รายงานผู้ป่วย
Case Report

การรักษาในระยะเริ่มแรกของฟันตัดซี่กลางคุดรุนแรงในแนวขนานและฟันตัดซี่ข้างคุดตามขวางในขากรรไกรบนข้างเดียวกัน

ศุภชัย เลิศนิมูลชัย* คีท ก็อดฟรีย์ เรวดี เลิศนิมูลชัย*****

บทคัดย่อ

รายงานผู้ป่วยนำเสนอขั้นตอนการรักษาฟันตัดบนคุดของฟันตัดซี่ข้างบนคุดตามขวางและฟันตัดซี่กลางบนที่อยู่ข้างเคียงคุดรุนแรงในแนวขนานในผู้ป่วยเพศหญิงอายุ 8 ปี 9 เดือน หลักการรักษาประกอบไปด้วยทันตกรรมสหสาขา ได้แก่ ทันตกรรมจัดฟัน ศัลยศาสตร์ช่องปาก ปริทันตวิทยา และความร่วมมือที่ดีของผู้ป่วย ผลการรักษา มีความสวยงาม การบดเคี้ยวใช้การได้ดี และสภาวะเยื่อปริทันต์ปกติดี

คำสำคัญ: ฟันคุดในแนวขนาน ฟันคุด ฟันหน้าบน ฟันคุดตามขวาง

Early Treatment of Unilaterally Severe Horizontally Impacted Maxillary Central and Transversely Impacted Lateral Incisors

Supachai Lertnimulchai* Keith Godfrey Rewadee Lertnimulchai*****

Abstract

This case report records the sequential management of a transversely impacted lateral incisor and adjacent severe horizontally impacted central incisor in a Thai girl aged 8 years and 9 months. The treatment protocol consisted of multidisciplinary management, combining orthodontics, surgery, periodontics and good patient's compliance. The treatment resulted in good esthetics and function, and good periodontal health.

Key words: Horizontally impacted, Impacted teeth, Maxillary incisors, Transversely impacted

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* ทันตแพทย์เอกชน : จังหวัดหนองคาย และจังหวัดอุดรธานี ประเทศไทย
** รองศาสตราจารย์คลินิกอาคันตุกะ ภาควิชาทันตกรรมจัดฟัน คณะทันตแพทยศาสตร์ มหาวิทยาลัยขอนแก่น
*** ทันตแพทย์เอกชน : จังหวัดหนองคาย และจังหวัดอุดรธานี ประเทศไทย
* D.D.S., M.Sc in Orthodontics, F.R.C.D.T. Private orthodontist in Nong Khai and Udon Thani, Thailand
** AM, MDS, Dr Dent. Visiting Clinical Associate Professor, Department of Orthodontics, Faculty of Dentistry, Khon Kaen University
*** D.D.S., Certificated in Endodontics Private practice in Nong Khai and Udon Thani, Thailand

Introduction

The definition of impaction is tooth retention due to an obstacle in the eruption path or ectopic position of the tooth buds[1]. Using data of Hou et al, a calculated prevalence among 8,912 child and adolescent Chinese was approximately 1.09% for maxillary central incisors and 0.38% for lateral incisors[2]. The available data did not take account of the possibility of isolated subjects having more than one incisor impaction. Kafle et al found 1.8% prevalence of impactions of maxillary central incisors among Nepalese orthodontic patients[3].

Although the process of normal tooth eruption remains unclear[4], local and systemic conditions are related to tooth impaction. Common local factors associated with impacted teeth include physical obstructions such as adjoining supernumerary teeth, odontome, malposition of the developing permanent tooth from early childhood trauma, scar tissue such as with repaired cleft lip, and dilacerations[1,5]. Root dilacerations are occasionally associated with tooth impactions and with history of previous local dento-alveolar trauma[6-8]. There was the possibility of either of the patient's incisors being dilacerated following early trauma, or minor dilacerations as a consequence of disturbance to remaining root development during orthodontic retrieval of the teeth[5-8].

Management of two complicated impacted maxillary incisors in one patient is a challenge because the treatment protocol requires orthodontics combined and extended multi-surgical exposures and excellent patient compliance. Early intervention before completion of tooth development where possible is preferred because of its potential benefits of retaining the tooth with as close as possible to normal dento-alveolar support and normal dento-facial esthetics[9-21].

The surgical exposure method is required for artificial eruption. The window exposure or excisional gingivectomy is proper for the impaction near the top of the alveolus with wide attach gingiva, where the apically positioned flap is used for narrow gingival[5,22]. The closed surgical technique is the choice for the impaction in the middle of the alveolus or higher, close to the nasal spine[5,22].

This case report presents the sequential management of two unilaterally impacted maxillary incisors: a transversely impacted of lateral incisor and a severe horizontally impacted of central incisor in the early mixed dentition.

Case report

Diagnosis and etiology

The mother of a Thai girl, age 8 years 9 months, complained about non-eruption of her child's maxillary right central and lateral incisors. The mother said that a previous orthodontist had suggested removing the two impacted incisors but she wanted to retain and correct the malpositions of the unerupted teeth. The patient was healthy. She had history of trauma to the maxillary primary incisors when she was 4-5 years old. The panoramic radiograph (Fig 1) showed a mixed dentition with horizontal impaction of her maxillary right central incisor in a high position near the floor of her nose and a transversely impacted maxillary right lateral incisor obstructing eruption of the central incisor. There is the likelihood of impaction of both maxillary canines because of dental arch crowding.

Figure 1. Pre-treatment panoramic radiograph.

The clinical examination showed an Angle Class I occlusion, a straight profile, normal anterior facial height, normal nasolabial angle, and unerupted maxillary permanent right central and lateral incisors (Fig 2). The space was sufficient for eruption of both maxillary incisors (Fig 2). There was dental caries of #64, #65 and # 84 teeth.

Her diagnosis was a horizontal impaction of maxillary right central incisor, a transversely impacted maxillary right lateral incisor and the likelihood of impaction of both maxillary canines. The etiology of maxillary incisors impaction may relate to her history of trauma to the maxillary primary incisors.

Figure 2. Pre-treatment facial and intra-oral photographs.

Orthodontic treatment objectives

The treatment objectives were to (1) maintain space for both maxillary incisors to erupt, (2) induce the impacted lateral incisor to move to its appropriate position, (3) induce the impacted central incisor to move to its appropriate position, and (4) gain space for maxillary canines.

Treatment alternatives

Immediate orthodontically-assisted tooth eruption should be the first alternative treatment because of evidence of its potential benefit in retaining the incisors[9-21]. However, in cases of a central incisor with horizontal position and great displacement, the parents should be informed of the possibility of alternative treatments, including removal of the impacted tooth in case there is failure of assisted eruption, necessitating artificial tooth replacement[1]. The treatment options were explained to the parents and it was decided to try to retain and align both impacted teeth. Firstly, the closed surgical exposure method[5,22] was applied for correcting the maxillary right lateral incisor to remove its obstruction to eruption of the maxillary right central incisor. Surgical-assisted eruption of the maxillary right central incisor was then evaluated after the maxillary right lateral incisor was seated to proper position.

Treatment progress

A "2 x 3" fixed appliance (2 molar bands, 2 bonded left incisors and one bonded right first permanent premolar) was used initially to maintain space, while facilitating eruption of the both impacted incisors. Three months later, after anterior teeth of maxillary arch leveling with a 0.018-in Australian stainless steel wire, the oral surgeon surgically exposed the maxillary right lateral incisor (Fig 3) and a button with ligature wire bonded to its labial surface by the orthodontist (author) with following mucosal flap closure leaving the ligature wire protruding through the oral mucosa. Orthodontic extrusion by elastomeric chains was started three weeks later. When the maxillary right lateral incisor became sufficiently exposed the button was replaced with a standard bracket converting to a "2 x 4" fixed appliance. The maxillary right lateral incisor was moved into normal position in another 5 months using a 0.014-in copper nickel-titanium wire

Figure 3. Closed surgical exposure of maxillary right lateral incisor was performed.

Figure 4. Progressive panoramic radiograph.

Figure 5. Closed surgical exposure and button bonded with ligature wire on maxillary right central incisor was performed.

Figure 6. After elastomeric chains extrusion in four visits, the crown of maxillary right central incisor was partially exposed in oral cavity.

Figure 7. Progressive panoramic radiograph after elastomeric chains lasting four visits.

Figure 8. After a small incision was performed to uncover the labial surface of maxillary right central incisor.

as an overlay (piggy-back) arch on the 0.018-in Australian stainless steel main arch wire. The patient was also referred for a panoramic radiograph (Fig 4). This progress radiograph showed the maxillary right central incisor had spontaneously moved downward from its initial position (Figs 1, 4).

One month later, surgical exposure with closed surgical technique for the maxillary right central incisor was performed by the oral surgeon and button with ligature wire bonded to the labial surface of incisor by the orthodontist (author) (Fig 5), followed by mucosal flap closure, leaving the ligature wire protruding through

9 A 9 B

Figures 9. A. The maxillary right central incisor was moved its correct position in 9 months after surgical assistance.
B. The periapical film at the end of treatment.

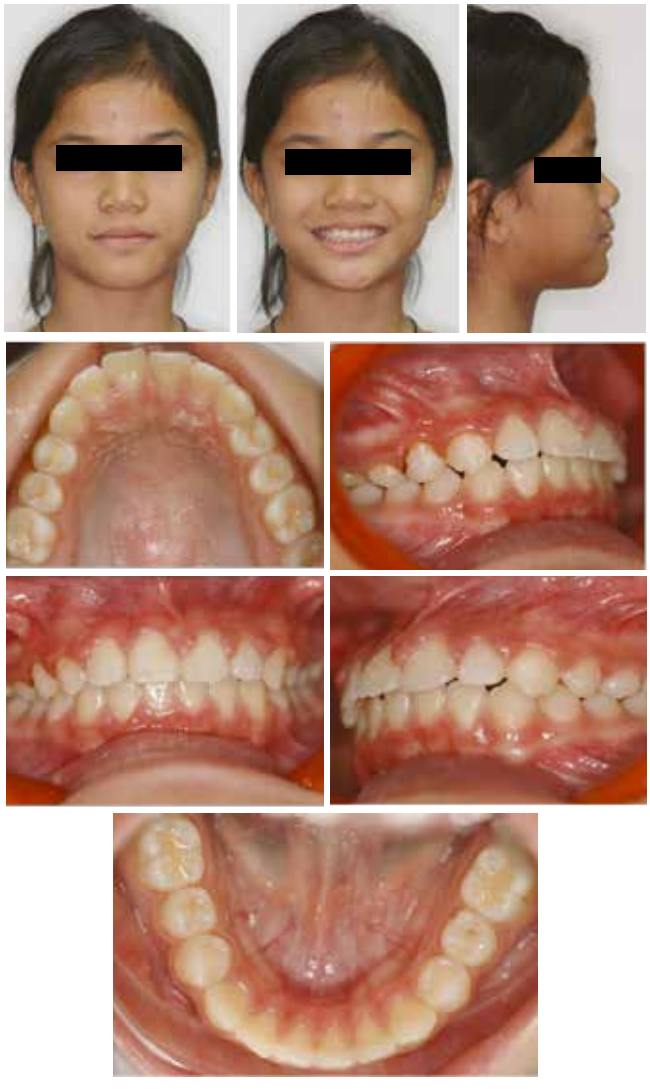

Figure 10. Post-treatment facial and intra-oral photographs.

oral mucosa. The orthodontic extrusion of the incisor by elastomeric chains to the ligature wire was started after two weeks. After four visits, the crown of the maxillary right central incisor was partially exposed (Fig 6). The patient was then sent for another panoramic radiograph. This radiograph showed the impacted right central incisor had changed to a vertical position (Fig 7). Then a small incision was performed to uncover the labial surface (Fig 8) and the button was replaced with a standard bracket converting to a "2 x 5" fixed appliance. The maxillary right central incisor was then moved to its planned position in 9 months (Fig 9 A- B) using elastomeric chains and piggy-back arch wires. The finishing arch wire was 0.019×0.025-in stainless steel.

The total active treatment period with the "2 x 5" fixed appliance was 19 months. Because of the likelihood of impaction of both maxillary canines, the parent wanted to retain appliances until all maxillary succedaneous teeth eruption. Nine months later, with all maxillary succedaneous teeth fully erupted, the "2 x 5" fixed appliance was removed. The patient had gingival hyperplasia due to plaque deposit in the cervical region of the maxillary incisors and was referred to the periodontist for appropriate care (Fig 10-13). The patient was suggested to wear a maxillary wraparound retainer at least two years.

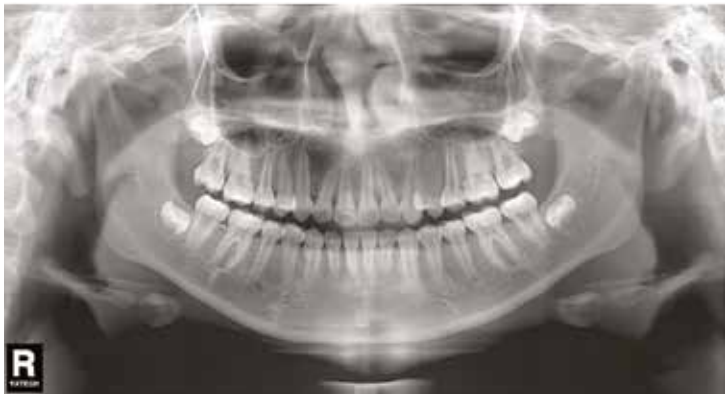

Figure 11. Post-treatment panoramic.

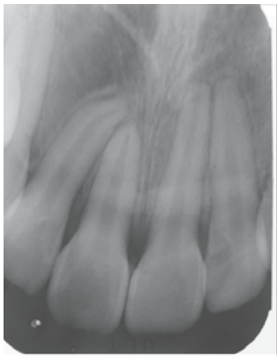

Figure 12. Post-treatment periapical film.

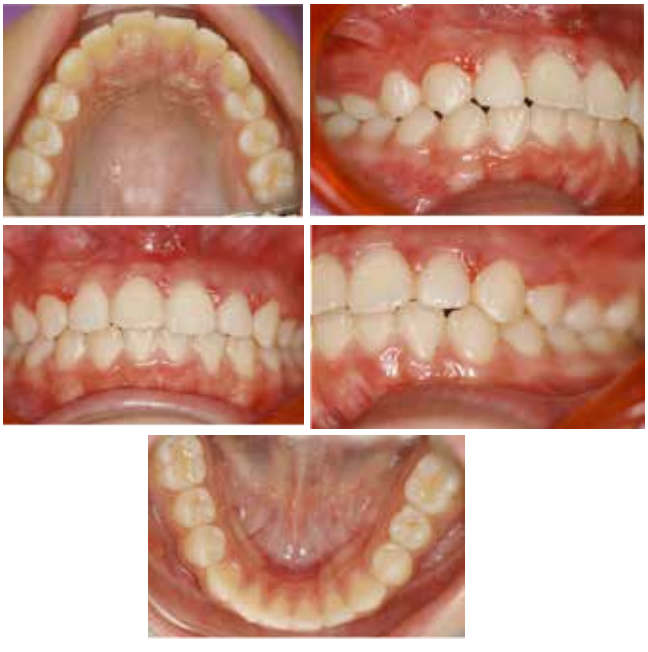

Figure 13. One week post-treatment intra-oral photographs after periodontal appropriate care.

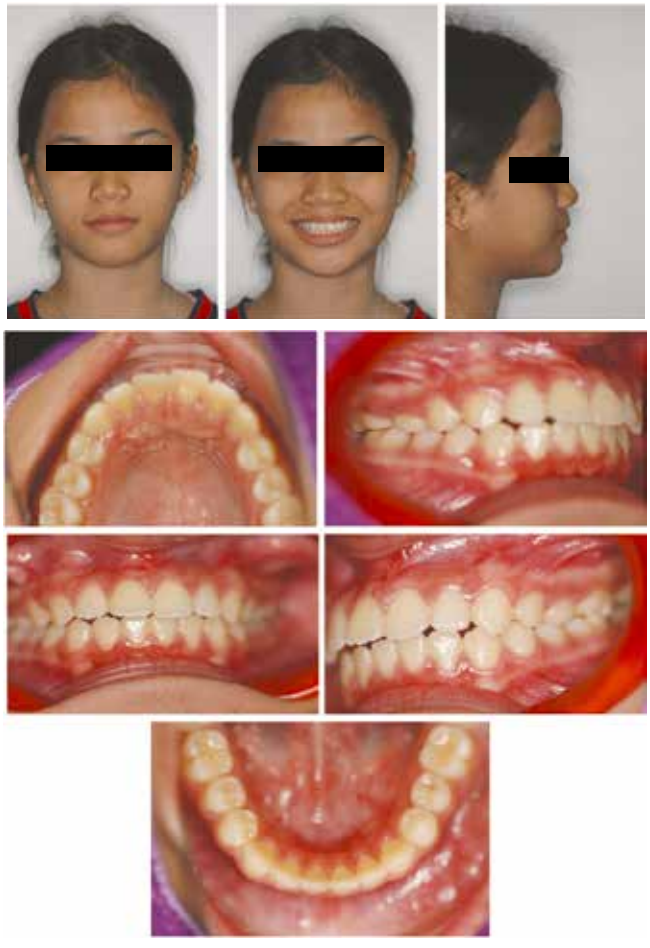

Figure 14. Facial and intra-oral photographs 1 year after treatment.

Treatment results

The maxillary right central and lateral incisors were successfully aligned in proper positions. Simultaneously, maxillary canines erupted in normal positions. The periapical film of maxillary right central incisor showed slightly shorter but otherwise normal root compared with the adjacent incisor and maxillary right lateral incisor had slight curvature towards its root apex which might be considered a dilacerations (Fig 12). Periodontal evaluation showed acceptable gingival contour and adequate width of keratinized attached gingival tissue (Fig 13).

One year after active treatment, the facial and intra-oral photographs showed stable results (Fig 14). The panoramic and periapical films showed no side effects on neighboring teeth and their surrounding

Figure 15. Panoramic and periapical films 1 year after treatment.

tissues (Fig 15). The periodontal condition was good without any gingival recession on maxillary right central and lateral incisors.

Discussion

There have been numerous published reports demonstrating successful retrieval of one impacted incisor[9-21]. But reports of simultaneous treatment of two impacted and displaced incisors for a young patient similar to the conditions in this case report were not found. The treatment protocol would be more difficult and complicated than for one impacted tooth. It may require a longer treatment time and have many risks such as pulp obliteration[13], nonvital pulps[15,18], root resorption[20], ankylosis and loss of periodontal attachment[23-24]. However, the prognosis of tooth impaction depends on the position and angulation of impaction, degree of root formation, and the space for eruption of impacted tooth[9,25]. In this patient, the prognosis of maxillary right lateral incisor was good, while the prognosis of maxillary right central incisor was less certain due to a horizontally position and close to floor of nose requiring more surgical trauma interventions[25].

Spontaneously eruption of an impacted incisor tooth after obstruction removal has been reported in the literature[26-27], but mostly with vertical impactions and only with obstructions in the way of normal eruption. In this patient, the horizontal impacted maxillary right central incisor showed some spontaneous movement downward after the obstructive effect of the maxillary right lateral incisor was moved to its proper position (Figs 1,4). The possible explanation of the spontaneously downward movement of horizontal impacted maxillary right central incisor may relate to provision of a better eruption pathway following movement of maxillary right lateral incisor.

In this present case, the chronological age of lateral incisor at initial treatment was almost 9 years. There are possibly 2 years for continued root formation until age 11 years[28-29], with more root lengthening as seen in the present case (Fig 7). This might be the reason for slight curvature towards the root apex of the lateral incisor during it's repositioning, and thus be considered as a minor dilaceration. The extruded central incisor showed only possible root shortening, but no dilacerations (Fig 12).

The closed surgical exposure technique is the treatment of choice for the tooth that is impacted in the middle of the alveolus or higher, close to the nasal spine[5,22]. This technique also provides natural tooth eruption and produces the best esthetic and periodontal results[30-32]. Both impacted teeth in this report were treated with the closed surgical exposure technique. The careful surgical procedure was intended to minimize bone loss to enable preservation of normal gingival attachment as the tooth erupted. Achieving

favorable outcomes for such young patients requiring repeated surgeries depends on careful patient-clinician-parent counseling.

Most reports of treatment of horizontal maxillary incisor impactions have recommended bonding the attachment on the palatal side to avoid excessive labial bone removal[9-14,16-20]. Some authors reported two stages of surgical crown exposure because of need to change from initial palatal to later labial bonding[9,19]. In this patient, after surgical exposure with minimal tissue removal, labial surface bonding could be performed thus avoiding repeat of surgical crown exposure.

Various attachment types to tie with ligature wire have been used, such as bracket[9,12], pin[10], tube[11,19], button[13-14,16,18,20-21], drilling a small a holing the incisor[15], a twist-flex with drop-shaped[17.] A button was used as the bonded attachment in this patient because it has wide bonding area and is easy to tie with ligature wire.

Orthodontic treatment in mixed dentition often requires the modified with "2 x 4" fixed appliance[9,12,14,21]. It is advantageous for a child since it dosen't require compliance during use, apart form maintaining oral hygiene. To obtain the sufficient anchorage, bonding to right first permanent premolar and first permanent molars were used in this patient. In the present patient, the orthodontic extrusion force was performed using an elastic chain with a stiff arch wire (0.018-in Australian wire). The 0.014-in copper nickel-titanium wire overlayed onto a stiff arch wire was continued for tooth alignment[15-16,20-21]. The overlay arch wire technique was a simple and effective method to align an impacted incisor.

This patient with two complicated maxillary impacted incisors was treated with orthodontically induced tooth eruption in the early mixed dentition. The closed surgical eruption combined with modified "2 x 4" fixed appliance achieved a stable occlusion and good periodontal health. The facial esthetic was restored without any artificial teeth replacement.

Conclusion

A multidisciplinary approach in the early mixed dentition for combined correction of a severe horizontally impacted central incisor and a transversely impacted lateral incisor for a child patient produced the satisfactory results; good esthetics and function and good periodontal health.

Early intervention, appropriate surgical exposure method, effective orthodontic traction and careful patient-clinician-parent counseling are importance for satisfactory outcome.

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