Multidisciplinary Treatment of "Twinned" Permanent Teeth: Two Case Reports

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ABSTRACT

Twinned teeth usually appear in the anterior region of the dental arch. Besides orthodontic malocclusions, such as protrusion, crowding, or diastema, they also cause esthetic problems. Different treatment methods can be used according to the requirements of the situation. This article reports multidisciplinary treatment of 2 patients whose maxillary central teeth were twinned with supernumerary incisors. The twinned tooth was reshaped following endodontic treatment in 1 of the patients and orthodontic treatment was performed with edgewise mechanics. In the second case, however, it was determined that the twinned tooth had 2 separate roots. There was also another supernumerary lateral incisor in the dental arch that increased the severity of the crowding. The twinned tooth was hemisected and the other supernumerary tooth was extracted. The patient wore a removable appliance for initial tooth movements and treatment was finished with fixed appliances. (*J Dent Child*. 2004;71:80-86)

KEYWORDS: TWINNED TEETH, RESHAPING, HEMISECTION, ENDODONTIC TREATMENT, ORTHODONTIC TREATMENT, ESTHETICS

Twinned teeth can be regarded as developmental anomalies of the dental hard tissue, which are caused by the persistence of the dental lamina between 2 or more tooth germs, or a supernumerary tooth developed from the remnants of the dental lamina after it has been divided from an adjacent tooth germ.[1] Although the etiology of this anomaly is still unknown, trauma, genetic predisposition, and environmental factors, such as thalidomide embryopathy, fetal alcohol exposure, or hypervitaminosis A of the pregnant mother are possible causes.[2,3] Twinned teeth may also be part of some syndromes like achondrodysplasia, chondroectodermal dysplasia, focal dermal hypoplasia, and osteopetrosis.[2]

Twinned teeth have been described under different terms and the terminology is often confusing. Union of teeth can occur in several ways and clinical and radiographic views of the twinned teeth may vary due to the developmental stage in which the buds are involved.[4] Terms that are commonly used to describe this anomaly are fusion, gemination, and concrescence.[5]

Fusion is the joining of 2 tooth buds during odontogenesis. If joining occurs before the calcification phase, 2 teeth join and become a large tooth, but if the joining happens after the beginning of crown formation, only the radix may join. Both of the conjoint buds may be normal or 1 may be a supernumerary. The fused tooth usually has 2 separate root canals and a wide crown. The crown is either a bifid crown or it has a groove between the mesial and distal parts. There may be 1 pulp chamber divided into 2 root canals or 2 independent endodontic systems.[3-6]

Gemination defines the partial splitting of a single bud into 2 distinct entities and results in a single root with an enlarged root canal with 2 completely or incompletely separated crowns.[5,6]

Concrescence occurs if the 2 adjacent teeth are joined together by cementum after root formation is completed.[7]

It may be difficult to distinguish gemination and fusion from each other and sometimes it is even impossible, especially when the fusion occurs between a normal and supernumerary tooth,[8,9] so the terms "twinned tooth," "double tooth," or "connated tooth" have been used by some authors to overcome difficulties in diagnosis.[3,4,10-12]

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Figure 1. Intraoral view of case 1 before treatment.

Twinned teeth occur in less than 1% of the population. Triplication of teeth is even more rare.[7,8] Conjoining of teeth usually appears in the anterior region and causes esthetic problems in addition to orthodontic anomalies, such as diastema, crowding, or protrusion. The severity of orthodontic malocclusion varies due to the different types and morphological variations of fused and geminated teeth. If 2 regular teeth conjoin, the resulting twinned tooth occupies less space than 2 single teeth, and it may cause a diastema and loss of proximal contact. However, if a regular tooth conjoins with a supernumerary tooth, crowding or protrusion may occur, or the adjacent tooth may become impacted due to insufficient arch length.[11-13]

Different treatment modalities should be used according to the requirements of the situation. The twinned tooth may be extracted, reshaped, or teeth may be leveled without any intervention on the twinned tooth. If the twinned tooth has separate roots, hemisection may be another treatment approach.[12,17]

The purpose of this report is to describe treatment alternatives for twinned teeth and emphasize the necessity of multidisciplinary approaches to achieve appropriate function and esthetics.

CASE REPORTS

CASE 1

The patient was a 14-year-old male concerned about the malalignment of his maxillary anterior teeth. There was no trauma to the teeth or jaws in his medical history. Clinical evaluation showed a healthy boy with no other physical abnormalities. Intraoral examination revealed that the maxillary left central incisor was twinned with a supernumerary tooth. A groove and triangular protuberance were observed on the buccal aspect of the twinned tooth, separating the crown into 2 parts, and it was determined that the distal component was smaller than the mesial one. Mesiodistal width of the twinned central incisor was 14.5 mm while the width of the adjacent central was 11 mm (Figure 1). As a result of space deficiency, the maxillary left lateral tooth was in palatoversion and the canine tooth was in buccoversion. Radiographic examination showed that the twinned tooth had a single root, but 2 separate root canal systems (Figure 2).

TREATMENT PLAN

Reduction 3.5 mm of the width of the crown was envisaged, but since it had a wide pulp chamber, endodontic treatment and devitalization were planned for the twinned tooth before reshaping. Alignment of the maxillary dental arch was planned to be achieved with edgewise mechanics.

ENDODONTIC TREATMENT

The twinned tooth was anesthetized and isolated with a rubber dam. A lingual cavity was prepared and 2 distinct pulp chambers with 2 orifices were found. Pulp canals were instrumented using the crown-down technique to a size of 25 master apical file. The site was copiously irrigated with sodium hypochlorite solution during preparation. The canals were obturated with gutta-percha points, and zinc-oxide eugenol sealer was used for cold lateral condensation (Figure 3). Final reconstruction was completed with a light-cured composite resin.

RESHAPING OF THE TWINNED TOOTH

The width of the broadened crown was reduced distally by 3.5 mm, using a high-speed turbine and an extra-long diamond bur. The triangular protuberance on the buccal surface

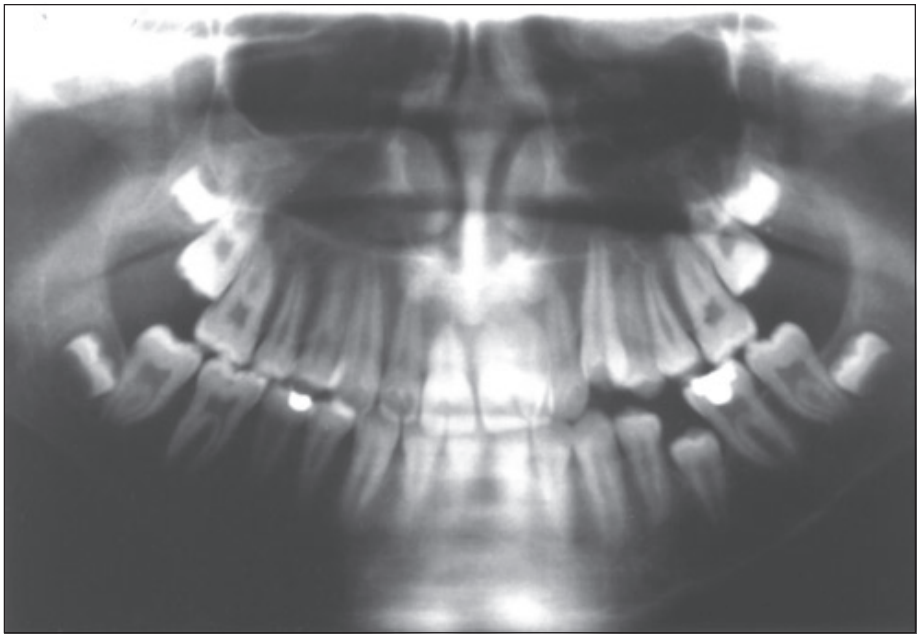

Figure 2. Panoramic radiograph of case 1 before treatment.

of the crown was also abraded with a diamond bur. Reshaping procedures were carried out under copious water and aspiration. The distal side of the crown was finally restored with a light-cured composite resin (Figure 4).

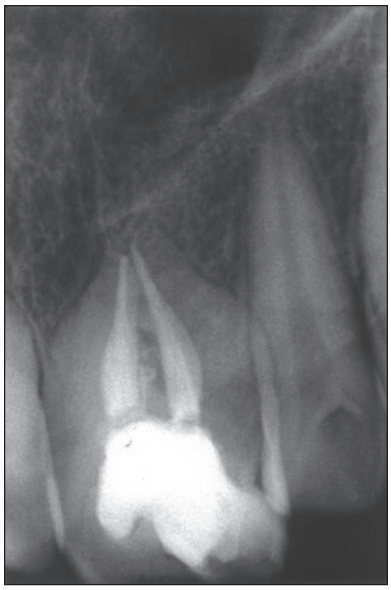

Figure 3. Periapical radiograph after endodontic treatment.

ORTHODONTIC TREATMENT

After the diastema was created between the twinned tooth and left lateral incisor, pretorqued Roth brackets were attached on the maxillary teeth. Ni-Ti archwires of 0.016 inch and 0.016×0.016 inch were used for initial leveling of the maxillary dental arch. Following the leveling phase, 0.016×0.022 inch Ni-Ti archwire was used and active orthodontic treatment was finished with the 0.017×0.025 inch blue algiloy archwire, which was used for artistic bends and torque control. A Hawley retainer was used for stability and retention, and the improvement in occlusion and facial appearance of the patient is seen in Figures 5 and 6.

CASE 2

The second patient was an 11-year-old male with severe maxillary anterior crowding. He had mixed dentition. Intraoral and radiographic examinations determined that the maxillary right central incisor was conjoined with a supernumerary incisor and became a giant tooth. A deep groove on the buccal surface of the twinned tooth was separating the crown into 2 parts and a protuberance was observed on the palatal surface. Apart from the fused tooth, there

Figure 5. Intraoral view of case 1 after treatment.

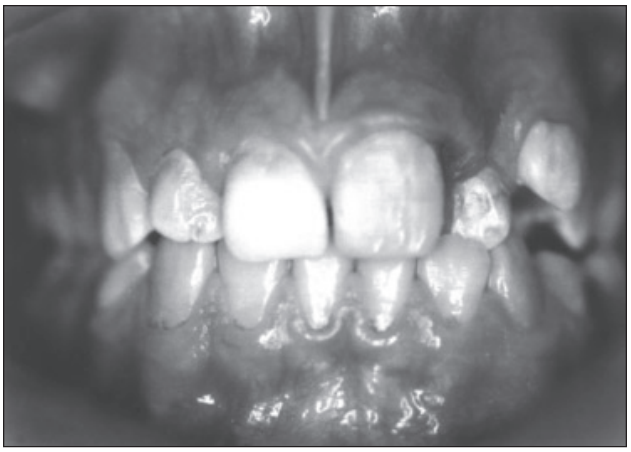

Figure 4. Light-cured restoration of the twinned tooth after reshaping.

was another supernumerary incisor between the left central and lateral incisors. The crowding was severe and the patient and his parents had concerns about the facial appearance. The maxillary right lateral incisor and mesial part of the twinned tooth was in crossbite. Mesiodistal width of the twinned tooth was 20.3 mm and the width of the adjacent central was measured 9.8 mm (Figure 7). Radiographic evaluation revealed that the twinned tooth had 2 separate roots (Figure 8).

TREATMENT PLAN

The 2 separate roots of the twinned tooth was an advantage for treatment. Hemisection of the twinned tooth and extraction of the conjoined supernumerary incisor and the left supernumerary lateral incisor were planned before orthodontic treatment. The treatment procedures were explained to the patient and his parents, and they accepted them.

HEMISECTION AND EXTRACTION PROCEDURES

The twinned tooth had 2 distinct roots and canals so hemisection was preferred instead of endodontic treatment and reshaping. The surgical procedure was performed under local anesthesia. Mucoperiosteal flaps were raised buccally and palatally. Some bone was removed with a bur to locate where the 2 roots were separated. The crown was divided into 2 with a diamond bur under

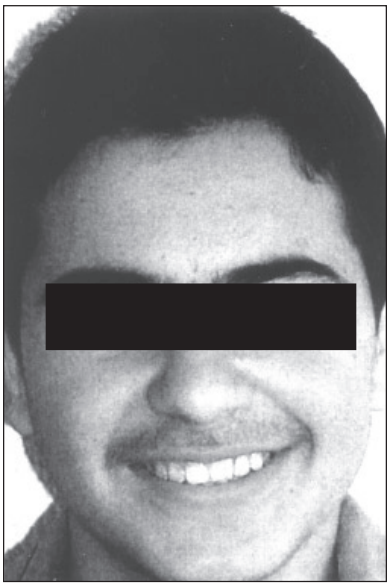

Figure 6. Extraoral view of case 1 after orthodontic treatment.

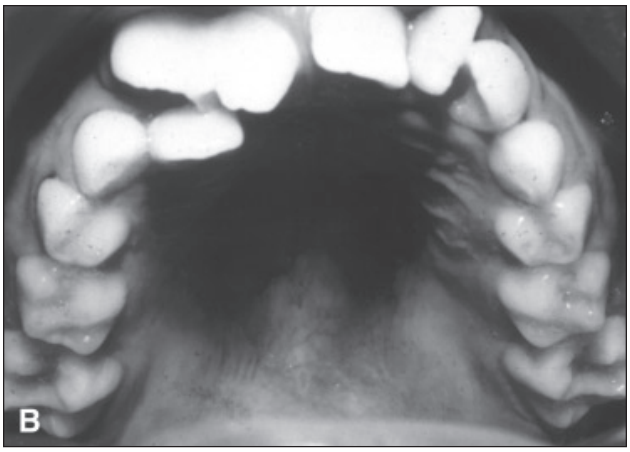

Figure 7. Intraoral views (A, B) of case 2 before treatment.

copious irrigation and the mesial part of the tooth was extracted. The supernumerary left lateral incisor was also extracted in the same session. Finally, the hemisected central incisor was reshaped and the remaining parts were smoothed with a diamond bur (Figure 9).

One week after the hemisection procedure, a vitality test was applied on the remaining part of the twinned tooth, and it was observed that the response of the tooth was normal and the tooth was vital.

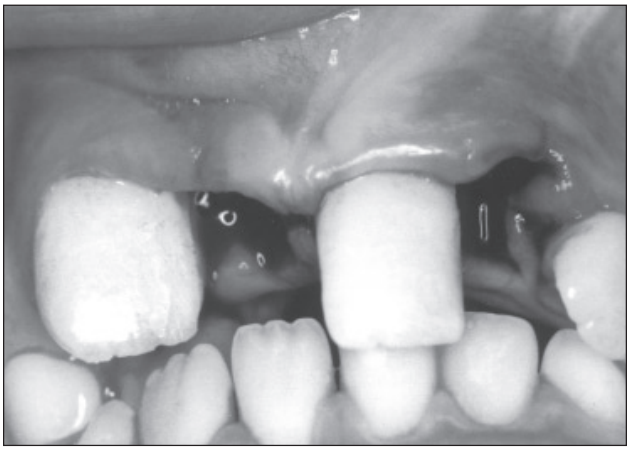

Figure 9. The view of the twinned tooth after hemisection.

ORTHODONTIC TREATMENT

Orthodontic treatment began after the healing of periodontal surrounding tissues. There was a diastema between the central incisors. The right lateral incisor was in crossbite and just behind the hemisected central, so a spring-loaded removable appliance was used for the initial movements of the anterior teeth (Figure 10).

Following 3 months of removable appliance treatment, pretorqued Roth brackets were attached and the maxillary incisors were aligned with a 0.016×0.016 inch Ni-Ti utility arch. A posterior mandibular bite-plate was prepared to prevent the right lateral incisor from being locked behind the lower incisors (Figure 11). Since the patient was in mixed dentition, it was considered that the treatment period would be prolonged. For this reason, after the incisors were aligned, the brackets were debonded to avoid the patient's negative cooperation. The central incisors were restored with light-cured composite resin by using strip crowns for an appropriate esthetic appearance. The patient used a Hawley appliance until the eruption of maxillary premolars. After the premolars erupted, the maxillary arch was bonded again with edgewise brackets, and an open–coil spring was used on an 0.016 Ni-Ti archwire to obtain adequate space for upper canines.

When the permanent dentition was completed, the maxillary dental arch was leveled by using 0.016 inch

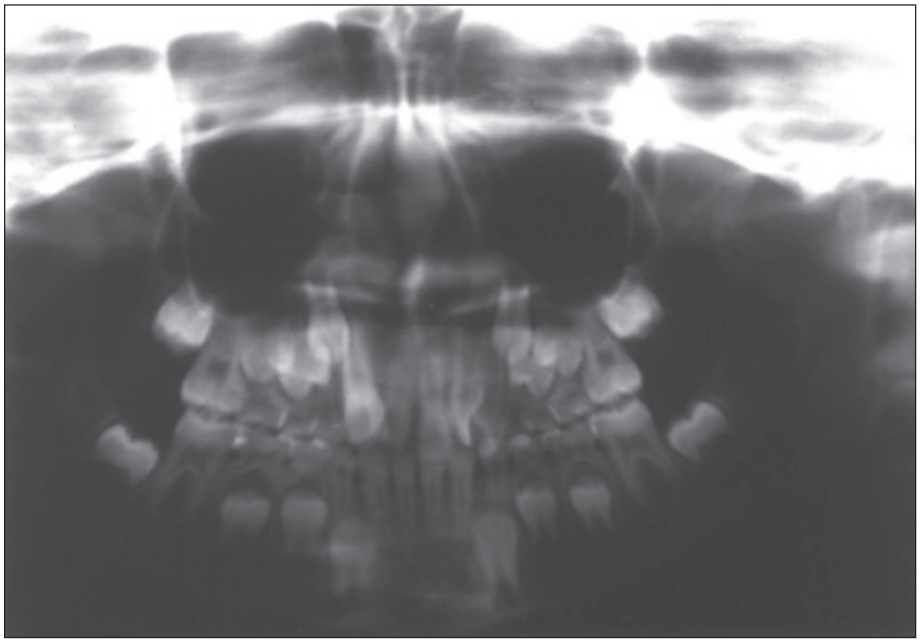

Figure 8. Panoramic radiograph of case 2 before treatment.

Figure 10. Mesial movement of right central incisor after removable appliance therapy.

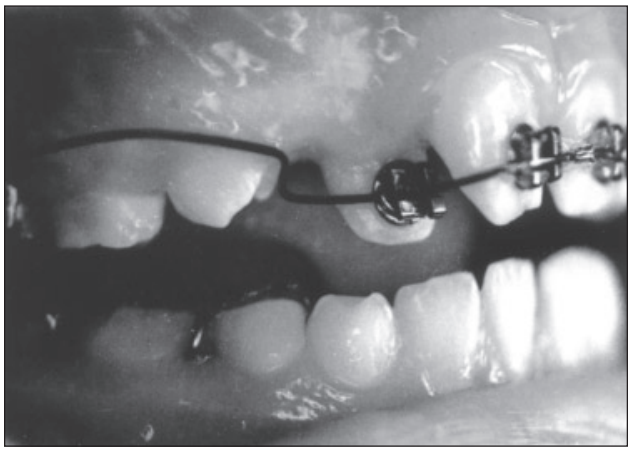

Figure 11. Intraoral view of the utility arch and posterior bite-plate.

and 0.016×0.016 inch Ni-Ti archwires, respectively. At the last stage of treatment 0.017×0.025 inch blue elgiloy finishing archwire was inserted for 2 months. The patient wore a Hawley retainer for 1 year after fixed appliances were removed. The final occlusion of the patient is seen in Figures 12 A, B, and C.

DISCUSSION

Fusion and gemination of teeth are developmental anomalies of the dental hard tissue. Fusion occurs when 2 independently developing tooth germs are joined during their formative period.[17,18] Two normal teeth can be fused or 1 of them may be supernumerary.[8,19] There may be only 1 pulp chamber divided into 2 root canals or 2 independent endodontic systems.[20] Fusion may be partial (incomplete), including only the tooth crowns or total (complete), involving tooth crowns and roots.[19-21] On the other hand, gemination occurs when the division of the tooth germ is halted before cleavage is complete and the result is a single tooth with a bifid crown and single root canal.[21] The pulpal anatomy and the number of roots have been used for diagnosis of fusion and gemination.[10,21,22]

Some authors have tried to differentiate fusion from gemination by using the method of Levitas who suggested

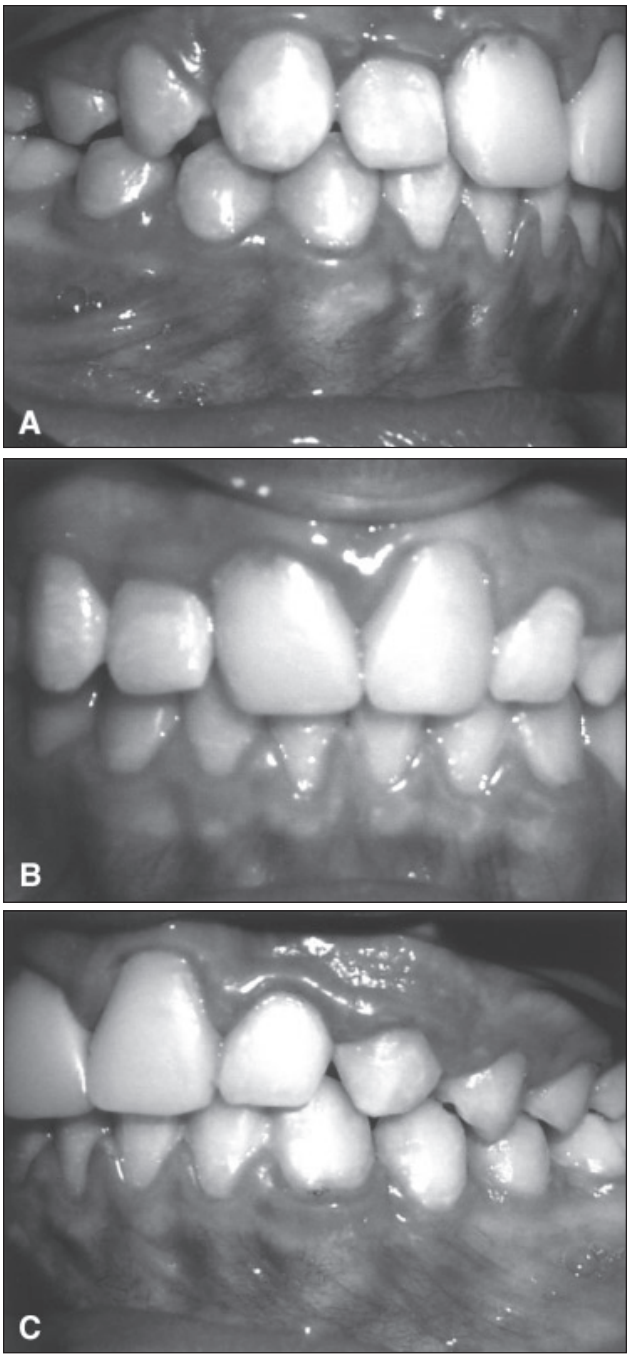

Figure 12. Intraoral views (A, B, C) of case 2 after treatment.

counting the teeth present on the dental arch; fusion diminishes the number of teeth while gemination does not.[21] However, this method was defined as unreliable by several authors[23] because the number of teeth may change due to the existence of supernumerary teeth or congenitally missing teeth.

Sometimes it is impossible to distinguish fusion from gemination so the terms "twinned teeth,"[10,11,24,25] "double teeth."[2,3,5,14,23] or "connated teeth"[18] were used by some authors to avoid confusion over nomenclature.

Radiographic evaluation of the first case revealed that although the twinned tooth had 1 root, it involved 2 separate pulp canals. In the second case, the twinned tooth had

2 distinct roots and 2 separate pulp chambers independent from each other. As both of the twinned teeth had 2 root canal systems, they were thought to be "fused teeth" because geminated teeth have an undivided pulp. Clinical and radiographic features were quite different from each other because the first patient's central incisor was a total fusion; not only the crown, but the root was also fused with a supernumerary tooth. On the other hand, the second case was a partial fusion with a supernumerary tooth as only the crowns were involved. However, the authors used the term "twinned teeth" to avoid confusion over terminology.

The prevalence of twinned teeth in the primary dentition ranged from 0.4% to 0.9% and in the permanent dentition it was approximately 0.2%. If the primary dentition was affected, there was a higher probability of abnormalities occurring in the subsequent permanent teeth.[2,26] In the cases presented, permanent and supernumerary teeth were twinned.

Twinned teeth may lead to serious problems relating to esthetics and malocclusion, especially when involving supernumerary elements and the treatment approach is usually multidisciplinary due to the abnormal crown shape, size and root formation, endodontic considerations, malalignment, and esthetics. The most common treatment alternatives are extraction, hemisection, reshaping after endodontic treatment, or just leveling of the dental arch without any intervention on twinned teeth.[12-16] Since the extraction of the twinned teeth requires both orthodontic and prosthodontic procedures, and orthodontic treatment without any intervention does not solve esthetic problems, hemisection or reshaping seems to be more successful than other treatment modalities.

In the first case, it was evident that malalignment of the right canine and lateral incisors were due to the insufficiency of the arch length so reduction of the width of the twinned tooth was required to obtain enough room for the leveling of teeth. Although the twinned tooth had 2 root canals, the roots appeared to be radiographically united and there was also no separation within the crown. Because of the wide pulp chamber in the crown, perforation was inevitable during the reshaping procedure so the twinned tooth had to be devitalized with endodontic treatment. Following endodontic treatment, 3.5 mm of tooth structure was removed from the distal aspect of the twinned tooth, and alignment of the maxillary arch was achieved by orthodontic treatment.

In the second case, union of the maxillary central incisor and supernumerary tooth was presented, demonstrating surgical separation of the tooth and extraction of 1 tooth-half while maintaining vitality of the remaining part of the tooth. This procedure may be an appropriate treatment method only if there are 2 completely separated roots. The separation of the twinned tooth into 2 single incisors is also possible as described in previous reports,[27] but in the present case, extraction of the supernumerary tooth was necessary to solve the esthetic problems and obtain space for leveling of teeth. Postoperative complications, such as hypersensitivity or pulpitis, were not detected in the case reported and the hemisected tooth was vital.

CONCLUSIONS

Clinically, it may be difficult to differentiate fusion and gemination when a supernumerary tooth is conjoined with a permanent tooth, but it is sometimes more difficult to choose an appropriate treatment method to provide acceptable esthetics and function for the patient.

Treatment goals can be achieved by meticulous diagnosis and a treatment plan. If the pulp system of both halves are connected in a common pulp chamber or communication exists between the 2 root canals, endodontic treatment should be performed prior to reshaping of the crown. On the other hand, if the fused tooth has 2 distinct roots and no connection between the 2 separate root canal systems, hemisection of the tooth and extraction of 1 tooth half should be preferred. This method may protect the vitality of the remaining half.

Anterior twinned teeth cause severe esthetic and functional problems and the treatment of such developmentally abnormal teeth requires special endodontic, surgical, prosthodontic, or orthodontic management. Appropriate function and esthetics may be achieved by multidisciplinary treatment methods.

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