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Case Report

Minimally Invasive Management of Peripheral Developing Odontoma in a Child Using Diode Laser Surgery: A Case Report and Literature Review

Paolo Ricci[1]*, Marco De Luca[1], Giulia Ferraro[2], Antonio Russo[1]

[1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, University of Naples Federico II, Naples, Italy.
[2]Department of Dental Surgery and Oral Health Sciences, Faculty of Medicine, University of Bologna, Bologna, Italy.

***E-mail** ✉ paolo.ricci@gmail.com

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ABSTRACT

Peripheral developing odontoma is a seldom-encountered odontogenic lesion that presents almost exclusively during childhood. Its clinical presentation, along with radiographic findings, ordinarily orients suspicion toward a benign condition, but a conclusive diagnosis rests entirely on microscopic tissue analysis. Operative management is, in most instances, uncomplicated and definitive; however, difficulty arises when patients are unwilling to cooperate, potentially requiring supplementary interventions to achieve appropriate surgical treatment. We document an instance of a peripheral developing odontoma affecting the palatal region of the anterior maxilla in a child who would not cooperate, whose care was subsequently accomplished through diode laser excision, underlining the merits of this surgical modality for young individuals. Published evidence on the peripheral developing odontoma has been compiled and examined in a narrative review.

Keywords: Odontoma, Diode laser, Pediatric dentistry, Oral laser surgery, Oral cavity

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Introduction

Odontogenic tumors represent a wide range of benign and malignant entities characterized by highly variable clinical behavior and cellular characteristics [1]. They comprise fewer than ten percent of oral disorders in pediatric age groups [2]. Among these neoplasms, odontomas are considered prevalent hamartomatous odontogenic alterations that interfere with the normal eruption sequence of permanent and primary teeth or substitute for the tooth bud in the region where development occurs [3]. Even though their typical location is within bone, soft tissue occurrences on the periphery have likewise been documented, labeled variably as “peripheral odontoma” (PO), “gingival odontoma”, “gingival peripheral odontoma”, “extraosseous odontoma”, and “soft tissue odontoma” [3, 4]. Reflecting its tissue origin, biological character, and microscopic appearance, Ide *et al*. [5, 6] proposed the term “peripheral developing odontoma”. Indeed, developing odontomas are recognized as a subgroup that falls short of the full maturational pattern of odontomas yet shows a level of organization exceeding that encountered in ameloblastic fibro-odontoma; simultaneously, they occur less often and arise predominantly in younger patients [7, 8]. Distinguishing a developing odontoma from an ameloblastic fibro-odontoma, therefore, remains a significant diagnostic challenge [8, 9].

In published works, a three-part classification of odontomas is adopted: those situated within bone, those in peripheral or extraosseous locations, and those that have erupted [10]. Intraosseous odontoma is noted most commonly, followed by erupted odontoma, while PO is encountered extraordinarily infrequently [10]. Lesions that develop peripherally or extraosseously tend to present as mucosal or gingival soft tissue

enlargements, and under the microscope, they resemble lesions found in bone [11]. Debates persist about the precise histogenesis, though the predominant view identifies the gingival remnants of the dental lamina (rests of Serres) as the specific source of peripheral odontoma; an alternative theory postulates that tooth-resembling formations arise from soft-tissue remnants of odontogenic epithelium, supported by epithelial–mesenchymal crosstalk [9]. As to causative factors, proposals have included associations with mechanical injury to the deciduous teeth, active inflammation or infection, odontoblastic overactivity, and DNA-level changes occurring with or without hereditary syndromes such as Gardner syndrome or Hermanns syndrome [12].

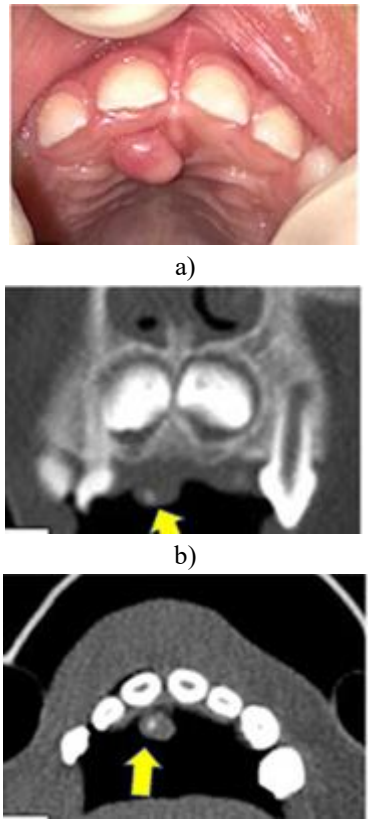
On clinical examination, the lesion characteristically presents as a slowly enlarging, painless lump of gingival or mucosal origin, radiographically devoid of any underlying osseous abnormality [13-15].

Operative removal, including periosteal curettage, generally achieves cure in PO; failures have been largely due to retained lesional tissue and the inability or considerable difficulty of clearing local irritating elements during the surgical act. Scalpel-based surgery further tends to bring about bleeding during the procedure (often in the setting of gingival inflammation and substandard oral cleanliness), bleeding afterward (commonly because placing sutures is frequently impossible), edema after the operation, and overall soreness. Tackling PO with lasers has been proposed as both an alternative and a definitive operative approach. Broadly speaking, instruments like diode, KTP, Neodymium, and YAG lasers afford clear procedural advantages in oral surgery owing to a lowered incidence of operative complications, bloodless or near-bloodless surgical fields, quicker restoration of the mucosal surface, and lower levels of postoperative pain, swelling, and higher patient approval [16].

We present a case of palatal mucosa involvement by a peripheral developing odontoma in a pediatric patient, in which a diode laser was used for removal. In this contribution, we stress that laser excision provides a valuable operative alternative for managing PO, particularly in subjects with limited cooperation, and survey three decades of global literature on diagnostic, therapeutic, and epidemiological aspects.

Case presentation

A 4-year-old boy with an otherwise unremarkable health record was referred to the Complex Unit of Odontostomatology at the University Hospital "Policlinico of Bari," Italy, for assessment of a swelling on the palate posterior to the upper incisors. His parents recounted no meaningful prior medical events. First noticed 2 months before presentation, the lesion had gradually enlarged, causing unease and interfering with speech and food intake, yet it provoked neither tenderness nor bleeding. Inspection of the oral cavity revealed a solitary, nodular, elevated area upon the palate, estimated at approximately 0.5 × 0.5 cm in extent and draped by mucosa of ordinary coloration **(Figure 1a)**. A preoperative maxillary computed tomography study, performed under general anesthesia, demonstrated calcified material within the lesion. Osseous participation was lacking **(Figures 1b and 1c)**.



a)

b)

c)

Figure 1. (a) Clinical appearance of PO arising within the retro-incisive palatal mucosa, draped by normally tinted mucosa and free of surface breakdown; (b) coronal CT image; (c) axial CT image. Both CT views displayed a tiny intra-lesional calcification.

Results and Discussion

Guided by the clinical picture and radiographic findings, and having secured the parents' approval, the team opted to undertake diode laser surgical ablation under conscious sedation. Once a minimal quantity of local anesthetic had been delivered, the lesion was

excised using a diode laser unit (Lasotronix-Piaseczno, Poland—910 nm, 2 W, CW, 300 micron fiber); the marginal gingiva of tooth 5.1 was spared, and the lesional tissue was cleared with generous lateral and deep boundaries, all without any intraoperative bleeding. No suture placement was called for **(Figure 2)**.

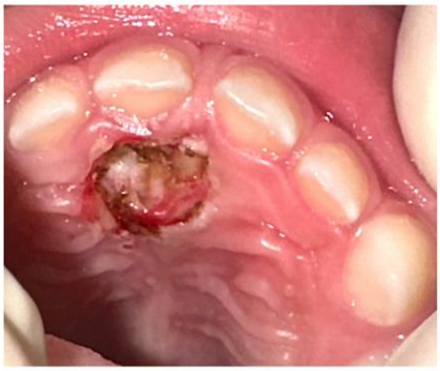
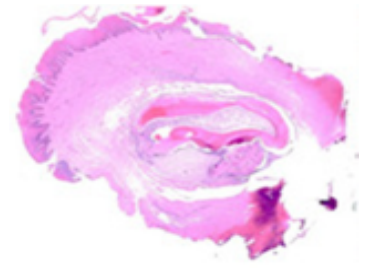


Figure 2. Immediate postsurgical appearance following diode laser removal. The operative field showed no hemorrhage and no need for suturing.

Paracetamol (500 mg given two times per day) was advised for analgesia across the 3–4 days following the intervention. The excised tissue was immersed in 10% formalin and submitted to the Unit of Pathological Anatomy for histopathologic evaluation. Following staining with Hematoxylin and Eosin, examination revealed a fibroblastic rim at the periphery, embedded within a densely collagenized, fibrous connective tissue background. Centrally located were tubular dentin, dental follicle, dental papilla, cementum-like calcified deposits, and cells with an ameloblastic appearance. These archetypal histopathologic hallmarks secured the definitive diagnosis of peripheral developing odontoma **(Figure 3)**.



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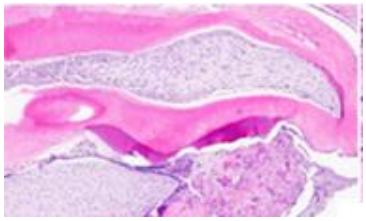

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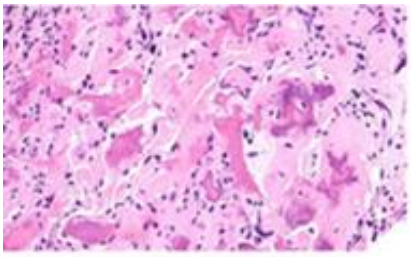

c)

Figure 3. A sharply delineated mucosal lesion marked by a superficial reactive hyperkeratotic epithelial layer together with a fibroblastic expansion set in a collagen-rich stroma (a). At its core, the lesion contains a variety of elements, including tubular dentin, dental follicle, dental papilla, cementum-like calcifications, and cells resembling ameloblasts (b). Higher-power (400×) view of the cementum-like calcifications (c).

No further immunohistochemical staining was deemed necessary to corroborate the diagnosis. The reporting pathologist described no artifacts or structural deviations attributable to the diode laser, thereby confirming that no morphostructural or cytological disturbances resulted from thermal phenomena associated with laser–tissue interaction.

No untoward events complicated the postoperative course, and no reappearance of the lesion was observed across an 8-month surveillance window **(Figure 4)**.

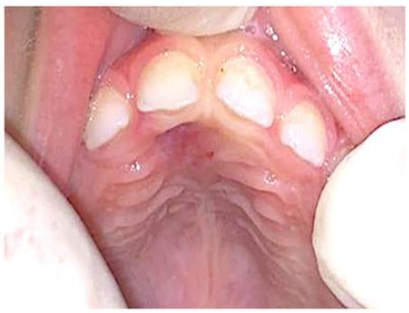

Figure 4. Clinical aspect at the 8-month mark, revealing no indication of recurrence.

Data collection from the literature

To place the treatment strategy we selected for the current peripheral developing odontoma in a 4-year-old child alongside published guidance from contemporary sources, we searched Google Scholar, PubMed, Scopus, and SciELO. The query employed the terms: “peripheral odontoma” combined with “pediatric” OR “infant” OR “adult”. Only case reports or small series specifically describing peripheral odontomas and published between 1990 and 2024 were retained, so long as they furnished individual case details capturing age, sex, anatomic site, clinical impression, therapeutic

modality, final histopathologic diagnosis, and any recurrence where applicable. A condensed overview **(Table 1)** was prepared to list all eligible studies and the attributes reported for each.

Table 1. Information culled from the related literature spanning the past 34 years regarding PO among pediatric and adult populations.

No.	Reference	Sex/Age	Site/Localization	Clinical diagnosis	Histopathological diagnosis	Treatment
1	Giunta and Kaplan [15]	Female/5 years; Male/21 years	Maxilla, palatal region; Mandible, and lingual posterior region	Periodontal abscess; Peripheral odontoma, implanted tooth fragment, or foreign body	Peripheral compound odontoma; Peripheral compound odontoma	Not specified
2	Castro *et al*. [17]	Male/6 years	Mandible, lingual posterior region	Not specified	Peripheral compound odontoma	Not specified
3	Ledesma-Montes *et al*. [18]	Female/3 years	Mandible, lingual posterior region	Peripheral odontogenic fibroma	Peripheral compound odontoma	Not specified
4	Ide *et al*. [6]	Male/39 years	Maxilla, anterior region	Peripheral osteoma	Peripheral complex odontoma	Excisional biopsy
5	Kintarak *et al*. [19]	Female / 13 years	Maxilla, palatal region	Irritation fibroma	Peripheral developing odontoma	Excisional biopsy
6	Ilief-Ala *et al*. [20]	Female/2 years	Maxilla, posterior gingiva	Not specified	Peripheral complex odontoma	Not specified
7	Bernardes *et al*. [21]	Male/12 years	Maxilla, anterior region	Pyogenic granuloma, periodontal abscess, peripheral ossifying fibroma	Peripherally developing compound odontoma	Not specified
8	Ide *et al*. [5]	Female/7 years	Mandible, lingual region	Not specified	Peripheral developing odontoma	Excisional biopsy
9	Silva *et al*. [13]	Male/8 months; Male/5 months	Maxilla, palatal region; Maxilla, palatal region	Congenital epulis; Congenital epulis	Peripheral developing odontoma; Peripheral developing odontoma	Excisional biopsy
10	Friedrich *et al*. [2]	Male/3 years	Maxilla, palatal region	Not specified	Peripheral developing odontoma	Excisional biopsy
11	Mikami *et al*. [22]	Male/9 months	Maxilla, palatal region	Not specified	Peripheral developing odontoma	Excisional biopsy
12	Hanemann *et al*. [14]	Female / 15 years	Maxilla, anterior region	Peripheral compound odontoma	Peripheral compound odontoma	Excisional biopsy
13	Koneru *et al*. [23]	Male/15 years	Maxilla, anterior region	Benign soft-tissue tumor	Peripheral complex odontoma	Excisional biopsy
14	Custódio *et al*. [24]	Female/11 years	Maxilla, anterior region	Peripheral ossifying fibroma, peripheral giant cell granuloma	Peripheral complex odontoma	Excisional biopsy
15	de Oliveira *et al*. [25]	Male/30 years	Maxilla, anterior region	Maxillary exostosis	Peripheral compound odontoma	Incisional biopsy
16	da Silva Rocha *et al*. [4]	Female/11 years	Maxilla, palatal region	Fibroma	Peripheral compound odontoma	Excisional biopsy
17	Soluk-Tekkeşin *et al*. [3]	Female/12 years	Maxilla, palatal region	Odontoma	Peripheral compound odontoma	Excisional biopsy
18	Atarbashi Moghadam and Mokhtari [26]	Female/8 years	Maxilla, palatal region	Peripheral reactive lesion	Peripherally developing complex odontoma	Excisional biopsy
19	This study	Male/4 years	Maxilla, palatal region	Peripheral ossifying fibroma	Peripheral developing odontoma	Surgical laser excision

In this report, having first documented the seldom-encountered event of a peripheral odontoma involving the palatal mucosa in a child and detailed its trajectory from diagnostic investigation to post-treatment surveillance, we now juxtapose our experience with insights from the relevant scientific record.

Epidemiology

Odontogenic lesions are typically split into peripheral and central forms based on their initial site of origin. Peripheral odontogenic tumors occur at a low frequency, and there is no consensus in the literature on their exact incidence [1]. Saghravanian *et al*. [27] found that a mere 4.3% of odontogenic neoplasms were assigned a peripheral classification. Peripheral odontogenic fibroma was the most prevalent peripheral odontogenic tumor, followed by peripheral ameloblastoma [27, 28]. Substantial heterogeneity in study sample sizes and the intrinsic rarity of these conditions yield conflicting epidemiological data on sex ratios, age distributions, and preferred anatomic locations in peripheral odontogenic tumors [28].

When viewed clinically, odontomas are categorized as central (intraosseous), peripheral (extraosseous), or erupted, among which the central variant predominates, the erupted variant follows, and the erupted PO is exceedingly sporadic [29].

A total of 21 PO instances are documented in **Table 1**, as reported in the literature. Collated figures indicate that PO receives its diagnosis more often in males (52.4%) and arises predominantly in children and adolescents, with 14 cases between ages 1 and 18 (70%), 3 between ages 18 and 39 (15%), and 3 among newborns (< 1 year, 15%). The maxilla was the most frequent region of involvement (80.9%), with a predilection for the palatal area, followed by the gingiva. The particulars of the present case align with published data concerning age at detection, location, mode of clinical presentation, and lesional dimensions.

Etiopathological theories

The causal mechanisms driving peripheral odontoma remain poorly elucidated and are considerably convoluted. A prevailing notion holds that the formation and outward presentation of PO, in line with other peripherally situated odontogenic tumors, stem from the sequestration of residual dental lamina epithelium (rests of Serres) housed within the gingiva, which subsequently lose the competence to communicate with adjacent mesenchymal tissue.

Even so, no shared view prevails on which specific triggers might rouse these dormant epithelial remnants and trigger the proliferative cascade underlying PO. Putative inciting events span mechanical damage, microbial insult, familial predisposition, and genomic alterations—occurring either independently or in conjunction with syndromic disorders, notably Gardner syndrome and Hermanns syndrome [11-25].

Differing morphological expressions of PO may be observed, contingent upon the maturational phase of the underlying tooth germ; these include mixed odontogenic proliferations lacking mineralized dental product, developing odontomas, denticles, and aggregates of hard tissue devoid of an enamel organ component. A competing etiological model posits that PO originates from the basal strata of the surface epithelium or from ectopically situated neural crest cells retaining odontogenic developmental capacity [26].

Clinical–radiological features and differential diagnosis

In the majority of documented cases, the lesions were described as asymptomatic tumefactions, palpably firm, covered by mucosa of unremarkable appearance, and expanding at a leisurely pace (width restricted to a band of 0.25–1.5 cm) [3-5, 7, 10, 11]. Within our own case, the child voiced concern over a gradually and persistently enlarging mass that provoked unease and hampered both speech articulation and nutritional intake, yet remained free of pain or hemorrhagic episodes. At the same time, physical examination uncovered a single nodular palatal protuberance approximating 0.5 × 0.5 cm in dimension and covered by ordinarily pigmented mucosa.

Hence, bearing in mind the clinical–pathological composite—a circumscribed, slowly progressive, keratinized gingival outgrowth of nodular shape, sheathed by normal-appearing mucosa, lacking spontaneous symptoms, and capable of surface breakdown following incidental injury—the differential diagnostic spectrum must encompass a broad assortment of benign gingival proliferations with dental associations (to cite examples, pyogenic granulomas, peripheral fibro-osseous entities, peripheral odontogenic tumors together with peripheral giant cell granuloma or fibromas, and peripheral ossifying fibroma), malignant processes (including osseous, salivary, and epithelial malignancies), and genodermatoses or hereditary syndromes (such as hereditary gingival fibromatosis, plasminogen deficiency states, mucopolysaccharidosis type II, and Gardner syndrome) [3-5, 7, 10, 11, 20]. Rendering an accurate differential diagnosis is deemed an exceptionally formidable task owing to the lesion's scarcity. It must further account for malpositioned tooth germs and supernumerary dental elements that

arrest development and manifest solely as tumefaction [30, 31].

Published sources likewise underscore the considerable difficulty inherent in separating ameloblastic fibro-odontoma from developing complex odontoma at the diagnostic level. Each entity belongs to the broader family of mixed odontogenic tumors and shares the hallmark combination of odontogenic epithelium and ectomesenchymal tissue. Several investigators have advanced the view that both lesions represent segments along a single pathological continuum in the pediatric population [26]. That said, ameloblastic fibro-odontoma is essentially a non-neoplastic variant of ameloblastic fibroma, composed of odontogenic epithelium and odontogenic ectomesenchyme, with fully formed dentin and enamel. Developing odontoma, conversely, is composed near-exclusively of dental hard tissues, although the extent thereof hinges on the degree of maturation achieved by the tooth germ [26-33].

Radiological investigation can provide an initial diagnostic pointer; the visualization of calcific deposits within the lesion, unaccompanied by any lytic bone changes, may guide the surgeon and pathologist toward a benign interpretation, whether a fibro-osseous or odontogenic neoplasm [30]. The most routinely requested first-line imaging study, panoramic radiography, generally falls short when the objective is to disclose and characterize punctate calcifications, given the risk of superimposition over adjacent calcified anatomical structures (dentition or alveolar bone). An intraoral periapical film may suffice in select circumstances. Second-line modalities—CT and Cone Beam CT—without question stand as the imaging tools best suited for reaching a diagnosis, as they empower the clinician to scrutinize every parameter while affording the flexibility to toggle across differing planes of orientation, thereby capturing accurate dimensional measurements, any encroachment upon neighboring anatomical landmarks, and minute calcific specks, all thanks to their superior sensitivity [29]. MRI might also confer benefit, although it is often viewed as a more resource-intensive and invasive alternative that provides inferior spatial resolution compared with CT [31].

Clinical assessment, histopathologic interpretation, and radiographic visualization collectively constitute the essential pillars that practitioners must master to avoid misdiagnosis.

With specific reference to the case presented herein, a supplementary complicating factor lay in the child's poor cooperativeness stemming from his tender age. This circumstance rendered general anesthesia indispensable for the CT examination during the preoperative workup. Under these conditions, the radiographic study was able to delineate the lesion's true extent, verify the complete absence of bony involvement, and pick up a tiny focus of intralesional calcification, thereby yielding a provisional diagnosis consistent with a benign lesion.

Peripheral developing odontoma in pediatric and adult Patients: Analysis of the relevant literature

Given how seldom peripheral odontogenic lesions arise, and even more so peripheral developing odontomas, we resolved to conduct a survey of the relevant literature on PO, the outcomes of which are detailed below.

Friedrich *et al*. [2] reported on a noteworthy maxillary peripheral developing odontoma in a 3-year-old boy. The clinical picture revealed a small, painless, nodular growth on the right palate. Radiographic evaluation uncovered a disruption of tooth alignment with no clearly demarcated abnormality at the site of concern. Operative care comprised standard surgical removal with a scalpel, bleeding control, and wound closure via suturing; no recurrence of the lesion was noted over a 3-year follow-up period [2]. Soluk-Tekkeşin *et al*. [3] presented a singular instance situated at the right palatal incisor zone in a girl aged 12, featuring a swelling devoid of ulceration or discomfort, with imaging disclosing radiopaque concretions that lay wholly within soft tissues and bore no relationship to the skeleton. The tumor underwent complete scalpel excision, with no reappearance at 10 months post-surgery, and was ultimately classified as "Peripheral Compound Odontoma" [3]. Mikami *et al*. [22] detailed a distinctive congenital PO occurring in a male infant of 9 months, who was noted to have two quiescent tumefactions occupying the anterior hard palate, sheathed by unremarkable mucosa and evident since delivery. Both lesions were operatively extracted when the child reached 28 months, under general anesthesia. The final pathologic assessment read "peripheral developing odontoma accompanied by teratomatous fibroma". Surveillance extending over a decade detected no recurrences [22]. Silva *et al*. [13] set forth two additional pediatric cases of peripheral developing odontoma: the first involved a neonate (male, 8 months) bearing a painless, sluggishly expanding congenital nodule over the palatal alveolar mucosa, while the second described a 5-month-old male whose nodule sat on the buccal aspect of the incisive papilla; neither case demonstrated bony implication, both underwent surgical eradication, and neither exhibited recurrence [13]. In a further contribution, de Oliveira

et al. [25] documented an exceptional erupted PO in a 30-year-old man, placed on the buccal aspect of the alveolar ridge and having surfaced roughly 18 months before diagnostic confirmation; the lesion was described as a symptom-free calcified lump. Radiographic studies revealed several radiopaque densities, and because the patient was disinclined toward total lesional removal, an incisional biopsy alone was performed [25]. Atarbashi Moghadam and Mokhtari [26] characterized a peripheral developing odontoma in an 8-year-old girl that presented as a solitary, ulcerated soft-tissue enlargement of the palatal gingiva, proximate to the right maxillary canine and the deciduous first molar. A periapical film showed no osseous extension, and local anesthesia was used to resect the mass under a provisional clinical diagnosis of a reactive soft-tissue entity—either pyogenic granuloma or peripheral ossifying fibroma. Histologic reading ultimately designated the specimen as a peripheral developing complex odontoma or peripheral ameloblastic fibro-odontoma. The authors also stressed the critical importance for pathologists and dental practitioners to recognize the formidable differential diagnostic challenges posed by such lesions and to become familiar with the clinical and tissue-level features of peripheral odontoma [26]. Likewise, da Silva *et al*. [13] reported a peripheral compound odontoma in an 11-year-old girl, presenting as a symptom-free, exophytic, sessile, nodular abnormality in the anterior palate, remarkable for yielding completely negative radiographic studies. An excisional biopsy was performed, and no recurrence was noted at 6-month follow-up. The group confirmed that local surgical removal is the preferred therapeutic approach for PO and reported that, as of their publication date, no relapsing cases had occurred after total lesion clearance [4]. Kintarak *et al*. [19] reported a case of a 13-year-old girl with a 5-month history of a gradually enlarging, asymptomatic nodular formation on the palatal interdental papilla, nestled between the right maxillary central and lateral incisors. A surgical extirpation was performed, and no recurrent lesion was identified during 18 months of observation [19].

All the foregoing information is consolidated within **Table 1**.

An examination of the most pertinent literature addressing this subject yielded 20 case reports across the past 34 years, underscoring either a genuinely infrequent patient occurrence or a restrained rate of publication; 14 pertained to the age span of 1 to 18 years (70%), 3 to individuals between 18 and 39 years (15%), and 3 to neonates (<1 year, 15%). Especially noteworthy is the sex-based breakdown, in which 11 instances (55%) occurred in males and 10 (45%) in females, thereby strengthening the notion of a male bias in PO. Across all age groups, cases uniformly exhibit shared microscopic features, including a para-keratinized epithelial covering underlain by a chronic inflammatory cell population, which borders a spindle-cell fibroblastic stroma harboring calcified deposits, without any zones of cytologic irregularity. Owing to the extreme infrequency with which PO is encountered, the case collection assembled for this narrative review remains too small to support any statistical inference; nonetheless, a handful of reflections may still be legitimately extracted. To begin, the sex ratio and site distribution are consistent with earlier published work, indicating a slight male bias [13-16]. In considerably over half of the compiled cases, the PO was situated in the maxilla (85%), with the balance occurring in the mandible (15%), and with a distinct predilection for the lingual/posterior sector. It bears emphasis that cases presenting in the mandible did not permit the attending clinicians to arrive at a clinical diagnosis before surgery; even so, this trend persists, though it lacks formal statistical confirmation [5-17]. The case we have contributed falls in line with the published record, since the young patient's PO was positioned in the palatal region of the maxilla. As noted by Soluk-Tekkeşin *et al*. [3], a palatal location further widens the differential considerations, encompassing reactive conditions as well as neoplastic entities arising from odontogenic or salivary gland tissues. As is often the case in analogous situations, the difficulty with our patient lay in anticipating the fundamental nature of the lesion without recourse to a preoperative tissue sample. In surmounting this, we relied solely on a CT examination, which, despite requiring general anesthesia, demonstrated no cortical bony erosion or dental displacement, allowing the clinician to remove malignancy from the list. Beyond this, the CT proved extraordinarily helpful in pinpointing a minute calcified fragment seated centrally within the mass, steering diagnostic thinking toward an ossifying, cementifying, or odontogenic process.

As the broader literature indicates, there is no consensus on the optimal preoperative evaluation of comparable abnormalities, particularly in the pediatric age group. Among the publications evaluated for this review, the most frequently used imaging tool was the periapical film, followed by panoramic tomography. Both represent first-level radiographic studies and can be obtained when patient cooperation allows; they provide considerable utility for centrally rooted pathologies (those strictly confined to bone) but contribute little to peripheral ones because of

superimposition artifacts cast by the intact hard tissues of the dentition and jaw [33]. The radiographic study advisable for this class of lesions is CT or Cone Beam CT [34].

The intraoperative management warrants a closer look as well. In the cases reported in the literature, the authors did not specify which anesthetic approach was used to facilitate the surgical biopsy. While local anesthesia remains the most secure and commonly administered technique, it does presuppose full patient willingness and cooperation. It bears mention that all neonatal patients were subjected to general anesthesia precisely because collaboration was inherently unattainable. In our patient, the anesthesiologist's contribution permitted the surgery to be conducted under conscious sedation paired with local anesthesia, thereby sidestepping the need for general anesthesia during the operation itself. The merits of conscious sedation in the dental setting are robustly supported by published evidence [35], and this modality ought to be elected when a child's ability to cooperate is diminished, and general anesthesia is not otherwise mandated, especially within the pediatric subset.

Therapeutic strategies

Regarding treatment, the published evidence supports surgical intervention as the definitive management for POs. Operative removal should achieve total clearance of the lesion, often encompassing the periosteal layer. Elimination of any local irritating elements is essential; consequently, the procedure is often coupled with scaling and root planing of neighboring teeth when these are implicated, or with replacement of over-contoured restorations. Furthermore, surgery is commonly performed without a prior incisional biopsy, particularly for small lesions, leaving a preoperative diagnosis absent. The capacity to secure a diagnosis before the operation carries considerable weight, as it enables more precise planning of the invasive surgical steps; clinicians are therefore confronted with the dual task of eradicating a lesion identified solely on clinical grounds as PO—while keeping in mind an extensive catalog of differential possibilities—and simultaneously striving to preserve as much healthy tissue as possible. Radical resection is ordinarily not warranted for these entities. The technique most frequently documented and employed involves a scalpel, succeeded by bone curettage, dental scaling, and root planing, adhering to a maximally tissue-sparing philosophy [17-26]. Among the 18 investigations involving both pediatric and adult subjects that we examined for this review, virtually every group of authors preferred this established treatment paradigm for its time-tested reliability [17-26]. To the best of our knowledge, the present study represents the first published account of a PO managed surgically with a diode laser.

An alternative operative modality is the diode laser, which offers the advantage of reduced associated morbidity, eliminating the need for suturing, lowering the incidence of superinfections, and curtailing the need for analgesic medication in the postoperative phase [36]. The application of diode lasers in dentistry and oral surgery enjoys robust literature backing, principally for soft tissue procedures spanning both benign and malignant pathologies [37, 38], enabling swift, bloodless lesional excision coupled with—typically—healing by secondary intention of the overlying mucosa, as well as transmucosal or intralesional photocoagulation of vascular malformations (thus circumventing the invasive and unpredictable surgical maneuvers of earlier decades) or of lesions carrying an elevated risk of intraoperative hemorrhage before their surgical removal [39]. It is pertinent to emphasize that the use of diode lasers was once a matter of debate owing to concerns about thermal artifacts during histological assessment. Yet, it has been convincingly established that the thermal effect is typically quite limited and does not compromise histopathologic interpretation [40]. Diode laser excision is, therefore, highly advisable for individuals with diminished cooperativeness, including children, and for lesions akin to the one documented here [41]. In our case, the subject was a 4-year-old child with very limited compliance; the use of the diode laser proved exceedingly beneficial, as sutures became superfluous, the postoperative recovery was uneventful, and the palatal mucosa regenerated completely within 10 days via secondary intention healing. This therapeutic selection also aligns closely with the recommendations put forth by the American Academy of Pediatric Dentistry, spanning from its 2013 policy statement on laser utilization [42] through to the most recent iteration published in 2022 [43], which explicitly acknowledges "Lasers as an alternative and complementary method of providing soft and hard tissue dental procedures for infants, children, adolescents, and persons with special health care needs."

Limitations and future directions

Several limitations attend this narrative review, chief among them the pronounced scarcity of published data on PO across the patient population, given that only a modest number of odontogenic lesion cases have been reported. This paucity precluded us from undertaking

any statistical analyses and from formulating definitive conclusions. The dearth of articles extending beyond case reports or brief case series stems directly from the rarity of this odontogenic entity. We aimed to recount the diagnostic and therapeutic approach we pursued, with favorable results, to place it alongside the relevant literature, and ultimately to put forward what may represent the optimal course of action in such a delicate clinical scenario. Drawing on the case detailed herein and bolstered by the most current literature, the authors further advocate adopting diode laser technology to promote rapid and thorough healing while minimizing attendant morbidities, particularly in pediatric subjects. This approach is further reinforced by the concurrent use of preoperative conscious sedation, which enables the performance of an appropriate surgical procedure—one often made more complex by the proximity of teeth and/or periodontal structures. Finally, the application of diode lasers in interventions of this kind, when performed by a seasoned surgeon using the most suitable laser parameters, facilitates the procurement of a surgical specimen amenable to subsequent histological examination, free of morphological distortions that might impede the final diagnosis.

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