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Dentigerous cyst: proposal for a therapeutic algorithm and combined treatment plan

Quiste dentígero: propuesta de un algoritmo terapéutico y plan de tratamiento combinado

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ABSTRACT

Included dental organs are associated with various jaws pathologies, among the most frequent are cysts, which are benign lesions that develop around the crowns from permanent teeth. The aim of this research is to propose a therapeutic algorithm and a treatment plan combined with two known techniques, in addition to describe clinical and radiographic findings and conservative therapeutic management. For this, gender and clinical diagnosis data were obtained from a series of 3 cases of dentigerous cyst, in which clinical, histological, radiographic characteristics and treatments used were described. In each case conservative surgical treatment was given accompanied by gauze soaked in nitrofurantoin. Because dentigerous cysts are the most common pathology associated with included dental organs, which can be detected in routine radiographic examinations, this must be corroborated with the histopathological study, allowing less invasive techniques, this work is based on a therapeutic algorithm and combined treatment plan, not only in children but also in adults, regardless of their size.

Palabra clave: quiste dentígero; diente incluido; biopsia con aguja; cirugía oral; patología bucal.

RESUMEN

Los órganos dentarios incluidos están asociados a diversas patologías de los maxilares, entre los más frecuentes se encuentran los quistes, que son lesiones benignas que se desarrollan alrededor de las coronas de los dientes permanentes. El objetivo de esta investigación es proponer un algoritmo terapéutico y un plan de tratamiento combinado con dos técnicas ampliamente conocidas, además de describir los hallazgos clínicos, radiográficos y el manejo terapéutico conservador. Para esto se obtuvieron los datos de género y diagnóstico clínico de una serie de 3 casos de quiste dentígero, en los que se describen características clínicas, histológicas, radiográficas y tratamientos empleados. En cada caso se le dio tratamiento quirúrgico conservador acompañado de gasa embebida en nitrofurantoína. Debido a que los quistes dentígero son la patología más común asociada a órganos dentales incluidos, que se pueden detectar en exámenes radiográficos de rutina, los cuales se deben corroborar con el estudio histopatológico, permitiendo realizar técnicas menos invasivas, este trabajo se fundamenta en un algoritmo terapéutico y plan de tratamiento combinado, no sólo en niños sino también en adultos, independientemente de sus dimensiones.

INTRODUCTION

Among the most frequent pathologies of maxillofacial complex are odontogenic cysts, which derive from epithelium produced during tooth development, such as the epithelial remains of Malassez, the reduced epithelium of enamel and the remains of dental lamina (remains of Serres)[1]. Among the most common after the radicular cyst, there is the dentigerous cyst (DC), also called follicular, which consists in accumulation of fluid between the reduced epithelium from enamel and the crown about tooth at the level of the amelocemental junction[2]. The DC appear in order of frequency, associated with the lower third molars, followed by canines. It usually occurs between second and third life´s decades, however it can also be found in childhood, predominantly in males, with a male / female ratio 2:1[3,4].

Clinically, facial deformity accompanied by cortical expansion, slow growth, with obstruction from dental eruption, dental displacement, rarely presents root resorption and in extreme cases, pathological fractures can be caused by the magnitude about injury. Those are generally located in the jaw in 70 to 75% of cases[5,6].

In diagnostic aids such as orthopanoramic radiography, a radiolucent image with a well-defined radiopaque halo that includes the crown from dental organ is observed[7]. Cone Beam computed tomography allows the three-dimensional localization with respect to lesion, precise measurements as regards the cystic diameter and volume, the delimitation with neighboring organs and the relationship with important anatomical structures, even so they must be corroborated or confirmed with histopathology[8].

The histology about DC consists in a wall of connective tissue lined with non-keratinized stratified flat epithelium, with several layers from ciliated cells and in some cases sebaceous. Generally, this joint is flat; however, inflammation can occur modifying the epithelial lining, transforming it into hyperplastic, atrophic or ulcerated. On the other hand, there are cholesterol and hemosiderin deposits, hyaline bodies and macrophages[9]. There is the possibility that epithelial lining becomes an ameloblastoma if there is no complete elimination about the lesion, on the other hand, it is unusual for the transformation to be carcinomatous[10]. Among differential diagnoses of DC is keratocyst, central giant cell granuloma, ameloblastoma unicystic and ameloblastic fibroma[2].

Its treatment lies in enucleation, marsupialization, resection, and adjunctive treatments with chemical cauterization using Carnoy's solution, as well as adjacent peripheral osteotomy, cryotherapy which reduces recurrence, and electrocautery. Everything depends on the location from lesion, the size, and involvement about anatomical structures[11]. Prior to this, aspiration can also be performed with a long needle of approximately 2 mm in diameter in the most fluctuating area, where a light brownish liquid can be found, which when put to the light reveals shiny crystals (cholesterol crystals)[12]. It should be noted such studies are currently being carried out with drugs and combinations about different types of treatments, including nitrofurazone, which is a synthetic nitrofuran with a broad antibacterial, bactericidal and bacteriostatic spectrum against microorganisms, thus inhibiting enzymes from citric acid cycle such as DNA, RNA and protein synthesis, causing damage into the DNA and ribosomes concerning cell[13]. On the other hand, it has antiseptic and disinfectant activity, which helps to prevent infection in open wounds, after surgical interventions, mainly in areas susceptible to contamination, while maintaining the cavity exposed into the oral environment and at the same time obtaining healing by second intention, likewise allows adequate hemostasis without bruising[14,15].

The objective from manuscript is to propose a therapeutic algorithm and a treatment plan combined with two widely known techniques such as enucleation and marsupialization, in addition to describing the clinical and radiographic findings and conservative therapeutic management.

CASE REPORT

Case 1

A 15-year-old male patient who attends a consultation placed at the dental surgery and stomatology clinic from Cartagena´s University - Colombia, due to a lesion located at level from chin. There is no relevant medical-personal and family history, or systemic compromise. The extraoral clinical examination revealed increased volume founded in the mandibular symphysis, the intraoral clinical examination revealed circumscribed swelling appearing in bilateral incisor to premolar area, which present the same color as the adjacent mucosa, about unknown evolution time.

The orthopanoramic radiograph shows an unilocular radiolucent lesion with a well-defined radiopaque border, that involves the lower right canine towards the second left premolar, associated with the lower left canine, which is included in a horizontal position (Figure 1A), the biopsy confirm the clinical diagnostic. After signing the informed consent by mother and patient, the surgical approach was performed under local anesthesia, initially proceeded to perform the aspiration from cystic fluid, then a Semilunar incision was made situated at the level from vestibule in the lower left area , with syndesmotomy, followed by lifting about mucoperiosteal flap, osteotomy of the adjacent bone, exposing the cystic capsule, proceed to perform enucleation plus curettage, take the lesion into a rigid container soaked in 10% formaldehyde solution, label and It is sent for histopathology study. In addition, an extraction from left deciduous canine is performed, profuse washing about the alveolus with 0.9% saline solution is performed, then 100 cm of gauze soaked with nitrofurantoin ointment 0.2 g / 100 g is placed at the cavity, which is removed 2 cm every 2 days for a week, to remove completely after 8 days; subsequently 60 cm of gauze is placed again on soaked with nitrofurantoin and withdraw 4 cm after 3 days continuously to remove completely after 2 weeks, at which time it is sutured the surgical window and radiographic controls are made one month after the last procedure. The sample sent for histological study showed the presence of a DC.

In the postoperative controls, a good healing process was observed, without signs of infection or inflammation, gauze in position, which was gradually withdrawn. After 14 months of evolution, it was decided to perform the extraction of the included lower left canine, where there was complete regeneration of the area and no recurrence was evident (Figure 1B).

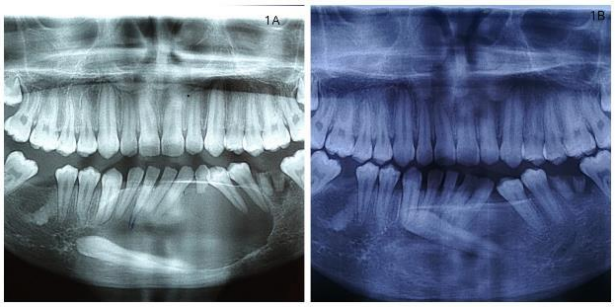

Figure 1A. Initial orthopanoramic radiograph. **Figure 1B.** Orthopanoramic radiograph 14 months after decompression of the injury.

Case 2

A 24-year-old male patient comes to postgraduate office of Stomatology and Oral Surgery at the Cartagena´s University, who consults with a lesion placed at the level of the left mandibular angle, without significant medical history. On clinical examination presented left hemifacial asymmetry with compromise about masseter and retromandibular region, intraorally presented fundus effacement appearing in the level from the lower left hemiarcade, with circumscribed swelling delimited near to molars, normochromic mucosa with respect to the adjacent mucosa and time of evolution unknown. In the diagnostic aids, is observed: in the computed tomography with axial and coronal slices, a hypointense area that compromises the third quadrant, there is no perforation about vestibular or lingual cortices, and no root resorption is evidenced either. Radiographic examination with orthopanoramic radiography shows a radiolucent unilocular lesion with a well-defined radiopaque border in the vicinity of antegonial notch, with the left lower third molar being involved (Figure 2).

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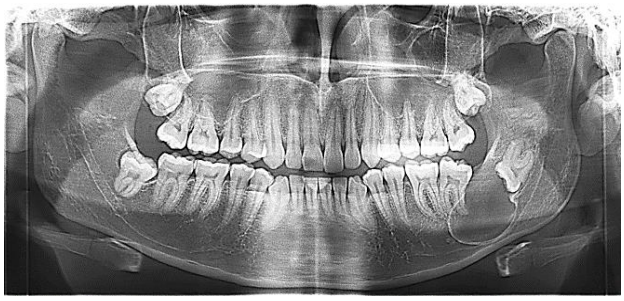

Figure 2. Initial orthopanoramic radiograph showing a radiolucent lesion associated with a lower left third molar included.

The surgical procedure previous confirmation by biopsy, is performed after signing the informed consent, asepsis and antisepsis, placement of local anesthesia with 2% lidocaine + 1: 80,000 epinephrine, aspiration of citrine-colored fluid is performed, followed by a semilunar incision, 10 mm below from the mucogingival line between dental organs 36 - 38 to lift the full thickness flap, a surgical window is made and a cystic lesion is removed, to carry out the protocol mentioned in case 1 with gauze soaked in nitrofurantoin. The sample is sent for histopathological study, with DC results. The patient reported that after 7 months the extraction of the lower left third molar was performed, which had been displaced mesially, without recurrence; however, there were no control radiographs due to transfer from patient.

Case 3

A 30-year-old female patient, who came to a private consultation of Stomatology and Oral Surgery, due to presenting a lesion on the face, without significant antecedents. Physical examination shows right facial asymmetry, with lesion near to the upper labial region, nasogenian region and right buccal region, intraoral examination presents at the bottom about the sulcus between dental organs 11 to 16, a lesion of approximately 5 cm long, 3 cm wide and 2 cm high, normochromic with respect to the adjacent mucosa, stone-like on palpation, asymptomatic, of unknown evolution time, where the right upper canine was included; the auxiliary diagnostic tools used are orthopanoramic radiography, which shows a unilocular radiolucent area with a radiopaque halo, defined from the anterior nasal spine to the tuberosity from maxilla about the right upper hemiarcade, and the Computed Tomography (CT) with axial and coronal slices, in where a hypointense area is observed that involves the right upper quadrant, without evidence of perforation about cortices or root resorption; on the other hand, it is imperative before the enucleation of the lesion to carry out the endodontic treatment from the dental organs adjacent to the lesion in order to avoid another pathologies with embryologic relation, in addition, the first step taken associated with a periapical lesion is made the endodontic treatment.

It was decided to perform aspiration and biopsy of the lesion, with the protocol set forth in case 1. A sample was sent for histopathological study with DC results (Figure 3). At 4 months after surgical treatment, the patient does not have recurrence and manifests that orthodontic treatment begins and the upper canine included will be tractioned by orthodontics once partial regeneration about the area is performed.

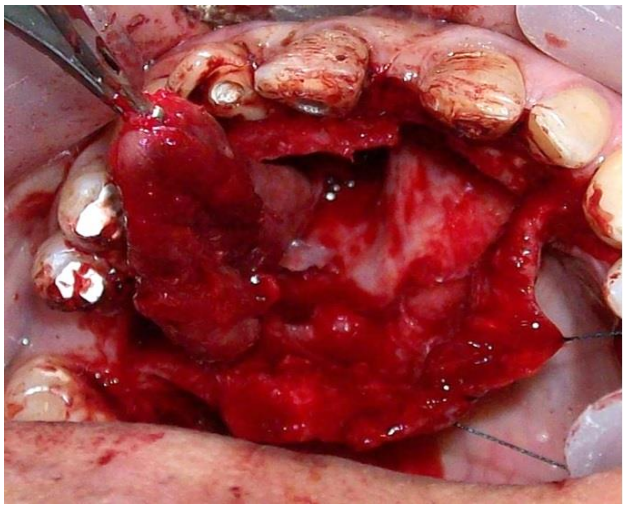

Figure 3. Macroscopic view of the cystic capsule of the lesion with a surgical approach to the palate.

Statement on ethical aspects

In carrying out and participating in this study, the signing of the settlement and informed consent by the patient and her parents were taken into account, in addition, the procedures followed were in accordance with the ethical standards of Resolution 8430 of 1993 of the Ministry of Health and Social Protection of Colombia and the Declaration of Helsinki.

DISCUSSION

The etiological factor from DC is still unknown, however, the clinical absence of teeth that reveal an error in the eruption of the dental organ suggests that there is a close relationship between the formation about DC and the eruption of the tooth, being the third molars are the most prone to these failures, followed by the canines[9]. As it happens in the present case report.

Acosta et al[16], they refer that the stimulation from epithelium of the follicles about the permanent dental organs associated with infectious and inflammatory processes could develop the formation of cysts at the level of the jaws, on the other hand, they comment that the ideal treatment for DC is enucleation, furthermore, in some cases it is imperative the extraction of the dental organ involved, while in others it is maintained and positioned in its respective arch.

There are literatures that propose a treatment algorithm for various pathologies such as ameloblastomas[17,18], keratocysts[19], among others, which are based on anatomical location, size, histological characterization, and involvement of adjacent anatomical structures. Taking these algorithms as a model, the authors propose a therapeutic algorithm for cystic lesions of the jaws, the purpose of which is the inclusion of management protocols which allow the choice of an accurate treatment, in every cystic the measurements are taken by tomographic (Figure 4).

More conservative treatments have been proposed, performing a decompression of the lesions, being carried out through a much more aesthetic and small incision, in which a small opening is made into the cavity with the cystic content and positioning a probe that is sutured around, so the cystic cavity does not collapse and help decompression, in this way later washes are performed through this communication, with 0.9% saline solution, this procedure greatly reduces the risks of complications during a resection, curettage and enucleation, with the only problem that this option requires a much longer follow-up; according to Mitchell et al[12], The first option to use in pediatric patients has to be this; On the other hand, a major problem is the tissue that creates the pathology in question is left behind and cannot be examined by histopathological study, however, the sample taken from the surgical window can be sent for the respective histopathological study to rule out more aggressive lesions.

Floriam et al[20], they present a case report of a minor who presented a volumetric increase in the lower left third about face, with marked facial asymmetry, compatible with DC and was established as a cyst enucleation treatment plan, in addition to using a furacinated gauze in the surgical cavity, with favorable results. Similarly, in the case reported by Guzmán et al[21], where a minor was mentioned who presented an ovoid lesion in the right sublingual region, unilateral, compatible with a giant intraoral ranula, whose treatment was the marsupialization technique, in addition using a gauze soaked in nitrofurans. Lastly, Bassetti et al[22] reported clinical cases with compromised mandibular angle and inclusion from dental organs where surgical management is conservative, through decompression of cystic lesions, allowing surgical enucleation to be more conservative, giving patients a better recovery and quality of life. In agreement with the aforementioned with the proposed cases in which dentigerous cysts were diagnosed in the 3 patients with treatment plans of enucleation plus curettage, likewise apply the gauze soaked with nitrofurantoin ointment.

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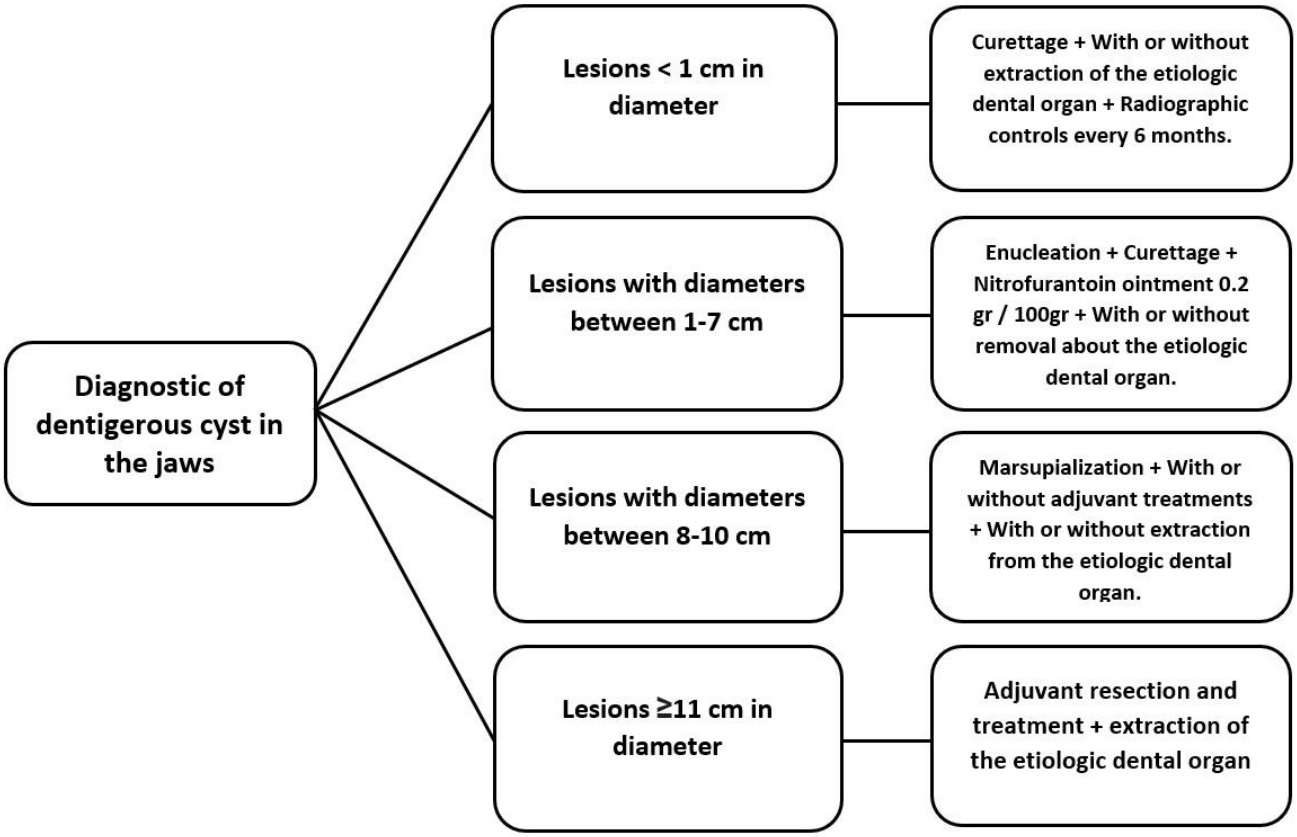

Figura 4. Therapeutic algorithm for dentigerous cystic of the jaws proposed by the authors.

In the series of DC cases presented in this article, it is worth highlighting the presence of the characteristics that the literature reports about this lesion, among which are facial deformity and retention from dental organs; other characteristics evidenced were the conservative management of the lesions. On the other hand, it should be noted like any study, there are limitations in the proposed algorithm, such as the small sample of patients from which it was prepared (n = 3), so it is suggested to carry out studies based on this algorithm in much larger samples great to validate or disprove this algorithm for the benefit of dental patient health.

DC are the most common pathologies associated with dental organs, which can be detected in routine radiographic examinations, which must be corroborated with the histopathological study, allowing less invasive techniques to be performed. By this reason, this work is based on a therapeutic algorithm and a combined treatment plan, not only in children but also in adults, regardless of their dimensions, with the aim of keeping the dental organs and adjacent structures associated with the cyst intact, which favors the spontaneous eruption from the tooth, or at least opens the possibility of performing orthodontic traction on it, although depending on the affectation that the dental organ presents, it is possible extract it and in this way avoid recurrences, stimulate bone repair and ensure the histopathological study that can corroborate the pathology in question and rule out more aggressive entities.

DECLARATION ON CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest

AUTHORS 'CONTRIBUTION

First author: field work, preparation of the manuscript; and writing;
Second author: preparation of the manuscript and writing;

Third author: field work.

BIBLIOGRAPHIC REFERENCES

1. Lotfi A, Shirkavand S, Mokhtari S, Zalani S, Atarbashi-Moghadam S. Relative frequency of dentigerous cyst in Iranian population: A 20-year retrospective study. Indian J Dent Res. 2019;30(5):751-754. Doi: https://doi.org/10.4103/ijdr.IJDR_392_17.

2. Wang LL, Olmo H. Odontogenic Cysts. In: StatPearls. Treasure Island (FL): StatPearls Publishing; October 4, 2021. Available in: https://pubmed.ncbi.nlm.nih.gov/34662043/

3. Alnofaie H, Alomran O, Ababtain R, Alomar A. Spontaneous Eruption of a Deeply Impacted Premolar After Conservative Treatment of an Associated Dentigerous Cyst: A Case Report. Cureus. 2019;11(12):e6414. Doi: https://doi.org/10.7759/cureus.6414.

4. Noujeim Z, Nasr L. The prevalence, distribution, and radiological evaluation of dentigerous cysts in a Lebanese sample. Imaging Sci Dent. 2021;51(3):291-297. Doi: https://doi.org/10.5624/isd.20210075.

5. Lee J. Dentigerous Cyst Associated With a Supernumerary Tooth. Ear Nose Throat J. 2020;99(1):32-33. Doi: https://doi.org/10.1177/0145561318823638.

6. Vinereanu A, Bratu A, Didilescu A, Munteanu A. Management of large inflammatory dentigerous cysts adapted to the general condition of the patient: Two case reports. Exp Ther Med. 2021;22(1):750. Doi: https://doi.org/10.3892/etm.2021.10182.

7. Martinelli-Kläy CP, Martinelli CR, Martinelli C, Macedo HR, Lombardi T. Unusual Imaging Features of Dentigerous Cyst: A Case Report. Dentistry Journal. 2019; 7(3):76. Doi: https://doi.org/10.3390/dj7030076.

8. Allison JR, Garlington G. The Value of Cone Beam Computed Tomography in the Management of Dentigerous Cysts – A Review and Case Report. Dent Update. 2017;44(3)182-184. Doi: https://doi.org/10.12968/denu.2017.44.3.182.

9. Huang G, Moore L, Logan RM, GueS. Histological analysis of 41 dentigerous cysts in a paediatric population. J Oral Pathol Med. 2019;48(1):74-78. Doi: https://doi.org/10.1111/jop.12776.

10. Hu N, Li Y, Wang J, Hou J, Yang C. A case report of multiple dentigerous cyst of mandible and review of literature. Shanghai Kou Qiang Yi Xue. 2019;28(1):110-112. Available in: https://pubmed.ncbi.nlm.nih.gov/31081012/

11. Aoki N, Ise K, Inoue A, et al. Multidisciplinary approach for treatment of a dentigerous cyst - marsupialization, orthodontic treatment, and implant placement: a case report. J Med Case Rep. 2018;12(1):305. Doi: https://doi.org/10.1186/s13256-018-1829-2.

12. Mitchell O, Singh R. Conservative technique for enucleation of a large dentigerous cyst through bony fenestrations. Br J Oral Maxillofac Surg. 2019;57(7):704-705. Doi: https://doi.org/10.1016/j.bjoms.2019.05.025

13. Roemhild R, Linkevicius M, Andersson D. Molecular mechanisms of collateral sensitivity to the antibiotic nitrofurantoin. PLoS Biol. 2020;18(1):e3000612. Doi: https://doi.org/10.1371/journal.pbio.3000612

14. Teoh X, Bt Mahyuddin F, Ahmad W, Chan S. Formulation strategy of nitrofurantoin: co-crystal or solid dispersion? Pharm Dev Technol. 2020;25(2):245-251. Doi: https://doi.org/10.1080/10837450.2019.1689401

15. Alrahman M, Faraj B, Dizaye K. Assessment of Nitrofurantoin as an Experimental Intracanal Medicament in Endodontics. Biomed Res Int. 2020;2020(3):1-13. Doi: https://doi.org/10.1155/2020/2128473

16. Acosta M, Aldape B, Rosales L. Quiste dentígero en pacientes pediátricos en el Hospital Centro Médico "La Raza". Rev Mex Cir Bucal Max.

2017;13(1): 4-11. Available in: https://www.medigraphic.com/cgi-bin/new/resumen.cgi?IDARTICULO=71481.

17. González M, Nieto A, Muñoz C, Sánchez A. Ameloblastoma sólido plexiforme multiquístico en cuerpo mandibular izquierdo. Reporte de caso. Odontol. Sanmarquina. 2018;21(3):229-234. Doi: https://doi.org/10.15381/os.v21i3.15156.

18. Singh M, Shah A, Bhattacharya A, Raman R, Ranganatha N, Prakash P. Treatment algorithm for ameloblastoma. Case Rep Dent. 2014;121032. Doi: https://doi.org/10.1155/2014/121032.

19. Slusarenko Y, Stoelinga P, Naclério M. The presentation of odontogenic keratocysts in the jaws with an emphasis on the tooth-bearing area: a systematic review and meta-analysis. Oral Maxillofac Surg. 2019;(23):133–147. Doi: https://doi.org/10.1007/s10006-019-00754-5.

20. Floriam L, Danelon M, Oliveira S, et al. Quiste dentígero en odontología. Reporte de caso. Rev Odotopediatr Latinoam. 2019;9(2):151-159. Doi: https://doi.org/10.47990/alop.v9i2.176.

21. Guzmán M, Crisosto C, Reyes B, Peñarrocha M, Peñarrocha D. Marsupialización modificada de ránula gigante intraoral: reporte de caso. Rev. Clin. Periodoncia Implantol. Rehabil. Oral. 2016;9(3):217-221. Doi: https://doi.org/10.1016/j.piro.2015.06.008

22. Bassetti M, Kuttenberger J, Novak J, Bassetti R. The dentigerous cyst: two different treatment options illustrated by two cases. Swiss Dent J. 2019;129(3):193-203. Available in: https://pubmed.ncbi.nlm.nih.gov/30932396