

Management of Maxillary Buccal and Palatal Impacted Canines – Case Reports

Dr. Adeel Ahmed Bajjad,¹ Dr. Anil Sharma,² Dr. Santosh Verma,³ Dr. Sayantan Choudhury⁴

¹Senior Lecturer, ²Professor, ³Professor & HOD, ⁴Post Graduate Student
Department of Orthodontics & Dentofacial Orthopedics,
Kothiwal Dental College & Research Centre

Corresponding author: Dr. Adeel Ahmed Bajjad; Email: dr4dentist@gmail.com

ABSTRACT

Maxillary impacted canine is one of the most common entity which a clinician encountered in day to day life. The management of impacted canines need precise diagnosis and careful application of biomechanics for optimum result. In this article 2 different case reports have been discussed which were treated with different mechanotherapy.

KEYWORDS: Canine, Buccal, Impaction, Palatal, Springs

INTRODUCTION

There are various methods to treat impacted canines but this is not the topic of discussion. An early intervention and diagnosis of impacted canine could save the clinician time, expenses and complexity in future. The treatment of an impacted canine usually involves its surgical exposure followed by orthodontic traction to align it into a proper location in the dental arch. Impacted canine management requires an interdisciplinary approach which involves general dentist, an orthodontist and oral surgeon. There is a long path of eruption of maxillary permanent canine from its initial development to final position in occlusion and thus it encounters a greater degree of displacement than any other tooth that might result in its impaction¹. As canine is also known as the corner stone tooth in oral cavity and its function is not limited to esthetics but also with the development of an arch to achieve functional occlusion.

Etiology and incidence

The maxillary permanent canine impaction is the second most common entity seen in 2 % of population after third molar impaction². In 85% cases, it is found palatally and 15% cases, it is diagnosed on buccal side³. Various theories have been proposed to explain the etiology behind the palatally displaced maxillary

canines. Peck et al. said that it is due to polygenic multifactorial inheritance⁴. Prinen et al. concluded that along with genetic it is related to peg shaped lateral incisors and premolar hypodontia⁵. The incidence of increased palatally impacted canines adjacent to missing lateral incisors has also been compared with general population by some authors⁶.

Broadly etiology is classified into localized, systemic and genetic.

A. Localized causes:

- Tooth size–arch length discrepancies
- Prolonged retention or early loss of the primary canine
- Cyst or neoplasm
- Absence of the maxillary lateral incisor
- Iatrogenic
- Idiopathic factors

B. Systemic causes maybe due to

- Endocrine deficiencies
- Febrile diseases
- Irradiation

C. Genetic causes

- Malposed tooth germ
- Presence of an alveolar cleft
- Heredity

Diagnosis

Clinically there is delayed eruption of permanent canine or prolonged retention of deciduous canine. A Palatal bulge is normally seen however normal labial bulge is absent. There is also delayed eruption, distal tipping or migration of lateral incisor. Various radiographs like peri-apical radiograph, occlusal radiograph, OPG are the useful diagnostic aids. Now a days CBCT is one of the most valuable tool to determine the exact level of canine. It also reveals about the ankylosis of canine.

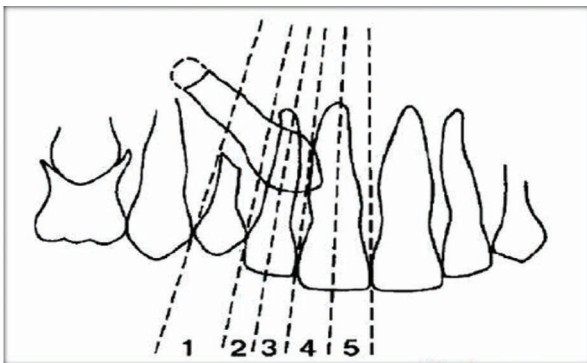


Fig. 1- Ericson and Kurol Sector classification of impacted canine

How to determine the difficulty level of impaction?????

Sector classification of impacted canine⁷ (Fig. 1)

Sector 1:- Cusp tip of canine is between mesial aspect of 1st premolar and distal aspect of lateral incisor.

Sector 2:- Cusp tip of canine is between distal aspect of lateral incisor and long axis of central incisor.

Sector 3:- Cusp tip of canine is between long axis of lateral incisor and mesial aspect of lateral incisor.

Sector 4:- Cusp tip of canine is between mesial aspect of lateral incisor and the long axis of central incisor.

Sector 5:- Cusp tip of canine is between long axis of central incisor and interincisor median line.

In this article we are presenting two case reports that are treated with different mechanics. Both of our cases were first surgically exposed and Case 1 was treated by first traction followed by frictionless mechanics however case 2 was treated by using Kilroy spring along with frictional mechanics.

CASE REPORTS

CASE 1

A 19 year female patient visited to Department of Orthodontics with Class I malocclusion with buccally impacted canine (23) and an over retained maxillary left deciduous canine (63). On clinical examination a labial bulge was seen. Since the patient had a class I malocclusion, it was decided to treat the patient with the extraction of retained left deciduous canine to create a space for the alignment of buccally impacted canine into the arch (Fig.3).



Fig. 3: Pre-treatment

Treatment progress: After achieving leveling and alignment, exposure of canine is done by closed eruption technique and attachment is bonded to the crown of canine followed by repositioning of the flap (Fig.4). On next visit a traction force was applied to canine from molar and when canine reached distal to lateral incisor, then it is engaged with the archwire. But this continuous archwire will cause hindrance to its eruption so a bypass wire is made.

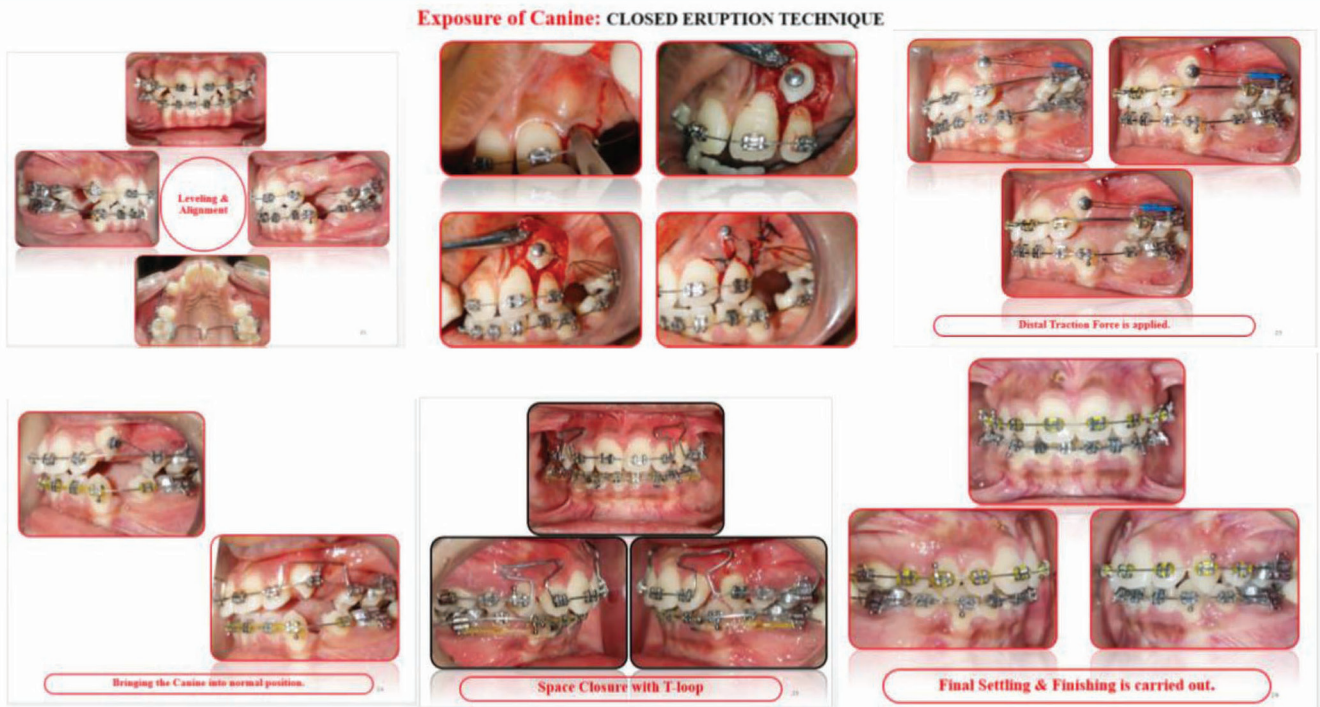


Fig.4: Treatment stages photographs



Fig. 5:- Post-treatment

Space closure was completed with T-loop made of 17x25 TMA and class I canine and molar relationship was achieved at the end (Fig.5).

CASE 2

A 22 year male patient reported to the department with a chief complaint of spacing and discoloured tooth in the anterior tooth region. Clinical examination shows a retained deciduous canine i.e 53 along with a bulge present on palatal side. Patient had class I molar relationship with normal overjet and midline diastema. An OPG reconfirms palatally impacted canine, so the treatment was decided to extract 53 and surgically exposed 13. The traction of impacted canine is to be done with Kilroy spring (Fig.6).



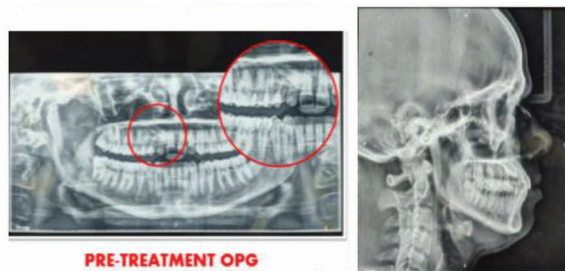


Fig. 6:- Pre-treatment

Treatment progress: After achieving leveling and alignment, exposure of canine is done by open eruption technique and attachment is bonded to the crown of canine. After 1 month Kilroy spring was fabricated with 0.16 AJW wire and traction force was applied. Activation of Kilroy spring was done on every visit till canine reached at occlusal level. Bracket was bonded and leveling and aligning was performed with 0.14 niti arch wire (Fig.7). Settling was done with Box elastics and class I molar and canine relationship achieved on both sides (Fig.8). Treatment duration was 30 months including 4-6 months of Covid pandemic phase which may cause delaying of treatment.



Fig.7:- Treatment stage photographs



Fig. 8: Post treatment

DISCUSSION

The mesiodistal position as determined by the sectors’s classification influences the prognosis as the treatment duration and complications like ankylosis, external root resorption increases as the canine moves from sector 1 to sector 5.3

Another factor we should keep in mind is the eruption technique of impacted canine, which is very much essential to maintain the periodontal health of the teeth.

CLOSED OR OPEN ERUPTION?????

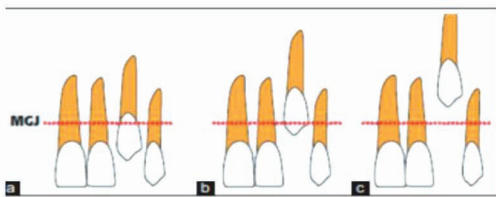


Fig.9

Kokich reported 3 methods for uncovering a labially impacted canine (Fig.9) when the canine cusp is (a) coronal to the MGJ: gingivectomy; (b) apical to the MGJ: creating an apically positioned flap; and (c) significantly apical to the MGJ: using a closed eruption technique⁸. If canine is exposed through closed eruption, On the palatal side it seems to lengthen the treatment time. In case of open eruption if feasible, on the palatal side there is an adequate thickness of keratinized tissue good oral hygiene and thus involves shorter treatment time whereas on the buccal side if feasible when atleast 2-3mm of keratized tissue is present after exposure. In the 1st case & 2nd case inspite of the moderate & high difficulty level respectively , the canine was successfully brought into occlusion because of meticulous treatment planning and judicious use of biomechanics.

Biomechanics: In our first case as the canine is labially placed just above the left lateral incisors and it is far away from lateral roots a distal traction is applied to the canine with the help of elastic thread. TPA is given to increase the anchorage value of molars. When the canine reached sufficiently at a distant from roots of lateral incisors, a bypass wire is attached and thus it brings into normal occlusion. Space closure is performed with frictionless mechanics and treatment completion was done in 18 months.

Kilroy Spring delivers a constant force module that slides onto a rectangular arch wire over the site of an impacted tooth⁹. Passively the vertical loop of Kilroy Spring extends perpendicularly from occlusal plane. Spring activation was done with a stainless steel

ligature wire guided through the helix of vertical loop, and this loop is directed toward the impacted canine. This ligature wire is then tied to an attachment that has been bonded directly to the surgically exposed tooth. In order to maintain a constant force the Kilroy Spring may need to be retied on every visit till the tooth erupts. An orthodontic bracket is then bond once the spring is removed to allow the tooth to continue moving into the arch. First it is passively engaged, then it is activated by engaging with the ligature wire tied with bonded attachment on the canine crown. This exerts extrusive force generating anti-clockwise moment causing uprighting of the root (Fig.10). In transverse plane shows when it is activated it generates a buccal force bringing canine into normal position (Fig.11).

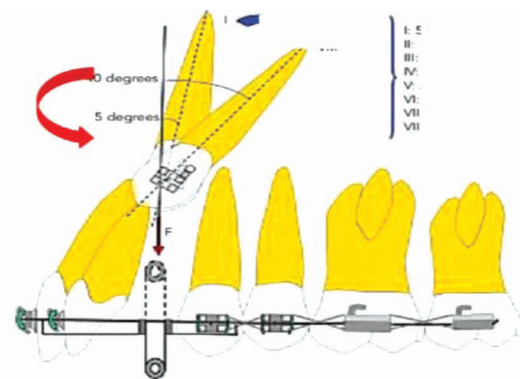


Fig.10: Passive and active Kilroy spring

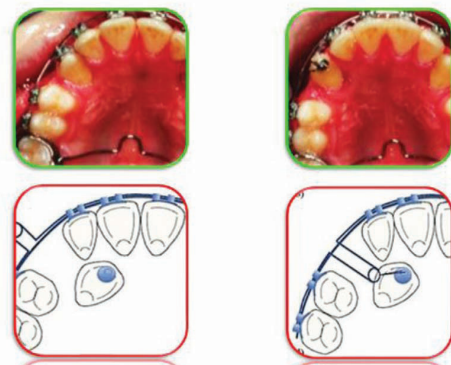


Fig. 11: This diagram is in transverse plane, it shows when Kilroy spring is activated it generates a buccal force that brings canine into normal position

CONCLUSION

- The management of impacted canines is important in terms of esthetics and function and it poses an esthetic and functional handicap.
- Clinicians must formulate treatment plans that are in the best interest of the patient.
- Therefore careful selection of surgical and orthodontic techniques is essential for the successful alignment of impacted canines.

Patient consent

The author certify that they have obtained all the appropriate patient consent forms. Patients have given consent to publish their images and other clinical information in the journal.

Conflicts of Interest: There are no conflicts of interest



REFERENCES

1. Dewel B F 1949 The upper cuspid: its development and impaction . Angle Orthod 19:79 – 90.
2. Thilander B, Jakobsson SO 1968. Local factors in impaction of maxillary canines. Acta Odontologica Scandinavica 26:145-68.
3. Ericson S, Kurol J 1986a Radiographic assessment of maxillary canine eruption in children with clinical signs of eruption disturbance. European Journal of Orthodontics 8:133-140.
4. Peck S, Peck L, Kataja M 1996 Prevalence of tooth agenesis and pegshaped maxillary lateral incisor associated with palatally displaced canine (PDC) anomaly . AJODO 110:441 –443
5. S. Prinen, S. Arte, S. Apajalahti. Palatal displacement of canine is genetic related to congenital absence of teeth. Europe Journal Of Orthod. 1996;18(5):457-63.
6. Zilberman Y , Cohen B , Becker A 1990 Familial trends in palatal canines, anomalous lateral incisors, and related phenomena . European Journal of Orthod 12:135–139.
7. Ericson S, Kurol J. Early treatment of palatally erupting maxillary canines by extraction of the primary canines. Eur J Orthod 1988;10(4):283-295.
8. Kokich VG. Surgical and orthodontic management of impacted maxillary canines. American Journal of Orthodontics and Dentofacial Orthopedics. 2004 Sep 1;126(3):278-83.
9. Bowman SJ, Carano A. The Kilroy spring for impacted teeth. Journal of Clinical Orthodontics. 2003 Dec 1;37(12):683-8.