

Review of Surgical Exposure of Impacted Upper Canine in Complementing Orthodontic Treatment: A Case Report

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Abstract

Surgical exposure is surgery to open the mucosa or alveolar bone that blocks the crown of the permanent tooth impacted. After surgical exposure, it is expected that the teeth can cause eruption usually. Tooth impaction occurs that the tooth is still embedded in the alveolar bone, so it fails to erupt into the mucosa of the mouth. The most often involvement tooth impaction are the upper canine, lower premolar, and third molar. This study aims to perform surgical exposure on impacted upper left canine, and then the canine is pulled into the correct area by fixed orthodontic treatment.

The case report presented was a fourteen-year-old male who came to the clinic complaining of a bulge in the upper left gum, no pain. His appearance was an irregular alignment of teeth that needs to be treated by fixed orthodontics appliances. Treatment applied was surgery exposure of upper left canine as follows, local anaesthesia was given on the patient's mucobuccal fold and palatal gum region upper left canine, which has been impacted. Surgical exposure was done with the closed-eruption technique. A button was then attached on the labial side of the crown upper left canine, which was impacted and hooked with ligature to stainless steel 16x16 archwire. After two weeks, the canine is pulled by power chain into the correct area in fixed orthodontic treatment. Every three weeks, the teeth are activated until the canine is in the proper area. After seven months of treatment, the canine was aligning.

The conclusion is that successful surgical exposure impacted upper left canine treatment by using the appropriate technique and fixed orthodontic appliance to obtain good esthetic and functional results.

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Introduction

Surgical exposure is a surgical action to open the gum mucosa or alveolar bone that blocks the crown of permanent teeth late to eruption or impaction.¹⁻⁵ After surgical exposure, it is expected that the teeth can cause eruption usually.⁶

Surgical exposure technique can be done by making a mucoperiosteal flap around the crown of the impaction tooth and removal the mucosa covering it.² If an alveolar bone covers the impacted teeth, it needs to be disposed of with a special bur for the bone.

Tooth impaction occurs that the tooth is still embedded in the alveolar bone, so it fails to erupt into the mucosa of the mouth.²⁻³ The most often involvement tooth impaction are the upper canine, lower premolar, and third molar.^{1,2,7,8} The cause of impaction can be both pathological and non-pathological. Pathological disorder in impaction teeth due to the presence of ameloblastoma or dentigerous cysts.⁹ Whereas non-pathological disorders can occur due to the thickening of connective tissue, premature loss by extraction of primary teeth.¹⁰ According to Mc Donald, the causes of impact are local and systemic factors. Disorders impaction due to local factors is arch length discrepancy, ankylosis primary tooth, premature loss. Whereas systemic factors such as hypopituitary hormone disorder and hypothyroidism.¹¹

Lack of space is one of the causes of tooth impaction.⁶ Permanent tooth impaction is more than the primary teeth. This condition is

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related to the mixed dentition period. In a mixed dentition period, the upper canine has the most potential to become crowded teeth. This condition is related to the sequence of eruptions in the maxilla.¹¹

Prevalence impacted canine is 1.7% – 4.7%, more common in the maxilla.^{2,5,6,10,12-15} Impacted canine in female 65%, in contrast in male 35%.^{5,16} 65% of impacted upper canines are situated in the palatal area twice that of the labial.^{2,3,6,17} Labial impactions mainly happen due to insufficient space; in contrast, the etiology of impaction palatally is unknown.⁶

Although the prevalence of impacted upper canine is small, the canine tooth has an important aesthetic role because of its unique shape.^{2,7,15,18,19} In addition, many cases are found in females, and it is necessary to manage surgical exposure knowledge well, especially for this case report. Then treatment is continued with a fixed orthodontic appliance.

Case Report and Clinical Intervention

The case report presented was a fourteen-year-old male coming to a clinic who suffered from a bulge in the upper left gum with no pain. His appearance was an irregular alignment of teeth that needs to be treated in fixed orthodontics appliances.



Figure 1. An upper left canine before surgical exposure.

On extraoral examination appears a slightly convex profile, narrow face type, no have temporomandibular joint abnormalities. Intraoral examination upper left canine has not erupted yet.

There was no place for an eruption upper left canine due to the upper left second incisor and the first premolar had been in close contact. Palpate examination shows a bulge in the upper left gum in the region between the upper left second incisor and the first premolar (Figure 1).

The panoramic photo showed the upper left canine in the alveolar bone with a vertical position and slightly rotated to the distal, while the root formation has closed perfectly. Periapical photos show insufficient space for the upper left canine to erupt. The conclusion of clinical and radiological examinations is an upper left canine that undergoes impaction in the labial.

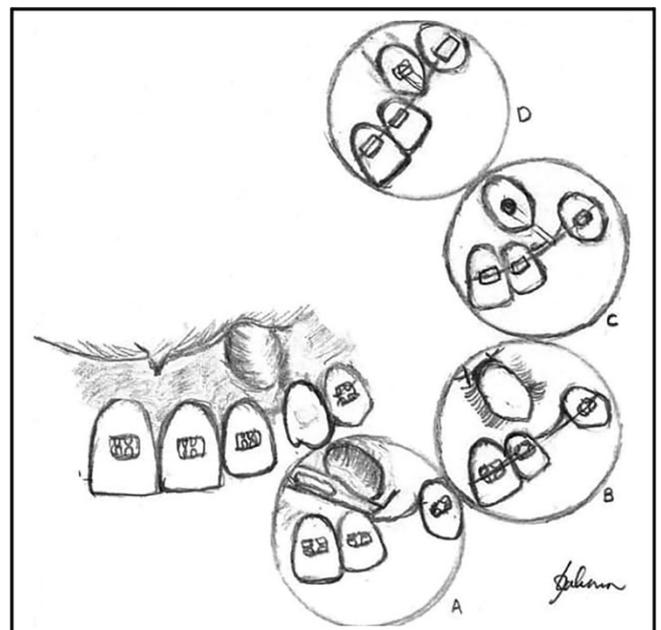


Figure 2. Illustration of the management of surgical exposure.²⁶

In this case, the patient is in orthodontic treatment. After clinical examination, radiological examination, and analysis model were done, an arch length discrepancy of 10 mm was concluded. The first premolar was extracted, then after two weeks of extraction, surgical exposure, and attaching buttons on the surface labial upper canine.^{5,20} Case management of surgical exposure:²⁰ Local anesthesia was given on the patient's mucobuccal fold and palatal gum region upper left canine, which had been impacted. The horizontal incision is carried out 2 mm above the incisal surface upper left canine (Figure 2A), and the flap is opened with a raspatorium (Figure 2B). When the upper left canine incisal has opened, continue with the vertical side. The flap is opened

and re-widened with a raspatorium. Then, remove gums around the labial upper left canine with tissue scissors until the entire surface of the crown upper left canine can open. Next, the gum tissue in the cervical area is formed so that the upper left canine can erupt. Apply the surgical pack on the cervical area's upper-left canine well. Next is attach of the button on the labial surface (Figure 2C). The installation of the button is as follows; the teeth are isolated so that the upper left canine areas are clean and dry, apply etching for 10 seconds, then rinse and dry. Next, apply bonding on the labial of the upper left canine and base button surface, then irradiation for 20 seconds. The patient was given amoxicillin 500mg 3x1 for five days, mefenamic acid 500mg 3x1 for three days, and mouth wash chlorhexidine 0.2%.

After one week, remove the surgical pack, then the button at the upper left canine is drawn using ligature to SS 16x16 archwire. Patients are activated every three weeks for orthodontic treatment, then the button was changed with bracket (Figure 2D). Treatments include alignment, leveling, improvement of dental relationships, space closure, and completion. After seven months of treatment, the position of the upper left canine is already in a proper position (Figure 3).



Figure 3. An upper left canine has occupied the correct position on the dental arch.

Discussion

Tooth impaction is one of the cases found in pediatric dental clinics. If the impaction tooth

occurs in the anterior tooth, patients and their parents often fear it. McDonald's reports that impaction teeth are associated with trauma to the primary teeth during a child's growth and development. In addition, a premature loss is one of the causes of tooth impaction due to the thickening of connective tissue above the teeth remains so that the eruption of teeth is inhibited.¹⁰ In this case, a fourteen-year-old male, experienced an upper impaction canine, but there was no trauma in the primary teeth; there were no complaints of pain. Lack of space is likely a genetic factor of his mother, who experienced anterior crowding. In this case report, the arrangement of irregular teeth, in addition to upper left canine impaction, so that fixed orthodontic treatment is needed.

Surgical exposure complements orthodontic treatments that need to be done on upper canine impaction.^{5,19-21} This surgery can cause the tooth to erupt spontaneously and move following the operator's instructions. The surgical exposure technique used is a closed eruption technique that produces good periodontal tissue conditions around the tooth impact and pleasing aesthetics.^{6,22,23} After surgical exposure was done, a surgical pack applied in the cervical of the upper left canine protects the gums and prevents bleeding. In the closed eruption technique, the gums are adequate around the crown upper left canine, causing good gum contouring and attached gums.^{5,22,23} This technique causes the reintrusion of the tooth that is impacted over a long period.

The installation of buttons on the labial upper left canine helps accelerate eruptions by pulling the upper left canine towards the occlusal. Furthermore, the patient must control every three weeks to activate the upper left canine teeth moving towards the occlusal. After surgical exposure is completed, continued with orthodontic treatment related to root formation completed. Spontaneous eruptions of upper left canine teeth cannot be expected to occur independently, as there is a barrier to erupting.⁶ In this case, the upper left canine ectopics, so to pull the tooth used traction orthodontic tools until in the desired place.

The surgical wound healing process is generally divided into 3 phases: the inflammatory phase, proliferation phase, and remodeling phase.²⁴ The inflammatory phase begins after surgical exposure until days 5-7 post-surgery. In

the inflammatory phase, there is a process of hemostasis and phagocytosis. The proliferation phase begins day 6 – 21 post-surgery. In this phase, fibroblasts produce collagen. The remodeling phase occurs on days 21 to 1 year.²⁴

At the time of control day seven, post-surgical exposure is an inflammatory phase visible redness, edema, and pain when touched in the area post-surgery. Three weeks later, the surgical scars are seen fused, which means the presence of collagen synthesis, which indicates the proliferation phase is underway. After six weeks of control, the area of the former surgery noticed a slight redness in the gums about the upper left canine, which indicates there is still inflammation in the area upper left canine. This matter is related to the activation of the button and the difficulty of cleaning plaque around the upper left canine. So that oral hygiene is not good, as a result of which there is inflammation. After control nine weeks is seen regular gum repair, which is an indicator of the remodeling process.

Surgical exposure treatment is supposed to be successful if the eruption phase has occurred within two years after completion of treatment.²⁵ The success of surgical exposure treatment on upper left canine impaction and activated with orthodontic tools can be good because, in seven months, the upper left canine has occupied the correct position on the jaw's curve.

Conclusions

Successful surgical exposure impacted upper left canine treatment using the appropriate technique and orthodontic fixed appliance to obtain good esthetic and functional results.

Acknowledgements

The article is original, it has never been published before.

Declaration of Interest

The authors confirm that there are no known conflict of interest associated with this publication.

References

1. Cruz RM. Orthodontic traction of impacted canines: Concepts and clinical application. *Dental Press J Orthod.* 2019;24(1):74-87.
2. Pasagic L, Ilic I, Kecman V, Bulajic M, Zubovic N, Glisic B. Combined orthodontic and surgical treatment of impacted maxillary canine in young patient with class II malocclusion: a case report. *Scr Med.* 2020;51(3):209-14.
3. Litsas G, Acar A. A review of early displaced maxillary canines: etiology, diagnosis and interceptive treatment. *Open Dent J.* 2011;5:39-47.
4. Halsnad M, Taylor G, Boyd D, and Pilley R. The dento-osseous distraction method – an innovative technique to manage ankylosed impacted maxillary canine. *Int. J. Oral Maxillofac. Surg.* 2015;44:222-3.
5. Baart JA, Bakker CJ, and Prahl-Andersen B. Therapeutic strategies for impacted maxillary canines. *Ned. Tijdschr. Tandheelkd.* 2000;107(3):419.
6. Vincent GK. Surgical and orthodontic management of impacted maxillary canines. *Am J Orthod Dentofacial Orthop.* 2010;126(3):278-83.
7. Alqahtani H. Management of maxillary impacted canines: A prospective study of orthodontists' preferences. *Saudi Pharmaceutical J.* 2021;29:384-90.
8. Kashmoola MA, Mustafa NS, Qader OAJA, Jamaluddin SA, Noordin SN. Retrospective demographic study on tooth impaction in Malaysian sample. *J Int Dent Med Res.* 2019;12(2):548-52.
9. Agacayak KS, Kose I, Gunes N, Bahsi E, Yaman F, Atilgan S. Dentigerous cyst with impacted canine: Case report. *J Int Dent Med Res.* 2011;4(1):21-4.
10. Impellizzeri A, Horodynski M, Serritell. Uncovering and autonomous eruption of palatally impacted canines—a case report. *Dent. J.*, 2021; 9(6):2-8 DOI: 10.3390/dj9060066.
11. Mc. Donald, R.E., Avery, D.R. *Dentistry for the Child and Adolescent.* 7th ed. St Louis: Mosby. 2000:177, 192-3.
12. Pedro FL, Bandéca MC, Volpato LE, et al. Prevalence of impacted teeth in a Brazilian subpopulation. *J Contemp Dent Pract.* 2014;15(2):209-13. Published 2014 Mar 1. doi:10.5005/jp-journals-10024-1516.
13. Chu FC, Li TK, Lui VK, Newsome PR, Chow RL, Cheung LK. Prevalence of impacted teeth and associated pathologies—a radiographic study of the Hong Kong Chinese population. *Hong Kong Med J.* 2003;9(3):158-63.
14. Rózsa N, Fábíán G, Szádeczky B, Kaán M, Gábris K, and Tarján I. Prevalence of impacted permanent upper canine and its treatment in 11-18-year-old orthodontic patients. *Fogorv. Sz.* 2003; 96:2-7.
15. Baptista J, Kizi G, Alves V. Impacted maxillary canine-clinical case. *Annals of Medicine.* 2018; 50, no. S1, S10-S170.
16. Sambataro S, Baccetti T, Franchi L, Antonini F. Early predictive variables for upper canine impaction as derived from posteroanterior cephalograms. *Angle Orthod.* 2005;75(1):28-34.
17. Luyten J, Grisar K, Opdebeeck H, Jacobs R, Politis C. A retrospective long-term pulpal, periodontal, and esthetic, follow-up of palatally impacted canines treated with an open or closed surgical exposure technique using the Maxillary Canine Aesthetic Index. *Am J Orthod Dentofacial Orthop.* 2020;158(4):e29-e36.
18. Vitria EE, Tofani I, Bhatiar EW. Association of maxillary transverse discrepancy and impacted maxillary canines in patients 10 – 25 years old. Clinical article. *J Int Dent Med Res.* 2016;9(Special Issue):322-8.
19. Hossain M, Mamun M, Haque S. Impacted Maxillary Canines, Premolar and Central Incisor - Surgical Exposure and Orthodontic management. *Bangladesh J. Orthod. Dentofac. Orthop.*, 2013;1(1):24-6. doi: 10.3329/bjodfo.v1i1.15975.
20. Gil PJV, Mateo MM, Tores MP, Alba LM, Gimilio MEI, Puchades RV. The meridian incision: A technical modification in conservative surgery of impacted maxillary canine. *Med Oral Patol OralCir Bucal.* 2008 Jan;13(1):E36-8.

21. Rizvi, H. Chawdhury, Rahman M, and Hossain M. Surgical Exposure of Bilateral Palatally Impacted Upper Canines and Its Proper Alignment with Fixed Appliance in the Dental Arch - A Case Report. *Bangladesh J. Orthod. Dentofac. Orthop.* 2013;19(2):13-5 , doi: 10.3329/bjodfo.v1i2.15985.
22. Bourzgui F, Belhaj S, Tazi H, Hamza M, Khazana M. Surgical-orthodontic management of dental impaction. *Int. Orthod.* 2009;7(3):257-67. doi: 10.1016/S1761-7227(09)73501-6.
23. Nugala B. Kumar BBS, Krishna. Biologic width and its importance in periodontal and restorative dentistry. *J Conserv Dent.* 2012 Jan-Mar; 15(1):12-7.
24. Wallace HA, Basehore BM, Zito PM . Wound healing phases. Statpearl Publishing. 2021. https://www.ncbi.nlm.nih.gov/books/NBK470443/#_NBK470443_pubdet_
25. Schubert M, Proff P, Krischneck C. Successful of multiple bilateral impaction-a case report. *Head Face Med.* 2016;12:24 doi: 10.1186/s13005-016-0122-0.
26. Yohana W. Illustration of the management of surgical exposure. Bandung, Indonesia. 2021. (There is available in Figure 2. Illustration of the management of surgical exposure²⁶)