ADA CE Program ARTICLE 3

The root of the problem

Occurrence of typical and atypical periapical pathoses

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ABSTRACT

Background. A preponderance of periapical radiolucencies are of inflammatory etiology (radicular cysts or periapical granulomas) secondary to pulpal disease. In some instances, however, a suspected periapical inflammatory lesion is not a consequence of pulpal disease but instead represents a lesion of noninflammatory origin. The differential diagnosis for such lesions is broad, ranging from odontogenic cysts and tumors to metastatic disease. As the biological behavior of such lesions is varied, the distinction between inflammatory odontogenic periapical lesions and lesions of noninflammatory origin in a periapical location is critical.

Methods. A retrospective study of 5,993 archival periapical biopsies over a span of 15 years from the database of the Oral Pathology Biopsy Service in the Henry M. Goldman School of Dental Medicine at Boston University recorded the incidence of various lesions in a periapical location.

Results. Of the cases studied, 97.2% represented lesions of inflammatory origin with histopathologic diagnoses as follows: periapical granuloma (60.0%), radicular cyst (36.7%), periapical fibrous scar (0.27 %), and periapical abscess (0.23 %). The remaining 2.8% cases were lesions of noninflammatory origin with histopathologic diagnoses of odontogenic keratocyst (also known as keratocystic odontogenic tumor), benign fibro-osseous lesions, and ameloblastoma. One patient had Langerhans cell disease, and 1 had central giant cell granuloma.

Conclusions. Although most periapical specimens biopsied represented expected inflammatory periapical lesions, the biological behavior of underdiagnosed lesions may have considerable consequences for both the patient and the clinician.

Practical Implications. This article serves to inform clinicians regarding the diversity of lesions arising in the periapical region of the jaws, to assist in the formulation of differential diagnoses, and to highlight the importance of submission of lesional tissue for histopathologic evaluation and definitive diagnosis when biopsy is clinically indicated.

Key Words. Periapical pathology; radicular cyst; periapical granuloma; odontogenic keratocyst; Langerhans cell disease; ameloblastoma; central giant cell granuloma; benign fibro-osseous lesion; periapical misdiagnosis.

JADA 2016:147(8):646-649

http://dx.doi.org/10.1016/j.adaj.2016.02.018

Often appearing as a radiolucency during a radiographic examination, pathologic lesions are frequently identified in a periradicular (adjacent to tooth root) location. Pulp vitality testing often helps direct the appropriate management of such lesions. If the pulp responds normally to vitality testing, a biopsy with submission of tissue for histopathologic evaluation would be indicated. When an inflammatory etiology is suspected secondary to loss of tooth vitality, conventional endodontic therapy is typically the first line of treatment for such lesions. If the lesion persists despite appropriate endodontic therapy and retreatment if indicated, a biopsy is generally recommended with submission of lesional tissue for histopathologic evaluation. Although a preponderance of such apical lesions are periapical granulomas or radicular cysts on histopathologic analysis, in some instances unexpected findings including developmental odontogenic cysts, odontogenic tumors, and metastatic disease,[1] among others, may mimic inflammatory periapical pathoses.

Periapical lesions are frequently encountered during routine dental treatment[2]; however, despite their commonality, relatively few large-scale studies have been performed to document the frequency of periapical lesions unassociated with pulpal necrosis.

We conducted this study to analyze 15 years of data collected from 1 oral pathology

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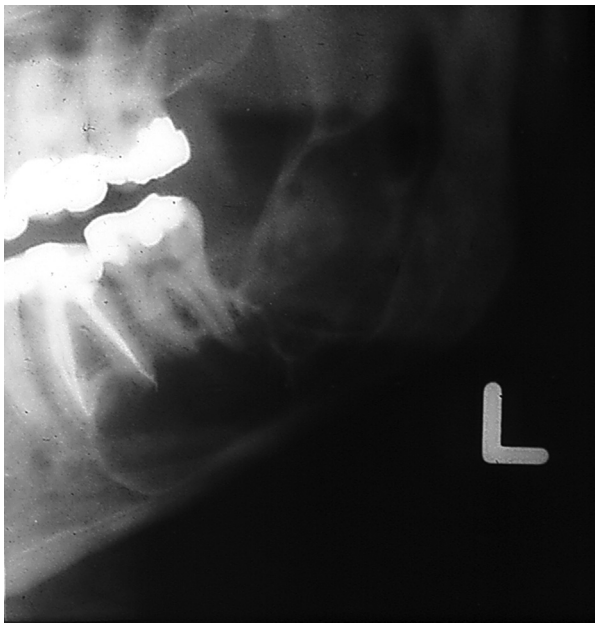

Figure. Cropped panoramic radiograph showing odontogenic keratocyst in a periapical location. After endodontic therapy failed to expedite resolution of an initially discrete lesion in a periapical configuration, the lesion progressed to involve the ramus as illustrated. A biopsy confirmed the diagnosis.

service's pathology logs and to determine the frequency at which unexpected periapical pathoses were identified.

METHODS

For the purposes of this study, we extracted all data in a form that consisted of deidentified information in compliance with the Health Insurance Portability and Accountability Act requirements. We tabulated 15 years of data, collected from January 2000 through June 2015, recorded in pathology logs from the Henry M. Goldman School of Dental Medicine at Boston University. We assessed 5,993 periapical cases. We performed the data analysis on data recorded in logs held in the Division of Oral Pathology; we excluded data points for any patient for whom it was unclear whether the lesion was situated in a periapical location.

RESULTS

Of the 5,993 periapical specimens biopsied and accessioned between 2000 to 2015, 5,827 (97.2%) were lesions of inflammatory origin with histopathologic diagnoses of periapical granuloma (60.0%), radicular cyst (36.7%), periapical fibrous scar (0.27%), and periapical abscess (0.23%); 166 specimens (2.8%) were periapical lesions unassociated with pulpal disease. Of periapical lesions of noninflammatory etiology, we found most commonly odontogenic keratocysts (OKC) (also known as *keratocystic odontogenic* tumors or *KCOT*) (1.8%) followed by benign fibro-osseous lesions (0.9%). Two of the specimens were ameloblastomas (0.03%). One case each of Langerhans cell disease (LCD) and central giant cell granuloma were also identified.

DISCUSSION

Periapical lesions frequently arise as sequelae of pulpal disease. In concurrence with the findings of previous studies,[3] our review showed periapical granulomas and periapical cysts to be the most commonly encountered pathologic lesions situated in a periapical location, with periapical granulomas arising somewhat more frequently (60%) than periapical cysts (36.7%). Periapical abscess was identified less frequently (0.23%), likely secondary to the fact that pain and tenderness often associated with initial stages of such lesions prompts conservative therapeutic intervention without the need for biopsy. Periapical fibrous scars comprised a small percentage of the population of periapical pathoses (0.27%). As such lesions represent a residual defect composed of densely collagenized fibrous connective tissue, such lesions may be radiographically indistinguishable from residual inflammatory periapical pathoses, prompting surgical intervention.

Although uncommon, a variety of odontogenic and nonodontogenic cysts and tumors are seen in a periapical location,[4] rendering definitive diagnosis by histopathologic evaluation requisite. These uncommon lesions arising in a periapical location pose the greatest concern clinically as management strategies must be tailored to the specific diagnosis. Often mimicking periapical lesions on radiographic examination, underdiagnosis of such lesions may cause considerable morbidity and even mortality if left unaddressed.

Our study confirms that of other reports[2] indicating OKC to be the most common mimic of a periapical lesion of inflammatory origin (Figure). OKCs are locally aggressive, frequently recurring cysts that are commonly mistaken for other pathologic lesions. A systematic review of 2,290 patient records revealed a recurrence rate between 17% and 56%, depending on how the lesion is managed.[5] It is critical for dentists to be aware of these cysts because of their biologic behavior. Although such lesions represent a small percentage of periapical pathoses, the clinical ramifications for these outlier diagnoses must be taken into consideration.

Incipient benign fibro-osseous lesions arising in a periapical location radiographically mimic periapical granulomas and radicular cysts. The particular type affecting the apex of the root is referred to as periapical cemental dysplasia. As the lesion matures and becomes mineralized, radiographic diagnoses become more

ABBREVIATION KEY. LCD: Langerhans cell disease. **OKC:** Odontogenic keratocyst.