

Bilateral Complete and Incomplete Fusion of Incisors and its Management

Abstract

This case report highlights the management of a case of bilateral complete and incomplete fusion of maxillary incisors in a 10-year-old child. A mock-up was done on the diagnostic cast. Pretreatment esthetic evaluation was done using bis-acryl composite temporaries which were transferred intraorally from the diagnostic cast using a putty index. An incisal overlap veneer preparation was done, following which, an IPS e-max veneer was cemented. A digital mock-up was carried out using the Adobe Photoshop and Corel Draw softwares to aid in laboratorial fabrication of the veneer.

Keywords: Adobe Photoshop, complete, Corel Draw, fusion, incomplete, IPS e-max veneer

Introduction

Fused tooth can be defined as a single enlarged or joined tooth in which the tooth count reveals a missing tooth when the anomalous tooth is counted as one.^[1] Bilateral fusion has an incidence ranging from 0.01% to 0.04% in the primary dentition, and 0.05% in the permanent dentition,^[2-4] out of which, incisors and canines are mostly affected.^[3,5-10] Fusion may be classified as complete or incomplete depending on the developmental stage of the teeth. If it occurs before the beginning of calcification, the union will be complete with the formation of a single large tooth.^[11] Complete fusion may be characterized by a single pulp chamber and root canal, or a single pulp chamber and two separate root canals, or separate pulp chambers as well as root canals.^[12,13] The dentin is always confluent in the case of complete fusion.^[11] Fusion of teeth is known to result from physical force or pressure causing contact of the developing tooth germs,^[1,14] hypervitaminosis A,^[15] viral infection during pregnancy and the use of thalidomide,^[16] heredity,^[11,13,17] aberration of the ectoderm and mesoderm during morphodifferentiation stage of tooth development,^[18] and syndromes such as achondrodysplasia, chondroectodermal dysplasia, focal dermal hypoplasia, and osteopetrosis.^[19-23]

Case Report

A 10-year-old boy visited the Department of Pedodontics and Preventive Dentistry with the

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chief complaint of an unaesthetic large bifid anterior right tooth. His medical history was not contributory. There was no family history of dental anomalies, and neither was there any history of trauma to the teeth or jaws. Intraoral examination revealed unusually large maxillary central incisors, out of which, the maxillary right incisor (MRI) was bifurcated with a groove traversing the labial and palatal aspects of the crown [Figures 1 and 2]. There was the absence of any caries and both incisors responded normally to thermal and electric pulp testing (C pulse pulp tester, Foshan Coxo Medical Instrument Co. Ltd). The surrounding tissues and gingiva appeared normal. An orthopantomogram revealed the absence of maxillary lateral incisors (MLI) [Figure 3]. A cone-beam computed tomography (CBCT) scan revealed two distinct roots that were connected through the groove, containing two distinct connected root canals, in relation to the MRI. However, the MLI had a single large root and root canal [Figures 4-6]. A diagnosis of incomplete fusion of the MRI (mesiodistal diameter of 16.5 mm; crown length of 12 mm) and complete fusion of the MLI (mesiodistal diameter of 12.5 mm; crown length of 12 mm) was made, based on the appearance of the incisors and the fact that the MLIs were missing.

After informed consent was obtained for carrying out treatment, upper and lower alginate impressions were made and poured with dental stone. A diagnostic mock-up was done using mockup wax on the MRI that matched with the size and shape of the

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Figure 1: Anterior view



Figure 2: Upper occlusal view

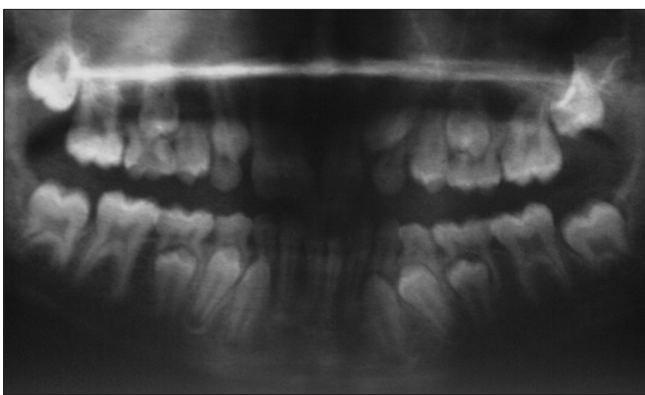


Figure 3: Orthopantomograph

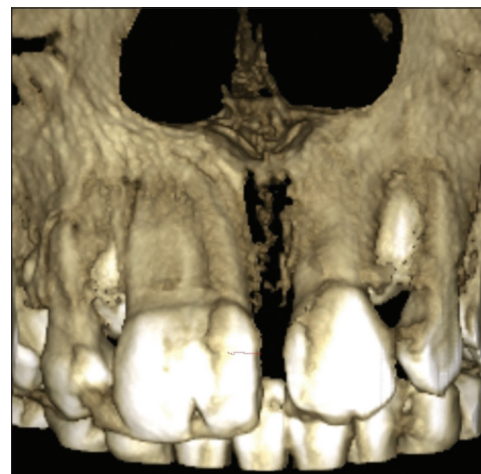


Figure 4: Cone-beam computed tomography with three-dimensional reconstruction

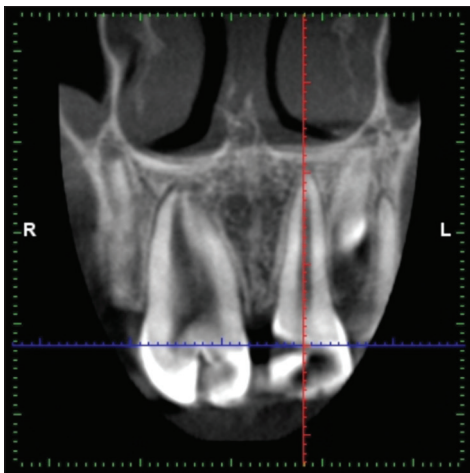


Figure 5: Cone-beam computed tomography (longitudinal)

adjacent MLI [Figure 7]. A putty index was made of the mock up wax, following which, bis-acryl composite (Kettenbach, Germany) was placed into the index and transferred to the MRI, intraorally. Pretreatment esthetic evaluation was carried out to check for adequate phonetics, lip support and smile line, and for approval from the patient and his parents.

An incisal overlap veneer preparation (facial reduction of 0.5 mm) with a shoulder finish line was carried out for the

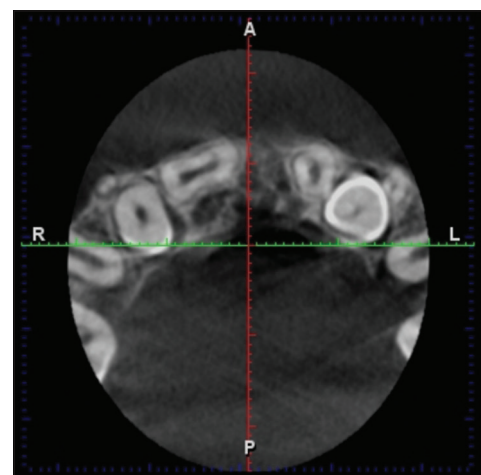


Figure 6: Cone-beam computed tomography (cross-section)

MRI [Figure 8]. A digital mock-up was done using Adobe Photoshop 7.0 software so that adequate information regarding the size, shape, and extent of the veneer could be sent to the laboratory. It consisted of the following steps:

- The free selection tool was used to select and trace the outline of the adjacent central incisor.

- The outline was converted into a smart object.
- The inversion tool was used to derive a mirror image of the same.
- The image was saved as a jpeg file.
- The jpeg file was imported into the Coral Draw software and placed over the image of the fused tooth.
- The cloning tool was used to mimic the gingiva to create an illusion of distinction between the central and the lateral incisors that constituted the MRI.

The digital mock-up helped in providing adequate information to the laboratory with regard to the addition of gingival porcelain on the veneer.

The fabricated IPS e-max press veneer (Ivoclar Vivadent AG, Schaan, Liechtenstein), with an incisal lapping preparation, was cemented using a translucent shade of dual cure composite resin luting cement (Rely-X ARC, 3M-ESPE, Germany) [Figures 9 and 10].

Discussion

There has only been one case of bilateral fusion of permanent maxillary incisors without the involvement of supernumerary teeth, reported in literature.^[24] Moreover, ours is the first case where there has been incomplete and complete fusion, bilaterally. The MRI was classified as incomplete fusion since there was a bifurcation of the crown along a groove running labially and lingually till the cervical margin, without the confluence of dentin between

the two sections. However, the MLI was classified as complete fusion (between the central and lateral incisors) because it consisted of only a single large crown and root structure.

Intraoral periapical radiographs are insufficient for understanding the morphology of roots and its canal systems in fused teeth.^[25] Moreover, it was difficult to interpret the same with the help of the orthopantomograph. CBCT that can produce three-dimensional images of oral structures are helpful particularly in such cases. Since the volume of the scan is smaller, the resolution of the image is higher with little effective radiation dose to the patient.^[26] The CBCT scans obtained provided us with accurate information with regard to the number of roots, canals and the region of the divide, both occlusally and labially, in the MRI. Since the CBCT scan showed a connection between the canals in the MRI, it was decided to place a veneer to avoid endodontic treatment, hemisectioning, and full crown placement on both the separated teeth.

Endodontic treatment was not preferred for the MRI because the tooth was asymptomatic and responded favorably to pulp tests. Orthodontic movement was not planned either because there was no shift in the midline, proclination, or spacing. Moreover, the child was only 10 years old with a mixed dentition. Although the MLI had a primary canine adjacent to it, the child or his parents had no complaint with regard to its esthetics. However, when the primary canine would get replaced with the succedaneus



Figure 7: Wax mock-up



Figure 8: Tooth preparation for veneer



Figure 9: Posttreatment anterior view



Figure 10: Posttreatment occlusal view

canine, its reshaping with composite resin or a veneer may be necessary to make it resemble a lateral incisor.

In a case reported by Sammartino *et al.*, involving fusion of both upper central incisors, surgical sectioning was carried out, and both teeth were restored with all-ceramic crowns after orthodontic alignment and endodontic treatment.^[27] In another case of geminated central incisors, esthetic rehabilitation was carried out using all ceramic crowns for both the incisors.^[2] However, in this case report, a conservative approach using IPS e-max press veneer (Ivoclar Vivadent AG, Schaan, Liechtenstein) was carried out.

In a case reported by Samimi *et al.*, a new lateral incisor tooth was fixed between the fused teeth (maxillary central and lateral incisors) and the canine using fiber-reinforced composite resin, after creating space by stripping the fused teeth. The contours of the teeth were designated by lines made with a thin tapered bur and restored with composite veneering. The pink composite was used to mimic gingival papillae between teeth.^[28] However, in this case, the MRI was made to appear like two teeth by veneering with IPS e-max tooth colored and gingival ceramic, instead of pink composite. The contours of the divided teeth that constituted the MRI were designated using the Adobe Photoshop software.

The groove that persists lingual to the MRI may be susceptible to caries and periodontal disease.^[2,7,8,29-31] However, since the groove was found to be shallow, periodic topical fluoride application and maintenance of oral hygiene should be sufficient to prevent caries or periodontal disease. The patient is on a follow-up schedule every 6 months and has been asymptomatic for over 2 years.

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Conflicts of interest

There are no conflicts of interest.

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