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CASE REPORT

Management of Unilateral Maxillary Canine Impaction

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ABSTRACT

Maxillary canine is an essential part of teeth for smile esthetic and function. Orthodontic treatment for patient with impacted maxillary canine is considered to be more complex and require good biomechanical control during traction. This case report describes an orthodontic treatment of a 17-year old female patient with unilateral maxillary canine impaction on the left side. Orthodontic traction was used to guide the canine into normal occlusion. The orthodontic treatment had been completed within 19 months and successfully obtained favourable esthetic and stable occlusion. *Taiwan Journal of Orthodontics 2021;33(1):26–32

Keywords: Tooth impacted; Maxillary canine; Orthodontic traction

1. INTRODUCTION

Being the last tooth to be developed through the longest path of eruption, the maxillary canine has the highest incidence of impaction after third molar.1 The incidence has been reported to have range between 0.92 – 2.2%.2,3 Furthermore, impacted maxillary canine normally occurs two times more in women than man.4 Reports stated that majority of maxillary canine impaction occurs unilaterally5 at which most of the cases (50% - 85%) are palatally displaced.5

The etiologies of impacted canine are believed due to multifactorial and idiopathic origins.6 However, there are several theories proposed as potential etiological factors; for example, prolonged retention or early loss of deciduous canine, absence or anomaly of upper lateral incisors, local obstruction, pathology, and genetic factor.1,7 Early diagnosis and timely interception provide better prognosis to manage the impacted canine.

The treatment is considered extremely challenging due to the potential adverse sequelae of impacted canines, including resorption of adjacent roots, referred pain, infection, dentigerous cyst formation, and resorption of the affected tooth.4,7 However, the maxillary canine plays an important role of esthetic and guidance of occlusion, thus the treatment priority is to preserve canine into its position.8 In this case report, we present a case of palatally impacted canine in a 17-year old female patient and was treated using a preadjusted edgewise system.

2. CASE REPORT

2.1. Clinical Examination

A 17-year old female patient came to orthodontic clinic with chief complaint of missing canine on her upper left side and irregularly arranged upper and lower front teeth.

Extra oral examination revealed a good facial profile (Figure 1). The intraoral examination presented full permanent dentition except upper left maxillary canine. Clinical examination showed bulging on palatal between upper left lateral incisor and first premolar. The upper and lower teeth are mildly displaced with maxillary dental midline deviated 1 mm to the left side and mandibular dental midline deviated 0.5 mm to the right side of her facial midline. There was also mild incisor proclination with an overjet of 4 mm. The canine...
relationship was Class I on the right side and the molar relationship was Class I on both sides (Figure 2).

Based on vertical parallax technique, the location of impacted tooth was confirmed on the palatal side (Figure 3). The prognosis of the impacted tooth was also assessed according to the reference of previous study by Mc Sherry and Counihan et al. Panoramic radiograph showed the canine was angulated $40^{\circ}$ to midline, left canine was not overlapping with the adjacent lateral incisor, crown of the canine was located in the cervical of lateral incisor and the apical of the canine was located between lateral incisor and first premolar. In brief, the impacted canine had a good prognosis of traction (Figure 4).

The cephalometric analysis presented Class I skeletal relationship with mild bimaxillary prognathism and proclination (Figure 5 and Table 1).

2.2. Diagnosis

The 17 years old female patient was diagnosed as Class I malocclusion with upper left canine palatally impacted.

2.3. Treatment Objectives

- To achieve alignment of the impacted canine into the upper arch
- To correct maxillary and mandibular midline in line with facial midline
2.4. Treatment plan

- Levelling and aligning upper and lower arch
- Midline correction and opening space for the impacted canine
- Traction of the impacted canine
- Releveling and realigning the upper arch
- Finishing
- Retention

2.5. Treatment Progress

An active orthodontic treatment was begun with preadjusted edgewise appliance with 0.022" MBT bracket. Levelling and aligning were performed on both arches. After 6 months treatment, consolidation of upper arch was finally done, followed by placing an open coil spring between left premolar
phases were performed (Figure 7). Finishing and
detailing were carried out with bending and settling
elastics. The active treatment had successfully been
completed within 19 months.

2.6. Treatment Result
The palatally impacted canine was properly
aligned in the maxillary arch by orthodontic traction. Ideal overjet and overbite were also achieved. Class I canine and molar relationship with a functional occlusion were established (Figures 8 and 9). The panoramic film demonstrated root parallelism was achieved with minimal root blunting (Figure 10). The cephalometric radiograph analysis and superimposition have shown no significant change in skeletal and dental parameter (Figures 11 and 12). In addition, the patient was suggested to use essix retainers for retention phase.

| Table 1. Cephalometric measurements in before and after treatment. |
|-------------|---------|---------|
| SNA         | 81 ± 3⁰ | 87⁰    |
| SNB         | 78 ± 3⁰ | 85⁰    |
| ANB         | 3 ± 2⁰  | 2⁰     |
| Angle of Co | 0 ± 10⁰ | 6⁰     |
| SN-MP       | 32 ± 3⁰ | 30⁰    |
| MMPA        | 27 ± 4⁰ | 23⁰    |
| Interincisal angle | 135 ± 10⁰ | 122⁰ |
| UI-SN       | 104 ± 6⁰ | 114⁰ |
| UI-PP       | 109 ± 6⁰ | 120⁰ |
| LI-MP       | 90 ± 4⁰  | 95⁰    |
| Upper lip - E line | 1 ± 2 mm  | 0 mm   |
| Lower lip - E line | 0 ± 2 mm  | -1 mm  |

Figure 6. Traction of the impacted canine.

Figure 7. Piggyback of the impacted canine.
Figure 8. The extraoral photographs after treatment.

Figure 9. The intraoral photographs after treatment.

Figure 10. Panoramic radiograph after treatment.
3. DISCUSSION

The etiology of palatally displaced canine is obscure. Several theories have been proposed to explain the etiology of palatally impacted canine at which guidance and genetic theories are the most commonly accepted reasons. Guidance theory states that insufficient distal aspect of the root on lateral incisor or agenesis of lateral incisor will result to a lack of guidance for permanent canine to erupt. On the other hand, genetic theory highlights the multiple genetic factors which could be responsible for palatal impaction. Other possible etiologies which are related for palatal canine impaction are systemic conditions, including cleft lip and palate, Pierre Robin syndrome, endocrine deficiency, and environmental factors, such as local obstruction, early loss of primary canine, displacement of the permanent tooth. In this case, premature loss of deciduous canine could be the reason of inadequate space for canine eruption and the canine becomes palatally displaced.

There are three diagnostic methods for impacted canine: inspection, palpation, and radiography. Whether it locates buccally or palatally, the canine bulge should be seen between the lateral incisor and first premolar. Abnormalities or agenesis of lateral incisor could also indicate a higher risk of canine impaction. In addition, the deciduous canine mobility should be observed to prevent any prolonged retention of the tooth. Clinical palpation of the canine bulge from age of 8 years old is...
recommended by previous study as it was proven to bring significant benefit for determining canine position. In addition, radiographs are required to locate the impacted canine in three dimensions and detect any root resorption. Parallax radiographic techniques or cone beam computed tomography have been commonly recommended in the diagnosis of impacted canine case.  

Assessment towards the position of impacted canine to determine its prognosis should be performed before starting the orthodontic treatment. There are four conditions that should be examined which are horizontal overlap of canine towards lateral incisor, vertical height of canine tip, angulation of impacted canine, and apical origin of impacted canine. In this case, those four criteria assessments have shown a good prognosis of canine position. Considering this finding, we decided to choose orthodontic traction of the impacted tooth. Prior to traction, adequate and enough space to accommodate canine eruption must present. Since palatally impacted canine seldom erupts without surgical intervention, orthodontic treatment usually includes surgical exposure. However in our case, the canine tip emerged through the gingiva after there was a sufficient space, therefore the attachment could be bonded on impacted teeth without any surgical intervention. Both anchorage planning and biomechanics during orthodontic treatment hold an important role in treating impaction cases. In this case, the palatally impacted canine was ligated piggyback on a .017 × .025 inch SS arch wire. The attachment in its labial surface was repositioned into more cervical for several times to apply more vertical force line that encouraged the canine erupted labially and occlusally. The force should be light, less than 2 oz.  

According to the treatment result, the cephalometric analysis revealed only a small proclination that is insignificant in skeletal and dental parameters. The orthodontic treatment was completed in 19 month and successfully obtained favourable esthetic and stable occlusion.

4. CONCLUSION

Maxillary canine impaction is a common case in orthodontics. Through a combination of clinical and radiographic diagnosis and careful planning of orthodontic biomechanics, the palatally impacted canine treatment will give an esthetic and functionally stable results.

ETHICAL APPROVAL

This study was approved by the Institutional Review Board of Faculty of Dentistry Universitas Indonesia.

PATIENT CONSENT

Provided.

Conflict of Interest Statement

The authors declare no conflicts of interest.

REFERENCES