



Endodontic Management of Maxillary Supplementary Premolar using Cone-Beam Computed Tomography

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ABSTRACT

Extra teeth in dentition is termed as 'supernumerary teeth' and is a very well-known dental developmental anomaly. Supernumerary premolars are a rare anomaly in the maxillofacial complex. Its rarity and complex characteristics often makes it difficult to treat. Radiographs play an important role in assessment of both the location and the typing of supernumerary teeth.

This article reports the rare case of 'nonsyndromic bilateral maxillary supernumerary premolars' in which the endodontic management of supernumerary premolar tooth is described. In this case the value of cone-beam computerized tomography is also emphasized.

Clinical significance: Developmental anomalies can occur in any tooth and supplementary premolars are no exception. The complexity of such teeth has to be considered for planning endodontic treatment to increase the chances of success.

Keywords: Supernumerary tooth, Supplemental premolar, Cone-beam computerized tomography, Endodontic therapy.

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INTRODUCTION

Supernumerary teeth or hyperdontia is defined as any tooth or teeth in excess of the usual series of 20 deciduous or 32 permanent teeth.^{1,2} Supernumerary teeth may appear as single tooth, bilateral teeth or as multiple teeth. They may occur unilaterally or bilaterally and in either one or both jaws. The prevalence of supernumerary teeth in permanent dentition varies between 0.5 and 5.3% and in primary dentition between 0.2 and 0.8%.²⁻⁴ Whereas some studies suggest a lack of gender differences, several studies have mentioned a male predominance (male: female=2:1).^{1,6}

Based on the morphologic appearance Primosch (1981)^{5,6,8} has classified supernumerary teeth as follows:

1. Supplemental teeth
2. Rudimentary teeth

The supplemental teeth are those teeth that are of normal size and shape and hence resemble the teeth with which it is associated. The rudimentary teeth are further classified as conical, tuberculate and molariform. The majority of supernumerary teeth occur in maxilla and are known as mesiodens.⁴⁻⁶ It has been reported that the prevalence of the supernumerary premolars (SP) in the permanent dentition is between 0.075 and 0.26% and most of them occur in mandible.^{9,10} Goksel et al in their study reported the prevalence of maxillary supplemental premolars to be 0.01% and mandibular supplemental premolars to be 0.2%.⁴

Most of the tooth anomalies are asymptomatic, being discovered during routine clinical or radiological examination.⁸⁻¹¹ Radiographs are critical in assessing the location and the type of supernumeraries.^{11,12} Most of the conventional radiographs (periapical, occlusal and panoramic) do not provide required information concerning the three-dimensional relationship between supernumerary teeth and anatomical structures for treatment planning. As a result more advanced imaging technique like cone-beam computerized tomography (CBCT) is an effective diagnostic tool to perform three-dimensional morphological reconstruction.¹¹⁻¹³

The supernumerary teeth usually do not cause any complications. However, sometimes they may lead to delayed or failure in the eruption of permanent teeth, crowding, dental caries and/or follicular cyst.^{5-7,14} When supernumerary tooth becomes endodontically involved, treatment of such tooth becomes challenging due to different tooth morphology or reduced accessibility and/or difficulties in isolation.

This paper reports a rare case of nonsyndromic bilateral maxillary supplementary premolars in which supplemental premolar on right side was endodontically involved and then was treated successfully with nonsurgical endodontic therapy with the help of CBCT.

CASE REPORT

A 28-year-old female patient reported to the Department of Conservative Dentistry and Endodontics, VS Dental College and Hospital, Bengaluru, India with a chief complaint of pain in her upper right back teeth region. On intraoral examination, the soft tissues appeared normal. Hard tissue examination revealed the presence of bilateral supernumerary premolars distal to permanent maxillary first molar in addition to the presence of normal series of premolars. The maxillary right second permanent molar was missing (Fig. 1). The patient gave history of extraction of maxillary left second premolar.

The patient’s medical and family history was noncontributory and there were no signs of any systemic disease or syndromic features. Patient appeared to be of normal height, weight and physical development for her age. Clinical examination also revealed the presence of deep caries on mesial surface of right supplemental premolar. It was tender on vertical percussion.

Periapical radiograph of both sides and panoramic radiograph were advised. On radiographic examination, it was noted that patient had impacted 3rd molars bilaterally in the maxillary and mandibular arch (Figs 2 and 3).

Following dentition was observed clinically and radiographically.

⑧ SP 6 5 4 3 2 1		1 2 3 4 E 6 SP 7 ⑧
⑧ 7 6 5 4 3 2 1		1 2 3 4 5 6 7 ⑧

SP—supplemental premolar

⑧—impacted third molar

E—extracted tooth

The right maxillary molar region revealed a missing permanent second molar and in its place was a supplemental premolar. At the premolar region of left side of maxillary arch healing socket was noticed with respect to permanent second premolar. Both the bilateral maxillary supplementary premolars were placed vertically distal to permanent first molar and were in normal occlusion and function.

In order to have three-dimensional reconstruction of the supplemental premolars, CBCT was advised. With the help of the images of CBCT it was confirmed that the supernumerary tooth was supplemental premolar which resembled maxillary second premolar in its internal morphology (Figs 4 to 10).



Fig. 1: Maxillary occlusal view

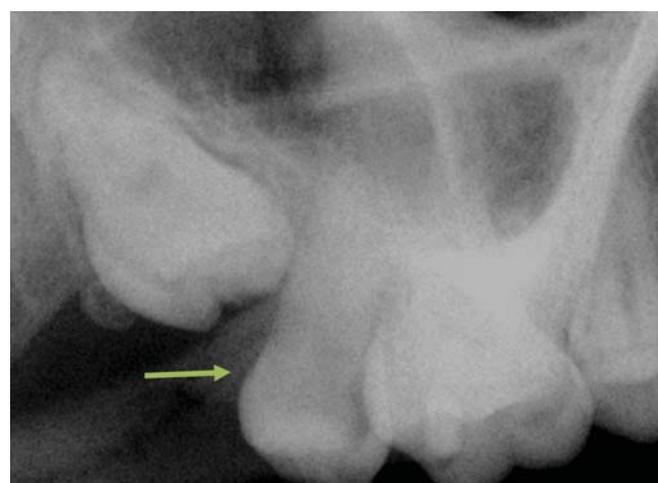


Fig. 2: Periapical radiograph

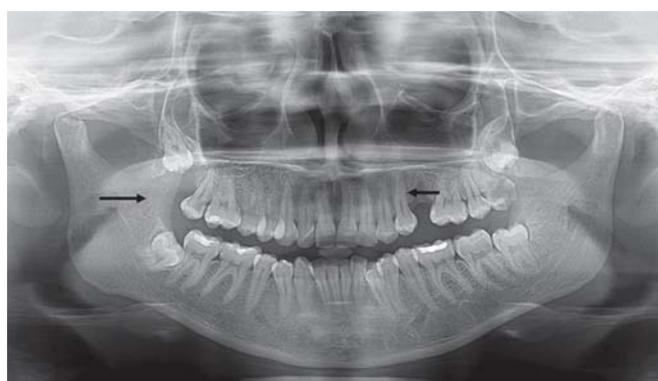


Fig. 3: Panoramic view

It was noticed that caries present on the mesial surface of right supplemental premolar was involving the pulp. Also there was presence of enlarged periodontal ligament space in the apical one-third of the root of right supplemental premolar (Figs 2 and 11). The pulp status of right supplemental premolar was evaluated utilizing thermal tests and electric pulp tester. It revealed a delayed response.



Fig. 4: CBCT image (3D view of maxillary right posterior teeth region)

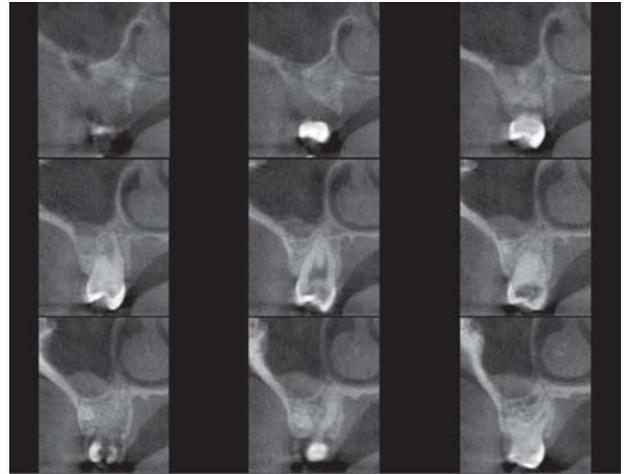


Fig. 7: CBCT image (anterior-posterior view—right side)

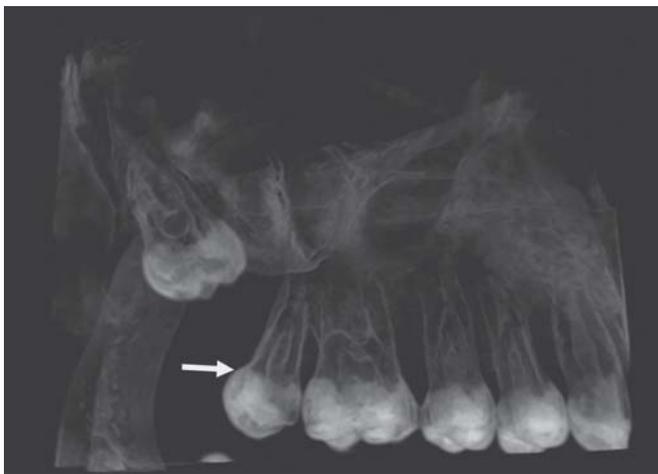


Fig. 5: CBCT image (3D buccal view—right side)

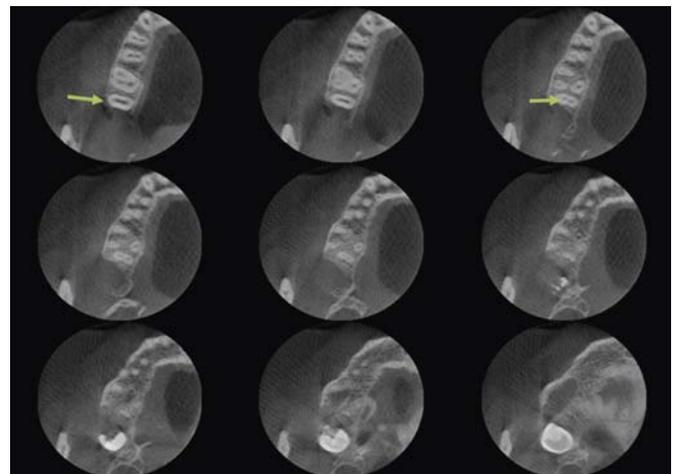


Fig. 8: CBCT image (axial section—right side)

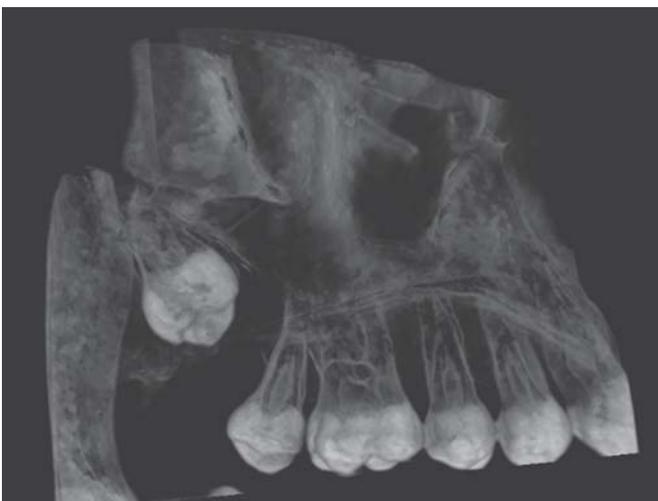


Fig. 6: CBCT image (3D palatal view—right side)

A treatment plan was formulated and the patient was explained the possible treatment options available and its prognosis. The patient gave consent for root canal treatment of the right maxillary supplemental premolar.

Local anesthesia was administered. Rubber dam placement was difficult in this particular tooth, due to limited access. Hence, other isolation aids were used to achieve moisture control. The access cavity was prepared and working length determined using apex locator (Root ZX, J. Morita USA, Inc) and Ingle’s method (Fig. 14). Cleaning and shaping was performed using hand K- files (Dentsply). The step-back technique was used. Master apical file for buccal and palatal canal was #35 K-file. Step back was performed till file #50. #10 K-file was used for checking canal patency and for recapitulation. The canals were irrigated with 2.5% sodium hypochlorite throughout instrumentation without alternating it with chelating agent. Canals were always filled with sodium hypochlorite so that working time of irrigant is increased and cutting efficacy of hand instrument is improved and also fluid-filled environment maintains the canal wet.

Once the shaping was completed, canals were thoroughly rinsed using aqueous 18% EDTA (Ultradent, South Jordan) for 1 minute. Each canal was rinsed with



Fig. 9: CBCT image (mesiodistal view)

5 to 10 ml of EDTA solution. Two percent chlorhexidine gluconate solution was used as final irrigant. The canals were dried using paper points and obturated with gutta-percha cones and AH plus sealer (Dentsply Mallifier, Switzerland) with lateral compaction (Figs 15 and 16).

The access cavity was cleaned with damp cotton and restored with composite resin (Fig. 16).

DISCUSSION

Varied prevalence of supernumerary premolars has been reported in various studies due to difference in patient population samples, age groups, ethnicity and radiographic techniques.^{1,4,6,7,9} Esenlik et al (2009)¹⁵ reported the prevalence of maxillary supplemental premolars to be 0.2% and mandibular supplemental premolars to be 0.5%. Hong Keun Hyen et al (2008)⁹ reported the prevalence of nonsyndromic mandibular supernumerary to be 0.029%, while in a recent study Goksel-Simsek Kaya et al (2011)⁴ reported the prevalence of nonsyndromic maxillary and mandibular supplemental premolars to be 0.01 and 0.2% respectively. In all the above cases supplemental premolars were either partially erupted or impacted. None of the supplemental premolars were erupted completely and were in occlusion and in function.^{4,5,9,15}

The present case report is unique, in that supplemental maxillary premolars had erupted normally and were in normal occlusion and function. The other interesting finding



Fig. 10: CBCT image (axial section at cemento enamel junction)

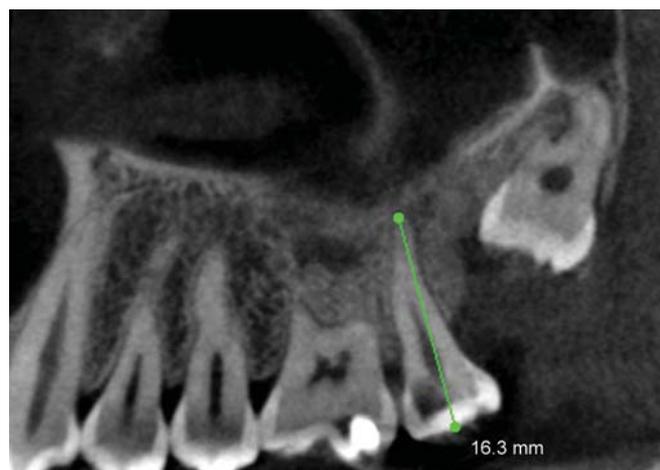


Fig. 12: CBCT image (approximate canal length of buccal canal)



Fig. 11: CBCT image (revealing presence of caries on mesial surface involving pulp)

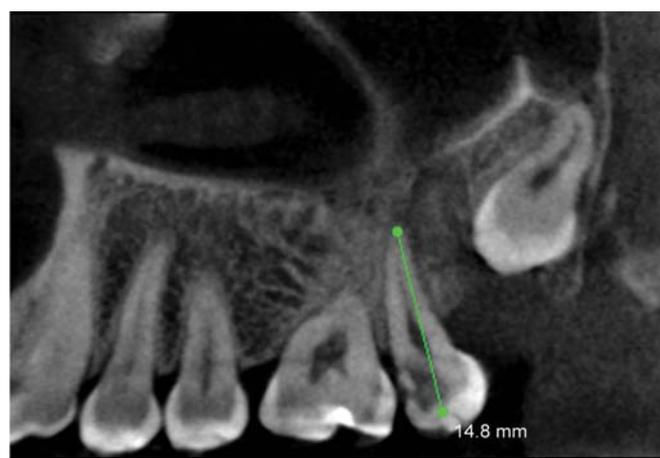


Fig. 13: CBCT image (approximate canal length of palatal canal)



Fig. 14: Working length check radiograph



Fig. 15: Master cone check radiograph



Fig. 16: Postobturation radiograph

was the presence of supplemental maxillary premolars distal to permanent maxillary first molar on both sides of the maxillary arch. However, similar reports have not been reported in the literature.

Multiple supernumerary teeth are usually associated with certain syndromes; however, literature has reported cases of nonsyndromic solitary or multiple supernumerary teeth.^{5-7,10} In this case report, the patient had no signs of any systemic diseases or syndromic features. The patient's medical and family history was also noncontributory. Hence, a diagnosis of 'nonsyndromic maxillary supplemental premolar' was made. Several theories of this kind of developmental anomaly have been proposed but the precise etiology of nonsyndromic supernumerary teeth is not clearly known.^{2,4,14} Some of the theories for the formation of supernumerary teeth include atavism, splitting of tooth bud and a combination of genetic and environmental factors. However, the most accepted theory is 'hyperactivity of dental lamina'.^{4,5,8}

In this case report, right maxillary supplemental premolar showed presence of caries on the mesial surface involving the pulp (Figs 2, 3 and 11). The supplemental premolar was in proper occlusion and function. Hence, it was important to save the tooth by endodontic therapy.

To ascertain the internal morphology of supplemental premolar and determine its relationship with adjacent teeth and other anatomical structures in the area, the patient was advised for CBCT (Figs 4 to 13). Traditionally, periapical, occlusal and panoramic radiograph are used to make these decisions. However, in some cases, the information provided through such radiographs may be insufficient.

CONCLUSION

Endodontic therapy of developmental dental anomalies is complex and challenging. This case reports the rare incidence of bilateral maxillary supplemental premolar distal to permanent maxillary first molar. The endodontic treatment in conjunction with CBCT, in the present case restored function, comfort and oral health of the patient.

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