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CASE REPORT

Supernumerary tooth: report of a case

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Abstract Supernumerary tooth (ST) is a developmental anomaly and has been argued to arise from multiple etiologies. These teeth may remain embedded in the alveolar bone or can erupt into the oral cavity. When it remains embedded, it may cause disturbance to the developing teeth. The erupted supernumerary tooth might cause aesthetic and/or functional problems especially if it is situated in the maxillary anterior region. A case of supernumerary teeth is presented where the teeth have been left in place and which later gave rise to some problems. The patient had history of trauma and requested orthodontic treatment for the misalignment of his anterior teeth. The treatment options are further discussed.

Introduction

Development of the tooth is a continuous process with a number of physiologic growth processes and various morphologic stages interplay to achieve the tooth's final form and structure. Interference with the stage of initiation, a momentary event, may result in single or multiple missing teeth (hypodontia or oligodontia respectively) or supernumerary teeth (Hattabb *et al*., 1994). A supernumerary tooth is one that is additional to the normal series and can be found in almost any region of the dental arch (Garvey *et al*., 1999). The term mesiodens denotes a supernumerary tooth located between the maxillary central incisors (Sykaras, 1975).

There seems to be a racial variation in the prevalence of supernumeraries with a frequency higher than 3% in Mongoloid races (Tay *et al*., 1984). In the primary dentition, the incidence is said to be 0.3%-0.8% and in the permanent dentition 1.5%-3.5% (Mason *et al*., 2000). The low prevalence of ST in primary dentition is lower because it is under reported (Taylor, 1972) and it is often overlooked, because the supernumerary teeth are often of normal shape (supplemental type), erupt normally, and appear to be in proper alignment; and can be mistaken for germination and fusion anomalies (Humerfelt *et al*., 1985). There is no significant sex distribution in primary supernumerary teeth; however, males have been shown to be affected more in the permanent dentition than females. These vary between populations studied (Hattabb *et al*., 1994; Tay *et al*., 1984). The most common location of supernumerary teeth is at the premaxillary region and it may cause pathological condition such as failure of eruption of the maxillary incisors, displacement or rotation of the permanent tooth, (Hattabb *et al*., 1994; Koch *et al*., 1986).

ST can be classified according to their location in the dental arch: mesiodens, paramolar and distomolar or according to their morphological forms: conical, tuberculate, supplemental and odontome (Mitchel, 1989). A mesioden is a supernumerary tooth located between the maxillary central incisors; a paramolar most commonly occurs in the interproximal space buccal to the upper second and third molars; and a distomolar is a fourth permanent molar which is usually placed either directly distal or distolingual to the third molar. A conical ST is small, peg-shaped (coniform) teeth with normal root; a tuberculate (multicusped) ST is short, barrel-shaped teeth with normal appearing crown, or invaginated but rudimentary root. A supplemental ST resembled one of the normal series of tooth (duplication) and found at the end of a tooth series. Most of the supernumerary in the primary dentition are of the supplemental type and seldom remain impacted and an odontome type having no regular shape. Odontome refers to any tumour of odontogenic origin. Most authorities, however, accept the view that the odontome represents a hamartomatous malformation rather than a neoplasm. Two separate types have been described: the diffuse mass of dental tissue which is totally disorganized is known as a complex composite odontome whereas the malformation which bears some superficial anatomical similarity to a normal tooth is referred to as a compound composite odontome (Garvey *et al*., 1999).

The characteristics of the conical and tuberculate types of ST have been described in details (Foster and Taylor, 1969). Primosh (1981) classified ST into two types according to their

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shape as supplemental (eumorphic) and rudimentary (dysmorphic). The ST position can be recorded as 'between central incisors' and 'overlap' and its orientation can be described as 'vertical', 'inverted' and 'transverse' (Gregg and Kinirons, 1991).

The aetiology of the ST however remains unclear. Several theories have been suggested for their occurrence such as the 'phylogenetic theory' (Smith, 1969), the 'dichotomy theory' (Liu, 1995), a hyperactive dental lamina (Primosh, 1981; Brook, 1984) and a combination of genetic and environmental factors-unified etiologic explanation (Brook, 1984).

The 'phylogenetic theory' relates to the phylogenetic process of atavism (evolutionary throwback) has been suggested. Hyperdontia is the result of the reversional phenomenon or atavism. Atavism is the return to or the reappearance of an ancestral condition or type. The third molar was rarely absent in the primitive dentition; it was comparable in size to the second molar. A fourth molar was often present. Phylogenetic evolution has resulted in a reduction in both the number and the size of man's teeth and supernumerary premolars may be an atavistic appearance of the third or fourth premolars of the primitive dentition (Smith, 1969). This theory has been rejected by many authors. The 'dichotomy theory' is where a supernumerary tooth is created as a result of dichotomy of the tooth bud. The supernumerary tooth may develop form the complete splitting of tooth bud (Liu, 1995). The tooth bud splits into two equal or different-sized parts resulting in two teeth of equal size or one normal and one dysmorphic tooth, respectively.

A hyperactive dental lamina where the localized and independent hyperactivity of dental lamina is the most accepted cause for the development of the supernumerary teeth; it is suggested that supernumerary teeth are formed as a result of local, independent, conditioned hyperactivity of the dental lamina (Primosch, 1981; Liu, 1995). According to this theory, the lingual extension of an additional tooth bud leads to a eumorphic tooth, while the rudimentary form arises from proliferation of epithelial remnants of the dental lamina induced by pressure of the complete dentition (Sykaras, 1975). Hattab and co-workers (1994) tend to believe that hyperdontia is a disorder with pattern of multifactorial inheritance originating from hyperactivity of dental lamina. Remnants of the dental lamina can persist as epithelial pearls or islands, "rests of Serres" within the jaw. If the epithelial remnants are subjected to initiation by induction factors, an extra tooth bud is formed resulting in the development of either a supernumerary tooth or odontome.

A combination of genetic and environmental factors (unified etiologic explanation - based on the study by Brook (1984). Many causes, both genetic and environmental, have been proposed for ST, hypodontia (congenital absence of teeth), megadontia and microdontia; these anomalies tend to be associated. Brook (1984) had conducted a study among 1115 school children aged 11-14 years old which were examined clinically and radiographically for aetiological explanation of the anomalies of human tooth number and size. The results showed that supernumerary teeth are more common in the relatives of affected children than the general population. In the population sample there were differences between sexes, with males more often having ST and megadontia and females more frequently having hypodontia and microdontia.

A familial tendency has been reported in the literature (Marya and Kumar, 1998; Gallas and Garcia, 2000). The presence of supernumerary teeth may be part of developmental disorders such as Cleft lip and palate, Cleidocranial dysostosis, Gardner's syndrome, Fabry Anderson's syndrome, Ellis Van Creveld syndrome (Chondroectodermal dysplasia), Ehlers Danlos syndrome, Incontinentia Pigmenti and Tricho-Rhino-Phalangeal syndrome (Rajab and Hamdan, 2002).

Case report

The patient was a 10-year-old Malay boy who came to the dental clinic of Hospital Universiti Sains Malaysia (HUSM) accompanied by his father in December 2004. The father complained about the "jutting out" of the upper left permanent central incisor (21). He also informed that the patient has had a history of alleged fall and fractured his upper left permanent central incisor (21) when he was 9 years old.

Oral findings: Oral examination revealed one erupted mesiodens between the upper right and left permanent central incisors (11 and 21). The upper right central incisor (11) had uncomplicated crown fracture at the mesioincisal angle. The upper left permanent central incisor (21) had complicated crown fracture and was non-vital with sinus present at the buccal sulcus. His upper left lateral incisor (22) erupted palatal to 21 and the upper left canine (23) was still unerupted. The upper right permanent canine (13) was already into occlusion. The intraoral view is shown in Figure 1.

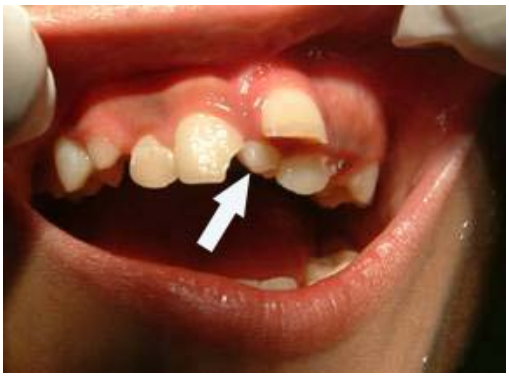

Figure 1 Intraoral view showing fractured upper left permanent central incisor and mesiodens (arrow)

Figure 2 An upper anterior occlusal showing inverted mesiodens (arrow)

Radiographic findings: A panoramic survey of the teeth and jaws revealed another unerupted and inverted mesiodens in close approximation to the root of upper right central incisor (11). A standard upper occlusal (Figure 2) was taken to determine the position of the unerupted mesiodens which was found to be located buccally. The bucco-lingual position of the unerupted supernumerary can be located using the parallax technique (Houston *et al.*, 1992). The panoramic view is shown in Figure 3.

Figure 3 A panoramic view of the patient showing two supernumerary teeth (arrows)

Treatment: An upper and lower impression (Alginate®) was taken for construction of study model to monitor changes in tooth movement. The non-vital 21 has open apex and apexification using calcium hydroxide (TempCanal®) was done in January 2005 prior to surgical removal of mesiodens in March 2005. The tooth 11 and 21 were restored with composite restoration shade A2 and A3 (Solare, GC Asia Dental Pte Ltd).

Surgical removal of inverted mesiodens at 11 region: Two months after the apexification was first started, the patient had undergone surgical removal of the mesiodens. Local anaesthesia (2.2ml, Lignocaine Hydrochloride Anhydrous 20mg, 2% w/v, Epinephrine 1:100,000, DuoPharma (M) Sdn. Bhd. Malaysia) was given to the upper labial sulcus and palatal area of 13 to 63 region. Buccal flap was raised. Bone was removed using slow speed bur with copious saline irrigation. The ST was exposed in relation to 11 with the crown sectioned from the root to assist its removal. The margins of the bone were smoothened and absorbable gelatin sponge (Gelfoam®, Pharmacia, Zuellig) placed in the socket. The flap s was utured with Coated Vicryl® 4/0 (Ethicon, Inc., Johnson and Johnson Company, USA) and haemostasis was achieved. The erupted mesiodens was extracted together with remaining carious primary teeth.

Review: The calcium hyrodxide (TempCanal®) was changed every three to six months before the apical closure was achieved in about one year period. The tooth 21 had undergone root canal treatment (RCT) once the apical barrier was achieved in March 2006 and the tooth is still being monitored until the time of the publication. During review of two years duration a few changes were noted. The upper left central incisor (21) had moved into occlusion even though it was non-vital and was root treated. The upper left canine (23) was partially erupted and the elevated upper lip was reduced since the 21 has moved into its place. The patient was referred for orthodontic assessment to correct his 'jutted' anterior teeth. The intra oral view is shown in Figure 4 and 5, respectively.

Figure 4 An intraoral view of the anterior segment showing 21 migrating into its position (after 2 months post surgery)

Figure 5 An intraoral view of the anterior segment showing tooth 21 in new position (after 2 years post surgery)

Discussion

It is essential not only to enumerate but also to identify the supernumerary teeth (ST) present clinically and radiographically before a definitive diagnosis and treatment plan can be formulated (Scheiner and Sampson, 1997). The mesiodens in this patient has probably originated from the permanent dentition tooth bud since in the primary dentition, supernumerary teeth occurred most often in the lateral incisor regions, as opposed to permanent supernumerary teeth, which prevailed in the central incisor regions (Humerfelt *et al*., 1985). Unerupted mesiodens may often cause retardation or obstruction of eruption of permanent incisors which may result in mesial shifting of the teeth to the opposite side, exceeding the midline and obliterating space for future eruption of succeeding central incisor. Early diagnosis and extraction of a mesiodens may prevent malocclusion and dental abnormalities such as delayed eruption of permanent incisors, rotation of the permanent incisors and diastema (Tay *et al*., 1984). Teeth located in the nasal cavity are a rare phenomenon but a case has been reported where a mesioden if left untreated can erupt in the nasal cavity (King and Lee, 1987). In this patient, it is unlikely that the inverted ST erupt in the nasal cavity but if it is left untreated without being monitored, it may give rise to the same problem as reported previously (King and Lee, 1987).

There are two schools of thoughts for the removal of ST (Tay *et al*., 1984). The delayed approach recommends intervention upon apical maturation of the central and lateral incisors, at an age around eight to ten years. The immediate approach calls for removal of the ST soon after the initial diagnosis of their presence (Primosh, 1981). Thus in this patient, it is necessary to remove the inverted ST under general anaesthesia since the patient was not be able to tolerate long surgical procedure under local analgesia. Furthermore, performing the surgical removal of the inverted ST under general anaesthesia allow for other dental treatment to be carried out in one sitting such as the extraction of the badly broken primary teeth, the extraction of the erupted ST, and restoration of carious teeth. When surgical removal is indicated, the advantage of avoiding the young children for local analgesia should be kept in mind where about 52% of the patient aged 5 to 9 years old often requires general anaesthesia for removal of ST (Koch *et al*., 1986). A survey of 112 supernumerary teeth showed that the teeth in transverse or inverted positions never erupted (Liu, 1995) and it is advisable for the ST to be surgically removed since in many instances, ST are associated with disturbances of tooth eruption, midline diastema or development of a local malocclusion (Tyrologou *et al*., 2005). It has been advocated that it is of great importance for ST to be removed (Von Arx, 1992) and some suggested for ST to be left “in-situ” and monitored (Tay *et al*., 1984).

Most ST are removed at the age of seven to nine years with peak at eight years old and some were done at a later age due to uncompleted root development of the central incisors and as a preventive measure against causing injury to the developing roots (Tyrologou *et al*., 2005) while other suggested at approximately eight to nine years of age or at the time when the upper central incisors are erupting; since these can reduced the surgical anxiety when the procedures were conducted under general anaesthesia, surgical trauma and prevent interference with the eruption of the permanent incisors (Liu, 1995).

An interesting finding was noted for the non-vital and root treated upper left central incisor (21) where it had moved into occlusion as shown in Figure 4 and 5, respectively during two years of review. The tooth is still in the process of apical seal under apexification procedure. This in a way might have some effect in the formation of the apical seal or calcific barrier at the root apex. Since the end point of the apex in undergoing movement as the tooth moved into occlusion, it might be impossible to gain the apical seal or apical barrier until the tooth has properly go into its correct position. The time taken for the apical barrier to form remains controversial and the type of intracanal medicament used affect its formation (Rafter, 2005). The underlying mechanisms involved in controlling not only the apexification process but also the shape of the “cap” remains unresolved (Selden, 2002). Nevertheless in this patient the tooth had aligned itself despite apexification and root canal procedures. In addition the most efficacious frequency of $Ca(OH)_2$ treatments is still controversial and the time required to effectively close the open apex is hard to predict (Selden, 2002).

The patient has Class II Division 1 malocclusion and is prone to injury such as fall and he might traumatize his upper anterior teeth again. Thus he was referred for orthodontic assessment and further treatment to correct his dental malocclusion to improve the aesthetic and functional problems. Long term monitoring and follow up is very important when dealing with paediatric dental patient.

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