Surgical management of bilateral horizontal mandibular canine impaction: case report

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ABSTRACT

Introduction: Mandibular canine impaction is one of the most complex dental anomalies. The low incidence rate of mandibular canine impaction resulted in the unavailability of guidelines for managing impacted mandibular canines, especially bilateral horizontal cases. This case report describes a surgical procedure in managing bilateral horizontal mandibular canines impaction. **Case report:** A 14-year-old girl with bilateral horizontal mandibular canines impaction was referred from the orthodontics department. The orthopantomograph (OPG) radiograph showed there was a bilateral horizontal mandibular canine impaction near premolars' root apices. The patient went for surgical removal in general anesthesia for the impacted canines. Odontectomy was performed by separating the tooth into several fragments. A three month follow-up showed there was no post-operative complaint. **Conclusion:** Odontectomy of bilaterally impacted mandibular canines can be done to avoid interference with orthodontic treatment.

Keywords

bilateral, horizontal, canine impaction, odontectomy, oral surgery

Penatalaksanaan kasus impaksi kaninus bilateral horizontal mandibula secara bedah: laporan kasus

ABSTRAK

***Pendahuluan**: Impaksi kaninus bilateral mandibula adalah salah satu bentuk kompleksitas kelainan gigi. Insidensi yang rendah pada kasus impaksi kaninus bilateral mandibula menyebabkan ketiadaan petunjuk untuk penatalaksanaan bedah pada kasus yang serupa, terutama pada kasus bilateral. Laporan kasus ini bertujuan mendeskripsikan prosedur pembedahan pada kasus impaksi kaninus bilateral mandibula. **Laporan kasus:** Perempuan berusia 14 tahun dengan impaksi kaninus bilateral mandibula dirujuk dari departemen ortodonsia. Radiografi panoramik menunjukkan terdapat impaksi kaninus bilateral dengan tipe horizontal, berdekatan dengan ujung akar premolar. Pasien dilakukan ekstraksi gigi impaksi kaninus dalam anestesi umum dengan metode pembelahan gigi menjadi beberapa fragmen. Kontrol tiga bulan selanjutnya menunjukan tidak terdapat keluhan pasca operasi. **Simpulan:** Odontektomi pada kasus impaksi kaninus bilateral mandibula dapat menjadi opsi untuk mencegah gangguan dalam perawatan ortodonti.*

Kata kunci

impaksi kaninus, bilateral, horizontal, odontektomi, bedah mulut

INTRODUCTION

Impacted canines refer to teeth that cannot emerge into the dental arch in the proper position. Bilateral impaction of canines refers to the abnormal positioning of canines on both the right and left sides of the dental arch. This condition is frequently associated with other dental anomalies, such as crowing and poor teeth alignment. Impacted canines, usually followed by odontoma, cysts, and other lateral incisor deformities as the etiology, is one of the most complex dental anomalies.[1] The incidence of impacted mandibular canines is relatively lower than its maxillary counterpart.[2] A study found that the incidence of maxillary canine impaction was about 2.8 percent, and mandibular canine impaction was about 1.8 percent.[3] According to a systematic review and meta-analysis of prevalence studies in 2018, the overall prevalence of impacted mandibular canines is around 2.3% in the general population. The prevalence varies significantly in different age groups, gender, and ethnicity.[4]

Impacted mandibular canines are more commonly observed in adolescents and young adults than children or older adults. The peak age range for impacted mandibular canines is 10-20 years old.[5] The incidence of impacted mandibular canines is higher in females than males, with a male-to-female ratio of 1:1.8, but another study found no gender differences. The prevalence of impacted mandibular canines varies significantly among different ethnic groups. A higher prevalence has been reported in Asian populations compared to Caucasian and African populations.[6] The lower left canine is more commonly impacted than the lower right canine in most populations.[7] Another study found that impacted mandibular canines are more commonly seen in individuals with a class II malocclusion, and that a history of previous orthodontic treatment is also a risk factor for impacted mandibular canines.[8] Moreover, the incidence of bilateral impacted mandibular canines is even lower than unilateral impaction. According to a systematic review and meta-analysis by Wang et al.[9] the global incidence of bilateral impacted mandibular canines ranges from 0.9 to 5.5% in the general population. Thus, based on studies with substantial population sizes, guidelines regarding managing bilateral impacted mandibular canines are challenging to find.

Untreated impacted canines could result in complications involving surrounding tissues. It could result in tooth malposition, internal resorption, dentigerous cysts, and infection caused by partially erupted teeth. In addition, external resorption of lateral incisors due to impacted canines is expected, with an incidence rate ranging from 38 to 66.7%.[10] The treatment options for bilateral impacted canines include orthodontic treatment, exposure and bonding, surgical removal, and surgical repositioning. The choice of treatment depends on the case's severity, the impacted tooth's position, and the patient's preferences.[11] Ideally, orthodontic treatments are indicated to tract impacted canines into their position in the dental arch. However, complex orthodontic treatments with unfavorable impacted canine positions are prone to complications, resulting in more extended treatments, and are relatively costly. Furthermore, orthodontic traction on impacted canines has a drastically higher failure rate in patients older than 20.[12]

Surgical removal is one of the options for the treatment of impacted canines. This technique can be performed when retention is not feasible and other treatment methods are unavailable.[13] The procedure involves the creation of a flap, removal of the bone tissue covering the impacted teeth, and extraction of the teeth from their sockets. In some cases, the teeth may need to be sectioned into smaller fragments for easier extraction. Although the procedure has several benefits such as improved oral health and facial aesthetics, it also presents several challenges. A sound surgical technique is needed to prevent the risk of trauma and damage to the adjacent tooth following surgical tooth removal.[14] The incidence of mandibular canine impaction is relatively low compared to maxillary canine impaction, whereas bilateral horizontal mandibular canine impaction (Mupparapu type 4) is harder to find. This study aimed to explanation a case about managing bilateral horizontal mandibular canine impaction in a young girl.

CASE REPORT

A 14-year-old girl was referred to the oral and maxillofacial surgery clinic by an orthodontist for extraction of the right and left mandibular canines. The patient had previously been in orthodontic treatment and planned to install lower jaw brackets after removing the mandibular canines. The reason for canine removal was the possibility of the teeth interfering with the orthodontic treatment, evaluated by an orthopantomogram (OPG) radiograph (Figure 1).

Previously, the patient had no complaints in the oral cavity related to the impacted teeth. History of toothache and swelling was denied. History of systemic diseases and allergies was also denied. In the intraoral examination, teeth number 33 and 43 did not erupt. On palpation, bulging was found on the labial mucosa around the root of 32-34 and 42-44. The diagnosis of this case according to Mupparapu's classification[1] is type 4 impacted canine because it is in horizontal position and near premolars' root apices. The patient was planned for surgical removal of 33 and 43 in general anesthesia and the prognosis in this case is favorable. One year later, the findings of the follow-up examinations revealed no complications.

Figure 1. OPG radiograph showed bilaterally impacted mandibular canines.

A cone-beam computed tomography (CBCT) radiograph examination was taken to establish the diagnosis (Figure 2). The result showed that 33 and 43 were impacted horizontally, with some parts of the crown penetrating the buccal cortical bone. The crown of 33 was impacted close to the apical of 34, with the apical leading to the lingual end of 32. The crown of tooth 43 was impacted apically close to tooth 44, with the apical lingual tip located at the apical of tooth 42.

There are some classifications of impacted canine, according to Mupparapu, mandibular canines impaction might be classified into five different types: Type 1 the impacted canine is in a mesioangular position across the lower midline; type 2 when the affected canine is in a horizontal impaction position near the lower mandibular border and below the incisor's root apical; type 3 the canine erupts either mesial or distal to the canine of the opposite side; type 4 the impacted canine is in a horizontal impaction position near the mandibular lower border and below the molars or premolars' root apices of the opposite side, and lastly type 5 is in a vertical position on the lower midline but with its long axis crossing it.[1]

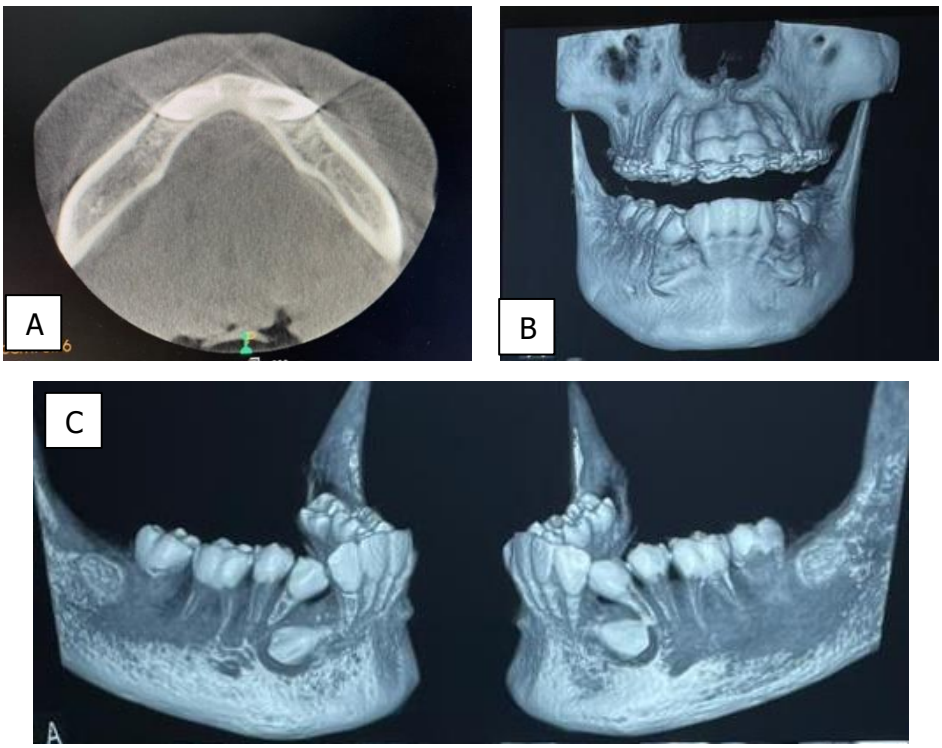

Figure 2. CBCT radiograph examination. (A and B) The superior and frontal view showed an opening of the impacted crown to the labial region of the cortical. (C) The lateral view showed contact of the impacted crown with the apical region of the adjacent tooth.

An envelope incision was made starting from the distal of tooth 35 to the distal of tooth 45 using blade No. 15, followed by a reflection of the flap using a dental raspatory. After adequate access was made, the bone surrounding the crown of impacted 33 was removed using a large round bur No. 8 (Figure 3). The crown and the root of the tooth were then separated using fissure bur No. 703. Luxation was performed to remove the

crown and the root of the tooth. The same procedure was performed on tooth 43. Unfortunately for 43, a dental laceration has occurred, which made it challenging to luxate the tooth. The roots were separated several times to reduce the pressure during luxation. The postoperative wound was then sutured using 3-0 Vicryl on each interdental area (Figure 4). The patient was then given antibiotics and postoperative painkillers.

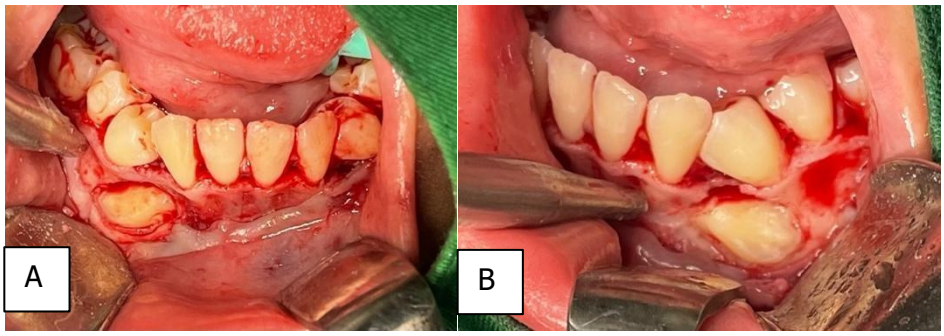

Figure 3. Envelope incision from distal of tooth 35 to the distal tooth of 45, and reduction of the bone to remove the impacted teeth. (A and B)

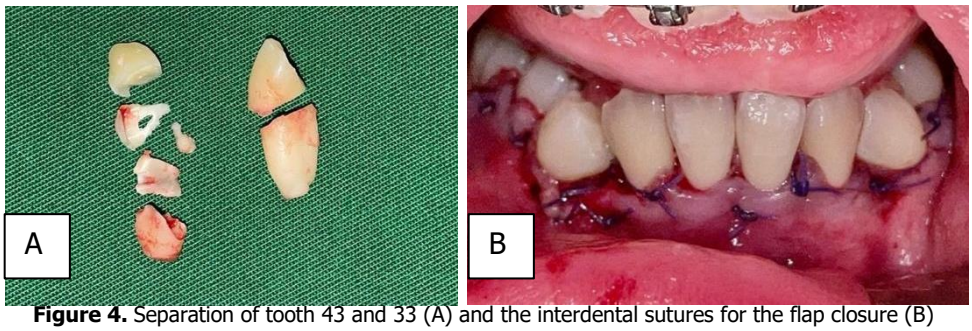

Figure 4. Separation of tooth 43 and 33 (A) and the interdental sutures for the flap closure (B)

By signing an informed consent form, the patient granted the author permission to use photographs and other clinical data linked to this case in a medical publication.

DISCUSSION

The definition of tooth impaction is a tooth that fails to erupt into the arch within the usual time. It happens when there is no adequate dental arch length, where the dental arch length is longer than the alveolar bone arch total length.[15,16] In the general population, the incidence of bilaterally impacted mandibular canines ranges from 0.9 to 5.5 percents.[17] In our case, the impacted canines in both teeth number 33 and 43 were classified as Mupparapu type 4 with the impacted canine in a horizontal impaction position near the mandibular lower border and below the molars or premolars' root apices of the opposite side.[14] Dentigerous cyst is one of the odontogenic cyst that surrounds the crown of an impacted tooth, caused by fluid accumulation between the reduced enamel epithelium and the enamel surface.[17,18] It is associated with an unerupted tooth including third molars, canines, and second premolars.[16] In this case, the patient is still young; we did the extraction of the bilateral horizontal canine impaction because if the procedure is performed at an older age, there is a possibility of the development of a dentigerous cyst around the impacted tooth.[17]

In this case both of the teeth lacked space to erupt in normal place and the germ was formed far from the occlusal plane which makes it become impacted. The impaction of the tooth is primarily caused by a lack of space on the arch for eruption because this tooth erupts later than adjacent teeth. The permanent canines are usually formed at two months of gestation and remain embedded in the jaw for about ten years. The eruption usually occurs after the adjacent tooth has erupted.[18] In late eruption cases, the bone around the tooth germ is completely formed and causes various unfavorable influences for a long time, including pressure from other anatomical structures located in the mandible. In addition, the premature loss of the primary canines may also result in the loss of eruption space for the permanent canines. Many other conditions can also affect the impaction of canines. The position of the tooth germ that is too deep and too far from the occlusal plane has great potential in causing impaction. Even slight germ displacement, rotation, and deviation can cause various types of impaction with the abnormal position.[19]

In this case, the orthodontic exposure procedure is not possible to position the teeth favorably due to the horizontal position of the teeth and their superimposed position with the other teeth. According to the systematic review from Dalessandri[2], only 20 per cent used the orthodontic traction in the management of mandibular canine

impaction and later showed a failure rate of 17 per cent, and 80 per cent used the surgical extraction. Because of that the surgical procedure was chosen to remove the impacted canines. The presence of mandibular canines usually has a great effect on treatment planning options both for the oral and maxillofacial surgeon or orthodontist.[20] Bilateral horizontal mandibular canine impaction is one of the most difficult anomaly cases to treat. Several procedures can be performed for impacted mandibular canines, such as no treatment, surgical removal, exposure with orthodontic alignment, surgical repositioning, and surgical transplantation.[21] There are some limitations and contraindications with surgical exposure and orthodontic treatment, such as ankylosis of the tooth, severe lack of space in the arch, pathologic changes (cyst), and anatomic consideration.[22] However, there are some risks of the odontectomy of canine impaction, such as paresthesia, hemorrhage, pain, bleeding, and swelling.[23]

In this case, due to the unique position of the tooth, where bilateral mandibular canine impaction occurred, we used the envelope flap technique extending from the teeth number 35 to 45 region. According to Bahl[24,25], the incision was made horizontally to get better visual and access, and we did not make a vertical incision at the end of the flap to maximize blood supply at the location where the flap was preserved. The envelope flap was made from teeth number 35-45 region to make the width of the flap adequate, so the operative field is easily accessible. Besides that, a broad and flexible flap can prevent tension and trauma during manipulation. After the flap was properly reflected, the bone around the crown was removed using a round bur to permit the positioning using the elevator. Then, a fissure bur was used to section the crown and the root on the cervical region, then the crown and root were removed using a straight elevator. Finally, as the aftercare of the wound, the flap was repositioned, and interrupted sutures were made in every interdental region.

CONCLUSION

Management of bilateral horizontal mandibular canine impaction must consider the condition of the impacted tooth and its surrounding teeth. In this case, the mandibular canine impaction occurred bilaterally in a horizontal position, overlapping the other teeth, making it impossible for orthodontic treatment to be performed. A surgical removal procedure is a more viable option in managing this case to avoid interference in orthodontic treatment with a good prognosis. It could also be a reference for bilateral horizontal mandibular canine transmigration cases in the future.

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