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Journal of Oral Medicine, Oral Surgery, Oral Pathology and Oral Radiology

Journal homepage: https://www.joooo.org/

Case Report

Differentiating nasopalatine cysts from apical pathology: The diagnostic crossroads

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Abstract

Differentiating maxillary radiolucent lesions is challenging due to overlapping clinical and radiographic features. Nasopalatine cysts (NPCs), the most common non-odontogenic cysts, originate from epithelial remnants of the nasopalatine duct and typically appear in the anterior maxillary midline. In contrast, apical pathologies result from pulpal necrosis, leading to periapical abscesses, granulomas, or cysts. This case report describes a 32-year-old female with a symptomatic maxillary anterior lesion initially suspected to be endodontic in origin. However, clinical examination, pulp vitality tests, and cone-beam computed tomography (CBCT) confirmed an NPC diagnosis. This highlights the necessity of a systematic diagnostic approach integrating clinical assessment, imaging, and histopathology to distinguish NPCs from apical pathology. Early and accurate identification prevents unnecessary endodontic treatment and ensures optimal patient care.

Keywords: Nasopalatine cyst, Differential diagnosis, CBCT, Periapical abscess, Non-odontogenic cysts.

Received: 10-04-2025; **Accepted:** 09-06-2025; **Available Online**: 04-08-2025

1. Introduction

The accurate diagnosis of radiolucent lesions in the anterior maxilla remains a significant challenge for dental professionals, primarily due to the overlapping clinical and radiographic characteristics of different pathologies. Among these, nasopalatine cysts (NPCs) and apical pathologies often present with similar radiolucent features, leading to diagnostic confusion. Proper differentiation is essential, as the treatment approaches and prognoses differ substantially between these entities.

Nasopalatine cysts, also referred to as incisive canal cysts, are the most common non-odontogenic cysts of the oral cavity, comprising approximately 1% to 4% of maxillary cysts (Gnanasekhar et al.[1] 1995; Shear & Speight, 2007).[2] These cysts originate from epithelial remnants of the nasopalatine duct and are typically located in the midline of the anterior maxilla (Swanson & Sheridan, 1992). NPCs are more commonly diagnosed in males, often during the fourth to sixth decades of life.

While the exact etiology remains uncertain, NPCs are believed to arise due to the spontaneous proliferation of embryonic epithelial remnants trapped within the incisive canal. Other contributing factors include trauma, local infection, or mucous retention (Shear & Speight, 2007 and Laskaris, 2011).[2,4] Clinically, most NPCs are asymptomatic and discovered incidentally on radiographs. When symptomatic, they may present as palatal swelling, mild discomfort, or a salty discharge in cases of secondary infection (Matsumura et al., 2013).[6]

Radiographically, NPCs appear as well-defined, round to ovoid or heart-shaped radiolucencies, with corticated margins located in the midline, often superior to the apices of the maxillary central incisors. The heart-shaped appearance is due to the superimposition of the anterior nasal spine. A large retrospective study of 334 cases reported an average diameter of 17.1 mm and noted no significant correlation between cyst size and patient age, symptoms, or epithelial lining type (Santos et al., 2011).[5]

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https://doi.org/ 10.18231/j.jooo.v.11.i.2.8

On the other hand, apical pathology, commonly resulting from pulpal necrosis or infection, is a condition frequently encountered in endodontic practice. It encompasses periapical abscesses, granulomas, and cysts, which arise due to the inflammatory response to microbial invasion from the root canal system (Nair, P. N. R. 2006).[7] Radiographically, these lesions also present as radiolucencies at the apex of affected teeth. They may exhibit similar size and shape to nasopalatine cysts, especially in cases involving the maxillary central incisors.

The overlap in radiographic appearance can lead to misdiagnosis if careful attention is not given to specific clinical, radiographic, and historical findings. For instance, a key distinguishing factor is the vitality of the adjacent teeth. Apical pathology is associated with non-vital teeth, whereas nasopalatine cysts usually present in association with vital teeth. However, additional imaging and diagnostic tests, such as cone-beam computed tomography (CBCT), pulp vitality testing, and histopathological examination, may be required to confirm the diagnosis.

Navigating this diagnostic crossroads requires a combination of thorough clinical evaluation, advanced imaging techniques, and a comprehensive understanding of the underlying pathophysiology of these lesions. Through case discussion and evidence-based insights, this article aims to provide clinicians with practical tools to enhance their diagnostic acumen and confidence in managing such cases.

2. Case Report

A 32-year-old female patient reported to the Department of conservative Dentistry and Endodontics with diffuse pain in the maxillary anterior region for 1 week. On examination, no soft tissue inflammation or swelling was apparent in the buccal sulcus or the palate. There was no tenderness to palpation of the labial oral mucosa, however, mild tenderness was noted on palpation of the palatal soft tissues adjacent to the maxillary central incisors. No enlargement or tenderness of local lymph nodes was found on clinical examination. Both maxillary central incisors were tender to percussion despite normal response on pulp sensibility testing using cold test (ENDO-FROST, ColteneTM) and electric pulp testing (Gentle Pulse, Pulp Vitality Tester Parkel TM), likely due to pressure or localized inflammation from the adjacent nasopalatine cyst. The probing depths and mobility were within physiologic limits. None of the anterior maxillary teeth were discolored.

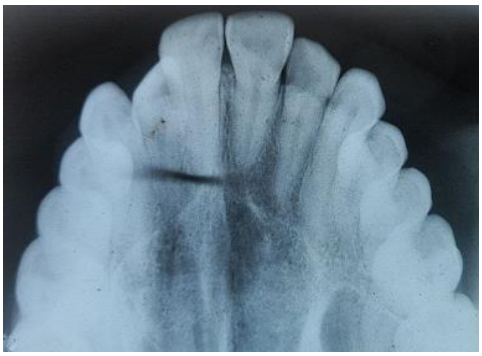

Figure 1: Orthopantograph showing ovoid diffuse radiolucency

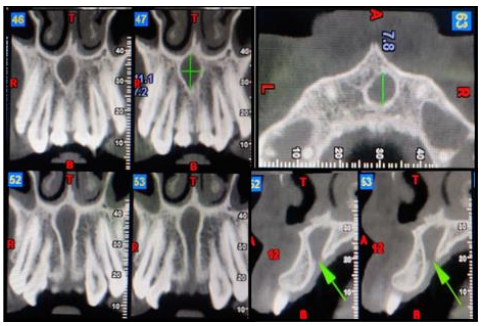

Figure 2: Different CBCT sections showing extent of the lesion

The radiograph revealed diffuse ovoid radiolucency on the distal root aspect of both the central incisors. The radiolucent areas were superimposed on the root of the maxillary central incisors but not over its apex. The periodontal ligament spaces around the maxillary central incisors appeared to be of normal dimensions. An orthopantomogram (OPG) was also obtained for further evaluation (**Figure 1**). The lesion did not seem to be of endodontic origin so to confirm the diagnosis sectional CBCT of the anterior maxillary region was taken. The scan showed well-defined oval-shaped, unilocular radiolucency that measures approximately 7.2 mm antero-posteriorly, 11.1mm supero-inferiorly and 7.8mm labio-palatally (**Figure 2**). This information confirmed a nasopalatine cyst as being the most likely diagnosis.

The patient was referred to the Department of Oral Surgery for a second opinion and further management. They prescribed medication (Tab Augmentin 625mg BD, Tab XPROD, BD and Tab PAN D, BD) and reviewed seven days later; at which time the pain was found to be significantly reduced. But still the palatal tissue was slightly tender to palpation. Therefore, the patient was advised for surgical exploration of the tissue palatal to the maxillary central incisors under endotracheal general anaesthesia. However, the patient did not return for the procedure, and as a result, histopathological diagnosis could not be established.

Table 1: Differential diagnosis of nasopalatine duct cyst (NPDC)

Condition	Key Features	Distinguishing Factors
Periapical Granuloma	Inflammatory lesion from pulpal necrosis; initial stage of chronic inflammation	Associated with non-vital tooth; histological confirmation; presents as periapical radiolucency
Radicular Cyst	Result of epithelial stimulation in periapical granuloma; well-defined radiolucency	Non-vital tooth; confirmed by histopathology; similar location but due to pulpal necrosis
Median Palatine Cyst	Developmental cyst located more posterior in the hard palate	Located posterior to NPDC, centered in midline; often painful due to nasopalatine nerve compression; lined by stratified squamous epithelium
Central Giant Cell Granuloma (CGCG)	Nonodontogenic tumor; more common in mandible but also seen in maxilla	Radiolucent lesion, may cause bone expansion, teeth/root divergence; intraoral appearance may include purple-blue soft nodule
Osteitis	Bone inflammation; may mimic NPDC with palatal fistula or sinus communication	Look for signs of fistula or bucconasal communication; history of infection
Enlarged Nasopalatine Duct	Anatomical variation; duct enlargement without true cyst formation	Duct diameter <6 mm usually normal; larger may mimic cyst but lacks epithelial lining of NPDC
Odontogenic Keratocyst (NBCCS-related)	Jaw cyst in Nevoid Basal Cell Carcinoma Syndrome; round/ovoid radiolucency with well-defined borders	Often lateral to tooth; common in mandible (80%) but can occur in maxilla; may be part of inherited syndrome (NBCCS); vitality testing crucial

3. Discussion

Accurate diagnosis is the cornerstone of effective management in dental practice, particularly when distinguishing between nasopalatine cysts and apical pathology. Both conditions can present as radiolucency in the anterior maxilla, leading to potential diagnostic confusion. However, clinical, radiographic, and histopathological evaluations provide critical insights for differentiation.

Nasopalatine cysts (NPCs) are often misdiagnosed as periapical lesions associated with the upper central incisors, especially when the nasopalatine foramen is unusually large. Typically, the nasopalatine foramen appears radiographically as an oval radiolucency with well-defined lateral borders but lacks complete circumferential definition. A key distinguishing feature of NPCs is their size, usually exceeding 6 mm, along with an inverted teardrop shape that appears more radiolucent (Shear & Speight, 2007).[10]

A comprehensive clinical examination is essential to check for signs of infection or inflammation, complemented by sensibility testing of the adjacent teeth. A positive response to pulp testing typically rules out apical pathology. Additionally, clinical history provides valuable clues, nasopalatine cysts are developmental and unrelated to dental infections, while apical lesions stem from pulpal disease. Advanced imaging modalities, such as cone-beam computed tomography (CBCT), imaging plays a vital role in differentiating nasopalatine cysts (NPCs) from apical pathologies. NPCs typically appear as well-circumscribed, corticated radiolucencies in the midline of the anterior maxilla, often heart-shaped due to superimposition of the nasal spine. They are located in relation to the incisive canal and usually remain separated from the apices of the maxillary central incisors, with no associated root resorption or loss of lamina dura (White and Pharaoh 2014). In contrast, apical lesions such as periapical granulomas or cysts are periapically located, may show poorly defined or non-corticated borders, are associated with non-vital teeth, and may occasionally lead to root resorption (Patel et al. 2015 and Scarfe et al. 2009). Whenever possible multiple diagnostic methods should be used to ensure a comprehensive evaluation, though cold testing remains the most commonly utilized in clinical practice. To differentiate NPDCs from odontogenic cysts like periapical granulomas or radicular cysts, tooth vitality testing is essential. NPDCs are typically associated with vital teeth, whereas apical pathologies are not. (**Table 1**)

When diagnostic uncertainty persists, histopathological examination following biopsy is definitive. However, in this case it was not possible due to failure of the patient to report for the treatment. Nasopalatine cysts exhibit epithelial lining derived from nasopalatine duct remnants, often with inflammatory infiltrates. In contrast, apical cysts and granulomas show features consistent with chronic inflammation, such as granulation tissue, epithelial rests of

Malassez, or fluid-filled cavities surrounded by connective tissue (Shear & Speight, 2007).

As in the presented case, careful clinical and radiographic evaluation, supplemented by advanced imaging techniques such as CBCT, enabled the diagnosis of a nasopalatine cyst. Despite initial medical management, persistent symptoms necessitated surgical exploration under general anesthesia. This underscores the importance of a multidisciplinary approach to diagnosis and treatment, ensuring optimal patient outcomes.

4. Conclusion

Differentiating between nasopalatine cysts and apical pathology demands a comprehensive approach combining clinical examination, radiographic analysis, and diagnostic testing. Misdiagnosis can lead to inappropriate treatment, such as unnecessary endodontic therapy or surgical intervention. By understanding the subtle distinctions and employing a systematic diagnostic process, dental professionals can ensure accurate identification and effective management of these conditions, ultimately enhancing patient outcomes.

5. Source of Funding

None.

6. Conflict of Interest

None.

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Cite this article: Jain A, Mittal S, Kumar T, Keshav V, Juneja S. Differentiating nasopalatine cysts from apical pathology: The diagnostic crossroads. *J Oral Med, Oral Surg, Oral Pathol, Oral Radiol*. 2025;11(2):91-94.