



Orthodontic treatment with functional and esthetic substitution of canines by first premolars. Case report

Tratamiento ortodóncico con sustitución funcional y estética de caninos con primeros premolares. Presentación de un caso

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ABSTRACT

Diagnosis and treatment of ectopic teeth is necessary in order to avoid complications that compromise dental function, stability and esthetics. The canine is the tooth that presents greater percentage of problems of space in the dental arch and its eruption in a high zone is frequent. For that purpose, a multidisciplinary approach is suggested, which will serve to achieve the goals that orthodontics itself may not fully achieve. This article presents a skeletal class I patient with an ectopic upper left canine with gingival recession, retained lower left canine with dilacerated root, bilateral molar class I, right canine class III and left non-assessable canine class, deviated midline, horizontal growth and retrusive lips. The results showed bilateral molar class I, right canine class I and left premolar class I, alignment and leveling of the dental arches, normal overjet and overbite and centered midline.

Key words: Ectopic canines, retained canines, gingival recession, orthodontics.

Palabras clave: Caninos ectópicos, caninos retenidos, recesión gingival, ortodoncia.

RESUMEN

El diagnóstico y tratamiento de los órganos dentales ectópicos son necesarios con el fin de evitar complicaciones que comprometan la función, estabilidad y estética dental. El canino es el órgano dental que presenta mayor porcentaje de problemas de espacio en la arcada dental y es frecuente su erupción en una zona alta. Para tal fin, se plantea un trabajo multidisciplinario, lo cual servirá para lograr los objetivos planteados que la ortodoncia por sí misma no podría conseguir de manera completa. Este artículo presenta a un paciente, clase I esquelética con el canino superior izquierdo ectópico, el cual presenta recesión gingival, canino inferior izquierdo retenido con raíz dilacerada, clase I molar bilateral, clase canina III derecha y clase canina izquierda no valorable, línea media desviada, dirección de crecimiento horizontal y birretroquelia. Se logró clase I molar bilateral, clase I canina derecha y clase I premolar izquierda, alineación y nivelación de arcos dentales, sobremordida horizontal y vertical adecuada, y línea media centrada.

INTRODUCTION

In common dental practice ectopic teeth are a common problem that the dentist and orthodontist face. The canine is the tooth that has the highest percentage of problems of space in the dental arch and its eruption in a high zone is frequent. The retention or inclusion of canines has a complex etiology, favored by evolutionary, anatomical and mechanical factors.¹

Ectopic canines generally imply dysfunctional and local risks as well as great therapeutic complexity, which includes the integration of surgical, orthodontic and periodontal phases.¹

Some of the reasons why an upper canine may suffer retention are: abnormal position of the tooth, retained primary teeth, supernumerary teeth, trauma to the tooth germ, odontomas, and cysts among other conditions. All these conditions may cause an anomaly

in the proper occlusion and dental function which has an impact on the health of the individual.²

Ericson and Kurol (1986) estimated that retentions are two times more frequent in women (1.17% of the total population) than in men (0.51%). Of all patients

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with upper canines retained it is estimated that 8% of these retentions are bilateral.³

Eruption anomalies include ectopic eruption, inclusion within the bone, with or without impaction in a structure. Labial impaction is usually associated with space problems, which may be corrected by increasing it, while palatal impaction is associated with anomalies of the eruption path.³

Among the mechanical factors, a distinction should be drawn between a lack of space caused by a maxillary dimorfosis or incisor retroclination and the presence of an obstacle that hinders the eruption of the canine such as temporary canine persistence, odontomas and supernumerary teeth.³

Traumatic factors may be responsible for the ectopic eruption or inclusion of the canines when the trauma causes destruction of the follicle and, consequently, ankylosis.⁴

With regard to etiology there are two main theories to explain the development of the maxillary canine impaction: the theory of the «guide» and the «genetics» theory. The first is referred to as causal to an excess of space in the apical region of the maxilla during the process of eruption of the permanent canine, due to hypoplasia or aplasia of the lateral incisors. Thus, the canine lacks an «eruptive guide» that is represented by the roots of the neighboring teeth, favoring an anomalous position of the dental germ. The genetic theory points out that there is an anomaly of the development of the dental lamina. Numerous studies suggest that genetics play a significant role in the palatal canine impaction noting its association with other dental anomalies such as tooth agenesis, microdontia of lateral incisors and premolars displaced to distal.⁵

Non-intervention of this pathology may lead to root resorption of the neighboring teeth, development of cysts, ankylosis and the need for complex and costly orthodontic treatments. Hence, early diagnosis and

careful follow-up of the development of dentition is essential for early intervention and the correction of eruptive anomalies.⁶

CASE REPORT

A male patient of 19 years of age, born in Xalapa, Veracruz, attended the Orthodontics Clinic of the High Specialty Center «Dr. Rafael Lucio», referring as reason for consultation «I don't like my fang».

Facially, patient was diagnosed as dolichofacial with convex profile, mild upper and lower retrocheilia and nasolabial angle of 95° (*Figure 1*).

Upon the intraoral clinical examination, the patient presented an upper left ectopic canine with gingival recession and a retained lower left canine, non-coincident dental midlines; ovoid arch forms, 1 mm overjet and 3 mm overbite. Molar class was I and canine class was III on the right side and on the left, it was non-assessable (*Figure 2*).

The orthopantomography revealed the upper left canine in supra-occlusion, a retained lower left canine with root dilaceration, and impacted third molars (*Figure 3*).

Cephalometric analysis showed a skeletal class I patient with upper and lower incisor retroclination and neutral growth (*Figure 4*).

TREATMENT

Treatment began with a hygienic phase consisting in caries removal and removal of calculus.

Considering the clinical and periodontal conditions of the upper left canine (gingival recession and cervical exposure) as well as the retention and the dilaceration at the root of the lower canine, it was decided to perform extraction of both canines, planning for the first premolars to aesthetically replace the extracted



Figure 1.

Initial facial photographs, where a dolichofacial patient with convex profile and supra-occlusion of the canine may be observed during smile.

teeth. 0.022 x 0.028" slot Roth brackets were placed, up to second molars.

The alignment and leveling phase had a duration of six months, with the following arch wire sequence: 0.012", 0.014", 0.016", 0.016" x 0.016", 0.016" x 0.022", 0.019" x 0.025" NiTi arch wires and then it continued with steel arch wires: 0.016" x 0.022" and 0.019" x 0.025". During this stage, stripping was performed in the lower left premolar area, due to the existing malposition in 44 and 45.

At nine months of treatment, a 0.016" x 0.022" SS arch wire with a «T» bend was placed to begin upper incisor retraction. At 11 months of treatment a 0.016" x 0.022" stainless steel arch wire with an elastomeric chain was used in the upper arch to complete space closure.

Once the working phase was finished, it was necessary to obtain a panoramic radiograph to assess root parallelism. Subsequently the finishing and detailing stage began with the use of intermaxillary elastics.



Figure 2.

Initial intraoral photographs, where the upper left ectopic canine with gingival recession may be observed as well as the retained lower canine.

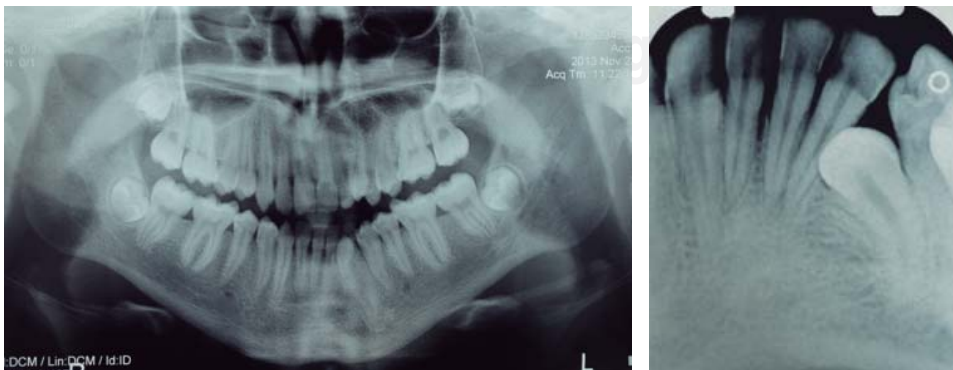


Figure 3.

The initial orthopantomography confirmed the upper left canine in supra-occlusion and the retained lower canine with dilacerated root as well as impacted third molars.

Active treatment time was one year, three months. For retention, upper and lower circumferential retainers were placed indicating to the patient a 24 hours use for a year. Subsequent control appointments were programmed on a monthly basis during the first four months after removal of orthodontic appliances.

RESULTS

Facial changes were minimal, with an improvement in the facial profile and good smile aesthetics (Figure 5).

The patient ended with good dental alignment and leveling, bilateral molar class I canine class I on the

right side and premolar class I on the left; coincident dental midlines, overjet and overbite in normal parameters, periodontal health and satisfactory aesthetics and function (Figure 6).

With regard to the final orthopantomography root parallelism and normal crown-root ratio may be observed (Figure 7).

The final lateral headfilm showed a skeletal class I patient (Figure 8), with neutral growth and upper and lower incisors stable in their basal bones. Cephalometric values were recorded in the initial phases and at the end of the treatment (Table I).

DISCUSSION

Statistically, 2% of the population has impacted canines and this condition is two times more frequent in women than in men (Cooke & Wang, 2006; Proffit et al., 2007). The incidence at the maxilla is more than double than that in the mandible (Yavuz et al., 2007), where about a third of maxillary canines are found labially and two-thirds, palatally.⁷

At three years of age, the upper canines are placed in a high position in the maxilla and present their crown directed towards mesial and palatal. Intraosseous migration takes their crowns to an intimate contact with the distal face of the roots of the lateral incisors. They have a long period of development with a complex path during which they are exposed to a variety of factors that may alter their eruption.⁷

Bishara classifies the causes that may slow its eruption in general and local. Within the local causes are: arch length and size discrepancies, prolonged retention or early loss of the temporary canine, abnormal position of the tooth germ, palatal



Figure 4. Initial lateral headfilm, which revealed a skeletal class I patient with neutral growth and incisor retroclination.

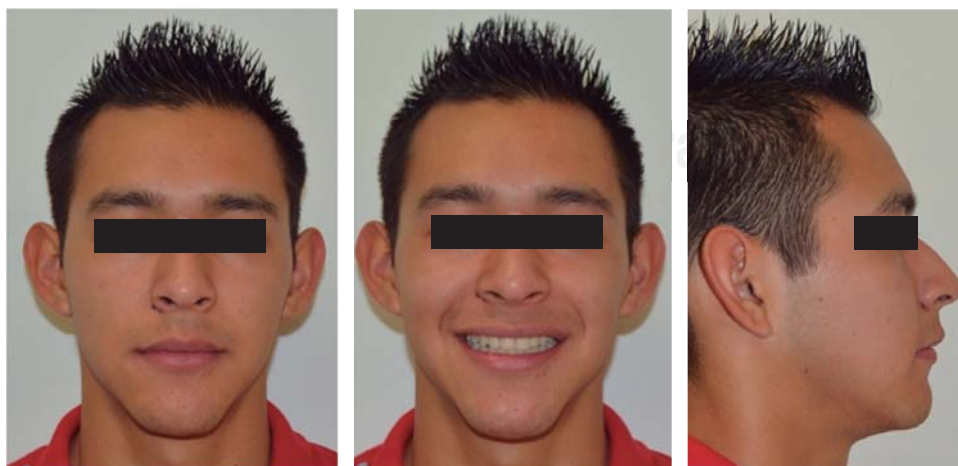


Figure 5.

Final facial photographs. An aesthetic improvement of the smile may be observed as well as a less convex profile.



Figure 6.

Final intraoral photographs: bilateral molar class I, canine class I on the right side and premolar class I on the left.



Figure 7. Control panoramic radiograph where good root parallelism and normal root length may be noted. Third molars would be extracted at the end of treatment.

clefts, ankylosis, formation of cysts or tumors, root dilaceration, root malformation, supernumerary teeth, fibrous gingival tissue, iatrogenies and idiopathic conditions.⁸

In this case it was decided to remove the upper and lower left canines, due to the fact that the upper canine was in supraocclusion, had gingival recession and exposure of the cervical third of the root; the lower left canine was retained and had a dilacerated root. Taking



Figure 8. Final lateral headfilm revealed a skeletal class I patient with upper and lower incisor centered in their basal bones.

into consideration that upper and lower left premolars were healthy it was determined that they could replace favorably, both in function and aesthetics, the canines thus reducing treatment time with satisfactory results for the patient.

Table I. Initial and final cephalometric values.

	Norm	Initial	Final
Ricketts			
Overbite	2.5 ± 2.5 mm	1 mm	2 mm
Interincisal angle	132° ± 6°	144°	137°
L1 protrusion	1 ± 2.3 mm	0 mm	2 mm
U1 protrusion	3.5 mm ± 2.3 mm	1 mm	2.5 mm
L1 inclination	22° ± 4°	15°	21°
U1 inclination	28° ± 4°	23°	25°
Lip protrusion	-3.8 mm ± 2 mm	-4 mm	-2 mm
Facial taper	68° ± 3.5 mm	70°	70°
Mandibular plane angle	23.3° ± 4°	20°	20°
Steiner			
SNA	82° ± 2°	85°	85°
SNB	80° ± 2°	82°	82°
ANB	3° ± 2°	3°	3°
Tweed-Merrifield			
FMIA	70° ± 5°	64°	68°
FMA	25° ± 3°	20°	24°
IMPA	90° ± 2°	86°	89°

CONCLUSIONS

At the end of the treatment the obtained changes were favorable. Class I molar relationship was maintained, canine class I was achieved on the right side and premolar class I on the left; arch form was improved, normal overjet and overbite were obtained and the profile was improved as well as incisor inclination.

Satisfactory results were achieved by replacing the canines with the premolars to acquire correct intercuspation between the upper and lower teeth, without any aesthetic or functional alterations. Orthodontic treatment was performed without much difficulty and treatment time was reduced.

The good treatment outcome is reflected in the absence of difficulties that may arise in these cases, such as: periodontal defects, occlusal interferences, root resorption and incorrect root parallelism.

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