Case Report

Orthodontic management of palatally impacted canine

ABSTRACT

Impacted canine teeth are problems frequently encountered in dental practice. Maxillary canine teeth are the most commonly impacted teeth next to third molars. Incidence of palatal impaction is greater than labial impaction. Many etiological factors attributed for canine impaction. Timely diagnosis and interception provide a better management of impacted canine. There are various orthodontic auxiliaries used for disimpaction of canine. Ballista spring is one of the simplified orthodontic auxiliary spring developed by Harry Jacoby used for repositioning impacted teeth. It delivers light force, excellent biomechanics, simplicity of the design, patient comfort, and esthetics. This case report presents a case of orthodontic repositioning of palatally impacted canine in a 15-year-old using ballista's spring.

Keywords: Auxiliary spring, ballista spring, palatally impacted canine

INTRODUCTION

Tooth eruption is defined as the movement of the tooth from its site of development within the jaws to its position of function within the oral cavity. The permanent maxillary canine has the longest path of eruption. Many local and systemic disturbances cause delayed eruption, transmigration, and impaction. Next to third molar, the maxillary canine teeth are the most commonly impacted teeth with an incidence of 1%–3%.[1] Maxillary canine impaction is more common in female than in male with a incidence of palatal impaction of around 85% than labial impaction 15%.[2,3]

Etiology of canine impaction can be classified into four distinct groups. Local hard tissues obstruction, local pathology, departure from disturbances of normal development incisors, and hereditary or genetic factors.[4] Early diagnosis and timely interception provide conservative clinical management of impacted canine with minimal or no adverse side effects.

Localization of position and its relation of impacted canine with its adjacent structures are foremost important before planning orthodontic management. Many radiographic techniques and analysis help us to locate canine. Cone-beam computed tomography imaging technique gives us a clear and precised position of palatally displaced canine in both linear and angular position.[5]

Several methods have been used for applying traction to the impacted canine which includes, elastic traction, lasso wires, and Kilroy spring designed by Bowman and Carano[6] for guiding the eruption of permanent canine, K-9 spring for alignment of impacted canine by Kalra,[7] eruption of impacted canine with an Australian helical archwire by Christine Hausen,[8] active palatal arch by Becker,[9] etc., Ballista spring designed by Jacoby.[10] These springs exert a light continuous force from being twisted on its long axis.

This case report presents a case of orthodontic repositioning of palatally impacted canine in a 15-year-old using ballista's spring.

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Access this article online	
Website: www.orthodrehab.org	Quick Response Code
DOI: 10.4103/ijor.ijor_49_17	

How to cite this article: Ramanathan T, Jayachandran T, Nirupama C, Anand S, Chandrasekaran P, Priya K. Orthodontic management of palatally impacted canine. Int J Orthod Rehabil 2018;9:41-7.

CASE REPORT

A 15-year-old male patient reported to the department with a chief complaint of spacing in the upper front tooth region. On clinical examination, patient presented a symmetrical face and convex profile. On intraoral examination, left permanent maxillary canine was missing and retained deciduous canine was present. Molar and canine relations were Class I bilaterally, overjet of 5 mm, and overbite of 2 mm with spacing in the upper anteriors were present. Radiographic examination revealed that maxillary left permanent canine was palatally placed [Figures 1-10]. On final diagnosis, patient planned for extraction of retained deciduous tooth, leveling and aligning, followed by orthodontic traction of impacted canine using ballista spring.

Treatment plan

1. Leveling and aligning of upper and lower arch
2. Providing space for disimpaction of canine
3. Extraction of deciduous canine and surgical exposure of impacted canine followed by orthodontic traction and alignment of canine
4. Final finishing of the repositioned canine
5. Fixed retention.

Treatment progress

Patient strap up done with preadjusted edge-wise appliance with 0.022 MBT slot and initial leveling and aligning done with 0.016, 0.018, 16 × 22, 17 × 25 NITI wire. After about 7 months of treatment, consolidation of the upper arch done and open coil spring is placed between left premolar and lateral incisors to open up the space for repositioning of canine. Left retained deciduous canine was extracted, and surgical exposure of impacted canine was done on the palatal side and attachment was bonded on the palatal surface with all necessary precaution taken, to prevent any moisture contamination. After leveling and alignment, 19 × 25 SS base archwire was inserted on which ballista spring was placed as an auxiliary wire for the forced eruption of permanent canine. After about 7 months of forced

Figure 1: Extra oral – frontal

Figure 2: Extra oral – smile

Figure 3: Extra oral – right profile

Figure 4: Pre treatment intra oral right side

Figure 5: Pre treatment intra oral front view

Figure 6: Pre treatment intra oral left side

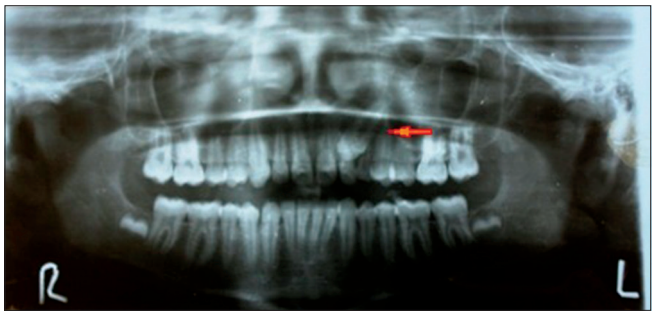

Figure 7: Pretreatment orthopantogram

Figure 8: Pretreatment intraoral periapical

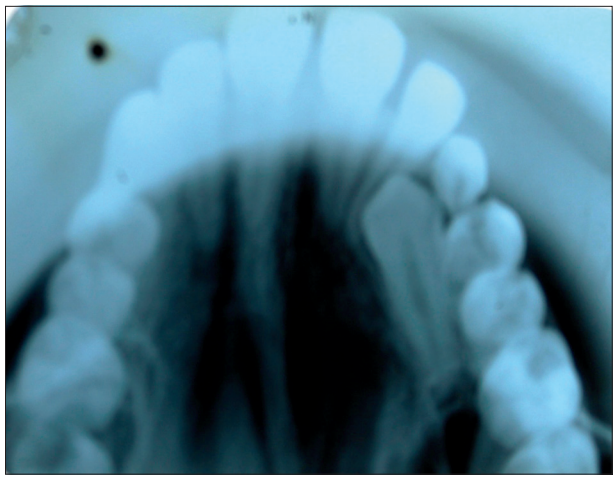

Figure 9: Pretreatment upper occlusal radiograph

Figure 10: Pretreatment lateral cephalogram

traction with ballista spring, the maxillary left impacted canine had erupted sufficiently into the oral cavity a labial attachment was placed. The canine was labial bonded and aligned and leveled. Finishing and detailing were carried out with 17 × 25 TMA wire for about 6 months [Figures 11 and 12] A good Class I canine relation, molar Class 1 molar relation, overbite 2 mm, overjet 2 mm with esthetically pleasing and functionally well-balanced occlusion had been achieved at the end of the 20 months of treatment. Fixed retainer was placed in the upper and lower arch [Figures 13-22].

DISCUSSION

Canines play a vital role in the facial appearance, dental esthetic, arch development, and functional occlusion. Early diagnosis of impacted teeth may reduce the treatment

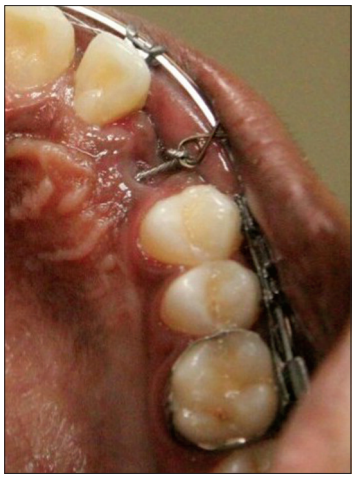

Figure 11: Mid treatment ballista spring

Figure 12: Mid treatment

Figure 13: Post treatment extra oral frontal

Figure 14: Post treatment extra oral smile

Figure 15: Post treatment extra oral right profile

Figure 16: Post treatment intra oral front view

duration, functional complication, and more extensive orthodontic treatment.[11] Impacted canines can be assessed at the age of 9–10 years when the canine begins its long intrabony movement toward its functional position in the dental arch.[12] Several theories have been proposed to explain the etiology of canine impaction of which guidance theory and genetic theory are the most commonly accepted. Guidance theory states that palatal impaction is due to lack of guidance along the root of lateral incisor. Genetic theory points to a multiple genetic factors which

Figure 17: Post treatment intra oral right side

Figure 18: Post treatment intra oral left side

Figure 19: Post treatment intra oral maxillary occlusal view

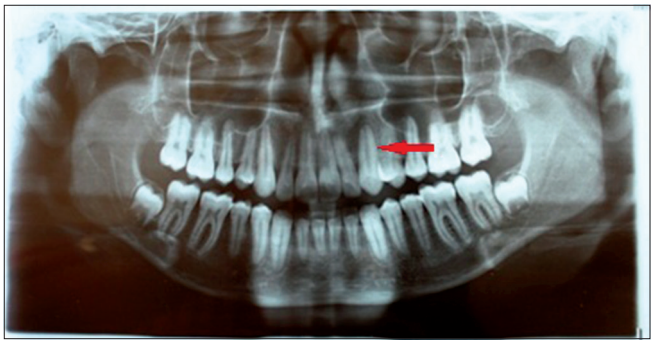

Figure 20: Posttreatment orthopantogram

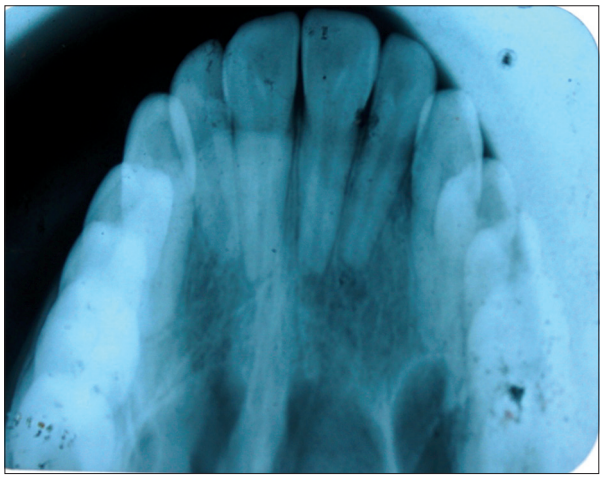

Figure 21: Posttreatment maxillary occlusal radiograph

Figure 22: Posttreatment lateral cephalogram

may be responsible for palatal impaction of maxillary canine.[13,14]

Routine panoramic radiographs in the mixed dentition period are very useful in diagnosing chances of canine impaction. Impacted maxillary canine presents an incidence of 12.5% of some degrees of incisor root resorption more significantly in girls.[15] A computed tomography is an excellent tool in diagnosing impaction. It presents all the three dimensions of the canine and its adjacent structures precisely. The extent and exact location of root resorption present in neighboring teeth is clearly visualized. The prognosis of orthodontic management of impacted teeth depends on various factors such as position, angulation, distance to be moved, and chances of ankylosis.[15]

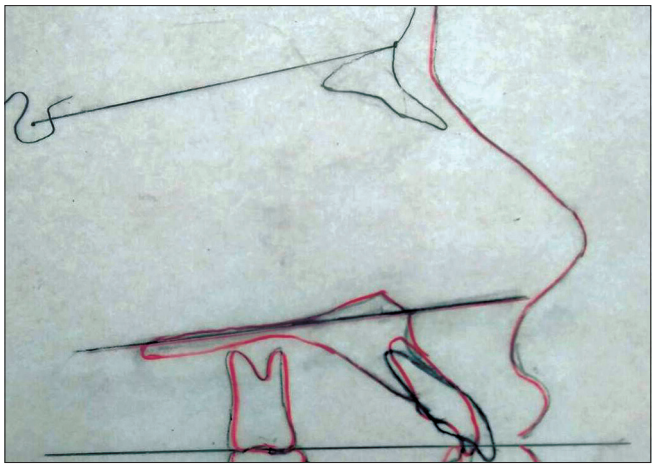

Figure 23: Cephalometric superimposition of pre- and post-treatment changes on palatal plane

There are normally five different treatment options which are often indicated for maxillary canine impaction.

1. Clinical evaluation and monitoring with no active treatment
2. Interceptive removal of retained primary canine
3. Surgical removal of impacted canine
4. Surgical exposure of impacted canine and orthodontic repositioning
5. Autotransplantation of impacted canine.[9]

The mechanotherapy intended in repositioning is to apply the vertical traction to the impacted teeth. Ballista spring designed by Jacoby[10] is an auxiliary spring made of 0.014, 0.016, 0.018 round stainless steel wires with a single loop design provides an unobstructive vertical force along the center of the crown. It delivers a force of 50–120 g depicting on the size of the wire. We used a 0.0018 SS ballista spring with a force of 100–120 g for repositioning of impacted canine. Anchorage planning and the type of mechanics we use play a very important role in avoiding anchorage loss which is very common in treating impactions. We compared the pre- and post-treatment cephalometric values [Table 1] and Intermolar width [Table 2] changes which showed that there was no anchor loss both in transverse and sagittal plane. The cephalometric superimposition [Figure 23] on palatal plane confirmed the absence of proclination of the anteriors.

Periodontal health of the impacted teeth depends on the surgical exposure and the mechanotherapy. We planned a closed flap technique; the width of the attached gingiva following reposition was almost same as the physiologically erupted teeth on the right side.

CONCLUSION

Canines being the cornerstone of the smile and important component of mutually protected occlusion; aim should always be to diagnose and intervene at the earliest of any possibilities in the displacement of the canine. Relevant and planned orthodontic mechanotherapy helps us in reducing the duration of treatment and detrimental effects to the adjacent structures.

Table 1: Cephalometric comparison of pre- and post-treatment changes

Cephalometric values	Pre	Post
SNA	82	83
SNB	82	82
ANB	0	1
SN-GoGn	33	34
SN-Pal Pl	4	6
SN-Ocl Pl	15	14
U1-NA	39	23
U1-NA (mm)	5	4
L1-NB	40	31
L1-NB (mm)	7	4
IMPA	101	95
FMIA	51	59
FMA	28	26

Table 2: Comparison of pre- and posttreatment intermolar width changes

Stage	Measurements
Pretreatment	53 mm
Posttreatment	51 mm

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. Moss JP. The unerupted canine. Dent Pract Dent Rec 1972;22:241-8.
2. Bishara SE. Impacted maxillary canines: A review. Am J Orthod Dentofacial Orthop 1992;101:159-71.
3. Shapira J, Chaushu S, Becker A. Prevalence of tooth transposition, third molar agenesis, and maxillary canine impaction in individuals with Down syndrome. Angle Orthod 2000;70:290-6.
4. Becker A, Chaushu S. Etiology of maxillary canine impaction: A review. Am J Orthod Dentofacial Orthop 2015;148:557-67.
5. Naoumova J, Kjellberg H, Palm R. Cone-beam computed tomography

for assessment of palatal displaced canine position: A methodological study. Angle Orthod 2014;84:459-66.
6. Bowman SJ, Carano A. The Kilroy spring for impacted teeth. J Clin Orthod 2003;37:683-8.
7. Kalra V. The K-9 spring for alignment of impacted canines. J Clin Orthod 2000;34:606-10.
8. Hauser C, Yon H. Lai, Karamaliki E. Eruption of impacted canines with an Australian helical archwire. Journal of clinical orthodontics: JCO 2000;34(9):538.
9. Becker A, editor. The Orthodontic Treatment of Impacted Teeth. 2nd ed. Abingdon, Oxon, England: Informa Healthcare; 2007.p. 1-228.
10. Jacoby H. The etiology of maxillary canine impactions. Am J Orthod 1983;84:125-32.
11. Shapira Y, Kuftinec MM. Early diagnosis and interception of potential maxillary canine impaction. J Am Dent Assoc 1998;129:1450-4.
12. Peck S, Peck L, Kataja M. The palatally displaced canine as a dental anomaly of genetic origin. Angle Orthod 1994;64:249-56.
13. Pirinen S, Arte S, Apajalahti S. Palatal displacement of canine is genetic and related to congenital absence of teeth. J Dent Res 1996;75:1742-6.
14. Ericson S, Kurol J. Radiographic examination of ectopically erupting maxillary canines. Am J Orthod Dentofacial Orthop 1987;91:483-92.
15. Alqerban A, Jacobs R, Lambrechts P, Loozen G, Willems G. Root resorption of the maxillary lateral incisor caused by impacted canine: A literature review. Clinical oral investigation 2009;13:247-55.