ARTICLES SCIENTIFIQUES

Management of impacted maxillary canines : a case report

Prise en charge des canines maxillaires incluses : à propos d'un cas

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Abstract

This case report describes surgical-orthodontics disinclusion of impacted maxillary canines. A 17 year old female patient presented herself to our department of orthodontics. Clinical examination revealed the absence of 13 and 23 with a bulge in the palatal mucosa in relation to 11, 12 and 21, 22. Orthopantomograph revealed impacted left and right canines. After orthodontic consultation, guided movement of the canine to the desired position was deemed to be feasible and orthodontic traction was suggested to be the treatment plan. After 34 months of active treatment, the main objectives were successfully achieved, and the patient was satisfied.

Keywords

impacted canine, oral surgery, orthodontic traction, anchorage

Résumé

Ce cas clinique décrit la désinclusion chirurgico-orthodontique des canines maxillaires incluses. Une patiente de 17 ans s'est présentée à notre service d'orthodontie. L'examen clinique a révélé l'absence de 13 et 23 avec une protubérance dans la muqueuse palatine en relation avec la 11, 12 et la 21 et 22. La radiopanoramique a révélé l'inclusion des canines gauche et droite. Après consultation orthodontique, la traction de la canine vers la position souhaitée a été jugé réalisable, et la traction orthodontique a été suggérée comme plan de traitement. Après 34 mois de traitement, les objectifs principaux ont été atteints avec succès, et la patiente était satisfaite.

Mots clés

Canine incluse, chirurgie orale, traction orthodontique, ancrage.

INTRODUCTION

Among impacted teeth, maxillary canines are the most frequently affected, second to third molars. Approximately 2% of the population experiences maxillary canine impaction, with twice as many cases occurring in females compared to males. Notably, the incidence of canine impaction is more than double in the maxilla compared to the mandible (1). It is worth mentioning that out of all patients with impacted maxillary canines, 8% exhibit bilateral impactions. According to several authors, among the theories aiming to explain the etiology of inclusion, two predominate : the theory of guidance and genetic theory (2).

In fact, impaction of maxillary canine is a common dental issue that can significantly affect a person's oral health and overall smile aesthetics. It can pose a significant challenge in orthodontic treatment, requiring multidisciplinary assessment, planning, and execution to achieve optimal outcomes. The treatment of this clinical entity can range from abstention to tooth extraction. However, the most desirable approach for managing impacted maxillary canines is early diagnosis and interception of potential impaction (3). Otherwise, clinicians should contemplate orthodontic treatment, followed by surgical exposure of the impacted canine, in order to guide it into proper occlusion. Here, we report a successful case of orthodontically traction of two impacted maxillary canines.

CASE REPORT

Case presentation

A 17-year-old female patient consulted the department of Orthodontics of the dental medicine clinic of Monastir, faculty of dental medicine, with the chief complaint of missing permanent canines in the upper arch. No relevant medical and dental history was recorded.

both right and left permanent upper canines and presence of decidious upper canines. The occlusal examination revealed a Class I molar relationship occlusion on both sides associated with anterior crossbite. The facial midline was shifted from maxillary and mandibular midline, and the maxillary dental midline was shifted by 2 mm to the right side (Figure 1). Functional evaluation showed nasal breathing and normal swallowing.

The panoramic radiograph revealed palatally impacted maxillary canines in the left and right quadrant.

Cephalometric radiography indicated a Class II skeletal Relationship (ANB angle = 6°) and a normodivergent mandibular plane (FMA= 22°). The lower incisor was well positioned, and the upper incisor was retrusive.

Cone-beam computed tomography (CBCT) revealed that the left and right canine roots apices were positioned above the normal canine position (Figure 2), indicating a good prognosis. The canines were angulated 40° and 30° to the midline on the left and right sides respectively, which suggested an average prognosis to the left canine and a good prognosis to the right canine.

Figure 1 Pretreatment extraoral and intraoral photographs of the patient

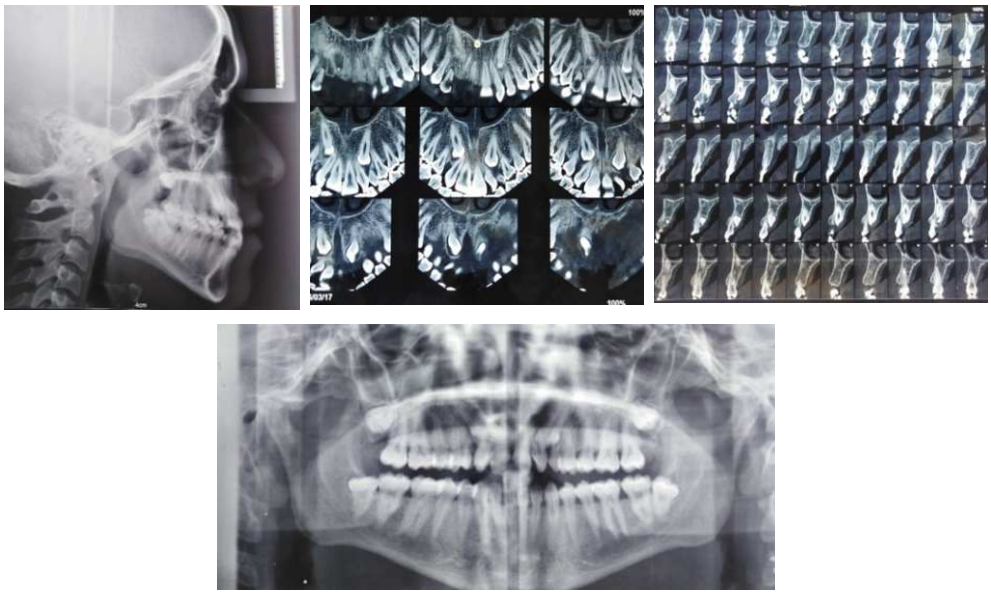

Figure 2 Pre treatment cephalometric radiograph, panoramic radiograph and CBCT

Table I Pretreatment cephalometric records

Measurement	Cephalometric values	Mean values
SNA	76°	82° ± 2
SNB	70°	80° ± 2
ANB	6°	-2°- +2
AoBo	6mm	0-4mm
IMPA	98°	87°
FMA	22°	20°-30°
GoGn/SN	38°	32±5
I/F	97°	107°

Treatment Objectives

The goals of treatment were (1) to readjust the patient's esthetics and function by repositioning impacted canines, (2) to align and level the arches, (3) to establish adequate overbite and overjet, and (4) to improve the patient's smile and facial profile.

Treatment Alternatives

The following treatment alternatives were considered : (1) extraction of decidious teeth and orthodontic traction of the impacted canines ; (2) extraction of the impacted teeth and provide adequate space for future dental implants ; and (3) extration of impacted teeth and mesialisation of posterior teeth and finishing in class II molar.

These treatment options were discussed with the patient's parents. Considering the patient's age and the good prognosis. Therefore, it was decided to tract the impacted canines and correct the patient's occlusion with orthodontic treatment.

Treatment Progress

The patient was reffered to the oral surgery department. Therefore, a closed surgical exposure technique of the upper impacted canines was performed. A bracket with twisted wire ligatures was bonded to the enamel surface of the impacted teeth crown. The flap was repositioned in its original location and sutured with Vicryl 4-0 absorbable thread. The extraction of deciduous maxillary canines was postponed.

Figure 3 Exposure of palatally impacted crown

The same day, a transpalatal arch on the first permanent molars to prevent mesial movement and tipping of the molars was placed. Two cantilevers in stainless steel wire were inserted in the tranpalatal arch and activated in extrusion to ward off the crowns of the impacted canines from the roots of upper incisors because of their proximity (Figure 4). These forces were activated twice monthly, and after 4 months, canine bumps were visible in the centre of the palate. At this stage, the deciduous canines were extracted and an orthodontic treatment with fixed .022x.028 multibracket appliance was started (Figure 4). The vector of activation on the cantilever was changed in extrusion and vestibular direction.

Figure 4 Maxillary leveling phase with 014 NiTi archwire.

Initial alignment was achieved with the sequence of nickel titanium archwires 0.014, 0.018, 0.017x0.025. The treatment was followed using 0.017 x 0.025 stainless steel wires. The spaces in the upper right and left canine regions were maintained with open coil inserted between the lateral incisor and first premolars. Mandibular elevation splint was delivered to the patient to facilitate the canines traction (Figure 5).

Figure 5 Canines traction with elastic chains

Once sufficiently erupted, the crown of the impacted canine was bonded with a canine bracket. Subsequently, the canine was gradually translated into the correct position in the dental arch by progressive reactivations of elastic traction with elastic chains.

One year and 5 months after exposue surgery, mandibular arch was bonded. A 0.014-in nickel-titanium wire was engaged as the initial archwire to start leveling and aligning. Then 0.018 NiTi, .017*.025 NiTi and .017*.025 SS were used successively. Gradually, 0.018 x 0.025 and 0.019 x 0.025 archwires SS were placed for finishing and refinement of intercuspation through elastics (Figure 6). After 34 months of active treatment fixed appliances were removed and fixed retainers in both the maxillary and the mandibular arches were bonded.

Figure 6 Finishing phase

Treatment results

At the end of the treatment, a functional occlusion was observed. The clinical results included normal overjet and overbite, adequate intercuspation, and dental midlines coinciding with the facial midline, normal maxillary and mandibular incisor proclination with class I molar and canine relationship bilaterally (Figure 7). The radiographic evaluation showed ideal root parallelism, preserved periodontium, and bone tissues health in canine region (Figure 8). The patient was satisfied and the case was finalized.

Figure 7 Post treatment facial and intra-oral photographs

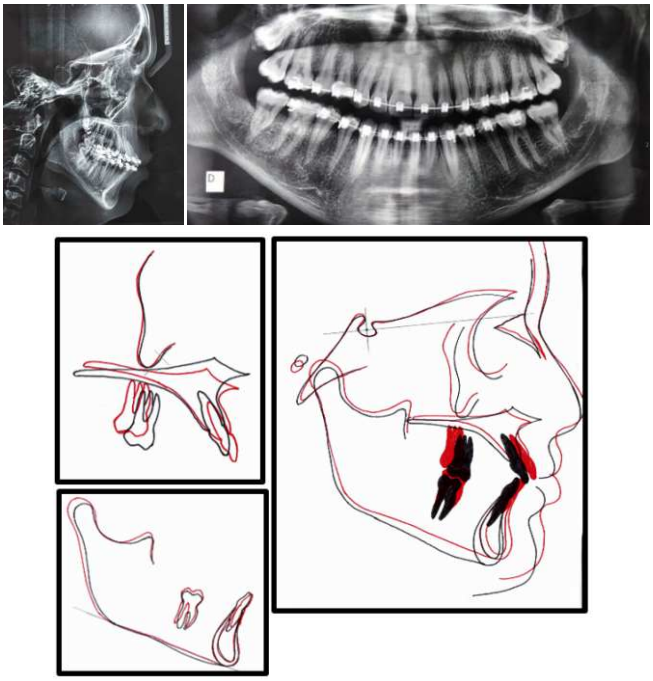

Figure 8 Post treatment radiograph and total and partial cephalometric superimpositions

Table II Pre and post-treatment cephalometric values

Measurement	Pretreatment	Posttreatment
SNA	76°	76°
SNB	70°	72°
ANB	6°	4°
AoBo	6mm	4mm
IMPA	98°	99°
FMA	22°	22°
GoGn/SN	38°	37°
I/F	97°	104°

DISCUSSION

Palatally impacted canines are considered one of the most challenging cases to be handled by an orthodontist. The exact etiology of canine impaction is unknown (4). Several etiologic factors for canine impactions have been suggested : localized, systemic, or genetic. It has been suggested that the devious path the canine follows during its eruption and the long period of its development play an important role in its impaction (5). Major complications could happen due to an impacted canine. The most cited are internal or external resorption of Adjacent teeth, Changement in alignment or proclination of lateral incisor and Odontogenic Cyst formation (6). To avoid these disorders, early diagnosis and effective treatment are highly recommended.

The management of an impacted maxillary canine can be approached using various techniques. The selection of a specific method depends on several factors, including the level of impaction, the patient's age, the stage of root development, the presence of any related dental issues (7), the condition of adjacent teeth, the position of the impacted tooth, the patient's cooperation As this case shows, for growing patients, without severe arch space deficiencies, The orthodontic traction of the impacted canine is more appropriate for cases with better prognosis(8). Therefore, High-quality tomographic images play a pivotal role in the successful assessment of dental traction. They empower dental professionals to precisely pinpoint the position of impacted teeth, assess potential damage to neighboring roots, and gauge the density of bone surrounding each tooth (9). Additionally, they aid in the detection of potential root ankylosis, which is often a key factor contributing to the failure of impacted teeth to reach their intended positions during the eruption process (10). Thus, The decision to proceed with orthodontic traction of an impacted canine should be thoroughly examined, relying heavily on a comprehensive clinical and radiological assessment.

CONCLUSION

The successful management of this case confirms that addressing impacted canines demands multidisciplinary approach, involving orthodontists, oral surgeons, and also periodontists.

REFERENCES

1. Sridhar Premkumar1, Shameer SFs2, Marcos Roberto Tovani-Palone. Management of impacted maxillary canines: a case report. Electron J Gen Med 2019;16(5):em155 ISSN:2516-3507

2. Sajnani AK, King NM. The sequential hypothesis of impaction of maxillary canine. A hypothesis based on clinical and radiographic findings. Journal of Cranio-Maxillo-Facial Surgery 40 (2012); 375-385

3. Manne R, Gandikota C, Juvvadi SR, Medapati Rama H, Anche S. Impacted canines: Etiology, diagnosis, and orthodontic management. J Pharm Bioall Sci 2012;4:234-8.

4. Mavani K J, Jain M J, Pai V, et al. (May 04, 2022) Orthodontic Treatment of a Case With Palatally Impacted Canine and Missing Molars: A Case Report. Cureus 14(5): e24741. doi:10.7759/cureus.24741

5. Varghese, G. (2021). Management of Impacted Canines. In: Bonanthaya, K., Panneerselvam, E., Manuel, S., Kumar, V.V., Rai, A. (eds) Oral and Maxillofacial Surgery for the Clinician. Springer, Singapore.

6. Gustavsson A, et al. Closed vs. Open surgical exposure of palatally displaced canines: Surgery time, postoperative complications, and patients' perceptions: A multicenter, randomized, control trial. Eur J Orthod 2018;40:626-35

7. Bjerklin: Orthodontic management of impacted maxillary canines. APOS Trends in Orthodontics Volume 10 Issue 2 April-June 2020

8. Ferguson DJ, Al Rossais D, Wilcko MT, Makki L, Stapelberg R. Forced-eruption time for palatally impacted canines treated with and without ostectomy-decortication technique. Angle Orthod 2019;89:697-704.

9. Becker A, Chaushu S. Success rate and duration of orthodontic treatment for adult patients with palatally impacted maxillary canines. Am J Orthod Dentofacial Orthop 2003;124:509-14

10. Cruz RM. Orthodontic traction of impacted canines: Concepts and clinical application. Dental Press J Orthod. 2019 Jan-Feb;24(1):74-87. DOI: https://doi.org/10.1590/2177-6709.24.1.074-087.bbo