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Paradental inflammatory odontogenic cyst associated with dental impaction in the maxilla: Rare case report and 6-month postoperative follow-up

Cisto odontogênico inflamatório paradental em maxila associado à impacção dentária: Relato de caso raro com acompanhamento pós-operatório de seis meses

Quiste odontogénico inflamatorio paradental en el maxilar asociado a impactación dental: Reporte de un caso raro con seguimiento postoperatorio de seis meses

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Abstract
Paradental inflammatory cyst (PIC) is an odontogenic cyst associated with episodes of mechanical trauma and is found near the lateral cervical margin of the dental root of a partially erupted tooth. It is typically located distal to mandibular third molars and rarely appears in the maxilla. This study aims to report a rare case of a PIC in the maxilla associated with the impaction of tooth 15 and with a 6 month post operative follow-up. A 20-year-old female patient with no systemic alterations was referred by an orthodontist due to the absence of tooth 15. Clinical examination revealed no significant alterations in the soft and hard tissues or the missing tooth. Radiographic examination identified a supernumerary tooth between teeth 16 and 15, as well as a hypodense lesion between teeth 14 and 16 in their root region. Differential diagnoses included dentigerous cyst, traumatic bone cyst, and chronic inflammatory lesion. The proposed treatment involved surgical removal under local anesthesia, including osteotomy for lesion access, extraction of the supernumerary tooth, extensive curettage, and complete enucleation of the intraosseous lesion. Histopathological examination revealed a cystic capsule lined by stratified squamous epithelium, with dense connective tissue and moderate lymphoplasmacytic inflammatory infiltrate, along with areas of diffuse hemorrhage, confirming the definitive diagnosis of PIC. The postoperative period was uneventful, and the patient was followed up for 30 days without signs of recurrence, being cleared for orthodontic treatment. In conclusion, PIC is an uncommon lesion that rarely occurs in the maxilla, which accurate diagnosis requires a thorough correlation of clinical, radiographic, and histological data, with a low recurrence rate.
Keywords: Odontogenic cysts; Maxilla; Oral pathology; Oral surgery.

Resumo
O cisto inflamatório paradental (CIP) é um cisto odontogênico associado a episódios de trauma mecânico, geralmente localizado próximo à margem cervical lateral da raiz dentária de um dente parcialmente irrompido. Tipicamente, ocorre distalmente aos terceiros molares mandibulares e raramente é observado na maxila. Este estudo tem como objetivo relatar um caso raro de CIP em maxila, associado à impacção do dente 15, com acompanhamento pós-operatório de seis meses. Paciente do sexo feminino, 20 anos, sem alterações sistêmicas, foi encaminhada pelo

ortodontista devido à ausência do dente 15. O exame clínico não revelou alterações significativas em tecidos moles ou duros, nem presença do dente ausente. O exame radiográfico evidenciou um dente supranumerário entre os dentes 16 e 15, além de uma lesão hipodensa entre os dentes 14 e 16, na região radicular. As hipóteses diagnósticas incluíram cisto dentígero, cisto ósseo traumático e lesão inflamatória crônica. O tratamento proposto consistiu em remoção cirúrgica sob anestesia local, incluindo osteotomia para acesso à lesão, exodontia do dente supranumerário, curetagem ampla e enucleação completa da lesão intraóssea. O exame histopatológico revelou cápsula cística revestida por epitélio pavimentoso estratificado, tecido conjuntivo denso e infiltrado inflamatório linfoplasmocitário moderado, além de áreas de hemorragia difusa, confirmando o diagnóstico definitivo de CIP. O pós-operatório transcorreu sem intercorrências, e a paciente foi acompanhada por 30 dias sem sinais de recorrência, sendo liberada para continuidade do tratamento ortodôntico. Em conclusão, o CIP é uma lesão incomum que raramente ocorre na maxila. Seu diagnóstico preciso requer correlação criteriosa entre dados clínicos, radiográficos e histopatológicos, apresentando baixa taxa de recorrência.
Palavras-chave: Cistos odontogênicos; Maxila; Patologia bucal; Cirurgia bucal.

Resumen
Un quiste inflamatorio paradental (CIP) es un quiste odontogénico asociado a episodios de traumatismo mecánico, generalmente localizado cerca del margen cervical lateral de la raíz dental de un diente parcialmente erupcionado. Suele presentarse distal a los terceros molares mandibulares y rara vez se observa en el maxilar. Este estudio tiene como objetivo reportar un caso raro de CIP en el maxilar, asociado a la impactación del diente 15, con un seguimiento postoperatorio de seis meses. Una paciente de 20 años, sin alteraciones sistémicas, fue derivada por el ortodoncista debido a la ausencia del diente 15. El examen clínico no reveló cambios significativos en los tejidos blandos ni duros, ni la presencia del diente ausente. El examen radiográfico reveló un diente supernumerario entre los dientes 16 y 15, además de una lesión hipodensa entre los dientes 14 y 16, en la región radicular. Las hipótesis diagnósticas incluyeron quiste dentígero, quiste óseo traumático y lesión inflamatoria crónica. El tratamiento propuesto consistió en la extirpación quirúrgica bajo anestesia local, incluyendo osteotomía para acceder a la lesión, extracción del diente supernumerario, curetaje amplio y enucleación completa de la lesión intraósea. El examen histopatológico reveló una cápsula quística revestida por epitelio escamoso estratificado, tejido conectivo denso y un infiltrado inflamatorio linfoplasmocitario moderado, además de áreas de hemorragia difusa, lo que confirmó el diagnóstico definitivo de PIC. El postoperatorio transcurrió sin complicaciones y el paciente fue seguido durante 30 días sin signos de recurrencia, siendo dado de alta para tratamiento de ortodoncia adicional. En conclusión, el PIC es una lesión poco común que rara vez se presenta en el maxilar. Su diagnóstico preciso requiere una cuidadosa correlación entre los datos clínicos, radiográficos e histopatológicos, con una baja tasa de recurrencia.
Palabras clave: Quistes odontogénicos; Maxilar; Patología oral; Cirugía oral.

1. Introduction

According to the World Health Organization (WHO), odontogenic cysts are defined as pathological intraosseous cavities lined by odontogenic epithelium and filled with fluid or semi-fluid material (Vered & Wright, 2022). These cysts are broadly categorized as inflammatory or developmental in origin, constituting up to 90% of all oral cysts (Kammer et al., 2020). As outlined by Kanno et al. (2006), their pathogenesis arises primarily from the proliferation of the reduced enamel epithelium and epithelial rests of Malassez in response to inflammatory stimuli or trauma. This process leads to the formation of distinct cyst types, including radicular, residual, traumatic bone, dentigerous, and paradental cysts (Franklin et al., 2021).

The paradental cyst, also termed the paradental inflammatory cyst (PIC), was first characterized by Main (1970) and Vedtofte & Praetorius (1989) as an inflammatory odontogenic lesion developing adjacent to the lateral cervical margin of a partially erupted tooth root and it is frequently associated with pro-inflammatory periodontal conditions such as pericoronitis (Chrcanovic et al., 2011). PIC exhibits a higher incidence among young adults, typically aged 20–30 years, with no significant sex predilection, and represents 1–5% of inflammatory odontogenic cysts globally. In contrast, Kammer et al. (2020) reported a prevalence of 13.5% in Brazil, with 55 cases identified among 406 histopathological samples analyzed between 2006 and 2018, underscoring its relative rarity in this population.

Li et al. (2023) observed that PIC predominantly occurs distal to partially or completely impacted mandibular third molars, often in association with food impaction. Acute presentations may include swelling, purulent discharge, and increased probing depth in the disto-buccal region. Following third molars, the second and first mandibular molars are the most affected

sites. Maxillary involvement particularly in incisors, canines, and premolars—is exceedingly rare. To date, only Morimoto et al. (2004) and Maruyama et al. (2015) have documented PIC cases in the maxillary premolar region, emphasizing the need for thorough clinical and radiographic evaluation to aid differential diagnosis.

Clinically, PIC is often asymptomatic, though some patients report discomfort, swelling, tenderness, mild to moderate pain, bleeding, or suppuration via the periodontal sulcus, particularly in pericoronitis-related cases. Most diagnoses are incidentally detected during routine radiographic examinations **(**Chrcanovic et al., 2011; Borgonovo et al., 2012**)**. Radiographically, PIC presents as a well-defined radiolucent or hypodense lesion adjacent to the lateral (typically distal) aspect of a tooth. In third molar regions, semilunar-shaped bone resorption is common, while the periodontal ligament and lamina dura of neighboring teeth remain intact. This pattern reflects the lesion's origin in pericoronal tissues and junctional epithelium rather than the endodontic system (Derindağ et al., 2019).

Histopathologically, PIC is indistinguishable from other inflammatory odontogenic cysts, such as periapical or dentigerous cysts, as noted by Begum et al. (2024). Differentiation relies on its pericoronal location rather than periapical orientation. The cystic capsule features a hyperplastic, non-keratinized stratified squamous epithelial lining with intense inflammatory infiltrate. Connective tissue may exhibit hemosiderin deposits and cholesterol clefts, consistent with an inflammatory etiology.

Treatment strategies depend on lesion location and tooth involvement. For third molars, enucleation followed by extraction is standard. For other teeth, enucleation or marsupialization may be performed based on lesion size, with efforts to preserve the affected tooth (Kaygisiz & Karsli, 2024)**.** Therefore, this study aims to present a rare case of a paradental inflammatory cyst in the maxilla associated with the impaction of tooth 15 and with a 6 month post operative follow-up.

2. Methodology

A descriptive research was carried out, of a qualitative nature and of the specific type of case report (Pereira et al., 2018; Estrela, 2018). The present study complied with ethical criteria for studies conducted with humans, with the patient signing the written informed consent term allowing the disclosure of information and images of the case for scientific purposes, and followed the ethical guidelines of the National Health Council Resolution No. 466/2012, ensuring the confidentiality and privacy of the patient involved and followed Care Guideline and Checklist, also the patient signed the written inform consent form publication

The clinical approach included anamnesis, extraoral and intraoral examinations, and radiographic analysis to establish diagnostic hypotheses and guide the surgical plan. The treatment involved local anesthesia, osteotomy for lesion access, extraction of the supernumerary tooth, extensive curettage, and complete enucleation of the intraosseous lesion. The excised material was sent for histopathological examination to confirm the diagnosis. Postoperative follow-up was carried out over a six-month period to evaluate healing and possible recurrence. This methodological approach allowed for an integrated clinical, radiographic, and histopathological correlation, ensuring the accuracy of the diagnosis and the reliability of the clinical outcomes described.

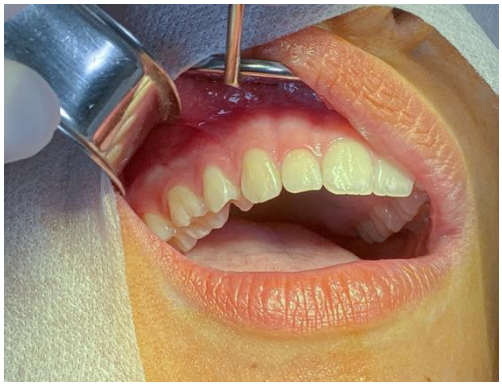
A 20-year-old female patient, mixed race, non-smoker, with no systemic conditions, residing in the state of Pará, northern Brazil, presented to a university in Belém, referred by her orthodontist with the chief complaint of the absence of tooth 15. This case report was prepared in a descriptive and qualitative manner, following the ethical guidelines of the National Health Council Resolution No. 466/2012, ensuring the confidentiality and privacy of the patient involved and followed Care Guideline and Checklist, also the patient signed the written inform consent form publication.

During anamnesis, the patient reported a painless pressure sensation upon palpation in the posterior region of the right

maxilla, the absence of tooth 15, and no history of mechanical trauma that could justify the pressure sensation or the missing tooth. Intraoral clinical examination revealed no significant alterations such as swelling, edema, bleeding, or secretion, and no displacement of the teeth present in the right maxillary quadrant.

Further clinical examination showed the absence of supra- and subgingival calculus and dental biofilm, no dental caries, no bleeding on probing, an adequate band of keratinized mucosa, a medium gingival phenotype, and no interproximal bone loss. Pulp vitality tests on teeth 14 and 16 were all positive (Figure 1). The occlusal analysis showed no posterior occlusal discrepancies, except for mild lower anterior crowding and a short anterior overbite.

Figure 1 -Vestibular view of teeth 14 and 16 without clinical alterations.

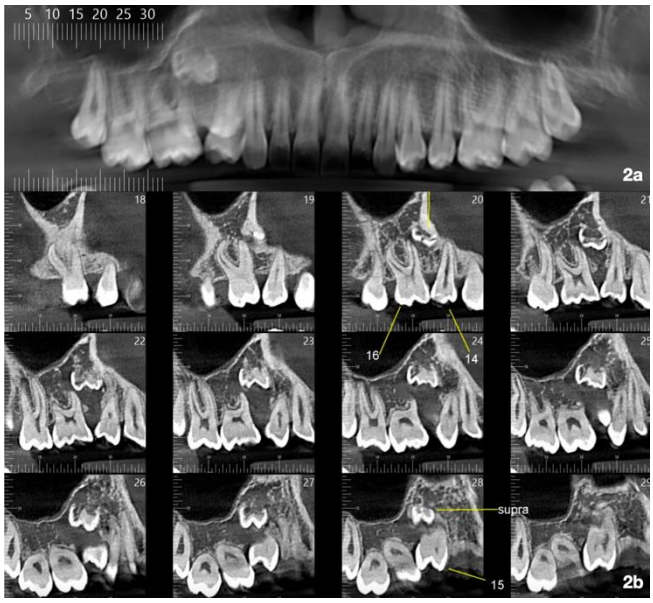


Source**:** Authors' archive (2025).

Radiographic examinations of the right maxillary quadrant revealed the presence of a supernumerary tooth mesial to tooth 16, an intraosseous impacted tooth 15 with root dilaceration. Between teeth 14 and 16, a well-defined hypodense image with regular contours measuring 9 mm in diameter and root resorption of the mesiobuccal root of tooth 16 was observed, suggestive of an intraosseous lesion (Figure 2).

Based on clinical and radiographic findings, the suggested differential diagnoses included a dentigerous cyst, a traumatic bone cyst, and chronic inflammatory pericoronal lesion. The proposed treatment consisted of the extraction of the supernumerary tooth and excisional biopsy of the intraosseous lesion and before any procedure the patient provided written informed consent for the publication of this case report.

Figure 2 - Hypodense lesion compatible with an odontogenic cyst and a hyperdense image corresponding to a supernumerary tooth.



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After complementary exams and medical clearance, local anesthesia was administered using 1:100,000 articaine with epinephrine (Nova DFL, Rio de Janeiro, Brazil) in the middle superior alveolar nerve, with additional infiltration in the nasopalatine and greater palatine nerves. Following confirmed analgesia, intrasulcular and releasing incisions were made, creating a mucoperiosteal trapezoidal flap using a 15c scalpel blade (Swann Morton, Sheffield, England) (Figure 3). Osteotomy was performed in an oval shape using a high-speed handpiece (Kavo Kerr, California, USA) and a long-shank 702 carbide bur (Angelus Prima, Londrina, Paraná) (Figure 4). After creating the surgical window, curettage and enucleation of the cystic lesion were performed using a Lucas curette (Supremo, São Paulo, Brazil). The lesion presented an irregular shape, brownish coloration, fibrous consistency, and a smooth surface, measuring 3 mm mesiodistally, 3 mm cervico-occlusally, and 2 mm buccopalatally, surrounded by inflammatory infiltrate (Figure 5). The specimen was placed in a plastic container with 10% buffered formalin for histopathological examination.

Figure 3 - Trapezoidal flap.

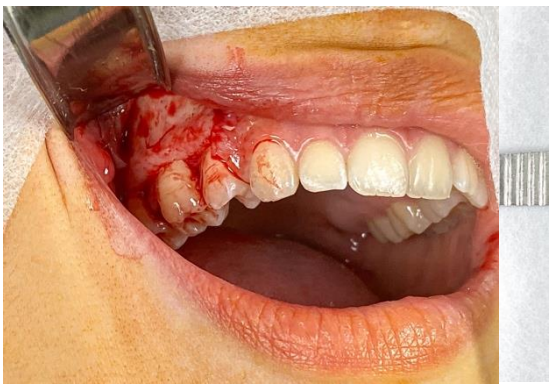

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Figure 4 - Oval-shaped surgical window.

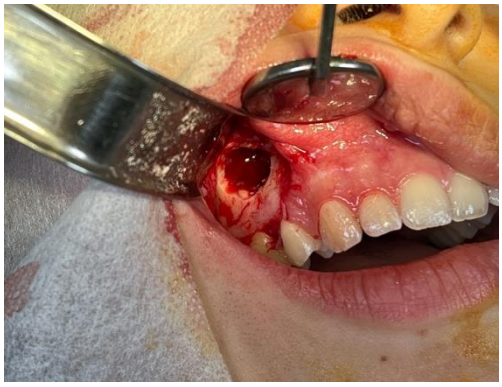

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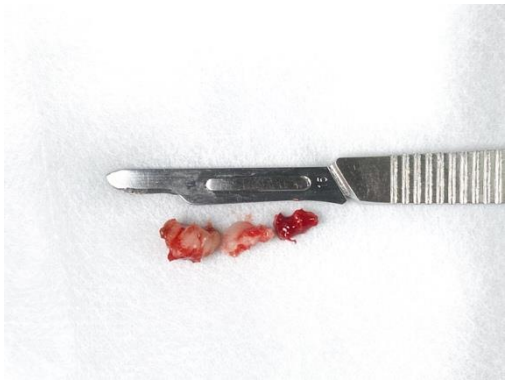
Figure 5 - Excisional biopsy and removal of the supernumerary tooth.



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Next, the supernumerary tooth was extracted using luxation movements with an Apex 303 elevator (Supremo, São Paulo, Brazil). After tooth removal, the site was further curetted using a Lucas curette (Supremo, São Paulo, Brazil) (Figure 6). Finally, the flap was repositioned and stabilized with simple sutures using 5.0 black nylon sutures (Techsuture, Bauru, Brazil). For immediate postoperative pain and inflammation control, low-level laser therapy (Aluminum Gallium Arsenide—GaAlAs)

was applied with a wavelength of 660 nm (Therapy XT DMC, São Paulo, Brazil), in continuous red mode at 3 J/cm² for 30 seconds per point.

Figure 6 - Surgical window post-enucleation and curettage.

Source**:** Authors' archive (2025).

Postoperative analgesics (Dipyrone sodium, 1g, every 8 hours for 5 days) and anti-inflammatory medication (Meloxicam, 15 mg, every 12 hours for 3 days) were prescribed. The postoperative follow-up lasted 30 days, during which the patient reported postoperative pain, tissue edema, no bleeding, and mild sensitivity upon interdental contact. There were no clinical or radiographic signs of cyst recurrence during the follow-up period.

After 7 days, the sutures were removed, and the patient reported no further episodes of pain, swelling, or edema (Figure 7). A 6-month follow-up was conducted to monitor for potential recurrence (Figure 8). No clinical or radiographic signs of recurrence were observed, and the patient was cleared to resume orthodontic treatment (Figure 9). And the patient was satisfied with surgery functional and esthetics results.

Figure 7 - 7-days postoperative follow-up.

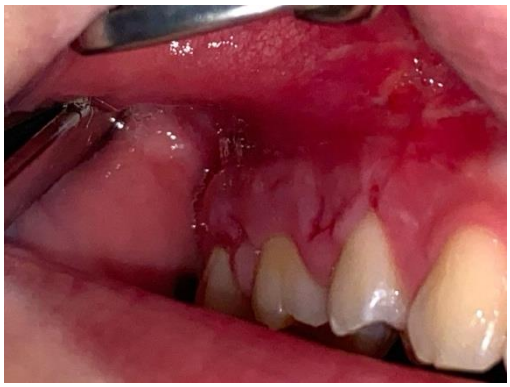

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Figure 8 -180-days postoperative follow-up.

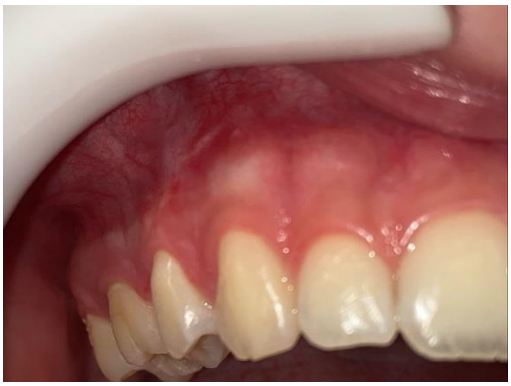

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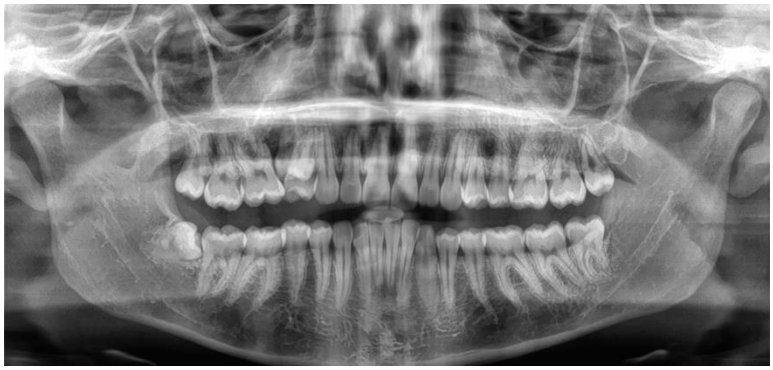
Figure 9 -panoramic x-ray after 180-days postoperative follow-up.



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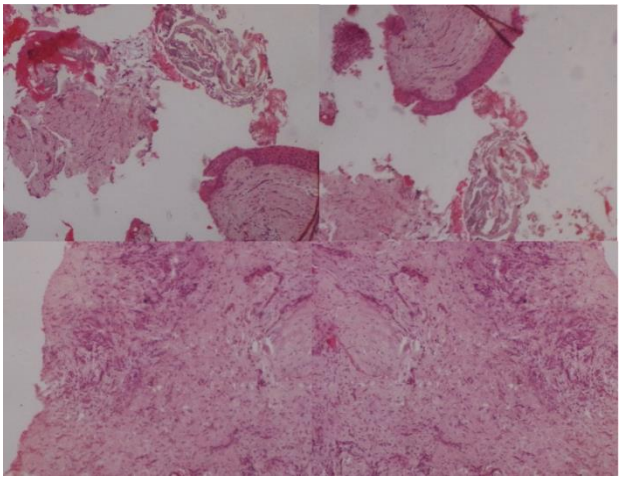
Histopathological examination revealed a fragment of mucosa partially lined by parakeratinized stratified squamous epithelium. The lamina propria consisted of dense connective tissue with a moderate chronic lymphoplasmacytic inflammatory infiltrate and congested, ectatic blood vessels. The cystic capsule was lined with stratified squamous epithelium and composed of dense connective tissue, exhibiting a chronic lymphoplasmacytic inflammatory infiltrate with diffuse hemorrhagic areas, consistent with the diagnosis of Paradental Inflammatory Cyst (Figure 10).

Figure 10 - Histological image of the paradental inflammatory cyst.



Source**:** Authors' archive (2025).

4. Discussion

Currently, the PIC is classified as a rare odontogenic cyst among major oral pathologies, with most reports limited to isolated cases in the mandibular region. To contextualize its rarity, Dhanuthai et al. (2024) conducted a 20-year retrospective study of 148.353 oral lesions, identifying 25.628 cysts (17.2%). Among these, odontogenic cysts predominated (23.732 cases; 92.6%), with radicular cysts (10.536; 39.7%), dentigerous cysts (8.307; 31.3%), and odontogenic keratocysts (3.273; 12.3%) being the most frequent. In stark contrast, PIC accounted for merely 405 cases (1.5%), all localized to the posterior mandible (Dhanuthai et al., 2024).

This low incidence of PIC has been consistently documented across diverse populations, with no apparent demographic predilection. For instance, Tamiolakis et al. (2019) reported 57 cases (1.1%) in a Greek cohort, Tekkesin et al. (2019) identified 11 cases (0.2%) in Turkey, Jones et al. (2006) noted 402 cases (5.6%) in the United Kingdom, and Daley et al. (1994) described 33 cases (0.5%) in Canada. Khandelwal et al. (2024) further corroborated this trend in an Indian population, observing 11 PIC cases (7.3%) among 218 odontogenic cysts, with a notable male predominance (4.5:1 ratio). Similarly, Villasis-Sarmiento et al. (2017) identified 4 PIC cases (0.5%) in Mexico, also favoring males (3:1 ratio). However, our case involved a female patient, underscoring the lack of clear sex-based predisposition.

The scarcity of PIC is further emphasized by Mello et al. (2019), whose systematic review found a pooled prevalence of 0.08%, precluding meta-analysis due to insufficient data. An exception is the study by Kammer et al. (2020), which reported an unusually high PIC prevalence of 13.5% (406 samples). The authors attributed this outlier to potential misclassification, as incomplete clinical or radiographic records might lead PIC to be erroneously diagnosed as dentigerous cysts. Accurate diagnosis of PIC requires careful differentiation from dentigerous, radicular, and periodontal cysts. As highlighted by da Silva et al. (2018), PIC pathogenesis involves pro-inflammatory stimuli in the posterior mandible, often linked to pericoronitis of partially erupted third molars, triggering proliferation of odontogenic epithelium. Kammer et al. (2020) stress that differential diagnoses must exclude periapical cysts and dentigerous cysts.

Clinically and radiographically, PIC distinctions are critical. Periapical cysts arise from infected, non-vital teeth, presenting as unilocular radiolucencies at the apex, often with swelling or fistulae (Weber et al., 2018; Bittencourt et al., 2021; Silva et al., 2018). Dentigerous cysts, typically asymptomatic, manifest as well-defined radiolucencies encircling unerupted teeth, commonly third molars or canines (Weber et al., 2018; Bittencourt et al., 2021; Silva et al., 2018). In our case, PIC occurred in a maxillary premolar a rare location and was positioned parallel to the root, deviating from the apical focus of

periapical cysts. Geographic distribution studies reveal that 85.3% of PIC cases involve mandibular first molars, followed by second (14.6%) and third molars.

Silva et al. (2018) reinforced this mandibular preference (6 PIC cases; 2:1 mandible-to-maxilla ratio) in an analysis of 7.259 biopsies. Valenzuela-Fuenzalida et al. (2023) propose that anatomical factors, such as the mandible's denser bone structure, may retain epithelial remnants during eruption, whereas the maxilla's pneumatized bone hinders such retention. Our maxillary case thus represents an uncommon presentation. While this report enriches the literature by documenting PIC in a rare location, several limitations warrant consideration. The single-case design restricts broader epidemiological or therapeutic generalizations. Additionally, publication bias may overemphasize atypical features, potentially underrepresenting shared characteristics with more common cysts.

5. Conclusion

We conclude that understanding the characteristics PIC in the context of the mandibular third molars and recognizing its rare occurrence in extra-mandibular regions, such as the maxilla, is critical for including this lesion in differential diagnoses of maxillary bone pathologies. As exemplified by the present case, a definitive diagnosis requires systematic integration of surgical, radiographic, and histopathological findings to ensure both precision and clinical relevance. While our study describes a single clinical scenario, current evidence suggests that surgical enucleation remains the standard approach for small lesions, whereas marsupialization may represent a viable therapeutic option for larger, anatomically complex cases. Nevertheless, methodologically robust clinical studies with larger cohorts and randomized designs are warranted to strengthen therapeutic consensus and refine diagnostic protocols.

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Author's Contributions

RRSF: conceptualization and supervision. A.C.M.H., M.A.A.C.J., C.E.M.H. and R.R.S.F.: contributed to data curation. S.A.F.M. and R.R.S.F.: writing-original draft preparation. S.A.F.M. and R.R.S.F.: review and editing of the manuscript. A.C.M.H., M.A.A.C.J., C.E.M.H. and R.R.S.F.: contributed to methodology. A.C.M.H., M.A.A.C.J., C.E.M.H. and R.R.S.F.: contributed to investigation. R.R.S.F.: contributed to the project administration.

Conflicts of interest

The authors declare no conflicts of interests.

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