DENTINO
JURNAL KEDOKTERAN GIGI
Vol VIII. No 1. March 2023

MULTIDISCIPLINARY APPROACH OF IMPACTED PERMANENT MAXILLARY LEFT CENTRAL INCISOR AND CANINE (CASE REPORT)

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ABSTRACT
Background: The permanent maxillary canines have significant incidence of impaction, being the most affected teeth after the third molars, while impacted maxillary insicor is the third most commonly impacted tooth. **Objective:** This case report is about a multidisclipinary orthodontic treatment of 12 years old female with chief complaint of unerupted anterior upper teeth**. Case:** A case with unerupted of permanent maxillary left central incisor tooth and permanent maxillary left canine tooth, with Angle Class 1 molar relation and crowded of mandibular teeth. Panoramic and occlusal radiograph showed impacted 21 tooth with severely root dilacerations and impacted 23 tooth in palatal and horizontal position. **Case Management:** The patient was treated with Edgewise technique. Surgical approach was applied 3 months after levelling and unravelling stage to extract 21 tooth due to its severely root dilaceration and to bond lingual button on palatal side of 23 tooth. Orthodontic traction of impacted 23 tooth was applied a week after being exposed to the position of 21 tooth. Thirteen months after traction, 23 tooth was totally erupted and need 8 additional months to reach its final position. The crown of 23 was reshaped with porcelain fused to metal crown and 63 tooth was left still and got conservative treatment with composite. **Conclusion:** Orthodontic traction and reshaping of impacted 23 tooth was succeeded to replace the position of 21 tooth with good occlusion and esthetic. Based on OPG after treatment, all teeth were in good root paralleling. The patient was satisfied with good occlusion and esthetic.

Keywords: *Impacted maxillary canine, Impacted maxillary incisor, Root dilaceration, Orthodontic treatment, Surgical exposure*
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INTRODUCTION

Impaction refers to total or partial lack of eruption of a tooth well after the normal age of eruption. An impacted tooth may result due to variety of reasons such as inadequate space, some physical barrier like bone, mucosa, retained deciduous tooth, supernumerary tooth etc. in the eruption path or lack of eruptive force. Normally tooth erupts when root length reaches threefourth of its final length.[1] Maxillary permanent incisors have a major role in facial esthetics. Impacted maxillary insicor is the third most commonly impacted tooth.[2] Impaction of them has great adverse effect on smile and causes serious concerns in patient and parents. Physical barriers (e.g., overretained primary teeth, supernumerary teeth, and pathologic lesions), space problems, developmental abnormalities, altered eruption sequence, trauma, palatal clefts, and genetics can act as etiologic factors. Currently, the conventional technique to treatment of impacted teeth consists of a combined orthodontic and surgical approach, to guide the impacted teeth in a constant position and surrounded by normal hard and soft tissues. Treatment is challenging because of some limitations such as patient's age, cooperation, anchorage, and mechanotherapy possibilities.[3]

Multiple factors are responsible for impaction. In this literature, the most commonly reported etiological factors were divided into two groups: local and systemic causes.[1] Acccording to Becker, The causes of impaction can be classified into 4 distinct groupings: local hard tissue obstruction, local pathology, departure from or disturbance of the normal development of the incisors, and hereditary or genetic factors.[4]

The permanent maxillary canines have significant incidence of impaction, being the most affected teeth after the third molars. The impaction of the canine is more common in the maxilla, palatally with unilateral trend.[5] Four factors to assess of the impacted maxillary canine are: (1) overlap of incisor, (2) vertical height, (3) angulation, and (4) position of apex.[6] According to Alhammadi[7], the difficulties of managed impacted canine based one canine angulation and the vertical position while females showed significant difficulty regarding dental midline and incisors irregularity or crowding of incisor segment. Patients with impacted canine must be treated with comprehensive treatment. The orthodontist must considered treatment option, which is surgical exposure and orthodontic treatment to bring the teeth into a normal occlusion.

The purposes of this case report was multidisciplinary approach of impacted teeth 21 and 23 at the upper jaw and mild crowding in lower jaw. Odontectomy of impacted 21 tooth was decided due to its severely root dilaceration and the position was blocking the traction of 23 tooth to the occlusal plane. The impacted 21 tooth has severe root dilaceration with approximately 90 degrees of dilacerated root has chosen to be extracted because it was difficult to apply orthodontic traction. Another reason was the position of impacted 23 tooth was closedly with the root of 22 tooth, it might cause root resorption of 22 tooth if orthodontic traction was applied. The permanent maxillary left canine tooth was decided to replace the position of 21 tooth, reshaped its crown with porcelain fused to metal crown. Any extracted teeth might cause alveolar bone loss. The alveolar bone becomes thinner and deficient during healing process after extraction. All that problems must be anticipated after extraction of impacted 21 tooth. The porcelain fused to metal crown was chosen because of its strength and economic reason. The overretained primary maxillary left canine tooth was maintained and reshaped using composites.

The treatment planning were: (1) levelling and aligning in both arch, (2) gaining a space between 11-22 teeth, (3) odontectomy of tooth 21 (4) surgical exposure of the impacted tooth 23 (5) orthodontic traction of tooth 23 (6) reshaping 63 tooth.

CASE

A girl, aged 12 years old came to the Orthodontics Department Faculty of Dentistry, University of Airlangga with chief complaint absence of her upper anterior teeth. The patient feels unconfidence during smile due to its gap in her front teeth.sd

An extraoral examinations shows a straight profile type, ovoid face type and mesocephalic head type. Patients have a symmetrical face shape and competent lips (Figure 1).

Figure 1. Extraoral photographs before treatment

Intraoral examination showed normal mucosal tissue, tongue and palate. The dental arch was crowding on the right and left maxillary posterior teeth and mild crowding on anterior mandibula. On the upper jaw showed diastema between 11 – 22 teeth, overretained 63 tooth, absences of 21 and 23 teeth. (Figure 2).

Figure 2. Intraoral photographs before treatment

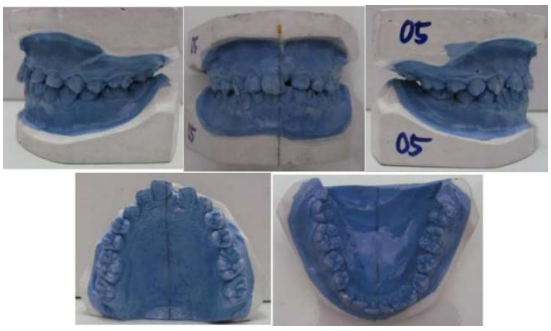

Figure 3. The pre-treatment study model

Panoramic radiograph examination showed impacted of 21 and 23 teeth, tooth germs of 18, 28, 38 and 48 (Figure 4). Occlusal radiographic examination showed impacted left permanent central incisors with a position that was not sufficiently clear and the impacted left permanent maxillary canines located horizontally and palatally with dilaseration of the roots (Figure 5.a).

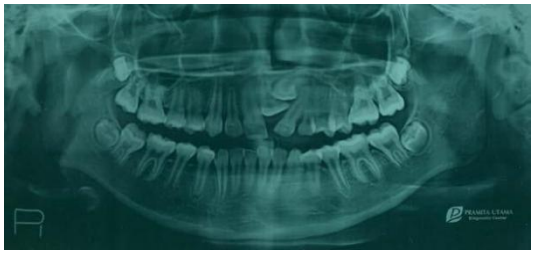

Figure 4. Panoramic radiograph photos before treatment showed 30^0 angulation of impacted 21 to the midline

Periapical radiographic photos clarifies the shape of left permanent maxillary central incisors tooth with severely dilaseration (approximately 90 degress of root dilaceration). The cusp of the left permanent maxillary canine was located distal to the left permanent maxillary central incisor and the crown has passed through the mesial side of the root left permanent maxillary lateral incisor tooth (Figure 5.b).

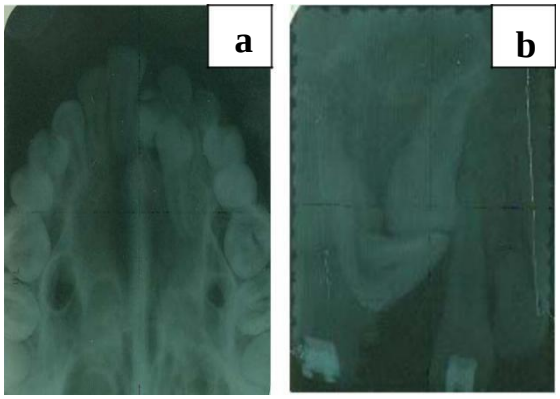

Figure 5. a. Occlusal radiographic photograph before treatment b. Periapical photograph before treatment showed the severely dilacerated impacted 21 and angulation of impacted 23 less than 31^0 to the midline

Cephalometric Analysis

The mesognati face type with a straight face profile (∠ FH-NP 85º, ∠ NAP 6º). The relationship of the maxilla and mandible to the cranium base shows skeletal class I relationship (∠ SNA 83º, ∠ SNB 80º, ANB 3º and Wits appraisal AO-BO : -4 mm) with the normal inclination of maxillary incisors and retrusion of mandibulary incisors (∠ I-NA 22,8º, ∠ I-NB 20,3º). Steiner's soft tissue analysis showed that lips located exactly on S-line.

CASE MANAGEMENT

Orthodontic treatment began with insertion of 0.018 inch (3M Unitek) standard edgewise slot bracket on the upper and lower jaw. Levelling, aligning and gaining space between 11-22 teeth were performed. Four months after active treatment, the space between 11-22 teeth was achieved, followed by odontectomy of 21 tooth and surgical exposure of impacted 23 tooth.

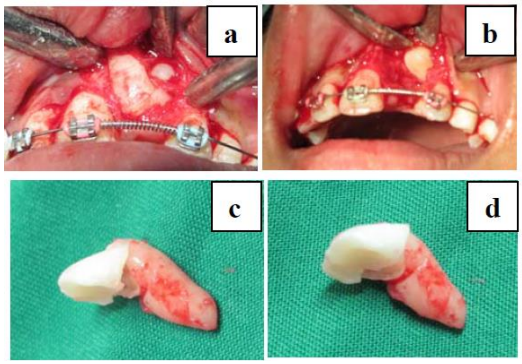

Figure 6. (a) Odontectomy of 21 tooth, (b) surgical exposure of 23 tooth, (c and d) dilacerated 21 tooth showing 90 degrees of dilaceration

A week after surgery, orthodontic traction was perfomed on 23 tooth with light force. The permanent maxillary left canines considered to replace the position of 21 tooth. On periapical radiographic photographs before treatment showed the crown of 23 tooth has passed through the mesial of the apical root of the left permanent maxillary lateral incisor tooth.

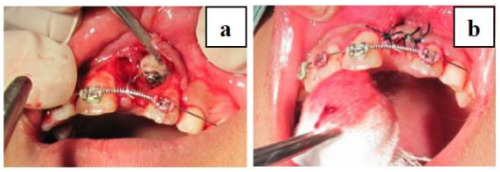

Figure 7. (a) Lingual button was bonded on palatal 23, (b) flap closure.

The lingual button was bonded to the palatal crown of 23 tooth followed by flap closure (closed surgical exposure method) (Figure 7a and 7b). A week after surgical exposure, orthodontic traction was applied to retract 23 tooth to the occlusal plane. Six months after orthodontic traction, periapical radiographic photograph were taken during the treatment and showed good progress. The left permanent maxillary canine tooth almost succeeds in penetrating the gingiva. The root and lingual button were in good condition.

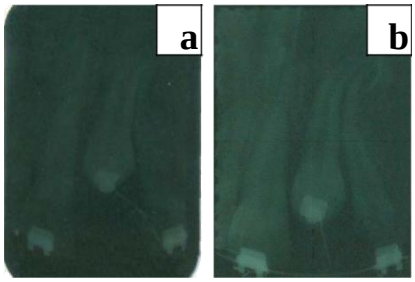

Figure 8. Periapical radiographic photographs during treatment were taken 2 and 4 months after orthodontic traction of impacted 23 and showed good root apex of 22 without any resorption.

Eight months after, the crown of left permanent maxillary canine has merged to gingival mucosa, followed by bracket placement on labial surface of 23 tooth followed by orthodontic traction of 23 tooth to the occlusal plane (Figures 9).

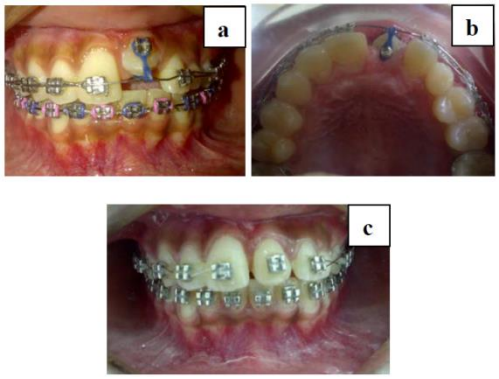

Figure 9. Intraoral photographs during the treatment (a). Bracket placement; b. Lingual button in palatal 23; c. 23 was already replace the 21 position

After 23 tooth has replaced 21's tooth position in good inclination and angulation, 23 tooth got conservative treatment to reshape its crown. The passive stage performed for 3 months after, followed by reshaping the left primary maxillary canine tooth with composite restoration to get a better aesthetic and occlusion before debonding the brackets.

Figure 10. Intra oral photographs after orthodontic treatment

Total treatment was finished in 2 years and 9 months. The final results of treatment were achieved. The left permanent maxillary canine was succed to replace 21's tooth position and reshaped 23 tooth with porcelain fused to metal crown.

DISCUSSION

The case showed a possibility of multidisciplinary approach of impacted 21 and 23 teeth. Impacted 21 was extracted followed by surgical exposure of impacted 23 tooth. The root of impacted 21 tooth on this case showed severely root dilaceration (approximately 90 degrees of dilaceration root), the decision was taken to extract impacted 21 tooth and replace it with 23 tooth. The extraction of the impacted teeth could be performed if only the root is severely dilacerated.[8]

Figure 11. Extraoral photographs after orthodontic treatment

Composite restoration was performed in 63 tooth for aesthetic and good occlusion. Crowding in both jaw were corrected and overall treatment obtained ideal occlusion and esthetic (figure 10).

Figure 12. Panoramic radiographic photograph after orthodontic treatment

Soft tissue profile was good and the smile was better (figure 11). Panoramic radiographic photograph after treatment showed good root paralleling (figure 12). Cephalometric analysis before and after treatment is also showed in table 1.

Table 1. Cephalometric analysis before and after treatment.

Variable	Before Treatment	After Treatment
FH-NP	85	82
NAP	6	7
SNA	83	83
SNB	80	80
ANB	3	3,6
Wits Appraisal AO-BO	-4	-1
1-garis NA	22,8	24,8
1-garis NB	20,3	28,3
Rickett's Lip Analisis	Upper lip 2 mm behind line E	Upper lip 1 mm behind line E
	Lower lip 1 mm in front of line E	Lower lip 0 mm in front of line E

Impacted teeth with mild dilaceration teeth can be treated, and dilacerated tooth was showed in 23 tooth. Singh et al reported that mild dilaceration impacted teeth (approximately 30 degrees of dilaceration root) can be treated successfully with surgical exposure and orthodontic traction.[8] Periapical radiograph also showed the position and angulation of impacted 23. The root of 23 tooth has passed palataly and mesialy of the root 22 tooth. The impacted 23 tooth than retracted to space of extracted 21 tooth. Based on Neena et al, if the impacted tooth is extracted, loss of alveolar bone must be anticipated. Following the healing period, the alveolar ridge becomes thinner and deficient[9], with all these disadvantages, retracting impacted 23 tooth was one of best option for this case. Another reason was because of apical root of 22 is too close to the crown of 23 tooth. According to Aslan, if the canine is in close proximity to the incisor roots and a buccally directed force is applied, then it will contact the roots of adjacent teeth and may cause damage.[10] Another reason was the angulation of impacted 23 tooth was less than 31^0 respectively to the midline. The determination of prognosis by calculating the angulation of the long axis of the canine toward the midline orthopantomogram (OPG) that exceeds 31° will reduce the chance of spontaneous eruption.[11] The best option of this case was retracting 23 tooth in position of 21 tooth. During the development, the crowns of canines are close to the roots of lateral incisors. Early correction of the root position in maxillary lateral incisor with distal tipping and flaring might either cause the impaction of canines or root resorption of lateral incisors.[12]

Orthodontic and surgical exposure are the best choice for impacted teeth management to bring these impacted teeth into proper position because its benefits in long-term esthetic, function, and stability.[2] Before surgical exposure to canine, space must be sufficient to provide access so that orthodontic movements can be immediately applied.[13]

In this case the surgical exposure, orthodontic traction and conservative treatment were the best options for the patient. Based on the duration of treatment, the combination of surgical exposure and orthodontic traction methods proved effective. This case was finished in 2 year and 9 months. The overall treatment time to move an impacted canine back to its place in the dental arch may vary. Treatment duration is related to the age of the patient. After puberty, it usually takes longer due to the greater mineral density of the bone tissue.[14]

Orthodontic traction performed using elastic chain or elastic has been shown to be effective in moving impacted teeth into the correct jaw arch. This is in accordance with the results of the study which showed that elastic use for impacted tooth traction recommended compared to ligature wire.[15] The reason of choosing porcelain fuced to metal crown because of its strength and esthetic result and still become the choice of crown replacement in many situations.

This case report was successfully reported a of impacted 21 tooth with severely root dilaceration an impacted 23 tooth with mild dilaceration. The impacted permanent maxillary left canine was successfully replacing 21 tooth's position. Porcelain fused to metal crown was perfomed to 23 tooth. At the end of treatment, patient was satisfied with good occlusion and better smile.

REFERENCES

1. Singh N, Bagga D, Gupta P, Singh R. Orthodontic management of Impacted Teeth: An overview. Indian Journal of Orthodontics and Dentofacial Research. 2017;3(2):59-63.
2. Noorollahian S, Shirban F. Chair time saving method for treatment of an impacted maxillary central incisor with 15-month follow-up. Dent Res J. 2018;15:150-4.
3. Olivia Jennifer Gunardi, Coen Pramono Danudiningrat, Andra Rizqiawan, Indra Mulyawan, M. Subhan Amir , David Buntoro Kamadjaja, Ni Putu Mira Sumarta, Ganendra Anugraha, Reza Al Fessi, Liska Barus, Shigehiro Ono. Decision-Making Criteria of Odontectomy or Surgical Exposure in Impacted Maxillary Canine Based on Treatment Difficulty Index Modification. Eur J Dent. 2022;16:796–802.
4. Becker A, Chaushu S. Etiology of maxillary canine impaction: a review. Am J Orthod Dentofacial Orthop. 2015;148(4):557-67
5. Nakandakari C, Gonçalves JR, Cassano DS, Raveli TB, Bianchi J, Raveli DB. Orthodontic Traction of Impacted Canine Using Cantilever. Case Rep Dent. 2016;4386464:6.
6. Jain S, Raza M, Sharma P, Kumar P. Unraveling Impacted Maxillary Incisors: The Why, When, and How. Int J Clin Pediatr Dent. 2021;14(1):149-157.
7. Alhammadi MS, Asiri HA, Almashraqi AA. Incidence, severity and orthodontic treatment difficulty index of impacted canines in Saudi population. J Clin Exp Dent. 2018;10(4):327–334.
8. Singh N. Impacted Central Incisor with Dilacerated Root-Treat with Ease. J Clin Diagn Res. 2016;10(3):07–J08.
9. Neena IE, Edagunji GC. Management of Impacted Maxillary Central Incisor and Supernumerary Tooth: Combined Surgical Exposure and Orthodontic Treatment- A Case Report. JSM Dent. 2014;2(2):1026.

10. Hsu, Yu-Cheng; Kao, Chia-Tze; Chou, Chih-Chen; Tai, Wen-Ken; and Yang, Po-Yu. Diagnosis and Management of Impacted Maxillary Canines. Taiwanese Journal of Orthodontics. 2019;31(1):04-11.
11. Aslan BI, Üçüncü N. Clinical Consideration and Management of Impacted Maxillary Canine Teeth. Electronic Journal of General Medicine. 2019; 16(5):465-500.
12. Al-Abdallah M, AlHadidi A, Hammad M, Dar-Odeh N. What factors affect the severity of permanent tooth impaction?. BMC Oral Health. 2018; 18(01):184.
13. Manne R, Gandikota C, Juvvadi S, Rama H, Anche S. Impacted canines: Etiology, diagnosis, and orthodontic management. J Pharm Bioallied Sci. 2018;4(2):234–238.
14. Cruz RM . Orthodontic traction of impacted canines: Concepts and clinical application. Dental Press J Orthod. 2019; 24(1):74–87.
15. Spuntarelli M, Cecchetti F, Arcuri L, Testi D, Melone P, Bigelli E, Germano F. Combined orthodontic-surgical approach in the treatment of impacted maxillary canines: three clinical cases. Oral Implantol (Rome). 2016;8(2-3):63-7.