

Surgical Separation of Double Maxillary Incisors; Orthodontic Perspective

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Abstract

Double incisors cause a variety of clinical problems that call for early diagnosis. Care should be taken to recognize developmental, periodontal and orthodontic effects. The patient's expectation and degree of compliance must also be accurately assessed when determining suitable management. Several treatment options are available and considered case dependent. This case series demonstrate three cases and the outcome of management and a flowchart demonstrating the pathway for effective management.

Keywords: Double Maxillary Incisors; Orthodontic Effects

Introduction

Double teeth can occur clinically as an isolated finding or in association with other dental anomalies, with patients and guardians esthetic concern, fused and geminated teeth have deep unsightly bifid grooves between the "two" teeth which can be very susceptible to developing caries in addition to space problems with blocked lateral incisors. Fusion and gemination are the most common of such anomaly. Fused teeth arise through union of two normally separated tooth germs. While gemination is the splitting of one tooth germ in two teeth. The differentiation from gemination may be very difficult.

Fusion depends upon the stage of development at the time of union, it may be either complete or incomplete. On some occasions, two independent pulp chambers and root canals can be seen [1]. In geminated teeth, division is usually incomplete and results in a large tooth crown that has a single root and a single canal, or can be a complete division resulting in a normal tooth plus a supernumerary tooth or incomplete division resulting in a large tooth mass with crowding in both situations. The pulp chamber in an incomplete division is usually single and enlarged and may be partially divided [2,3]. Fusion can also be the union of a normal tooth bud and a supernumerary tooth germ in these cases, the number of teeth is normal and crowding is seen.

Double teeth can occur as an isolated finding or in association with other dental anomalies as, Talons cusp which is characterized by the presence of an accessory cusp like structure projecting from the cingulum area, or at the cemento enamel junction. In its typical shape, the anomaly resembles an eagle's talon, but it could also present as pyramidal, conical or teat-like [4,5].

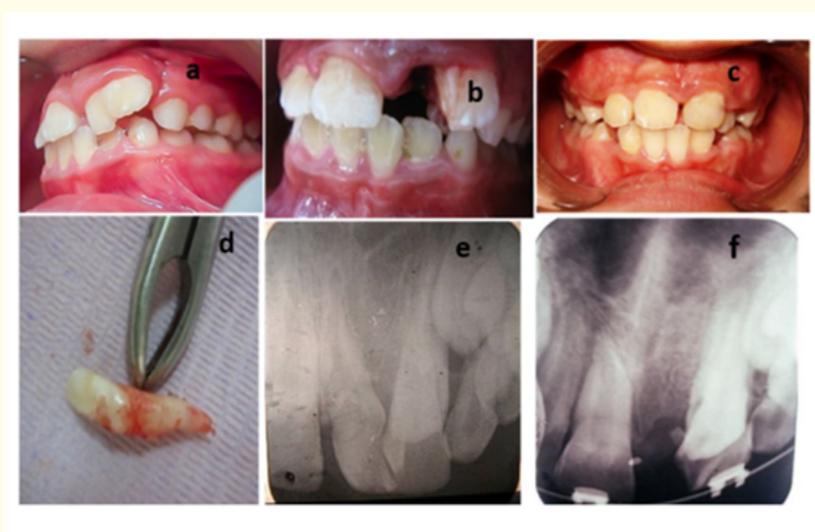
For acceptable aesthetic and functional results, special multidisciplinary treatment approaches including orthodontics, surgical hemisectioning and prosthodontics were required [6]. This report will discuss 3 cases of double maxillary central incisors. All the cases had large tooth mass with facial deep groove, aesthetic problems, crowding, and palatally blocked lateral incisor adjacent to the double incisor.

Interdisciplinary management were discussed with the parents. They preferred hemi-sectioning and retaining half of the double incisors rather than extraction and long-term prosthetic rehabilitation with Maryland bridge or removable partial dentures.

Diagnosis and etiology

Case 1

The first case was a 9 years old boy with a bifid double maxillary left central incisor crown complaining of bad aesthetics. Periapical radiographs showed two separate roots and fused crowns above the level of cement enamel junction {CEJ}. No missing teeth indicated incompletely fused incisor to a supernumerary tooth or incomplete gemination. Crowding in the maxillary arch was evidenced by palatally blocked left lateral incisor. Fine tapered stone was used to deepen the fusion mark in the incisal edge cervically and closed Extraction of the smallest mesial part was done (Figure 1). The labial surface of the crown was smoothed to remove some surface irregularities. Orthodontic treatment was accomplished using removable appliance to bring the lateral incisor in position.

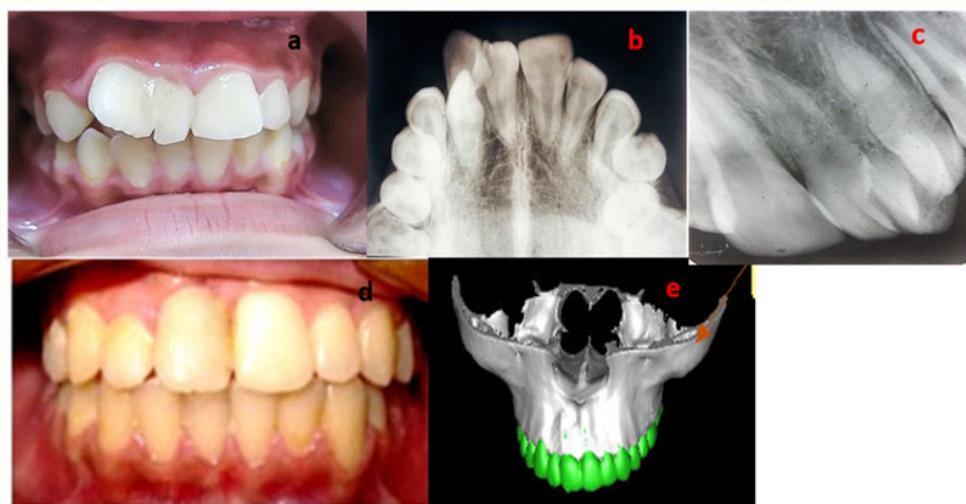


Picture 1: First case; a: Preoperative intraoral photograph showing increased width of the clinical crown, longitudinal enamel projection extending cervically and incisal notch, b: after surgical splitting, c: postsurgical separation and composite reshaping of the distal half, d: the extracted mesial part, e: Intraoral Periapical radiograph showing fusion at the crown and two separate roots, the level of fusion above CEJ, f: postsurgical radiograph showing the incisor was split and the space was created.

Case 2

The second case was a 12 years old female with a bifid double right permanent central incisor. On the palatal aspect, the crown exhibited a pronounced, well-defined accessory cusp extending from the (CEJ) to within 0.5 mm of the incisal edge. Based upon clinical and radiographic findings, a diagnosis of Talon cusp on incompletely fused incisor to a supernumerary was made or incomplete gemination. The double-Taloned tooth had an enlarged pulp chambers, two roots and bifid crown appearance impeding the alignment of the adjacent lateral incisor. Treatment of this case was complicated by the Talon's cusp and extension of the fusion apically beyond the CEJ. Fissure in the incisal edge indicated the point where separation started using tapered fissure bur. Muccoperiosteal flap was raised from the labial side and a surgical bur was used to split the tooth. Labial bone destruction and pulpal exposure beyond the CEJ apically at the Talon's cusp

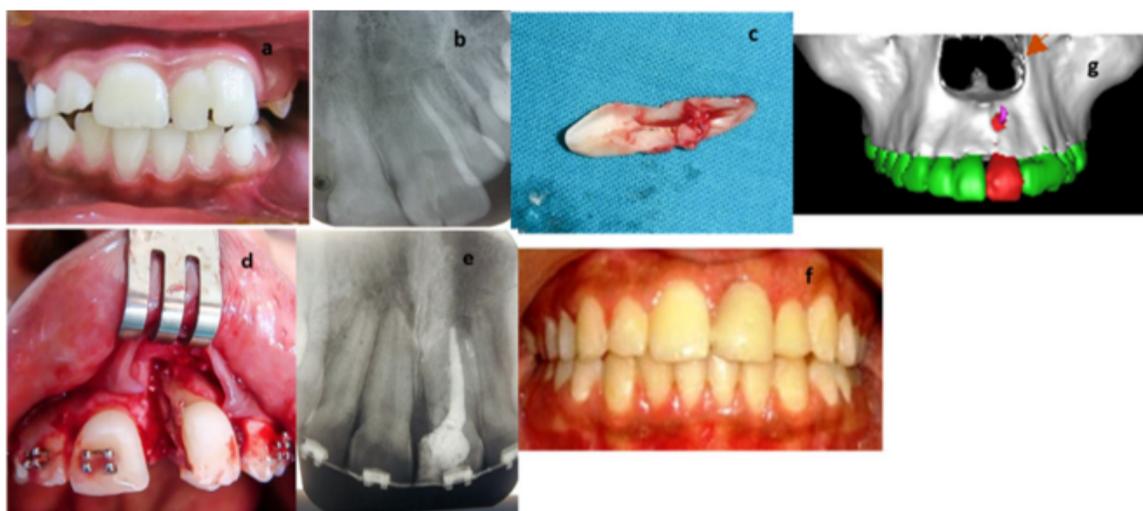
were evident. Endodontic treatment and bone grafting followed by 4-months healing period was needed before the space closure started with sliding mechanics. The space was created for the lateral incisor which was aligned in place in the treatment sequence. Probing depth was recorded and compared to the adjacent central with revealed insignificant increases. Cone beam computerized tomography was done and revealed normal appearance of the crown and the root with no root fenestration (Figure 2).



Picture 2: Second case a: Preoperative intraoral photographs showing; double central incisor with large tooth mass, incisal notch, abnormal enamel groove, b: occlusal radiograph showing fused crowns, the level of fusion is at or above CEJ and separate roots, c: periapical radiograph showing; Talon cusp detected as V-shaped formation, d: CBCT showing normal incisor appearance with the bone covering the whole root length.

Case 3

The third case was a 10-years 6-months old girl presented with a complaint of a large, unsightly bifid left central incisor with the lateral incisor in cross bite and increased mesiodistal crown diameter. Radiographic examination revealed fusion extending from the incisal edge till the apex of the root (Figure 3). She was diagnosed with complete fusion to a supernumerary or incomplete gemination on counting there was no missing teeth. The patient had intentional root canal treatment and a mucoperiosteal flap to ensure proper surgical access. Surgical hemisectioning was done using long surgical bur and a chisel to separate the roots. This case was complicated by; extension of fusion till the apex of the tooth, difficult endodontic treatment due to abnormal configuration of the crown and the root, added to the fear from ankylosis on the mesial side or periodontal problems. Composite resin was used to reshape the mesial half. No bone graft was used in this case as there was less compromise to the aesthetics than case 2. Space was closed using sliding mechanics with light force and the lateral incisor was aligned in place during treatment. CBCT revealed a very small area of fenestration and an unidentified material, which is believed to be endodontic sealer. Periodontal probing was performed and indicated absence of deep pockets circumferentially.

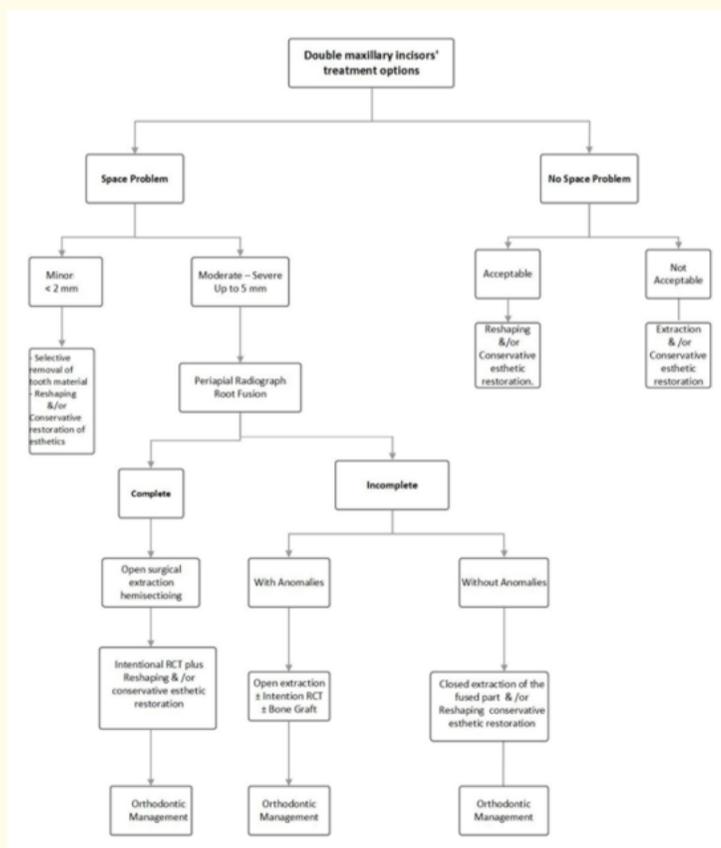


Picture 3: a: Intraoral preoperative photograph showing double central incisor, incisal notch and abnormal enamel groove, b: periapical radiograph showing increased width in crown and root till apex, c: extracted mesial part, d: post-operative intra oral photographs showing open extraction of the mesial part of the tooth from incisal edge till apex, e: periapical radiograph showing outcome after hemisectioning, endodontic treatment and orthodontic correction, f: corrected esthetics and the lateral incisor in proper occlusion, g: post operative CBCT, with a red area at apex indicating minute root exposure [fenestration], the violet color is for unknown material {endodontic sealer}.

Discussion

Double incisors with normal teeth count may lead to serious space and aesthetics problems especially when involving supernumerary elements [7].

Several treatment options are available and considered case dependent (Figure 4); among which is accepting the condition if there is no space problem; and aesthetic reshaping with grinding stone and/or composite resin. However, if there is minor space problem; selective removal of tooth material using interproximal reduction IPR to create an additional space is an executive solution.



Picture 4: Flow chart showing the suggested management of double incisors according to the amount of space loss.

If there is moderate to severe space problems; with incomplete fusion and two roots, surgical separation (hemi-section) of these teeth is more common and solves the problem of severe crowding. Surgical separation becomes more difficult with the level of fusion below the CEJ apically [8] and with complete roots fusion.

Endodontic treatment may be needed in combination with surgical separation especially in young patients or in cases with anomalies extending apically as dens evaginatus. Composite resin may be used to reshape these malformed teeth in combination with almost all treatment options.

Extraction of the whole tooth is sometimes [9], the treatment of choice and is associated with prosthetic replacements that can be for long term if the patient is in the mixed dentition stage.

Geminated-Taloned teeth cause a variety of clinical problems that call for early diagnosis. Care should be taken to recognize developmental, periodontal and orthodontic effects [8,9]. The patient's expectation and degree of compliance must also be accurately assessed when determining suitable management.

Therefore, treatment of Talon's cusp should involve careful clinical judgment and review of whether the cusp contains or is devoid of a pulp horn. Earlier reports, based on radiographic examination, stated that removal of the cusp would inevitably lead to pulp exposure that would require endodontic treatment [2]. Pitts and Hall removed 3 mm of the anomalous cusp in one visit, without pulp exposure [10]. Hattab and Hazza'a [11] reported several times to reduce 1.0 mm to 1.5 mm of Talon cusp in one appointment without exposing the pulp [7]. However, this does not imply that all Talon cusps are devoid of pulp horn.

Recent evidence suggests a localized osteoporosis state, as a part of a healing event called regional acceleratory phenomenon (RAP), may be responsible for the rapid tooth movement [12].

This acceleration is the regional acceleratory phenomenon. RAP usually occurs after a fracture, arthrodesis, osteotomy, or bone-grafting procedure, and may involve recruitment and activation of precursor cells necessary for wound healing concentrated at the site of injury [13,14]. RAP is not a separate healing event, but it can expedite hard and soft-tissue healing stages two- to tenfold [15].

Conclusion

A multidisciplinary approach will contribute to the success of the treatment, in cases with such abnormalities this approach should be implemented from the beginning of the diagnosis going through treatment planning and executing the final outcome. Because it is related to esthetic sensitive zone careful assessment as to; the level of fusion, the presence of complicating factors and esthetic restorative need in relation to the age of the patients is a must. Not only orthodontists, surgeons and restoratives, periodontists as well, should be consulted to recommend bone grafting if needed and follow up the pocket depth post operatively. Restorative treatment should be implemented early in treatment to enhance esthetics and aid final treatment outcome. It is important that in these types of cases to reach to the best possible esthetics outcome and avoiding the complications as caries and periodontal problems.

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