing adequate hygiene maintenance in proximal areas.
- Severe root exposure due to dehiscence.

### Endodontic and Restorative Indications:-

- Prosthetic failure of abutments within a splint: If a single or multirooted tooth is periodontally involved within a fixed bridge, instead of removing the entire bridge, if the remaining abutment support is sufficient, the root of the involved tooth is extracted.
- Endodontic failure: Hemisection is useful when there is perforation of the pulpal floor or in the canal system in one of the roots which is inoperable.
- Vertical fracture of one root in a multirooted tooth. The offending root in this case may be amputated.
- Severe destructive process: which may occur either due to furcation, sub gingival caries or may result from trauma from occlusion.

Farshchian and Kaiser illustrated the success of a molar bisection with subsequent bicuspidization. They stated that the success of bicuspidization depends on three factors:-

- Stability of, and adequate bone support for, the individual tooth sections.
- Absence of severe root fluting of the distal

aspect of the mesial root or mesial aspect of the distal root.

- Adequate separation of the mesial and distal roots, to enable the creation of an acceptable embrasure for effective oral hygiene.

At the same time it must be kept in mind that hemisection like any other restorative procedure has its limitations. The contraindications to hemisection include:-

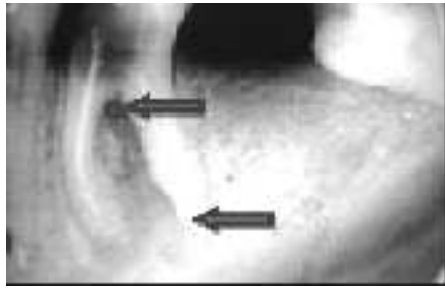
- Inoperable canal systems in the root to be retained.
- Strong adjacent teeth available as abutments to serve as alternatives to hemisection.
- Root fusion making hemisection impossible.

It is nicely summed up by Newell according to whom the advantage of the amputation, hemisection or bisection is the retention of some or the entire tooth. However, the disadvantage is that the remaining root must undergo endodontic therapy and the crown must undergo restorative management.

### Case Report

A 32 yr old patient reported with the chief complaint of pain in a tooth previously treated by root canal therapy. The offending tooth was identified as the left mandibular first molar i.e. tooth number 36. It was found to be tender on percussion (both lateral and vertical). A diagnostic radiograph was taken which revealed that the tooth was improperly obturated and also had grade II furcation involvement. These changes can be appreciated in figure 1 below.

Fig-1



It was decided to retreat the tooth endodontically and use the hemisection procedure to retain the tooth<sup>7</sup>. The patient was willing to accept the treatment as an alternative to extraction. A general outline of the treatment procedure undertaken in the following case study is as described under:-

First, under local anaesthesia, the area with the defect is probed to determine the extent & outline of the alveolar bone destruction around the root & half of the crown to be removed. A radiograph was taken to aid in visualization and accurate estimation of the size and location of the defect.

Once the diagnosis phase was completed, endodontic therapy for was initiated. The existing gutta percha was removed from the canals using chloroform as a solvent. The canal was then re prepared using conventional stainless steel (SS) files in the step back fashion. The obturation was carried out using lateral condensation and gutta percha (Figure 2). The pulp chamber was filled with IRM to facilitate later placement of an endodontic post (Figure 3). This marked the completion of the endodontic phase. The insertion of the self-threaded post was indicated as a result of the excessive loss of crown structure that would have been inadequate by itself to provide support. The insertion of the post was carried out after the surgical phase and the removal of the mesial root.

Fig-2

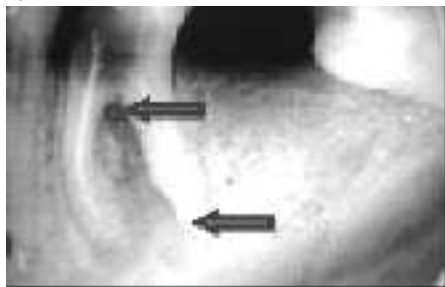
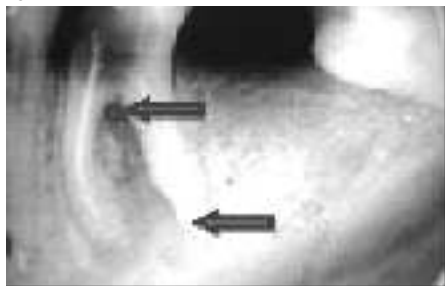


Fig-3

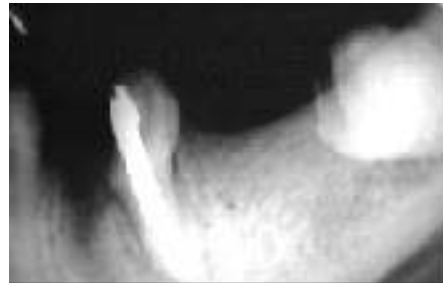


In the surgical phase that followed, a crevicular incision was made and a full thickness mucoperiosteal flap was raised to expose the underlying bony defect. Once the flap was raised the area of bone loss became apparent. The granulation tissue was then removed using curettes to expose the bone. To separate the crown the vertical cut method was applied, with a contrangled hand piece & cross cut bur, the cut was placed in an apical direction up to the approximate position of the bifurcation area. A fine probe was passed through the cut to ensure separation<sup>3, 4</sup>. Now the mesial half of the tooth was removed and remaining surface was shaped to provide a self-cleansable margin for the crown that would follow. Subsequently the area was cleaned by using saline irrigation. Any sharp bony prominences were trimmed to prevent further periodontal destruction (Figure 4). After the replacement of the flap, 3-0 silk sutures were used to hold it in place. It was then covered with a periodontal pack.

Fig-4



Fig-5



After a 15 day recall when it was ascertained that the hemisection procedure was successful and that adequate healing had occurred the procedure for insertion of an endodontic post was carried out. The choice was that of a self shearing post which would provide adequate retention for the crown to follow. The coronal GP was removed using GG drills and post space was created. A radiograph after post insertion was taken (Figure 5). Figure 6 shows a post operative photograph of the same patient.

The tooth was now deemed ready to accept a four unit FPD extending from the mandibular left second

Fig-6



Fig-7



premolar to the third molar on the same side, replacing the missing second molar as well (figure 7). An important feature in the bridge design was the placement of a hygienic pontic over the hemisected tooth (36). This provides a self cleansable area and facilitates good periodontal health in the area. Also the occlusal table was lowered to ensure even distribution of the masticatory forces along the long axis of the remaining distal root of the mandibular molar, thus helping in minimizing the destructive forces. The cuspal inclines were made less steep to reduce the number of laterally directed forces.

Fig-8



Figure 8 shows the 1-month recall radiograph, complete with post and core with a four unit FPD in place. The patient was totally asymptomatic.

### DISCUSSION

Like any other clinical procedure, the success or failure of a hemisection procedure depends on good case selection and diagnosis as much as it does on effectively carrying out the procedure. Thus whenever the procedure is indicated some important factors must be taken into consideration. These broadly include<sup>3</sup> the following parameters that are used to assess the ease & efficiency of the procedure followed are: -

- Bone loss: - Advanced bone loss around one tooth with an acceptable level of bone around the remaining roots.



- Angulations & position of the tooth in the arch: - A molar that is buccally, lingually, mesially or distally tilted cannot be resected.
- † Divergence of the roots: - Teeth with divergent roots are easier to resect, whereas teeth with closely approximated or fused roots are poor candidates.
- Length and curvature of roots: - Long, straight roots are far more favourable for this procedure than short conical roots.
- † The feasibility of endodontic & restorative dentistry: - If the endodontic treatment & crown restoration are not possible, the tooth is not a candidate for resective therapy.
- Also one must keep in mind that any form of surgery however minor is always associated with apprehension and anxiety for the patient, therefore alternatives must always be kept in mind. Sometimes a successfully performed procedure may have its prognosis disrupted by postoperative decay or failure may even result from excessive and deleterious occlusal forces.

### CONCLUSION

If performed correctly and in judiciously selected cases hemisection can be expected to have a prognosis as good as any conventional endodontic or restorative procedure. With its wide acceptance in the field of general practice hemisection has emerged as a suitable alternative to extraction in case of grade II and grade III furcation involved teeth which otherwise would have had a hopeless prognosis. Teeth so treated have been known to maintain their position in the oral cavity over extended periods of time while serving all the functional requirements asked of it.

### REFERENCES

1. Basaraba N. Root Amputation and tooth hemisection. Dent Clin of N Amer 1969;13 : 121
2. Weine FS. Endodontic Therapy, 5th Edition.
3. Hemisection- report and review; Parmar and Vashi 2003
4. Ingle JI and Bakland LK. Endodontics, 4th Edition.
5. Carranza and Newman. Clinical Periodontology, 8th edition WB. Saunders Co., Philadelphia.
6. Staffileno HJ. Surgical treatment of Furca Invasion, Dent Clin of N Amer 1969; 103-119.
7. Kost WJ, Stakiw JE. Root amputation and hemisection; J. Canad Dent Assoc 1991; 57: 42-5.
8. Biesterfeld RC and Taintar JF : Endodontic considerations related to hemisection and root amputation. N W Dent 1978;157:142-148.
9. Ross IF and Thompson RH. : A long term study of
10. Root retention in the treatment of maxillary molars with furcation involvement. J Periodontol; 49: 238-244.

## Management of Bilateral Maxillary Buccal Canine Impaction with Variable Prognosis : A Case Report

### Abstract

Treatment planning decision regarding management of canine impaction depends upon various factors. One of the critical variable is the prognosis of the impacted canine on the basis of viability of relocating and traction of the canine into its normal position. Here a case report is presented where two maxillary canines are impacted but different in location to adjacent teeth and hence bearing variable prognosis. While one of the canine could be aligned to its normal position, the other had to be extracted.

### Key Words

Impaction, Radiation, Haemostasis

<sup>1</sup> Anup Kanase

<sup>2</sup> Anil Nafria

<sup>1</sup> Associate Professor, Department of Orthodontics and Dentofacial Orthopaedics, Maulana azad institute of Dental Sciences, New Delhi -110002

<sup>2</sup> Senior Resident, Department of Orthodontics and Dentofacial Orthopaedics, Maulana azad institute of Dental Sciences New Delhi -110002

### Address For Correspondence:

Anup Kanase,  
Associate Professor, Department of Orthodontics and Dentofacial Orthopaedics, Maulana azad institute of Dental Sciences, New Delhi -110002

Date of Submission : 25-Oct-2010

Date of Acceptance : 12-Jan-2011

### INTRODUCTION

Impaction of tooth is a retardation or halt in the normal process of eruption. In contemporary view an impacted tooth is one "whose eruption is considerably delayed, and for which there is clinical or radiographic evidence that further eruption may not take place".<sup>1</sup> Kuflinec states impaction is a condition in which a tooth is embedded in the alveolus so that its eruption is prevented or the tooth is locked in position by bone or by the adjacent teeth. <sup>2</sup> Hence, an impacted tooth is the one that fails to erupt into a normal functional position past its root formation which may be attributable to physical impedance (other tooth or surrounding soft or hard tissue), ankylosis, a systemic cause or primary failure of eruption.

Permanent maxillary canines are the second most frequently impacted teeth; the prevalence of their impaction is 1-3% in the general population.<sup>3</sup> Methods of diagnosis that may allow for early detection and prevention should include a family history, visual and tactile clinical examinations by the age of 9-10 years and a thorough radiographic assessment.

A canine is considered as being impacted if it was unerupted after complete root development or if the contra lateral tooth was erupted for at least 6 months with complete root formation. <sup>4</sup> The maxillary canine is normally not palpable in the buccal sulcus at 8-9 years of age. A spontaneous correction of palatally placed canines up to the

age of 10 years is considered highly probable. <sup>5</sup> Therefore, if a maxillary canine is not palpable after 10 years of age one should start to suspect impaction. Clinical variables such as sex and dental age of the remaining teeth should be considered and the chronological age of the child should not be the lone diagnostic criteria.

### Radiographic assessment

1. A single periapical film provides the clinician with a two-dimensional representation of the dentition. In other words, it would relate the canine to the neighboring teeth both mesiodistally and superoinferiorly. To evaluate the position of the canine buccolingually, a second periapical film should be obtained by one of the following methods.

- a. Tube-shift technique or Clark's rule. Two periapical films are taken of the same area, with the horizontal angulation of the cone changed when the second film is taken. If the object in question moves in the same direction as the cone, it is lingually positioned. If the object moves in the opposite direction, it is situated closer to the source of radiation and is therefore buccally located.
- b. Buccal-object rule. If the vertical angulation of the cone is changed by approximately 20° in two successive periapical films, the buccal object will move in the direction opposite the source of radiation. On the other hand, the lingual object will move in the same direction as the source of radiation. The basic principle

of this technique deals with the foreshortening and elongation of the images of the films.

Occlusal films also help determine the buccolingual position of the impacted canine in conjunction with the periapical films, provided that the image of the impacted canine is not superimposed on the other teeth.

According to Orton et al <sup>6</sup> the lateral cephalogram offers information about 3 aspects of unerupted maxillary canines: (1) inclination of the tooth axis, (2) height of the unerupted canine tip relative to the occlusal plane, and (3) sagittal position of unerupted canines relative to the incisor roots.

Methods of diagnosis that may allow for early detection and prevention should include a family history, visual and tactile clinical examinations by the age of 9-10 years and a thorough radiographic assessment. The management of these impacted canines include (i) interception by extraction of deciduous teeth, (ii) extraction of permanent impacted tooth with poor prognosis and (iii) exposure with orthodontic traction.

The following case report demonstrates how bilaterally impacted maxillary canines in same case were managed with different approach due to different prognosis.

**Manju, a 15 yr** old female patient reported in the orthodontic clinic 25 months back, with the chief

complaint of crowded upper and lower front teeth. Extra-oral examination (fig1,2&3.) revealed the patient had an apparently symmetrical mesoprosopic face form, competent lips, straight facial profile .

**Fig1. Extraoral profile view of the patient (right side).**



**Fig2. . Extraoral profile view of the patient (Left side).**



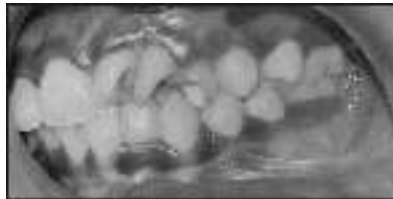
**Fig3. Fig.3. Extra oral frontal view of the patient (right side).**



Intra-oral examination (fig 4,5&6) revealed

healthy Periodontium with melanin pigmentation of attached gingivae and the presence of full complement of teeth except third molars, mandibular right second premolar and maxillary canines in the arches, Angle's Class I first permanent molar relation, upright upper and lower incisor with mild crowding in the lower anterior segment. There were retained 53 and 63 while 21 and 22 were rotated, and adjacent deciduous canine was carious, restored and discolored. The upper midline was shifted to the right. Functional examination of patient showed normal speech pattern, oro-nasal breathing and typical swallowing pattern. The path of closure of mandible was normal without any deviation and there were no other associated signs or symptoms of TMD.

**Fig.4.Intraoral buccal view of the patient (left side) showing Class 1 molar relation and left deciduous canine and rotated upper left lateral and central incisor**



**Fig.5. Intraoral buccal view of the patient (right side) showing Class 1 molar relation and right deciduous canine.**



**Fig.6. Intraoral frontal view of occlusion of the patient.**



**Cephalometric analysis (fig 7)** revealed that patient was in CVMI stage V had Class I skeletal bases. The low mandibular plane angle depicted horizontal growth pattern of the mandible. Maxillary and mandibular incisors were positioned normally.OPG(fig 8) reveals all teeth second molar to second molar except 2nd mandibular right premolar. 13 and 23 were impacted.21 endodontically treated with resorbed root. 22 show dilacerated roots. Occlusal view (fig 9)confirmed the impaction of the 13 and 23. The impacted teeth were angulated

mesially in the buccal region.

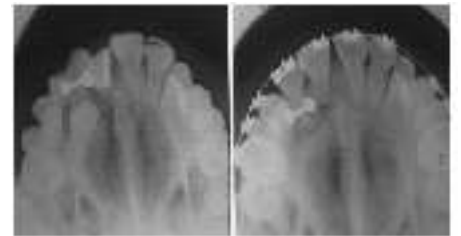
**Fig.7. Lateral cephalogram with teeth in occlusion.**



**Fig. 8. Orthopantomograph showing the position of canine. It should be noted that the right and left permanent maxillary canines are impacted but are present in different location with respect to adjacent lateral incisor. On the right side the canine is in sector I**



and on the left side the canine is in sector IV.



**Fig .9. Pre treatment and midtreatment occlusal view of maxilla .Note in the mid-treatment occlusal view the right side permanent canine could be easily aligned and positioned in the arch while the left side permanent canine is missing as it was extracted due to unfavourable prognosis. The treatment plan was to extract 23,53 and 63**

due to poor prognosis and disimpaction of 13, followed by guiding the right maxillary canine into its natural position with the help of orthodontic traction force.

At the end of the treatment the following objectives were achieved

- 13 deimpacted and aligned in the arch
- Crowding relieved
- Normal Overjet and overbite achieved
- Class I molar relationship retained

### Discussion

According to a study, interceptive extraction of the primary canine resolves permanent canine impaction in 62% of cases and 17% show improvement in their position. 7 A major predictor of success is the relationship of tip of the permanent canine crown with the roots of lateral incisors: those distal to lateral incisors have better chances of successful eruption than which are more mesially positioned.<sup>8</sup>

Surgical removal of the tooth is indicated if there is poor prognosis, patient co-operation or poor position for alignment (canine in an oblique or horizontal position). Ideally, there should be a good lateral incisor/first premolar contact. In cases where the patient is willing to undergo comprehensive treatment, it is possible to use the first premolar as a adequate replacement for the canine. Grinding of the premolar palatal cusp is also necessary.

Surgically assisted orthodontic guidance is required when a definite diagnosis of impaction has been made, and all possibilities of its natural eruption have been exhausted. Surgically assisted orthodontic guidance of eruption is usually considered after complete root apex formation.<sup>9</sup>

To guide the eruption of tooth, first a large periodontal flap with mucoperiosteum is raised a very careful chiseling on bone is done, based on earlier radiological assessment and palpation of maxillary bone to locate the canine. The bone is carefully removed preferably towards the crown tip. Efforts are made not to uncover CE junction or disturb periodontal fibers. Great care is taken not to disturb the neighboring teeth. Once the crown is exposed a bonding attachment with a well fitting contour with tooth surface is selected and bonded to tooth with direct bonding technique. To prevent tearing of flap and buttonholing the attachment should preferably be the one with low profile and minimal labiolingual thickness.

The most critical aspect of the procedure is maintenance of moisture free environment for successful bonding. Very small pieces of gauze soaked in local anesthesia with adrenaline, pushed into space between tooth and bone created by removal of tooth follicle helps in local

haemostasis. For maintaining moisture free tooth surface a powerful suction and continuous flow of air gently blown over the tooth crown surface.

The force of traction is directed at the centre of crest of the alveolar ridge. Light forces of magnitude 20- 60gm should be applied to align the canine. Niti coil Spring is used for this purpose. The flap is closed with sutures and patient is reviewed after a week.

### Conclusion

Maxillary canine impaction can be treated successfully by adhering to a strict protocol and careful technique as demonstrated by the abovementioned case report.

### References

1. Mason C, Papadakou P, Roberts GJ. The radiographic localization of impacted maxillary canines: a comparison of methods. *Eur J Orthod.* 2001; 23:25-34.
2. Kufinec MM, Stom D, Shapira Y. The impacted maxillary canine: I. Review of concepts. *ASDC J Dent Child.* 1995; 62: 5. 317-324.
3. Bishara SE. Clinical management of impacted maxillary canines. *Semin Orthod* 1998;4:87-98.
4. Lindauer SJ, Rubenstein LK, Hang WM, Andersen WC, Isaacson RJ. Canine impaction identified early with panoramic radiographs. *J Am Dent Assoc* 1992; 123:91-97.
5. Ericson S, Kurol J. Early treatment of palatally erupting maxillary canines by extraction of the primary canines. *Eur J Orthod* 1988 ;10: 283-295.
6. Orton HS, Garvey MT, Pearson MH. Extrusion of the ectopic maxillary canine using a lower removable appliance. *Am J Orthod Dentofacial Orthop* 1995; 107:349-359.
7. Power SM, Short MB. An investigation into the response of palatally displaced canines to the removal of deciduous canines and an assessment of factors contributing to favorable eruption. *Br J Orthod* 1993;20:217-23.
8. Ericsons and Kurol J. Early treatment of palatally erupting maxillary canines by extractions of primary canines. *Eur J Orthod* 1988;10:283-95.
9. Kokich VG, Mathews DP surgical and orthodontic management of impacted teeth. *Dent Clin North Amc* 1993;37:181-204

## A Customized Intraoral Radiation Carrier For Edentulous Patient: Clinical Report

### Abstract

Prostheses used in the oral and paraoral regions for radiotherapy have been described and classified as locators, stents, and carriers. Radiotherapists recognize that treatment with these aids is easier and more accurate. This article describes method of fabrication of customized radiation carrier for a edentulous patient who is having squamous cell carcinoma in the region of Mandibular anterior alveolus. This radiation carrier ensures maximal therapeutic radiations to the desired location and in addition sparing the normal surrounding tissues due to rapid fall-off radioactivity and thus minimizes posttreatment sequelae of irradiation like mucositis, erythema, xerostomia etc.

### Key Words

Intracavitary, Brachytherapy, Radiooncologist

<sup>1</sup> Jain Deshraj  
<sup>2</sup> Juneja Pankul  
<sup>3</sup> Goel Gaurav

<sup>1</sup> M.D.S. Prof and Head, Department of Prosthodontics, Govt. College of Dentistry, Indore (M.P.), India

<sup>2</sup> PG Student, Department of Prosthodontics, Govt. College of Dentistry, Indore (M.P.), India

<sup>3</sup> M.D.S. Senior Lecturer Department of Prosthodontics, Institute of Dental Studies and Technology, Modinagar (U.P.), India

### Address For Correspondence:

Dr. Deshraj Jain,  
Address: Govt College of Dentistry Indore, M.P.  
Tel- 0731-2554955, 09425065020, Fax-0731-2701608  
E mail drdeshrajain@rediffmail.com

Date of Submission : 13-oct-2010

Date of Acceptance : 18-oct-2010

### INTRODUCTION :

Both surgery and radiation therapy are used in treatment of Squamous cell carcinoma (SCC). If an adequate margin of normal tissue can be obtained, surgery is the usual treatment, followed by radiation treatment. Alternatively, radiation may be used as a primary treatment followed by surgery salvage. Radiotherapy can be applied by external beam also known as brachytherapy. 1, 2

Brachytherapy can be divided into multiple categories: Interstitial, intracavitary, intraluminal, and surface applicator techniques. In addition, the application can be further subdivided depending upon the loading technique (preloading or after loading), the dose rate (low dose rate [LDR] or high dose rate [HDR]), and duration of the implant (temporary or permanent). In interstitial brachytherapy, the radioisotope is placed temporarily or permanently either into the tumor site or into bed. Intracavitary or intraluminal brachytherapy entails temporary application in a natural cavity near the tumor bed. Surface application has been more commonly applied intraoperatively after a gross total resection to the exposed tumor bed while shielding adjacent normal tissues. 3

The purpose of present clinical report is to describe the procedure of fabrication of "brachytherapy radiation carrier appliance(BRCA)" for the treatment of early stage SCC'S of the mandibular anterior alveolus. The carrier has been fabricated from auto polymerizing acrylic resin. Radiation carrier that will be worn must be carefully constructed to provide maximum patient comfort and correct

dose delivery to treatment area.

### CLINICAL REPORT

A 75 year old edentulous male was presented with a chief complaint of abnormal growth in lower front region of mouth since 3-4 months.(Fig 1) .On intraoral examination ,two nodular lesions in the region of anterior mandibular alveolar ridge (2 ×2 mm )and mucobuccal fold adjacent to It (3 ×4 mm) were observed . The biopsy of the lesion confirmed the diagnosis as SCC

Case was discussed with a radiation oncologist and brachytherapy with the aid of a BRCA was planned for the patient.



Fig 1. Preoperative photograph.

### PROCEDURE OF FABRICATION OF APPLIANCE

1. Maxillary and mandibular impressions were made with modeling plastic impression compound using stock trays. While making mandibular impression the lip was pulled out and the impression prudently extended to

cover the region of the neoplasm. Casts were prepared with dental stone. (Fig 2)

Fig 2. Definitive casts.



2. After fabricating the trial bases maxillomandibular relationship in vertical and horizontal planes were recorded and casts were mounted on a class II type A articulator. 4  
3. The appliance for the maxillary arch was fabricated with autopolymerising acrylic resin. The purpose of the maxillary appliance was to aid in the stabilization of the Mandibular appliance while the tongue was in position. To stabilize the tongue, an acrylic shaft was attached to the appliance.(Fig 3)

Fig 3. Maxillary appliance.



Mandibular appliance was fabricated with autopolymerising acrylic resin to cover the edentulous ridge along with the region of the lesion. (Fig.4) and both the appliances were tried in patient's mouth.(Fig 5)

**Fig 4. Mandibular appliance.**



**Fig 5. Appliance tried in patient's mouth for stability and comfort.**



5. The exact positions for placement of the nylon radiation carrying tubes were planned after careful discussion with the radiooncologist. (Fig. 6)

**Fig 6. Exact markings for nylon tube positioning.**

6. 3 grooves of approx. 5 mm diameter were placed on the tissue surface of the appliance with the help of a round bur for the placement of nylon tubes which would transport the radioactive source to the target site. These



grooves were placed approximately 1 cm distance from the margins and 1 cm from each other.

7. Nylon tubes were placed in grooves and secured in position with adhesive tape.

8. The appliance was tried in patient's mouth and checked for stability, position of the tubes and discomfort to the patient. (Fig. 7)

**Fig 7 .Definitive appliance in the patient's**



**mouth**

**DISCUSSION**

The use of custom-made acrylic resin radiation appliance can be a valuable adjunct to the radiation treatment of oral cancers. Because the anatomical locations of the lesions are usually inaccessible, so to provide radiotherapy the carrier appliance should have good retention; stability and support. Retentive clasps can be incorporated in the appliance, if required.

The presented BRCA allows consistent and stable direction of a radiation beam for treating intraoral lesions<sup>5</sup>. As the plastic tubes are positioned at the predetermined exact location by physicist and oncologist, the close proximity of the radiation source to the lesion radiation limits radiation scatter and helps assure a more constant beam to the radiation field thereby minimizing the side effects of radiotherapy. The delivery of radiotherapy through this appliance reduced discomfort of both oncologist and patient due to short immobilization period.

The presented procedure is a simple non-invasive procedure. Radiation exposure of treating and nursing staff is eliminated. In HDR, mold brachytherapy the radioactive source accurately positioned for the treatment of small lesion. The BRCA enables the radiotherapist to deliver a high dose of 50 Grays in 10 - 15 days. HDR mold brachytherapy eliminates the morbidity of surgery, preserving the function of salivary glands

The fabrication of splint for edentulous patient in two piece provide ease of placement by radiooncologist and patient .Placement of rod shaped acrylic resin in posterior part of upper appliance help in positioning the tongue in its position. Hence, this appliance can be called as radiation carrier as well as position maintaining device.

Moreover, the technique for fabrication of BRCA requires materials that are readily available and there is no need of special prosthodontic expertise laboratory procedures or expensive equipments. Minimal clinical time is required and appliance can be given to the patient in a single visit, hence treatment of the patient is not delayed because of the minimal time required for the fabrication of the appliance.

**SUMMARY**

The principles of fabricating an intraoral

radioactive carrier have been described to treat malignant disease of oral cavity .The prosthesis provides consistent direction and fixation of radioactive source into the same location.

**REFERENCES**

1. Adisman K , Desjardins R P. Use of the afterloading technique for intraoral radiation carriers. *J. Prosthet. Dent.* 1985; 53:676-678.
2. Shafer, Hine, Levy, Textbook of oral pathology. 5th edition p.161.
3. Anupama Sharma, Kenneth S. Kurtz, Kenneth M. Schweitzer, David R. Silken & Jonathan Beitler, A customized orofacial brachytherapy carrier: A clinical report. *J. Prosthet. Dent.* 2005; 93:24-27.
4. Winkler S, Essentials of complete denture prosthodontics. 2nd edition. p.142-154
5. Beumer J, Curtis TA, Marnick M T. Maxillofacial rehabilitation: Prosthodontic and surgical considerations. St. Louis: Medico dental media Intl Inc; 1979. p. 23 - 40

## Limited Mouth Opening, A Challenge In Complete Denture Prosthodontics: A Case Report

### Abstract

This article describes techniques used to fabricate mandibular and maxillary sectional trays and a complete denture for a patient with limited oral opening caused by oral submucous fibrosis. The literature contains various reports on the fabrication of sectional or hinged tray complete dentures, utilizing various mechanisms for connecting each of the components. A technique of a simplified and practical design for fabrication of mandibular and maxillary sectional trays and complete denture has been presented here; this technique utilizes components that are commonly available, to simplify the treatment modality of limited oral access to the prosthesis.

### Key Words

Limited Mouth Opening, Microstomia, Sectional Trays

<sup>1</sup> Bhupender Yadav

<sup>2</sup> Himanshu Aeran

<sup>3</sup> Mukesh Dhanda

<sup>4</sup> Chetan Chawla

<sup>1</sup> MDS (Prosthodontics), Senior Lecturer, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh.

<sup>2</sup> Himanshu Aeran MDS (Prosthodontics), Professor, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh.

<sup>3</sup> Mukesh Dhanda MDS (Prosthodontics), Professor and Head, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

<sup>4</sup> Chetan Chawla MDS (Prosthodontics), Professor, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

### Address For Correspondence:

Dr. Bhupender Yadav, Department of Prosthodontics, Seema Dental College, Rishikesh, India.  
E-mail: drbhupenderyadav@gmail.com

Date of Submission : 05-Oct-2010

Date of Acceptance : 06-Oct-2010

### INTRODUCTION

Limited mouth opening (microstomia) can be defined as a reduction in the perimeter of the oral cavity or an abnormally small orifice. In healthy individuals mouth opening is around 30-50mm. But when the mouth opening is limited to a maximum of 20mm, the individual is said to have a reduced mouth opening. Limited mouth opening in itself is not a disease but manifests as a consequence of certain conditions, namely, surgical treatment of oro-facial carcinomas, cleft lip, trauma and burns, Plummer-Vinson's syndrome, scleroderma, trismus, temporomandibular joint dysfunction syndrome, rheumatism, oral submucous fibrosis, or any damage to the masticatory muscles. Scleroderma is a disease that causes fibrosis by affecting the connective tissue and the blood vessels; it is believed to stem from a disorder of the immune system. Oral sub-mucous fibrosis is a pre-cancerous condition, chronic in nature, highlighted by fibrous transformation of juxta-epithelial layers which lead to mucosal rigidity & inability to open the mouth. Salivary secretion decreases due to tissue dehydration.

A maximal oral opening that is smaller than the size of a complete denture can make prosthetic treatment challenging. Several techniques have been described for use when either standard impression trays or the denture itself becomes too difficult to place and remove from the mouth. The literature contains reports on the fabrication of a

foldable, hinged posterior section with molar and premolar teeth and a second denture base on which anterior teeth were arranged. Sectional dentures have been recommended, with the denture pieces connected by clasps. McCord et al<sup>10</sup> described a maxillary complete denture consisting of 2 pieces joined by a stainless steel rod with a diameter of 1 mm fitted behind the central incisors.

During a prosthodontic procedure, it is the loaded impression tray that forms the bulkiest item requiring intraoral placement. This, compounded by the presence of limited mouth opening, makes the task of obtaining a proper path of tray placement a difficult and challenging procedure. In this article, a different design for the fabrication of mandibular and maxillary sectional trays is described. The technique was used for a patient whose oral opening was limited as a result of oral submucous fibrosis.

### CLINICAL REPORT

An edentulous lady, 65 years of age, had reported to the clinic with chief complaint of inability to open the mouth. (fig 1, 2) Her masticatory function was normal (fig 1, 2). She was suffering from this condition from last one year. On investigation it was found that she had some decayed teeth which were painful, and to suppress that she was advised to use tobacco and slowly it became a habit. All the decayed teeth were extracted later.

Fig.1



Fig.2



### EXTRA ORAL EXAMINATION

It revealed decreased lower facial height, decreased mouth opening only 2.5cm from upper lip to lower lip, toughened lips, restricted TMJ movement, with class III profilerelation.

### INTRA ORAL EXAMINATION

Examination revealed severely resorbed lower

ridge except for the canine to canine area. (Atwood classification class IV in mandibular and class III in maxillary arch). The cheek mucosa was taut. The tongue was large and the mouth was dry. Mucosa was pale and shining with a thinned soft palate, and an ill defined posterior palatal seal.

**IMPRESSION PROCEDURE**

The smallest trays were tried but failed to enter into the mouth. So impression compound (Y-Dent, MDM Corp. India) was kneaded and shaped approximating to the ridge shape and countered and loaded on the ridge at bearable temperature and impressions completed in both arches and cast were poured with type II dental plaster. (Neelkanth, India)

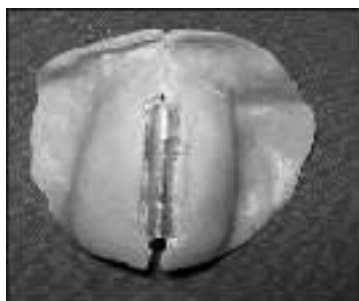
**Maxillary special tray fabrication**

A steel door hinge of length 20 mm, breadth 4 mm and a thickness of 1.5 mm) was selected. The preliminary cast was marked with lead pencil to give guidelines for the placement of the hinge. Cold mould seal was painted on the tissue surface of the cast. Using sprinkle- on method, auto-polymerising resin (RR, Dentsply, India) was sifted approximately to 2mm thickness. Two vertical locators were made on the outer surface of the tray over the ridge for cross- arch stabilisation and stabilized by a flat piece of wooden plank which was also used as handle. A vertical cut was made in the midline near the labial frenum, incisive papilla, mid-palatine raphe and posterior palatal seal area, so as to enable a folded special tray technique and tray was completed. (fig 3, fig 4)

Fig 3



Fig 4



Mandibular special tray:  
A hinge was made with 2 aluminium sheets of 16

mm length, 12mm breadth, and 0.5 mm thickness. Strip 'A' was taken moulded on the left side of the arch, to approximately 3 mm length and breadth. The centre part of the sheet was slit & the outer areas were folded towards the sheet where a metal wire was inserted which formed the centre of axis of the hinge. Strip 'B' was taken and moulded on the right side of the arch. The side were slit with approximately 3mm length & breadth leaving a central portion extending out.

This was folded towards the sheet with the wire in the centre which was fixed in strip A & the hinge was finished (fig 5). Cold mould seal was painted on the tissue side of the cast and the hinge was placed on the cast & auto polymerising resin was added onto it using sprinkle-on-method to approximately 2mm thickness. The tray was slit in the midline near the labial frenum, ridge and lingual frenum without damaging the metal part. The tray is now foldable to ease entry of it into the oral cavity. A small handle was constructed on the left side of the midline of the ridge and it helped in seating the tray perfectly on the ridge (fig 6).

Fig 5



Fig 6



**FINAL IMPRESSION**

**Maxillary arch:**

On the maxillary special tray, tray adhesive (Dentsply) was applied and medium body silicone (Reprosil, Dentsply Caulk, USA) was used in single step technique to take the impression of the border areas. After that the tray was loaded with impression material and placed in the oral cavity, once the left side of the tray was placed on the ridge, the right side was unfolded and pressed against the right side of the patient mouth. The tray was further stabilised by wooden stabiliser and border moulding was completed in single step (fig 7, 8). The tray was

then removed from the patient mouth and a slit was made in the mid-line with BP blade (no 3) where the hinge was present to make the tray foldable. Polyvinylsiloxane light body material (Reprosil Dentsply Caulk, USA) was loaded on the tray and same procedure as above was followed to stabilise and make the master impression. And it was removed from the mouth without any difficulty.

Fig 7



Fig 8



**Mandibular arch:**

The tray adhesive and single step tray moulding was done using R.W. Tench technique for impression for impression. Medium body material (Reprosil, Dentsply, Caulk USA) was loaded on to the tray and taken into the mouth in a folded fashion. First the tray was seated onto the left side, then using the handle the tray was unfolded and seated into the right side of the arch and border moulding was completed (fig 9). Then the tray was removed and slit was made in the hinge area and the light body polyvinylsiloxane material (Reprosil Dentsply Caulk, USA) was loaded on the tray and inserted in same way as above mentioned. Impression was completed and removed with tray unfolded and master cast were made. (fig 10)

Fig 9





**Fig 10**



### JAW RELATIONS AND TEETH ARRANGEMENT

Occlusal rims were made with shellac base plate (Pyrex, India) and modelling wax sheet (Y dent no 2, MDM Corp, India). Jaw relation record was made at reduced vertical dimension in static method with Niswonger's technique (fig 11). The patient exhibited a class III jaw ridge relation. The occlusal rims were fused in the mouth and taken out. Mounting of the cast & occlusal rim were done on a mean-value articulator. Teeth election was done (Acry Rock, Ruthinium) and arrangement was done in class III, edge-to-edge relationship in anterior region (fig 12). Second premolars were omitted from all four quadrants; the teeth were set in cross bite in posterior segment to increase stability and denture try-in was done.

**Fig 11**



**Fig 12**



The denture was fabricated with Ivoclar-Triplex material and extensions of all margins were checked for rough margins and they were polished and finished. Denture adhesive was applied on the tissue surface of the complete denture and inserted in the mouth. Initially, the patient had difficulty to place and remove the denture comfortably. But after 3-5 weeks she was

able to carry out these manoeuvres comfortably  
**Fig 13**



### DISCUSSION

Many methods have been tried to fabricate dentures for patient with restricted mouth opening. This effort was an indigenous idea to create a collapsible tray and make impression and fabricate the prosthesis for a patient who was suffering from oral submucous fibrosis. This technique shares disadvantages common to all sectional tray/prosthesis designs, namely, additional time, labor, and materials. However, to determine the long-term success of this technique, periodic recall, maintenance, and further improvements in design are needed.

### CONCLUSION

The patient who comes with a debilitating problem should be mentally prepared about the possible outcome of the limitations. Sincere efforts should be done both by the dentist and the patient at every stage so a functionally acceptable prosthesis can be attained as a success of our hard work.

### REFERENCES

1. Acuri M.R, Elike L, Deets K, maxillary sectional tray technique for microstomia patients; Quintessence dental Technol 1986;10:627-9.
2. Cura C, Cotert Hs, User A; Fabrication of a sectional impression tray and sectional complete denture for a patient with microstomia and trismus: a clinical report. J Prosthet Dent 2003;83:540-3
3. Benetti R Zupi A, Toffanin A; Prosthetic rehabilitation for a patient with microstomia a clinical report. J Prosthet Dent 2004;92:322-27
4. Laith Abd, Hana Abas; Treatment of an edentulous patient with surgically induced microstomia: A Clinical report; J Prosthet Dent 2002;87:423-26
5. Philip S. Baker, Robert L Brandt; impression procedure for patient with severely limited mouth opening; J Prosthet Dent 2000;84:241-44.
6. The glossary of prosthodontics 8th ed. J Prosthet Dent. 2005; 94:1-92.
7. Conroy B, Reitzik M. Prosthetic restoration in microstomia. J Prosthet Dent 1971; 26:324-7.
8. Al-Hadi LA. A simplified technique for prosthetic treatment of microstomia in a patient with scleroderma: a case report. Quintessence Int 1994;25:531-3.
9. Ohkubo, et al. Application of cast iron-

platinum keeper to a collapsible denture for a patient with constricted oral opening: A clinical report. J Prosthet Dent 2003; 90:6-9.

10. McCord JF, Tyson KW, Blair IS. A sectional complete denture for a patient with microstomia. J Prosthet Dent 1989; 61:645-7.

## INSIGHT TO THREE DIMENSIONAL IMAGING IN ENDODONTICS

### Abstract

Imaging modalities like Spiral computed tomography, Microcomputed tomography, Cone Beam computed tomography, and Tuned Aperture computerized tomography and Optical Coherence Tomography has gained lots of attention in endodontics. A PUBMED search (National Library of Medicine, NCBI; revised 30 June 2009 from 1989 to Dec 2009) was conducted. This search revealed 78 papers which were clinically relevant and were analysed in detail. The results of the review show that there is a lack of evidence-based Data on the radiation dose and patient selection criteria for these imaging modalities which call for a set of guideline for their future use in clinical practice of endodontics

### Key Words

Coherence, Tomography, Osteomyelitis

<sup>1</sup> Ashwani Dobhal  
<sup>2</sup> Dr. Anubha Agarwal  
<sup>3</sup> Dr. Sonia Gupta

<sup>1</sup> MDS Professor & HOD  
Dept of Conservative & Endodontics Seema Dental  
College & Hospital Rishikesh

<sup>2</sup> MBBS, DCH, DNB Medical Superintendent  
Metro Hospital & Heart Institute Meerut

<sup>3</sup> BDS Lecturer  
Seema Dental College & Hospital  
Rishikesh

### Address For Correspondence:

Dr. Ashwani Dobhal  
Seema Dental College & Hospital  
Rishikesh- 249203, Uttarakhand, INDIA  
Tel:+91-135-2453465, Fax: +91-135-2453743  
MOBILE NO. : 9412051404  
E-MAIL: aashwini\_dobhal@yahoo.com

Date of Submission : 01-Oct-2010

Date of Acceptance : 06-Oct-2010

### INTRODUCTION:-

Within the last 20 years, diagnostic digital modalities in dentistry, including periapical, bitewing, panoramic and cephalometric imaging, have been replacing conventional (filmbased) radiography. Drawbacks of two-dimensional (2-D) imaging include inherent magnification, distortion and overlap of anatomy. As early as the 1920s, manufacturers attempted to overcome the problems of 2-D imaging by devising movement of the source and

receptor in opposite directions to produce tomographic "slices" of oral and maxillofacial anatomy; this process is termed as "linear" or multidirectional tomography" which led to the introduction of micro CT (computed tomography), CBCBT, (Cone beam computed tomography), OCT(Optical coherence tomography) and " Tuned aperture tomography"(TACT). These techniques are as follows:-

**Computed Tomography** uses a fan shaped beam and multiple exposure around an object to reveal the internal architecture of the object. In this way the clinician can view the morphological features as well as pathology from different three dimensional perspectives. However, if ratio opaque materials are present, there can be scattering and creation of artifacts which can significantly hamper visualization.<sup>1</sup>

**Cone Beam Computed Tomography(CBCT)** or Volumetric CT a relatively new diagnostic imaging modality, has been used in endodontic imaging recently. This modality uses a cone beam instead of a fan shaped beam acquiring

images of entire volume. It offers high resolution , isotropic images for effective evaluation of root canal morphology.<sup>2</sup>

**Optical Coherence Tomography** is a new diagnostic imaging technology that was first introduced in 1991.<sup>3</sup>OCT combines the principles of an ultrasound with the imaging performance of a microscope. OCT uses infra red light waves that reflect off the internal micro structure within the biological tissues. Using the principle of low coherence interferometry it achieves depth resolution of the order of 10µm and in plane resolution similar to the optical microscope. By scanning the probe along the imaged specimen while acquiring image lines, a two dimensional or three dimensional image is built up

**Tuned Aperture Computed Tomography (TACT)** is a flexible 3D imaging method that converts any number of 3D projections produced from any number of arbitrary or even unknown projection source positions and angles into a true 3D image. The image produced is similar to viewing the original object with unlimited visual access through a window or aperture whose size is determined by the original projection. Such 3D displays could be useful for caries/ demineralization detection and in the determination of root fractures especially vertical fractures. Three dimensional technology enables reconstructions, with suitable enhancement and refining of the digital image, form upto 7 images of the region of interest at different angles. At the moment the development of TACT in dentistry is centered on using a panoramic system as the radiation source.<sup>4,5,6</sup>

### Ultrasonography With Color Doppler

Ultrasonography can give an idea about the nature and dimension of lesion which helps in pre-operative assessment and treatment planning.<sup>7,8</sup>

How ever, here we are discussing the most commonly used techniques and presenting case reports in relation to them.

### Computed Tomography

CT endodontic applications were first reported by Tachibana and Natsumoto in 1990.<sup>9</sup> They reported that CT had only limited usefulness in endodontics as a result of inadequate image detail and a high cost. However one distinct advantage of CT is that it allow for 3-D construction of root canal systems (RCSs).<sup>10</sup> 3D information along with tactile feedback during instrumentation gives the clinician more understanding of true morphology of RCSs.

Some CT software programs add colour enhancement features to highlight pathological lesions from normal anatomic structures. CT images have the ability to show the slices of the given tissue, with each tissue thickness and location chosen by the operator. Therefore CT would enable the operator to look at the multiple slices of tooth roots and there RCSs.<sup>1</sup> CT has been suggested as the preferential imaging modality in difficult situations demanding localistaion and description of RCSs because of its ability to render 3D information.<sup>11</sup>

Micro CT has been evaluated in endodontic imaging. Comparison of the effects of

biomechanical preparation on canal volume on reconstructed root canals in vitro using micro CT shown to assist with characterization of morphological changes associated with these techniques.<sup>12,13</sup>

Micro CT imaging of filled root canals showed it to be a highly accurate and non destructive method of evaluation of root canal filling and their constituents. Qualitative and quantitative correlation between histological and micro CT examination of root canals filling was high.<sup>13,14</sup>

CT may play an important role in optimizing palatal root end surgery through vestibular access, with regards to precision and preventing complications, with relatively low biological and economic cost, also possibly contributing to the affirmation of the new procedure.<sup>12</sup> Ebihara et al incorporated with 3D construction in the diagnosis and monitoring of the case of Garres's osteomyelitis managed by root canal treatment of a mandibular 2nd molar.<sup>15</sup>

Traditional radiographs could only determine the mesiodistal extent of the pathology and not the buccolingual extent.<sup>16</sup> trope et al in 1989 for the first time used CT scans for the differentiation of radicular cysts and granulomas. A cyst could be differentiated from the periapical granuloma by CT scans because of marked difference in density between the contents of the cyst cavity and granulomatous tissue.<sup>17</sup>

A major concern with the use of CT scan is its high radiation dosage. In a study<sup>18</sup> guidelines by Cristoph et al<sup>19</sup> were use, using these guidelines, effective radiation dosage reduced by this method was 0.56+/-0.06mGy, which was equivalent to a standard panoramic radiograph. The result of the study indicate that CT scan and ultrasound with power Doppler flowmetry can provide additional or alternate but more accurate diagnosis of periapical lesion with validity equivalent to histopathological diagnosis.

CT used to evaluate root canals prepared by nickel titanium(NITI)hand and steel hand endodontic instruments showed that the system used in the study provided a repeatable no invasive method of evaluating certain aspects of endodontic instrumentation.<sup>20</sup>

#### CASE REPORT WITH SPIRAL CT :

This report presents two cases of diagnosis of radix entomolaris and detection of mesiobuccal two (MB2) canal in retreatment case by spiral computerized tomography. In both the cases strict adherence to ALARA(as low as reasonably achievable) principle of radiation dose were maintained.

#### Case Report

A 23 year old male patient reported to the Department of Conservative Dentistry and Endodontics, Seema Dental College & Hospital, Rishikesh with a complaint of severe tenderness on biting pressure. Intraoral periapical radiograph revealed a small carious lesion in the distal surface of right mandibular first molar (46)

with a periodontal pocket of 3.5mm probing depth. Two outlines of distal roots are appreciated on a digital radiograph captured with Kodak CCD software. After obtaining a written consent from the patient a mandibular plane spiral CT (SOMATOM, ACCULITE SOFTWARE) was done with a pitch of 0.05mm. Spiral CT images clearly shown a distolingual root (Radix entomolaris) in the involved tooth.

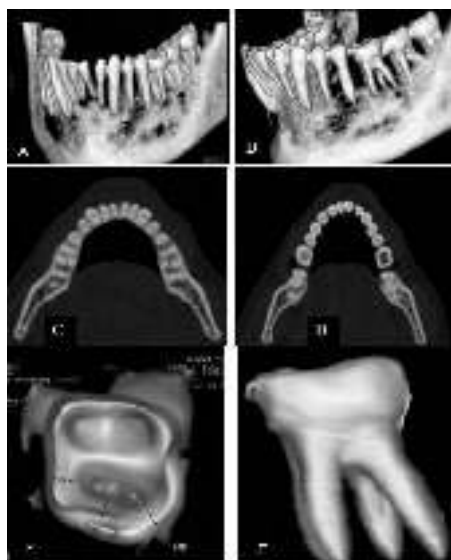
Figure 1: IOPA X- RAY



Figure 2 : EXTRA DISTOLINGUAL ROOT



Figure 3: SHOWING EXTRA



#### DISTOLINGUAL ROOT IN 46.

#### Ultrasonography With Color Doppler

Ultrasound with a colour Doppler is a proven, useful and non invasive diagnostic tool in endodontics. Periapical lesions accompanying

endodontic infection are usually diagnosed and treated based on the initial radiological findings.<sup>21</sup> Sometimes periapical surgery is necessary to eliminate and diagnose the cystic and non cystic nature of the lesion.

#### CASE REPORT WITH COLOR DOPPLER AND ULTRASONOGRAPHY Case Report :(FIG 4-9)

A 22 yr old male patient reported to the department of conservative dentistry and endodontics with a chief complaint of pain and swelling in maxillary anterior region. Periapical radiograph showed a large radioluscent area in the region of 21, 22.

An ultrasound examination was performed using the diagnostic ultrasound machine, HLS 9ED SONOACE 8000 LIVE\*/ EX PRIME (Medison America Inc. USA) with color doppler function, incorporating a high definition, multifrequency ultrasonic Probe ( 3D 3 5EK probe ) operating at a frequency of 0.60KHz (90 decibel). The probe position was changed in order to obtain transverse scans (axial plane) and longitudinal; scans (sagittal plane).

Colour Doppler was applied to detect internal vascularisation. The image was analysed by an expert ultrasonographer. A tentative differential diagnosis of periapical granuloma was agreed upon based upon the following principles.<sup>22</sup>

Granuloma: a poorly defined hypoechoic area, showing rich vascular supply on colour Doppler examination.

Cystic lesion: a hypoechoic well – contoured cavity surrounded by reinforced bone walls, filled with fluid and with no evidence of internal vascularisation on colour Doppler examination.

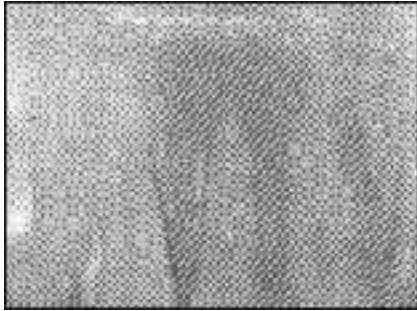
Mixed lesion : predominantly hypoechoic area with focal anechoic area, showing vascularity in some areas on colour Doppler Examination.

Following conventional principles of periradicular surgery the case was operated and biopsies were obtained from the periapical areas.<sup>10,11,12,13,23,24</sup> Result of the biopsy was found to be a periapical granuloma as confirmed by ultrasound and colour Doppler.

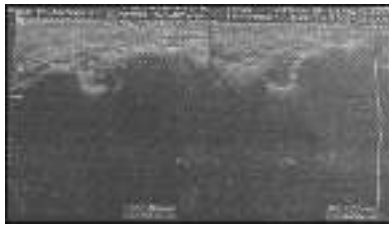


FIG 4- PREOPERATIVE PHOTOGRAPH

**FIG 5- IOPA RADIOGRAPH TOOTH NO 21,22 WITH PERIAPICAL LESION**



**FIG 6-ULTRASONOGRAM IN 21,22 REGION**



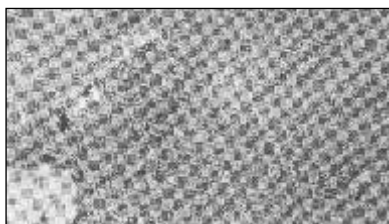
**FIG7- ULTRASONOGRAM WITH COLOUR DOPPLER SHOWING VASCULARISATION**



**FIG 8- 3D RECONSTRUCTED IMAGE OF GRANULOMA**



**FIG 9 - HISTOLOGICAL REPORT SHOWING GRANULOMATOUS TISSUE**



**CONCLUSION :**

Several advanced radiography techniques for the precise detection of the lesions and root canal systems have been in use in endodontics, namely

digital radiography, CBCT, OCT, CBCT, ultrasound etc. The use of novel imaging techniques is gaining a lot of attention in the field of endodontics but the need of the hour is to develop a cost effective chair side three dimensional imaging system for routine use..

**References-**

1. Brooks SL. Computed tomography. Dent Clin North Am 1993;37:575-90.
2. Nair MK, Nair UP. Digital and advanced imaging in endodontics, a review. J Endod, 2007, 33;1-6
3. Huang D, Swason EA, Lin CP et al. Optical coherence tomography . Science 1991;254;1178-81
4. Webber RL, Messura JK. An in vivo comparison of diagnostic information obtained from tuned aperture computed tomography and conventional dental radiographic imaging modalities Oral Surg Oral Med Oral Pathol Oral Radiol Endod 20203;96:223-8.
5. Nance R, Tyndall D, Levin LG. Identification of root canals in molars by tuned aperture computed tomography. Int Endod J 2000;33:392-6.
6. Nair MK, Nair UDP, Grondanl HG. Et al. Detction of artificially induced vertical fractures using tuned aperture computed tomography. Eur J Oral Sci 2001;109:375-9.
7. Cotti E, Campisi G, Ambu R , Dettori C. Ultrasound real time imaging in differential diagnosis of periapical lesions. Int Endod J 2003;36:556-563.
8. Cotti E, Campisi G, Garau V, Puddu G. Anew technique for the study of periapical bone lesion: ultrasound real time imaging. Int Endod J 2002;35:148-152
9. Tachibana H, Matsumutu K. Applicability of X-ray computerized tomography in endodontics. Endod Dent Traumatol 1990;6:16-20.
10. Dowker SEP, Davis GR, Elliot JC. X-ray microtomography: non destructive three dimensional imaging for in vitro endodontic studies. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1997;83:510-6.
11. Robinson S, Czerny C, Gahleinter A , Bernhart T et al .Dental CT evaluation of mandibular first premolar root configurations and canal variation. Oral Surg Oralmed Oral Pathol Oral Radiol Endod 2002;93:328-32.
12. Rigolone M, Pasqualini D, Bianchi I et al . Vestibular surgical access to the palatine root of superior first molar . “ low dose cone beam CT analysis of the pathway and its anatomic variations.” J Endod 2003;29:773-5.
13. Jung M, Lommel D, Klinek J. The imaging of root canal obturation using micro-CT. Int Endod J 2005;38:617-26.
14. Gullaume B, Lacoste JP, Gabroit N, et al. Micro computed tomography used in the analysis of morphology of root canals in extracted wisdom teeth. Br J Oral Maxillofac Surg 2006;44:240-4.
15. Ebihara A, Yoshioka T, Suda H. Garre’s osteomyelitis managed by root canal treatment of mandibular second molar: incorporation of

computed tomography with 3D reconstruction in diagnosis and monitoring of the disease. Int Endod J 2005;38:255-61.

16. Kaffe I, Gratt BM. Variation in radiographic interpretation of periapical dental lesions. J Endod 1988;14:330.
17. Trope M, Pettigrew J, Petras J et al. Differentiation of radicular cyst and granuloma using computerized tomography. Endod Dent Traumatol 1989;5:69-72
18. Agarwal V, Logani A, Shah M. Evaluation of computed tomography scans and ultrasound in the differential diagnosis of periapical lesions. K Endod 2008;34:1312-32.
19. Christoph GD, Wilfried Gh Britta R et al. Must radiation dose for CT of maxilla and mandible be higher than that for the panoramic radiography? Am Soc Neuroradiol 1996;96:1709-58.
20. Gambill Jm, Alder M, del Rio Ce: Comparison of NiTi and Stainless stell hand file instrumentation using computed tomography. J Endod 196;22:369-75 .
21. Gundappa M, Ng SY, Whaites EJ. Comparison of ultrasound digital and conventional radiograohy in differentiating periapical lesions. Dent max fac Radiol 2006;35:326-333.
22. Nielsen AB; Alayssin AM, Peters DD, Carnes DL, Lancaster J, microcomputed tomography: an advanced system for detailed endodontic research. J Endon 1995; 21; 561-8.
23. Rigolone M, Pasqualini D, Bianchi I et al . Vestibular surgical access to the palatine root of superior first molar . “ low dose cone beam CT ananlysis of the pathway and its anatomic variations.” J Endod 2003;29:773-5.
24. Velvart P, Hecker H, Tilinger G. Detection of apical lesion and mandibular canal in conventional radiography and computed tomography. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001;92:682-8.

## Ceramic Laminate Veneers: A Conservative Approach To Esthetics.

### Abstract

Ceramic laminate veneers have been developed as one of the best methods for conservative anterior esthetic restorations. In comparison to other veneer materials like composite resin, ceramic laminates offer various advantages like: Color stability, Life like translucency, High strength, Resistance to abrasion, Enhanced bond strength. This restorative modality can be used in a wide array of situations ranging from diastemata to age related changes. The case we present here showed generalized spacing in the maxillary anterior region following orthodontic treatment for malaligned teeth. Use of ceramic laminate veneers for the closure of diastemata spaces was planned. The final restoration resulted in an esthetically pleasing smile with complete closure of diastemata spaces.

### Key Words

Ceramic Laminate Veneer

<sup>1</sup> Mukesh Dhanda  
<sup>2</sup> Maneesh Srivastava  
<sup>3</sup> Ashwani Dobhal  
<sup>4</sup> Neeraj Sharma

<sup>1</sup> MDS (Prosthodontics), Professor and Head, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

<sup>2</sup> MDS (Prosthodontics), Sr. Lecturer, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

<sup>3</sup> MDS (Conservative & Endodontics), Professor and Head, Department of Conservative & Endodontics, Seema Dental College and Hospital, Rishikesh

<sup>4</sup> MDS (Prosthodontics), Sr. Lecturer, Department of Prosthodontics, Seema Dental College and Hospital, Rishikesh

### Address For Correspondence:

Dr. Mukesh Dhanda  
Seema Dental College and Hospital, Virbhadra, Rishikesh  
PIN-249203 Phone- 0135- 2453465, 9897053730  
E-mail- drmdhanda@gmail.com

Date of Submission : 28-Sep-2010

Date of Acceptance : 04-Oct-2010

### INTRODUCTION

One of the very first dental practitioners to address esthetics and the "Perfect Smile" was California's Dr. Charles Pincus. In the 1930's his practice was involved in creating the perfect smiles for Hollywood film actors. Pincus understood the importance of "Hollywood Smile" and how it enhanced image and personality. Thin facings made of air fired porcelain were used by Pincus as esthetic temporary restorations. These facings were held in place temporarily by adhesive denture powder, for actors who needed to change their smile while in front of the camera.<sup>1</sup>

By the mid 1970s and early 1980s composite resin restorative materials had evolved. These were added directly to the facial surfaces of tooth to restore malformed, fractured or discolored permanent incisors in a procedure known as "bonding".<sup>2</sup> The use of "bonding" presented several problems such as monochromatic appearance, loss of luster over time and staining. As these restorations did not employ any tooth preparation, a bulk of material was necessary to obtain a pleasing appearance thus leading to gingival inflammation due to overcontoured restorations.<sup>3</sup>

Next in evolution came the procedure referred to as "laminating" where veneer facings were bonded to etched tooth structure.<sup>3</sup> Hollow ground denture teeth, preformed stock laminates,

and custom fabricated laminates of processed acrylic resin were commonly used.<sup>4,5</sup> Laminating was a definite improvement over bonding but color instability, surface staining, loss of surface luster, low abrasion resistance, biologic incompatibility, and a poor bond between the veneer and the tooth still persisted.<sup>6,7</sup>

In the early 1980s a method of bonding porcelain to acid etched enamel was developed. Etching the porcelain with hydrofluoric acid or a derivative increases the shear bond strength between composite resin luting agent and the porcelain veneer by a factor of four when compared to unetched porcelain.<sup>8</sup>

The laminate veneer facings have greatly evolved and presently can be divided into two broad categories:

Indirect veneers and Direct veneers.

Indirect veneers: Indirect veneers include- Preformed laminates, Lab fabricated acrylic resin, Microfill resin and Porcelain veneers.

Direct veneers: Composite resin veneers which are free-hand placed.

Porcelain Veneers: Glazed porcelain is one of the most esthetic and biocompatible materials used in dentistry. It is well tolerated by gingival tissues and its abrasion and stain resistance are excellent. Etched Porcelain exhibits high tensile bond strength to composite resin as reported by Simonsen and Calamia.<sup>9</sup> Porcelain laminate

veneers, although being technique sensitive give exceptional surface texture, color, fluorescence, and overall esthetics.

### Advantages:

Porcelain presents various advantages over other veneering systems and acts as an excellent replacement for unesthetic tooth substance.

**Conservative approach:** Laminate veneer preparations are much more conservative of tooth structure than either porcelain fused to metal or all porcelain full coverage restorations.

**Color:** Porcelain offers better inherent color control, translucency, natural look and color stability

**Bond Strength:** Etched porcelain bonds to enamel surface much better than any other veneering system.

**Resistance to abrasion:** Porcelain is known for its exceptionally high wear and abrasion resistance as compared to composite resins.

**Strength:** Porcelain veneer restorations develop high shear and tensile strengths when veneer is luted to the enamel.

**Periodontal Health:** Highly glazed porcelain surface resists plaque accumulation as compared to any other veneer system thus maintaining periodontal health.

**Esthetics:** Much better esthetics than any other veneer material as it enables control of color and surface texture. Both internal and superficial stains can be used with porcelain and the natural fluorescence lends a certain vitality.

**Resistance to fluid absorption:** Porcelain absorbs fluid to a lesser degree than any other veneering material.

**Disadvantages:**

**Cost:** Additional cost incurred when compared to direct restorations due to laboratory involvement and additional chair-side time required. The cost will also depend on difficulty of patients problem, the time, level of skill, artistic requirements, and planning involved.

**Time:** Veneering is a highly technique sensitive procedure and thus time consuming. Multiple visits also demand more time.

**Fragility:** Veneers are extremely fragile and difficult to manipulate during try-in and cementation stages.

**Repair:** Repairs are difficult once veneers are luted to the enamel.

**Color:** It is difficult to modify color once the veneer has been luted to the enamel surface, also precise shade matching is difficult.

**Technique sensitive:** Fabrication of veneers is an indirect process requiring accurate impression making and high quality laboratory work.

**Indications:**

Use of porcelain veneers offers clinical solutions that are both conservative of tooth structure as well as esthetically pleasing. Ceramic laminate veneers can be used in cases which are traditionally restored using composite resin veneers or full coverage crowns.

**Diastema:** Unsightly spaces between teeth can be closed.

**Discoloration:** Discolored or stained teeth due to, tetracycline staining, devitalization, fluorosis and age related changes can be masked.

**Enamel defects:** Different types of enamel hypoplasia and malformations can be masked.

**Malaligned teeth:** Visual appearance of rotated or malpositioned teeth can be improved by developing the esthetic illusion of straight teeth. In cases where orthodontics is not sought by the patient or is not indicated, porcelain laminate veneers can be used.

**Poor restorations:** Teeth with numerous, shallow, unesthetic restorations on the labial

surface can be covered and dramatically restored.

**Age related changes:** Aging results in color changes and wear in teeth, these can be esthetically restored using porcelain veneers.

**Wear patterns:** Cases which exhibit slowly progressive wear patterns can be restored using porcelain laminates if sufficient enamel remains and the desired increase in length is not excessive.

**Malocclusion:** The configuration of lingual surfaces of anterior teeth can be changed to develop increased guidance or centric holding areas in malocclusions or periodontally compromised teeth.

**Time constraint:** In cases of time constraint on the patients part or when the patient is not willing to undergo long term orthodontic treatment.

**Contraindications:**

**Available enamel:** Ideally, there should be enamel around the whole periphery of the laminate, so as to seal the veneer to the tooth surface. Studies show that bond strengths to dentin decline over time, and porcelain veneers placed in intraenamel preparations offer the best long term results.

**Oral habits:** Patients with tooth to tooth (bruxism) or tooth to foreign object habit patterns may not be ideal candidates for veneer restorations. The porcelain may not withstand shearing stress generated by such habits.

**Crowding:** Crowded teeth should first go for orthodontic treatment to attain proper alignment before starting veneer treatment.

**Clinical Report:**

A 26 years old male patient reported to the clinic with chief complaint of unesthetic appearance due to spacing in upper front teeth. History revealed that the patient had malaligned teeth and had undergone orthodontic treatment for the same. As the total tooth material was less, he was referred to the department of prosthodontics for closure of diastemata using porcelain laminate veneers.

**Extra oral examination:**

On extra oral examination esthetic appearance seemed satisfactory, lateral profile was slightly convex.

**Intra oral examination:**

Intra oral examination revealed diastemata between the maxillary central incisors, lateral incisors and the canines. The tooth structure showed no deformity, enamel defects or wear patterns. Gingival health was satisfactory.



Fig.1. Preoperative intraoral view.

**Tooth Preparation:**

Minimal tooth preparation is required for porcelain laminate veneers. The preparation should ideally be limited to the enamel but still sufficient enamel thickness must be removed to provide adequate space for a correctly contoured restoration. 10 A 0.5 mm (incisal half) and 0.3 mm (gingival third) reduction with slight chamfer finish line at the level of gingival crest was planned. 11,12

**Facial Reduction:**

A depth cutting diamond bur with three 1.6 mm diameter wheels mounted on a 1.0 mm diameter noncutting shaft (PR13 834-016, FG Diamond, Strauss & Co.) was used for making depth orientation grooves in the gingival half of the labial surface. This provided a 0.3 mm reduction in the gingival third area of facial surface. A second three wheeled diamond depth cutter with 2.0 mm diameter wheels mounted on 1.0 mm diameter noncutting shaft (PR12 834-019, FG Diamond, Strauss & Co.) was used in the incisal half of the facial surface thus providing a 0.5 mm reduction in the incisal half.

The remaining tooth structure between the depth orientation grooves was removed using round end tapered diamond. The tip of round end tapered diamond was used to establish a slight chamfer finish line at the level of the gingiva.



Fig.2. Anterior view of tooth preparation.

**Proximal Reduction:**

The facial reduction was extended into the proximal area using round end tapered diamond (C4 850-021, FG Diamond, Strauss & Co.) It was ensured that the diamond was parallel with the long axis of the tooth so as to avoid uneven finish line.

**Fig.3. Right lateral view of tooth preparation.**



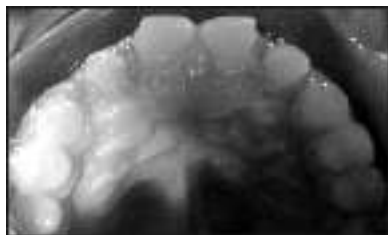
**Fig.4. Left lateral view of tooth preparation.**



**Incisal Reduction:**

An incisal overlap design was prepared on all the four teeth. The incisal overlap design acts as a vertical stop and aids in proper seating of the veneer. A multiple wheel diamond (PR12 834-019, FG Diamond, Strauss & Co.) was used to make 0.5 mm depth orientation grooves on the incisal edge. Round end tapered diamond was used to remove tooth structure between the grooves. The incisal edge configuration was maintained.

**Fig.5. Palatal view of tooth preparation.**



**Lingual Reduction:**

The round end tapered diamond was used to create lingual finish line. A 0.5 mm slight chamfer was prepared by holding the diamond parallel to the lingual surface. The finish line was prepared approximately one-fourth the way down the lingual surface.

**Finishing:**

Sharp angles at the junction of incisal angle and lingual surface were removed using round end tapered diamond.

**Impression:**

A "00" retraction cord (Ultrapak, Ultradent Products, Inc.) was used for gingival retraction on all prepared teeth. An impression was made using Poly vinyl siloxane impression material (Reprosil, Caulk Dentsply, USA). Temporary restorations were not given as the preparations were shallow and involved only the enamel. The

patient was instructed not to bite on hard objects, keep the area clean and to expect some mild sensitivity to hot and cold.

**Final Restoration:**

Completed veneers (IPS Empress Esthetic) were inspected for cracks, overextended margins and adequate internal etching. The prepared teeth were cleaned with a pumice slurry, rinsed and dried. Isolation was accomplished using cotton rolls and retraction cords. The veneers were tried on the teeth for proper fit and contour and appropriate shade of resin cement was selected.

The two central incisors were etched and adhesive was applied to etched enamel and the tooth side of porcelain veneer. A thin layer of light cured resin cement (Calibra, Caulk Dentsply, USA) was placed on tooth side of the veneer. Light finger pressure was used to place the veneer on the tooth, accurate seating was verified by examining the veneer margins using No.2 explorer. Excess cement was removed and the veneer was exposed to curing light for 60 seconds each from facial and lingual directions. The above procedure was repeated for lateral incisors. Final finishing was done using abrasive rubber and porcelain polishing cups. Surface luster was obtained by using porcelain polishing paste with rubber prophyl cup.

**Fig.6. Anterior view of final restoration.**



**Fig.7. Right lateral view of final restoration**



**Fig.8. Left lateral view of final restoration**



**Discussion:**

Porcelain presents various advantages for its use

in anterior tooth restorations. Porcelain laminate veneers offer a conservative approach to restoring anterior teeth. The incorporation of ceramic veneers has resulted in restorations with improved strength, durability, periodontal health preservation, marginal integrity, wear resistance and color match & stability.

**Conclusion:**

The final restoration by porcelain veneers resulted in an esthetically pleasing smile without the need of extensive loss of tooth structure. The final result, showed complete closure of diastemata, taking advantage of an excellent material like porcelain with a much conservative approach.

**References:**

1. Garber DA, Goldstein RE, Feinman RA: Porcelain Laminate Veneers, Quintessence Publishing Co., Inc. 1988, p 11.
2. Goldstein R: Diagnostic dilemma: To bond, laminate or crown? Int J Periodont Rest Dent 1987; 5:9-29.
3. Faunce FR, Myers DR: Laminate veneer restoration of permanent incisors. J Am Dent Assoc 1976;93:790-792.
4. Horn HR: Porcelain laminate veneers bonded to etched enamel. Dent Clin North Am 1983; 27:671-684.
5. Boyer DB, Chalkley Y: Bonding between acrylic laminates and composite resin. J Dent Res 1982;61:489-492
6. Horn H: A new lamination: Porcelain bonded to enamel. NY State Dent J 1983; 49:401-403.
7. Calamia JR: Etched porcelain facial veneers: A new treatment modality based on scientific and clinical evidence. NY State Dent J 1983; 53:255-259.
8. Hsu CS, Stangel I, Nathanson D: Shear bond strength of resin to etched porcelain. J Dent Res 1985;64:296.
9. Simonsen RJ, Calamia JR: Tensile bond strength of etched porcelain. J Dent Res 1983.
10. Jordan RE: Esthetic Composite Bonding. Philadelphia, DC Decker Inc, 1987, Ch 3.
11. Calamia JR: Etched porcelain veneers: The current state of the art. Quintessence Int 1985; 16:5-12.
12. Quinn F, McConnell RJ, Byrne D: Porcelain laminates: A review. Br Dent J 1986; 161:61-65.

## "Oral Mucositis: A Sequel to Cancer Therapy" Prevention and Management

### Abstract

Cancer is a horrifying pathology, whose treatment (radiotherapy and chemotherapy) is accompanied by many side effects. The most challenging one is oral mucositis, which is sometimes so severe, that patient just refuses to take therapy anymore and gets ready to face the fatal consequences rather than living a compromised and painful life. As oral health care providers, we can help these patients by timely assessing, diagnosing, educating and making aware about oral mucositis and its management before, during and after oncotherapy. I wish to suggest through this paper that the dentist should be there full time or on call in every oncotherapy department for guiding management protocol for oral mucositis, prior to, during and after therapy, so that these patients can pass through the difficult phase of life with minimal stress and be able to win over this fatal disease by pursuing the treatment.

### Key Words

Mucositis, Erythema, Pseudomembrane, Ulcer, Dysphagia, Oncotherapy.

- 1 Raman Kapur
- 2 Ravi Kapur
- 3 Mannat Dogra
- 4 Rajat Kapur

<sup>1</sup> Associate Professor, Department of Pedodontics and Preventive Dentistry, M.M.C.D.S.R., Mullana, Ambala.

<sup>2</sup> Principal & Dean, Professor & Head, Department of Conservative Dentistry and Endodontics M.M.C.D.S.R., Mullana, Ambala.

<sup>3</sup> B.D.S intern, M.M.C.D.S.R., Mullana, Ambala.

<sup>4</sup> B.D.S intern, National Dental College, Derrabassi (Punjab).

### Address For Correspondence:

Dr. Raman Kapur  
Department of Pedodontics and Preventive Dentistry  
M.M. College of Dental Sciences and Research, Mullana,  
District Ambala, Haryana-133203, India.  
Mobile No.: 09815655553  
E mail - rrrk@yahoo.com

Date of Submission : 07-Jan-2011

Date of Acceptance : 25-Jan-2011

### INTRODUCTION

Cancer in whatever form it may occur, is a horrifying pathology till date, reason being its insidious onset, stealthy spread and fatal nature, treatment of cancer and measures adopted to curtail its spread are often accompanied by complications. These complications have oral and dental implications that are known to compromise the quality of life especially in children. Pediatric dentists play an important role in the diagnosis, prevention, stabilization and treatment of oral and dental problems which can compromise a child's quality of life before, during and after cancer treatment.

The mucosal lining of oral cavity as well as G.I.T is a prime target for treatment related to toxicity by virtue of its rapid cell turnover rate. The most common complications related to cancer therapies are mucositis, infection, salivary gland dysfunction and pain leading to dehydration, loss of taste and malnutrition. In myelo suppressed cancer patients, radiation of head and neck can irreversibly injure oral mucosa, vasculature and bone, further leading to xerostomia, rampant dental caries, trismus, soft tissue necrosis and osteonecrosis.

Oral mucositis is the most common problem, it occurs in 20-40% of patients treated with chemotherapy alone and up to 50% of patients receiving a combination of chemotherapy and radiotherapy.<sup>1</sup>

### DEFINITION

Oral mucositis may be defined as inflammation of oral mucosa with extensive ulceration and painful irritation. It is a complex biological process divided in to four phases, which are interdependent and can occur due to action of cytokines on epithelium. These phases are:

1. Inflammatory or vascular phase: day 0
2. Epithelial phase: days 4-5
3. Ulcerative or bacteriologic phase : days 6-12
4. Healing phase: days 12-16<sup>2</sup>

Following radiation and or chemotherapy the effect is visible on the oral mucosa within 5-7 days (Phase 1& 2). If unattended, the condition worsens within another 7 days making it unbearable within 6 - 12 days (Phase - 3 ), and then further on healing starts.<sup>3</sup>

### Causative agents Chemotherapeutic agents

#### Anthracyclines

- a) Daunorubicin
- b) Doxorubicin
- c) Epirubicin

#### Alkylating agents

- a) Cyclophosphamide
- b) Busulphan
- c) Procarbazine
- d) Thiotepa
- e) Mechlorethamine

### Vinca Alkaloids

- a) Vinblastin
- b) Vincristine

### Antimetabolites

- a) Methotrexate
- b) 5 - Fluorouracil
- c) Hydroxy urea
- d) Cytocine
- e) 6 - Mercaptopurine
- f) 6 - Thioguanine

### Antitumour Antibiotics

- a) Actinomycin
- b) Bleomycin
- c) Mitomycin

Combination of drugs may have more side effects.<sup>4</sup>

### Predisposing factors

These may be direct or indirect.

### DIRECT

- i) Age - more in young individuals
- ii) Gender - more in females
- iii) Pre-existing dental hygiene - Ill fitting appliances, Periodontal diseases.
- iv) Nutritional status - more in under nourished persons.
- iv) Chemotherapy - the effect is directly related to the type of drug, its dosage and the duration of intake.
- vi) Radiotherapy - severity is directly influenced by dosage of radiation and its duration.



## INDIRECT

- i) Myelosuppression
- ii) Immunosuppression
- iii) Reduced secretory IgA
- iv) Infections - bacterial, viral, fungal

### Clinical features and assessment of mucositis

The first symptom to appear is erythema or redness of mucosa along with raised, discrete, white desquamative, slightly painful patches that are sensitive to touch and pressure (Fig:1). This is followed by larger, often confluent ulcers with pseudomembranes (Fig : 2). The ulcers when present in posterior pharynx are extremely painful and cause dysphagia, thereby disturbing and causing nutritional deficiency leading to delayed regeneration of healthy mucosal layer because of decreased resistance to secondary infections, thus vicious cycle sets up.<sup>3</sup>



Figure 1 - White desquamative patch on lateral border of tongue



Figure 2 - Ulceration in mucobuccal fold.

W.H.O has proposed the following grading system for assessment of oral mucositis with regard to severity of pain and ability of the patient to maintain adequate nutrition:

- Grade 0 - Asymptomatic.
- Grade 1 - Soreness, erythema, no ulceration.
- Grade 2 - Erythema, ulceration, but ability to swallow solid food.
- Grade 3 - Extensive erythema, ulceration, solid food cannot be swallowed.
- Grade 4 - Mucositis to the extent of impossible alimention.<sup>6</sup>

### Remedial and preventive measures ,before, during and after therapy:

#### A)Dental and oral care before initiation of cancer therapy.

##### Objective:- these are two fold

- 1)To identify and stabilize/eliminate existing sources of infection and local irritants that can complicate therapy.
- 2)To educate the patient and care takers about importance of optimal oral care so as to minimize

oral discomfort during and after the treatment.

#### B)Initial evaluation

Involvement of a dental team experienced with oral oncology can reduce the risk of oral complications. The dentist should evaluate:

- 1)Medical History:- it should include type of cancer treatment protocol, medications, allergies and immunosuppression status too.
- 2)Dental History: it should include information like habits, trauma, symptomatic teeth care, preventive practices etc.
- 3)Oral/Dental Status:- it should include thorough head and neck and intraoral examination, oral hygiene assessment and radiographic evaluation based on history and clinical findings.<sup>7</sup>

#### ii)Oral hygiene:-

- 1)Brushing of teeth and tongue two- three times a day with soft toothbrush.
- 2)Ultrasonic brush and dental floss may be used by a properly trained patient.
- 3)Patients with poor oral hygiene and periodontal disease can use chlorhexidine rinses.

#### Fluorides :- it includes use of :

- Fluoridated tooth paste
- Fluoride supplements if indicated
- Neutral fluoride gels/rinses
- Fluoride varnish application (if patient is at caries risk or xerostomia)

#### iv) Diet

Should encourage a non carious diet and patient's attendants should be warned about high cariogenicity of dietary supplementary and pediatric medication rich in sucrose.

#### v)Trismus prevention /Treatment:

Patient receiving therapy may develop trismus , so daily stretching oral exercise should start before, throughout and during therapy. Trigger point injections, analgesics and muscle relaxants may be used.

#### vi) Reduction of radiation to healthy oral tissues :-

In case of radiation to head and neck, the use of lead lined stents, prostheses and shields, as well as beam - sparing procedures should be discussed with radiation oncologist.

#### vii)Education

Patient/ care taker education includes the importance of optimal oral care in order to minimize oral problems/discomfort during and after treatment and the possible acute and long term effects of therapy in the craniofacial complex.

#### viii)Data provided by dentists to oncologist

- a)Dental caries
- b)Number of teeth requiring restorations
- c)Endodontic disease
- d)Teeth with pulpal infection
- e)Teeth requiring endodontic treatment

- f)Periodontal disease status
- g)Number of teeth requiring extractions
- h)Other urgent care required
- i)Time necessary for complete stabilization of oral disease

#### ix)Pulp therapy :-

In primary teeth before therapy, if this treatment is complete it would impose minimum risk. However, extraction is the choice of many dentists as pulp infection during immunosuppression can have significant effect on cancer therapy and become life threatening. In permanent nonvital teeth , root canal treatment can be done one week prior to initiation of cancer therapy, as there is sufficient time to assess success of treatment but if it is not possible then extraction is the choice followed by antibiotic therapy. Asymptomatic needs can be delayed till the patient is stable.

#### x)Ortho-appliances and space maintainers:-

These should be removed. If bands and loops or lower lingual arches are difficult to remove, then orthodontic wax should be used to reduce tissue trauma.

#### xi)Periodontal treatment:-

If hematological status permits in case of partially erupted teeth, over lying gingival tissue should be excised otherwise it can be a source of infection.

#### xii)Extraction:-

Loose teeth should be left to exfoliate naturally. Impacted teeth should be removed two weeks prior to start of therapy to allow healing.<sup>8</sup>

## B. DENTAL CARE PROTOCOL DURING THERAPY:-

### Objectives:-

1. To maintain optimal oral health during therapy.
2. To manage side effects which may develop as a consequence of therapy.
3. To educate patient/care taker about optimal oral care to minimize oral problems and discomfort during therapy.

Oral hygiene needs softer tooth brush e.g. end tufted brush, foam brush or super soft brush soaked in chlorhexidine solution for brushing. Brush should be air dried. Electric or ultrasonic brushes may be used if patient is able to use them atraumatically.

#### i) Lip care

Lanolin based creams and ointments should be used to protect and moisturize lips.

#### ii) Education

Patient caretaker should be properly educated about oral care protocol and prepared about short and long term side effects of therapy.<sup>9</sup>

#### iii) Psychological support

As mucositis being the most devastating

complication of cancer therapy, affecting eating, swallowing and communication, which are the most basic of human activities. Patients become withdrawn and socially avoidant, depressed and frustrated. Care should be taken while giving psychotropic drugs as these should not worsen their existing oral problems. Anticholinergic drugs should be avoided in patients with xerostomia and salivary problems. Its important to monitor each patient's level of distress, ability to cope and respond to treatment. Education of patient and caretaker, symptom management and demonstration of concern for patient's discomfort and supportive care from staff and family can help the patient to cope better with the problem.<sup>10</sup>

### C. MANAGEMENT FOLLOWING CANCER THERAPY:-

Management of patient undergoing high dose chemotherapy or upper mantle radiations requires specialized oral care protocol aimed at reduction of physical trauma to oral mucosa.<sup>10</sup>  
Routine oral hygiene care:-

#### i) Tooth Brushing

- Use soft Nylon 2-3 rows tooth brush.
- Brush all surfaces gently for 90 seconds using Bass sulcular method.
- Rinse frequently with water.
- Foam tooth brush should be used if regular one can't be used.
- Rinse with antimicrobial rinses when possible.

#### ii) Dentrifice

Fluoridated is recommended.

#### iii) Flossing

Atraumatically once daily.

#### v) Bland rinses

Rinses with a solution of salt and baking soda 4-6 times daily per day (½ teaspoonful salt and ½ teaspoon soda) in one cup warm water to clean and lubricate

#### vi) Fluoride

1.1% neutral sodium fluoride gel  
4% stannous fluoride gel  
Brush on gel for 2-3 minutes  
Expectorate and rinse mouth gently  
Apply once a day.

#### vii) Antimicrobial rinses

0.12% to 0.2% chlorhexidine oral rinses.  
Povidone iodine oral rinses.  
Tetracycline oral rinse.  
Rinse, hold 1-2 minutes, expectorate.

#### viii) Cryotherapy

Ice chips and flavoured ice pops.

#### ix) Anaesthetic cocktails

Viscous lidocaine and diclonine HCL relieves pain.

#### x) Laser therapy

It is beneficial in reducing the severity and

duration of mucositis.

#### xi) Mucosal coating agents

Kaolin - Pectin, Diphenhydramine in orabase and oratect gel.

#### xii) Capsaicin

Active ingredient is chilly pepper in candy vehicle, increases pain threshold, effective for symptomatic pain relief.

#### xiii) Narcotics

May be Oral, Transmucosal, Parenteral, Topical  
Opioid morphine 0.08% gel.

#### xiv) Dental care

a) Periodic evaluation  
Patient needs to be checked up every six months to rule out any Oro- dental problem reappearing after therapy.

b) Orthodontic treatment can be started only after two years of disease free survival. During treatment care is taken to:

- Use appliance with minimum risk of root resorption.
- Use lighter forces to move teeth.
- Terminate the treatment earlier.
- Choose the simplest treatment method.
- Don't treat lower jaw.<sup>11</sup>

c) There is marked alteration of growth and development of children who have long term cancer therapy. In children younger than 12 years undergoing therapy, disturbance in size, shape and eruption sequence of teeth occurs. Usually decreased crown size, short and conical roots, microdontia and sometimes complete agenesis may occur. Alveolar processes are diminished causing decreased occlusal and vertical dimension. If growth centers are affected, then size of mandible and maxilla also gets compromised.  
Role of orthodontic treatment in these therapy related malocclusions is still not fully established.<sup>12</sup>

#### d) Oral Surgery-

Simple oral surgical procedures like extraction or excisional biopsy require preoperative and post operative hyperbaric oxygen to avoid osteomyelitis if patient had radiotherapy previously.

### SUMMARY

Children or their caretakers should be properly evaluated about their dietary and oral hygiene habits. Then they should be educated about oral hygiene measures, preventive procedures like fluoride gels, pastes and rinses and frequent rinsing and wetting of mouth. Information about anaesthetic cocktail rinsing gels and pain relieving preparations should be given. This can be well achieved by proper coordination between pediatric oncologists and pedodontists. This

helps the patient to tide over difficult situations with relative ease and complete the whole treatment to get well.

### References

- Earnest H. Rosenbaum, Isadora R. Rosenbaum. Everyone's Guide to Cancer supportive care. 4th ed. Kansas city: Andrews Mc Meel Publishing; 2005. pp257-62.
- Sonis ST. Mucositis as a biological process. A new hypothesis for the development of chemotherapy induced stomatotoxicity. Oral oncol. 1998; 34(1):39-43.
- DeVita VT, Hellman S, Rosenberg SA. Cancer: Principles and Practice of oncology. 4th ed. Philadelphia; JB Lippincott, 1993. pp2385-92.
- Wilkes J.D. Prevention and treatment of oral mucositis following cancer chemotherapy. Semin Oncol. 1998;25:538-51.
- Dodd M.J, Miaskowski C, Shiba G H etal. Risk factors for chemotherapy induced oral mucositis: Dental appliances, oral hygiene, previous oral lesion, and a history of smoking. Cancer Invest. 1999;17(4):278-84.
- Sloan JA, Loprinzi CL, Novotny PJ etal. Sex differences in Fluorouracil induced stomatitis. J Clin Oncol. 2000;18(2):412-20.
- Sonis ST, Eilers JP, Epstein JB. Validation of a new scoring system for the assessment of clinical trial research of oral mucositis induced by radiation or chemotherapy. Cancer. 1999;85(10):2103-13.
- Sonis ST, Wood PD, White BA. Oral complications of cancer therapies. Pretreatment oral assessment. NCI Monogr. 1990;9:29-32.
- Sonis S, Kunz. Impact of improved dental services on the frequency of oral complication of cancer therapy for patients with non head & neck malignancies. Oral Surg Oral Med Oral Pathology. 1988;65(1):19-22.
- Dodd MJ, Dibble S, Miaskowski C et al. A comparison of effective state and quality of life of chemotherapy patients who do and who do not develop chemotherapy induced oral mucositis. J Pain Symptom Manag. 2001;21(6):498-505.
- Dahllof G, Bolin P etal. Disturbances in dental development after total body irradiation in bone marrow transplant recipients. Oral Surg Oral Med Oral Pathol. 1988;65(1):41-44
- Dahllof G. Craniofacial growth in children treated for malignant diseases. Acta Odontol Scand. 1998;56(6):378-82.

## BRUXISM/BRUXOMANIA, CAUSES AND MANAGEMENT.

### Abstract

The term bruxism is derived from the French word, "La Bruxomanie" suggested by Marie and Pietkiewics in 1907.

Bruxism has been defined as "a nonfunctional, voluntary or involuntary mandibular movement which may occur during the day or night, manifested by the occasional or habitual grinding, clenching or clicking of the teeth". References to grinding or "gnashing" can even be found in the Old Testament of The Holy Bible

### Key Words

Parafunctional, Bruxing, Subconscious.

<sup>1</sup> Pritpal Singh Gill  
<sup>2</sup> Kamal Kishore Chawla  
<sup>3</sup> Saksham Chawla

<sup>1</sup> Intern, Himachal Dental College, Sundernagar, H.P.  
<sup>2</sup> BDS, Chawla Dental Clinic, Kapurthala and Sultanpur.  
<sup>2</sup> BDS, Chawla Dental Clinic, Jalandhar.

### Address For Correspondence:

Dr. Pritpal Singh Gill,  
Intern,  
Himachal Dental College,  
Sundernagar, H.P.  
E-mail: dr.gillps777@gmail.com

Date of Submission : 21-Oct-2010

Date of Acceptance : 22-Oct-2010

### INTRODUCTION:

It is quite common for parents to report that their child grinds his teeth and that often while the child is sleeping this grinding can be heard beyond his bedroom. Parents question dentists about the damage that might occur to the teeth and about ways to stop the child from bruxing. It usually occurs without the patient's awareness during sleep. Day time Bruxism (bruxomania) is usually semi voluntary.

**INCIDENCE AND PREVALENCE:** The actual prevalence of bruxism is difficult to say due to the fact that it is performed at a subconscious level by most individuals. Asking bed partner is more reliable indicator. But it is estimated to be present in 5-20 % of total population. 80% of all bruxers may be unaware of the habit. It is suggested that the incidence of bruxism may be higher if the subject has a stressful career. There is no evidence to support any difference between males and females.

**CLASSIFICATION:** DAYTIME bruxism/bruxomania can be conscious or subconscious and may occur along with parafunctional habits. NIGHT bruxism is subconscious grinding of teeth characterized by rhythmic patterns of masseter.

**ETIOLOGY:** The aetiology of bruxism is controversial and often uncertain. It is likely that an individual will have one or a combination of causal factors, however, there is current literature which suggests that a centrally (central nervous system) mediated response combined with stress

is the most likely aetiology in most cases. Various factors could be:

**LOCAL FACTORS:-** a) Discrepancy between centric relation and centric occlusion.  
b) Gingival flaps of third molars (Pericoronitis).  
c) Any type of periodontal disease with pain.  
d) Surface irregularities of lips, cheek and tongue.  
e) Pain or discomfort of TMJ and jaw muscles.  
f) Jaw malformations

**SYSTEMIC FACTORS:-** Magnesium deficiency, Chronic abdominal distress, Intestinal parasites.

**OCCUPATIONAL FACTORS:-** Compulsive over achievers, Over enthusiastic students.

**OTHER FACTORS:-** Musculoskeletal disorders (cerebral palsy), Subclinical nutritional deficiency, Allergy, At the onset of schizophrenia, Endocrine disturbance, Emotional stress.

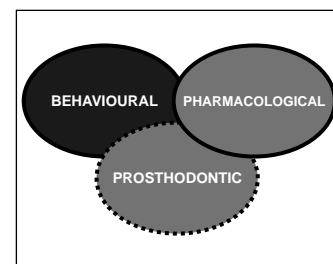
There is evidence that smoking and alcohol consumption can trigger bruxism. Antidepressants and antipsychotics may also exacerbate bruxism. There is an increase in bruxism in those who abuse amphetamines and other 'recreational' drugs.

**EFFECTS OF BRUXISM:** Certain amount of tooth wear is physiologic, but accelerated wear is seen in bruxism. It can cause tooth mobility, hypersensitivity, tooth fracture, periodontal pain, may contribute to masticatory system disorder, temporalis muscle pain, TMJ problems like locking/clicking/pain, headache, earache, cheek

ridging, enlarged muscles of mastication. It has been associated with implant failures by affecting osteointegration. It may lead to gross maxillofacial malformations like MIDFACE COLLAPSE SYNDROME



### TREATMENT OF BRUXISM:



- **BEHAVIORAL:** This includes
- Visual imagery
- Relaxation tapes before going to sleep
- Stress management
- Nocturnal biofeedback
- Counseling

- Hypnosis
- Deep breathing exercise
- Psychotherapy.

**PHARMACOLOGICAL:** This is intended for short term use only. This includes use of drugs like

- **BENZODIAZEPINES:** Diazepam, Clonazepam, etc may be beneficial for short term but cannot be used long term due to dependency.
- **MUSCLE RELAXANTS:** Cyclobenzoprine
- **BOTULINUM TOXIN-A (BTX-A):** In very refractory cases. It decreases masseter muscle hypertrophy.
- **CALCIUM AND PENTOTHENIC ACID:** may be helpful as they are often used in treating involuntary muscle movement.
- **NUTRITIONAL ADVICE:** such as a hypoglycaemic diet avoiding fast food, red meat, refined sugars, saturated fats etc. may decrease the habit.

**PROSTHODONTIC:** This includes OCCLUSIVE APPLIANCES/ SPLINTS/ PROTECTORS.

They are of various varieties and could be customised or Pre-fabricated. They provide temporary effect as they protect teeth but do not stop bruxism. They may not always be sufficient on their own for splints do not treat the cause of the bruxism and in 20% of cases do not significantly improve the symptoms.

**OTHER: These include:**

- A typical sound alarm setup for the treatment of bruxism: A strain guage is used between teeth and alarm gets activated when pressure exceeds a predetermined level.
- Liquid - filled bilaterally sleeved capsule: Appliance equipped with rods to which a capsule filled with salt/capsaicinoids etc can be attached which gets ruptured during bruxing.
- Physical therapies such as stretching and spraying with vapocoolants, exercises, ultrasound techniques, transcutaneous electrical stimulation, injection with saline solution or local anaesthetic may help alleviate pain and treat dysfunctional muscles

Till today no entirely satisfactory treatment has been identified in managing bruxism and that practitioners may not be able to stop bruxism in some cases, regardless of the techniques they use

**BIBLIOGRAPHY:**

1. Chokroverty S. Sleep Disorders Medicine. Butterworth-Heinemann, Boston 1998.
2. Dement WC, Roth T, Kryger MH ed. Principles and practice of sleep medicine 3rd Ed. Newyork 2000.
3. Inger Egermark-Eriksson, Gunnar E. Carlsson and Bengt Ingervall. Prevalence of mandibular dysfunction and orofacial parafunction in 7-11 and 15-year-old Swedish children. The European Journal of Orthodontics 1981; 3(3):163-172.
4. Nadler, S.C. Detection and recognition of

bruxism. Journal of the American Dental Association. 1960; 61: 472-479.

5. Reding, G.R., Rubright, W.C., & Zimmerman. Incidence of bruxism. Journal of Dental Research. 1966; 45: 1198-1204.
6. Wigdorowicz-Makowerowa, N. Grodzki, C., & Maslanka, T. Frequency and etiopathogenesis of bruxism (on the basis of prophylactic examination of 1,000 middle-aged men) 1972.
7. Bober, H. Cause and treatment of bruxism and bruxomania. Dental Abstracts. 1958; 3: 658-659.
8. Lindqvist, B. Bruxism in children. Odontologisk Revy. 1971; 22: 413-424.

## "No needles.. No Tears ..Engaging smiles for children."

### Abstract

Fears about the dreaded needle, even just the thought of having a needle inserted into your cheek and a tooth to be removed is enough to bring tears to the eyes. Recent advances in dentistry, however, along with certain relaxation techniques have gone a long way toward ridding people of their needle phobia with the result that many children are now leaving dental clinics without little or pain whatsoever. The achievement of successful local anesthesia is a continual challenge in dentistry. Adjunctive local anesthetic techniques and their armamentaria are often marketed to clinicians as a panacea. The purpose of this article is to review the niche applications of these techniques and to summarize the scientific literature appraising their use.

### Key Words

Fear, Painless, Needle, Local Anaesthesia

<sup>1</sup> Rani Somani

<sup>2</sup> Iram Zaidi

<sup>1</sup> Professor, H.O.D Department of Pediatric & Preventive Dentistry, D.J . COLLEGE OF DENTAL SCIENCES AND RESEARCH, MODINAGAR. (UP) INDIA.

<sup>2</sup> PG Student Department of Pediatric & Preventive Dentistry, D.J . COLLEGE OF DENTAL SCIENCES AND RESEARCH, MODINAGAR. (UP) INDIA.

### Address For Correspondence:

Dr Rani Somani  
Professor, H.O.D, Department of Pediatric & Preventive Dentistry, D.J . College Of Dental Sciences And Research, Modinagar. (UP) INDIA.

Date of Submission : 08-Sept-2010

Date of Acceptance : 09-Sept-2010

### INTRODUCTION:

There is one place where children dread to go, it is the dentist's chair. The sight of a large syringe being injected into tender gums can bring tears to the eyes of most of the children.. An ideal extraction is the painless removal of the entire tooth with minimal trauma to the investing tissues, so that the wound heals uneventfully. The extraction of tooth is an emotionally upsetting to the child and parents, thus it need to be rectified by use of certain modifications. Thus, effective pain control in children during dental treatment is important to achieve comfort, cooperation, and compliance with dental care during adulthood. For invasive procedures such as teeth extraction, local anaesthesia is administered.<sup>1</sup> This involves the injection of an anesthetic to block sensation to the nerve that sends pain signals to the brain. By blocking the nerve with an anesthetic, the dentist numb the area requiring treatment for a specific period of time. But the thought of having a needle inserted into your cheek bring tears to the eyes of children. may be a source of pain, discomfort, and distress for children, parents, Dentistry has come a long way over the last few years to eliminate the discomfort associated with injections. Different methods have been proposed to alleviate this pain.<sup>2</sup>

Topical Anesthesia (or "numbing gel") is commonly used to numb tissues before an injection, so that one can't feel the needle glide in. But topical application of local anesthetic agents may not have adequate clinical effect for certain procedures in pediatric dentistry<sup>3</sup>  
One of the most critical factors in topical

anesthetic is maintaining prolonged intraoral mucosal contact. Most topical anesthetic agents used in dentistry come in gel form, which can be difficult to localize to a particular site and are easily diluted by saliva.

Therefore newer techniques are introduced The purpose of this article is to review the niche applications of these techniques and to summarize the scientific literature appraising their use. Some of latest techniques are discussed below.

### Iontophoresis

Recently there has been an increased interest in using iontophoretic technique for the transdermal delivery of medications, both ionic and nonionic.

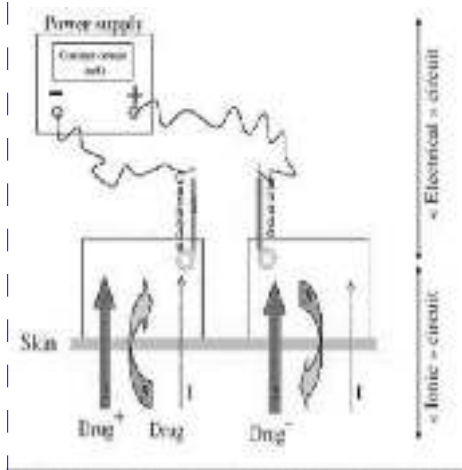
The method of iontophoresis was described by Pivati in 1747. Galvani and Vota two well known scientists working in the 18 th century combined the knowledge that the electricity can move different metal ions and the movement of the ions produce electricity Iontophoresis is defined as the introduction, by means of a direct electrical current of ions of soluble salts into the tissue of the body for therapeutic purposes. It is a technique used to enhance the absorption of drugs across biological tissues such as the skin<sup>4</sup>.

Iontophoresis is the method where the movements of ions across a membrane enhanced using an externally applied potential difference. When the membrane under consideration is skin, the method is called transdermal iontophoresis<sup>5</sup>. The principle barrier to the transport of the

molecules into an across the skin is stratum corneum (SC), this is the uppermost layer of the epidermis with a thickness of between 10-100 µm. The SC consists of several layers of corneocytes (a nucleate keratin filled cells) inlaid in a lipid matrix, a continuous medium through the SC, arranged mainly in bilayers<sup>5,6</sup>. The intercellular lipids consist of approximately equal quantities of ceramides, cholesterol and free fatty acids. Percutaneous absorption may take place simultaneously by any combination of the three main pathways that include; the intercellular (paracellular) pathway between the corneocytes along the lamellar lipids, the intracellular (transcellular)

pathway through the cells or the appendageal (shunt) pathway via hair follicles, sweat ducts and secretory glands. Ions prefer the routes of the least electrical resistance; in the SC this is believed to be via the pores. Some investigations indicate that these pores are sweat glands, others that transport occurs through both hair follicle and sweat glands. Iontophoretic delivery of lignocaine 2% was effective in reducing the pain of venipuncture and venous cannulation within 10 minutes. Tharian ad Tandon 1993 found iontophoresis a suitable alternative of the drug for achieving surface anaesthesia. It presents a painless modality for administration of anaesthesia. (Fig 1)

FIG 1: IONTOPHORESIS



**Intraoral patch.**

To reduce the perception of pain associated with needle penetration, dentists often apply topical anesthetics to the oral mucosa before injecting local anesthetic solutions.<sup>7</sup> While a number of placebo- controlled clinical trials have studied the effectiveness of such topical agents, and found that one of the most critical factors in topical anesthetic is maintaining prolonged intraoral mucosal contact

Thus, dentistry would benefit from the development of a topical anesthetic system that could adhere to the oral mucosa, maintain effective local anesthetic concentrations and demonstrate efficacy even when the local anesthetic was administered with 25-gauge needles and the periosteum was contacted. Anesthetic patches containing lidocaine base that is dispensed through a bioadhesive matrix and applied directly to the oral mucosa recently have been approved by the Food and Drug Administration and are commercially available (DentiPatch lidocaine transoral delivery system, Noven Pharmaceuticals Inc.)<sup>8,9</sup>. These patches are available in 10 and 20 percent concentrations, each containing approximately 23 and 46 milligrams of lidocaine base per 2 square centimeters of patch, respectively. The lidocaine contained in the matrix diffuses directly through the mucosa while the patch is affixed. (Fig 2)

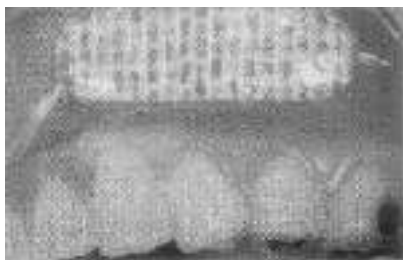


FIG 2: INTRAORAL PATCH

**Jet injection**

Many devices have been developed that would eliminate the need to inject material by needle and syringe. The development of jet injectors was one of the first fundamental improvements. First

described in 1866, jet-injection devices were originally developed for mass immunization<sup>10</sup>. Modern designs have been approved for intramuscular and subcutaneous delivery of medications such as hepatitis B vaccine and insulin. Needleless jet injectors such as the Syrijet Mark II system (Mizzy Inc., Cherry Hill, NJ) are marketed for use in the dental setting.<sup>11</sup> A jet injector is a type of medical injecting syringe that uses a high-pressure narrow jet of the injection liquid

instead of a hypodermic needle to penetrate the epidermis, the purpose being to reduce the pain associated with needle injection<sup>12</sup>. The advantages of needleless systems for delivery of local anesthetic include rapid onset of anesthesia, predictable topical anesthesia of soft tissues, controlled delivery of anesthetic dose, obviation of needle-stick injury, obviation of intravascular injection and high patient acceptance, especially in instances of needle-phobia. (Fig 3)

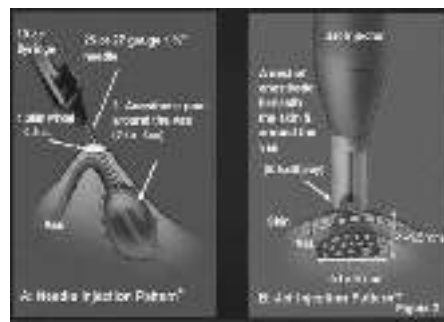


FIG 3: JET INJECTION

**Computer controlled injections**

There are currently a number of computer-controlled injection devices available. Compared to a standard syringe, computer-controlled injection devices are larger, require more operatory space. Because the needle and handle generally appear less threatening and are more aesthetic, patient acceptance is generally high. The ability of the computer to control and limit the rate of the injection and subsequently limit patient discomfort has created considerable popularity for these devices<sup>13</sup>. Wand was the first computer-controlled dental anesthetic delivery system. The Wand Local Anesthesia System is a computer controlled injection device, the size of a paperback book. It accommodates a conventional local anesthetic cartridge that is linked by microtubing to a disposable, lightweight, pen like handle with a Luer lock needle attached. The computer-controlled system is activated by a foot control that automates the delivery of local anesthetic at a precise pressure and volume ratios, resulting in an effective and comfortable injection. Patients who have experienced an injection with this system report a virtually imperceptible needle penetration followed by a sensation of mild pressure. It has been reported that the physical appearance of dental injectors is important to children and even more important for children who are anxious.<sup>14</sup> The manufacturer suggests that

needle penetration and advancement be done very slowly to allow for anesthetic to proceed along the path of the needle. The Wand/CompuDent system administers local anesthetic at two specific rates of delivery. The slow rate is 0.5 ml/min and the fast rate is 1.8 ml/min. An aspiration test can be activated at anytime by simply releasing the pressure on the foot-rheostat starting a 4.5-second aspiration cycle. The Wand/CompuDent system permits both a precise rate of flow and a controlled pressure to be maintained irrespective of the type of tissue into which the local anesthetic is being deposited. Therefore even tissues with low elasticity receive a constant pressure and rate of flow, resulting in a more favorable (e.g., comfortable, less tissue damage) outcome. The controlled rate of fluid administration also explains the reduced pain perception noted by most patients during dental injections into tissues that typically elicit a high pain response (e.g., the hard palate, attached gingiva, and periodontal ligament). (Fig 4)



FIG 4: WAND

**Comfort Control Syringe**

Introduced several years after the Wand, the Comfort Control Syringe (CCS) system attempts to improve on the CCLAD concept. The CCS system is an electronic, preprogrammed delivery device that provides the operator with the control needed to make the patient's local anesthetic injection experience as pleasant as possible. CCLADs, this is achieved by depositing the local anesthetic more slowly and consistently than is possible manually. The CCS has a two-stage delivery system; the injection begins at an extremely slow

rate to prevent the pain associated with quick delivery. After 10 seconds, the CCS automatically increases speed to the preprogrammed injection rate for the technique selected. There are five preprogrammed injection rates for specific injections. The front button with the arrow and square controls the "Start/Stop" functions by initiating or terminating the selected program. The middle button activates the "Aspiration" function by

slightly retracting the plunger<sup>15</sup>. The rear button initiates "Double Rate" and operates in the same manner as the Double Rate button on the unit. It doubles the preprogrammed injection rate. Selecting it again resumes the preprogrammed speed.

### Electronic Dental Anesthesia

This method of achieving local anesthesia involves the use of the principle of Transcutaneous Electrical Nerve Stimulation (TENS) which causes the relief of pain. It can be used as a supplement to conventional local anesthesia and has been found to be well accepted by the parents. Electronic dental anesthesia requires a considerable degree of patient cooperation and participation to be successful. With this in mind, the use of EDA in younger populations, although not contraindicated, requires a more intensive evaluation of patients' abilities to both understand the concept of EDA and to perform their tasks properly. The physiological basis of pain relief due to TENS has been attributed to the activation of large-diameter primary afferent beta fibers (sense of touch) that segmentally inhibit central pathways through a gating mechanism. The release of opioid peptides (endorphins and enkephalins) and other neurochemicals, such as 5-hydroxytryptamine, has also been implicated. The electronic dental anesthesia apparatus (Electro-Med Dental Anaesthesia 14S, Electro-Med Box Hill, Victoria, Australia) was used.<sup>16</sup> This device produces a postsynaptic, exponentially decaying wave with a maximum frequency of 500 Hz, a maximum amplitude of 23 V and a pulse width of 130  $\mu$ s. It also generates a bipolar square wave with a maximum frequency of 500 Hz, a maximum amplitude of 25 V and a pulse width of 100  $\mu$ s.

### EMLA

In recent years, a new topical anesthetic agent has been developed, EMLA cream 5% (eutectic mixture of local anesthetics, Astra Pharmaceuticals, Sydney, Australia). The cream is a 1:1 oil/water emulsion of a eutectic mixture of lidocaine (2.5%) and prilocaine (2.5%) bases.<sup>3</sup> The eutectic mixture has a lower melting point (17°C) compared with the respective individual melting points of the lidocaine base (66-69°C) and the prilocaine base (36-38°C). This new physical property allows the lidocaine/prilocaine eutectic mixture to be liquid at mouth temperature and thus facilitate rapid absorption of the bases. It has become the treatment of choice when patients desire a needle-free method for topical anesthesia during venipuncture and IV catheter insertion<sup>17</sup>. However, effective analgesia requires the application of EMLA for 60 to 90 min, limiting its usefulness in busy ambulatory health care settings

### References:

1 Asc G, Moore P, Needleman H, Shusterman S. The incidence of post extraction pain and analgesic use in children. *Anesth Prog* 1986; 33: 147-151.

- 2 Primosch R, Antony S, Courts F. The efficacy of preoperative analgesia administration for postoperative pain management of pediatric dental patients. *Anesth Pain Control Dent* 1993; 3: 102-106.
- 3 Trijsburg RW, Jelacic M, van den Broek WW, et al. Exposure and participant modelling in a case of injection phobia. *Psychother Psychosom* 1996; 65: 57-61.
- 4 Hoffman PN, Abuknesha RA, Andrews NJ, et al. A model to assess the infection potential of jet injectors used in mass immunisation. *Vaccine* 2001; 19: 4020-7.
- 5 Denne JR, Andrews KL, Lees DV, Mook W. A survey of patient preference for insulin jet injectors versus needle and syringe. *Diabetes Educ* 1992; 18: 223-7.
- 6 Greenberg RS, Maxwell LG, Zahurak M, Yaster M. Preanesthetic medication of children with midazolam using the Biojector jet injector. *Anesthesiology* 1995; 83: 264-9.
- 7 Xavier B, Carraratti J, Orsola A, Garat JM, Vicenter GJ. [Topical anesthesia with EMLA cream: application in pediatric urology]. *Actas Urol Esp*. 1996; 20: 883-885
- 8 Serour F, Mandelberg A, Zabedda D, Mori J, Extra S. Efficacy of EMLA cream prior to dorsal penile nerve block for circumcision in children. *Acta Anaesthesiol Scand*. 1998; 42: 260-263
- 9 Halperin DL, Koren G, Attias D, Pelligrini E, Greenberg ML, Wyss M. Topical skin anesthesia for venous, subcutaneous drug reservoir and lumbar punctures in children. *Pediatrics*. 1989; 84: 281-284
- 10 Rylander E, Sjoberg I, Lillieborg S, Stockman O. Local anesthesia of the genital mucosa with a lidocaine/prilocaine cream (EMLA) for laser treatment of condyloma acuminata: a placebo-controlled study. *Obstet Gynecol*. 1990; 75: 302-306
- 11 Malamed SF. Sedation: A Guide to Patient Management. 4th ed. St. Louis, Mo: CV Mosby Co; 2003: 199.
- 12 Kaufman E, Weinstein P, Milgrom P. Difficulties in achieving local anesthesia. *J Am Dent Assoc* 1984; 108: 205-208.
- 13 Ralph E, McDonland RE, Avery DR. Local anesthesia for the child and adolescent. In: McDonland RE, Avery DR, eds. *Dentistry for the Child and Adolescent*. 7th ed. St. Louis, Mo: CV Mosby Co; 1985: 288-290.
- 14 Wright GZ, Starkey PE, Gardiner DE. *Managing Children's Behavior in the Dental Office*. St. Louis, Mo: CV Mosby Co; 1983: 132-133.
- 15 Jorgensen NB, Hayden J Jr. *Sedation: Local and General Anesthesia in Dentistry*. 3rd ed. Philadelphia, Pa: Lea and Febiger; 1980: 64.
- 16 Malamed SF. *Handbook of Local Anesthesia*. 5th ed. St. Louis, Mo: CV Mosby Co; 2004: 274-275.

## C-Reactive Protein and Its Role In Periodontitis

### Abstract

C-Reactive Protein (CRP) was originally discovered by Tillet and Francis in 1930 as a substance in the serum of patients with acute inflammation that reacted with the C- polysaccharide of pneumococcus. Initially, it was thought that CRP might be a pathogenic secretion as it was elevated in people with a variety of illnesses including cancer. However, discovery of hepatic synthesis demonstrated that it is a native protein. C-reactive protein is a protein found in the blood and its levels rise in response to inflammation. Its physiological role is to bind to phosphocholine expressed on the surface of dead or dying cells (and some types of bacteria) in order to activate the complement system via the C1q complex.

### Key Words

CRP, Chronic Periodontitis, Adipocytes

<sup>1</sup> S. C. Gupta  
<sup>2</sup> Vikas Jindal  
<sup>3</sup> Rambhika Thakur

<sup>1</sup> Professor, Department Of Periodontology,  
Himachal Dental College, Sunder Nagar, H.P.

<sup>2</sup> Professor, Department Of Periodontology,  
Himachal Dental College, Sunder Nagar, H.P.

<sup>3</sup> Postgraduate Student  
Department Of Periodontology  
Himachal Dental College, Sunder Nagar, H.P.

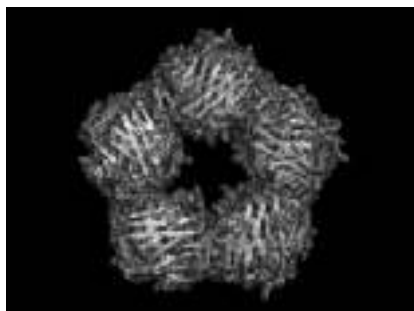
### Address For Correspondence:

Dr. S. C. Gupta  
Professor, Department Of Periodontology,  
Himachal Dental College, Sunder Nagar, H.P.

Date of Submission : 17-Aug-2010

Date of Acceptance : 17-Aug-2010

CRP is synthesized by the liver in response to factors released by fat cells (adipocytes). It is a member of the pentraxin family of proteins.



### 250px-CRP\_pretty

Periodontitis is a destructive inflammatory disease of the supporting tissues of the teeth. The host responds to the periodontal infections with an array of events involving both innate and acquired immunity. Although periodontitis is chronic in nature, acute-phase elements are also part of the innate immunity. The acute phase reactants have also pro-inflammatory properties. They activate complement factors, neutralize invasive pathogens and stimulate repair and regeneration of a variety of tissues.

There is evidence that periodontitis as well as coronary artery diseases (CAD) are linked by inflammatory factors including CRP. It is an acute-phase reactant that is produced in response to diverse inflammatory stimuli including heat, trauma, infection, and hypoxia. CRP levels

provide useful information for the diagnosis, monitoring and therapy of the inflammatory process and associated disease. CRP levels rise in the serum or plasma within 24-48 hours following acute tissue damage, reaching a peak during the acute stage and then decrease with the resolution of inflammation or trauma.

The acute phase reactants receiving most attention are C-reactive protein (CRP), plasminogen activator 1 (PAS-1), and fibrinogen. CRP plays a key role in innate immune response and is easily measured due to its long plasma half life of 12-18 hours. In healthy individuals, CRP levels are found in trace amounts with levels <0.3 mg/l. Serum levels of CRP could exceed 100mg/l in the presence of systemic infection which provides a useful marker for tracking the course of infection.

It has been postulated that increased CRP level as a result of periodontal inflammation could provide an explanation of the reported relationship between periodontitis and coronary heart disease. In recent years it has become evident that CRP is a sensitive circulatory marker of inflammation. Atherosclerosis, though it is a multifactorial disease, inflammation also plays an important role in its pathogenesis. Thus increased CRP level as a result of periodontal inflammation could provide an explanation of the reported relationship between periodontitis and coronary heart disease.

There are now several reports indicating that bacteraemia may also occur frequently in

periodontitis patients. The host responds to short lived bacteraemia and systemic cytokine dumping from untreated chronic periodontitis lesions in a similar manner as would be the case with other chronic infections or inflammatory processes. For example, elevated levels of interleukin-6 (IL-6), known to induce hepatocytes to produce CRP and other acute phase proteins and pro-coagulant mediators have also been reported in periodontitis patients. Thus, it is not surprising to note that changes in cellular and molecular components of peripheral blood have been observed in periodontitis.

CRP during its role in inflammatory process binds to the surface of pathogens and opsonizes them for uptake of phagocytes. CRP can also activate the classic complement cascade by binding to 'q' factor of complement factor 1 (C1q). Another pro-inflammatory function of CRP includes the induction of cytokines and tissue factor in monocytes. Therefore, it acts as anti-inflammatory by decreasing neutrophils migration to the site of inflammation, preventing adhesion of neutrophils to endothelial cells, and affecting clearance of nuclear antigens released from apoptic or necrotic cells. Apart from infections, inflammation and trauma, factors associated with increased levels of CRP include obesity, cigarette smoking, hormone use, metabolic syndrome, and cardiovascular disease. Moderate alcohol consumption, increased physical activity and medication use are associated with reduced CRP levels.

It needs to be stressed that CRP is a non specific



marker of the acute phase response. That is, many potential stimuli including unknown chronic infections and or inflammatory conditions, smoking, obesity and trauma may also account for mild increase in CRP.

Recent literature identifies adiposity as a key factor in low grade chronic inflammation. Higher body mass index is associated with elevated CRP concentration in adult men and women. Overweight women may thus be more likely to have chronic inflammation and elevated CRP levels.

Various studies of acute phase reactants in periodontitis have focused on patients with chronic periodontitis. It has been demonstrated that CRP levels are higher in periodontitis patients than in periodontally healthy subjects and that serum CRP levels are still higher in patients with more severe periodontitis. In addition recent trials have indicated that treatment of periodontal infections, whether by intensive mechanical therapy, drug therapy, or extraction can significantly lower serum levels of CRP.

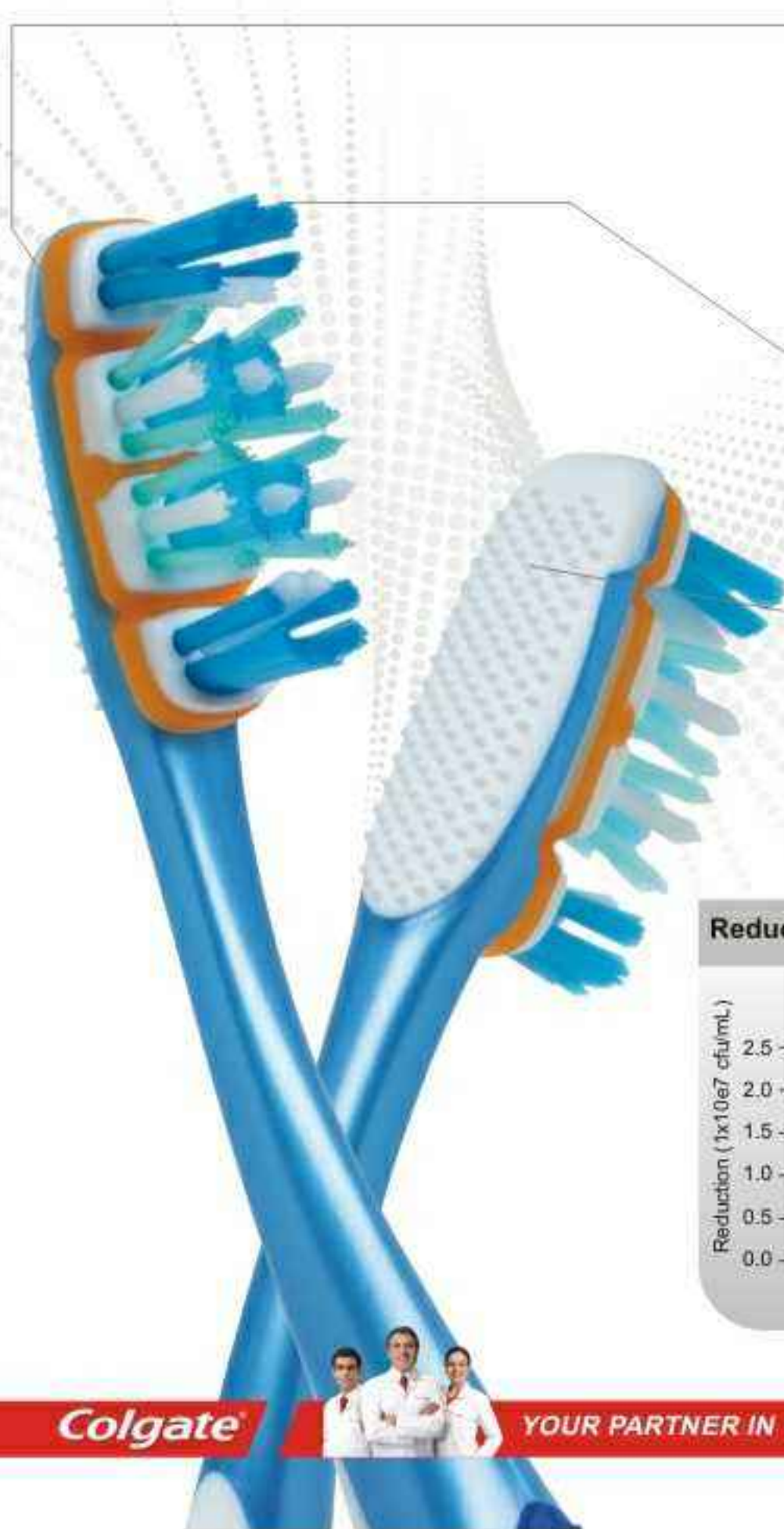
#### REFERENCES

1. Thompson D, Pepys MB, Word SP (1999). The physiological structure of human C- reactive proteins and its complex with phosphocholine. *Structure* 7(2): 169-77.
2. Pepys MB, Hirschfield GM (2003). C-reactive protein: a critical update. *J clin Invest* 111 (12): 1805-12.
3. Lau DC, Dhillon B, Yan H, Szmilko PE, Verma S (2005). *Am J Physiol Heart Circ Physiol*: 288(5): H2031-41.
4. Tillot WS, Francis Jr T (1930). Serological reaction in pneumonics with non-protein somatic fraction of pneumococcus. *J Exp Med* 52: 561-85.
5. Paraskevas S, Huizinga JD, Loos BG. (2008). A systematic review and meta-analyses on C-reactive protein in relation to periodontitis. *J Clin Periodontol* 35:277-290.
6. Trang N Salzberg, Benjamin T. Overstreet, Jeffrey D. Rogers, Joseph V. Califano, Al M. Best, and Harvey A. Schenkein (2006). C - reactive protein levels in patient with aggressive periodontitis. *J Periodontol* 77(6): 933-39.
7. Linden GJ, Mc Clean K, Young I, Evans A, Kee F. (2008). Persistently raised C- reactive protein levels are associated with advanced periodontal disease. *J Clin Periodontol* 35:741-747.
8. Pittphat W, Savetsilp W, Wara- Aawapati N. (2008). C- reactive protein associated with periodontitis in a Thai population. *J Clin Periodontol* 35:120-125.



The latest addition to the 360° line

**Removes 99% more germs\***



○ **Unique flexible brush head**  
Bends to access difficult spaces

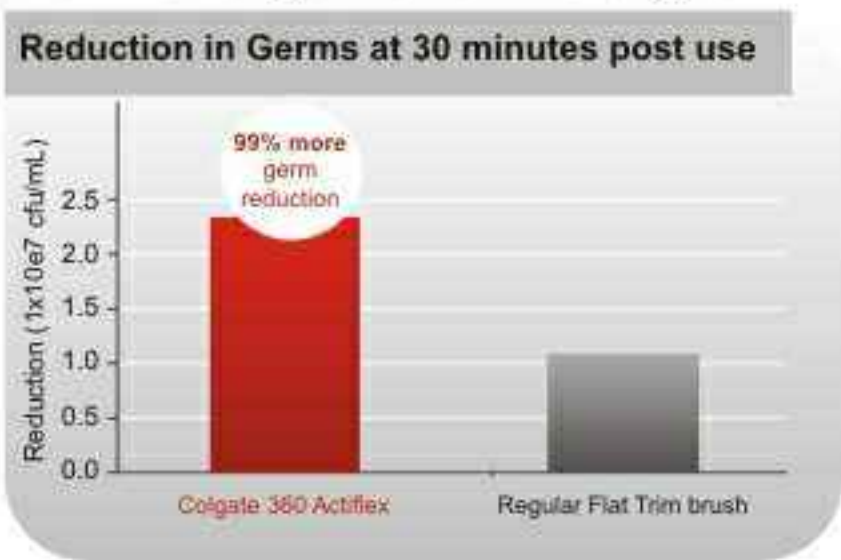
Flexible action bridge allows the bristles to clean around and between teeth

Stability ball improves torsion movement

○ **Raised cleaning tip**  
Cleans hard-to-reach places in the back of the mouth and between the teeth

○ **Unique soft-textured cheek and tongue cleaner**  
Gently cleans inner cheeks during tooth brushing

Removes odor-causing germs from the tongue



\* VS regular flat trim toothbrush

**Colgate**



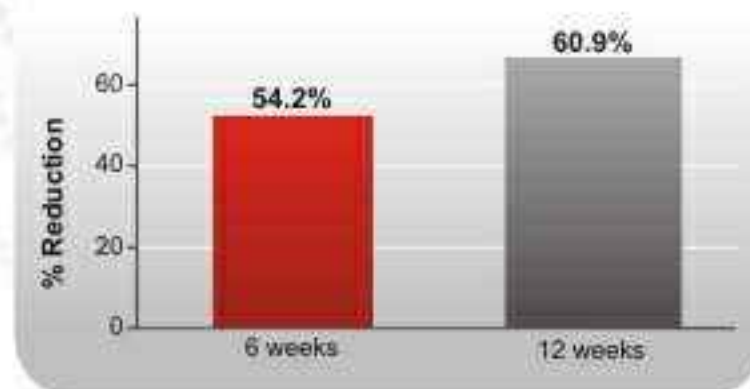
**YOUR PARTNER IN ORAL HEALTH**

[www.colgateprofessional.co.in](http://www.colgateprofessional.co.in)



If **cold** means **pain**  
it is a sign of  
**Sensitive** Teeth

Reduction in Airblast Dental Hypersensitivity Scores versus Placebo\*



**Fast relief from pain of sensitive teeth**



\*Schiff T et al. J Clin Dent Vol. V; 87-92; 1994.

**Colgate**

**YOUR PARTNER IN ORAL HEALTH**

[www.colgateprofessional.co.in](http://www.colgateprofessional.co.in)