Orthodontic treatment of bilateral geminated maxillary permanent incisors

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Gminated teeth occur more frequently in the deciduous dentition than in the permanent dentition, with prevalence figures of 0.6% and 0.1%, respectively. Bilateral presentation is rare. A survey of the literature showed that the prevalence estimates for bilateral double teeth range from 0.01% to 0.04% in the deciduous dentition, and 0.05% in the permanent dentition. In this article, we report a rare case of bilateral fusion of the maxillary permanent incisors, discuss possible histogenetic mechanisms related to this anomaly, and explain the treatment management. (Am J Orthod Dentofacial Orthop 2011;139:698-703)

Dental anomalies of forms can occur in the deciduous and permanent dentitions. Various terms have been used to describe dental twinning anomalies. “Double teeth,” “double formations,” “joined teeth,” “fused teeth,” “synodontia,” “schizodontia,” “concrescence,” and “dental twinning” are often used to describe fusion or gemination.1

The phenomenon of gemination arises when 2 teeth develop from 1 tooth bud, and, as a result, the patient has a larger tooth but a normal number, in contrast to fusion, when the patient appears to be missing a tooth, if the double tooth is counted as 1 unit. In geminated teeth, division is usually complete and results in a large tooth crown with a single root and a single canal. Fused teeth arise through the union of 2 normally separated tooth germs, and, depending on the stage of tooth development at the time of union, they can be either complete or incomplete. However, fusion can also be the union of a normal tooth bud to a supernumerary tooth germ. In these cases, the number of teeth is also normal, and differentiation from gemination might be difficult, if not impossible. Supernumerary teeth are not uncommon, and they appear in 0.3% to 3.8% of the population.2 Double teeth originate from the morpho-differentiation stage of tooth
Development; however, the exact etiology is unclear. Pressure or a physical force producing close contact between 2 developing tooth buds has been reported as a possible cause. Evolution, trauma, and genetic and environmental factors have also been implicated as contributing factors. Double teeth might also be part of syndromes such as achondrodysplasia, chondroectodermal dysplasia, and KBG (the name of the syndrome is based on the initials of the first three patients reported by Hermann in 1975). In contrast to other dental anomalies, double teeth occur more frequently in the deciduous dentition than in the permanent dentition, with prevalence figures of 0.6% and 0.1%, respectively, in white patients. They are found predominantly in the anterior region, with incisors and canines the most frequently affected. Geminated teeth are usually found in the maxilla, but cases of fusion are more frequently found in the mandible. Bilateral presentation is rare, as reported by Duncan and Helpin. A survey of the literature showed prevalence estimates for bilateral double teeth ranging from 0.01% to 0.04% in the primary dentition, and 0.05% in the permanent dentition.

In this article, we report a rare case of bilateral fusion of the maxillary permanent incisors and discuss the possible histogenetic mechanisms related to this anomaly and the treatment options for the patient.

**CASE REPORT**

The patient, a 12-year-old white girl, was referred by her dentist because of the morphologic abnormality of 2 teeth. The patient’s main complaints concerning her development; however, the exact etiology is unclear. Pressure or a physical force producing close contact between 2 developing tooth buds has been reported as a possible cause. Evolution, trauma, and genetic and environmental factors have also been implicated as contributing factors. Double teeth might also be part of syndromes such as achondrodysplasia, chondroectodermal dysplasia, and KBG (the name of the syndrome is based on the initials of the first three patients reported by Hermann in 1975). In contrast to other dental anomalies, double teeth occur more frequently in the deciduous dentition than in the permanent dentition, with prevalence figures of 0.6% and 0.1%, respectively, in white patients. They are found predominantly in the anterior region, with incisors and canines the most frequently affected. Geminated teeth are usually found in the maxilla, but cases of fusion are more frequently found in the mandible. Bilateral presentation is rare, as reported by Duncan and Helpin. A survey of the literature showed prevalence estimates for bilateral double teeth ranging from 0.01% to 0.04% in the primary dentition, and 0.05% in the permanent dentition.

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teeth were their unesthetic appearance. The clinical in-
traoral examination showed double teeth (maxillary cen-
tral incisors). No supernumerary teeth were observed,
and all permanent teeth were present.

She came for an orthodontic consultation with a Class
1 malocclusion, a symmetrically proportionate face, and
a concave profile (Fig 1). Intraoral and dental cast exam-
inations (Figs 2 and 3) indicated a maxillary left central
incisor that was rotated distopalatally, and oversized
maxillary right central incisor (14 mm mesiodistally)
and maxillary left central incisor (16 mm). The
remaining permanent teeth were of normal size and
shape. Overbite was 1 mm, and overjet was 2 mm.
Each of the 2 central incisors had an incisal notch in
the central part of the incisal edge. Both teeth

responded positively to electrical pulp testing. The
radiographs showed 2 distinct roots of the left and
right central incisors (Fig 4), and their pulp chambers

Fig 5. Immediately postoperative photographs: buccal and mesial views of the fused teeth.

Fig 6. Postoperative dental casts.

Fig 7. Clinical photograph, showing the restoration of the teeth and the diastema between the central incisors.
were individualized. No periapical radiolucency was associated with these teeth, since the lamina dura were intact. All remaining permanent teeth in each arch were fully erupted and of normal size and morphology.

The patient had a dental Class I malocclusion, with crowding in both arches and the maxillary left lateral incisor in crossbite (Fig 3). Her medical history was uneventful.

After dental sectioning (Figs 4, 5, and 6), the 2 mesial fused fragments of the crown roots were extracted under local anesthesia and separated longitudinally throughout the root conjunction line.

Prosthetic restoration of the 2 distal fragments was done to improve the final project and guided us through 2 years of orthodontic treatment. We aligned and leveled the maxillary arch and closed the spaces between the central incisors (Fig 7).

After the 1-year recall appointment (Figs 8–10), the teeth were symptom-free and still in functional use. At the 5-year follow-up (Fig 11), the teeth were in the occlusion properly and responded positively to electrical pulp testing, showing a good esthetic result with the periodontal and periapical health preserved.
DISCUSSION

It is difficult to establish a differential diagnosis between fused teeth and bigeminal teeth, particularly when they are associated with supernumerary teeth. For this reason, many authors prefer to use the term “double tooth” because of the uncertainty regarding the embryologic cause underlying the junction defect.9

Hamasha and Al Khateeb10 found that the incisors are also more affected in adults. In this case, orthodontic treatment followed by complementary esthetic treatment preserved the health and restored the esthetics. The etiology of fused teeth remains uncertain. Environmental factors, trauma, systemic diseases, vitamin deficits, and genetic predispositions have been proposed as causes for fused teeth.11,12

By our usage of “fused teeth,” we have implied that, at an appropriate early stage of development, we would expect to encounter 2 separate tooth germs that enlarge and subsequently merge across the midline. We cannot, however, exclude the possibility that the fused teeth initially arise from a single abnormal tooth germ in the midline that subsequently develops 2 basal elements.

There is no difference in incidence between the sexes, according to Brook and Winter.6 It is believed that physical forces acting to induce compression bring the tooth germs into contact with resultant fusion.

The association between abnormal maxillary incisor dentition and various brain malformations has been noted but is extremely rare, according to Axrup et al13 and Bazan.14 Knudsen15,16 also reported other dental anomalies associated with hypervitaminosis A induced exencephaly, involving the incisor germs of the mandible and the molars of both jaws, although fusion of the maxillary incisors was the most frequent malformation observed in our study.17

CONCLUSIONS

Periodontal, endodontic, orthodontic, and esthetic problems are frequently caused by fusion. The restoration of acceptable esthetics and function, as above described, is a consequence of a team approach, when every specialist has selected the best treatment in his or her field.3 This treatment method can be selected as the protocol for the patient’s specific treatment needs. It is important to identify the anomaly so that a conservative individualized treatment plan can be organized.9

Treatment objectives should aim to preserve pulpal vitality, meet esthetic and occlusal requirements, and prevent caries. Although 2 individual canals might lead to the diagnosis of fusion, a diagnosis of gemination can also be made because there were no missing teeth.

REFERENCES