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Case report

HOW AND WHY TO EXTRACT IMPACTED CANINES? MULTIDISCIPLINARY BEST PRACTICES FOR DENTISTRY

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ABSTRACT

Surgical extraction of impacted canines represents a significant challenge for dentistry. It is a relatively frequent clinical problem whose management, more often than not, requires a multidisciplinary approach. Surgical exposure of the impacted canine or the complex orthodontic mechanics applied to realign the tooth in the arch can frequently lead to complications involving the supporting tissues, not to mention the lengthy treatment times and high costs imposed on patients. In the face of this, it is worth emphasizing the importance of early diagnosis to intervene effectively and as soon as possible. This clinical case combines concepts and tips, such as the prevalence, etiology, and classification of impacted canines, and describes the different clinical management options that can help solve the problem.

KEYWORDS: *impacted canine, oral surgery, jaws*

INTRODUCTION

Impacted lower canines often present a challenge, as they play an important role in achieving good facial and smile aesthetics, given their strategic position above the canine eminences, which support the lower lip (1). They result in very nice anterior tooth proportions and correct smile lines when aligned correctly and with good shape and size. Regarding functional aspects, canines are equally important in supporting the overall dentition and contributing to posterior disocclusion during lateral excursions (2).

After third molar impactions, canines are the second most frequent cause of displacement and impaction among all teeth.1 Generally, they have an estimated prevalence ranging from 1 to 4 percent. Impacted upper canines affect about 2 percent of the population and are twice as common in females as in males (3). The incidence of canine impingement is twice as high in the maxilla as in the mandible. Of all patients with impacted lower canines, 3% have bilateral impacts (4).

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Among local etiologic factors, the ectopic position of the dental germ could be considered the most important, in addition to arch length discrepancies caused by lack of space and the absence of an eruption guide, which is very common in cases of agenesis of lateral incisors (5). What results is a long eruptive pathway to allow the canine to reach the arch. Literature shows that only 75% of vestibular-impacted lower canines have sufficient space in the arch to erupt. In comparison, only 25% of lingually impacted lower canines have insufficient space for eruption (6).

As a result, timely diagnosis and early intervention during the mixed dentition phase are indispensable; only then can treatment time be shortened, costs reduced, and more complex treatments to be performed during the permanent dentition be avoided (7). Clinically, delayed eruption of the permanent canine is observed; prolonged retention of deciduous canines after 14-15 years of age; absence of labial canine eminence; delayed eruption and distal tipping or abnormal migration of lateral incisors. A CBCT is essential for a 3d evaluation of the included element and the best plan, either extraction or its traction (8). The limitations of 2D radiographic techniques are pretty well-known and include augmented images, other distortions, and overlapping structures. Approximately 37% of lateral incisors affected by root resorption appear normal on 2D radiographs (9). Therefore, CT is currently the gold standard for diagnosing impacted teeth. It is possible to accurately identify and localize the location of the impacted tooth, assess any damage to adjacent roots, and quantify the bone around each tooth.

The literature describes that the most significant risk is the possibility of root resorption in adjacent teeth. Studies using Cone Beam CT indicate that the percentage of root resorption in lateral incisors caused by impacted canines ranges from 19% to 54% (10).

The extraction of the impacted canine followed by the insertion of an implant or the orthodontic closure of the space is indicated in cases with poor prognosis, which is impossible in orthodontic traction (11). A deep impact represents the clinical and radiographic signs or, when the root of the canine is completely formed, when the space in the arch is restricted, or when the orthodontic displacement of the teeth involved can damage others. In all these cases, we proceed with the extraction of the impacted tooth, replacing it with an implant or a first premolar (12). Other causes, such as cysts, resorptions, or rhizolysis of adjacent teeth, are high indications for surgical extraction.

On the other hand, the indication for orthodontic traction of the affected canine is more appropriate for cases with a better prognosis, such as those of growing patients without severe arch space shortages. Treatment involves surgical exposure of the affected tooth, followed or not by orthodontic traction, which will guide and align the tooth in the arch (13). Bone loss, root resorption, and gum recession around the pulled tooth are the most common complications of this procedure. In surgical exposure to trigger the affected canine displacement, good communication between the orthodontist and the surgeon is essential to adopt the most appropriate technique (14).

The most common traction method for palatally impacted canines involves surgical exposure followed by the bonding of the orthodontic attachment so that a light and slow force can be applied to move the tooth along the correct position (15).

CASE REPORT

A 12-year-old male patient, in the final phase of mixed dentition and beginning permanent, came to the visit with delayed eruption 4.4 and absence 8.3. He appeared in good health without allergies, signs, and symptoms worthy of not, and he had no family history of dental impacts or severe dental ectopic events.

Radiological examinations

Initial panoramic radiographs revealed the presence of all permanent teeth except for the impacted lower right canine and delayed eruption of the lower right first premolar. The root contour, periodontal space, and bony ridges were normal. The CT examination confirmed the radiographic findings, where the right lower canine was angled with the crown mesially in a very apical position, displaced vestibular, and in contact with neighboring teeth (Fig. 1).

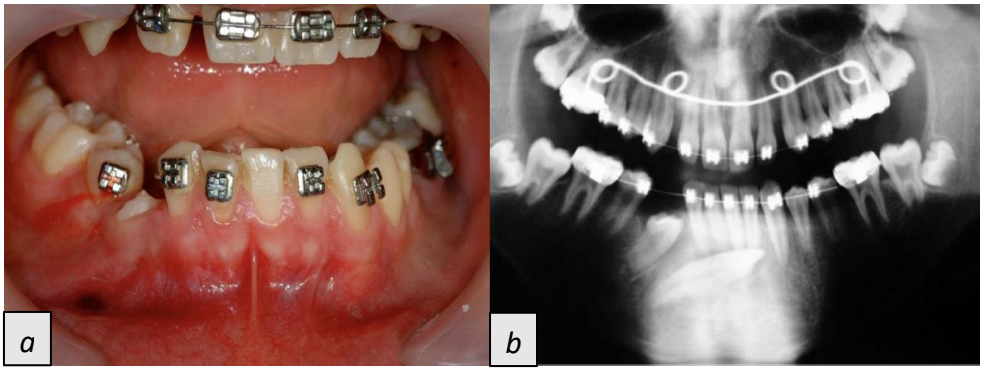

Fig. 1a, b. *In preoperative images, one can appreciate the absence of the canine and its included apical mesioverse position.*

Management and treatment

The mental vestibular cortex was exposed after raising a thick paramarginal mucoperiosteal flap. Subsequently, a bone breach was performed, and the impacted element was exposed, which was removed only after conducting a coronotomy. The area was sutured with non-absorbable sutures (Fig. 2-6).

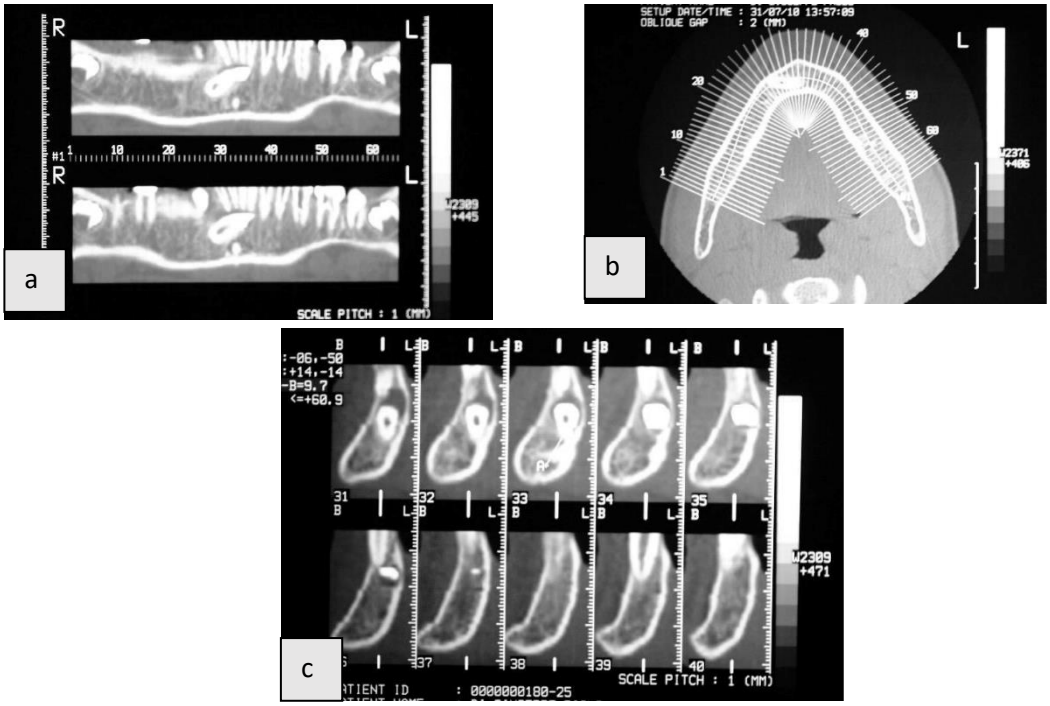

Fig. 2a, b, c. *CBCT sections demonstrate the included hostile position of the impacted mandibular canine with signs of areas of osteolysis.*

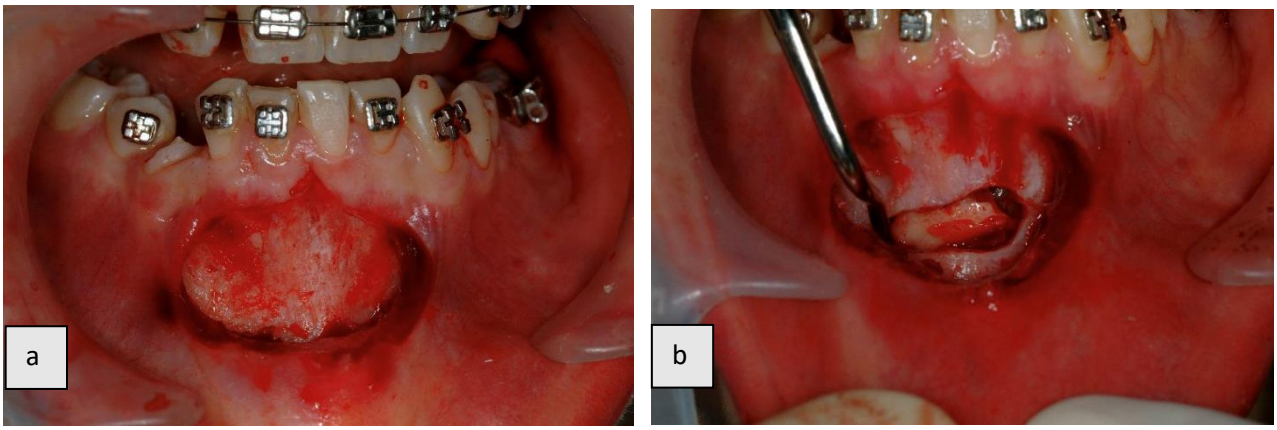

Fig. 3 a, b. *Paramarginal full-thickness flap with relief of the mental cortical slope and impacted canine.*

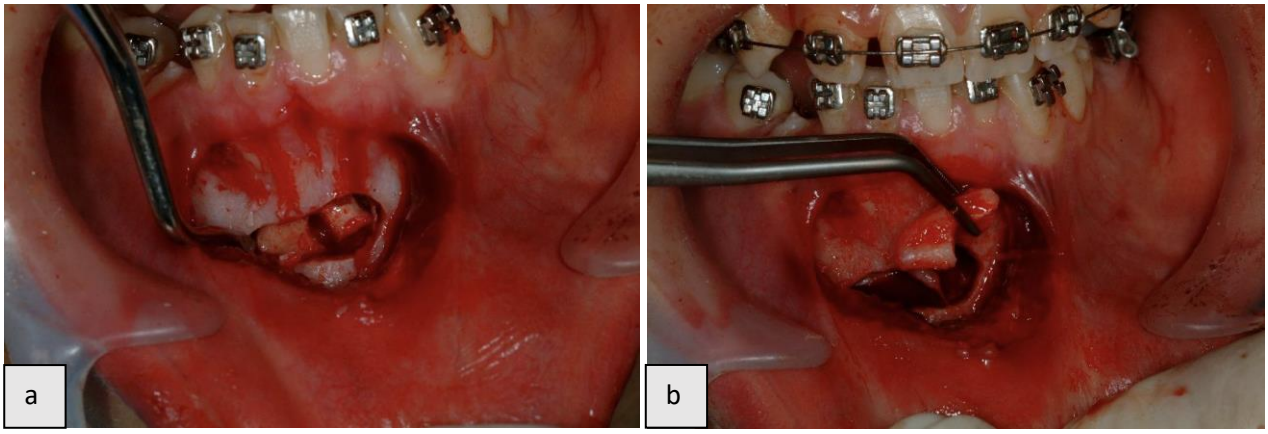

Fig. 4. *Section of the impacted canine and its removal.*

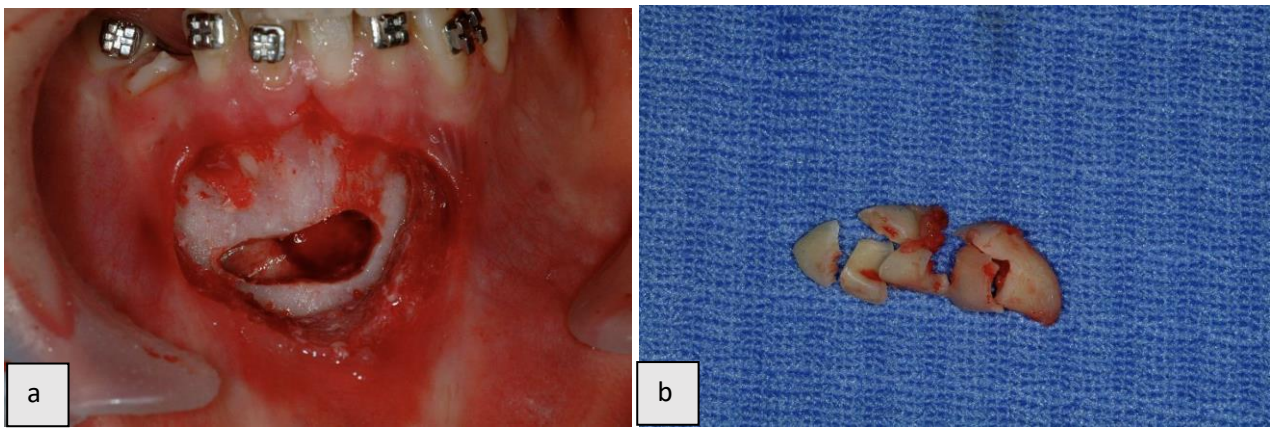

Fig. 5 a, b. *The post-extraction cavity is free from the presence of the canine and previously dissected removed canine. Multi-part cutting of the included element facilitates its extraction and makes the procedure less invasive on the bone.*

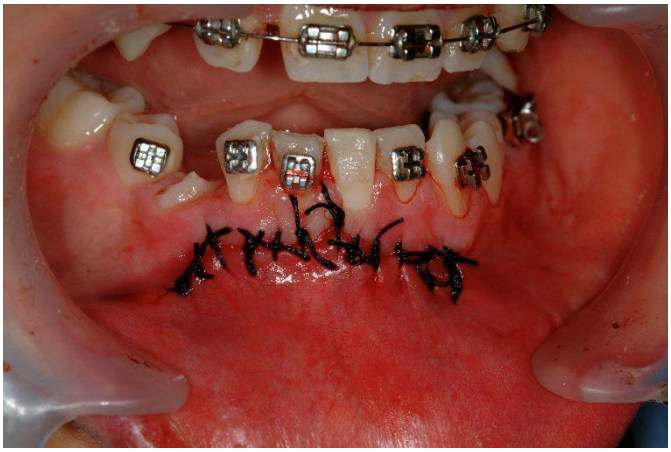

Fig. 6. *Wound closure using 3.0 nonabsorbable sutures.*

Appropriate antibiotics (amoxicillin 875 mg + clavuranic acid 125 mg), pain medications (naproxen 550 mg tablet), and dietary instructions were provided (15). The surgical wound healed well after 20 days (Fig. 7).

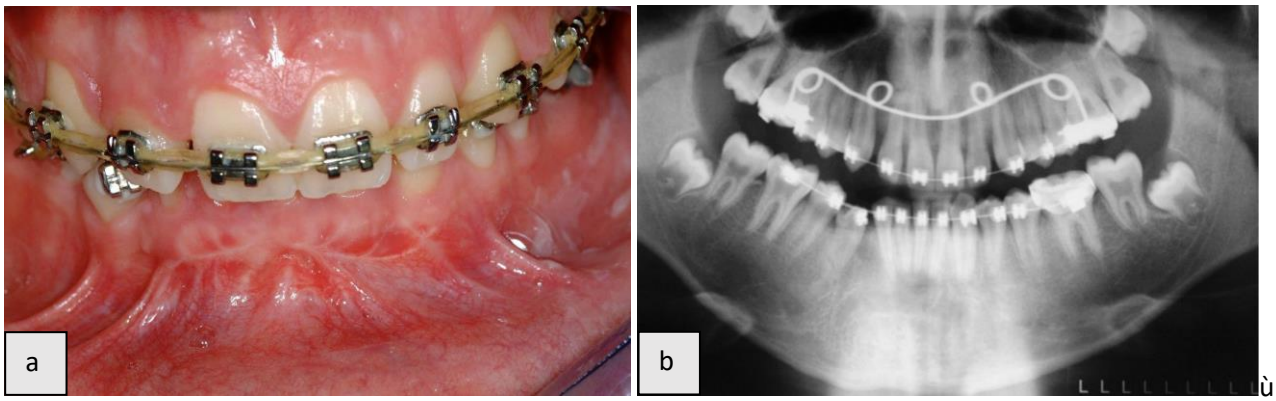

Fig. 7 a, b. *1-year follow-up images demonstrate perfect tissue and bone healing.*

DISCUSSION

Canine impaction is often defined as an intrabony position of the tooth that has passed and the expected time for eruption has passed (16). The diagnosis is always on a clinical-radiographic basis. Prolonged retention of the deciduous canine (after 14-15 years of age) and delayed eruption of the permanent canine, distal inclination, or migration of the ateral incisor are indicators of canine impaction. Differently, transmigration is a rare clinical tendency of the impacted tooth to deform the midline (17).

"transmigration" is observed mainly in the mandibular canine and very few cases in the maxillary canine; the female sex is more affected than the male sex (18). Due to intraosseous movement, the canine tooth remains impacted or erupts in the median/contralateral position. In many cases, such a canine tooth remains asymptomatic, but in some cases, it can cause displacement of adjacent teeth or resorption of the root (19). Compared to superiors, orthodontic correction of these mandibular canine cases is very difficult; untreated cases may develop dentigerous cysts. In such conditions, extraction of the impacted canine and enucleation of the cystic lining is the treatment of choice. Most commonly, the permanent mandibular canine moves in a vertical and labial direction (20). Shreya Singh has drawn up a classification of the canines included (7):

Type – 1: canine impacted mesioangularly along the midline, labial or lingual to the anterior teeth;
Type – 2: horizontally impacted canine near the lower edge of the mandible, inferior to the tips of the incisors;
Type – 3: canine erupted mesial or distal to the contralateral canine;

Type – 4: horizontally impacted canine near the lower edge of the mandible, under the apices of the premolars or molars on the opposite side;
Type – 5: Canine positioned vertically on the midline, with the long axis of the tooth crossing the midline.

If the impacted canine is left untreated, it can cause further migration of adjacent teeth and loss of arch length, dentigerous cyst formation, internal resorption, infection, and external root resorption of the impacted tooth and neighboring teeth (22). For this reason, even if asymptomatic, their extraction is always recommended.

CONCLUSIONS

Diagnosis, evaluation, and treatment of canine transmigration are essential to prevent related complications, both cosmetically and functionally. Recognizing dental abnormalities early can avoid many complications, mainly by preventing tooth extraction.

The ideal treatment to follow in this specific case is extraction of the tooth and the inflamed tooth follicle, with subsequent orthodontic treatment to stabilize the arches to provide an aesthetic and definitive solution through a dental implant once the patient's growth is finished.

Consent

Written informed consent was obtained from the patient for publication of his clinical details and clinical images.

Conflicts of Interest

The authors declare no conflicts of interest.

REFERENCES

1. Charles A, Duraiswamy S, Jacob S, Krishnaraj R. Surgical and orthodontic management of impacted maxillary canines. *SRM Journal of Research in Dental Sciences*. 2012;3(3):198. doi:https://doi.org/10.4103/0976-433x.107403
2. Herrera-Atoche JR, Agüayo-de-Pau M del R, Escoffié-Ramírez M, Aguilar-Ayala FJ, Carrillo-Ávila BA, Rejón-Peraza ME. Impacted Maxillary Canine Prevalence and Its Association with Other Dental Anomalies in a Mexican Population. *International Journal of Dentistry*. 2017;2017:1-4. doi:https://doi.org/10.1155/2017/7326061
3. Nagpal A, Pai KM, Setty S, Sharma G. Localization of impacted maxillary canines using panoramic radiography. *Journal of Oral Science*. 2009;51(1):37-45. doi:https://doi.org/10.2334/josnusd.51.37
4. Sharma V, Lavania A, Mallick SA, Sharma M. Ectopic canine tooth: a rare cause for maxillary antral mucocoele. *Kathmandu University medical journal (KUMJ)*. 2006;4(2):251-252.
5. Al-Zoubi H, Alharbi AA, Ferguson DJ, Zafar MS. Frequency of impacted teeth and categorization of impacted canines: A retrospective radiographic study using orthopantomograms. *European Journal of Dentistry*. 2017;11(1):117-121. doi:https://doi.org/10.4103/ejd.ejd_308_16
6. Juvvadi S, Medapati Rama HR, Anche S, Manne R, Gandikota C. Impacted canines: Etiology, diagnosis, and orthodontic management. *Journal of Pharmacy and Bioallied Sciences*. 2012;4(6):234. doi:https://doi.org/10.4103/0975-7406.100216
7. Singh S, Singh A, Sharma N, Chaturvedi T. Transmigration of impacted mandibular canine with the development of dentigerous cyst: Surgical extraction or orthodontic alignment? *Journal of Dental and Allied Sciences*. 2017;6:32.
8. Dalessandri D, Parrini S, Rubiano R, Gallone D, Migliorati M. Impacted and transmigrant mandibular canines incidence, aetiology, and treatment: a systematic review. *European Journal of Orthodontics*. 2016;39(2):161-169. doi:https://doi.org/10.1093/ejo/cjw027
9. Díaz-Sánchez RM, Castillo-de-Oyagüe R, Serrera-Figallo MÁ, Hita-Iglesias P, Gutiérrez-Pérez JL, Torres-Lagares D. Transmigration of mandibular cuspids: review of published reports and description of nine new cases. *British Journal of Oral and Maxillofacial Surgery*. 2016;54(3):241-247. doi:https://doi.org/10.1016/j.bjoms.2016.01.010
10. Rosa A, Lio F, Lorenzi C. Computer-guided implant placement and immediate loading: a case report. *European Journal of Musculoskeletal Diseases*. 2019;8(1):27-31.
11. Bhullar M, Aggarwal I, Verma R, Uppal A. Mandibular canine transmigration: Report of three cases and literature review. *Journal of International Society of Preventive and Community Dentistry*. 2017;7(1):8. doi:https://doi.org/10.4103/jispcd.jispcd_231_16
12. Cavuoti S, Matarese G, Isola G, Abdolreza J, Femiano F, Perillo L. Combined orthodontic-surgical management of a transmigrated mandibular canine. *The Angle Orthodontist*. 2015;86(4):681-691. doi:https://doi.org/10.2319/050615-309.1
13. Koszowski R, Pisulska-Otremba A, Wójcik S, Śmieszek-Wilczewska J. Canine transmigration accompanying mandibular retrognathism secondary to osteitis. *Open Medicine*. 2015;10(1). doi:https://doi.org/10.1515/med-2015-0096
14. Kamiloglu B, Kelahmet U. Prevalence of impacted and transmigrated canine teeth in a Cypriote orthodontic population in the Northern Cyprus area. *BMC Research Notes*. 2014;7(1). doi:https://doi.org/10.1186/1756-0500-7-346
15. Gruszka K, Różyło TK, Różyło-Kalinowska I, Denkiewicz K, Masłowska K. Transmigration of mandibular canine – case report.

Polish Journal of Radiology. 2014;79:20-23. doi:https://doi.org/10.12659/pjr.890090

16. Pérez Flores MA, Pérez Flores P, Fierro Monti C. Alteraciones en la Erupción de Caninos Permanentes. *International Journal of Morphology*. 2009;27(1):139-143. doi:https://doi.org/10.4067/S0717-95022009000100025
17. Sharma G, Nagpal A. A Study of Transmigrated Canine in an Indian Population. *International Scholarly Research Notices*. 2014;2014:1-9. doi:https://doi.org/10.1155/2014/756516
18. Matteo Chiapasco, Rossi A, Jason Jones Motta, Crescentini M. Spontaneous bone regeneration after enucleation of large mandibular cysts: A radiographic computed analysis of 27 consecutive cases. *Journal of Oral and Maxillofacial Surgery*. 2000;58(9):942-948. doi:https://doi.org/10.1053/joms.2000.8732
19. Pértile C, A Pujia, Arcuri C. Complete Full Arch Supported by Short Implant (<8 mm) in Edentulous Jaw: A Systematic Review. *Applied sciences*. 2023;13(12):7162-7162. doi:https://doi.org/10.3390/app13127162
20. Vaida L, Todor BI, Corega C, Băciuţ M, Băciuţ G. A rare case of canine anomaly - a possible algorithm for treating it. *Romanian Journal of Morphology and Embryology = Revue Roumaine De Morphologie Et Embryologie*. 2014;55(3 Suppl):1197-1202.
21. Estrela C, Bueno MR, Azevedo BC, Azevedo JR, Pécora JD. A New Periapical Index Based on Cone Beam Computed Tomography. *Journal of Endodontics*. 2008;34(11):1325-1331. doi:https://doi.org/10.1016/j.joen.2008.08.013
22. Araujo R, Gomez RS, Castgro W, Lehman L. Pathology Differential diagnosis of antral pseudocyst, surgical ciliated cyst, and mucocele of the maxillary sinus. *Ann Maxillofac Surg*. 2014;2(1):1-10.