Management of Fused Two Mandibular Incisors In The Same Quadrant With Space Closure: Case Report

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Abstract—A twelve-year-old Filipino female presented to the Orthodontic Clinic with fused mandibular central and lateral incisors and an impacted canine, all on the right side, and severe crowding in both arches. Fixed appliance therapy was employed to align the buccally located maxillary right and left permanent canines and the mandibular right canine, and to close the space created by the extraction of the fused mandibular incisors. Various treatment options were presented and discussed.

Index Terms—Fused teeth; Orthodontic; treatment; Space closure.

I. INTRODUCTION

Fusion and gemination are both terms which describe ‘double teeth’. In gemination the arch has a full complement of teeth. Fusion, in contrast, describes a developmental anomaly associated with one missing tooth in the arch. Either condition can arise in the deciduous or permanent dentitions, be complete or incomplete, and have fused or separate pulpal canals. [1-2]. Fused teeth are generally asymptomatic. Fusion is more often unilateral rather than bilateral and can cause esthetic impairment when present in an anterior segment due to the larger dimension and irregular morphology of the tooth. Furthermore, fusion may adversely affect the occlusion, giving rise to deviation on opening and closing, and may cause delayed or ectopic eruption of the permanent dentition. [3-4] Reports of fusion involving molar and premolar teeth are rare. [5-7].

The incidence of tooth fusion in the primary dentition has been reported to range from 0.5% to 2.5%. Its prevalence in the permanent dentition appears to be lower.[8] Chalakkal and Thomas reported that fused teeth may give rise to, or contribute to existing space problems, occlusal disturbances, and delayed eruption of permanent successors. In light of this, they emphasized the need to closely monitor such cases.[9] The etiology of fusion remains uncertain. One theory derives from the influence of physical forces that pressure adjacent developing teeth into close contact. [2] Hereditary and racial factors, and trauma have also been implicated as possible contributing factors.[3] The management of fused primary teeth includes endodontic intervention, restoration - with or without separation, and extraction.[10]

A review of the literature reveals difficulty in correctly differentiating between fusion and gemination. Detailed radiographic and clinical examinations are needed for a differential diagnosis between these anomalies. Further, Dhindsa et al 2013 reported a very rare unilateral occurrence of an anomalous, primary mandibular first macro-molar formed by fusion with a dysmorphic premolar like supernumerary tooth in deciduous dentition period and concluded that Instead of agenesis of succedaneous tooth, the double tooth has been succeeded by normally developing mandibular first premolar in the same region.[11] The patient in this case report was a twelve-year-old female with fusion of the lower right permanent central and lateral incisors who underwent Orthodontic treatment for space closure.

II. CASE REPORT

A twelve-year-old Filipino female presented complaining of an unattractive smile. Her medical history was unremarkable and no evidence of the same dental problems in her family members.

Clinical Examination

Extra-oral examination revealed a symmetrical, proportionate, oval face with a convex profile, competent lips, and acute nasolabial angle (Fig. 1).

Intra-oral examination revealed that the patient was in the early stage of permanent dentition. From a sagittal perspective the molar relationship was Angle Classification Class 1 with a normal over jet and a reduce overbite.

The mandibular arch was parabolic in shape and, except for third molars and the permanent right canine (Impacted), all other teeth were present. The permanent right central and lateral incisors were fused. The permanent second molars were partially erupted; third molar buds were not visible radiographically (Fig. 2).

Fig 1. Pretreatment-extraoral view

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Radiographic Examination
Cephalometric analysis revealed a skeletal Class II relationship, a steep mandibular angle, deficient chin, and bimaxillary protrusion (Fig 3).

The orthopantomogram confirmed the presence of all permanent teeth except for the third molars, which is to be expected given the patient’s age (Fig 4).

Treatment aims:
The treatment goals were to correct the skeletal relationship while maintaining an Angle’s Class I molar relationship, over jet and overbite, to correct the midline, align the teeth in both arches, and achieve sound intercuspation.

Following the discussion of several treatment options with one of the parents, a decision was made to treat with a straight wire orthodontic appliance and extraction of the fused lower right central and lateral incisors, and maxillary first premolars bilaterally, followed by space closure in the mandibular incisor segment. Before starting the treatment, a consent form was signed.

Treatment progress:
Mandibular arch: 0.022 slots MBT brackets were bonded to the lower arch. A lower lingual holding arch was cemented into place to maintain the space gained following extraction of the fused incisors. This space was utilized for the eruption of the impacted lower right permanent canine tooth and to correct the mesial inclination of the lower left permanent canine (Fig. 5).

0.016 nitinol was used for the first leveling arch. Subsequently, the patient was referred for extraction of the fused lower right central and lateral incisors. Once the lower right canine had fully erupted and aligned, the sequence of arch wires was 0.016 SS followed by 0.018 SS. An open coil spring was used to move 32 and 31 medially to create space for the correction of the mesially inclined 33, and to allow for the repositioning of 32 in the site of 31, and 31 in the site of 41 (Fig. 6).

Following realignment of 33 and the complete eruption of 43, a 0.016 x 0.022 contraction arch with Bull loops was ligated and activated to retract the lower incisor segment. This was done in order to close the residual spaces mesial to 43 and 33, and also to normalize the over jet and overbite (Fig 7).

Maxillary arch: A combined trans-palatal and Nance holding arch was cemented into place to maximize the benefit of the space created by the extractions. 0.022 slot MBT brackets were bonded to the upper arch. 0.016 nitinol leveling arch wire was inserted. The patient was referred for extraction of teeth 14 and 24. Figure eight ligature wire extending from 12 to 22, 15 to 16, and 25 to 26 was ligated to guard against intrusion of the premolars and anterior segment while pulling down the buccally displaced permanent canines.
bilaterally.

Once both canines were aligned, the sequence of arch wires was 0.016 SS, 0.018 SS, 0.017 x 0.025 nitinol, and finally 0.018 x 0.025 TMA (Fig 7.).

![Fig 7. Bull loop in lower arch to close extraction space in incisor segment+ lower lingual arch.](image1)

Finishing was done with a 0.017 x 0.025 nitinol arch wire and finalized with 0.018 x 0.025 TMA (Fig. 8)

![Fig 8. Releveling and alignment of both arches.](image2)

Upon completion of treatment, and following de-bonding, a maxillary Hawley retainer, and a mandibular vacuum retainer were given along with instructions (Fig 9,10,11).

![Fig 9. Extraoral view after debonding](image3)

![Fig 10. Intraoral view after debonding](image4)

![Fig 11. Cephalogram and Orthopantomogram after treatment, lower left second molar not fully erupted.](image5)

### III. DISCUSSION

Dental fusion and gemination are terms used to define two different morphological dental anomalies, both of which are characterized clinically by a wider tooth. The differentiation between these two anomalies is challenging, as the literature reports.[12] Information derived from the case history along with clinical and radiographic examination contributes to the differential diagnosis of this abnormality. Fusion arises from the incomplete attempt of two tooth buds to fuse into one resulting in one less tooth in the arch. Gemination, on the other hand is the result of the incomplete effort of one tooth bud to divide into two, with no resulting deficit in tooth numbers.[13] A comprehensive understanding of the etiology, pathogenesis, and various treatment options for this condition will contribute to success in treatment. Conventional intraoral periapical radiographs are routinely used to assess root canal morphology, but their inherent limitations render them of limited value in the management of complex cases. Additional information regarding the teeth and surrounding tissues can be gained by computerized tomography (CT) or cone beam computed tomography (CBCT) technology. Hence, accurate diagnosis can be established.[14] Both fusion and gemination can give rise to an esthetic deficiency attributable to the wider dimension and irregular morphology of the resulting tooth. A gminated maxillary incisor requires complex multidisciplinary treatment to preserve health and restore esthetics.[3]

There exist different approaches for the management of fused and gminated central incisors. However, the esthetic outcome is typically the main determinant in deciding whether to retain or extract the affected teeth.

One treatment option is extraction followed by approximation of the adjacent teeth, with or without crowning.[15] Selective grinding is a possibility in some cases.[14] Another option is to extract the affected teeth and replace the missing dentition with an interim removable partial denture until the patient attains eighteen years of age, at which time a definitive replacement in the form of a fixed partial denture (bridge) or implant supported crown can be
considered.\[16,17,18\] A further treatment option would be to extract the affected teeth and apply an activated orthodontic contraction loop arch wire, ending with two mandibular incisors and closure of the extraction space.

Retaining the fused or geminated teeth may be the best option where the nature of the case contraindicates any other options.\[19\] Upon completion of treatment, the patient was kept under retention by means of a maxillary Hawley, and mandibular vacuum formed retained. The patient was instructed to wear the retainers continuously throughout the first year, except when eating or drinking hot liquids. This was reduced to nocturnal usage in the second year. Others have reported placing a fixed bonded retainer in the mandibular arch to guard against any relapse.

Schneidera and Mosera stated: “to our knowledge, no case report about orthodontic closure of two adjacent extraction spaces in the same quadrant has been published” \[20\]. Thus, this case is the second such report for publication.\[20\] Overall, the best approach to the management of such cases will depend upon the level of knowledge and skill of the treating orthodontist. Effective teamwork involving multiple disciplines will lead to the greatest chance of success.

IV. CONCLUSION

The present case report was the second submitted for publication. A comprehensive understanding of the etiology and diagnosis of fusion and gemination is mandatory. A multi-disciplinary approach involving restorative, prosthodontics, surgical and orthodontic input is necessary. This case was managed orthodontically by the application of simple frictionless orthodontic straight wire treatment mechanics. Esthetic and functional goals were achieved and these met the expectations of both patient and parents.

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