

*From the Chairman's Desk*



Dear All,

Season greetings from the office of Sri Rajiv Gandhi Group of institutions which is ever evolving from the dedicated support of all its members. With years of experience in teaching and running this institution, I strongly believe in Socrates saying that 'Education is the kindling of a flame and not the filling of a vessel.' In that connection, I am proud that Dental Era is contributing to the speciality of dentistry for continuously acquiring new and better knowledge having direct practical implications.

Bless you all with long life with continuous learning!

Dr. P. SADASIVAN  
Chairman





*From the Editor's Desk....*

Dear colleagues!

Wishing you all a very happy and prosperous 2014!

It is a privilege to be taking over as chief editor of “Dental Era”

The amazing progress this journal has made in such a short time is phenomenal and all the credit goes to the editorial team who has been working relentlessly towards our goal of making the journal one of the finest for the dental practitioners and academicians.

We would be going online soon and expanding our horizons with peer review and indexing. A lot has to be done, and we are privileged to have a lot of support from the management, staff and authors. Together we can take this journal to a new height.

Looking forward to an academically fulfilling new year!

Dr. VAIBHAVI JOSHIPURA  
Editor-in-Chief

MISSION STATEMENT

"Dental Era - A Journal of Dentistry" is to provide a means for the interchange of ideas amongst the academicians and advance the evidence base of Clinical Dentistry.

This shall be achieved by critical review process and guided by eminent authorities in all disciplines.

"Dental Era - A Journal of Dentistry"  
will continue to communicate the highest standard  
for dental care of patients.

*Editor in Chief*

**Dr. Vaibhavi Joshipura**  
Principal, Prof., Dept. of Periodontics

*Editorial Board*

**Dr. Tejavathi Nagaraj**  
Prof. & HOD, Dept. of Oral Medicine

**Dr. Sarita Joshi Narayan**  
Prof. & HOD, Dept. of Periodontics

**Dr. Deepika Kenkere**  
Prof. & HOD, Dept. of Oral Surgery

**Dr. Sreedevi D. Ajith**  
Prof. & HOD, Dept. of Orthodontics

**Dr. Rekha Patil**  
Prof. & HOD, Dept. of Oral Pathology

**Dr. Kusum Valli**  
Prof. & HOD, Dept. of Conservative Dentistry

**Dr. Santosh T Paul**  
Prof & Head, Dept. of Pedodontics

**Dr. Achut Devarhubli**  
Prof & Head, Dept. of Prosthodontics

*Sub Editors:*

**Dr. Shammash Mohammed**  
Professor, Dept. of Prosthodontics

**Dr. Abdul Rahim Khan**  
Reader, Dept. of Orthodontics

**Dr. Akshay D. Shetty**  
Reader, Dept. of Oral Surgery

**Dr. Siddheswaran .V**  
Reader, Dept. of Conservative Dentistry & Endodontics

**Dr. Vijay Raghava.K**  
Reader, Dept. of Periodontics

**Dr. Umme Azher**  
Reader, Dept. of Pedodontics

**Dr. Nanda Prasad**  
Reader, Dept. of Oral Pathology

**Dr. Pooja Sinha**  
Senior Lecturer, Dept. of Oral Medicine & Radiology



## ETHICAL COMMITTEE FOR CLINICAL RESEARCH

The Ethical Committee consists of  
the following members

**Dr. Vaibhavi Joshipura**

Principal, Prof., Dept. of Periodontics

**Dr. Tejavathi Nagaraj**

Prof. & HOD, Dept. of Oral Medicine

**Dr. Sarita Joshi Narayan**

Prof. & HOD, Dept. of Periodontics

**Dr. Deepika Kenkere**

Prof. & HOD, Dept. of Oral Surgery

**Dr. Sreedevi D. Ajith**

Prof. & HOD, Dept. of Orthodontics

**Dr. Kusum Valli**

Prof. & HOD, Dept. of Conservative Dentistry

**Dr. Rekha Patil**

Prof. & HOD, Dept. of Oral Pathology

**Dr. Santosh T. Paul**

Prof. & HOD, Dept. of Pedodontics

**Dr. B. P. P. Rathnam**

Prof., Dept. of Anatomy

**Mr. S. Sunil**

Director (Admin) - Legal Advisor

**Mr. Rakesh .B**

Statistician

## GUIDELINES TO AUTHORS

All the Manuscripts must be prepared in accordance with "Uniform requirements for Manuscripts submitted to Biomedical Journal" developed by International Committee of Medical Journal Editors (October 2001)

### ETHICAL POLICIES OF THE JOURNAL

Submission is considered on the conditions that the paper submitted should be previously unpublished, and has not been submitted elsewhere. The "Manuscript submission Form" should be duly filled and attached with the manuscript at the time of submission.

### TYPES OF MANUSCRIPTS AND WORD LIMITS:

#### Original research articles

Randomised controlled trials, intervention studies, studies of screening and diagnostic test, outcome studies, cost effectiveness analyses, case-control series, and surveys with high response rate. Up to 2500 words excluding references and abstract.

#### Case reports

New / interesting / very rare cases can be reported. Cases with clinical significance or implications will be given priority. Up to 2000 words excluding references and abstract and up to 5 references.

#### Review articles

Systemic critical assessments of literature and data sources. Up to 3500 words excluding references and abstract.

### Preparation of Manuscripts

**Title Page** The title page should have the following information:

1. Authors should include all information in the title that will make electronic retrieval of the article both sensitive and specific.
2. Authors' names and institutional affiliations.
3. The name of the department(s) and institution(s) to which the work should be attributed.
4. Contact information for corresponding authors. The name, mailing address, telephone and fax numbers, and e-mail address of the author responsible for correspondence about the manuscript
5. Running title or short title not more than 50 characters;

### Abstract Page

The second page should carry the full title of the manuscript and an abstract (minimum of 150 words not exceeding 200 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 5 key words.

## TEXT

### INTRODUCTION

Provide a context or background for the study (that is, the nature of the problem and its significance). State the specific purpose or research objective of, or hypothesis tested by, the study or observation; both the main and secondary objectives should be clear, and any prespecified subgroup analyses should be described.

### MATERIALS AND METHODS:

Describe the selection of the observational or experimental subjects (patients or laboratory animals, including controls) clearly. Identify the age, sex, and other important characteristics of the subjects. Identify the methods,

apparatus (give the manufacturer's name and address in parentheses), and procedures in sufficient detail. Give references to established methods, including statistical methods; provide references and brief descriptions for methods that have been published but are not well known; describe new or substantially modified methods, give reasons for using them, and evaluate their limitations. Identify precisely all drugs and chemicals used, including generic name(s), dose(s), and route(s) of administration.

### **ETHICS**

When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional)

### **STATISTICS**

When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Report losses to observation (such as dropouts from a clinical trial). Put a general description of methods in the Methods section. When data are summarized in the Results section, specify the statistical methods used to analyse them. Avoid non-technical uses of technical terms in statistics, such as 'random' (which implies a randomising device), 'normal', 'significant', 'correlations', and 'sample'. Define statistical terms, abbreviations, and most symbols. Use upper italics ( $P < 0.05$ ).

### **RESULTS**

Present the results in logical sequence in the text, tables, and illustrations. Do not repeat in the text all the data in the tables or illustrations; emphasise or summarise only important observations.

### **DISCUSSION**

Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other material given in the Introduction or the Results section. Include in the Discussion section the implications of the findings and their limitations, including implications for future research. Relate the observations to other relevant studies.

In particular, contributors should avoid making statements on economic benefits and costs unless their manuscript includes economic data and analyses. Avoid claiming priority and alluding to work that has not been completed. State new hypotheses when warranted, but clearly label them as such. Recommendations, when appropriate, may be included.

### **ACKNOWLEDGEMENTS**

An appendix to the text, one or more statements should specify

1. contributions that need acknowledging but do not justify authorship, such as general support by a departmental chair;
2. acknowledgements of technical help; and
3. acknowledgements of financial and material support, which should specify the nature of the support. This should be the last page of the manuscript.

### **REFERENCES**

1. References: must follow the Vancouver system and numbered consecutively in the order in which they appear in the text. Examples: References cited only in tables or figure legends should be numbered in accordance with the sequence established by the first identification in the text of the particular table or figure.
2. If the number of authors is more than four list the first four authors followed by et al.
3. A minimum of 5 references is must for case reports a minimum of 10 references is must for review articles.

**JOURNAL:**

Buchner A, Sciubba JJ. Peripheral epithelial odontogenic tumours: a review. *Oral Surg Oral Med Oral Pathol* 1987; 63:688-97

**BOOK:**

Ten Cate AR. *Oral histology: Development, structure and function*, 5 edition, Missouri: Mosby-Year Book, Inc, 1998: 50-66

**TABLES**

- Number tables, in Arabic numerals, consecutively in the order of their first citation in the text and supply a brief title for each.
- Brief descriptive title should be separate for each
- Place explanatory matter in footnotes, not in the heading.
- For footnotes use the following symbols, in this sequence: \*, †, ‡, §, †, \*, \*, ††, ‡‡

**LEGENDS FOR ILLUSTRATIONS**

- Type or print out legends (maximum 40 words, excluding the credit line) for illustrations using double spacing, with Arabic numerals corresponding to the illustrations.
- When symbols, arrows, numbers, or letters are used to identify parts of the illustrations, identify and explain each one clearly in the legend.
- Explain the internal scale and identify the method of staining in photomicrographs.

**ILLUSTRATIONS (FIGURES)**

- Figures should be numbered consecutively according to the order in which they have been first cited in the text.
- Symbols, arrows, or letters used in photomicrographs should contrast with the background and should be marked neatly with transfer type or by tissue overlay and not by pen.
- Titles and detailed explanations belong in the legends for illustrations not on the illustrations themselves.
- When graphs, scatter-grams or histograms are submitted the numerical data on which they are based should also be supplied.
- The photographs and figures should be trimmed to remove all the unwanted areas.
- If photographs of people are used, either the subjects must not be identifiable or their pictures must be accompanied by written permission to use the photograph.
- If a figure has been published, acknowledge the original source and submit written permission from the copyright holder to reproduce the material. A credit line should appear in the legend for figures for such figures.
- The Journal reserves the right to crop, rotate, reduce, or enlarge the photographs to an acceptable size.
- Illustrations should be of high resolution in JPEG or TIFF Format.

**UNITS OF MEASUREMENT**

Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or litre) or their decimal multiples.

Temperatures should be in degree celsius. Blood pressures should be in millimeters of mercury, unless other units are specifically required by the journal.

Description of teeth should use the ISO 3950 international notation developed by FDI.

#### **STATISTICS**

Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing, such as *P* values, which fail to convey important information about effect size. References for the design of the study and statistical methods should be to standard works when possible (with pages stated). Define statistical terms, abbreviations, and most symbols. Specify the computer software used.

#### **ABBREVIATIONS AND SYMBOLS**

Use only standard abbreviations; use of nonstandard abbreviations can be confusing to readers. Avoid abbreviations in the title of the manuscript. The spelled-out abbreviation followed by the abbreviation in parenthesis should be used on first mention unless the abbreviation is a standard unit of measurement.

#### **HONEST ERRORS PUBLICATION OF CORRECTIONS.**

The journal has a duty to publish errata when errors could affect the interpretation of data or information, whatever the cause of the error (i.e, arising from author or publisher errors.)

#### **Online submission checklist**

- First page file (doc/pdf) with title, authors name, name of institution affiliated, correspondence address.
- Article file (doc/pdf)-text of the article, beginning from title, abstract till references (including tables).  
Images (jpeg/tiff): submit good quality colour images.

**Online submissions email id**  
[dentalera@srgcds.ac.in](mailto:dentalera@srgcds.ac.in)

**MANUSCRIPT SUBMISSION FORM**

**JOURNAL “Dental era a journal of dentistry”**

**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. 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 Ethical committee. I/we also certify that we have taken all necessary permissions from The Ethical committee and/or department for conducting and publishing the present work.

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 of Dental Era. 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.

I/we am/are willing to make necessary changes as per the request of the journal.

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	Signature	Date signed	
1 -----	-----	-----	
2 -----	-----	-----	
3 -----	-----	-----	
4 -----	-----	-----	(up to 4 contributors for case report/images/review)
5 -----	-----	-----	
6 -----	-----	-----	(up to six contributors for original studies)

## CONTENTS

## EDITORIAL

HOW TO PUBLISH AN ARTICLE IN AN INDEXED JOURNAL.....01

## CASE REPORTS

ADENOMATOID ODONTOGENIC TUMOR: A CASE REPORT.....07  
Dr. Aaliya Kousar, Dr. Rekha Patil

HEMISECTION : A REPORT OF TWO CASES AND REVIEW.....12  
Dr. Mrinalini Kunte

INTRARADICULAR REHABILITATION: A CASE REPORT.....17  
Dr. Bathula Vimala Chaitanya, Dr.Kusum Valli S, Dr.Siddheswaran V

KERATOCYSTIC ODONTOGENIC TUMOR IN THE ANTERIOR MANDIBLE: A CASE REPORT....21  
Dr. Rahul Dev Goswami, Dr. Sreelakshmi N, Dr. Bhavana TV  
Dr. Tejavathi Nagaraj, Dr. Leena James

DENTIGEROUS CYST ASSOCIATED WITH INVERTED MESIODENS: A RARE CASE REPORT....27  
Dr. Pinhaj Asherashiya, Dr. Yogesh TL

## REVIEW

VIBROTACTILE DEVICES FOR PAINLESS LOCAL ANESTHESIA: A REVIEW.....31  
Dr. Umme Azher

GLASS IONOMER CEMENT - PAST, PRESENT AND FUTURE: A REVIEW.....35  
Mrs. Sowmya Rao, Dr. N. Sree Naga Swetha, Dr. Sudhamani K.H

MOLAR INCISOR HYPOMINERALISATION: A REVIEW.....41  
Dr. Smitha M, Dr. Santhosh T. Paul

OZONE THERAPY : A REVIEW.....48  
Dr. Joguline Vinita, Dr. Vijay K Raghava, Dr. Umesh Yadalam

RADIOTHERAPY AND CHEMOTHERAPY INDUCED ORAL MUCOSITIS.....56  
Dr. Marin Abraham, Dr. Tejavathi Nagaraj, Dr. Leena James, Dr. Suchetha. DN

SHORTENED DENTAL ARCH: REVISITED.....62  
Dr. Goutham GB, Dr. Karthik K, Dr. Sanam Basheer





# How to publish an article in an indexed journal

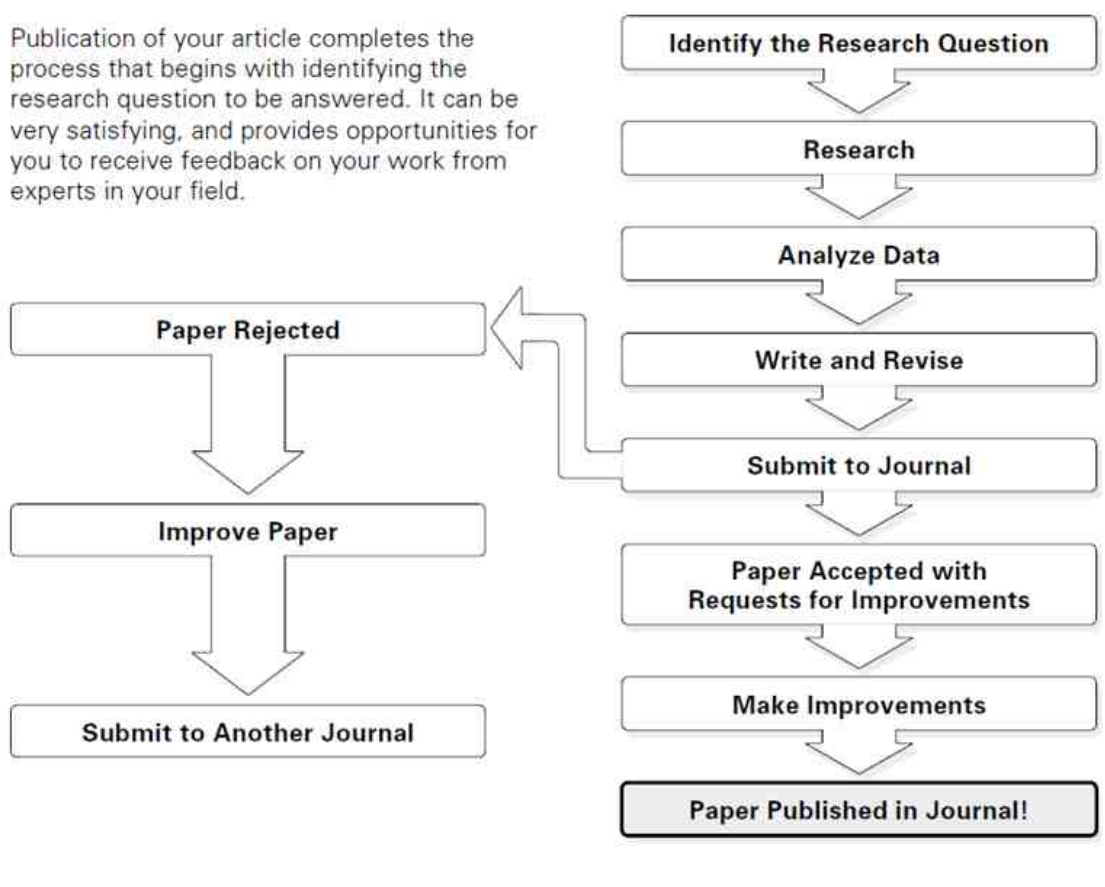
From the editorial committee.....

## INTRODUCTION

A journal is defined as an English language journal because, in practice, English is the language of science, but it is also a journal that aims to reach researchers throughout the world. This article offers advice on how to choose a journal, how to write an article and how to submit an article to a journal. It also provides some comments on publication ethics and what to expect after you have submitted your paper. It will focus on how to write original research papers.

## The process at a glance

Publication of your article completes the process that begins with identifying the research question to be answered. It can be very satisfying, and provides opportunities for you to receive feedback on your work from experts in your field.



## Why publish in an indexed journal?

Understanding why you hope to publish in an indexed journal should help you decide to which journal you should submit.

Researchers usually publish in an international journal because they want:

- Their research findings to become known to others working in the same field.
- To reach clinicians or specialists, those who will implement the results of their research in the treatment of patients.
- To get tenure, promotion or research funding.

Quite often the journal must have an impact factor. The **impact factor** (IF) of an [academic journal](#) is a measure reflecting the average number of [citations](#) to recent articles published in the journal. It is frequently used as a [proxy](#) for the relative

importance of a journal within its field, with journals with higher impact factors deemed to be more important than those with lower ones. The impact factor was devised by [Eugene Garfield](#), the founder of the [Institute for Scientific Information](#). Impact factors are calculated yearly starting from 1975 for those journals that are indexed in the [Journal Citation Reports](#).

The dominance of the impact factor is unfortunate. There are many good journals without impact factors. No new journal can have an impact factor until it has been published for two years.

### **How to choose a journal**

Several reasons for publishing in an indexed journal have been mentioned.

Specific suggestions for finding a journal:

- Check the aims and scope of a range of journals, to see where your article would fit best.
- If your research is very specialized, aim for a specialist journal rather than one intended for a general research audience. Choose the journal that is likely to be read by those who share a common interest in the content.
- Look at a recent copy of a journal to see what areas of research it publishes.
- Look at the dates of submission and acceptance which most journals give and then note the month of publication. This demonstrates speed to publication.
- Check the affiliations of authors in recent issues and also the affiliations of members of the editorial board.
- If your work has important clinical implications and is written to be understood by specialists and practitioners.
- If the topic of your paper can only be properly explained by the use of high quality color prints, make sure by inspection that the journal you choose routinely produces color of high quality.

### **Writing a paper**

The first question to ask is how good is your work? Is the research on which the paper is to be based worth publishing in an article? Would it be better in something less formal such as a short note? This question can be expanded as follows:

- How good is your experimental design or data?
- Are you repeating someone else's work or is your approach novel or original?
- How robust are the conclusions in relation to the evidence presented?

**It is always vital to read and follow the guidance for authors for the journal.**

### **Structure of the main text**

The main text of nearly all scientific papers has the same basic structure. This has been summarized by an expert using the acronym **IMRAD**

#### **INTRODUCTION**

What question was asked in the research?

#### **METHODS**

How was it studied?

#### **RESULTS**

What was discovered?

#### **DISCUSSION**

What do the findings mean?

### Planning your article

1. Make a list of the data to be presented, then consider what data analysis is necessary.
2. Interpret your data and draw conclusions and on that basis decide how you are going to “tell a story”.
3. Plan each section of the manuscript using key points.
4. When you have everything you need, start writing properly, expanding on your bullet points to form a coherent report.

### Style of writing

Use simple language and write clearly and succinctly. Try to read what you write from the outside and see if you can understand what you are trying to convey.

### Publication ethics

The big topic for discussion is **Plagiarism**. In author instructions it is usually dealt with by the simple statement that the submission must be an **original** paper. It is important to avoid plagiarism. The term is a confusing one even to experienced researchers. What does plagiarism mean? In practical terms the following two sentences represent a good way of looking at the real meaning, though only the second refers to what is actually an act of plagiarism:

- Do not offer work for publication that has already been published elsewhere.
- Do not pass off the work of someone else as if it were your own.

### Redundant (dual) publication

It is remarkably easy to publish what is substantially the same paper in more than one journal. It is called **redundant publication**. It is easy to forget that one presentation of results can, for example, have been published in the proceedings of a conference and then also offered for submission to a journal. Redundant publication undermines science and can skew the scientific literature. This can have important consequences, for example where meta-analyses inadvertently cover the same results more than once.

### Misuse of others' work

This second piece of advice relates to true plagiarism. It is against national law and international conventions to use copyrighted material without permission or acknowledgment.

### Transparency

There is growing insistence among journal editors in medical and related disciplines that certain publication policies have to be understood, accepted and followed by authors.

In particular there are policies relating to:

1. Conflict of interest it is important to declare all the funding which made the research possible. Journals differ in the way in which they want funding to be acknowledged.
2. Registering clinical trials clinical trials should be registered in publicly accessible registries.
3. Respecting confidentiality protect patients from being recognized. Their permission must also have been obtained.
4. Protecting research subjects, patients and experimental animals.

### Authorship

Finally, it is important to discuss authorship. This is an area where misunderstanding is possible among researchers. It is very important to agree who will be listed as an author **before** writing the paper.

Many journals follow the guidance provided by the International Committee of Medical Journal Editors (ICMJE). This guidance is so important that it is worth quoting:

*Authorship credit should be based on*

- 1) *Substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;*
- 2) *Drafting the article or revising it critically for important intellectual content; and*
- 3) *Final approval of the version to be published.*

*Authors should meet conditions 1, 2, and 3.*

Colleagues who have made contributions but not sufficient to qualify for authorship should be acknowledged and they should confirm that they are happy to be acknowledged.

### **The finishing touches**

This section is concerned with those aspects of the paper which may cause particular problems for inexperienced researchers writing in a journal for the first time. The title, the abstract and key words, the references and the presentation of illustrations are best left until the main part of the paper is written. It is important to take as much care with these elements of the paper as the main text. The title, key words and abstract which will first gain the attention of readers.

### **Title**

It is important that the **title** should be concise and informative. One writer of a guide to writing in another discipline suggests that it should contain “the essential words that will grab readers’ attention and let them know what your article is about”. Title should be comprehensible to other scientists in related fields and, it is often suggested, that it should contain no abbreviations.

### **Abstract**

Writing a clear **abstract** is particularly important. It is the first part of the paper that the editor looks at. There is always a word limit for the abstract. Be careful to adhere to it. The abstract should not contain abbreviations or references.

### **Key words**

Choosing meaningful **key words** is crucial. The key words must be specific enough for researchers with similar interests to find your article in their searches. Some journals will ask you to select key words from a defined list. The US National Library of Medicine also provides a list of Medical Subject Headings (MESH). See [http://www.nlm.nih.gov/mesh/2009/mesh\\_browser/MBrowser.html](http://www.nlm.nih.gov/mesh/2009/mesh_browser/MBrowser.html)

### **Reference style**

If you have written the main text before making a final decision about the journal to submit it to, the references will need to be organized at the end of the process. It is important that the journal’s author guidelines, usually quite detailed, are carefully followed.

### **Illustrations and tables**

Most publishers give detailed guidance for preparing illustrations. For example;

- Many journals like hard copy as well as electronic copy where color needs careful reproduction.
- Tables and graphs should be self-contained and understandable separate from the text.

- Avoid abbreviations which reduce clarity.
- Use appropriate numbers of decimal places.
- Sizing of illustrations is often crucial and, where asked for, information should be given to make sure that the illustrations are presented in the final version in the correct size.
- Illustrations should always illustrate a point in the text.

### **Submitting your article**

The website for most journals will have instructions on how to submit an article. If your submission is incomplete, it may delay the review process.

### **Peer review**

In the end it is the journal editor who accepts or rejects an article. It is the wish of the editor to help the researcher bring science into publication. In the case of almost all journals, the editor seeks the help of at least two independent researchers (research “peers”) who are familiar with the subject area of the paper to be referred.

### **Publishing procedures**

Researchers will have invested a lot of time in a paper and once it has been accepted, they will naturally want to know what happens next. Most major publishers make it possible for the corresponding author to track the progress of their paper in production by using a special identification number.

### **The author contract**

Most publishers will require the author to sign a copyright transfer agreement. The acquisition of rights from authors is very important. If this document has not been signed the paper will not be published.

You should also make yourself aware of what rights you have to re-use your article and your obligations to the journal that has published your article.

There are three recognized versions of any journal article.

1. Submitted version
2. Accepted version (accepted and peer reviewed, but not final version)
3. Final published version

### **Acknowledgement**

This article was edited from “Writing for Publication in an International Journal” by Professor Lakshman Samaranayake.



# ADENOMATOID ODONTOGENIC TUMOR - A CASE REPORT

AALIYA KOUSAR<sup>1</sup>, REKHA PATIL<sup>2</sup>

## 1. Dr. Aaliya Kousar

Post Graduate Student,  
Dept Of Oral Pathology,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

## 2. Dr. Rekha Patil

Professor & HOD,  
Dept Of Oral Pathology,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

## ABSTRACT

Adenomatoid odontogenic tumor (AOT) is an uncommon tumor of odontogenic origin, characterized histologically by the formation of duct like structures with amyloid-like deposits. Histogenesis of AOT is still uncertain and it is often considered as a hamartomatous lesion rather than a true neoplasm. AOT has a benign behaviour and conservative surgical enucleation or curettage is sufficient. We report a case of AOT in a 21-year-old female who presented with a lesion on the right side of the upper jaw. Histopathology revealed AOT with osseous metaplasia/ calcifications. A brief review of literature is also discussed.

## KEYWORDS

AOT, odontogenic tumour, odontogenic hamartoma, jaw swelling.

## INTRODUCTION

The Adenomatoid Odontogenic Tumor (AOT) is a benign (hamartomatous), non-invasive lesion with a slow but progressive growth. It occurs in intraosseous as well as in peripheral forms.<sup>1</sup> AOTs have three clinicopathologic variants: intraosseous follicular (pericoronal), intraosseous extrafollicular (extracoronal) and peripheral (extraosseous). The follicular type is associated with the crown and also often with part of the root of an unerupted tooth, whereas the extrafollicular type is not associated with unerupted teeth. The peripheral variant is associated with gingival structures.<sup>2</sup> It shows female predilection. The most common site involved is the anterior maxilla. The maxilla is involved nearly twice as frequently as the mandible. Unerupted permanent teeth were associated with this lesion in one-third of the cases.<sup>3</sup> The cuspid is the tooth most commonly associated with the adenomatoid odontogenic tumor. Three-quarters of the tumors involved the anterior aspect of the jaws, particularly the incisor-canine premolar region, of which the canine region is the most common site.<sup>3</sup> This case report provides a detailed history of the patient diagnosed with adenomatoid odontogenic tumor.<sup>1</sup>

## CASE REPORT

A 21 year old female patient presented with a chief complaint of pain and swelling in the upper front teeth region since three weeks. The pain was of sudden onset, moderate and continuous in type. No medication was taken. Patient gave a history of pain four months earlier in the same region which subsided on its own without taking

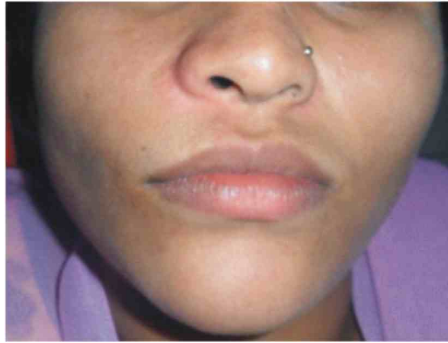
For correspondence:

**Dr. Aaliya Kousar**

Email id: aaliya3588@gmail.com



any medication. Patient was in the second month of pregnancy.



**Fig 1: Extraoral swelling extending from ala of nose till the front of tragus.**

On extraoral examination (Fig.1), there was a solitary swelling on the right side of the face measuring 2 x 1 cm in size extending from the ala of the nose upto 3 cm in front of the tragus. On palpation, the swelling was tender and no local rise in temperature was noted.



**Fig 2: Intraoral swelling causing vestibular obliteration and cortical expansion.**

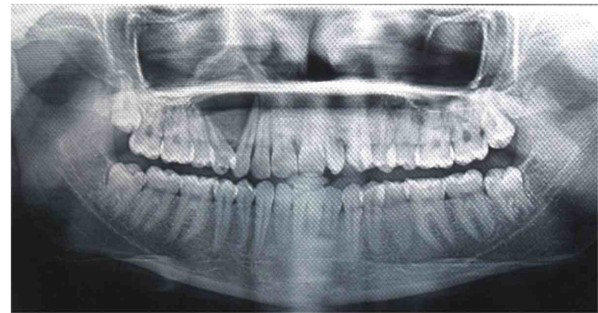
On intraoral examination (Fig.2), a swelling was seen on the labial aspect of 13, 14 region extending from mesial aspect of 13 to distal aspect of 14 along with vestibular obliteration. Pus discharge was also present in relation to 13 and 14. On palpation, tenderness was present and buccal cortical expansion was noticed in the region of 13 and 14.

On hard tissue examination, 13 and 14 showed slight yellowish discolouration. Based on clinical findings, considering the yellowish discolouration of the teeth which was suggestive of non-vital teeth, a provisional diagnosis of periapical cyst was made.

As the region was anterior maxilla in a female patient, a differential diagnosis of Adenomatoid odontogenic tumor and desmoplastic ameloblastoma was

considered. The third differential diagnosis was of Keratocystic Odontogenic tumor.

For investigations, an intraoral periapical radiograph was advised which revealed a well-defined radiolucency in the periapical region of 13 and 14 measuring more than 2 cm in size.



**Fig 3: An Orthopantomogram**

An Orthopantomogram (Fig.3) was advised, which revealed, a large radiolucent lesion measuring about 25 mm vertically and 20 mm horizontally seen in the interdental region of 13 and 14 extending from about 1 to 2mm from the crest to the maxillary sinus and nasal wall, mesiodistally from the root apices of 13 to 15. The roots of 13 and 14 were displaced mesially and distally respectively. The inferior, anterior and posterior border appeared well defined and corticated while the superior border extended into the sinus, lifting the sinus lining upwards. An appearance of a diffuse coronal radiolucency was seen in relation to 14. Widening of periodontal ligament space and loss of lamina dura was noted in relation to 12, 13, 14. The periodontal ligament space, lamina dura and alveolar crest appeared intact in all other teeth region. The alveolar bone of maxilla and mandible appeared reticular, with step ladder pattern and intact in all other region.

A radiographic differential diagnosis of Periapical cyst in relation to 14/15 region; other odontogenic cysts like lateral periodontal cyst, primordial cyst from supernumerary tooth, Keratocystic Odontogenic tumor; and a tumor like Adenomatoid odontogenic tumor was considered.

The lesion was excised in toto and the specimen (Fig.4) was subjected to histopathological examination in the department of Oral Pathology.





**Fig 4 : Gross specimen**

On macroscopy, the tissue was white to tan in colour and firm to gritty in consistency. The tissue was taken for routine processing and H & E staining.

## DISCUSSION

Adenomatoid odontogenic tumors (AOTs) are unique odontogenic lesions located either centrally within the jaws or peripherally in the soft tissue overlying the tooth bearing area. Some authors consider AOTs to be true benign, non-aggressive non-invasive neoplasms, whereas others view them as developmental hamartomatous odontogenic growths.<sup>2</sup>

AOT accounts for 2.2 to 7.1% of all odontogenic tumours which gives this tumour a ranking of fifth among the odontogenic tumours only surpassed by odontomas, myxomas, ameloblastomas and cemento-osseous tumours or lesions.<sup>1</sup> The age range of patients with AOT varies between 3 and 82 years at the time of diagnosis and second decade shows the highest peak of incidence.<sup>1</sup> The male: female ratio for all age groups and AOT variants together and globally is 1:1.9, showing a clear female predilection.<sup>1</sup>

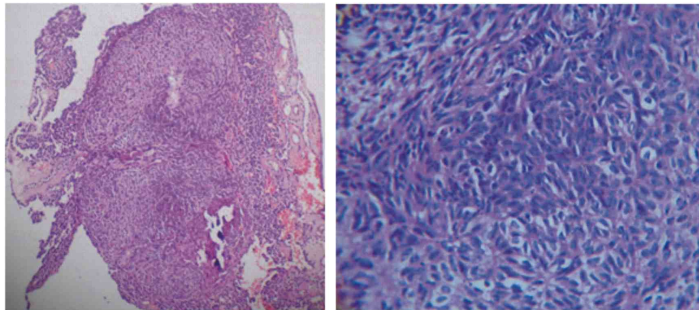
Radiographically, the intra-bony variants comprise a follicular and an extra-follicular type. The follicular type shows a well-defined, unilocular (round or ovoid) radiolucency associated with the crown and often part of the root of an unerupted tooth thus mimicking a dentigerous or follicular cyst. If the AOT contains minimal quantities of calcified deposits,

intraoral periapical radiographs are superior to panoramic radiographs in detecting the characteristic (although not pathognomonic) radiopacities.<sup>1</sup> The radiographical differentiation of AOT from dentigerous cysts, Calcifying Odontogenic Cyst, Calcifying Epithelial Odontogenic tumor, Odontogenic keratocysts, and Ameloblastoma is sometimes difficult. MRI is a preferred choice to radiographically differentiate AOT from Odontogenic keratocyst.<sup>4</sup>

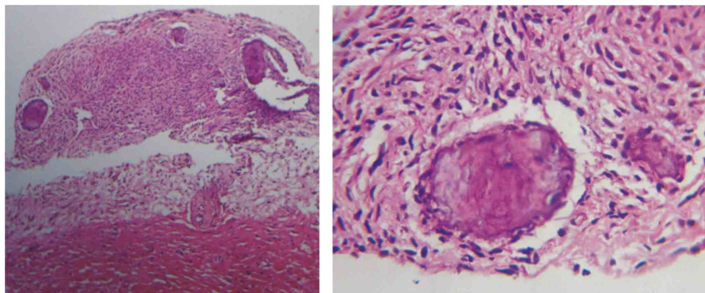
The current WHO classification of odontogenic tumors defines AOT as being composed of odontogenic epithelium in a variety of histoarchitectural patterns, embedded in a mature connective tissue stroma and characterized by slow but progressive growth.<sup>5</sup> The tumor may be partly cystic, and in some cases the solid lesion may be present only as masses in the wall of a large cyst.<sup>1</sup>

Histopathologically, at low magnification the most striking pattern is that of various sizes of solid nodules of columnar or cuboidal epithelial cells forming nests or rosette-like structures with minimal stromal connective tissue. Between the epithelial cells of the nodules and in the centre of the rosette-like configuration is found eosinophilic amorphous material, often described as tumor deposits. Conspicuous within the cellular areas are structures of tubular or duct-like appearance. A third characteristic cellular pattern consists of nodules of polyhedral, eosinophilic epithelial cells with squamous appearance and exhibiting well-defined cell boundaries and prominent intracellular bridges. These islands may contain pools of amorphous amyloid-like material and globular masses of calcified material (thus the suggestion of a combination of calcifying epithelial odontogenic tumor and adenomatoid odontogenic tumor). Another epithelial pattern has a trabecular or cribriform configuration. Induction of hyaline, dysplastic dentinoid material or calcified osteodentin has been described. The connective tissue stroma is very loosely structured and contains thin-walled congested vessels characteristically showing marked degenerative (fibrinoid) changes of the endothelial lining, vessel wall and perivascular connective tissue. It has been suggested recently that the tumor droplets represent some form of enamel matrix<sup>6</sup>.

In the present case, the microscopic examination of the H & E section revealed a tissue with fragmented epithelium composed of cuboidal & hyperchromatic cells with areas of calcification, hyalinisation and hemorrhage. Tumor cells were arranged in rosette pattern. Plump spindle shaped fibroblasts were arranged in whorling pattern in few areas and few duct like structures with eosinophilic areas are seen. (Fig 5 & 6)



**Fig 5: Low and High magnification (10 x & 40 x): tumor cells arranged in rosettes and whorling pattern forming duct like structures**



**Fig 6 : Low & High power magnifications of intralesional osseous metaplasia /calcifications.**

Immunohistochemistry is recommended for research purposes but not as a routine tool to establish diagnosis of odontogenic tumors, including AOT. In a study done by Friedrich *et al*, the identification of  $\alpha$ -SMA in a small population of tumor cells pointed to be a myoepithelial differentiation of a subset of the tumor and the co-expression of vimentin pointed to the neoplastic nature of the entity.<sup>5</sup> Immunohistochemically, the classical AOT phenotype is characterized by a cytokeratin (CK) profile similar to follicular cyst and/or oral or gingival epithelium based on positive staining with CK5, CK17 and CK19. On the other hand the classical AOT is negative for CK4, 10, 13 and 18. Recently, Crivelini *et al*. detected the expression of cytokeratin 14 in AOT and concluded that this

probably indicate its origin in the reduced dental epithelium which is also positive for staining with cytokeratin 14 antibodies. Positive reactions for amelogenin in limited areas in AOT are also reported as well as in ameloblasts and in the immature enamel matrix.<sup>7</sup> All variants of AOT are well encapsulated and show an identical benign behavior. Conservative surgical enucleation or curettage is the treatment of choice with only rare recurrence.<sup>8</sup> In addition, Handschel *et al*. reviewed all reports regarding AOT and cited in “PubMed” since 1990 and found the prognosis for AOTs is excellent with conservative treatment, such as curettage or enucleation.<sup>9</sup> The microscopic features of this lesion are however distinctive and usually do not present a diagnostic difficulty.<sup>10</sup>

## CONCLUSION

Adenomatoid odontogenic tumor is a rare benign epithelial odontogenic tumor most commonly seen in 2<sup>nd</sup> -3<sup>rd</sup> decade of life with a female predilection; that can be treated by local excision. Expert morphological diagnosis is required to establish differential diagnosis, in particular from ameloblastoma. Immunohistochemical investigations validate cytoskeletal characteristics which this entity shares with odontogenic cysts. The identification of  $\alpha$ -SMA in a small population of tumor cells points to a myoepithelial differentiation of a subset of the tumor.

## REFERENCES

1. Philipsen HP, Reichart PA. Adenomatoid odontogenic tumour: facts and figures; Oral Oncol 1988 ;35 :125-131.
2. Becker T, Buchner A and Kaffe I. Critical evaluation of the radiological and clinical features of Adenomatoid odontogenic tumor; Dentomaxillofacial Radiology 2012;41: 533-40.
3. Dayi E; Adenomatoid odontogenic tumor (adenoameloblastoma). Case report and review of literature; Aust Dent J 1997; 42 (5): 315-8.
4. Asaumi J, Yanagi Y. Assessment of MRI and dynamic contrast- enhanced MRI in the differential diagnosis of Adenomatoid

- odontogenic tumor; Medicine fields, Okayama University Year 2003.
5. Friedrich RE, Scheuer HA. Adenomatoid odontogenic tumor (AOT) of Maxillary Sinus : Case Report to Immunohistochemical Findings; *in vivo* 2009; 23: 111-16.
  6. Batra P, Prasad S. Adenomatoid odontogenic tumor: Review and Case Report; *Journal de l' Association dentaire canadienne*; Avril 2005; 71(4): 250-3.
  7. Handschel GK, Depprich RA. Adenomatoid Odontogenic Tumor Of The Mandible: Review Of The Literature And Report Of A Rare Case; *Head and Face Medicine* 2005, 1:3.
  8. Nigam S, Gupta SK. Adenomatoid Odontogenic Tumor -A Rare Cause of Jaw Swelling; *Braz Dent J* 2005; 16(3): 251-3.
  9. Xiang ZC, Yan G. Adenomatoid odontogenic tumor: a report of a rare case with recurrence, *J Oral Pathol Med* 2007; 36:440-3.
  10. Gnepp DR. *Diagnostic Surgical Pathology of The Head and Neck*, sec edition 2009 , Saunders Elsevier publication; 820-22.

## HEMISECTION: A REPORT OF TWO CASES AND REVIEW

MRINALINI KUNTE<sup>1</sup>, AMEYA G. MOGHE<sup>2</sup>

### 1. Dr. Mrinalini Kunte

Senior lecturer  
Department of Conservative  
Dentistry and Endodontics  
Dr. G. D. Pol Foundations  
YMT Dental College and Hospital,  
Kharghar, Navi Mumbai

### 2. Dr. Ameya G. Moghe

Senior lecturer  
Department of Periodontology  
Dr. G. D. Pol Foundations  
YMT Dental College and Hospital,  
Kharghar, Navi Mumbai

### ABSTRACT

An endodontically compromised tooth always presents a dilemma to the dentist. The prognosis of such a tooth remains guarded and the treatment preferred is extraction followed by replacement of concerned tooth. In accordance with DeVan's phrase, our goal remains preservation of what remains rather than the meticulous replacement of the missing. This case report presents one such treatment modality viz; hemisection, which aims at preserving optimal tooth structure rather than extracting the tooth. Hemisection involves sectioning of multi-rooted teeth and maintaining either all or selective components depending upon their prognosis. This not only helps in preserving tooth structure but also makes the area maintainable to oral hygiene procedures.

### KEYWORDS

endodontic treatment, instrument separation, hemisection, retreatment, post

### INTRODUCTION

A tooth with extensive decay may be unsuitable for restoration. The treatment options are limited and may include a removable partial denture or a dental implant to replace the missing tooth<sup>1</sup>. Alternatively, if the defect is limited to one root, a hemisection procedure may be possible. This procedure represents a form of conservative dentistry, aiming to retain as much of the original tooth structure as possible<sup>2</sup>. From a periodontal perspective, this procedure is indicated if there is one or more of the following representations: severe vertical bone loss involving only one root of the multi-rooted teeth, through and through furcation destruction, unfavorable proximity of roots of adjacent teeth preventing adequate hygiene maintenance in proximal areas and severe root exposure due to dehiscence. Other indications include untreatable endodontic failure, due to circumstances such as perforations and broken instruments, furcation or sub-gingival caries, traumatic injury or resorption<sup>3</sup>.

Hemisection involves removing significantly compromised root structure and the associated coronal structure through deliberate excision<sup>4</sup>. Appropriate endodontic therapy must be performed before these tooth modifications to avoid intrapulpal dystrophic calcification and postoperative tooth sensitivity. The furcation region is carefully smoothed, to allow proper cleansing and thus to

For correspondence:

**Dr. Mrinalini Kunte M.D.S**  
Email: mrinalini.kunte@gmail.com



prevent accumulation of plaque<sup>5</sup>. Root fracture is the main cause of failure after hemisection, so occlusal modifications are required to balance the occlusal forces on the remaining root<sup>6</sup>.

## CASE REPORTS

### Case 1

Patient aged 65 years reported to the Department of Conservative Dentistry and Endodontics with chief complaint of pain in lower right side of mouth since 1 month. Clinical examination revealed a grossly damaged 46, which was tender on percussion.



**Figure 1: Pre operative photograph showing grossly mutilated 46.**



**Figure 2: Radiograph showing retreatment in distal root**

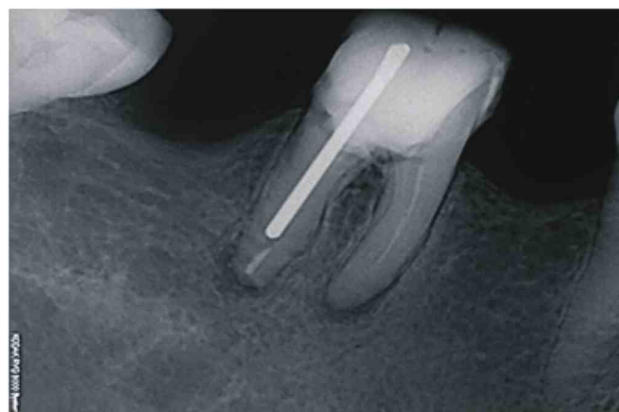
Radiographic examination showed poor endodontic treatment and instrument separation in mesial root of 46. Also periapical radiolucency was present on both mesial and distal roots of 46. Both 45 and 47 were missing.

### Treatment plan

Retreatment of tooth number 46 was attempted but was not successful in the mesial roots.

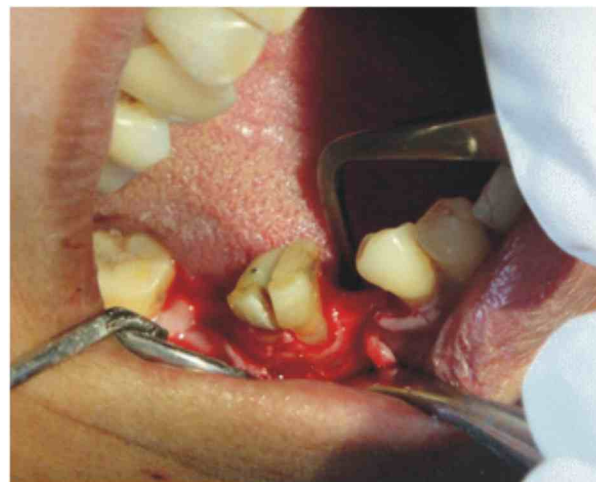
Various options were presented, including extraction followed by placement of 3 implants or removable partial denture to replace the teeth in the extraction site. However, the patient was reluctant to lose the tooth. Hence, hemisection with preservation of distal root and restoration of missing teeth by means of fixed partial denture was suggested.

Retreatment was done in the distal root. Serrated parallel-sided post was cemented in the distal root followed by composite core build up. Hemisection of mesial root of 46 was done.



**Figure 3: Radiograph showing post cemented in distal root of 46.**

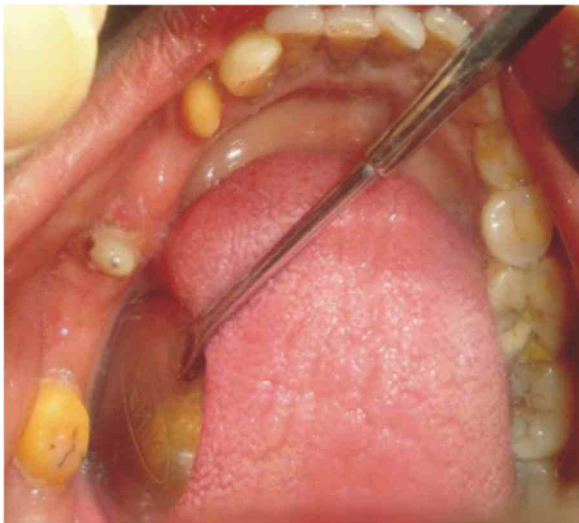
After the healing process a 5-unit porcelain fused to metal fixed partial denture from 44-48 was fabricated. Mesial root was hemisectioned due to failure of retreatment in the mesial root.



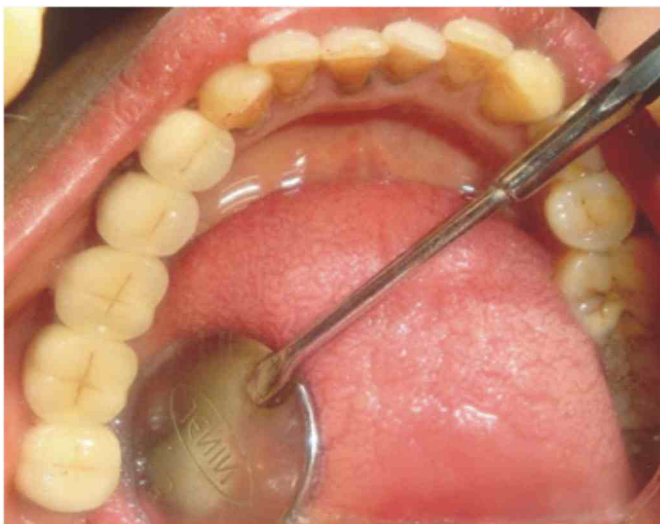
**Figure 4: Mucoperiosteal flap reflected**



**Figure 5: Mesial root hemisected**



**Figure 6: Tooth preparation for FPD**



**Figure 7: Five unit FPD cemented**

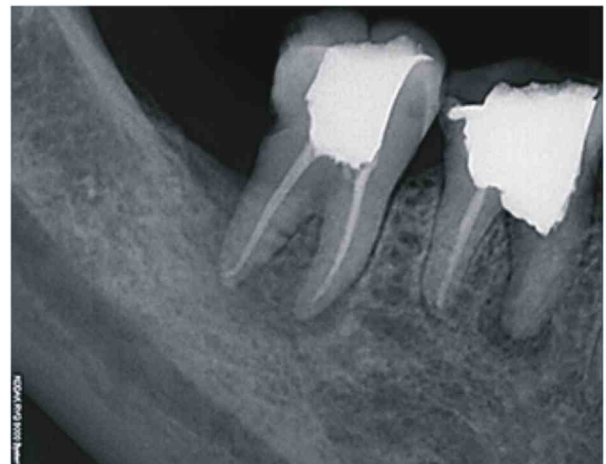
**Case 2**

Patient aged 35 years reported to the Department of Conservative Dentistry and Endodontics with chief complaint of pain in lower right posterior region. Clinical examination showed tenderness on percussion with respect to tooth numbers 46 and 47.



**Figure 8: Pre-operative photograph**

Cold test and electric pulp test was negative with 47. 47 also presented with 4 mm pocket on distal surface and Grade I mobility. Radiographic examination revealed periapical radiolucencies on both mesial and distal roots of 46 and 47.



**Figure 9: Radiograph showing root canal treated 47 and retreatment in distal root of 46**

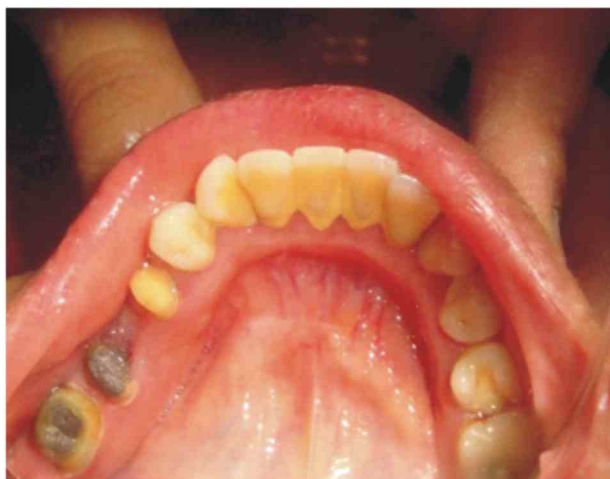
In addition, fractured instrument was found in mesiobuccal root of 46 with perforation on furcal surface of mesial root.

**Treatment plan**

Root canal treatment was carried out with 47. 46 had poor prognosis, as there was an irretrievable fractured



instrument as well as perforation on furcal surface of mesial root. Patient was given the treatment option of extraction of 46 followed by replacement with an implant or a three unit fixed partial denture. However, patient was reluctant for extraction of 46. Hence, hemisection of mesial root followed by replacement with fixed partial denture was suggested as a treatment option. The patient was happy with the concept of preserving at least a part of tooth structure. Hence, hemisection of mesial root of 46 was planned.



**Figure 10: Tooth preparation for FPD**



**Figure 11: Four unit FPD cemented.**

#### PROCEDURE

Under local anesthesia, full thickness flap was reflected (Fig 4). The vertical cut method was used to resect the crown. A long shank tapered fissure carbide bur was used to make vertical cut toward the bifurcation area. A fine probe was passed through the cut to ensure separation. The involved root was extracted and the socket was irrigated adequately with sterile saline to remove bony chips and

restoration debris. The furcation area was trimmed to ensure that no spicules were present. The extraction site was irrigated, debrided and the flap was then repositioned and sutured with 3-0 black silk sutures (Fig 5). The occlusal table was minimized to redirect the forces along the long axis of the retained root. After healing of the tissues, fixed partial denture was given involving retained half with a modified ridge lap pontic design. (Fig 7 and 11)

#### DISCUSSION

Hemisection of mesial root was planned due to irretrievable fractured instruments in mesial roots in case 1. Implant therapy was considered but not chosen; instead, a 5-unit fixed partial denture, extending from the terminal abutment third molar to first premolar, was done. The distal root is broader and straighter, making it more suitable as an abutment<sup>7</sup>. The mesial root contains a longitudinal groove, which decreases its surface area and contraindicates the use of posts. In the case 2, hemisection of mesial root was done due to irretrievable fractured instrument and perforation on furcal surface of mesial root. A 4-unit fixed partial denture extending from second premolar to second molar was done. Success of hemisection procedures depend, largely, on proper case selection. It is important to consider the following factors before deciding to undertake any of the hemisection procedures.

- 1] Advanced bone loss around one root with acceptable level of bone around the remaining roots.
- 2] Divergence of the roots - teeth with divergent roots are easier to hemisect. Closely approximated or fused roots are poor candidates.
- 3] Length and curvature of roots - long and straight roots are more favorable for hemisection than short, conical roots.
- 4] Feasibility of endodontics and restorative dentistry in the root to be retained.

However, there are few disadvantages associated with hemisection. As with any surgical procedure, it can cause pain and anxiety. Root surfaces that are reshaped by grinding at the site of hemisection are more susceptible to caries. Often a favorable result

may be negated by decay after treatment. Failure of endodontic therapy due to any reason will cause failure of the procedure. Also restoration can contribute to periodontal destruction, if the margins are defective or if non-occlusal surfaces do not have physiologic form. In addition, an improperly shaped occlusal contact area may convert acceptable forces into destructive forces and predispose the tooth to trauma from occlusion and ultimate failure of hemisection.

Implant therapy is a predictable option with good functionality, however, in these cases, the patients chose an alternative treatment because of reluctance to lose the tooth and financial considerations<sup>8</sup>.

The prognosis for hemisection is the same as for routine endodontic procedures provided that case selection has been correct, the endodontics has been performed adequately, and the restoration is of an acceptable design relative to the occlusal and periodontal needs of the patient.

## CONCLUSION

With recent refinements in endodontics, periodontics and restorative dentistry, hemisection has received acceptance as a conservative and dependable dental treatment and teeth so treated have endured the demands of function.

In conclusion, hemisection may be a suitable alternative to extraction and implant therapy and should be discussed with patients during consideration of treatment options.

## BIBLIOGRAPHY

1. Koka S. Is an implant-supported restoration better than a fixed partial denture to replace single missing teeth? *Compend Contin Educ Dent* 2006;27(3):158-61.
2. Kost WJ, Stakiw JE. Root amputation and hemisection. *J Can Dent Assoc* 1991;57(1):42.5.
3. Weine FS. *Endodontic therapy*. 5th ed. St. Louis: Mosby; 1996.
4. Bühler H. Survival rates of hemisected teeth: an attempt to compare them with survival rates of alloplastic implants. *Int J Periodontics Restorative Dent* 1994;14(6):536-43.
5. Rapoport RH, Deep P. Traumatic hemisection and restoration of a maxillary first premolar: a case report. *Gen Dent* 2003;51(4):340-2.
6. Kryshtalskyj E. Root amputation and hemisection. Indication, technique and restoration. *J Can Dent Assoc* 1986;52(4):307-8.
7. Rosenstiel SF, Land MF, Fujimoto J. *Contemporary fixed prosthodontics*. 2nd ed. St. Louis: MosbyYear Book, Inc.; 1995.
8. Bashutski JD, Wang HL. Common implant esthetic complications. *Implant Dent* 2007;16(4):340-8.



## INTRARADICULAR REHABILITATION: A CASE REPORT

BATHULA VIMALA CHAITANYA<sup>1</sup>, KUSUM VALLI .S<sup>2</sup>, SIDDHESWARAN .V<sup>3</sup>

### 1. Dr. Bathula Vimala Chaitanya

Post Graduate Student  
Department of Conservative  
Dentistry & Endodontics,  
Sri Rajiv Gandhi College of  
Dental Sciences and Hospital,  
Cholanagar, Hebbal  
Bengaluru, Karnataka.

### 2. Dr. Kusum Valli .S

Professor & HOD  
Department of Conservative  
Dentistry & Endodontics,  
Sri Rajiv Gandhi College of  
Dental Sciences and Hospital,  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### 3. Dr. Siddheswaran .V

Reader  
Department of Conservative  
Dentistry & Endodontics,  
Sri Rajiv Gandhi College of  
Dental Sciences and Hospital,  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### ABSTRACT

Many anterior teeth requiring restoration are severely weakened, having wide flared canal spaces and thin dentinal walls, and are at a high risk of getting fractured. Traditionally, such teeth would be restored using metal posts, but this procedure has often been unsuccessful, because of lack of retention or root fracture. The canal can be reinforced using a new post system involving intraradicular composite resin polymerization with light transmitting posts, rendering the defective endodontically treated root capable of supporting a post and core, and thereby ensuring continued function of the badly damaged tooth. This paper highlights the technique of rehabilitating a endodontically compromised tooth with glass fibre post.

### KEYWORDS

intra-radicular rehabilitation, reinforcement, weakened root canals, post and core

### INTRODUCTION

Success of endodontic treatment depends on quality and type of coronal restoration apart from the quality of root canal treatment. The factors responsible for loss of tooth structure in endodontically treated teeth include extensive caries, fracture, trauma to an immature tooth, iatrogenic and pulp pathology, as well as endodontic treatment.<sup>1</sup> Loss of water content in dentin after endodontic therapy also reduces tooth resilience, and can subsequently increase the probability of fracture. The post endodontic restoration of such teeth is commonly accomplished using intraradicular restorations or post and core to retain the core before the placement of a restoration. Factors such as location and quantity of the remaining healthy dentinal structure and the internal configuration and morphology of the root, affect the choice of post system. Also, the principles for retention of the posts such as length, diameter and surface configuration should be considered.<sup>2-4</sup>

Cast posts were most commonly used for the treatment of endodontically treated teeth with wide canals. Their disadvantages include root fractures in teeth with reduced remaining dentinal thickness, shadowing and graying of the root, and discolouration at the tooth's gingival margins. In the recent times, prefabricated esthetic posts, have gained popularity. Endodontically treated teeth with weak canals i.e. remaining dentinal thickness less than 2 mm, should be ideally reinforced before post placement. Light

For correspondence:

**Dr. Kusum Valli .S**

Email: kusumvalli@hotmail.com

polymerized composite resin can be used for this purpose. Composite resin absorbs and distributes forces in a more uniform manner as compared to metals, and increases resistance to fracture, thus providing improved prognosis. An adhesive bonding system used with these resins is based on its ability to create micromechanical retention, which has an added advantage for a weakened root.<sup>3,4</sup>

When the post does not allow light transmission, it is only possible to polymerise the resin within the intraradicular space to a maximum depth of 2-3 mm, due to the limited effect of trans-illumination within the composite resin. However, introduction of commercially available light transmitting posts allow light polymerization by transillumination that effectively polymerises the composite along the entire length of the radicular preparation.

The following case report illustrates a technique for rehabilitation of an endodontically compromised tooth with a glass fibre reinforced composite post.

## CASE REPORT

A 57 year old male patient reported to Department of Conservative Dentistry & Endodontics, Sri Rajiv Gandhi College of Dental Sciences, Bengaluru with the complaint of dislodged crown with respect to left upper front tooth with a past history of root canal treatment done 10 years ago (Fig 1). On clinical examination, very little tooth structure was present supragingivally. Dental caries was seen at the cervical third of the involved tooth. On removal of caries (Fig 2 & 3), remaining dentinal thickness was very less, so it was decided that the root canal would require reinforcement. Also, as the tooth was a central incisor, it was prudent to select an esthetic post system. Therefore Glassix radio opaque fibre post was selected.

As there was insufficient tooth structure supragingivally, crown lengthening was done (Fig 4). Gutta percha from the canal was removed carefully using peeso reamer, without disturbing the apical third of the filling. A radiograph was taken to ensure the adequacy of the canal preparation, and a matching diameter light transmitting glass fibre post was selected. The canal was etched with self etching primer for 15 seconds. A thin coat of dentin bonding agent (Dual Cure Paracore, coltene whaledent) was

placed using a micro applicator brush. Dual cure glass reinforced composite resin (Paracore) was placed into the canal and glass fibre post was cemented, which was cured for another 40 seconds (Fig 5). Core build up was done using dual cure composite resin (Paracore, coltene whaledent) and this was light-cured for 20 seconds. Next, the central incisor was prepared to receive PFM crown (Fig 6). Gingival retraction was done using a knitted cord (Ultradent Products Inc., Salt Lake City, Utah). Definitive impressions of the prepared maxillary anterior tooth were obtained using vinyl polysiloxane impression material (Aquasil, Dentsply, USA). Working casts were made from Type IV die stone. The restorations were subjected to a bisque trial to verify the colour and the contour. The final restoration was cemented using dual cure resin cement (Rely X ARC 3M ESPE) (Fig 7). Patient was recalled after 6 months for review and the tooth was asymptomatic.



**Fig 1: Preoperative view**



**Fig 2: After the removal of dental caries**



**Fig 3: IOPA radiograph after removal of caries**



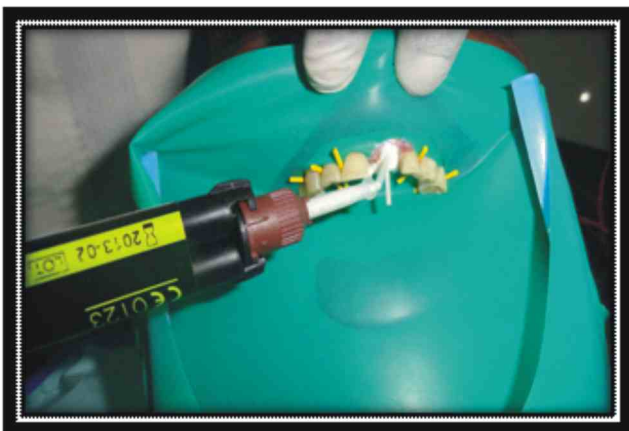
**Fig 6: Tooth preparation for PFM crown**



**Fig 4: After Crown lengthening**



**Fig 7: Postoperative frontal view**



**Fig 5: Cementation of glass fibre composite post (Glassix radiopaque)**

## DISCUSSION

The potential of fibre-reinforced materials in restorative dentistry has been appreciated for some time.<sup>5</sup> The current emphasis on preservation of natural dentition combined with successful endodontics has resulted in various methods to restore pulpless teeth. With the evolution of new adhesive systems offering excellent bonding to the tooth surface, now the treatment of such critical cases has become simpler and shows good results. Fiber reinforced composite resin can be a good alternative to conventional post systems. As these posts have modulus of elasticity which closely resembles dentin, they create a monoblock effect, which reinforces the remaining tooth structure and provides resistance to tooth fracture. Fiber reinforced composite post increases retention and distributes stress along the root. It improves the impact strength, modulus of elasticity and flexural strength of composite



materials. Fiber reinforced composite post systems are composed of unidirectional fibres in the resin matrix that strengthen the structure of post system. Fiber reinforced composite posts were able to minimize the risk of root fractures and displayed significantly higher survival rates.<sup>6</sup> In the current case, we used an adhesive, dual-cure luting composite system and a fibre-reinforced composite root canal post. This technique can reinforce the restored parts and, probably, increase durability and survival. The results of several *in vitro*<sup>7</sup> and *in vivo*<sup>8</sup> studies indicate that non-metal posts can be used when the crown is well supported by the remaining tooth structure. With a modulus of elasticity similar to dentin, the fibre post can reduce the concentration of stress and thus, reduce the rate of root fracture compared with cast posts.<sup>9</sup>

## CONCLUSION

This technique provides the benefits of root strengthening and natural esthetics for restoring the compromised tooth. It successfully combines the adhesive cementation with the metal-free core build-up procedure. Using glass fibre-reinforced composite root canal posts and composite materials, this can be a simple and efficient procedure for the treatment of anterior carious or traumatized teeth for excellent esthetic and functional results.

## REFERENCES

1. Conclaves LA, Vansan LPV, Paulino SM, Neto MS. Fracture resistance of weakened roots restored with a transilluminating post and adhesive restorative materials. *J Prosthet Dent* 2006; 96:339-44.
2. Saupe WA, Gluskin AH, Radke RA, Jr. A Comparative Study of fracture resistance between morphological dowel and cores and a Resin Reinforced Dowel System in the Intradicular Restoration of Structurally Compromised Roots. *Quintessence Int* 1996; 27:483-91.
3. Lui, J.L. Composite Resin Reinforcement of Flared Canals Using Light-Transmitting Plastic Posts. *Quintessence Int* 1995;25: 320-5.
4. Robbins JW. Guidelines for restoration of endodontically treated teeth. *J Am Dent Assoc* 1990; 120:558-62.
5. Kakehashi Y. A new all-ceramic post and core system: clinical, technical and *in vitro* results. *Int J Periodont Rest Dent* 1998 18:586-93.
6. Forberger N, Gohring TN. Influence of the type of post and core on *in vitro* marginal continuity, fracture resistance, and fracture mode of lithia disilicate-based all-ceramic crowns. *J Prosthet Dent* 2008; 100:264-73.
7. Stockton LW, Williams PT. Retention and shear bond strength of two post systems. *Oper Dent* 1999; 24:210-6.
8. Isidor F, Brondum K, Ravnholt G. The influence of post length and crown ferrule length on the resistance to cyclic loading of bovine teeth with prefabricated titanium posts. *Int J Prosthodont* 1999; 12: 78-82.
9. Qualtrough A, Mannocci F. Tooth-colored post systems: A review. *Oper Dent* 2003; 28:86-91.

## KERATOCYSTIC ODONTOGENIC TUMOR IN THE ANTERIOR MANDIBLE: A CASE REPORT

RAHUL DEV GOSWAMI<sup>1</sup>, SREELAKSHMI N<sup>2</sup>, BHAVANA T.V.<sup>3</sup>,  
TEJAVATHI NAGARAJ<sup>4</sup>, LEENA JAMES<sup>5</sup>

### 1. Dr. Rahul Dev Goswami

Post graduate student,  
Dept of Oral Medicine,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### 2. Dr. Sreelakshmi N

Post graduate student ,  
Dept of Oral Medicine,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### 3. Dr. Bhavana T. V.

Post graduate student ,  
Dept of Oral Medicine,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### 4. Dr. Tejavathi Nagaraj

Professor and HOD,  
Dept of Oral Medicine,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### 5. Dr. Leena James

Reader, Dept of Oral Medicine,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### ABSTRACT

Keratocystic Odontogenic tumor formerly known as Odontogenic cyst is a distinctive form of developmental odontogenic cyst that deserves special consideration because of its specific clinical behavior and histopathological features. There is a general agreement that the Keratocystic odontogenic tumor arises from the cell rests of dental lamina. The cyst shows a different growth mechanism and a biological behavior from the more common dentigerous cyst and radicular cyst. The keratocystic odontogenic tumor is the third most common cyst of the jaws, after the follicular and radicular cyst. Keratocysts most commonly occur as single lesions in the jaw of otherwise healthy persons. Multiple odontogenic keratocysts are a well-recognized feature of the nevoid basal cell carcinoma syndrome. The mandibular posterior region, especially the third molar region, the angle and the ascending ramus involves around 49% and the mandibular anterior is about 7-9%. Mandible is far more frequently involved than the maxilla. Clinically, the cysts often remain asymptomatic and there are two specific histological entities: the orthokeratinized and the parakeratinized odontogenic keratocyst.

### KEYWORDS

cyst, keratocystic odontogenic tumor, cell rests of dental lamina, keratinization

### INTRODUCTION

Cysts are defined as fluid- filled epithelial lined pathological cavities.<sup>1</sup> According to Kramer, the cyst is defined as “a pathological cavity having fluid, semifluid or gaseous content and which are not created by accumulation of pus and may or may not be lined by epithelium.”<sup>2</sup>

Cyst may arise due to trauma, inflammation and degeneration or retention. They are called true cysts if lined by epithelium and, pseudocyst (false) is not lined by epithelium. During the initial stages, when the cysts are small they are usually asymptomatic. Secondary infection may result in formation of abscess, cellulitis, osteomyelitis and subsequent sinus formation. As the cyst enlarges it may cause displacement of roots of teeth, resorption of roots, paresthesia, expansion of cortical plates and eventually results in pathological fracture of jaw.<sup>3</sup>

The term Odontogenic Keratocyst was first described by Philipsen

For correspondence:

**Dr. Rahul Dev Goswami**

Email: goswami.rahuldev@gmail.com

in 1956. The odontogenic keratocyst (OKC) is now designated by the World Health Organization (WHO) as a keratocystic odontogenic tumour (KCOT) and is defined as “a benign uni- or multicystic, intraosseous tumour of odontogenic origin, with a characteristic lining of parakeratinized stratified squamous epithelium and potential for aggressive, infiltrative behaviour.” WHO “recommends the term keratocystic odontogenic tumour as it better reflects its neoplastic nature.” In light of the reclassification, it is appropriate to review the salient features of this well-known lesion and to consider the implications for treatment.<sup>4</sup>

The term Keratocyst is because the cyst epithelium produces so much keratin that it fills the cyst lumen. Toller in 1967 suggested that Odontogenic keratocyst might be regarded as Benign Cystic Neoplasm.<sup>5</sup>

Keratocystic odontogenic tumor may be found in patients from infancy to old age. But about 60% of all the cases are diagnosed in people between 10 and 40 years of age.<sup>6</sup>

There is a slight male predilection. The mandible is involved in 60-80% of cases, with a marked tendency to involve the posterior body and ascending ramus.<sup>6</sup> Diagnosis of Keratocystic Odontogenic Tumor is based on the clinical features, radiographical findings and histopathological features.

## CASE REPORT

A 58 year old female patient reported to the Department of Oral Medicine and Radiology, Sri Rajiv Gandhi College of Dental Sciences and Hospital with a chief complaint of pain and swelling in the lower right back tooth region since 1.5 yrs. Pain was insidious in onset, mild to moderate, intermittent with H/O swelling which was small in size and increased to the present size. (Fig 1)



**Figure 1 : Extraoral Profile Photograph**  
Patient was known diabetic since 4years and was under medication.



**Figure 2 : Extra oral photograph showing solitary well defined swelling on right lower part of face.**

Extra oral examination showed asymmetry of the face due to the solitary well defined swelling in right lower part of the face measuring about 2× 1 cm in size extending anteriorly- corner of the mouth posteriorly- till the body of mandible and inferiorly- till the inferior border of mandible. (Fig 2) On palpation swelling was found to be tender, soft to firm

in consistency without any surface ulceration, colour change and rise in temperature .



**Fig 3: Intraoral oral photograph shows buccal cortical plate expansion**

Intra oral examination revealed well defined swelling in 44, 45 and 46 region measuring about 2×1 cm in size extending from distal aspect of 43 to mesial aspect of 46 with vestibular obliteration. ( Fig 3 ) on palpation inspeactory findings were confirmed. Swelling found to be tender & soft to firm in consistency with buccal and lingual cortical plate expansion. Grade I mobility and tender on percusssion in relation to 44,45& 46 was present. Generalized attrition and generalized recession were noticed. Provisional diagnosis was given as keratocystic odontogenic tumor with differential diagnosis of

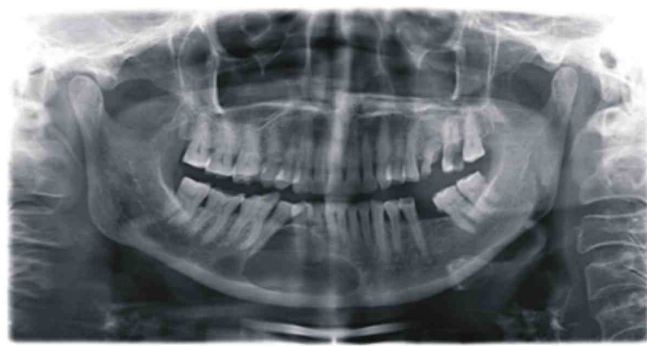
- 1 . Ameloblastoma
2. Radicular cyst
3. Central giant cell granuloma

#### **Radiographic findings :**



**Figure 4 : Mandibular Cross Sectional occlusal Radiograph showing radiolucency seen in 43,44,45,46 region.**

i) Mandibular cross sectional occlusal radiograph revealed diffused radiolucency in relation to 43, 44 , 45 & 46 extending from mesial aspect of 43 to mesial aspect of 46 With buccal and lingual cortical plate expansion. (Fig 4).



**Figure 5: Panoramic radiograph shows a well-defined unilocular radiolucency with corticated border in the right mandibular body region.**

ii) Orthopantomograph revealed a well-defined corticated multilocular radiolucency on right body of mandible measuring about 3× 2.5 cm in diameter in relation to 31, 41, 42, 43, 44 & 45. Suggestive of extending from the alveolar crest superiorly to 1 cm above the lower border of mandible inferiorly with antero-posterior expansion cyst suggested odontogenic keratocyst.( Fig 5 )

#### **Radiological differential diagnosis**

1. Ameloblastoma
2. Central giant cell granuloma

Based on the clinical findings and radiographic findings provisional diagnosis was given as Keratocystic odontogenic tumor of anterior mandible.

#### **TREATMENT**

FNAC and cyst enucleation was done under LA in the Department of Oral and Maxillofacial Surgery, Sri Rajiv Gandhi College of Dental Sciences and Hospital. A cheesy semisolid fluid was obtained sent to the department of oral & maxillofacial pathology. Histopathological examination revealed parakeratinized stratified squamous corrugated epithelium with palisading nuclei which confirmed the diagnosis. After 1 week patient was recalled for check-up. Operated area was irrigated and suture



removal done. Patient underwent RCT for nonvital teeth( 41, 42, 43 ,44, 45,&46).

## DISCUSSION

Keratocystic odontogenic tumour (KCOT), formerly known as odontogenic keratocyst (OKC), a cyst derived from the remnants (rests) of dental lamina with a biological behaviour similar to benign unicystic or multicystic intraosseous neoplasm of odontogenic origin with a distinct.<sup>1,2</sup>

It has long been of particular interest because of its potential for locally destructive behaviour, its recurrence rate, and its tendency for multiplicity, particularly when associated with nevoid basal cell carcinoma syndrome.<sup>2</sup>

The discovery of increased mitotic activity in the cyst epithelium, the potential for epithelial budding from the basal layer or daughter cysts in the cyst wall, the presence of chromosomal abnormalities and the role of mutation of the PTCH gene in the aetiology of KCOTs resulted in reclassification of this lesion as a neoplasm in the WHO classification of head and neck tumours in 2005, and its renaming as KCOT.<sup>2</sup>

**Shear states** “The mandible is involved far more frequently than the maxilla.”<sup>2</sup> The high frequency of mandibular involvement, born out in other series, is 77% (Hansen, 1967); 83% (Browne,1970); 65% (Brannon, 1976); 72% (Hodgkinson *et al.*, 1978); 71% (Vedtofte and Prætorius, 1979); 78% (Forsell, 1980); 75% (Ahlfors *et al.*, 1984); 69% (Voorsmit, 1984); 69% (Chow Hsun-Tau, 1998); 62% (Lam and Chan, 2000); and 73% (Morgan *et al.*, 2005).<sup>2</sup>

As described by Bran and Rannon (1977), the epithelial lining is very thick and uniform in thickness with little evidence of rete ridges. The basal layer is prominent and often palisaded and the spinous layer is thin and may exhibit intracellular edema.<sup>1,2</sup> Keratinization is predominantly parakeratotic (with nuclei) but may be orthokeratotic. Keratin layer is often corrugated. In addition the fibrous connective tissue wall is generally thin and inflammation is absent.<sup>1,2,4,5,6</sup> Other authors, such as Browne (1977) and Magnusson (1978), observed a tendency for the

epithelium to separate from the connective tissue lining.

In some instance, **abtropfung** or dropping down phenomenon of epithelial elements in connective tissue wall has been observed.<sup>7,8</sup> Payne in 1972 found that this budding like hyperplastic proliferation of basal layer was suggestive of dental lamina structure and that it was present in 85% of patient with the Jaw Cyst Basal Cell Nevus Bifid Rib Syndrome, 45% of patients with recurrent KCOT and 8% of patients with non recurring KCOTs.<sup>7,8,9</sup>

The KCOT may occur in people of any age. Seen in people in 10-40 years of age, there is a slight male predilection. Mandible is more commonly involved with a mark tendency to involve the posterior body and the ascending ramus.<sup>6,7</sup>

Small KCOT's are usually asymptomatic and are discovered only during the radiographic examination. Large KCOTs may associate with pain, swelling or drainage. KCOTs tend to grow in an antero-posterior direction within the medullary cavity without causing the obvious bone expansion. This feature may be useful in differential, clinical and radiographical diagnosis from dentigerous cyst and radicular cyst of comparable size which are usually associated with bony expansion. Multiple KCOTs may be present and such patients should be evaluated for other manifestations of Gorlin Syndrome.<sup>8,9,10</sup>

Radiologically most KCOTs are unilocular, presenting a well-defined peripheral rim. Scalloping borders is also a frequent finding and this represent variation in growth pattern of the cyst. Multilocular radiolucent KCOT is also observed. When it is multilocular and especially if located in the third molar area, it may be confused radiographically with an ameloblastoma. Occasionally KCOT may mimic a dentigerous cyst and contain the crown of a retained tooth with its lumen.<sup>11,12</sup> Multilocularity is often present and tends to be more frequent in larger lesions. Most lesions are often unilocular, with as many as 40% noted adjacent to crown of unerupted tooth. Approximately 30% of maxillary and 50% of mandibular lesions produce buccal expansion.



Mandibular lingual enlargement is occasionally seen.<sup>13,14,15</sup> Proximity to the roots of adjacent normal teeth will sometimes causes resorption of roots, although displacement is more common.

The lining epithelium of KCOT is highly characteristic and composed of

- 1) A parakeratinised surface which is corrugated, rippled or wrinkled.
- 2) A remarkable uniformity of thickness of the epithelium, usually ranging from 6 to 10 cells thick.
- 3) A prominent palisaded , polarised basal layer of cells having a 'picket fence' or 'tomb-stone' appearance.<sup>6,9,11,16,17</sup>

Histologically these cysts are formed with a stratified squamous epithelium that produces orthokeratin(10%), parakeratin(83%) or both types of keratin .No rete ridges are present; therefore the epithelium often sloughs from the connective tissue(94% of the time). The epithelium is thin and mitotic activity is present; therefore KCOT grows in a neoplastic fashion and not in response to internal pressure. In the presence of intense inflammatory process, the adjacent epithelium loses its keratinised surface, may thicken and develop rete processes or may ulcerate.<sup>6,9,11,16,17</sup>

## CONCLUSION

In conclusion, KCOTs are benign unicystic or multicystic intraosseous tumors of odontogenic origin and should be considered in the differential diagnosis of jaw lesions. In the presence of clinical and radiological features indicative of KCOT, a definitive diagnosis cannot be made without microscopic analysis. Only a detailed investigation will allow to determine the most effective treatment and thus to avoid recurrences.

## REFERENCES

1. Greenberg MS, Glick M, Ship JA : Burkett's Textbook of Oral Medicine, 11th edition Ontario Canada, BC Decker Publisher; 147-8
2. Shear M, Speight PM. Cyst of Oral and Maxillofacial Region, 4<sup>th</sup> Edition. New Jersey, Blackwell2007; 59-75
3. Ongole R, BN Praveen. Textbook of Oral Medicine Oral Diagnosis and Oral Radiology, 2<sup>nd</sup> Edition India Reed Elsevier Publisher 2013; 303-5
4. Madras J, Lapointe H; JCDA J Can den Asso 2008, March 719 (2)
5. Rajendran R, Sivapathasundharam B; Shafer's Textbook of Oral Pathology, 6<sup>th</sup> Edition ; Elsevier 2009; 258-61
6. Neville BW, Damm DD, Allen CM Bouquot JE; Oral and Maxillofacial Pathology, 2<sup>nd</sup> Ed; Publisher 594-601.
7. Bande CR, Prasanth M L Sumbh.B, Pandilwar P.K Prevalence, Treatment and Recurrence of Odontogenic Keratocyst in Central India. J Maxillofac Oral Surg. 2010 June; 9(2): 1469.
8. Langlias RP, Langland OE Diagnostic Imaging Of The Jaws 1<sup>st</sup> edition USA Williams & Wilkins; Publisher 1995 Ch 13 p327-34.
9. Altini M, Cohen M. The follicular primordial cystodontogenic keratocyst. Int J Oral Surg. 1982;11(3):175-82.
10. Rud J, Pindborg JJ. Odontogenic keratocysts: a follow-up study of 21 cases. J Oral Surg. 1969;27(5):323-30
11. Keith DA. Macroscopic satellite cyst formation in the odontogenic keratocyst. Report of two cases. Oral Surg Oral Med Oral Pathol 1973;35(1):217.
12. Robinson HB. Primordial cyst versus keratocyst. Oral Surg Oral Med Oral Pathol. 1975;40(3):| 36-24.
13. Brannon RB. The odontogenic keratocyst. A clinicopathologic study of 312 cases. Part I. Clinical features. Oral Surg Oral Med Oral Pathol. 1976;42(1):54-72.
14. Forssell K. The primordial cyst. A clinical and radiographic study. Proc Finn Dent Soc. 1980;76(3):129-74.

15. Brondum N, Jensen VJ. Recurrence of keratocysts and decompression treatment. A long-term follow-up of forty-four cases. *Oral Surg Oral Med Oral Pathol.* 1991;72(3):26-59.
16. Wright JM. The odontogenic keratocyst: orthokeratinized variant. *Oral Surg Oral Med Oral Pathol.* 1981;51(6):609-18.
17. Kakarantza-Angelopoulou E, Nicolatou O. Odontogenic keratocysts: clinicopathologic study of 87 cases. *J Oral Maxillofac Surg.* 1990;48(6):59-39.

## DENTIGEROUS CYST ASSOCIATED WITH INVERTED MESIO DENS: A RARE CASE REPORT

PINHAJ A SHERASHIYA<sup>1</sup>, YOGESH T L<sup>2</sup>

### 1. Dr. Pinhaj Sherashiya

Post graduate student,  
Department of Oral  
Maxillofacial Pathology,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### 2. Dr. Yogesh T L

Reader,  
Department of Oral  
Maxillofacial Pathology,  
Sri Rajiv Gandhi College of  
Dental Sciences  
Cholanagar, Hebbal  
R.T. Nagar Post,  
Bengaluru, Karnataka

### ABSTRACT

Dentigerous cyst is a developmental odontogenic cyst associated with unerupted teeth, odontomes or supernumerary teeth. About 95% of dentigerous cysts involve the permanent dentition and only 5% are associated with supernumerary teeth. Supernumerary teeth should be examined very carefully to prevent possible effects on adjacent regular teeth and possible cystic development. Dentigerous cysts are usually slow growing lesions and may attain a considerable size with minimal or no symptoms. Ameloblastoma, mucoepidermoid carcinoma, and squamous cell carcinoma have also been reported to arise from the lining epithelium of dentigerous cysts, indicating the pluripotentiality of their cells. Early detection and removal of such cysts is therefore important to reduce potential morbidity. A rare case of a thirty three year old female with mesiodens associated with dentigerous cyst is described here along with the treatment strategy employed for the patient.

### KEYWORDS

dentigerous cyst, supernumerary tooth, mesiodens.

### INTRODUCTION

Dentigerous or follicular cysts are the second common type of odontogenic cysts, and the most common developmental cysts of the jaws.<sup>1</sup> The dentigerous cyst is defined as a cyst that originates by the separation of the follicle from around the crown of an unerupted tooth.<sup>2</sup> Dental follicle associated with unerupted or impacted teeth shows fibrous connective tissue with remnants of reduced enamel epithelium. Dentigerous cysts are caused by expansion of dental follicles resulting from accumulation of fluid between tooth crowns and epithelial components.<sup>3</sup> This cyst most frequently occurs in patients between 10 and 30 years of age and there is a greater incidence in males with 1.6:1 ratio.<sup>1,2</sup> The cysts most often involve impacted mandibular third molars, followed by maxillary canines, mandibular premolars, and occasionally supernumerary teeth or odontomas.<sup>2,4</sup> The clinical examination reveals a missing tooth or teeth and occasionally a hard swelling, sometimes resulting in facial asymmetry and possible pathologic fracture. Dentigerous cysts are tentatively diagnosed on routine dental radiographs.<sup>5</sup> Radiographically, the cyst appears as a unilocular radiolucent shadow with a welldefined sclerotic border associated with the crown of an unerupted tooth, but an infected cyst will show ill defined borders.<sup>6</sup> Only 5% of dentigerous cysts are associated with

For correspondence:

**Dr. Pinhaj Sherashiya**

Email: hi\_pinhaz@yahoo.com

supernumerary teeth. The usual age of clinical presentation of dentigerous cyst due to supernumerary tooth is in the first four decades of life.<sup>7</sup> Supernumerary teeth are most common in the maxilla with a strong predilection for the anterior region, in which case the supernumerary tooth is termed a mesiodens.<sup>1,2</sup> This article presents a case of dentigerous cyst associated with a mesiodens in a 33-year old female.

## CASE REPORT

A female patient presented with a chief complaint of displaced front teeth since 8-10 month. Initially the displacement was minor with disto labial direction and becoming progressive to present condition. No history of any trauma, swelling and pain was present. Her systemic and family history was not significant. Extra oral examination showed no gross asymmetry of the face. Displaced teeth were vital and non tender. Routine laboratory parameters were normal. FNAC of the swelling showed straw coloured brownish fluid and on cytologic examination nonspecific inflammatory cells were noted. Intra oral periapical radiograph (Fig 1) showed a well-defined and unilocular radiolucent lesion approximately measuring 1 x 1.5 cm, attached to the crown of the unerupted inverted mesiodens in the right alveolar process of the anterior maxilla. Also a supernumerary tooth was noted on the left side of the palate. Based on the history and clinical examination, a provisional diagnosis of nasopalatine cyst was given. The differential diagnosis of dentigerous cyst with an impacted supernumerary tooth was considered.



**Fig. 1 : Intra Oral Principal Radiograph**

**Figure 1 IOPAR** shows a well-defined and unilocular radiolucent lesion approximately measuring 1 x1.5 cm, attached to the crown of the unerupted inverted mesiodens in the right alveolar process of the anterior maxilla.

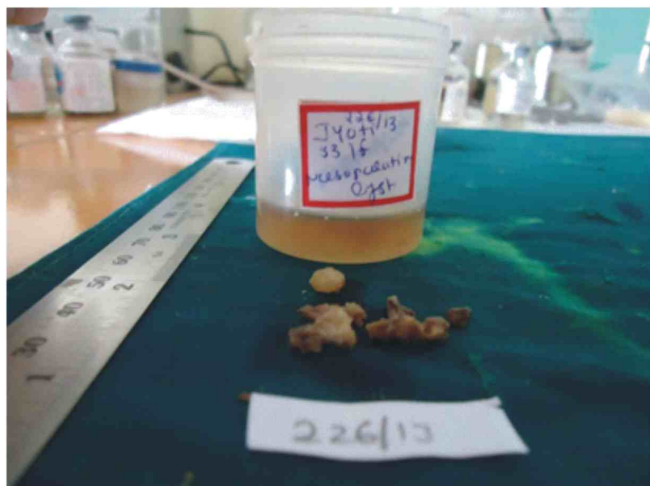
## TREATMENT

Under local anaesthesia a palatal flap was raised on the left side, excessive bone loss was avoided and the supernumerary tooth was partially exposed and removed. A semilunar incision was made in the on the right side, flap raised and the cyst was enucleated. The specimen was submitted to the department of oral and maxillofacial pathology (Figures 2,3) for histopathological examination which revealed that the cystic lumen were lined by 3-5 layers of non keratinized epithelium, (Figures 4) resembling reduced enamel epithelium with focal areas of proliferation. The connective tissue was myxomatous to fibrous with a infiltrate of acute and chronic inflammatory cells in some areas. A few islands of odontogenic epithelium were also seen within the connective tissue (Figure 4). All these feature confirmed the diagnosis of a dentigerous cyst. The patient has remained asymptomatic and experienced no recurrence during the 6 months postoperative period.

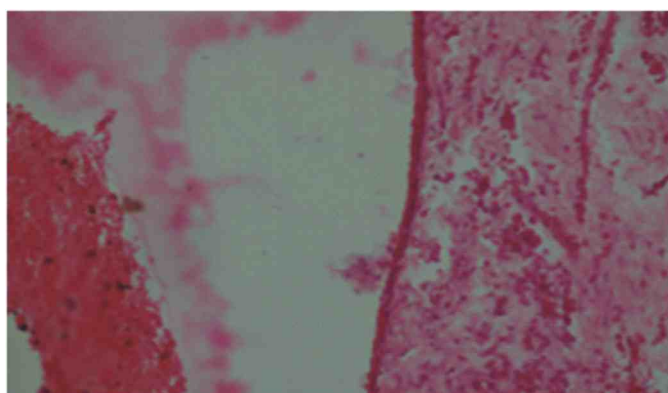


**Figures 2.** Gross specimen after post operative surgical procedure shows greyish white in color with cone shape mesiodens





**Figures 3.** Gross specimen with formalin container.



**Figures 4.** histopathological examination which revealed that the cystic lumen were lined by 3-5 layers of non-keratinized epithelium.

## DISCUSSION

After the radicular cyst, the dentigerous cyst is the second most common type of odontogenic cyst and is always associated with the crown of an impacted, embedded, or otherwise unerupted tooth. Dentigerous cysts are typically asymptomatic and may be large, destructive, expansile lesions of a bone. The highest incidence of dentigerous cysts occurs during the second and third decades.<sup>8</sup> The cyst usually occurs in the mandible, and is known to be both unilocular and multilocular and causes apical resorption of the adjacent teeth. The diagnostic feature of this cyst is the presence of the unerupted tooth in its cavity, which in our case was a mesiodens.<sup>9</sup> A mesiodens is known to have a cone shaped crown without root, as seen in our patients. It is a rare entity with a reported incidence of 0.15% to 1.9%, and it has a slight predominance in females.<sup>9</sup> Dentigerous cyst formation is another problem that

may be associated with supernumerary teeth. **Primosch** reported an enlarged follicular spacing in 30% of the cases, but the histological evidence of cyst formation was found in only 4-9% of the cases.<sup>10</sup> According to **Asaumi** et al, dentigerous cyst formation arising from the supernumerary teeth comprises 11% of cases. A further study found that 6% of supernumerary teeth have dentigerous cyst development, and **Hurlen** suggested that dentigerous cysts associated with the supernumerary teeth occur in 7% of cases.<sup>11</sup> Radio graphically, the dentigerous cyst typically appears as a well circumscribed, unilocular, usually symmetric radiolucency around the crown of an impacted tooth. An important diagnostic point is that this cyst attaches at the cemento-enamel junction. The internal aspect of the cyst is completely radiolucent except for the crown of the involved tooth. One of the most difficult conditions to distinguish in the differential diagnosis is hyperplastic follicle. The standard treatment for a dentigerous cyst is enucleation and extraction of the cyst associated with impacted or unerupted tooth. However, large lesions can be marsupialised. Histologically, dentigerous cysts are lined by a layer of nonkeratinized stratified squamous epithelium, with surrounding wall of thin connective tissue containing odontogenic epithelial rests.

## SUMMARY

Dentigerous cyst rarely involves central incisors, supernumerary teeth and mesiodens. The diagnostic feature of this cyst is the presence of unerupted / impacted tooth in its cavity. Therefore, it is important to perform a radiographic examination of all the unerupted teeth. Removal of the associated tooth and enucleation of the soft tissue component is a definitive therapy in most of the cases. In this case, displacement of maxillary anterior teeth, due to the cyst, was corrected with time, into the proper alignment of the arch. The result of this technique was elimination of the pathology and maintenance of proper dentition.

## REFERENCES

1. Regezi AJ, Sciubba JJ, Jordan RCK. Oral Pathology. Clinical Pathologic Correlations . 5th edi, 2008:242-244.

2. Neville BW, Damm DD, Allen CM, Bouquot JE. Oral and Maxillofacial Pathology. 3rd, 2008:679-681.
3. Edamatsu M, Kumamoto H, Ooya K, Echigo S. Apoptosis related factors in the epithelial components of dental follicles and dentigerous cysts associated with impacted third molars of the mandible. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2005;99:17-23.
4. Kumar N, Rama Devi M, Vanaki S, Puranik S. Dentigerous cyst occurring in maxilla associated with supernumerary tooth showing cholesterol clefts - a case report. Int J Dent Clin 2010;2:39-42.
5. McCrea S. Adjacent dentigerous cysts with the ectopic displacement of a third mandibular molar and supernumerary (forth) molar: a rare occurrence. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009;107:15-20.
6. Wood NK, Goaz PW. Differential Diagnosis of Oral Lesions, 5th edi, 1997:283-288.
7. Grover SB, Singh P, Venkat achalam VP, Hekha N. Mesiodens presenting as a dentigerous cyst: case report. Indian J Radiol Imaging 2005;15:69-72.
8. Gulses A, Karacayli U, Koymen R. Dentigerous cyst associated with inverted and fused supernumerary teeth in a child: a case report. Oral Health Dent Manag 2009; 8 : 38 -41.
9. Grover SB, Singh P, Venkat achalam VP, Hekha N. Mesiodens presenting as a dentigerous cyst: Case report. Indian J Radiol Imaging 2005;15:69 - 72.
10. Primosch RE. Anterior supernumerary teeth assessment and surgical intervention in children. Pediatr Dent 1981;3:204-215.
11. Hurlen B, Humerfelt D. Characteristics of premaxillary hyperdontia. A radiographic study. Acta Odontol Scand 1985;43:75-81.