Management of impacted all canines with surgical exposure and alignment by orthodontic treatment

RADHA KATIYAR, PRADEEP TANDON1, GYAN P. SINGH1, AKHIL AGRAWAL2, T. P. CHATURVEDI3

Abstract

Canine impaction is a dental problem very often encountered in orthodontic practice. After the third molar, the canine is the most frequently impacted tooth. Bringing the impacted canine into a normal position is important for functional occlusion and the final esthetics of the orthodontic treatment. This article illustrates a peculiar case, in which all four permanent canines maintained their unerupted status at age of 16 years. All four impacted canines were surgically exposed, attachment bonded, traction given with K-9 spring and ideally positioned with fixed orthodontic mechanotherapy.

Keywords: Canine, impaction, surgical exposure

Introduction

Impacted tooth is a tooth that cannot, erupt into its normal functioning positions.[1] Most of the impactions are asymptomatic and usually present no obvious abnormal appearance except from maxillary incisors. However, some impacted tooth presents pathological complications in the form of resorption of root of adjacent teeth, cyst formation, loss of arch length, referred pain, etc.[2]

The permanent canines are the foundation of a balanced smile and functional occlusion.[3] Canines also provides a major support for the cheek. Absence of the canine accentuates the appearance of a flattened upper lip. Impacted canines increase the risk of infection, cyst formation and compromise the long-term prognosis of adjacent lateral incisors due to root resorption. Impaction of all four permanent canines is very rare.[4] In this case report, we present treatment planning and management of a patient with impacted maxillary and mandibular canines.

Case Report

A 16-year-old girl reported to Department of Orthodontics, Dental faculty of C.S.M. Medical University, Lucknow, with the chief complaint of severe intermittent pain in upper and lower anterior teeth. Patient had past dental history of root canal therapy in the lower right lateral incisor and amalgam restorations and her medical history was not significant.

Clinical examination

On clinical examination, extra orally patient shows incompetent lips with convex profile [Figures 1a and b] Intraoral examination showed there was 100% overbite, 5 mm overjet and molars were in Class I relation [Figures 1c-e] The most noticeable feature was absence of both maxillary and mandibular canines [Figures 1f and g] In the maxillary arch, space was present between the lateral incisors and the first premolars, but in mandibular arch, there was some arch length discrepancy.

Radiographic examination

Evaluation of panoramic radiograph, shows impacted maxillary and mandibular canines. Both maxillary canines were palatally impacted and mandibular canines were lingually impacted. All four canines were exerting pressure on the roots of lateral incisors. Lateral cephalometric evaluation shows the prognathic maxillae, high mandibular plane angle with protrusion of both upper and lower lips [Figure 1h and i, Table 1].

Treatment objectives

The main treatment objectives for the patient were to relieve pain that was due to pressure of impacted canines on lateral incisors and to correct the patient’s esthetics, overjet, overbite and correction of functional occlusion by bringing all the four permanent canines into alignment.
and occlusion.

### Treatment plan and sequence
Surgical exposure of the impacted maxillary and mandibular canines followed by directional forces to bring them into occlusion was planned. Extraction of the maxillary, first premolars was planned for correction of the overjet, overbite and space management for the impacted maxillary canines. In the mandibular arch, extractions of the lateral incisors were planned due to arch length discrepancy and poor prognosis of mandibular left lateral incisors.

Initial maxillary and mandibular arch alignment was performed and 0.019” × 0.025” stainless steel arch wires were inserted. A transpalatal arch in the maxillary arch and a lingual holding arch in mandible arch was placed to stabilize the molars. Thus adequate anchorage was planned before the canines’ exposure.

Exposure of the palatally impacted maxillary canines was performed by an open window procedure and lingual buttons bonded on the exposed crown surface.[5] [Figure 2a] because the crowns of mandibular canines were in close proximity to the roots of the lateral incisors, both canines were exposed with closed flap technique and then lingual buttons were attached on the accessible surface of the teeth. The flap was replaced over the crown and the hook were exposed for force application.[6] Only when we were assured of tooth eruption, the maxillary first premolars and mandibular lateral incisors were extracted. Glass ionomer cement bite block was placed on mandibular posterior teeth to prevent obstruction and facilitate movement of maxillary canines. Light orthodontic forces were applied from K-9 extrusion spring for the traction of the impacted canines into the extraction space.[7] [Figure 2b].

Since light exposure of impacted canines without exposing cementoenamel junction results in better bone support latter as compared with heavy exposure with complete removal of follicular sac, bone was removed conservatively.

To activate the spring after it is engaged in the auxiliary tube of molar buccal tube the vertical arm is swung upward and ligated to the bonded attachment on the impacted canine. This provides a gentle extrusive force on the canine; the spring also has a buccal component of force due to the arcial pattern of activation and deactivation. The force needed to distalize the canine is achieved by cinching the spring back about 2 mm after it has been ligated to the canine. When the vertical arm of the K-9 spring is rolled upward and inward to be engaged to an impacted canine, the result is an intrusive force and a clockwise moment on the molar and premolars. A transpalatal arch and lingual holding arch control this reactive force and moment.

Simultaneously an intrusion arch was ligated in both arches for the intrusion of maxillary and mandibular incisors. After completion of the traction, a series of stainless steel wires (0.016”, 0.017” × 0.025”, 0.019” × 0.025” and 0.021” × 0.025”) were ligated

### Table 1: Cephalometric analysis

| Parameter                              | Pre | Post |
|----------------------------------------|-----|------|
| Facial angle                           | 86° | 85°  |
| Angle of convexity                     | 19° | 16°  |
| SNA                                    | 89° | 88°  |
| SNB                                    | 80° | 81°  |
| ANB                                    | 9°  | 7°   |
| Mandibular plane angle (SN to GO-Gn)   | 35° | 34°  |
| Upper lip to E line                    | +5 mm | +3 mm |
| Lower lip to E line                    | +6 mm | +4 mm |
| Upper 1 to A line                      | +6 mm | +2 mm |

SNA: Sella nasion to point A; SNB: Sella nasion to point B; ANB: Difference of SNA and SNB; SN: Sella nasion plane; GO-Gn: Gonion to gnathion plane

**Figure 1:** (a) Pre-treatment frontal photograph. (b) Pre-treatment profile photograph. (c) Pre-treatment intraoral frontal view. (d) Pre-treatment intraoral right lateral view. (e) Pre-treatment intraoral left lateral view. (f) Pre-treatment intraoral occlusal view of maxillary arch. (g) Pre-treatment intraoral occlusal view of mandibular arch. (h) Pre-treatment lateral cephalogram radiograph. (i) Pre-treatment panoramic radiograph, showing all permanent canines impacted
and final alignment and leveling accomplished. The case was completed within 2 years and 4 months and the final results are shown in post treatment photographs.

Results

All the permanent canines were positioned into proper alignment with the remaining teeth and with a pleasant smile and reduced overbite. Convexity of profile improves in a significant amount, accompanied with competent lips [Figures 3a-i].

Discussion

Canines are the corner stone of the maxillary and mandibular dental arches. There is several treatment options are available for correction of impacted canine, but the best option with long-term prognosis are to bring these teeth in alignment.

In this case report all four impacted permanent canines were exposed and positioned into proper alignment with the remaining permanent teeth. Minimum removal of surrounding bone during exposure of impacted canines and maintenance of oral hygiene are the crucial factor for final clinical height of the crown after orthodontic treatment. A lack of attached gingiva poses a potential risk for gingival recession with a possibility of accumulation of plaque. Periodontal therapy may be indicated for the mandibular canines to align the gingival margin of the positioned tooth with the adjacent tooth. Although some objectives were not met like upper incisor to a line and anterior occlusion, but the patients profile improves significantly.

Summary

Impacted permanent canines pose a functional as well as an esthetic concern in the patients. Correction of deeply impacted canines in patient was always a challenge for an orthodontist. Correct treatment planning combined with space management and properly directed light continuous traction force are the three main factors to determine the success of every impacted case. The result of treatment in this case is quite acceptable. Patient has increased her self-esteem due to an enhanced smile and function.

References

1. Becker A. The Orthodontic Treatment of Impacted Teeth, 2nd ed. London: Informa Healthcare; 2007.
2. Bishara SE. Impacted maxillary canines: A review. Am J Orthod Dentofacial Orthop 1992;101:159-71.
3. Richardson G, Russell KA. A review of impacted permanent maxillary cuspids: Diagnosis and prevention. J Can Dent Assoc 2000;66:497-501.
4. Crawford LB. Four impacted permanent canines: An unusual case. Angle Orthod 2000;70:484-9.
5. Kokich VG. Surgical and orthodontic management of impacted maxillary canines. Am J Orthod Dentofacial Orthop 2004;126:278-83.
6. Vanarsdall RL, Corn H. Soft-tissue management of labially positioned unerupted teeth. Am J Orthod 1977;72:53-64.
7. Kaira V. The K-9 spring for alignment of impacted canines. J Clin Orthod 2000;34:606-10.

How to cite this article: Katiyar R, Tandon P, Singh GP, Agrawal A, Chatuvedi TP. Management of impacted all canines with surgical exposure and alignment by orthodontic treatment. Contemp Clin Dent 2013;4:371-3.

Source of Support: Nil. Conflict of Interest: None declared.