

A rare case of impacted mandibular premolar associated to dentigerous cyst and periodontal lesion: clinical management and histological analysis

Francesco Gianfreda¹
Ludovica Nucci²
Patrizio Bollero¹
Andrea Danieli³
Andrea Palermo⁴
Paolo Salvadori⁵
Marco Gargari³
Mirko Martelli³

¹ Department of System Medicine, University of Rome "Tor Vergata", Rome, Italy
² Multidisciplinary Department of Medical-Surgical and Dental Specialties, University of Campania Luigi Vanvitelli, Caserta, Italy
³ Department of Clinical Sciences and Translational Medicine, University of Rome "Tor Vergata", Rome, Italy
⁴ Dipartimento di Medicina Sperimentale, Università del Salento, Lecce, Italy
⁵ IRCCS Istituto Ortopedico Galeazzi, Milan, Italy

Corresponding author: Mirko Martelli
e-mail: mirko.marte@libero.it

Abstract

Background: Dental cysts, particularly dentigerous cysts (DCs), are a common pathological condition affecting the jawbone. The literature categorizes DCs based on histology and associates them with impacted teeth, often leading to complications. However, the occurrence of DCs in the elderly and their association with mandibular premolars is not well-documented, presenting a knowledge gap in dental pathology and management.

Objective: This case report aims to present a rare clinical case of an impacted mandibular premolar associated with a dentigerous cyst and a periodontal lesion, detailing the clinical management, radiographic diagnosis, histopathologic analysis, and surgical intervention.

Case presentation: A 65-year-old male patient presented with pain and mobility in tooth 36. Clinical examination, radiographic imaging, and histological analysis were conducted to diagnose and plan the treatment—the treatment involved enucleation of the DC and extraction of the impacted tooth. Histological examination was performed using hematoxylin and eosin staining to determine the nature of the cyst.

Results: The patient's postoperative recovery was uneventful, with complete remineralization of the site after one year. Histological findings indicated a significant inflammatory infiltrate, predominantly lymphocytes, suggesting a periodontal cyst. The impacted mandibular premolar association with a DC in an elderly patient is rare, with the literature reporting a higher frequency of such cysts in younger demographics.

Conclusions: The case report contributes to the existing literature by highlighting the successful management of a rare case of an impacted mandibular premolar with a dentigerous cyst and periodontal lesion. It emphasizes the importance of accurate diagnosis and individualized treatment planning in managing complex dental cyst cases. It suggests a conservative approach to prevent surgical risks, especially near critical anatomical structures.

Keywords: Dentigerous cyst, Impacted mandibular premolar, Periodontal lesion, Enucleation, Histological analysis.

Authors

Francesco Gianfreda - Department of System Medicine, University of Rome "Tor Vergata", Rome, Italy

Ludovica Nucci - Multidisciplinary Department of Medical-Surgical and Dental Specialties, University of Campania Luigi Vanvitelli, Caserta, Italy

Patrizio Bollero - Department of System Medicine, University of Rome "Tor Vergata", Rome, Italy

Andrea Danieli - Department of Clinical Sciences and Translational Medicine, University of Rome "Tor Vergata", Rome, Italy

Andrea Palermo - Dipartimento di Medicina Sperimentale, Università del Salento, Lecce, Italy

Paolo Salvadori - IRCCS Istituto Ortopedico Galeazzi, Milan, Italy

Marco Gargari - Department of Clinical Sciences and Translational Medicine, University of Rome "Tor Vergata", Rome, Italy

Mirko Martelli - Department of Clinical Sciences and Translational Medicine, University of Rome "Tor Vergata", Rome, Italy



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Introduction

Dental cysts are a common pathological condition that can affect the jawbone. The World Health Organization (WHO) classification categorizes jawbone cysts into different types based on their histology. One of the most common types of odontogenic cysts is the dentigerous cyst (DC), also known as the follicular cyst. DCs occur when the epithelium surrounding a developing tooth evolves into a cyst that attaches to the cemento-enamel junction. DCs are usually asymptomatic, appear as unilocular radiolucencies on radiographs, and are occasionally associated with impacted teeth, causing discomfort or pain due to swelling and inflammation (1). The incidence of DCs ranges between 20 to 24% of the entire epithelial lined jaw cyst. Statistics indicate that 1.44% of cysts occur for every 100 non-erupted teeth. A higher frequency of cysts in the general population occurs during the second (23% of all DCs) – and third (20% of all DCs) decades of life (2). Although DCs can also be found in the 4th, 5th, and 6th decades (17%, 17%, and 12 %, respectively) and less commonly in the 1st and the 7th decades and above. Males are more affected than females, but the reason for this sex preference is still unclear (3).

In about 75% of cases of DC, the impacted tooth is usually the mandibular third molar. Less frequently, other teeth may be involved, including the maxillary canine, maxillary third molar, and mandibular second premolar, in descending order of frequency. This order of frequency also corresponds to the frequency of impaction of the respective teeth (4).

In severe cases, DCs may lead to tooth displacement, jaw bone erosion, and nerve damage. The diagnosis of follicular cysts is usually made through a combination of clinical examination, 2-D radiographic imaging, advanced radiological imaging, CT, and biopsy (5). Diagnosing and treating DCs is important to prevent complications and neoplastic transformations. Similarly, it is essential to carry out a correct differential diagnosis, including a dental follicle, an eruptive cyst, a glandular odontogenic cyst, or an odontogenic Keratocyst. The conventional treatment plans for DCs include

enucleation, marsupialization, or a combination of the two. Enucleation remains the gold standard. In fact, this surgical procedure lowers the recurrence rate and accelerates recovery times (6). Ihan Hren N et al. have shown that enucleation and subsequent simple closure of the cyst guarantee good bone repair even in extensive lesions (7). Despite this, a conservative approach is indicated to prevent possible surgical risks. Before the treatment plan, professional oral hygiene should be performed, and the patient should be instructed on oral hygiene to avoid complications (8). The surgical approach may include the extraction of an impacted tooth.

The aim of the present study is to present a clinical case of an odontogenic cyst extended from 4.4 to 4.7 associated with unerupted 4.5 and to highlight the treatment decision-making process. Thus, characteristics, radiographic diagnosis, histopathologic diagnosis, and surgical intervention of the cystic neoformation have been highlighted. The report also described the management of the impacted premolar located near the alveolar nerve, which can be challenging to treat due to its proximity to an important anatomical structure.

Materials and methods

Clinical and Radiological Analysis

A 65-year-old man, in good general health, comes to our attention complaining of pain and mobility of the element 3.6.

The clinical examination demonstrated the presence of a 36 with mobility 3, the presence of pus and bleeding on probing, and tenderness on percussion. The vitality test was negative despite the absence of caries (Figure 1).

The radiographic examination has highlighted an osteolytic lesion with net margins, in correspondence with the root apex of the 3.6, that was mesially tipped. The crown of 3.5, located below the apex of 3.6, was incorporated into the neoformation. The diameter of the lesion was about 22 mm (Figs. 2, 3).

The scrupulous diagnosis and analysis of the case have suggested that clinicians perform a demolition surgery approach with DC enucleation.



Figure 1. Clinical pictures of the pre-surgical site after probing

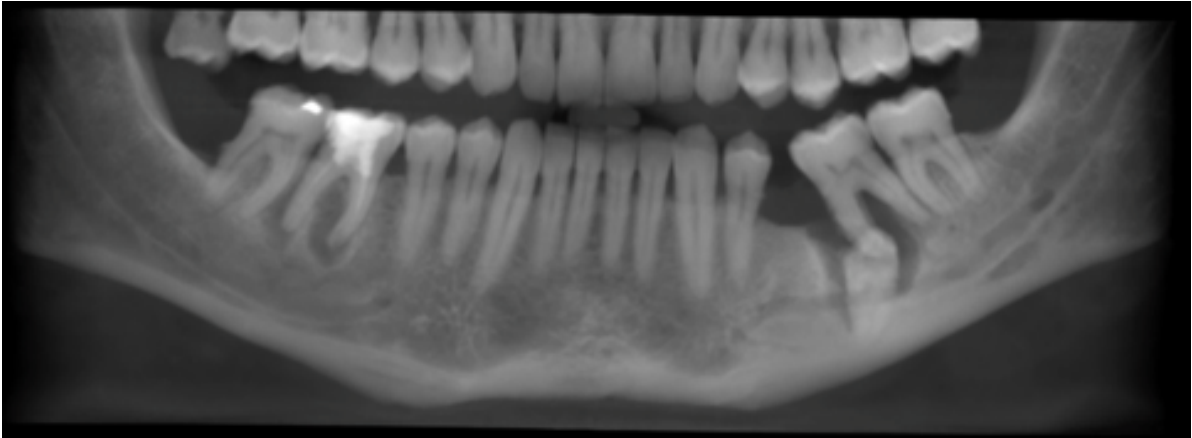


Figure 2. Panorex of the case. It is possible to see a periodontal lesion involving the impacted tooth

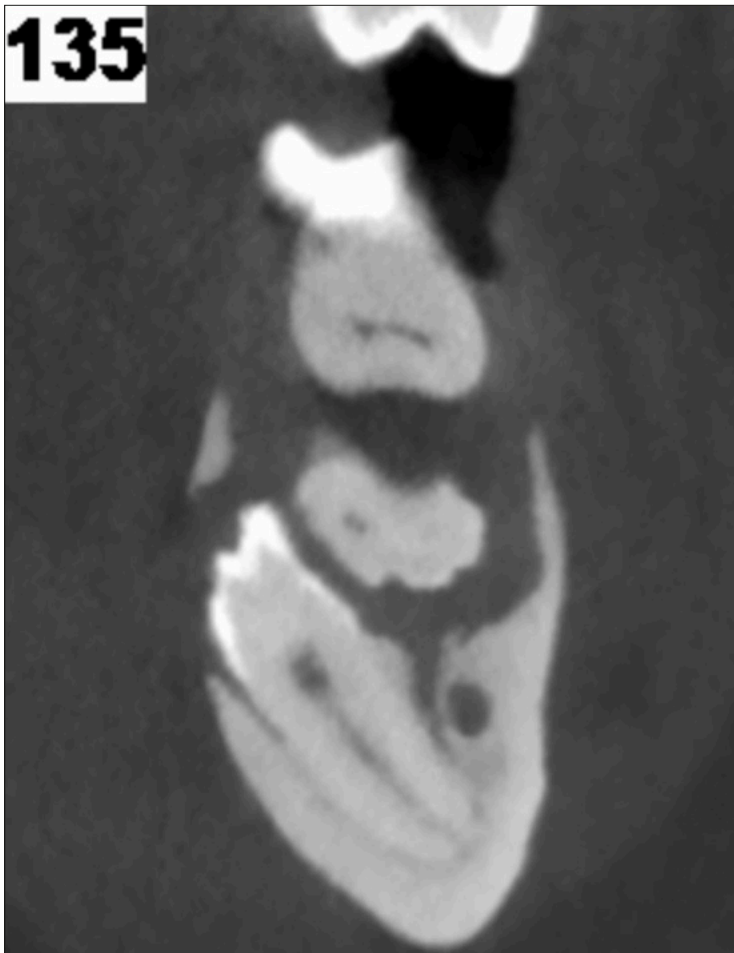


Figure 3. Sagittal plane of the surgical site

Surgical Procedure and follow-ups

Obtained informed consent, administered 1 gram of amoxicillin + clavulanic acid to the patient the night before the surgery, and prescribed the subsequent intake of 1gr every 12 hours for the following five days. Additionally, 1-minute chlorhexidine 0.2% mouthwashes twice daily for the 14 following days. Executed a plexus anesthesia by infiltration of articaine

hydrochloride 4% with adrenaline 1:100,000 in the third quadrant, reinforced by an intra-ligament infiltration on item 3.6

Proceeded with the incision, using a 15c scalpel blade, starting from the vestibular drain distally from item 3.4. The cut proceeds with a mid-crestal incision directed to item 3.6, following an intra-sulcus incision, concluding with a last drain incision mesially to item 3.7.

Subsequently, a full-thickness detachment using syndesmotic and curette was executed to dry out the tissue, paying particular attention to isolating the mental nerve below.

After extracting item 36, the top of the cystic neoformation on the alveolus bottom was noted.

Subsequently, it was expanded the surgical field via osteotomy with a round multi-blade bur on a straight handpiece to facilitate the access and removal of the cyst and the element impacted.

A coronectomy to facilitate the cleavage preceded the extraction of the impacted 35 (Figs. 4 ,5).



Figure 4. Intraoral view after extraction of the element 36. The presence of tartar on the occlusal surface of the impacted 35



Figure 5. Teeth removed (36 and 35 impacted) and cyst. Note the presence of tartar and bacterial biofilm at the apex of element 36

The dentigerous cyst was removed with a Lucas curette. The sample was stored in a container with formalin to preserve it until the histological examination. The residual surgical field was cleaned with a physiological solution. Lastly, the flaps were sutured with a 4-0 pledged suture removed after 10 days.

Histological Analysis

The sample was excised from the patient and fixed in 10% natural buffered formalin for 72 hours. Subsequently, the sample was dehydrated using incremental ethanol concentrations ranging from 70% to 100%. It was then infiltrated with paraffin using different xylene-paraffin baths and paraffin alone (7). Twenty consecutive sections, each 3 micrometers thick, were obtained from the cystitis sample using a microtome (Leica, RM2255, Buccinasco (MI), Italy). Two sections were placed on each glass slide, using Superfrost slides to ensure better adherence. The glass slides were stained with hematoxylin and eosin, supplemented with phloxin B and orange G, to enhance the details of the soft tissues (9).

Results

The healing was uneventful. The intraoral x-ray 1 year later demonstrates complete remineralization of the site (Figure 6).

From a histological point of view, the cyst shows a lot of infiltrated connective tissue with a significant amount of leukocytes, particularly lymphocytes, some plasma cells, and Russell bodies, an aggregate of immunoglobulins. The tissue appears to be degenerated due to the large amount of inflammation. A portion of non-keratinized stratified cellular layers with the characteristic shape found in cystic lesions is visible (Figure 7).

Macrophages are present but in reduced numbers compared to lymphocytes. Judging from the extensive infiltration of inflammatory cells and the presence of plasma cells, this cyst could be periodontal. Another factor suggesting this type of lesion is that the tooth adjacent to the cyst was healthy and had not undergone any previous treatment (Figure 8).

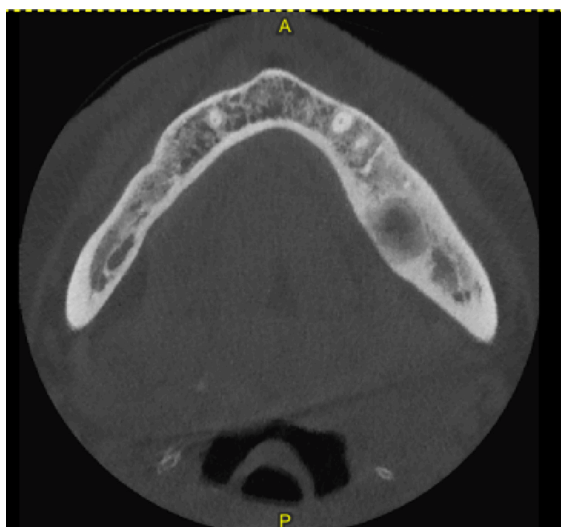


Figure 6. CBCT after 6 months of follow-up. It is possible to see the complete remineralization of cortical bone and progressive healing and mineralization of spongy bone

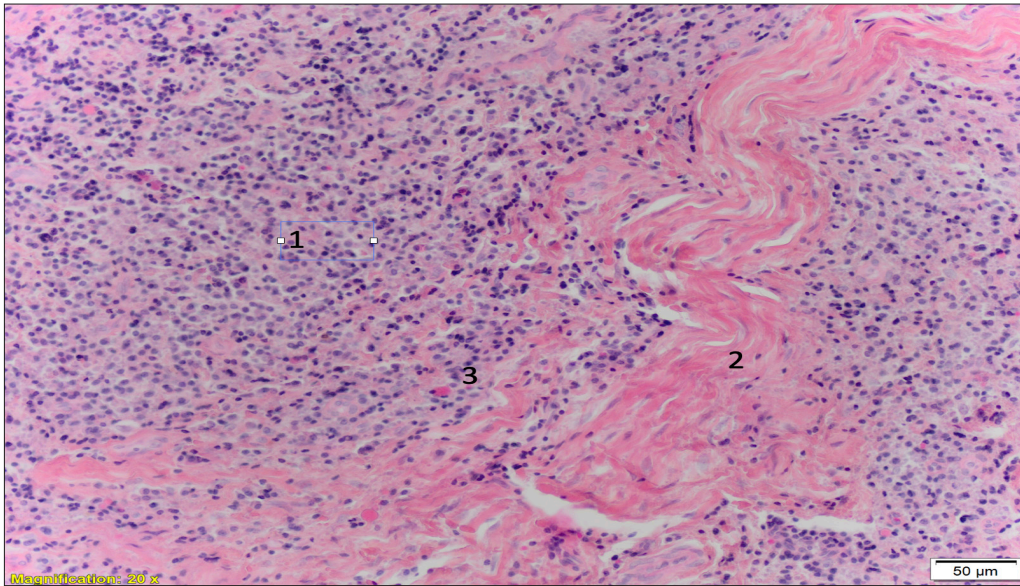


Figure 7. Histological figure depicting approximately 70% of the cyst's overall surface area: 1) Inflammatory infiltrates primarily comprised of lymphocytes, accompanied by plasma cells and Russell bodies (immunoglobulins). 2) Non-keratinized stratified epithelium arranged in arches, resulting in the formation of compartments within the cyst.

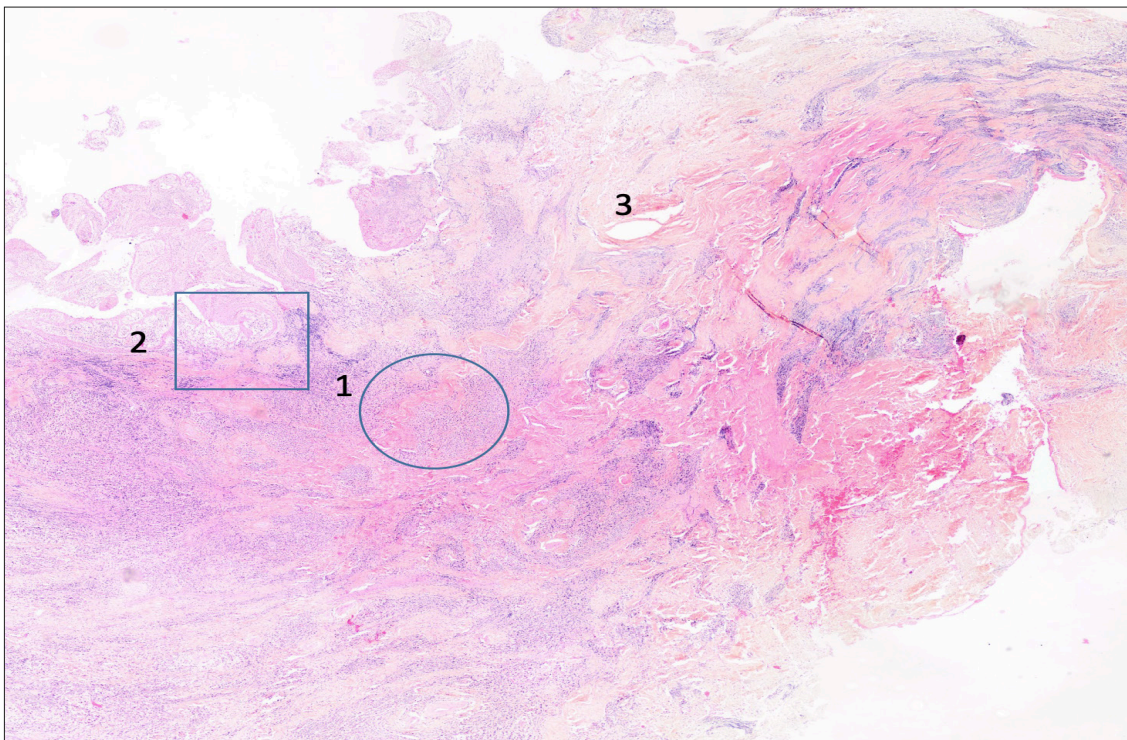


Figure 8. Inflammatory infiltrates (1) have caused the degeneration of the surrounding connective tissue, rendering connective tissue fibers undetectable in this context, while they remain visible in the unaffected tissue (2). A plasma cell filled with immunoglobulins is also observed (3)

Discussion

The case report presents a rare occurrence of an impacted mandibular premolar associated with a follicular cyst and a periodontal lesion. The successful management of this case, involving the enucleation of the dentigerous cyst and the treatment of the impacted premolar, underscores the complexity of diagnosing and

treating odontogenic cysts. Only four case reports are reported in the literature regarding the management of dentigerous cysts in the mandibular premolars (10) (11) (12) (13). However, all four cases involved the treatment of these lesions in patients of developmental age. In fact, in all cases, the treatment of choice was the marsupialization of the cyst to allow the eruption of the premolars (10) (11) (12) (13). In this case, the element

included in question has the peculiarity of having finished its eruptive thrust. Another peculiarity of the case lies in the presence of tartar on the occlusal surface of the impacted premolar. This suggests that a periodontal lesion of element 36 has occurred.

The histological analysis revealed extensive inflammatory infiltration, predominantly lymphocytes with some plasma cells and Russell bodies, suggesting a periodontal cyst. This finding is significant as it highlights the cyst's inflammatory nature and its potential impact on surrounding dental structures.

The incidence of dentigerous cysts (DCs), as reported in the literature, varies, but they are recognized as one of the most common types of odontogenic cysts. The case report aligns with the literature regarding the cyst's association with impacted teeth. However, the involvement of a mandibular premolar is less common than that of the more frequently impacted mandibular third molar. The literature also suggests a higher frequency of DCs in the second and third decades of life, making the occurrence in a 65-year-old patient, as described in this case report, relatively rare. This discrepancy emphasizes the need for clinicians to consider odontogenic cysts in their differential diagnosis, regardless of the patient's age. The clinical management of the case, particularly the decision to perform cyst enucleation, reflects the current gold standard in treating DCs. This approach is supported by literature highlighting the benefits of enucleation, including lower recurrence rates and accelerated recovery times (14).

However, the case also illustrates the importance of a proper surgical approach to minimize surgical risks, especially when dealing with impacted teeth near critical anatomical structures like the alveolar nerve (15). This case report's strength lies in its detailed clinical and radiological analysis and comprehensive histological examination, which provides a thorough understanding of the condition and its management. However, as a single case report, the findings' generalizability may be limited. Future research could focus on more extensive studies to explore the prevalence and characteristics of similar cysts in older populations and investigate the long-term outcomes of different treatment approaches for impacted teeth associated with cysts.

Conclusion

In conclusion, this case report contributes to the existing literature by detailing the clinical management and histological analysis of a rare case of an impacted mandibular premolar associated with a follicular cyst and a periodontal lesion. The findings underscore the importance of accurate diagnosis, individualized treatment planning, and the need for a conservative approach to managing complex dental cyst cases.

References

1. Speight P, Fantasia FE, Neville BW. Dentigerous cyst. In EINaggar AK, Chan JKC, Grandis JR, Takata T, Sloatweg

- PJ, editors. WHO Classification of Head and neck tumors, 4th ed. Lyon: International Agency for Research on Cancer; 2017. pp. 234–35.
2. Mishra R, Tripathi AM, Rathore M. Dentigerous Cyst associated with Horizontally Impacted Mandibular Second Premolar. *Int J Clin Pediatr Dent.* 2014 Jan; 25206240, 7(1):54-7. Doi: 10.5005/jp-journals-10005-1235. Epub 2014 Apr 26. PMID: PMC4144059
3. Padawe D, Narwade A, Takate V, Khade A, Sachdev SS. Dentigerous cyst associated with an impacted mandibular second premolar: A case report. *International Dental Journal of Student's Research* 2022; 10(4):1-3.
4. Seward GR. *Radiology in General Dental Practice.* London: British Dental Association, 1964: 67.
5. McCrea S. Adjacent dentigerous cysts with the ectopic displacement of a third mandibular molar and supernumerary (fourth) molar: a rare occurrence. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2009 Jun;107(6):e15-20
6. Ihan Hren N, Miljavec M. Spontaneous bone healing of the large bone defects in the mandible. *Int J Oral Maxillofac Surg.* 2008;37:1111–6.
7. Barlattani A Jr., Franco R., Martelli M., Gianfreda F., Ferro R., Basili M., Bollero P. (2019) Guided bone regeneration in patients taking bisphosphonates: two case series. *8. Oral Implantology*, 2019, 12(2), pp. 194-204
8. Gianfreda F, Bollero P, Muzzi M, Di Giulio A, Nicolai E, Canullo L. The Effects of Ultrasonic Scaling and Air-Abrasive Powders on the Decontamination of 9 Implant-Abutment Surfaces: Scanning Electron Analysis and In Vitro Study. *Dent J (Basel).* 2022 Mar 1;10(3):36. doi: 10.3390/dj10030036. PMID: 35323237; PMCID: PMC8947291.
9. Savadori, P., Dalfino, S., Piazzoni, M., Inchingolo, F., Del Fabbro, M., Tartaglia, G. M., & Giardino, L. (2023). Arduino automated microwave oven for tissue decalcification. *Bioengineering*, 10(1) doi:10.3390/bioengineering10010079
10. Khalifa C, Garma M, Mabrouk R, Slim A, Bouguezzi A, Selmi J. Conservative management of dentigerous cyst in children: Report of two clinical cases. *Clin Case Rep.* 2023 Apr 11;11(4):e7051. doi: 10.1002/ccr3.7051. PMID: 37064731; PMCID: PMC10090943.
11. 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 Dec 18;11(12):e6414. doi: 10.7759/cureus.6414. PMID: 31988815; PMCID: PMC6970100.
12. Şahin O. Conservative management of a dentigerous cyst associated with eruption of teeth in a 7-year-old girl: a case report. *J Korean Assoc Oral Maxillofac Surg.* 2017 Dec;43(Suppl 1):S1-S5. doi: 10.5125/jkaoms.2017.43.S1.S1. Epub 2017 Dec 27. PMID: 29354590; PMCID: PMC5770471.
13. Serra e Silva FM, Sawazaki R, de Moraes M. Eruption of teeth associated with a dentigerous cyst by only marsupialization treatment: a case report. *J Dent Child (Chic).* 2007 Sep-Dec;74(3):228-30. PMID: 18482520.
14. Minetti E, Gianfreda F, Palermo A, Bollero P. Autogenous Dentin Particulate Graft for Alveolar Ridge Augmentation with and without Use of Collagen Membrane: Preliminary Histological Analysis on Humans. *Materials (Basel).* 2022 Jun 18;15(12):4319. doi: 10.3390/ma15124319. PMID: 35744378; PMCID: PMC9230765.
15. Barlattani A Jr, Martelli M, Gargari M, Ottria L. (2019) Articular disc of temporomandibular joint: an anatomical and histological study. *Functional considerations.* *J Biol Regul Homeost Agents.* 33(6 Suppl. 2):199-208. PMID: 32338474.