Clinical and Radiographic Evaluation and Comparison of Six Cases of Fusion Involving the Primary Dentition

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ABSTRACT

Fusion occurs infrequently, but could cause esthetic, spacing, and periodontal problems. An understanding of fused teeth and their associated problems is important to provide prophylactic measures, thereby preventing or minimizing possible complications. The purpose of this case report was to highlight the infrequency of fused primary teeth by virtue of the number of such cases reported in the literature. Six cases of asymptomatic dental twinning anomalies in the primary dentition are reported in this study, and a clinical and radiographic presentation of the cases of fusion of primary incisor teeth is illustrated. This clinical entity has been found to appear with varied clinical and radiographic appearances. All cases are different from each other. This study's fourth patient is of particular interest because he is the second known case of bilateral fusion of the primary mandibular central and lateral incisors to be reported in the literature. An association of fusion of primary incisors with the number of succedaneous teeth was observed. **(J Dent Child 2012;79:34-9)**

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Fusion has been described as a developmental anomaly characterized by the union of 2 adjacent teeth. This union of 2 separate tooth buds may be either complete or incomplete. Fused teeth have separated or shared pulp chambers and canals.[1]

These types of anomalies may be unilateral or bilateral and may affect either dentition, although the primary teeth are more commonly affected. Bilateral dental fusion in the primary dentition is a rare dental anomaly.[2] Epidemiological studies showed that the prevalence of fused teeth was similar for females and males and occurred most frequently in the primary dentition.[3] This malformation can be distinguished from gemination because it is an attempt by the tooth germ to divide.[4]

The etiology of fusion is not exactly known. Some writers contend that fusion results when 2 tooth buds develop so close together that, as they grow, they come into contact and fuse before calcification. Other researchers believe that physical pressure or force generated during growth causes contact between adjacent tooth buds.[5] Other authors consider a viral infection during pregnancy and the use of thalidomide as possible causes of the anomaly.[6] The genetic foundation for the anomaly is possibly autosomal dominant with reduced penetrance.[7]

Tooth fusion occurs more in the primary dentition (~1%) than in the permanent dentition (<1%), with a rare chance of bilateral involvement in the primary dentition (<1%).[7] Fusion occurred infrequently but could cause clinical problems related to appearance, spacing, and periodontal conditions.[8] The general problem relating to fused teeth is hypodontia of the permanent dentition, which has been noted in 50% of affected subjects.[8] Therefore, cases with primary double tooth necessitate

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careful examination, as they may be associated with anomalies in the succeeding permanent dentition and require proper treatment planning.

The purpose of this case report was to highlight the infrequency of fused primary teeth by virtue of the number of such cases reported in the literature.

CASE REPORTS

This report presents 6 cases of double teeth in children with different dental problems who reported to the Department of Oral Diagnosis and Radiology, Faculty of Dentistry, Erciyes University, Kayseri, Turkey. In all cases, there was no significant medical history and no family history of dental anomalies. Patients' parents had no hereditary peculiarities, and their mothers had not used any medication or been exposed to radiation or trauma during pregnancy. A photograph, intraoral radiograph, and/or panoramic radiograph were taken at the time of diagnosis in all cases. Each double tooth case was, therefore, classified by its clinical and radiographic morphology based on the number and shape of crowns and roots.

Patient 1 was an 8-year-old girl who reported with the complaint of having large teeth within her mandible. Bilateral fusion involving the primary lower lateral incisor and canine was diagnosed using intraoral and extraoral clinical and radiographic examinations. Deep labiolingual grooves were associated with both enlarged teeth (Figure 1a). An orthopanthomogram revealed the patient's fused teeth. Radiographic evaluation of the left and right side's 2 distinct roots and root canals revealed primary teeth N and M as well as Q and R were fused. The lower permanent lateral incisors were congenitally absent bilaterally (Figure 1b). The intraoral examination and radiographic evaluation of patient 2 revealed unilateral primary double teeth (Q and R) associated with the absence of the permanent right lateral incisor (Figure 2). Similarly, patient 3 had unilateral primary double teeth (N and M) associated with the presence of the permanent left lateral incisor (Figure 3). Patients 1, 2, and 3 were each diagnosed as having a case of fused primary mandibular lateral incisors and canines of the incomplete type.

An intraoral examination revealed that patient 4 had bilateral presence of unusually large teeth in the mandibular incisor region. Both sides were strongly suggestive of conjoined primary central and lateral incisors (Figure 4a-b). Radiographic evaluation of the left and right side revealed fused primary teeth O and N as well as P and Q, with a single root and root canal and the presence of the permanent incisors. Similarly, patient 5 had unilateral primary double teeth (Figure 5). A radiographic evaluation of the left side revealed fused primary teeth O and N, with a single root and root canal associated with the presence of the permanent incisors. Deep lingual grooves were associated with both of the enlarged teeth. Patients 4 and 5 were diagnosed as having fused primary mandibular central and lateral incisors of the complete type.

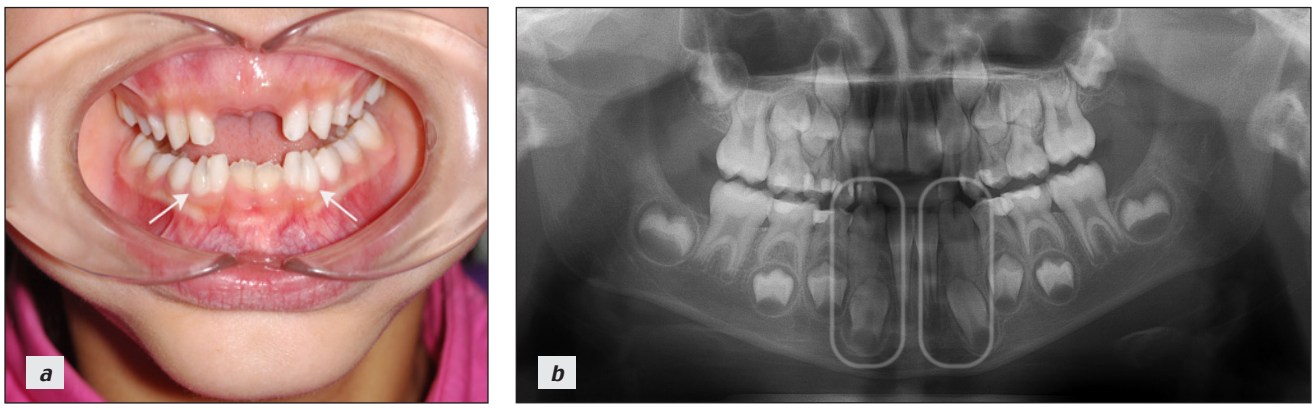

Figure 1. (a) Intraoral view of bilaterally fused primary mandibular lateral incisors and canines (teeth N–M and Q–R). (b) Note fused primary teeth with congenital absence of corresponding permanent mandibular lateral incisors.

Figure 2. Orthopantomogram revealing double teeth and mesiodens.

Figure 3. Orthopantomogram showing congenital absence of permanent mandibular lateral incisors and absence of permanent tooth no. 23, although primary teeth N and M are not fused.

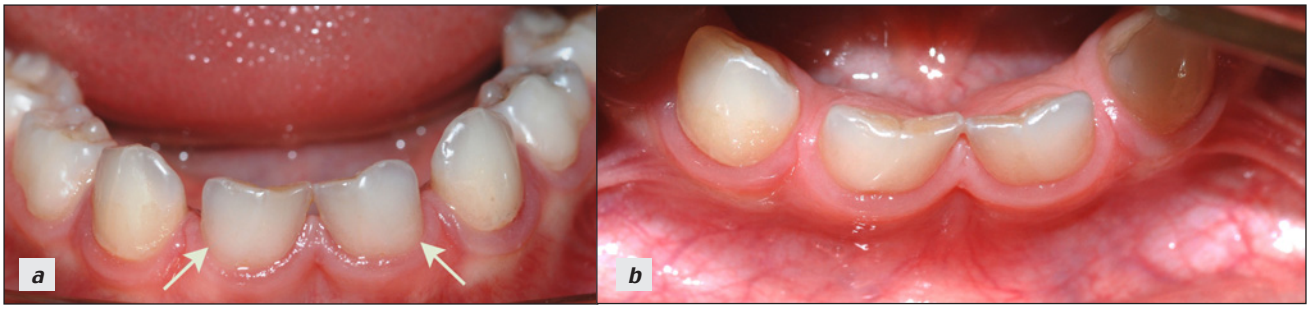

Figure 4. (a) Labial view of bilaterally fused teeth involving mandibular central and lateral incisors. (b) Occlusal view of fused teeth O and N as well as P and Q.

Figure 5. Fused primary mandibular central and lateral incisors P and Q.

An intraoral examination revealed that patient 6 had unilateral presence of unusually large primary teeth in the maxillary incisor region (D and E). Deep labiolingual grooves were associated with both enlarged teeth (Figure 6a). Radiographic evaluation of the right side revealed fused primary teeth D and E, with absence of the permanent right lateral incisor (Figure 6b). The fused teeth were extracted (Figure 6c).

In each case, the child's gender, position of the double teeth, and other anomalies in either dentition were noted (Table 1). An orthodontic consultation was established during the first appointment. The fused teeth were caries-free, except for patient 6. Because these grooves may be difficult to clean, caries may result. Fissure sealants were applied, and a topical fluoride application was also performed.

DISCUSSION

Fusion is a dental developmental anomaly characterized by the union of 2 adjacent teeth with a comparatively weak aesthetic and/or functional influence. Fused teeth usually cause a reduced number of teeth in the arch. A bifid crown may be present or 2 perceivable teeth may be joined by dentin or enamel. The crowns of fused teeth generally appear to be large and solitary, or an incisocervical groove of varying depth or a bifid crown occurs.[5]

Fusion can be classified into 2 types: (1) complete; and (2) incomplete. In the complete type, fusion begins before calcification.[9] The crown includes features of both participating teeth regarding their enamel, dentin, cementum, and pulp (Figures 4a and 5a). In the incomplete type, fusion occurs at a later stage (Figures 1a, 2, 3, and 6a). The tooth might exhibit separate crowns and fusion may be limited to the roots alone with pulp canals fused or separate.[9]

In accordance with the correlation between the crown and root morphology of the double teeth, the studied cases were classified into 2 morphological types: (1) type I, large crown/large root; and (2) type II, 2 fused crowns/double conical root. In the clinical observations of this study, double teeth were seen to involve 2 adjacent teeth: central and lateral incisors.

The differential diagnosis for fused teeth includes gemination and macrodontia. Several clinical and radiographic benchmarks are used to distinguish fusion from gemination. Fusion is the incomplete attempt of 2 tooth buds to fuse into 1; however gemination is the incomplete attempt of 1 tooth bud to divide into 2. Clinically, there is usually a vertical groove in the crown, but on the fused teeth radiographs there should be 2 distinct pulp chambers; if the fused tooth is counted as 1 unit, there will be one less tooth in the arch than normal.

In cases of gemination, radiographically there is only 1 pulp chamber; if the anomalous tooth is counted as one unit, the number of teeth in the arch will be normal. Gemination may be differentiated from fusion by the increased number of teeth, except in unusual cases where the fusion is between a supernumerary tooth and a normal tooth.[5] In all our cases, fused teeth have buccal and/or lingual grooves, and there was 1 fewer tooth in the arch than normal.

Only 14 cases of bilateral fusion of primary mandibular lateral incisors and canines have been reported in the dental literature between 1940 and 2010.[2,9,10-19] Hagman[18] reported that such patients have a 75% change of lacking succedaneous lateral incisors. Patient 4 in our study is the second known reported case of bilateral fusion of primary mandibular central and lateral incisors. The other case was reported by Aguiló L et al.[20] In both cases within the present study, the double teeth were localized in the mandibular incisor region.

Cho et al.,[21] reported that double teeth involving primary canines and lateral incisors is found only in the mandible. Eidelman[22] reported double teeth involving the bilateral primary maxillary central and lateral incisors, with congenitally absent corresponding lateral incisors as in case 6 of our study. In case 4 of our study, bilateral primary mandibular central and lateral incisors were observed with congenitally present corresponding central incisors.

Table 1. Each patient's age, gender, affected teeth, clinical features, diagnosis, classification and complications of fused teeth

Case	Age	Gender	Affected teeth	Clinical features	Diagnosis	Classification	Complication	Figures	Treatment
1	8	Female	N-M and Q-R	bilateral two fused crowns with deep labiolingual grooves and two fused roots	fusion	incomplete	absence of 23 & 26	Figure 1-a Figure 1-b	Follow-up visit
2	5	Male	Q-R	two fused crowns with two fused roots	fusion	incomplete	absence of 26	Figure 2	Follow-up visit
3	10	Female	R-Q	two fused crowns with two fused roots	fusion	incomplete	absence of 23 & 26	Figure 3	Follow-up visit
4	6	Male	O-N and P-Q	large crown with a large root and root canal	fusion	complete	no complication	Figure 4-a	Follow-up visit
5	4	Female	O-N	large crown with a large root and root canal	fusion	complete	no complication	Figure 5-a	Follow-up visit
6	8	Male	E-D	two fused crowns with deep labiolingual grooves and two fused roots	fusion	incomplete	absence of 7	Figure 6-a Figure 6-b Figure 6-c	Extraction

White et al.,[5] reported that, when a primary canine and lateral incisor fuse, the corresponding permanent lateral incisor may be absent. In our study, cases 1, 2, and 3 presented with primary double teeth related to the absence of the permanent lateral incisor. In case 3, however, there was a unilateral fused primary mandibular lateral incisor and canine but bilateral absence of permanent lateral incisors.

Fused teeth may induce esthetic problems and malocclusions, especially when supernumerary elements are included. Since fused teeth are obviously wider than the circumjacent teeth, esthetics may be a concern. When normal teeth fuse, excess dental space can occur, resulting in diastema formation. When fusion occurs in the primary dentition, some of the permanent incisors are often not present. These problems require both cosmetic and orthodontic consideration.[23] The presence of fissures or grooves at the union between fused teeth predisposes these teeth to caries and periodontal disease.[24] Because these grooves may be difficult to clean, caries may result. The placement of fissure sealants or composite restorations in these grooves should decrease the caries risk.[25] The presence of a double primary tooth can also cause delayed resorption of the root due to greater root mass and an increased area of root surface relative to the size of the permanent successor crown.[13]

Brook et al.[13] reported that half of the primary double teeth have been followed by an anomaly in the permanent dentition, and family histories of hypodontia or supernumerary teeth were found in some cases. Studying the family history of the cases reported in this article, we observed that double teeth have not been detected among the patients' parents and siblings.

Several treatment methods have been described in the literature regarding the different types and morphologic ranges of fused teeth, including restorative, endodontic, periodontal, surgical, and orthodontic treatment when it is required.[11]

The management of a case of fusion depends on which teeth are included, the level of fusion, and the morphologic result. If the affected teeth are primary, they may be retained as they are. If the clinician intends extraction, it is important to first determine whether the corresponding teeth are present.[5] The patients' expectations and degree of compliance must also be accurately assessed when determining suitable management.

Treatment of a fused tooth will depend on the clinical situation. If the fused tooth is free from caries, it

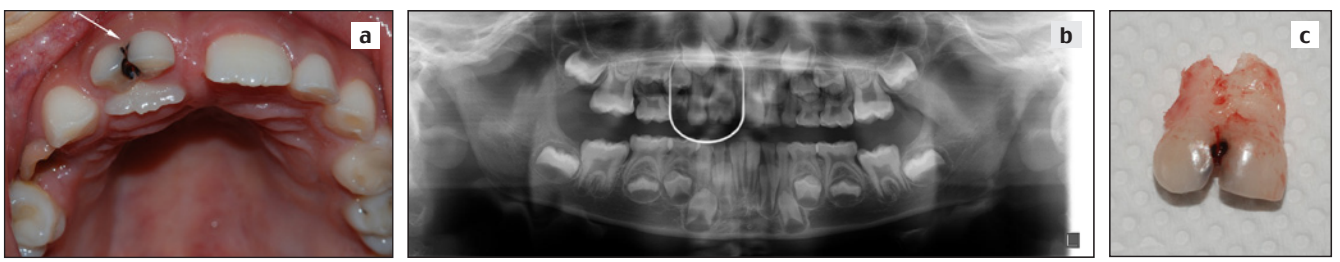

Figure 6. (a) Intraoral view showing fused primary maxillary right central and lateral incisor . (teeth E and D) (b) Orthopantomogram showing congenital absence of the permanent maxillary right lateral incisor, although teeth E and D are fused. (c) Labial view of extracted double teeth involving the primary maxillary right central and lateral incisor.

may require no particular treatment. Universal preventive advice should be given to the parent and the child,[26] and if caries already exists, a restoration should be performed to retain function and aesthetics.[27] If there is pulpal involvement, endodontic treatment should be conducted as it would for a multirooted tooth.[28]

The most common problem related to double teeth is hypodontia of the permanent dentition, which has been observed in 50% of affected subjects.[29] The anomalies of the permanent dentition are strongly associated with anomalies in the primary dentition.[30] Consequently, early diagnosis of this anomaly is important and should be followed by careful clinical and radiographic observations that will allow surgical intervention at an appropriate time.[13,31-33] The present cases continue to be followed by our department.

Fusion is not a usual condition, but it is an important dental anomaly. Recognizing this condition will facilitate the establishment of appropriate treatment with a multidisciplinary view.

In conclusion, dental fusion and gemination are asymptomatic, but both can result in a number of dental difficulties, including tooth reduction in the permanent successors, increased susceptibility to subgingival bacterial plaque, aplasia or malformation of the permanent successors, and dental impaction. To establish proper treatment for this anomaly, an accurate examination and diagnosis is a prerequisite. Once fusion has been diagnosed, careful monitoring is required, since problems with exfoliation can occur, along with caries formation in the groove of the incompletely fused teeth. Although primary double teeth themselves may be regarded as harmless anomalies, their presence can cause some space problems, occlusal disturbances, and delayed eruption of the permanent successors. Consequently, early diagnosis of the anomaly is of considerable importance.

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