

5 Cusps and 4 Roots in Maxillary Second Molar a Rare Anatomical Variation by Eyes of CBCT for Dentists

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Abstract

As a dentist knowledge of the anatomy of teeth is necessary for a successful treatment and to reduce post-operative issues, there are variations in every tooth but maxillary second molars commonly have more. They usually have four cusps, rhomboidal in shape with two buccal and one palatal root with three root canals. In this case report we are discussing a case where not just only roots are variants but crowns too by using cone beam computed tomography these variations are feasible to detect and report.

Keywords: Accessory Root; CBCT; Maxillary Second Molar

Abbreviations

CBCT: Cone Beam Computed Tomography; FOV: Field of View

Introduction

An accessory extra supernumerary root or cusp frequently occurring developmental/morphological variations with teeth. In clinical practice, intra oral periapical radiographs are frequently used and it is 2D radiography, so this radiographic technique sometimes fails to identify extra roots or canals [1]. Due to overlapping and other errors. Preoperative knowledge of the crown and root system will help in better understanding, treatment and reducing post-operative complications.

Formation of an extra root or accessory root usually occurs through two means, either by splitting the Hertwig's epithelial root sheath to form two similar roots or by folding the Hertwig's epithelial root sheath to form an independent root which may present with various morphological features [2]. The exact pathogenesis of the formation of accessory roots is still uncertain, multiple reasons like race, environment, disease etc. can cause this [3].

There are multiple variations (morphological variations) in maxillary molar roots:

- Four rooted maxillary roots classification by Ahmed and Abbott in 2012 [3]:
- Four rooted maxillary second molars with an accessory palatal root.
- Four rooted maxillary second molars with an accessory buccal root.

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- Four rooted maxillary second molars with an accessory mesial root.
- Four rooted maxillary second molars with an accessory distal root.

Four roots in maxillary molars were reported as 0.9%, 1.4% and up to 7% in the first, second and third maxillary molar teeth, respectively [4]. The prevalence and incidence of four roots in the maxillary second molar are 0.047% and 0.4% [5,6]. They are seen mostly in Asian or Caucasian populations [4].

Case Report and Discussion

A 55-year-old female patient residing in Navi Mumbai reported to the department of oral medicine and radiology for assessment of implant in 26 region, so informed personal consent was taken from the patient for the radiographic examination and use of personal record, that a CBCT scan of 25, 26, 27 region was taken by Carestream machine 8200 with FOV of 5 x 5 cm and scan was reported by Cs3D Imaging software version 3.10.21 for implant assessment as bone quality is Type 2 by Zarb and Lekholm [7] (Figure 1a and 1b) bone graft is advised as length is inadequate and serrated type of root implant of 6 mm length and width 4.20 mm is advised (Figure 2a and 2b).

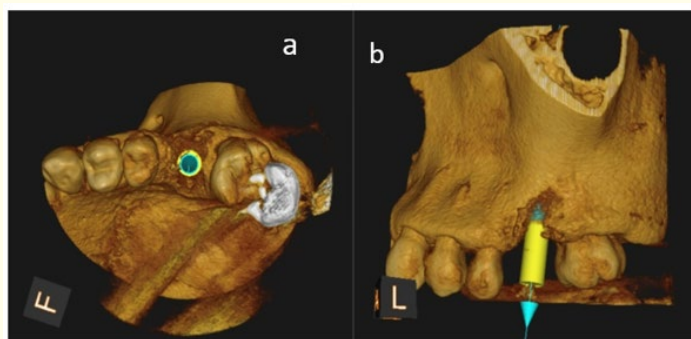


Figure 1: a) Shows a 3D axial view of the maxillary arch with an implant placed at 26 regions, b) Shows a 3D sagittal view of the arch.

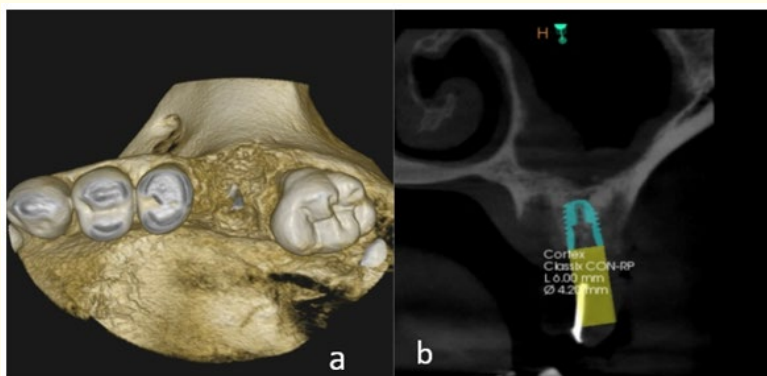


Figure 2: a) Shows a 3D axial view without implant and b) Shows implant height and width in 26 regions.

The CBCT radiography is a 3D imaging modality that helps in detecting minor anatomical and morphological changes in the maxilla. The maxillary second molar with 4 roots exhibited well-defined and completely formed roots with its root canal. The largest root, in this case, was the disto-palatal root, with a maximum diameter from apex to cervical third of 4.5 mm.

The distopalatal root was the longest with a length of 9.8 mm. Distopalatal root is slightly curved at the apex and mild linear hyperdensity is seen at the floor of sinus suggestive of sinus mucosal thickening (Figure 3) and panoramic and axial showing canals and tooth position (Figure 4).

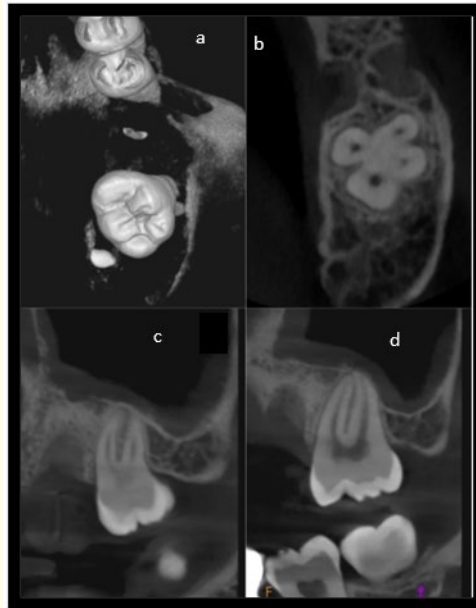


Figure 3: a) Showing 5 cusps in the second maxillary molar, b) Showing 4 roots at the axial slice of the cervical region, c) Showing 2 roots mesiobuccal and distobuccal, d) Showing 2 roots mesiopalatal and distopalatal with slight curving at the apex.

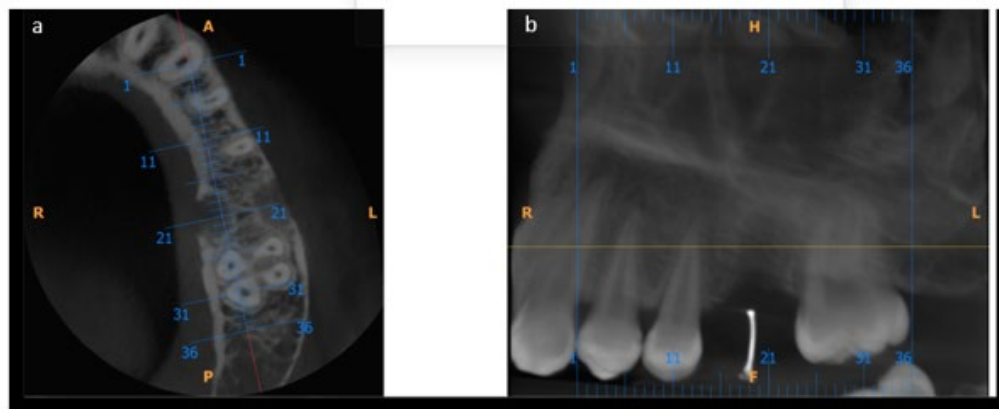


Figure 4: Images showing (a) Axial and (b) Panoramic images of maxillary second molar.

It's unusual to see accessory roots with maxillary second molar in CBCT examination and the incidence of 4-rooted Maxillary second molars ranges from 0.98% to 5.6% given by Gu Y, Wang W, Ni L [2]. In general multiple techniques were used to identify this but CBCT is a far better modality than any procedure as CBCT has better spatial resolution and low radiation exposure [8]. CBCT is considered a non-invasive procedure for detecting morphological and anatomical variations of jaws.

As occurrence of four roots and 5 cusps in maxillary second molar is a rare clinical instance and is rarely documented. Yang, *et al.* investigated the prevalence of two palatal roots in maxillary molars using cone-beam computed tomography in 528 patients comprising 1957 maxillary molars [9].

Two classifications were given for accessory roots in maxillary second molars:

The first classification was given by Christie, *et al*, Baratto-Filho, *et al.* [9,10]:

- Type I: Maxillary molars with two widely divergent palatal roots that are often long and tortuous.
- Type II: Maxillary molars with four separate roots also but the roots are often shorter, run parallel, have buccal and palatal root morphology, and have blunt root apices.
- Type III: Maxillary molar with four roots but it is constricted in root morphology with the mesiobuccal, mesio-palatal, and disto-palatal canals engaged in a web of root dentine.
- Type IV: Maxillary molar with four roots but the accessory palatal root is fused with the mesio-buccal root up to the apical level.

Second classification was given by Carlsen and Alexandersen [11]:

- Radix mesiolingualis.
- Radix distolingualis.
- Radix mesiolingualis/distolingualis.

Conclusion

In conclusion, in this case report the four-rooted maxillary second molar is an incidental finding, due to its complex anatomy and hidden root, CBCT was a boon to identifying such anatomical and morphological changes, so extra canals should be considered, in addition to preventing future incomplete endodontic procedures or treatment failures. As an oral radiologist, we must report any variation or change in anatomy or morphological changes in the jaw.

Funding Source

None.

Conflict of Interest

None.

Ethical Clearance

Ethical clearance is not required.

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