

Unveiling the Impacted Canine – Eyelet Chain Guide: Concepts and Clinical Application

Abstract

Impaction of canine is frequently encountered clinical problem in orthodontics. Canine usually erupts when two third of the root development is complete. It is considered as impacted if the root development is completed, but unaided eruption is not expected to occur. Surgical exposure of impacted canine and orthodontic traction to align the tooth is a major challenge in which the management requires a multidisciplinary approach. This article presents a case of impacted canine in a 20-year-old female patient. Impacted canine was aligned by orthodontic traction using a modified eyelet attachment and guided eruption without repeated surgical intervention or tissue damage. In the clinical case discussed, the bonding attachment used was a low-profile Begg bracket containing multiple eyelets for varying the force of traction and also to apply force along the long axis of the tooth. An ideal traction force was applied for the adequate period of time thus minimizing the side effects. This method proved to be efficient in maintaining good periodontal and mucogingival health and thus satisfying both esthetic and function goals.

Keywords: Bonded attachment, eyelet chain, impacted canine, orthodontic traction

Introduction

Orthodontic treatment enhances facial esthetics and masticatory function. Impacted canines often appear to be challenging in the management and also in achieving a good esthetic and functional occlusion.^[1] The incidence of canine impaction is the second most common next to third molar. In general, they present an estimated prevalence ranges from 1% to 4%.^[2] Most important etiologic factor is the long path of eruption and arch length tooth size discrepancy.^[3] Clinical diagnosis and radiographic localization play an important role in determining the access for surgical approach and also to accurately apply orthodontic traction forces.^[4]

The treatment of impacted maxillary canines usually requires an interdisciplinary approach. Due to the importance of canine, its preservation is the best treatment option to maintain functional and esthetic integrity.^[5] Orthodontic mechanics are applied to guide the canine through the center of the alveolus.^[6] Force applied should be light and continuous (<60 g).^[7] Various methods are used for bonding to the

exposed surface of the impacted tooth, for example, Bracket or Button but they may lead to bond failure and repeated surgical exposure, therefore attachment should be of a low profile attachment to avoid break down of overlying tissue, dehiscence or “buttonholing.”^[8,9] To overcome all these drawbacks, an easy and economical method was explained in this case report which reduces the bond failure and repeated surgical intervention during the treatment.

Eyelet traction guide

A Begg bracket and 0.010 ligature wire was used to construct eyelet traction guide [Figure 1]. Considering the position of the impacted canine from the arch wire four to five eyelets of 1.5 mm diameter were made. The free end of the eyelet chain was tied to the Begg bracket. Begg bracket is bonded to the tooth and through the eyelet elastic threads or ligature wire is passed and tied to the arch wire. The low profile Begg bracket attachment avoids tissue damage and provides excellent adaptability and adequate bond strength. The use of multiple eyelets avoids repeated surgical intervention during orthodontic traction.

**Sunil Chandy Varghese,
G. Preethi,
K. Balaji,
Job Jacob Anison,
R. Rajesh,
K. Mahalakshmi**

*Department of Orthodontics,
Tagore Dental College and
Hospital, Chennai, Tamil Nadu,
India*

Submitted : 18-Jan-2020

Revised : 23-Jun-2020

Accepted : 27-Jun-2020

Published : 20-Dec-2020

Address for correspondence:

*Dr. Sunil Chandy Varghese,
Department of Orthodontics,
Tagore Dental College and
Hospital, Rathinamangalam,
Chennai - 600 127, Tamil Nadu,
India.*

E-mail: sunil_cv84@yahoo.com

Access this article online

Website:

www.contempclindent.org

DOI: 10.4103/ccd.ccd_52_20

Quick Response Code:



How to cite this article: Varghese SC, Preethi G, Balaji K, Anison JJ, Rajesh R, Mahalakshmi K. Unveiling the impacted canine – Eyelet chain guide: Concepts and clinical application. *Contemp Clin Dent* 2020;11:403-7.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

Diagnosis and Etiology

A 20-year-old female patient has been reported with a chief complaint of protrusion of teeth and prolonged retention of upper primary canine. On extraoral examination, the patient had a straight profile, associated with average facial height and a skeletal Class III relationship. She had competent lips, and there were no obvious asymmetries in the frontal view [Figure 2a-c]. On intraoral examination, Class III molar relationship with retained deciduous canine on both sides of the upper arch, right maxillary canine erupted palatally while on the left side canine was clinically absent. She also presented with proclined upper incisor and upright lower incisor with negative overjet (-1 mm) and reduced overbite [Figure 2d-h]. Functional examination showed no clicking or crepitations or tenderness on palpation of temporomandibular joint and the muscles of mastication. Panoramic radiograph reveals the presence of all permanent teeth, with impacted left maxillary canine being buccally placed and mesially angulated along with the presence of retained deciduous canine [Figure 2i].



Figure 1: Eyelet traction guide

Root contour and periodontal space of both the impacted canine and the adjacent tooth were shown to be normal. Although the etiology of impacted canine have an iatrogenic or idiopathic origin, potential causes may include dentoalveolar discrepancies, transverse maxillary deficiencies, prolonged retention, or early loss of deciduous canines or abnormal position of tooth buds.^[3] The case was diagnosed as Angle's Class III malocclusion with impacted left permanent maxillary canine.

Treatment objective

The objectives were to correct Class III relationship, align maxillary and mandibular arches, create space to align the impacted left maxillary canine by surgical exposure and orthodontic extrusion, to establish Class I canine relationship and normal overjet and overbite.

Treatment alternative

Treatment alternatives include surgical removal of the impacted tooth, while preserving the deciduous canine as long as possible. After treatment tooth could be restored with a composite buildup or removal of deciduous canine and prosthetic replacement with a resin-bonded bridge or a conventional bridge or an implant.

The second treatment option could be autotransplantation, possibly followed by immediate or postponed endodontic treatment. A disadvantage of this option is that the tooth eventually might become ankylosed.

The third treatment option was surgical exposure followed by the movement of the canine toward its normal position in the dental arch. Extraction of first premolar on both sides in the lower arch alone for correcting canine relationship,

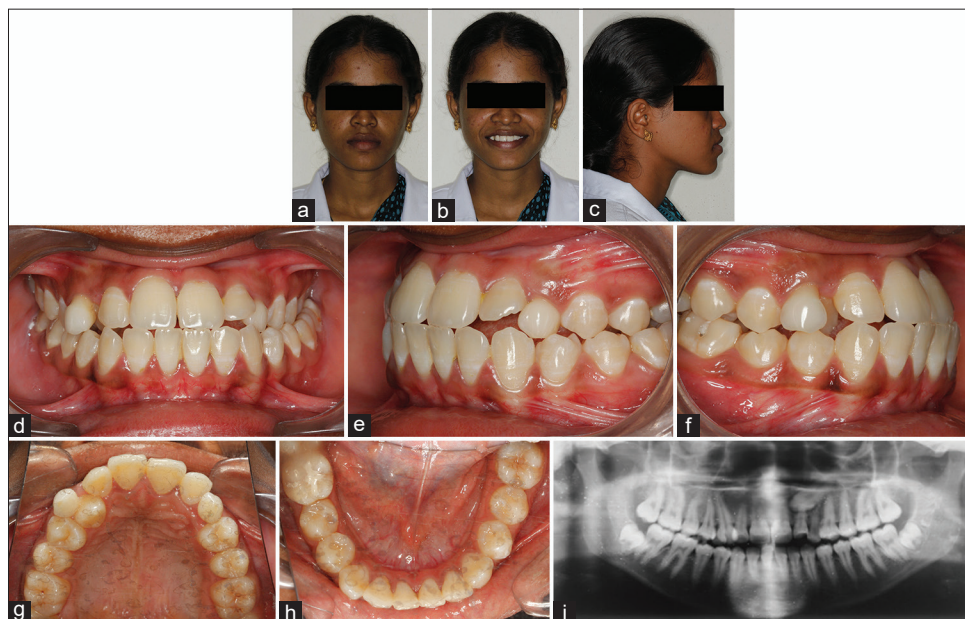


Figure 2: Pretreatment photos. (a) Extraoral frontal. (b) Extraoral smile. (c) Extraoral profile. (d) Intraoral frontal. (e) Left lateral. (f) Right lateral. (g) Upper occlusal. (h) Lower occlusal. (i) Pretreatment orthopantomogram

overjet and overbite, and to maintain Class III molar relationship.

Due to the unfavorable position of the impacted maxillary canines, a treatment option was canine extraction, which would greatly facilitate orthodontic mechanics. However, because of the Class III profile, we chose the third option of surgical exposure and orthodontic traction of impacted canine. The prognosis of the case was considered good considering the age of the patient and the periodontal biotype of the patient.

Treatment progress

Considering the skeletal, dental, and soft-tissues features, the case was planned for the extraction of retained deciduous canine in the upper arch and to align the impacted canine on the left side by surgical exposure and closed flap technique. In the lower arch planned for the extraction of first premolar on both sides to achieve Class I canine relationship to camouflage Class III relationship.

0.022 × 0.028 MBT Prescription brackets were bonded to upper and lower arch. Levelling and aligning with the wire sequence of 0.014 NiTi, 0.016 × 0.022 NiTi, 0.017 × 0.025 NiTi, followed by 0.017 × 0.025 SS was placed. NiTi open coil spring was placed to gain the space of the left upper canine. To maintain the canine space and prevent any inclination of the adjacent teeth, an open-coil spring was placed onto the main archwire. After 3 months of treatment, adequate space has been opened for the maxillary left canine. Then, the patient was referred to the oral surgery department for a closed exposure of upper left canine and the eyelet chain guide was bonded to the exposed crown surface [Figures 3 and 4] and the eyelets were passed through the flap. The flap was repositioned into its original position and sutured. A 0.009” ligature wire was passed through the eyelet and tied to the arch wire to retract the canine in a distal and occlusal direction [Figure 5]. This ensured that the canine was retracted away from the root of lateral incisor to avoid root resorption. Orthodontic traction was continued for 8 months until the canine reaches the occlusal level. No complications were observed, and the gingiva remained healthy. Once the canine reached, the occlusal plane bracket was bonded and canine was aligned into its position.

Treatment Results

Orthodontic traction was given for 8 months for the guided eruption of canine. The canine had sufficient width of attached gingiva without any tissue damage. Intermaxillary elastics were used during the finishing stage to improve the intercuspation. At the end of treatment, the impacted maxillary left canine was positioned into proper alignment, resulting in a pleasing smile [Figure 6a-g]. Posttreatment orthopantomogram reveals proper root inclination of the left maxillary canine [Figure 6h]. The total duration of the traction was 18 months. During retention, a fixed bonded



Figure 3: Surgical exposure of canine and bonding attachment



Figure 4: Eyelet traction guide bonded to canine



Figure 5: Flap is sutured and eyelet chain is tied to the arch wire with ligature

retainer from canine to canine was placed in both the arches, and a removable wrap around retainer was given in the upper arch.

Discussion

Impacted canines are often more challenging to manage and achieve a successful result. A proper radiographic localization of the position of impacted canine in relation to adjacent tooth is necessary.^[4] Severity of impacted

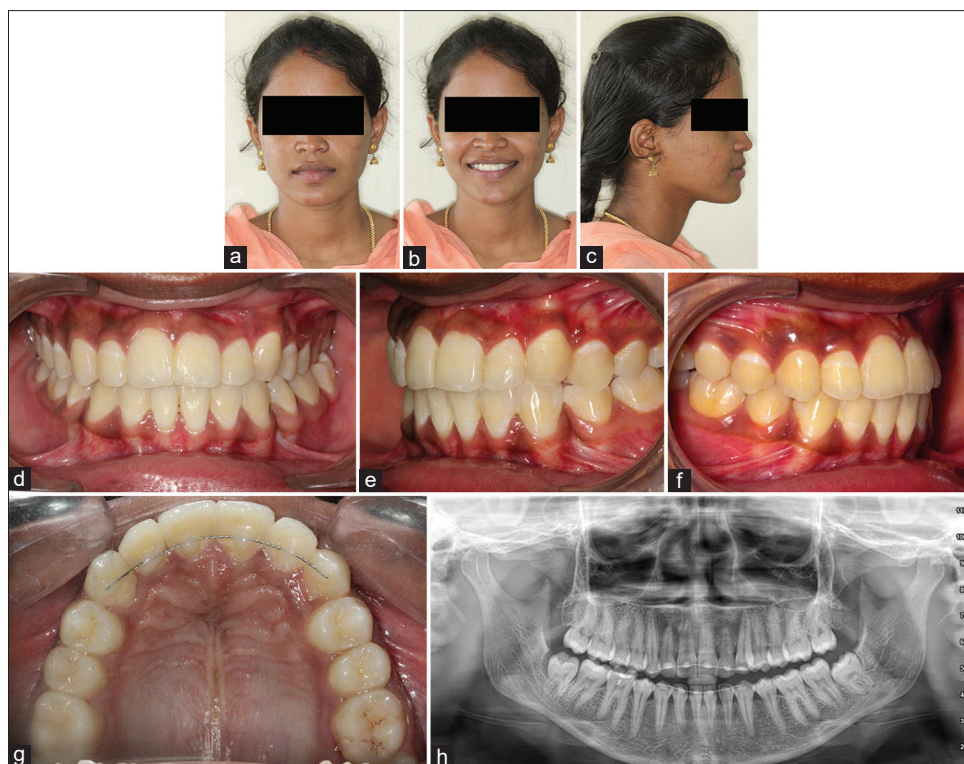


Figure 6: Posttreatment photos. (a) Extraoral frontal. (b) Extraoral smile. (c) Extraoral profile. (d) Intraoral frontal. (e) Left lateral. (f) Right lateral. (g) Upper occlusal. (h) Posttreatment orthopantomogram

canine in all three planes can be assessed by using the various radiographic analysis. According to these analysis, the prognosis is considered poor when the tip of impacted canine was present at the mesial surface of lateral incisor root, then the root apex of the impacted canine is above the second premolar and the angulation of the canine to midline is more than 31° .^[10] The impacted canine in the case report would therefore be considered having an unfavorable prognosis. Considering the other factors such as dental and periodontal health, oral hygiene, and patient motivation, which are more favorable; therefore, a decision was taken to align this impacted canine orthodontically. Fournier *et al.* recommended that a labially impacted tooth should be surgically exposed without the application of orthodontic traction in a young patient, whereas immediate traction is almost always needed in an adult patient.^[11] Before determining the appropriate intervention, the esthetic and functional requirement, gingival attachment, height and width of gingiva, and clinical crown length must be carefully evaluated.^[12] Important considerations were the lack of attached gingiva around the erupting canine which can lead to inflammation and other periodontal consequences during orthodontic traction. For this reason, a closed flap technique is preferred, thereby ensuring adequate gingival tissue around the canine.^[13] Secondly, bonding a proper attachment to the canine is also important, since bond failure may leads to unwanted necessity of another surgery and periodontal injury during traction.^[5]

In the clinical case discussed, an alternative method was applied. Bonding attachment used was a low-profile Begg bracket which is easily available, and there was no need for repeated surgical intervention since there was a multiple eyelets for varying the force of traction and also allows force to be applied along the long axis of the tooth.^[5] The canine traction was initially in the distal direction to avoid contact with roots of lateral incisor and later changed towards the occlusal and buccal direction for more favorable alignment [Figure 5]. An ideal traction force was applied for adequate period of time thus minimizing the side effects. It also promotes good hygiene at the exposed site, thereby minimizing the risk of gingival inflammation. Continuous traction force was given by adjusting the ligature tie at different level of eyelet chain. Adequate width of attached gingiva was achieved, and a good intercuspation was also observed [Figure 6a-g]. Posterior disocclusion was seen during protrusive movements with incisal guidance and the presence of canine guidance during lateral excursive movements without any interference.

Conclusion

Accurate diagnosis, careful localization of the position, selection of surgical approach, precise bonding attachment, direction of force application, and conservative management of the soft tissues are the important factors for the successful management of impacted canines. Eyelet chain guide is an easy and economically inexpensive method of attachment to give orthodontic traction to impacted tooth

without repeated surgical intervention or tissue damage. It can be easily made at chair side without any high inventory cost and also comfortable to the patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Okeson JP. Management of Temporomandibular Disorders and Occlusion. St. Louis: Mosby Year Book Inc.; 1993. p. 121.
2. Bass TB. Observations on the misplaced upper canine tooth. Dent Pract Dent Rec 1967;18:25-33.
3. Jacoby H. The etiology of maxillary canine impactions. Am J Orthod 1983;84:125-32.
4. Jacobs SG. Localization of the unerupted maxillary canine: How to and when to. Am J Orthod Dentofacial Orthop 1999;115:314-22.
5. Bishara SE. Clinical management of impacted maxillary canines. Semin Orthod 1998;4:87-98.
6. Kokich VG. Surgical and orthodontic management of impacted maxillary canines. Am J Orthod Dentofacial Orthop 2004;126:278-83.
7. Datana S, Londhe SM, Kumar P, Mathur V. Orthodontic guidance of an impacted maxillary Canine: A review. J Oral Health and Comm Dent May 2014;8:101-3.
8. Shailaja AM, Nishitha C, Romana IU, Aboobacker M. Management of impacted canine using different attachments and auxiliaries – A review. Glob J Res Anal 2017;6:170-3.
9. Becker A, Shpack N, Shteyer A. Attachment bonding to impacted teeth at the time of surgical exposure. Eur J Orthod 1996;18:457-63.
10. Stivaros N, Mandall NA. Radiographic factors affecting the management of impacted canines. J Orthod 2000;27:169-73.
11. Fournier A, Turcotte JY, Bernard C. Orthodontic considerations in the treatment of maxillary impacted canines. Am J Orthod Dentofacial Orthop 1982;81:236-9.
12. Vermette ME, Kokich, VG, Kennedy DB. Uncovering labially impacted teeth: Apically positioned flap enclosed-eruption techniques. Angle Orthod 1995;65:23-32.
13. Vanarsdall R, Corn H. Soft-tissue management of labially positioned unerupted teeth. Am J Orthod Dentofacial Orthop 1977;72:53-64.