case report

RARE CASE OF INVERTED IMPACTED CANINE IN INFRA-ORBITARY POSITION REQUIRING SURGICAL THERAPY

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SUMMARY

Objectives. Inclusion of maxillary canine is a common anomaly of timing eruption. The tooth is commonly found in a palatal position, and the frequency rate is higher in female than in male patients. In the frame of this type of anomaly, the inverted position of the impacted tooth is very rare, and unfortunately, the only possible treatment is the surgical extraction.
Case report. Here a case of a completed and root formed impacted canine in an inverted position is reported together with the surgical intervention. A 14-years-old patient under orthodontic treatment presented a delay in the canine eruption. The orthopantomogram revealed the canine was retained in an inverted position with the crown under the orbit floor. After an accurate radiological study of the involved anatomic area by means of computed tomography, the surgical extraction under general anesthesia was performed and the tooth was removed. Even though the tooth was nearby the orbital floor and the nasal cavity the intervention did not require the use of operative microscope.
Conclusions. Tooth retention is a frequent eruption anomaly that the dental practitioners may face in their professional life. An accurate clinical and radiological diagnosis, based on tridimensional exams such as computed tomography is fundamental for a correct treatment planning, either involving the combined intervention of surgical and orthodontic procedures or the surgical removal alone.

Key words: impacted inverted canine, eruption anomaly, tooth surgical extraction, mid cheeck region.

Introduction

After upper third molar, maxillary canine is the second dental element for frequency among impacted teeth (1). Its retention is most commonly palatal and the frequency rate is higher in female than in male patients.
The causes of the tooth retention are vary and different (2).
Anatomical site of development: the development of dental germ starts in the canine fossa between the orbit and the nasal cavity during the 5 and 6 months of intra-fetal life: this means the maxillary canine must complete a long pathway (22 mm at least), in a period ranges from 5 and 15 years old to reach the arch.
Difficult anatomical site of eruption: when the upper lateral incisors erupt in the arch, also the canine starts its eruption path by absorbing the root of the deciduous tooth. In this region of maxillary arches the permanent canine must go through between the lateral incisors and the first premolar already present in the arch.
Genetic predisposition and congenital diseases: in patients with cleft lip and palate, postoperative lip scratching occasionally compresses the premaxilla, preventing the physiological eruption of the front teeth. In subjects with trisomy 21 there is a high percentage of agenesis of mo-

lar thirds associated with maxillary canines included and transposition of the canine and premolar. Slow cell growth and the resulting reduced number of cells that characterize Down's syndrome may be responsible for the development of maxillary artery, delayed cell growth, altered canine eruption pathway and of the reduction in number and size of dental elements. In the cleido-cranial disostosis the presence of supernumeraries and alterations in the development of periodontal tissues causes the retention of the incisors and the inclusion of the canine. It is common to find the inclusion of one or more dental elements in several components of the same family. Palatal inclusion is the more frequent inclusion case: it may be related to an excess of space in the canine region, a microdontic or pin-shaped lateral incisor, for hypodontia, delayed dental growth or a cross-developed jaw.

Anamnestic and clinical information such as the oral hygiene status of the patient and its compliance (3-7) are fundamental for a correct diagnosis and to plan the timing of treatment, information about the eruptive forces, considering apex status, the availability of space in the tooth arch, the presence of the first premolar, the root morphology, the position and the axial inclination of the dental element play a key role in the diagnosis and the related choice of treatment (8, 9).

There are several treatment options (10), due to the importance of the considered element, in either lateral functionality, occlusion or aesthetics. If the cause of retention is represented by archway space shortage, orthodontic treatment allows us to recover space if the element still has residual eruptive capacity (11).

If retention has been diagnosed late, that is, when there is no residual eruptive capacity, orthodontic and surgical treatment seems to be the best choice.

If the position of the canine is unfavorable, such as horizontal or inverted position, the only treatment choice is the surgical one, with prosthodontics replacement if necessary.

We report in this paper the case of a 14-year-old patient who has been diagnosed with an inverted canine: in this situation the only therapeutic choice possible was the surgical treatment.

Case history

The female patient at the age of 9 started an orthodontic treatment with rapid palatal expansion and bracket placement to solve an anterior dental crowding of maxillary incisors.

At the end of the treatment, 4 years later, the dentist noticed the left upper-canine did not erupted yet.

Therefore an orthopantomogram (OPG) was prescribed. The OPG revealed the inverted inclusion of the upper left canine in the infra-orbitary position (Figure 1).

Since the tooth was already developed, and the position very unfavorable, surgery extraction was planned.

The surgical planning was preceded by the analysis of the computed tomography that allowed to study the position and the relationship of the tooth with the other anatomical structures (Figure 2).

The crown of the canine was placed on the bony border of the orbital floor. The root instead appeared to be laterally to the nasal structures with the closed apex (Figure 2).

The surgical intervention was performed under general anesthesia. Once anesthetized with nasal intubation and the antisepsis of the surgical field, a mucoperiosteal flap was realized with a linear incision on the vestibular side of the maxillary arch extended from the second molar to the left lateral incisor (Figure 3). The flap was detached to discover the area of the infraorbital

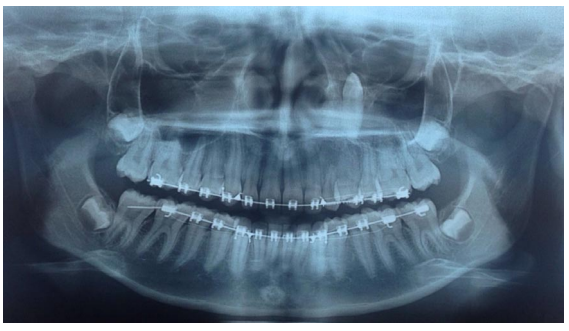

Figure 1
Orthopantomogram showing the left maxillary canine in inverted position.

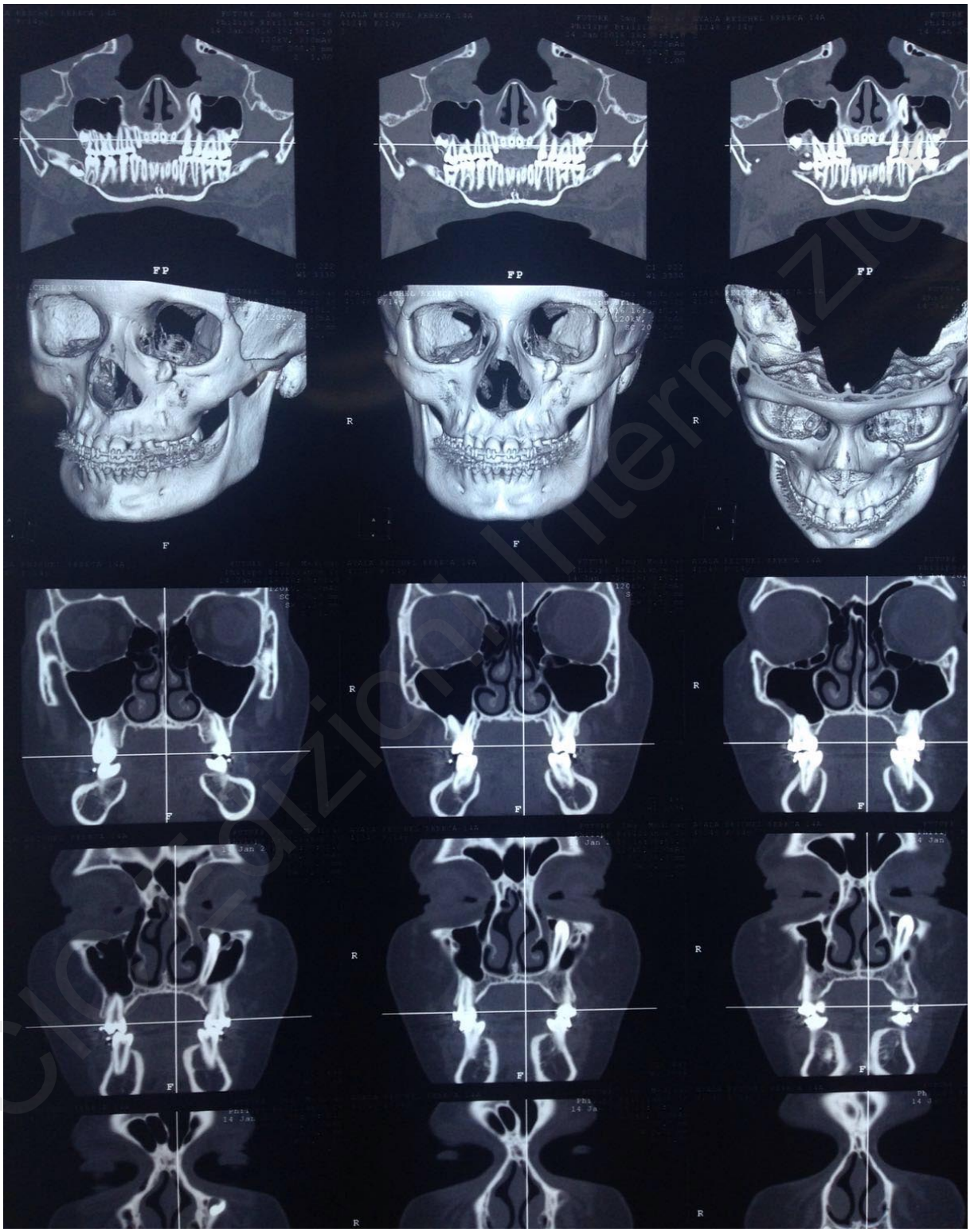

Figure 2
Computed tomography study showing the position of the impacted canine and its anatomical relationship with the orbit floor, with the nasal cavity and with the infraorbit foramen.

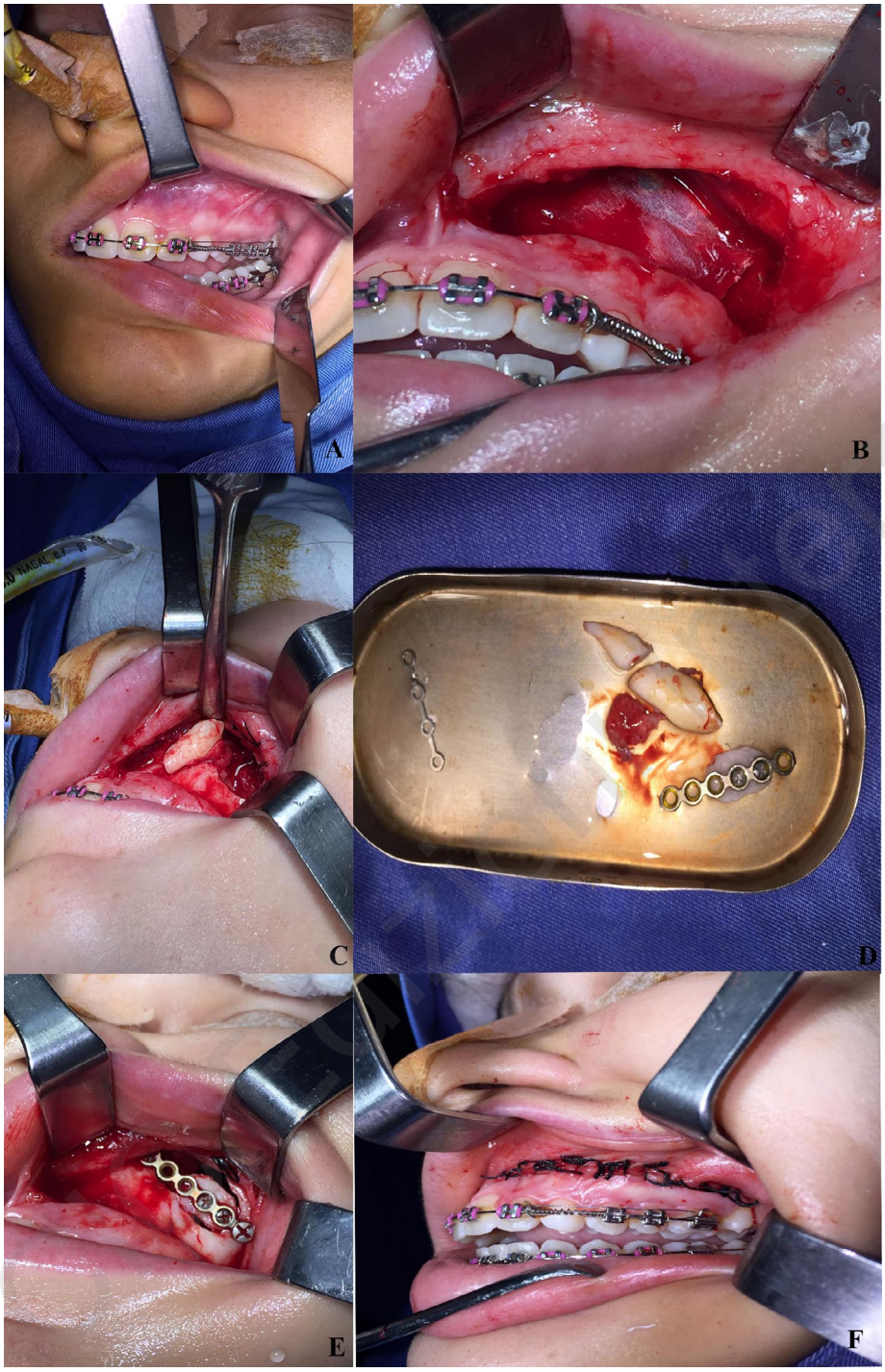

Figure 3
Surgical steps of the interventions. (A) Preoperatory surgical field. (B) Paramarginal flap in the vestibular side of the maxillary arch from the molar to the central maxillary incisor. (C) Exposure of the maxillary bone, osteotomy and exposure of the canine. (D) Section of the canine and its extraction with the follicular sac. (E) Placement of titanium miniplates to fast the bone healing. (F) Suture.

nerve and malar. Then a window-shaped osteotomy was performed on the external cortex of the malar bone to gain access through it to the retained canine. After the removal of the cortical bone, the maxillary sinus was accessed exposing and sectioning the Nashville membrane to visualize the canine retained through the maxillary sinus (Figure 3).

Afterwards, the canine was sectioned at the middle root level to proceed with the extraction, roving firstly the upper segment, thus allowing the extraction of the middle third of the root (Figure 3).
Then, a curettage of the pericoronary follicle and a wash with physiological saline inside the sinus and remaining alveolar bone was performed.
Then the cortical bone was repositioned and fixed to the malar bone with a micro plate and titanium screws (MACO Dental Care) for its stabilization and integration. Finally, the toilette and suture were made with separate points of 3-0 silk thread (Figure 3).
The removal of the microplate was performed eight months after surgery, when it was evident that the maxillary bone had healed completely.
Even though the position of the impacted tooth was critical due to the position under the floor of the orbit, no surgical microscope was used.

Discussion

Tooth retention is acknowledged among the anomalies of eruption. According to the type and the grade of tissue covering the tooth (soft/hard tissue), it can be classified into partial and complete retention.
Reasons for tooth retention are numerous, but in case of maxillary canine, the position of the germ formation plays a key role in the pathogenesis of the tooth retention.
The position of the permanent maxillary canine is the canine fossa. The development of the skeletal structure goes parallel to the development of the long root of the upper canine.
The pathway of the upper canine eruption, though, is not flawless. From the canine fossa the maxillary canine has to migrate in the arch, avoid the apex of the maxillary lateral incisor and take its position between the lateral incisor and the premolar (12).
The position of a retained canine, usually, is palatal (11). In the case here reported the tooth was positioned upside-down. This particular type of anomaly is rare in canine. Indeed, it is more frequent in impacted third molars and premolars (13).
This type of malposition may not present any particular symptoms or it can cause complications such as delayed or ectopic eruption, crowding, diastema, eruption into the nasal floor, resorption of the adjacent root and development of a dentigerous or primordial cysts (14).
The final diagnosis is reached by radiological exam, such as orthopantomogram. However, a more accurate study is necessary when surgery is indicated for the treatment (either conservative or extractive) (15). Computed tomography in these cases is indicated to study the position and the relationship of the tooth with the anatomical structures nearby (16, 17). In addition, the detection of eventual cysts or lesions derived from the follicular tissue is possible by means of CT and important for planning their removal (18).
In the case here reported, the CT analysis allowed to visualize accurately the tooth position, in the mid-cheek area (19).
The anatomy of this area indeed makes surgical interventions very challenging. Specifically in the case presented three sub-anatomical segments were involved: lid cheek segment, the malar segment and the nasolabial segment. Therefore, the important anatomical structures to consider were the nasal cavity, the maxillary sinus and the orbital floor, together with their related arterial vessels (20).
Indeed, the arterial vascular system of this complex area is given by the branches of the internal maxillary artery, which rises directly from the external carotid artery (17). The main vascular concern in this case is given by the infraorbital artery, within the infraorbital foramen.
The used approach in this case included the access from the oral cavity to reach out the maxillary bone to localize the tooth and remove it together with the follicular tissue in the safest way.

Conclusions

Tooth retention is a frequent eruption anomaly that the dental practitioners may face in their professional life. An accurate clinical and radiological diagnosis, based on tridimensional ex-

ams such as computed tomography is fundamental for a correct treatment planning, either involving the combined intervention of surgical and orthodontic procedures or the surgical removal alone.

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