

## Case Report

# Alignment of buccally placed canine with modified transpalatal arch

### ABSTRACT

Alignment of malposed teeth is generally treated using coaxial wires, NiTi wires, or HANT wires. However, when canines which are ectopically erupted are tried to be aligned with NiTi wires, due to their bulky root structure, there is a risk of round tripping of adjacent teeth. This unnecessary round tipping creates load on the anchorage (leading to anchor loss) and prolongs the treatment duration. In this case, a unique approach to align buccally placed canine using a modified transpalatal arch (TPA) has been discussed. This case report describes a 20-year-old female, with a buccally placed left maxillary canine, being placed totally out of the arch. The first premolar was extracted to make space for the canine in the arch. The canine was brought into alignment using a palatal traction with the help of a modified TPA and an E-chain initially and later a closed coil spring attached to a palatal button on the canine.

**Keywords:** Buccally placed canine, canine alignment, modified transpalatal arch

### INTRODUCTION

The permanent canines are frequently impacted or have erupted ectopically as they are the second last teeth to erupt.<sup>[1]</sup> The prevalence of permanent maxillary canine impaction or ectopic eruption in the general population is approximately 1%–2%.<sup>[2]</sup> The maxillary canine has the longest period of development and the longest route to travel from under the orbit to its complete eruption site. Any bony obstruction, insufficient bone development and crowding for other reasons, or resistance of the neighboring teeth, such as a retained deciduous canine, may deflect the permanent canine from its normal eruptive pathway.<sup>[3]</sup>

Alignment of malpositioned teeth is generally treated using multilooped SS wires,<sup>[4]</sup> coaxial wires, NiTi wires,<sup>[5]</sup> or HANT wires. However, when ectopically erupted canines are aligned with NiTi wires, due to their bulky root structure, there is a risk of round tripping of adjacent teeth. This creates a load on the anchorage leading to anchor loss and prolongs the treatment duration.

Therefore, in this case report, we have used an innovative method of using a modified transpalatal arch (TPA) to align the canine and to prevent the round tripping of adjacent teeth.

### CASE REPORT

This case report describes a 20-year-old female who reported to the Department of Orthodontics and Dentofacial Orthopaedics, Chatrapati Shahu Maharaj Shikshan Sanstha Dental College, Aurangabad, Maharashtra, with a complaint of irregular and forwardly placed upper teeth.

Extraorally, the patient had a convex profile, incompetent lips, and an acute nasolabial angle [Figures 1-4]. Intraoral

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examination revealed proclined upper and lower anteriors, and a buccally transpositioned maxillary left permanent canine between rotated 1<sup>st</sup> and 2<sup>nd</sup> premolars. The maxillary left deciduous canine was retained [Figures 5-7].

**Diagnosis**

The cephalometric findings suggest a Class 1 skeletal base with a horizontal growth pattern and proclination of the incisors [Tables 1 and 2].

According to the space analysis, the case required all first premolar and deciduous canine extraction [Table 3].

Thus, this was a case of Angle’s Class 1 malocclusion with a buccally erupted permanent left maxillary canine, an over-retained left maxillary deciduous canine, proclination [Table 4], and spacing in the upper anteriors and crowding in the lower anteriors.

**Treatment planning**

Written consent was obtained from the patient before starting any treatment procedure.

For alignment of the buccally placed canine, the first treatment alternative was to bond the upper arch and engage a coaxial wire, NiTi wire, or HANT wire. However, this was difficult because it would have resulted in

unwanted buccal tipping of the lateral incisor and the second premolar instead of the canine tipping palatally into the arch, creating further complications. Furthermore, the engagement of the wire into the bracket slots would



Figure 1: Pre-treatment extraoral Frontal photograph



Figure 2: Pre-treatment extraoral Lateral photograph



Figure 3: Pre-treatment extraoral Oblique photograph

**Table 1: Anteroposterior parameters**

Parameters measured	Values
SNA (sella-nasion-point A)	83°
SNB (sella-nasion-point B)	79°
ANB (Difference of SNA and SNB)	4°
Wits appraisal (perpendicular from point A and point B occlusal plane)	BO is 1 mm behind AO

**Table 2: Vertical parameters**

Parameters measured	Values
SN plane-mandibular plane	15°
Frankfurt horizontal plane-mandibular plane	12°
Frankfurt mandibular plane angle	14°
Jarabacks ratio (%)	81

S: Sella, N: Nasion

**Table 3: Space analysis**

	Space required	Space available
Maxillary arch	Proclination: 16 mm Buccally placed canine: 8 mm	Interdental spacing: 3 mm Extraction of 14, 24: 14 mm (critical anchorage) Extraction of 63: 7 mm
Total	24 mm	24 mm
Mandibular arch	Proclination: 14 mm Crowding: 1 mm	Derotation of posterior: 1 mm extraction of 34, 44: 14 mm
Total	15 mm	15 mm



Figure 4: Pre-treatment extraoral Smiling photograph



Figure 5: Pretreatment intraoral Frontal photograph



Figure 6: Pretreatment maxillary occlusal photograph



Figure 7: Pretreatment mandibular occlusal photograph

be difficult with the severity of the malalignment and would result in patient discomfort. Hence, this option was discarded.

Thus, a second alternative was to use a method which would palatally apply force only to the canine and align it without affecting the alignment of adjacent teeth. This led to the innovation of the modified TPA to which the palatal force component was be attached from the palatal button on the canine.

Thus, the first phase involves the first premolar extraction and the space obtained was to be utilized for canine alignment. Considering the esthetics, in the later phase, the over-retained deciduous canine extraction and the bonding was planned.

#### Treatment progress

The upper molars were banded and a modified TPA was fabricated with a 19-G hard round stainless steel wire. The

wire was bent to form an inverse 'U' facing posteriorly and placed on the opposite side of the midline [Figure 8]. A palatal button was bonded to palatal aspect of maxillary canine and the modified TPA was cemented.

Initially, an E-chain (5 units) was attached [Figure 9]. The patient was recalled after 15 days.

On the subsequent visit, it was found that the transposed canine had started drifting palatally [Figure 10]. However, the forces applied by elastic chains tend to decay, and frequent patient visits for replacement of the E-chain were required. Therefore, it was decided to use NiTi closed coil helical spring instead [Figure 11]. It would provide a constant force, and less frequent visits were expected from the patient. The patient was recalled after a month's interval.

On the subsequent visit, the canine had drifted almost completely into the first premolar extraction space [Figure 12].

The root of the over-retained deciduous canine was now creating an obstruction and was extracted to enable the further palatal movement of the canine and for the later retraction of the anteriors.

After 15 more days, the canine was found to be in the arch. Now, the upper arch was bonded for further alignment [Figure 13] and the closed coiled spring was removed.



Figure 8: The modified transpalatal arch soldered to the molar bands



Figure 9: E-chain attached to canine and modified transpalatal arch



Figure 10: First visit with E-chain



Figure 11: Closed coil spring instead of E-chain



Figure 12: Midtreatment



Figure 13: End of canine alignment

**Table 4: Dental parameters**

Particulars	Values
Upper incisor - NA	30° 8 mm
Upper incisor to A-pogonion	7 mm
Lower incisor - NB	45° 8 mm
Lower incisor to A-pogonion	6 mm
Incisor mandibular plane angle	127°
Interincisal angle	102°

NA: Nasion to point A, NB: Nasion to point B, A-pogonion: Point A to Pogonion

## RESULTS

The buccally erupted canine was aligned into the arch within a span of 2 months. This avoided the convention fixed orthodontics for the alignment period.

## DISCUSSION

Canines are also the most frequently malposed teeth due to their long path of eruption. They may be impacted or ectopically erupted, either palatal or buccal to the arch.

To avoid any complications such as untoward tooth movement of adjacent teeth, the conventional alignment mechanics were disregarded in this case. A unique method was employed for applying forces palatally to the malpositioned canine using a modified TPA.

The method used in this case report is noninvasive and thus more acceptable to the patient. We have achieved faster alignment of the buccally placed permanent canine, i.e., in almost 2 months. Undesirable round tripping of adjacent teeth was avoided. The bonding on anterior teeth was prolonged till the canine alignment, which made the mechanics more inconspicuous and acceptable to the patient.

The fabrication of the components is easy. The materials used are routinely found in all orthodontic setups; therefore, no additional cost has to be borne.

Only drawback of this is the irritation caused to the tongue by the modified TPA. The loop incorporated in the modified TPA also caused some discomfort during swallowing and speech.

## CONCLUSION

With this innovative method, we have avoided conventional fixed orthodontics for about 2 months of time. The conventional wires would have created untoward buccal flaring of the adjacent teeth; therefore, a new method was thought of. Thus, a modified TPA which applied a palatal force to the buccally erupted canine was used. The force was applied with the help of a lingual button which was close to the center of resistance of the canine, thus preventing any distorted tooth movements. This method has effectively aligned the buccally erupted canine.

### 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.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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