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Transmigration of a mandibular canine: case report

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ABSTRACT

Background Transmigration of mandibular canine is an uncommon clinical condition in which impacted canine crosses the midline. The present study describes the case report of a transmigrated canine associated with a follicular cyst located near the inferior border of the mandible in a 15-year-old female patient.

Case report Orthopantomography showed the presence of an included transmigrated canine, tooth 43, in a horizontal position, along the lower edge of the mandible, under the roots of the lower incisors, and, in addition, the presence of an attached cysts. CBCT showed type D2 bone quality, according to Misch's classification, and that the medullary component was well represented, which allows a good healing of hard tissues thanks to an adequate vascularization. One week after the extraction of the transmigrated canine with the contemporary enucleation of the cyst, the removal of stitches was performed and excellent tissue healing was assessed. After six months the orthopantomography showed an optimal healing of the hard tissues.

Conclusion Etiology of this phenomenon is unknown, but in some cases the presence of follicular cyst may be one of the causes. Canine transmigration is more prevalent in the mandible and women seem to be more affected than men. Mandibular canines play a crucial role in the oral cavity. Therefore, an early diagnosis is required, by the use of radiographs, especially orthopantomography or computed tomography. In case of transmigrated canine associated with follicular cyst, although several treatment options are described in literature, surgical extraction along with the enucleation of the cyst is the only treatment of choice.

KEYWORDS Mandibular canine; Transmigration; Impacted canine; Ectopic tooth eruption.

INTRODUCTION

The failure of the eruption of permanent canines is a relatively frequent clinical condition. There are two reasons that explain this failure: the first is due to the fact that there is not enough space for the eruption, the second is related to the late eruption of the teeth. This may lead to tooth inclusion or transmigration. Tooth inclusion refers to the failure of the of permanent tooth eruption with a fully formed root, while transmigration refers to the inclusion of the tooth beyond the midline for more than half of its length (1–3).

Transmigration can occur in either the upper or lower jaw, but it is more frequent in the lower jaw and affects the canine tooth (4), while canine inclusion is more frequent in the upper jaw (5).

Ando was the first to describe this phenomenon in 1964, while Mupparapu drew up a classification, describing 5 types based on the position of the canine with respect to adjacent structures and teeth (6,23). To date, the etiology of transmigration is still not fully understood, but there are some hypotheses about it. The causes may be: premature loss of the deciduous tooth, retention of the deciduous canine, supernumerary teeth, excessive length of the crowns of the mandibular incisors (8), but also tumours, cysts (6), lack of space along the path of the canine germ eruption, hereditary factors, disorders of the endocrine glands (9).

A commonly accepted explanation is the abnormal displacement of tooth germ in embryonic life (10). The path of least resistance probably defines the movement of tooth migration. It follows the direction of its longitudinal axis, while the crown guides the migration (11).

Stafne and Gibilisco argue that the migration of an unerupted tooth is possible thanks to rich blood circulation and active alveolar bone formation at the stage of development of the dental apex (12).

Usually there are no clinical symptoms, although the formation of follicular cysts, chronic infection and pain in the lower incisors have been reported (13).

The canine plays a very important role in the oral cavity. It has the function of guiding in the sideways, it has the aesthetic function of supporting the soft tissues and giving attractiveness to the smile, it has the function of anchoring and giving stability to the tooth for its length

FIG. 1 Pre-operative orthopantomography.

and longevity (14,36). Lack of permanent canines in the dental arch can bring misalignment with the result of unsteadiness and alterations of occlusal contacts.
Ciancaglini et al. (15,16) reported significant relationships between distribution of occlusal contacts and temporomandibular disorders. It is important to make an early diagnosis of dental inclusion/transmigration in order to be able to recover it orthodontically or to provide for its surgical removal.
In some studies, a preventive orthodontic study is recommended, to determine if it is possible to open the space occupied by the deciduous canine in order to reposition the permanent tooth and/or to be able to insert an implant in adult age (13,17,18).
However, sometimes before implant placement, it is necessary to perform reconstructive preimplant surgery with the use of different grafting materials (19,20) or with bone grafts (harvested from the calvaria) (21) to restore bone morphology for the implant-prosthodontic rehabilitation. Today, less invasive methods such as shorts and all-on-four procedures are preferred in patients with systemic or immunocompromised diseases; therefore it is necessary to preserve the quantity and the quality of the bone (34,37).
This paper illustrates a case of mandibular canine transmigration associated with follicular odontogenic cyst.

CASE REPORT

A 15-year-old female patient presented at the observation at the Department of Dentistry of the San Raffaele Hospital in Milan complaining of a slight pain on palpation, in the region of the mandibular symphysis.
The history did not show any previous trauma and the clinical examination showed a deciduous canine

FIG. 2 Pre operative CBCT cross section.

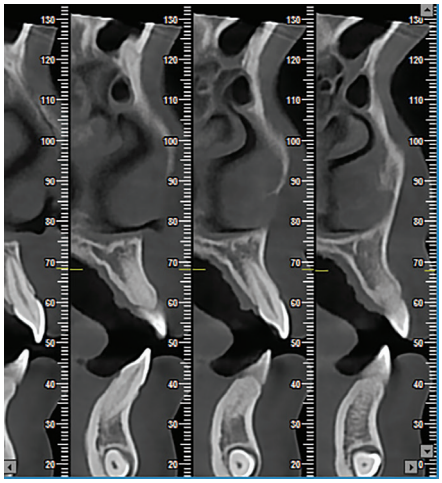

FIG. 3 Pre operative CBCT sagittal section.

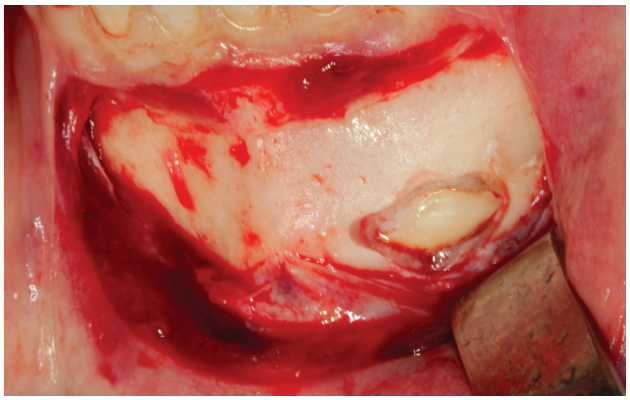

FIG. 4 Osteotomy to expose the crown.

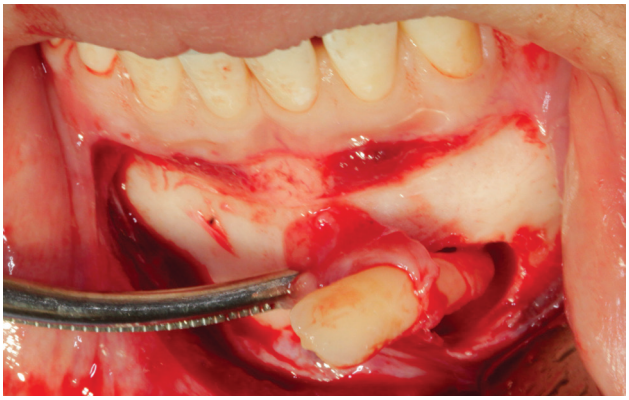

FIG. 5 Extraction of the transmigrated tooth.

in the 4th quadrant. Vitality tests were performed for the lower anterior dental group with positive results for all teeth. At this point the patient was invited to perform further diagnostic investigations: first an orthopantomography, then a computerized tomography (Fig. 1-3).
Orthopantomography showed the presence of an included transmigrated canine, tooth 43, in a horizontal position, along the lower edge of the mandible, under the roots of the lower incisors, in accordance with type T2 of Mupparapu classification and, in addition, the presence of an attached cysts.
After a second level radiographic investigation, CBCT, the extraction of the transmigrated canine with the contemporary enucleation of the cyst was planned. Before starting, it is necessary to rinse with 0.2-0.3% chlorhexidine, which reduces the bacterial load in the oral cavity (35).
The operation was performed under local anesthesia (Optocaine 20 mg/mL with adrenaline 1:80,000). A paramarginal incision was made, from canine to canine, with release from both sides, gently separating the tissues to the lower edge of the mandible.
An osteotomy was then performed to expose the crown and part of the root, then the tooth was dislocated and, after making a small notch at the cement-enamel junction, extracted with the aid of a Berry lever (Fig. 4, 5).
The cysts were enucleated and the curettage of the alveolus and the irrigation of the residual cavity with abundant physiological solution were performed.
Collagen sponges were applied and flap adaptation and suturing in the various muscular and mucous planes were performed with 3–0 resorbable suture (Vicryl; Ethicon, Johnson & Johnson, New Brunswick, NJ, USA) (Fig. 6, 7).
At the end, an extraoral compression bandage was performed and a postoperative care with 875 mg amoxicillin + 125 mg clavulanic acid three times a day for 6 days was prescribed. Moreover, if necessary, the analgesic therapy with ibuprofen 600 mg was continued.

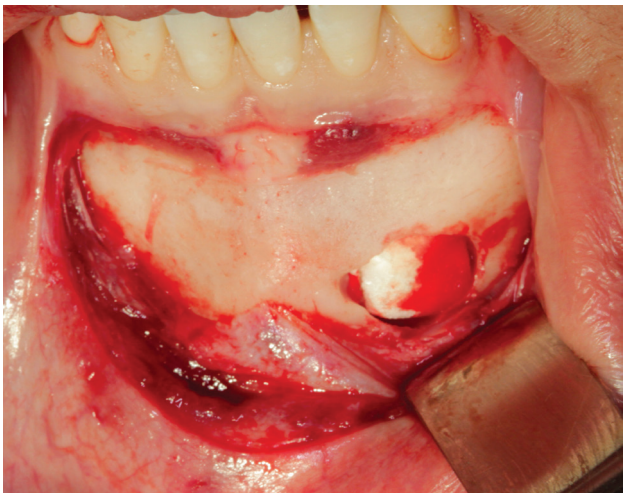

FIG. 6 Application of collagen sponges for clot stabilization.

FIG. 7 Wound healing one week after surgery.

One week later, given the excellent healing of the soft tissues, the removal of stitches was performed in order to further improve patient's comfort.
The patient was finally included in the program of periodic routine recalls. After six months from the oral surgery the orthopantomography showed an optimal healing of the hard tissues (Fig. 8).

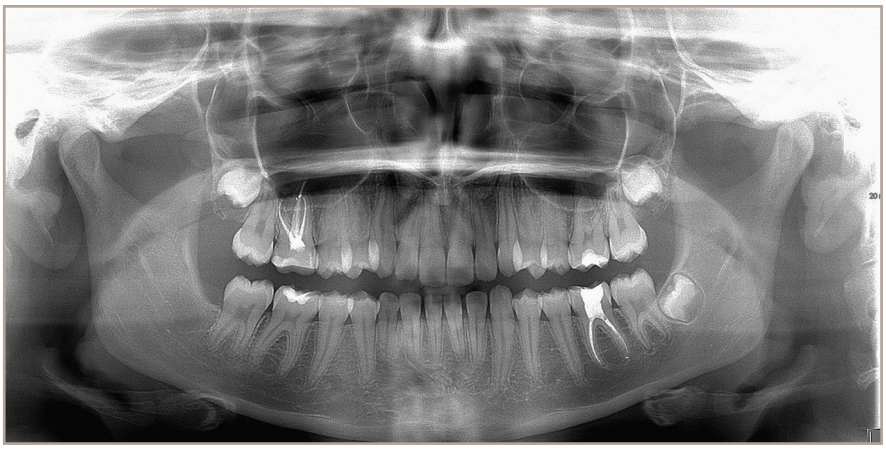

FIG. 8 Orthopantomography: 6 months follow up.

DISCUSSION

The present case confirms the current literature, as transmigrated mandibular canines are reported more frequently in females than males in the ratio of 1.6:1 (22). Tarsitano et al. defined transmigration as the phenomenon of an unerupted mandibular canine crossing the midline (23,24). By the early 1980s, Javid (25) modified Tarsitano's (17,18) definition, because he included the cases in which more than half of the tooth had passed through the midline. Joshi and Auluck et al. (26,27) considered that it is more important the tendency of a canine to cross the midline suture than the distance of migration after crossing the midline.

Some authors support that, for a correct diagnosis, localization and an effective treatment plan, intraoral radiographs are not sufficient, and further investigations by means of orthopantomography and computed tomography are necessary (28). Accordangly, mandibular canines positioned near the inferior border of the mandible, as in this case report, can only be diagnosed with orthopantomography.

Transmigrated canines are classified by the criteria established by Mupparapu (7) as follows.

- Type 1: mesioangular canine with the crown crossing the midline, lateral or lingual to the anterior tooth.
- Type 2: horizontal canine, near the lower edge of the mandible, under the apexes of the lateral incisors.
- Type 3: the canine is erupted, medially or distally to the opposite side.
- Type 4: the canine is horizontal near the lower edge of the mandible, under the apexes of the premolars and/or the contralateral molars.
- Type 5: the canine is positioned vertically, in the midline, with the long axis of the tooth crossing the midline

The case reported is an example of type 2 mandibular canine transmigration with tooth at the lower border of mandible and horizontally impacted below the apices of the incisors. The exact mechanism of transmigration is still unknown though there are some hypotheses.

Candeiro and Tavares (29) suggested that the premature loss of the deciduous canine, resulting in the lack of space of the dental arch for eruption and misplacement of the tooth germ is the most common cause of impacted teeth.

For some authors, such as González-Sánchez et al. (30) and Joshi (26), the presence of follicular cysts, odontomas, tumours or supernumerary teeth may be the cause of transmigrated canine.

Canine transmigration is less common in the upper jaw because of the short distance between the roots of the maxillary incisors, the floor of the nasal fossa and the restriction of the path of tooth movement given by the roots of the adjacent teeth, the maxillary sinus and the median suture of the palate, which probably act as a barrier (31).

Clinically, when we see a patient with a deciduous canine in an arch beyond the time of exfoliation or with a delay of eruption of the permanent canine, we must suspect an agenesis or an inclusion of the permanent tooth. X-rays will therefore be required for a correct diagnosis and an appropriate treatment plan. The gold standard is orthopantomography and CBCT. With these instrumental investigations and with an accurate study of the case, also from an orthodontic point of view, it is possible to decide with the patient and, if necessary, with the parents, the therapy to be implemented.

The possible treatment options for transmigrated canines are as follows.

- Extraction of the transmigrated tooth.
- Orthodontic repositioning of the transmigrated tooth.
- Waiting and control.

The main indications for the extraction of the transmigrated tooth are (32) the following.

- Painful symptoms on palpation.
- Proximity of the transmigrated tooth to the lower edge of the mandible.
- Association with dental cyst (and possibly its histological examination).
- Resorption and/or inclination of the roots of adjacent teeth.

- Closed root tips.
- Overcoming the transmigrated tooth beyond the apex of the adjacent lateral incisor.
- Dento-alveolar discrepancy of the mandibular arch, which requires extractions for teeth alignment.

The main indications for orthodontic recovery are (3,13,33) the following.

- Correct position of the roots of the lateral incisors.
- Sufficient space for the repositioning of the transmigrated canine.
- Transmigration of the canine not beyond the apex of the lateral mandible.
- Not complete formation of the apex of the canine (and there must be no signs of ankylosis).

Sometimes if there are no symptoms or no resorption and/or inclination of the roots of the adjacent teeth, and if no dental cysts are associated, it may be decided not to intervene and to monitor the patients periodically with X-rays (13). Surgical extraction is the most recommended treatment in scientific literature (13).

In our case, surgical treatment was the ideal option for the following reasons.

- Horizontal location of the tooth at the lower border of mandible without chance of orthodontic traction in the dental arch.
- Presence of an odontogenic cyst around the canine.
- Presence of a small protuberance in the region of the mandibular symphysis with slight pain in palpation.

CONCLUSIONS

The transmigration of the mandibular canine is a rare event, more frequent in women and it is often associated with the presence in the arch of the corresponding deciduous tooth for a longer time. The radiographic investigations of choice are OPT and CBCT.

Several therapies have been suggested, but in the presence of a dental cyst, painful symptoms and for T2 localizations, the best solution is the extraction of the transmigrated tooth and the enucleation of the cyst. The corresponding deciduous tooth can be left in place if its root is not resorbed.

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