



## CHILDREN'S EDUCATION SOCIETY (Regd.)

### Administrative Office:

Ist Phase, J.P. Nagar, Bangalore-560 078.  
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### THE OXFORD DENTAL COLLEGE

(Recognised by the Govt. of Karnataka, Affiliated to Rajiv Gandhi University of Health Sciences, Karnataka & Recognised by Dental Council of India, New Delhi)

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## 7.2 Best Practise

### BEST PRACTISE- 1

#### 1. Title: Finite Element Method (FEM)

#### 2. Objectives:

- FEM aims to provide an accurate solution for systems with complex geometries, boundary conditions, and material properties that cannot be analyzed using simplified methods or analytical equations.
- Convert a continuous problem into a discrete system by dividing the domain into smaller, manageable elements (mesh), facilitating numerical analysis.
- FEM helps engineers optimize designs by predicting performance under various conditions, allowing adjustments to improve safety, efficiency, and cost-effectiveness.
- Provide insights into how a system will behave under specific loads, forces, or environmental conditions before physical prototypes are built.
- Minimize the need for expensive and time-consuming physical experiments by using simulations to predict outcomes.

#### 3. The Context:


Primarily focused on solving complex engineering and physical problems that are difficult or impossible to solve analytically.

#### Education:

#### Under graduates:

#### Theoretical Foundations

- Definition and history of FEM.
- Applications in different fields (e.g., structural, thermal, fluid).
- Introduction to FEM software (e.g., ANSYS, Abaqus, COMSOL, MATLAB).
- Model setup, boundary conditions, and result interpretation.
- Case studies to analyse real-world problems.

  
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## Post graduates:

### Practical Applications

- **Lectures:** Focus on theoretical concepts, supplemented with case studies.
- **Tutorials:** Hands-on exercises for solving simple FEM problems manually.
- **Software Labs:** Training on FEM software, covering simulations and validation.
- **Projects:** Dissertation projects to apply FEM concepts to real-world problems.

### 2. Practise: Clinical training

a program designed to train in applying FEM to solve real-world problems, specifically in fields where computational simulations play a critical role in clinical services, such as biomechanics, biomedical engineering, or medical device design.

This type of training focuses on equipping participants with the skills needed to analyze and optimize healthcare-related systems using FEM tools and techniques.

### 3. Problems Encountered:

- Difficulty in capturing the full complexity of a system due to simplifications in geometry, boundary conditions, and material properties.
- FEM requires significant expertise in both theory and software tools, which may be lacking
- FEM studies are expensive

### 4. Evidence of Success:



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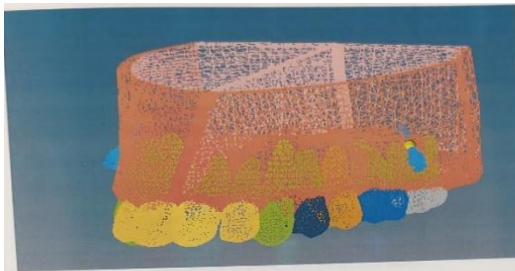


Fig 3: Bone screw position with transparent view.



Fig 4: Stl file of mandibular bone with required teeth (Molar 1 and Molar 2)

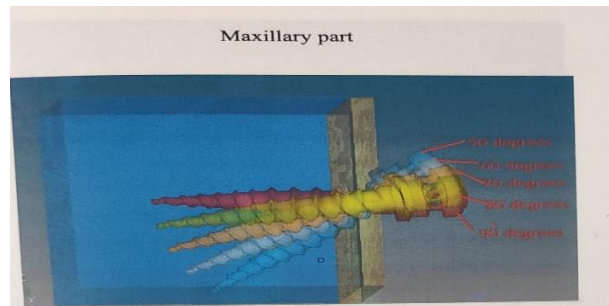


Fig 9: Bone screw placement at various angulations



Fig 10: Mesh plot at 90° angulation



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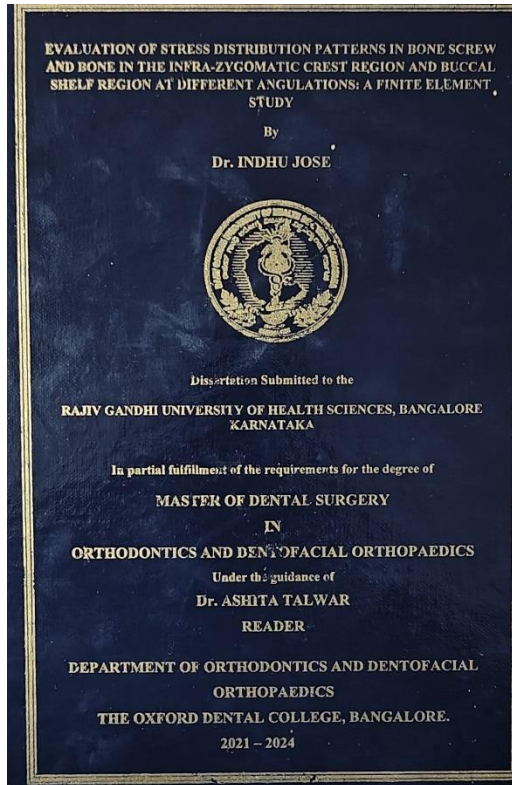
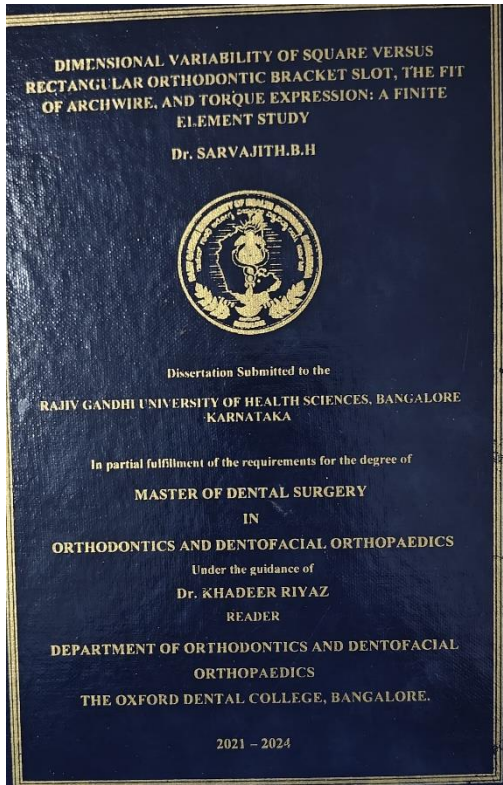
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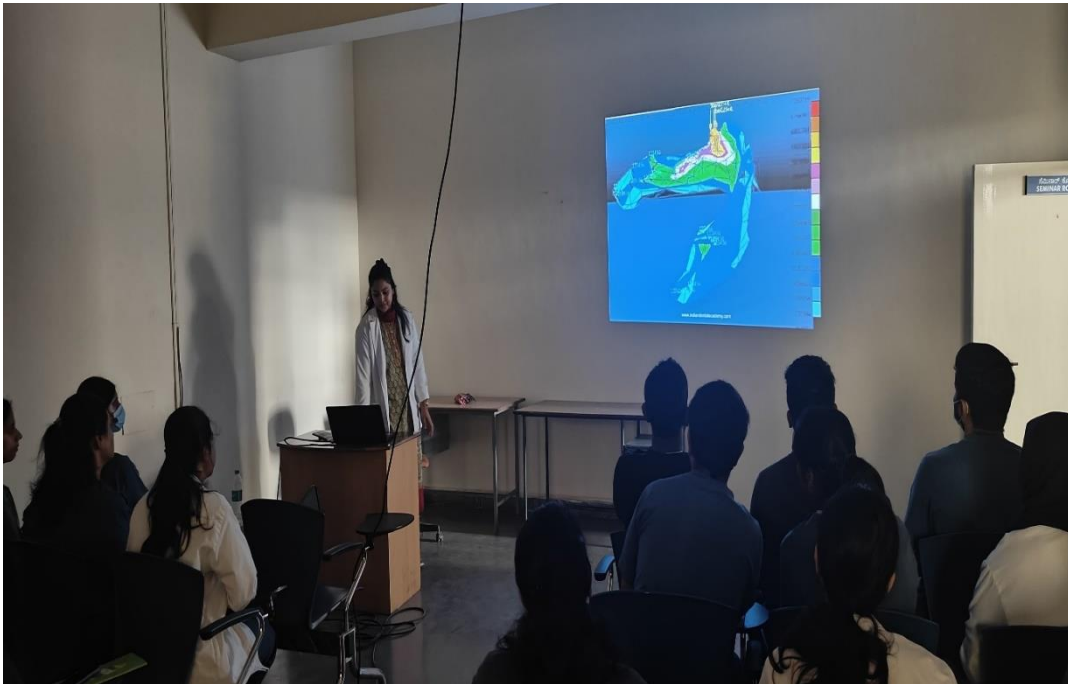
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## BEST PRACTISE- 2

### 1. TITLE

Management of severely calcified canals and minimally invasive Access Cavity using the AReneto® System

### 2. OBJECTIVES

The objectives of this system were to guide the clinician and act as a passive assistant to help prepare minimally invasive access cavities and also help the clinician negotiate calcified canals with ease.

### 3. CONTEXT

Traumatic injuries to anterior teeth often lead to complications such as calcification and periapical lesions, which frequently necessitate root canal treatment. Traditional methods of preparing access cavities in these cases can compromise the tooth's structural integrity, impacting long-term outcomes. With the advancements in minimally invasive techniques, guided endodontics has emerged as a critical innovation in modern dentistry. The AReneto® system, developed by Roots to Cusps® Private Limited integrates augmented reality (AR) into endodontic procedures, enabling clinicians to enhance precision and preserve tooth structure.

### 4. PRACTICE

Merging guided endodontics with AR, Roots to Cusps® Private Limited, based in Bangalore, India, developed the AReneto® system. The AReneto® system projects preoperative virtual planning of the access cavity directly before the clinician's eyes through AR glasses, thereby helping the clinicians focus on the operating area and perform minimally invasive access cavity preparation. The AReneto® system helps the clinician to perform minimally invasive access openings, potentially improving the long-term prognosis of endodontic treatments. However, its effectiveness largely depends on the clinician's expertise. This system reduces chairside time, minimizes operator fatigue, and provides a more comfortable patient experience.

### 5. EVIDENCE OF SUCCESS



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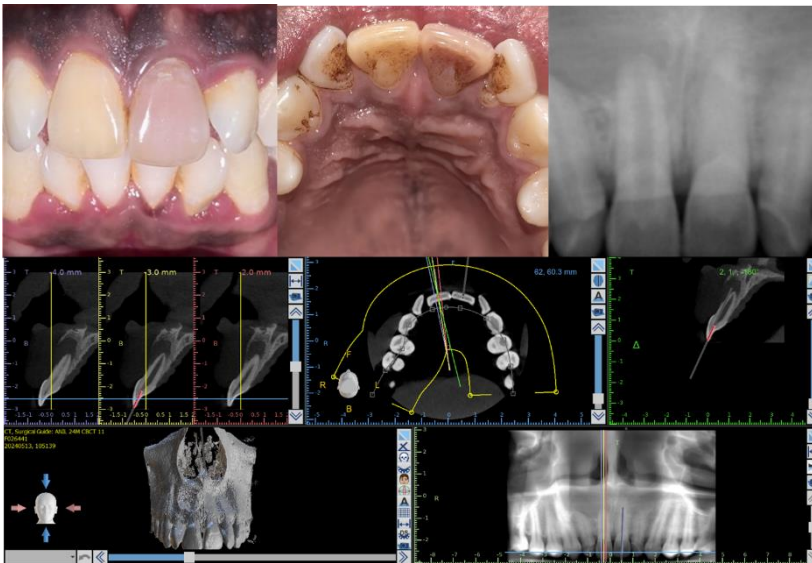
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The AReneto® system helps the clinician to perform minimally invasive access openings, potentially improving the long-term prognosis of endodontic treatments. However, its effectiveness largely depends on the clinician's expertise. This system reduces chairside time, minimizes operator fatigue, and provides a more comfortable patient experience. In cases of financial constraints or time limitations, the AReneto® system can serve as an efficient alternative to static guides or dynamic navigation systems. The AReneto® system is cost-effective, requiring only glasses and a computer rather than bulky equipment, and avoids the need for STL files and multiple preoperative impressions, which can be uncomfortable for patients.

#### 6. PROBLEMS ENCOUNTERED AND RESOURCES REQUIRED

Initially in the first case there was a minimal deviation seen which was then rectified in the following case without any additional resources.





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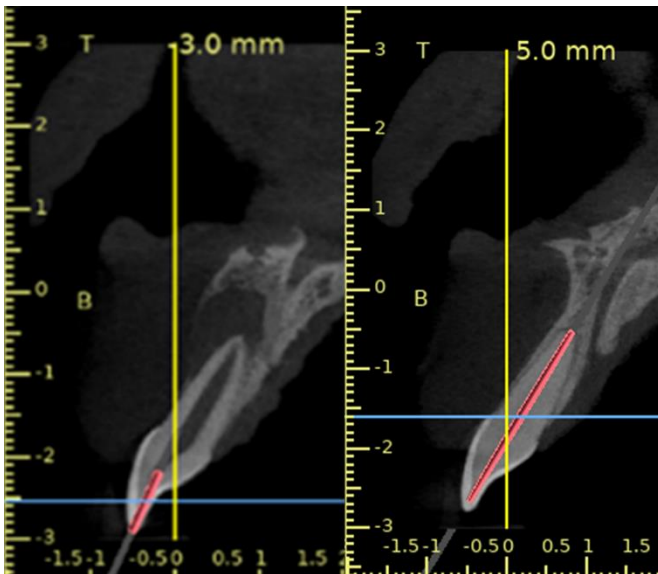
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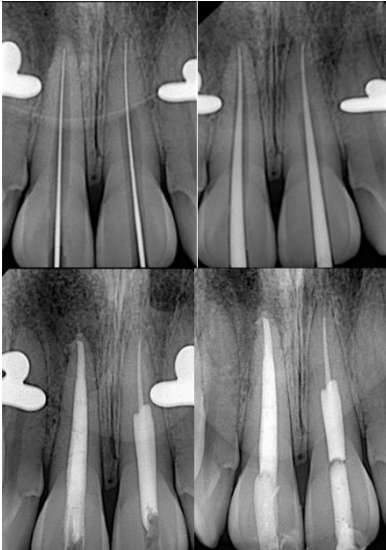
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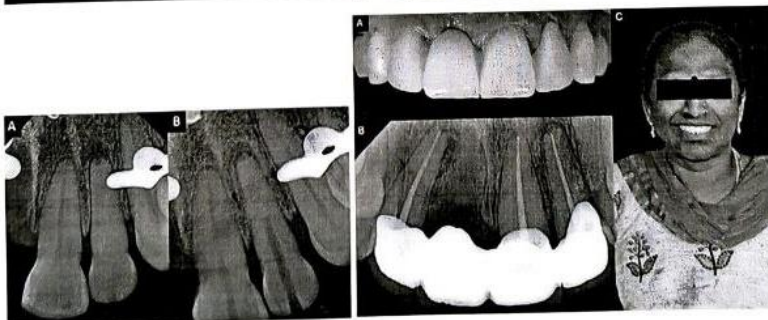
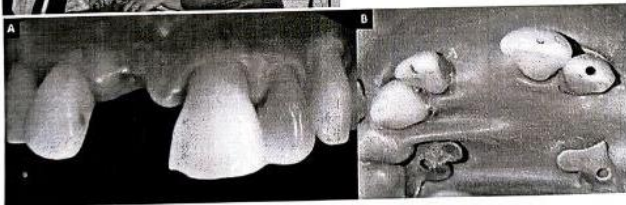
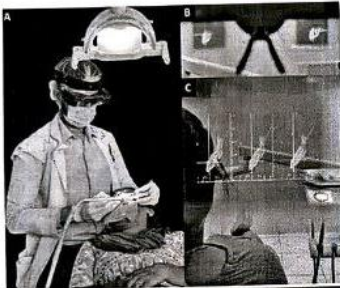
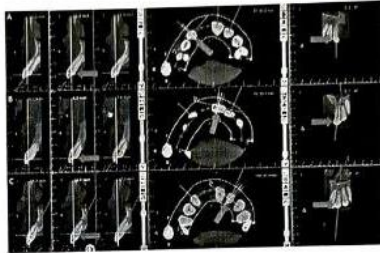
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