Multidisciplinary management of impacted central incisors due to supernumerary teeth and an associated dentigerous cyst

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Abstract

Supernumerary teeth are the most common developmental dental anomaly resulting from hyperactivity of dental lamina, dichotomy, environmental factor, or polygenetic process of atavism. Supernumerary teeth present classical oral complication such as impaction of adjacent teeth, crowding, diastema formation, rotation, displacement of teeth, and occlusal interference. A dentigerous cyst associated with anterior supernumerary teeth (mesiodens) is rare and accounts for 5% of all dentigerous cysts. The present case reports describe the successful management of the impacted permanent maxillary central incisor positioned high in the vestibule. A combination of surgical and orthodontic techniques was employed to improve treatment outcome with greater hard and soft tissue preservation and to prevent psychological problems. In the surgical phase, supernumerary teeth and dentigerous cyst were removed. Subsequently traction was employed by bonding bracket on the labial surface using closed and open eruption techniques. Successively, fixed orthodontic treatment was started to align permanent maxillary central incisors in an occlusal plane. Thus, combination of surgical and orthodontic method can be the treatment of choice over surgical extraction, implant placement, and surgical repositioning.

Keywords: Dentigerous cyst, follicular space impacted tooth, management of for impacted central incisors, orthodontic intervention, supernumerary tooth, surgical

Introduction

Impaction of permanent central incisors is a well-documented entity usually encountered in the clinical practice. They are usually associated with supernumerary tooth, trauma to the primary anterior teeth early in life (dilacerations or change in eruption path of permanent successors) or the cyst (inflammatory dentigerous cyst, periradicular cyst) associated with non-vital primary anterior teeth.[1,2] Supernumerary tooth is a disorder of odontogenesis resulting from the continuous budding of the enamel organ or from excessive proliferation of cells. It can be responsible for a variety of irregularities in the developing occlusion particularly the impaction or ectopic eruption of adjacent permanent teeth.[1,3] A dentigerous cyst is defined as a cyst that originates by the separation of the follicle from around the crown of an unerupted tooth. These cysts are developmental in origin and predominately involve the mature mandibular third molar.[4] The dentigerous cyst around supernumerary teeth accounts for 5% of all dentigerous cysts most developed around a mesiodens in the anterior maxilla.[5] They are uncommon in the first decade of life.[5] These cysts are discovered on routine radiographic examination or accidentally during surgical removal of supernumerary teeth. The present case reports describe the management of impacted and displaced permanent maxillary central incisors due to the presence of supernumerary teeth and associated dentigerous cyst.

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Case Reports

Case 1

A 12-year-old boy presented with the chief complaint of a missing maxillary right central incisor. The patient's medical and family history was insignificant. Intraoral examination showed the clinical absence of a permanent maxillary right central incisor with no evidence of eruption [Figure 1]. Radiographic examination (maxillary occlusal radiograph) revealed the presence of the impacted maxillary right central incisor and multiple supernumerary teeth (mesiodens). Additionally, radiolucent space was observed surrounding the crown of supernumerary teeth and permanent maxillary right central incisor mimicking enlarged follicular space [Figure 2]. Multidisciplinary treatment plan was planned: surgical removal of supernumerary teeth followed by orthodontic correction of the un-erupted permanent maxillary right central incisor. Prior to surgical phase, routine blood investigations were done which were within normal limit.

Figure 1: Intraoral view showing the absence of 11

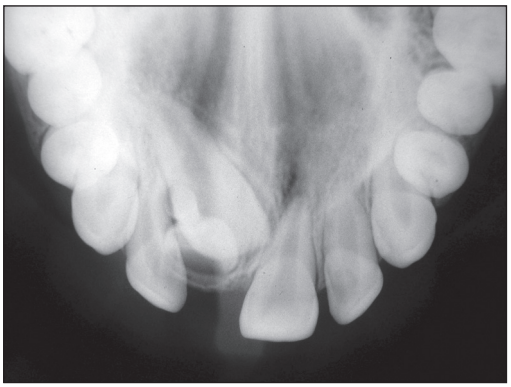

Figure 2: Preoperative maxillary occlusal radiograph revealing impacted 11 and multiple supernumerary teeth

Figure 3: Surgical area after removal of supernumerary teeth

Figure 4: Surgically removed supernumerary teeth and soft tissue mass

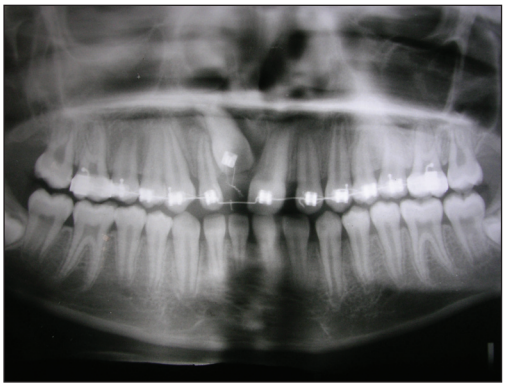

Figure 5: Panoramic radiograph showing Begg's bracket on 11 and traction with a ligature wire tied to a stainless steel base arch wire

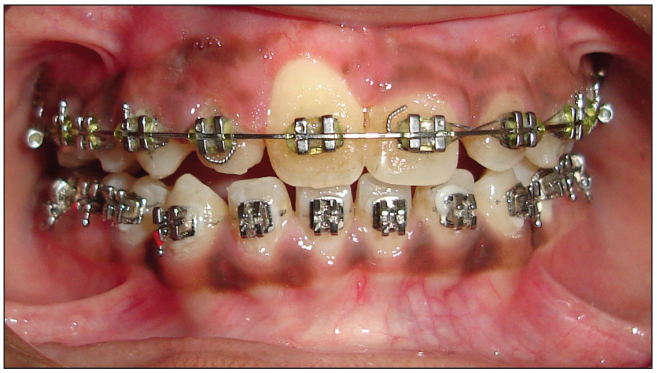

Figure 6: Intraoral view showing the alignment of 11 and a rectangular stainless steel wire

Surgical phase

After administration of local anesthesia, a labial muco-periosteal flap was reflected to expose the supernumerary teeth and permanent maxillary right central incisor. Supernumerary teeth along with soft tissue mass were surgically removed [Figures 3 and 4], which were sent for histopathological examination. The surgical site was irrigated with a povidone iodine solution. The Begg's bracket was bonded on the exposed permanent maxillary right central incisor and tied with a ligature wire. The flap was repositioned, approximated, and closed with 3-0 silk suture. Microscopy of the lesion demonstrated a dentigerous cyst.

Orthodontic phase

In the subsequent visit, a 0.018 inch pre-adjusted edgewise bracket (MBT) was bonded to the patient. For initial alignment and leveling, a 0.016 inch nickel titanium wire was placed. The traction was applied with the help of the ligature wire

Figure 7: Post- treatment intraoral view showing well aligned 11

Figure 8: Intraoral view showing the absence of 11

Figure 9: Preoperative panoramic radiograph showing impacted 11 and supernumerary tooth

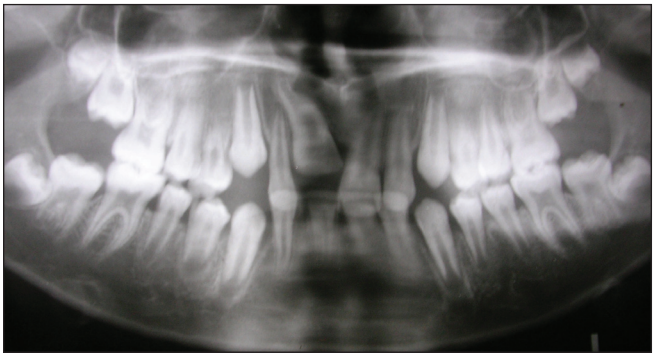

Figure 10: Panoramic radiograph showing mild eruption of 11

Figure 11: Surgical exposure of 11

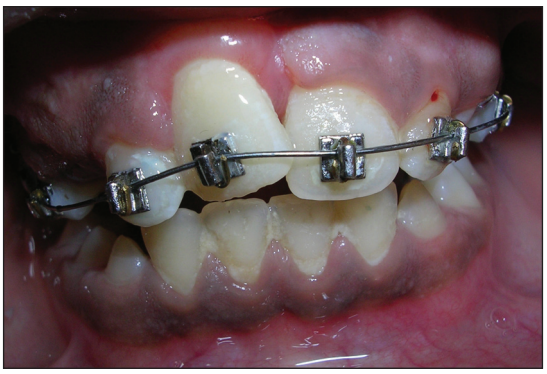

Figure 12: Intraoral view showing the alignment of 11 with a NiTi wire

Figure 13: Intraoral view showing the complete alignment of 11

tied to the permanent maxillary right central incisor. In the subsequent visit, a 0.016 stainless steel wire with the occlusal step bend in the permanent maxillary right central incisor region was given and traction was applied until it erupted to the occlusal plane [Figure 5]. Then Begg's bracket of the impacted central incisor was replaced with the MBT bracket. After initial alignment and leveling, a 0.016 × 0.022 inch NiTi wire and 1 month later a 0.016 × 0.022 inch stainless steel wire was placed [Figure 6]. After achieving a desired result debonding was done [Figure 7].

Case 2

A 12-year-old boy reported to the department with the chief complaint of a missing permanent maxillary right

central incisor. The patient's medical and family history was insignificant. Intraoral examination showed the clinical absence of the permanent maxillary right central incisor [Figure 8]. Radiographic examination (panoramic radiograph) revealed the presence of the impacted permanent maxillary right central incisor and supernumerary tooth (mesiodens) [Figure 9]. Radiographically radiolucent space was observed surrounding the crown of supernumerary tooth and impacted the permanent maxillary right central incisor. A multidisciplinary treatment plan was planned; surgical removal of supernumerary tooth followed by orthodontic correction of the un-erupted permanent maxillary right central incisor. Prior to the surgical phase, routine blood investigations were done which were within normal limit.

Surgical phase

After administration of local anesthesia, a labial muco-periosteal flap was reflected to expose the supernumerary tooth. Supernumerary tooth along with soft tissue was surgically removed, which were sent for histopathological examination. The flap was repositioned, approximated, and closed with 3-0 silk suture, which were removed after 1 week. Microscopy of the lesion demonstrated a dentigerous cyst. The impacted permanent maxillary right central incisor was kept under observation to check natural eruption. Thereafter patient did not report for 8 months. Even after 8 months, the permanent maxillary right central incisor was not clinically evident. The panoramic radiograph revealed mild eruption of the permanent maxillary right central incisor [Figure 10]. It was further decided to orthodontically correct the impacted permanent maxillary right central incisor. In the subsequent visit two-third crown of the permanent maxillary right central incisor was surgically exposed [Figure 11].

Orthodontic phase

After exposure of the permanent maxillary right central incisor, Begg's appliance was placed and a 0.016 inch nickel titanium wire was used for initial alignment and leveling [Figure 12]. The traction was applied with the help of a ligature wire tied to the maxillary right central incisor. After 1 month, a 0.016 stainless steel Australian wire and later a 0.018 stainless steel Australian wire was placed. The traction was continued till permanent maxillary right central incisor reached the occlusal plane. To correct mesiodistal inclination, the uprighting spring was placed [Figure 13]. Debonding was done after achieving good intercuspation and normal overjet and overbite.

Discussion

Supernumerary teeth are the most common disorder of odontogenesis. They may occur alone or in multiple, unilateral or bilateral, erupted or impacted, and appear in the maxilla, mandible, or both.[6] Single supernumerary teeth are most common in the anterior maxilla (mesiodens) followed by the maxillary molar region. Multiple supernumerary teeth occur most frequently in the mandibular premolar region.[1,6] Supernumerary teeth have been associated with a number of developmental disorders and syndromes such as cleft lip and palate, cleidocranial dysplasia, Downs's syndrome, and Gardner syndrome.[1,6] Four major types of supernumerary teeth are recognized based on their morphology and location: conical, tuberculate, supplemental, or odontome.[7] Although the etiology of supernumerary teeth is unknown, the tendencies are familial. Other possible hypotheses are hyperactivity of dental lamina, dichotomy, spontaneous gene mutation, or environmental factors.[1,7]

Supernumerary teeth's common oral complications are impaction of adjacent teeth, crowding, diastema formation, rotation, displacement of teeth, occlusal interference, caries, periodontal problems, difficulty in mastication, and compromised esthetic.[1,3] Other pathologic manifestations associated with multiple supernumerary teeth are formation of a dentigerous cyst with associated bone destruction, displacement of adjacent teeth, root resorption, and oronasal fistula.[3,7,8] The reported percentage of the dentigerous cyst associated with supernumerary teeth is 2.7% to 11%.[9-12]

Most of the dentigerous cysts associated with supernumerary teeth are accidentally diagnosed on routine radiographic examination. Sometime, difficulty exists in a differentiating dentigerous cyst and enlarged follicular space, similar to the present case report 1. Goaz *et al*,[13] stated that if the radiolucent space surrounding the tooth crown is 5 mm or more in diameter, then it should be considered as a dentigerous cyst. Furthermore, such supernumerary teeth when associated with soft tissue attachment warrant histological inspection to rule out the suspected diagnosis. However, in most of the cases the histopathologic appearance of the cystic lining epithelium is not specific. Thus, the diagnosis of dentigerous cyst should relay on the radiographic and surgical observation of the cyst to the cemento-enamel junction.[14]

Impaction of permanent incisors due to supernumerary tooth and associated pathology is a rare entity encountered in the clinical practice. Management options for such teeth can be: (1) extraction or surgical removal of impacted supernumerary tooth and further observation till the permanent incisors erupts, (2) surgical extraction of impacted tooth followed by implant placement, (3) surgical repositioning, and (4) orthodontic correction.

The most common treatment modality for impacted permanent incisors is either extraction of erupted supernumerary tooth or surgical removal of impacted supernumerary tooth. Some authors advocate planned treatment. They says management of impacted permanent incisors depends on the type of supernumerary teeth,

number of supernumerary teeth, impacted or erupted supernumerary tooth, unilateral or bilateral, stage of tooth development, direction of impaction, available arch space for unerupted teeth, and displacement of adjacent teeth.[3,15] However, some prefer immediate removal of supernumerary teeth following the initial diagnosis. They suggested that longer the impaction period of supernumerary teeth, higher is the risk of forming dentigerous cyst, similar to the present case reports and increased risk for occurrence of an odontogenic keratocyst or the development of an ameloblastoma or mucoepidermoid carcinoma.[16,17] Secondly, inverted supernumerary teeth tend to move in the direction of their crown; mid-palatal, premolar, nasal cavity, or maxillary sinus region, further complicating the condition. Furthermore, children with multiple supernumerary teeth are often encountered with psychological problems.[16] We therefore recommend timely recognition and extraction or surgical removal of supernumerary tooth followed by the observation period till the impacted permanent incisor erupts in the oral cavity. However, if impacted permanent incisors failed to erupt, orthodontic intervention is required to align the impacted tooth in the occlusal plane.

Fixed orthodontic treatment is the treatment of choice to manage impacted permanent incisors. Certain factors to be considered while planning fixed orthodontic treatment are such as placement of bracket, open or closed eruption technique, and traction force. In the present case reports, bracket was bonded on the labial surface of impacted permanent maxillary right central incisors to bring the impacted tooth to its natural position. For such traction, some authors prefer lingual bonding of bracket to preserve bone reduction.[18,19] However, no excessive bone reduction was observed in the present case reports. Chawla *et al*,[20] suggested that selection of surface may be decided by individual basis except in cases where the attachment cause trauma to the labial surface, lingual bracket should be preferred. For aligning of the impacted tooth, most author preferred a closed eruption technique, compared to the open eruption technique on account for better esthetic results.[21] However, in the present cases we achieved favorable esthetic using both the techniques.

The traction or extrusion force is another factor to be considered while aligning the impacted central incisor. This may influence the length of clinical crown and post alignment vitality. The traction force greater than 50 g may lead to postalignment non-vitality.[22] However, in young children chances of postalignment non-vitality is rare due to wide apical foramen. In the present case reports, the traction force less than 50 g was applied as the patients were 12 year old.

Conclusion

Impacted permanent incisors due to supernumerary tooth and associated pathology are a rare entity and often encountered with psychological problems in children. In the present case reports, cumulative surgical and orthodontic treatment resulted in esthetically pleasant and balanced occlusion. Thus, timely recognition of these entities and early multidisciplinary treatment are required for greater hard and soft tissue preservation.

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