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## Facing the facts: Cone beam CT imaging in diagnostic implant dentistry

### Cone Beam Computed Tomography

**Language:** English

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### Introduction

Cone beam computed tomography provides 3-D cross-sectional views and has a high value when considering the ratio between diagnostic potential, cost of study, and risk to the patient. It has proven to be an important tool for the clinicians to diagnose and plan their treatment.

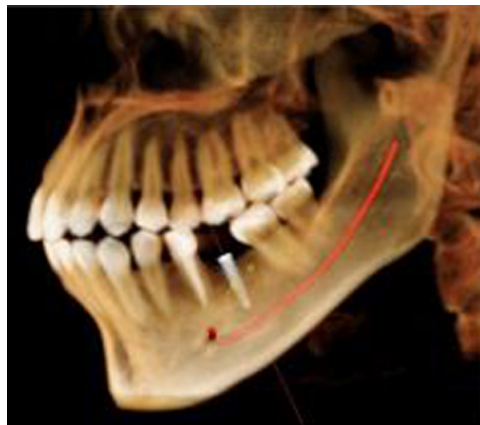
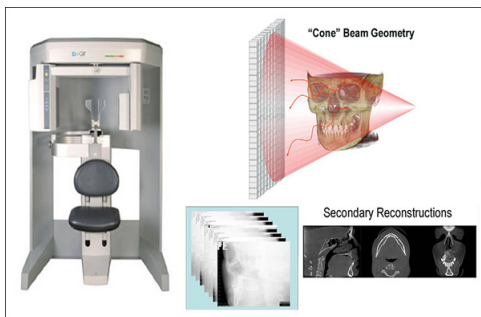


Fig: 1: Image Acquisition & Reconstruction

Fig: 2: Implant Planning

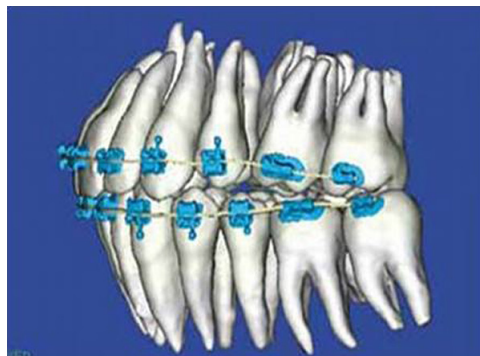


Fig: 3: Cephalometric Analysis

Fig: 4: Orthodontic Planning

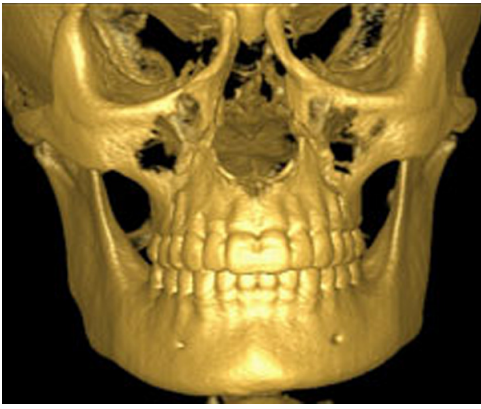


Fig: 5: Dento Maxillofacial Imaging

Fig: 6: Jaw Pathologies

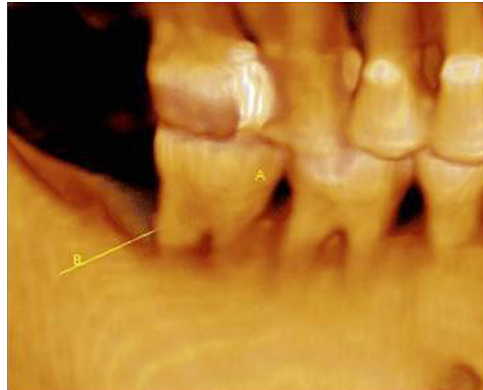
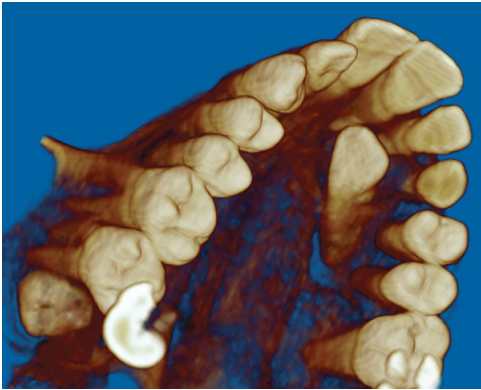


Fig: 7: Impacted Teeth

Fig: 8: Periodontal Diseases

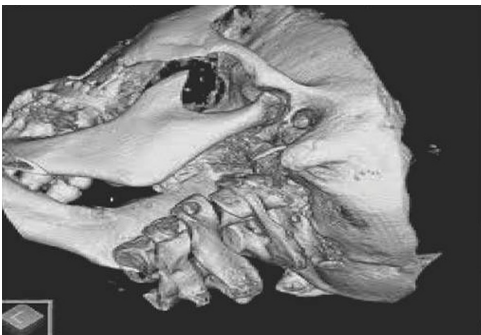


Fig: 9: TMJ Analysis

## Material and Methods

A 30 year old male reported with history of trauma leading to loss of teeth #8, #9, #23, #24, #25 and #26. Two dimensional (IOPA, OPG) radiographic examination revealed a faint radiopacity in upper anterior region. Further, three dimensional CBCT was performed to view it more precisely.

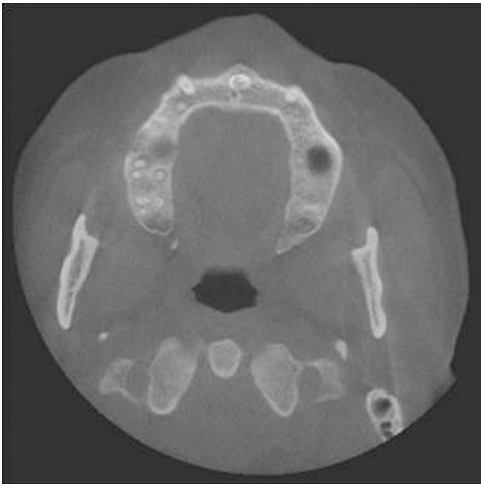


Fig: 10: Axial Image

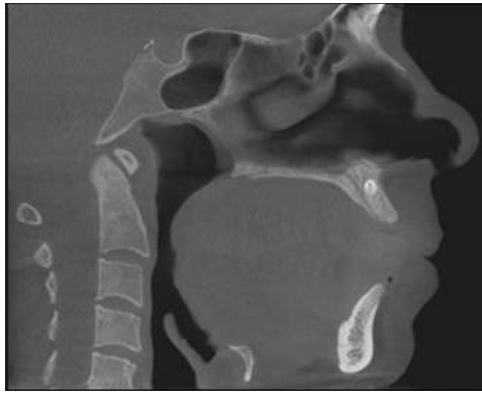


Fig: 11: Saggital Image



Fig: 12: Coronal Image

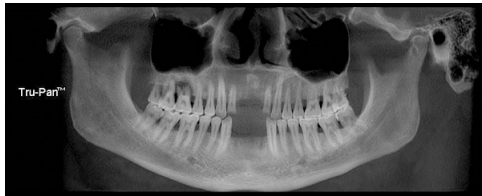


Fig: 13: Panoramic Image



Fig: 14: Lateral Cephalometric Image

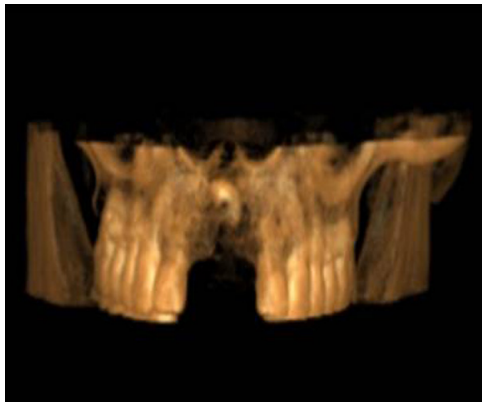


Fig: 15: Volumetric 3-D Representation

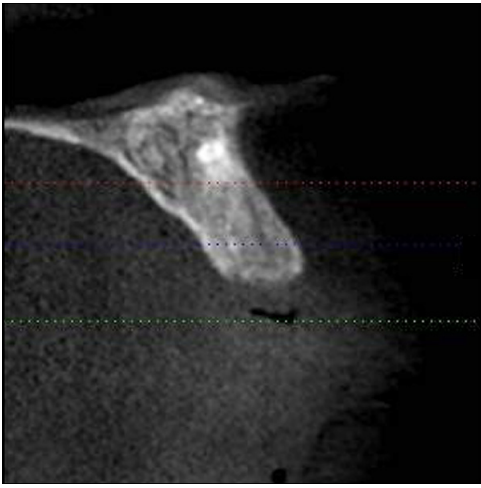


Fig: 16: Cross-Sectional Slice - 1

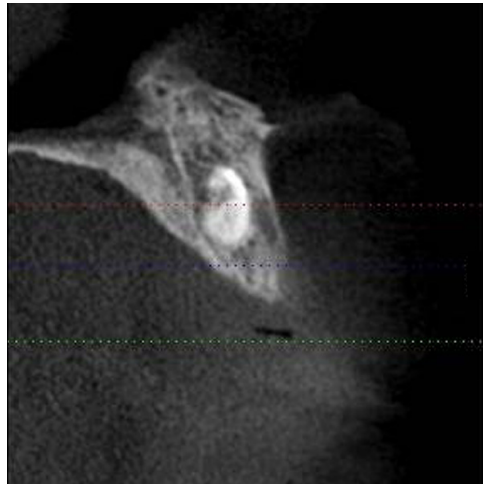


Fig: 17: Cross-Sectional Slice - 2

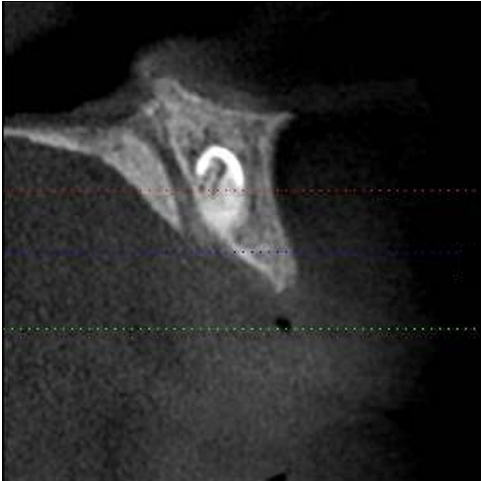


Fig: 18: Cross-Sectional Slice - 3

1 - 7.60 mm  
2 - 5.10 mm

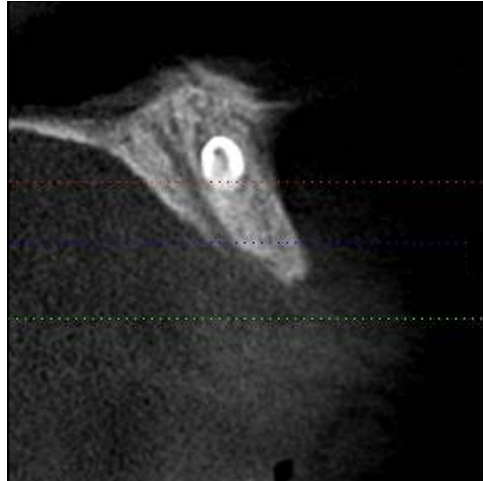
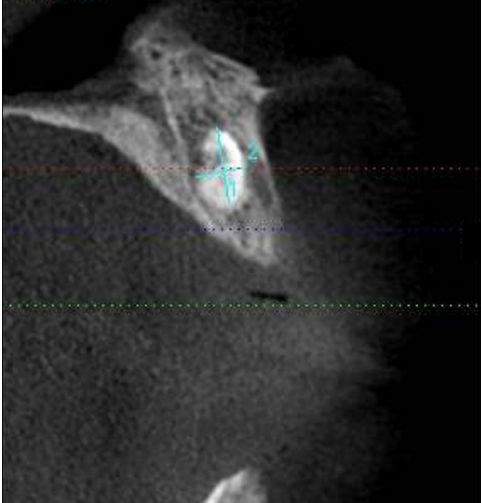


Fig: 19: Cross-Sectional Slice - 4

1 - 5.34 mm  
2 - 4.04 mm

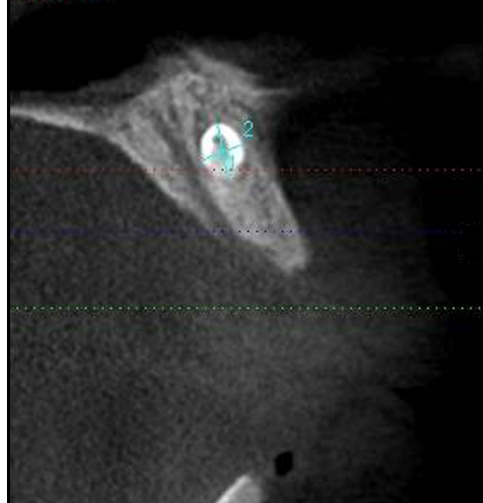


Fig: 20: Cross-Sectional Slice With Measurement - 1

Fig: 21: Cross-Sectional Slice With Measurement - 2

**Results**

Cross sectional views of the desired region when explored, revealed a radiopacity depicting presence of two root fragments. Surgical exploration was performed and root remnants were removed. The cavity was filled with bovine origin alloplastic material containing hydroxyapatite with collagen (BioOss®). Uneventful healing was seen and radiographic evaluation was done to observe the uptake of graft material.

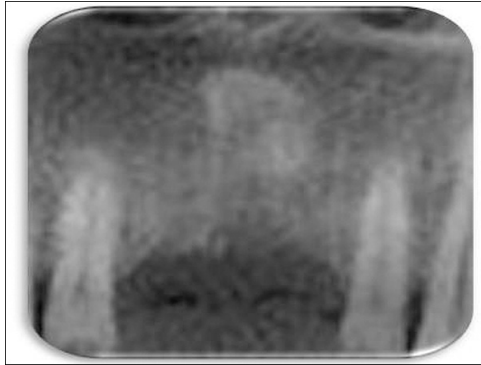


Fig: 22: Preoperative - Intraoral

Fig: 23: Preoperative - IOPA

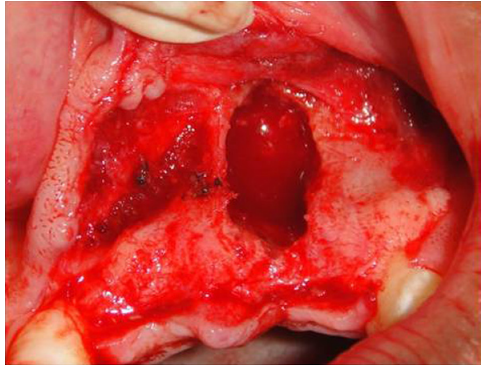
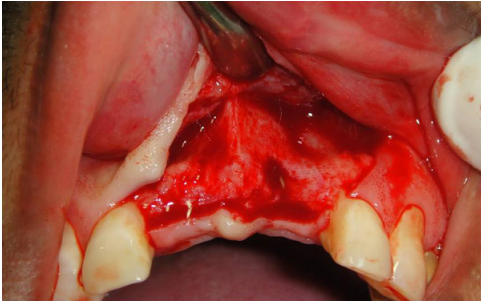


Fig: 24: Intraoperative - 1

Fig: 25: Intraoperative - 2

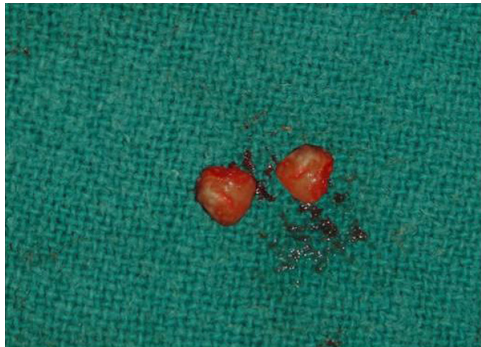
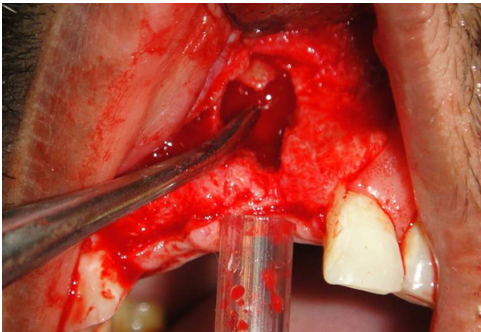


Fig: 26: Intraoperative - 3

Fig: 27: Intraoperative - 4

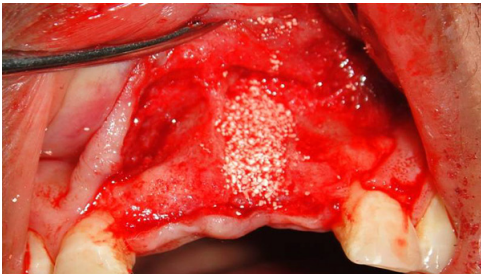


Fig: 28: Intraoperative - 5

Fig: 29: Intraoperative - 6



Fig: 30: Postoperative - Intraoral

Fig: 31: Postoperative - IOPA

## Conclusions

Thus the case study demonstrates the diagnostic utility of CBCT in providing the vital information about the implant sites in trauma cases and thus improving the clinical success of endosseous implants. CBCT is indispensable in the evaluation of osseous structures when planning treatment for dental implants. It creates the opportunity for clinicians to acquire the highest quality of diagnostic images with an absorbed dose that is comparable to other dental surveys and less than a conventional CT. The large field of view and 3-D image set offered by CBCT helps in adequate assessment of the implant site. CBCT is the medium of the future, predicting success of implant dentistry.

### Benefits of CBCT

- X-ray beam limitation
- Image accuracy
- Rapid scan time
- Dose reduction
- Reduce image artefact
- Display modes unique to maxillofacial imaging

### Limitations of CBCT

- Image noise
- Poor soft tissue contrast

## Literature

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2. Guerrero ME, Jacobs R, Loubele M, Schutyser F, Suetens P, van Steenberghe D. State-of-the-art on cone beam CT imaging for preoperative planning of implant placement. Clin Oral Investig. 2006;10:1-7.
3. Schwartz-Arad D, Levin L. Post-traumatic use of dental implants to rehabilitate anterior maxillary teeth. Dent Traumatol. 2004;20:344-7.
4. Hatcher DC, Dial C, Mayorga C. Cone beam CT for pre-surgical assessment of implant sites. J Calif Dent Assoc. 2003;31:825-33.
5. Dixon DR, Morgan R, Hollender LG, Roberts FA, O'Neal RB. Clinical application of spiral tomography in anterior implant placement: case report. JPeriodontol.2002;73:1202-9.

## Abbreviations

CBCT: Cone-beam computed tomography  
 3D: 3 dimensional  
 IOPA: Intra oral peri apical  
 OPG: Orthopantogram  
 CT: Computed tomography

This Poster was submitted by Dr. Priyanka Pahwa.

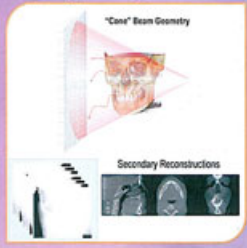
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**Poster Faksimile:**

# Facing the facts : Cone beam CT imaging in diagnostic implant dentistry

*Image Acquisition & Reconstruction*



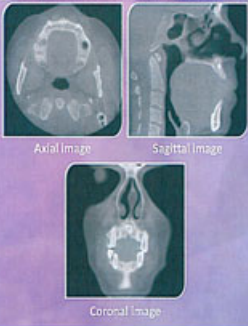
**Applications**



**CASE REPORT** A 30 year old male reported with history of trauma leading to loss of teeth #8, #9, #23, #24, #25 and #26. Two dimensional (IOPA, OPG) radiographic examination revealed a faint radiopacity in upper anterior region. Further, three dimensional CBCT (Cone Beam Computed Tomography) radiography was performed to view it more precisely.

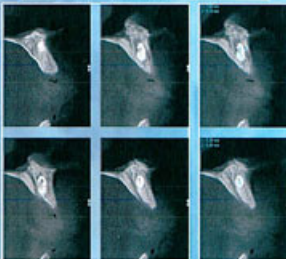
## RADIOGRAPHIC INVESTIGATIONS

**Multiplanar Reformation (MPR)**



Axial Image    Sagittal Image    Coronal Image


**Cross-sectional Slices**




Cross sectional views of the desired region revealed a radiopacity depicting the presence of two root fragments.

## SURGICAL EXPLORATION

**PRE OPERATIVE**

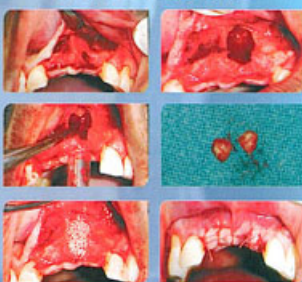


**POST OPERATIVE**



Surgical exploration was performed and root remnants were removed. The cavity was filled with bovine origin alloplastic material containing hydroxyapatite with collagen (BioOss®). Uneventful healing was seen and radiographic evaluation was done to observe the uptake of graft material.

**INTRA OPERATIVE**



CBCT is indispensable in the evaluation of osseous structures when planning treatment for dental implants.

Presented by : Dr. Priyanka Pahwa, Dr. Neha Yadav • Supervised by : Dr. Arundeeep Kaur Lamba  
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