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Multidisciplinary Management of Impacted Supernumerary Teeth

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Authors' contributions

This work was carried out in collaboration between all authors. Author WMF designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author HAZ managed the literature searches, analyses of the study performed, orthodontics and author GG managed the experimental process and author MSZ assessed the restorative aspects and reviewed it critically. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Background: Mesiodens are supernumerary teeth present in the anterior maxillary region that may erupt or remain embedded in the jawbone. The incidence of mesiodens is rare, surgical removal of supernumerary teeth with correction of anterior teeth by orthodontic treatment is performed.
Case Report: This case report represents a very rare incidence of multiple mesiodens in a male patient. Extraction of two mesiodens was indicated, as these impacted supernumerary teeth may cause complications during orthodontic treatment. The third tooth was not operated on the fact that it needs to be extracted by additional extraoral approach involving risk factors. The current case report delineates the fruitful administration of the un-erupted supernumerary teeth situated high in

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the mid-palatal area not associated with any syndrome. Blends of operating and surgical strategies were utilized to enhance the results with hard and soft tissue conservation, maintenance and support. In the surgical phase, surgical removal of the supernumerary teeth, bone grafting was done using the hydroxyapatite. Radiographic evidence of complete healing was observed following up visit.

Conclusion: Timely diagnosis and suitable management can decrease the potential complications due to the presence of supernumerary teeth. Dental clinicians should be aware of related clinical signs and must look for unexpected findings during the routine clinical as well radiological examinations.

Keywords: Dental anomalies; malocclusion; mesiodens.

1. INTRODUCTION

Dental anomalies are common congenital malformations that can occur either as an isolated finding or in conjunction with syndromes [1]. Hyperdontia is a congenital malformation that is characterized by increased in the number of teeth. Polygenesis or polydontia are the other names of such conditions representing with additional teeth [2]. A supernumerary tooth is an additional tooth that can be found in almost any region of the dental arch. Different supernumerary teeth in a patient may have a hereditary or genetic component [3]. Their reported prevalence is rare and ranges between 0.3−0.8% in the primary dentition and 0.1−3.8% in the permanent dentition [4]. Several studies have reported that there is a gender and racial differences [5-8]. Incidence of supernumerary teeth (90%) have been reported in the upper jaw; only 10% of all supernumerary teeth are found in the mandible [9]. Patients with supernumerary teeth represent typical problems related to general oral health or orthodontics such as crowding, midline diastema, impaction of adjacent teeth, rotation and/or displacement of teeth and occlusal interferences [10].

Supernumerary teeth that specifically occupy the anterior midline area of the maxilla (the area around maxillary central incisors) are called 'mesiodens' [11]. In addition, serious consequences such as development of cysts, displacement/resorption of central incisor roots or bone resorption may occur [8]. Considering these factors, it is crucial to diagnose promptly, treatment planning (surgical/orthodontic involvement) timely surgical intervention and/or follow up of mesiodens patients is mandatory [12]. The treatment planning for such cases is usually multidisciplinary and requires a team of general dentists, oral radiologists, oral pathologists, and orthodontists, oral and maxillofacial surgeons [13]. In the current publication, we are reporting a case of multiple (three) mesiodens in a male patient. This includes the diagnosis, treatment planning, the surgical procedure, orthodontic treatment of anterior crowding and follow up to monitor any postoperative complications and a complete recovery of the patient.

2. PRESENTATION OF CASE

A 14-years old male patient visited the Orthodontics specialty clinic at Taibah University, College of Dentistry, with the chief complaint of irregular upper frontal teeth. The patient was in good state of general health and reported a previous history of dental trauma resulting in fracture of upper left central incisor with periapical lesion was root canal treated (Fig. 1).

No applicable indications or signs of temporomandibular joint dysfunction were observed during the initial clinical and radiographic examination. The extraoral examination by the orthodontist demonstrated a convex profile and incompetent lips which debilitates facial esthetics. There was no gross asymmetry of the facial skeleton. The orthodontic examination suggested malocclusion (Angle Class I) with moderate crowding (2.5 mm) in the maxillary arch and a well-adjusted and aligned mandibular curve. Overbite was 1 mm, Overjet was expanded 5mm. Preoperative intraoral images suggested that there was a bimaxillary protrusion and Angle class 1. The supernumerary mesiodens teeth were not the cause of this type of malocclusion, although their presence was co-incidental and leaving them there would have caused orthodontic treatment difficult or post treatment complications. Therefore to prevent further complications of existing malocclusion, to ease the orthodontic movement of anterior teeth, and also to prevent relapse of orthodontic treatment' extraction of mesiodens was strongly indicated. A detailed radiographic examination was performed using

panoramic radiography (O.P.G), lateral cephalogram and periapical views showing multiple impacted mesiodens (Fig. 2). The cephalometric norm values, standard deviation and patient's values are given in Table 1.

Fig. 1. Patient's intraoral examination; A)- Labial view, B)- Palatal view

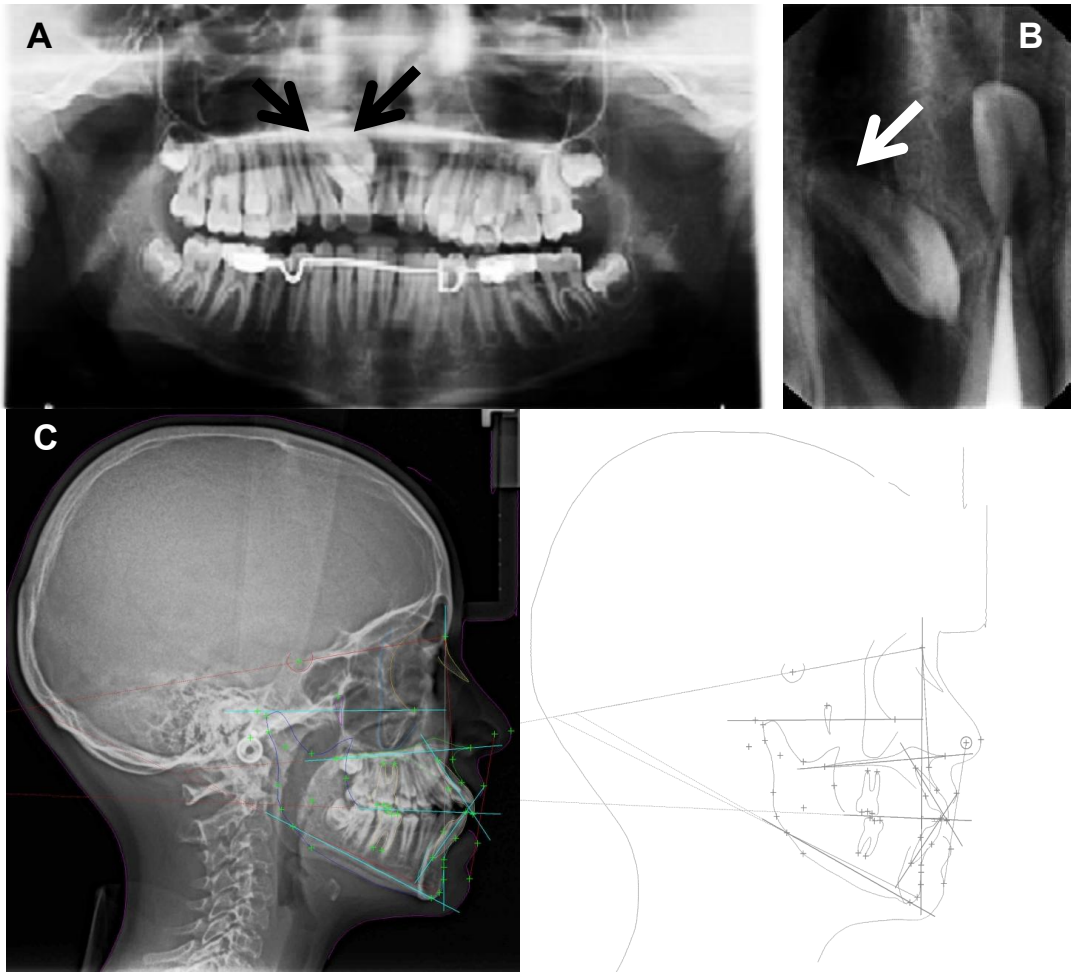

Fig. 2. Radiographic examination of the patient; A)- Panoramic view, B)- Periapical view; showing supernumerary mesiodens (arrows); C)- Lateral cephalogram and paper tracing for comparing patient's landmarks and normal cephaometric values

Additionally for further examination 3D Cone beam computed tomography (3D CBCT) was performed that revealed an impacted supernumerary teeth (2 mesiodens) which were found palatal to the central incisors. The panoramic radiograph furthermore showed all the permanent dentition, together with the maxillary and mandibular wisdom molar buds. Cephalometrically, class I skeletal relationship of the mandible is found in the patient (Table 1). There was a little proclination of maxillary and mandibular incisors and resulted in a decreased inter-incisal angle and aesthetic. The preliminary treatment strategy was to relieve the signs, symptoms and indications of dental trauma of tooth number 21. In the surgical segment, the extraction of two un-erupted 2 mesiodens was planned; the patient is motivated for removal of 3rd mesiodens.

The orthodontic assessment was assessed and recorded for future reference. In addition, a stable deficient occlusion with a Class I canine relationship was planned to achieve, with the pleased soft-tissue profile and competent lips. The detailed radiographic assessment (Fig. 3) was performed for accurate treatment planning. Three dimensional cone beam computed tomography (CBCT) showed that the root development of mesiodens were still not complete. However, the permanent incisors were fully developed with closed apex. This suggested that mesiodens appeared in jaw after the completion of more than half of roots of anterior teeth.

The final treatment plan was formulated and both oral surgeon and orthodontist were consulted. The treatment possibilities and preferences were explained to the patient and his guardian in the native language. An informed written consent was obtained for the surgical procedure as well as getting photographs for publication purposes. Surgical procedure was performed using local anesthesia 1:100,000 epinephrine infiltrated into the palatal mucosa near palatal incisive foramen and in the area of impacted supernumerary teeth additional anesthesia was infiltrated in the depth of buccal vestibule in relation to 21 and 22.Full thickness Intrasulcular incision for the entire palate exposure done from left bicuspid to right bicuspid for better visualization of the mesiodens [14]. The extractions of the extra/ supernumerary/surplus teeth in the middle of the maxillary central incisors (two mesiodens) were performed the area was enucleated (Fig. 3). Insertion of hydroxyapatite bone graft [BiO-Oss] in the defect was performed successfully. The flap was sutured using the 3/0 black silk sutures (Fig. 4).

In order to manage the arch space and alignment of the teeth, Orthodontic intervention using the fixed orthodontic appliances was planned. Correction of crowding in the mixed dentition through tooth reduction is achieved through maxillary and mandibular 1st premolar serial extraction. The maxillary molars were fortified by buccal tubes, and the remaining teeth were reinforced with a 0.022X0.028 pre-accustomed edgewise appliance [15]. (MBT 3M Unitek, Monrovia, Calif). After the primary leveling and adjusting by 0.016 Heat-activated nickel titanium (HANT) and 0.019X0.025 HANT wires subsequently, a 0.019X0.025-in stainless steel arch wire was placed in the arches of maxilla and mandible by means of a closed-coil spring (9 mm). Additionally, Active tie-back was used to close the extraction spaces with Torque correction for incisors supported be Class II elastics [16]. For finishing and detailing, 0.014 Stainless steel arch wires were used. The estimated time of completing the orthodontic treatment is about 1 year. Orthodontic follow up is done every 1 month for activation.

3. DISCUSSION

Tooth development is a continuous activity based on physiologic growth processes and a number of morphologic stages to achieve the tooth's final form. Supernumerary teeth can occur as singles, multiples, unilaterally or bilaterally and in the maxilla, the mandible or both [4]. They are often found in palatal position [17]. Several authors have proposed that the extraction of mesiodens in the initial mixed dentition with a specific end goal to enable spontaneous eruption, alignment and/or arrangement of the incisors [18,19]. In the present case, surgical removal of the mesiodens was judged necessary, since these teeth had caused axial rotation of the permanent central incisor. Munns [20] suggested that the offending supernumerary tooth if removed as soon as possible shows better the prognosis. At the period of 7-9 years with peak at eight years old most of the mesiodens are extracted and certain extractions were performed at an advanced age because of incomplete root growth of the central incisors and as a precautionary measure against producing harm and or damage to the emerging roots [21]. On the other hand several authors recommended and proposed extractions at around 8-9 years of age or at the phase once the

Table 1. Cephalometric norms and analysis using lateral cephalograph

Label	Norm	SD	Patient's value
S-N-A angle	82	3.5	81.6
S-N-B angle	80	3.5	80.0
A-N-B angle	2	2.5	1.6
Go-Gn,S-N angle	33	2.5	34.0
Max-Man angle	25	6.0	31.0
U1-Max angle	110	6.0	118.0
L1-Man angle	94	7.0	98.0
Interincisal angle	132	6.0	111.0
Nasolabial angle	102	8.0	96

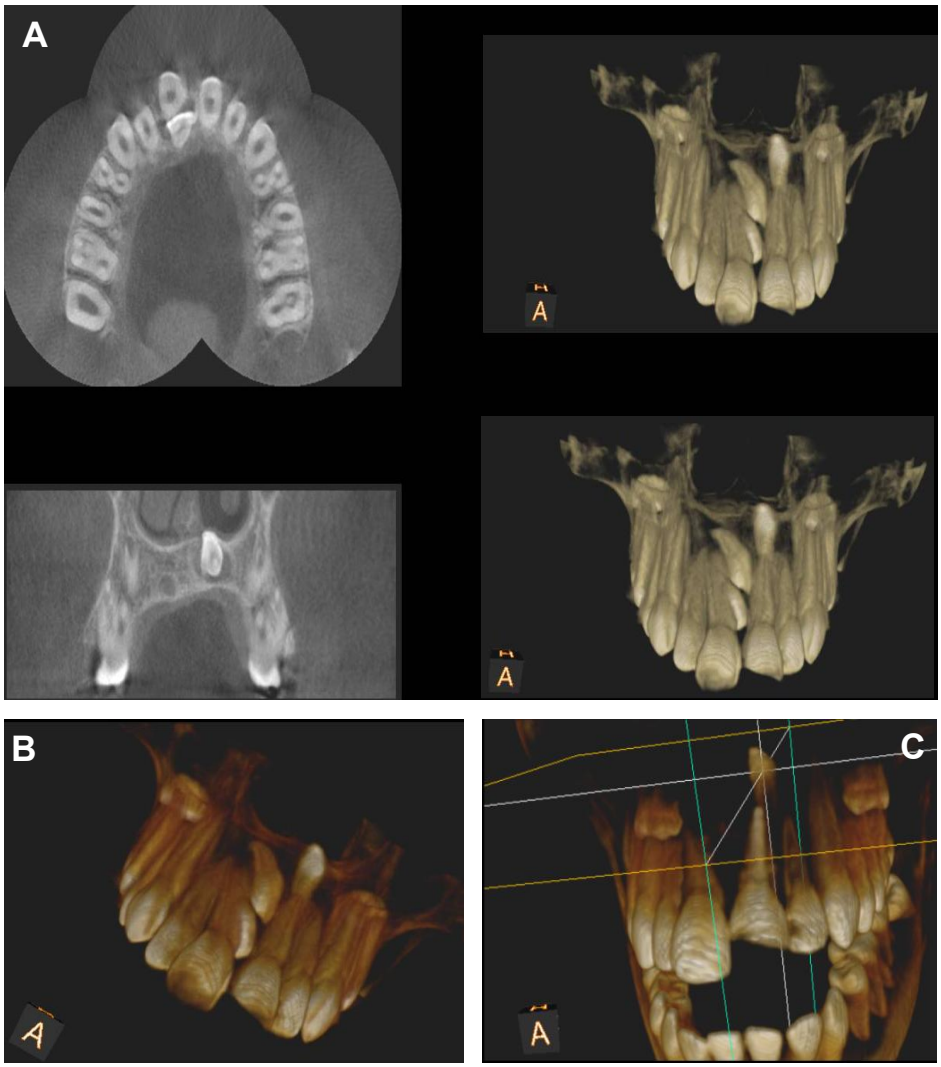

Fig. 3. Three dimensional cone beam computed tomography (CBCT) showing selected slices for anatomical assessment and treatment planning of mesiodens; A)- Preoperative horizontal views, B)- Preoperative oblique view, C)- Postoperative CBCT confirming removal of two mesiodens, while leaving the third mesiodens in the place; anatomical lines have been drawn to show the depth of the mesiodens. The angulation of images in relation to the horizontal plane ["A" sign] is shown at lower left corner of each image

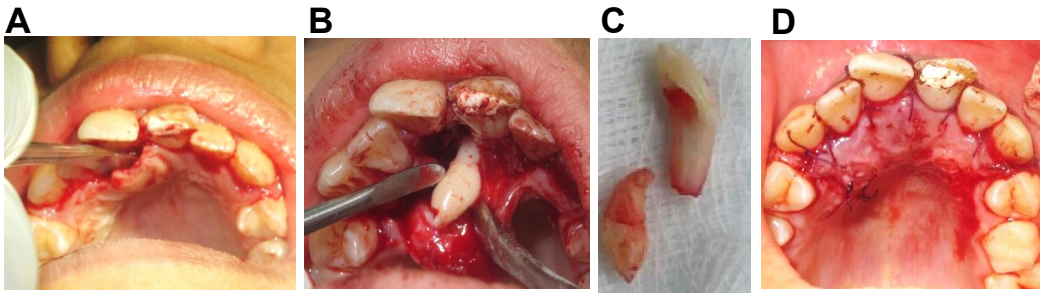

Fig. 4. Surgical procedure using palatal flap approach; A)- Access and exposure of mesiodens, B)- Laxation and removal of mesiodens, C)- Extracted mesiodens, D)- Postoperative view showing palatal flap sutures back in place using silk sutures

maxillary central incisors are erupting. As this can ease and facilitate the surgical nervousness apprehension and stress of the patient.

Leena et al. [22] quoted that the treatment may possibly differ from removal of superfluous teeth or extraction coupled with orthodontic alteration and correction to form and create a pleasant aesthetic as well as occlusion [22]. In the existing case the scheduling and planning for operative extraction of both mesiodens was appropriate as both maxillary central incisors were entirely erupted displaying complete root formation. The patient is apprehensive and reluctant to get 3rd mesiodens extracted through intranasal approach, therefore the 3rd is left and he is being motivated to get it removed the earliest. Surgical removal of the other two supernumerary teeth, bone grafting was done. Bone grafting after extraction is proven to reduce bone loss, maintain ridge proportion, improve aesthetic and post-operative results, and fulfil patient expectations. Fortunately, the post-surgical phase was uneventful, and did not affect commencement of fixed orthodontic therapy after a relatively short follow-up period.

4. CONCLUSION

Timely diagnosis and suitable management can decrease the potential complications due to the presence of supernumerary teeth. Dental clinicians should be aware of related clinical signs and must look for unexpected findings during the routine clinical as well radiological examinations.

CONSENT

All authors declare that 'written informed consent was obtained from the patient for publication of this case report and accompanying images.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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