Identical unerupted maxillary incisors in monozygotic twins

Hasan Babacan,a Fırat Öztürk,b and Hidayet Burak Polatc
Sivas, Malatya, and Kayseri, Turkey

Mesiodens is the most common type of supernumerary tooth found in the premaxilla. It might be discovered by the orthodontist by chance on a radiograph or as the cause of an unerupted maxillary central incisor. The genetic transmission of supernumerary and impacted teeth is poorly understood. The occurrence of identical unerupted maxillary central incisors and mesiodentes in monozygotic twins suggests that genetic factors might influence the etiology of this problem. In this case report, we discuss the treatment of unerupted maxillary permanent incisors caused by mesiodentes in monozygotic twins. (Am J Orthod Dentofacial Orthop 2010;138:498-509)

Delayed eruption of a permanent maxillary incisor (due to a supernumerary tooth) is a problem encountered occasionally by an orthodontist. These supernumerary teeth, located in the premaxillary region, are known as mesiodentes. The prevalence of mesiodentes has been estimated at 0.15% to 1.9% in the population.1,2 Although there is no significant sex distribution in deciduous supernumerary teeth,3 males are affected about twice as frequently as females in the permanent dentition.1-4 Mesiodentes have been reported to cause delay or failure of eruption of the permanent incisors in 28% to 52% of reported cases.5,6

Brodie7 first reported delayed eruption of central incisors in 1936 using radiographic records of a 10-year-old boy with a mesiodens. He noted mesiodentes in 3 other members of his family. Since then, several patients with a mesiodens have been reported, and various theories such as hyperactivity of the dental lamina, a phylogenetic relic of extinct ancestors who had 3 central incisors,8 and a dichotomy of tooth buds, one of which is the mesiodens,1 have been proposed as the etiology of mesiodentes. Although genetic origin is thought to contribute to the development of a mesiodens, the familial pattern of occurrence and mesiodens in twins strongly supports genetics. Autosomal dominant inheritance with incomplete penetration has been the proposed genetic theory.1,6

Many twins have bilateral occurrence, and unilateral mesiodentes can be mirror images.9 The aim of this report was to illustrate the orthodontic treatment of unilateral mesiodens in monozygotic twins with identical malocclusions.

DIAGNOSIS AND ETIOLOGY

The patients, AY and UY, are monozygotic twin brothers. They were referred to our clinic when they were 10.5 years old for orthodontic treatment of impacted maxillary left central incisors. Their medical histories showed no systemic diseases, and the dental histories showed no facial trauma or other developmental anomalies. Each had a balanced facial profile (Fig 1). Clinical analysis showed that both children were in the mixed dentition, and their left central incisors were missing, and the left lateral incisors had drifted mesially in both children (Figs 2 and 3). Radiographic examinations showed that a mesiodens was preventing the eruption of the maxillary left central incisor in both twins (Fig 4). Maxillary anterior occlusal and periapical radiographs showed that the mesiodentes were palatal to the impacted central incisors (Figs 5 and 6). Cephalometric analyses showed a Class I skeletal relationship, with a normal growth pattern (Fig 7, Table). They had similar clinical, radiographic, and cephalometric characteristics with a similar clinical appearance, so their treatment objectives and alternatives were the same, as was the treatment progress.

TREATMENT OBJECTIVES

Based on diagnostic records, the treatment objectives were to (1) remove the mesiodens before surgical
exposure of impacted central incisors, (2) erupt the impacted central incisors orthodontically, (3) develop ideal overjet and overbite, and (4) correct the midlines and root angulations.

**TREATMENT ALTERNATIVES**

Treatment options included (1) wait for spontaneous eruption of the impacted central incisor after surgical extraction of the mesiodens, (2) remove the mesiodens...
with surgical exposure of the unerupted tooth, and (3) remove the mesiodens with orthodontic traction of the unerupted tooth.

After careful consideration of all parameters, removal of the mesiodens with orthodontic treatment was the chosen plan.

**TREATMENT PROGRESS**

The twins were treated in a relatively analogous fashion, with 0.018 × 0.022-in Roth system fixed appliances placed on the maxillary permanent teeth and deciduous molars. After the maxillary teeth were leveled, the boys were admitted to the oral and maxillofacial surgery department for their surgeries. The labially impacted maxillary central incisors were surgically exposed with an envelope flap. Under local anesthesia, the supernumerary teeth were removed with an elevator after bone removal (Fig 8). A button with a gold chain was bonded to the impacted central incisors. The surgical flap and closure were carefully performed to prevent poor periodontal complications. After the tissues had healed, 0.014-in superelastic nickel-titanium wires were placed, and space was created for the impacted central incisors with an open-coil spring.

![Fig 2. Pretreatment intraoral photographs of AY and UY.](image-url)
Elastic thread was placed through the link of the gold chain and tied with tension to the coil, thereby applying traction to the impacted incisor. Once the impacted tooth became visible, an orthodontic bracket was placed ideally. The impacted central incisors were moved into their proper positions in 9 months (Fig 9). After the maxillary arches were leveled and aligned, the mandibular arch was bonded. Treatment was finished after the eruption of all permanent teeth. Bilateral Class I occlusions with ideal overjet and overbite were achieved. Essix retainers (Dentsply, York, Pa) were placed in both dental arches to maintain the orthodontic corrections. The total active treatment time was 29 months.

Fig 3. Pretreatment dental casts of AY and UY.
TREATMENT RESULTS

The impacted maxillary left central incisors were successfully aligned in their proper positions, and both boys finished treatment with pleasant smiles (Fig 10). Class I molar and canine relationships, and ideal overjet and overbite were achieved. In both patients, the repositioned incisors had acceptable gingival contour and width of the attached gingiva (Figs 11 and 12). The posttreatment panoramic radiographs show no root resorption or periodontal bone loss (Fig 13). Cephalometric measurements show that Class I skeletal relationships and normal growth patterns were maintained after treatment (Figs 14 and 15).
The etiology of a mesiodens is not understood. Several theories, such as hyperactivity of the dental lamina, a phylogenetic relic of extinct ancestors, and a dichotomy of tooth buds, have been proposed to explain the phenomenon. Many authors have focused on the genetic influence, such as Brook, who reported much higher frequencies of supernumerary teeth among first-degree relatives than in the general population, suggesting a significant genetic component in the etiology. Similarly, Hattab et al suggested that supernumerary teeth have a strong hereditary component but do not conform with a simple Mendelian pattern.
Langowska-Adamczyk and Karmanska\textsuperscript{11} reported similarly positioned supernumerary and impacted teeth in monozygotic twins, and they concluded that there is a genetic influence in the etiology. Nevertheless, they suspected environmental factors for the differences observed in the twins’ dentitions. Kabban et al\textsuperscript{12} investigated 34 pairs of twins and found a remarkable similarity in tooth sizes and morphologies of monozygotic twins, suggesting a strong inheritability factor in tooth size and shape. The twins presented here displayed identical appearances on all radiographic, cephalometric, and intraoral images. This identical resemblance strongly indicates a genetic origin as the main etiologic factor.

There were 3 treatment choices for these twins: removal of the mesiodens, removal of the mesiodens with surgical exposure of the unerupted tooth, and removal of the supernumerary tooth with orthodontic traction of the unerupted tooth. Studies have shown that the delayed tooth might erupt naturally after the supernumerary is removed; however, eruption occurs when the arch length is sufficient and root formation of the unerupted tooth has been completed.\textsuperscript{13-15} These twins had inadequate space for the unerupted central incisor because of migration of adjacent teeth into the space. Different treatment modalities might have been applied to each twin to determine the best treatment alternative for similar patients; however, this would have been unethical.

\textbf{Fig 9.} Orthodontic traction of impacted central incisors. Progress photos of AY and UY: \textbf{A}, beginning of treatment; \textbf{B}, after 6 months of treatment; \textbf{C}, After 7 months of treatment; \textbf{D}, after 9 months of treatment.
Removal of the mesiodens with orthodontic traction of the unerupted central incisor seemed to be the best treatment approach. Patient cooperation, length of treatment, potential risk of migration of adjacent teeth into the empty space, and patient age must be considered in treatment of a mesiodens.

Some previous reports stated that spontaneous eruption occurs 18 to 24 months after removal of a mesiodens.\textsuperscript{16,17} These twins’ impacted central incisors were fully erupted with orthodontic traction in 9 months, and the total treatment time was 29 months. Eruption and leveling of the permanent teeth were controlled in the next 20 months. The eruption of the second permanent molars was controlled at the followup appointments.

**CONCLUSIONS**

Monozygotic twins with identical malocclusions were treated in the same manner. It is known that the...
genotype of the monozygotic twins is the same; in this report, the phenotype was the same also. Environmental factors might affect the formation of the phenotype; however, the identical appearance of these twin brothers strongly suggests that the role of genetic influence on the etiology of malocclusions could be stronger than known.

Fig 11. Posttreatment intraoral photographs of AY and UY.
Fig 12. Posttreatment dental casts of AY and UY.
Fig 13. Posttreatment panoramic radiographs of AY and UY.

Fig 14. Posttreatment cephalometric radiographs and tracings of AY and UY.
REFERENCES


Fig 15. Initial and final cephalometric tracings of AY and UY, superimposed on S-N at sella.

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