Odontogenic Cysts and Neoplasms

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KEYWORDS

• Odontogenic cysts • Gnathic • Odontoma • Keratocystic odontogenic tumor • Ameloblastoma
• Calcifying epithelial odontogenic tumor • Clear cell odontogenic carcinoma

ABSTRACT

This article reviews a myriad of common and uncommon odontogenic cysts and tumors. The clinical presentation, gross and microscopic features, differential diagnosis, prognosis, and diagnostic pitfalls are addressed for inflammatory cysts (periapical cyst, mandibular infected buccal cyst/paradental cyst), developmental cysts (dentigerous, lateral periodontal, glandular odontogenic, orthokeratinized odontogenic cyst), benign tumors (keratocystic odontogenic tumor, ameloblastoma, adenomatoid odontogenic tumor, calcifying epithelial odontogenic tumor, ameloblastic fibroma and fibroodontoma, odontoma, squamous odontogenic tumor, calcifying cystic odontogenic tumor, primordial odontogenic tumor, central odontogenic fibroma, and odontogenic myxomas), and malignant tumors (clear cell odontogenic carcinoma, ameloblastic carcinoma, ameloblastic fibrosarcoma).

OVERVIEW

In considering all gnathic cysts, embryologic process fusion, epithelial enclavement, and epithelial invagination put epithelium in the jaws, but the odontogenic entities rely solely on invagination from the thickened "horseshoe" band of epithelium overlying the maxillary and mandibular ridges where teeth will develop and subsequent enclavement by alveolar bone. The thickened surface epithelium sends an epithelial cord (dental lamina) into the underlying ectomesenchyme to form the dental organ.[1]

The epithelial extension stops well above the basal bone. The downward epithelial migration, formation of the dental organ, and the ectomesenchyme immediately surrounding it (dental follicle) provides the impetus for formation of alveolar bone (and also the periodontal ligament periradicularly) that envelops and encases the dental organ. Thus, odontogenic epithelium is embedded in bone. The dental lamina leaves behind a canal through which future tooth eruption is guided (gubernacular canal).

The subsequent breakdown of dental lamina (Rests of Serres), Hertwig's epithelial root sheath (which guides root development and dissolves to leave Rests of Malassez) and postfunctional ameloblasts, and other entities (reduced enamel epithelium) leave residual epithelium in the jaws. Cellular characteristics of the embryologic odontogenic epithelium provide presumptive origin of the cysts and tumors (ie, cytoplasmic clearing owing to glycogen accumulation, suggests their origin as from residual dental lamina).[2,3]

There are inflammatory and developmental cysts (**Table 1**). Some odontogenic tumors may have a cystic morphology clinically and grossly. Inflammation and associated growth factors stimulate epithelial hyperplasia of apical periodontal ligament retained rests of Malassez and provide a "loop and arcade" hyperplasia or spherical enlargement of the epithelial remnants that outgrows its blood supply, causing central necrosis. The osmotic gradient that pulls fluid (plasma) from surrounding tissue to enhance cystic enlargement.

The odontogenic epithelium entrapped in the bone and in the periodontal ligament that gives rise to both developmental and inflammatory cysts can undergo neoplastic transformation as well. Neoplastic transformation of any of the elements of the dental organ and the aforementioned cysts

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Table 1
Odontogenic cyst classification schema

Developmental Odontogenic Cysts	Inflammatory Odontogenic Cysts	Odontogenic Cystic Neoplasms
Dentigerous cyst	Periapical (radicular) cyst	Keratocystic odontogenic tumor
Lateral periodontal cyst	Residual cyst	Calcifying cystic odontogenic tumor
Glandular odontogenic cyst	Paradental cyst	
Orthokeratinized odontogenic cyst		

From Robinson R, Vincent S. Tumors and cysts of the jaws. In: Silverberg S, editor. 4th edition. Silver Spring (MD): ARP Press; 2012. p. 11–37.

is possible. Therefore, odontogenic tumors can be purely epithelial, purely mesenchymal, or mixtures thereof. Furthermore, the capacity for these tumors to produce tooth structure add to the already broad morphologic diversity. The odontogenic epithelium has a pluripotential character, so nonodontogenic tumors such as mucoepidermoid carcinoma and primary intraosseous carcinoma can occur within the jaws.

With completion of tooth development (**Fig. 1**), postfunctional odontogenic epithelium (reduced enamel epithelium) overlying the crown of the tooth merges with the surface mucosa during eruption. As the tooth perforates the oral epithelium, this reduced enamel epithelium is attached at the cemento–enamel junction and becomes the junctional epithelium of the gingival sulcus, and epithelial attachment to the tooth and part of the periodontium. The periodontal ligament is the fibrous connective tissue subjacent to junctional epithelium that supports the tooth in its alveolar bone housing. This mesenchymal tissue is contiguous with the pulpal tissue of the tooth at the apical foramen and at various other foramina of lateral and accessory canals within tooth roots.

PERIAPICAL (RADICULAR) CYST

Periapical (radicular) cysts are inflammatory odontogenic cysts, and overall are the most common cyst of the jaws. They must be associated with the apex of a nonvital tooth (**Fig. 2**).[4] Clinically, the tooth may be carious or have a past history of trauma. Periapical cysts arise from expansion of residual epithelial remnants from tooth development. The epithelial proliferation in precursor inflamed granulation tissue at the apex, termed a periapical granuloma, incurs increasing osmotic pressure leads to cyst formation and expansion. Radiographically, a well-demarcated radiolucency

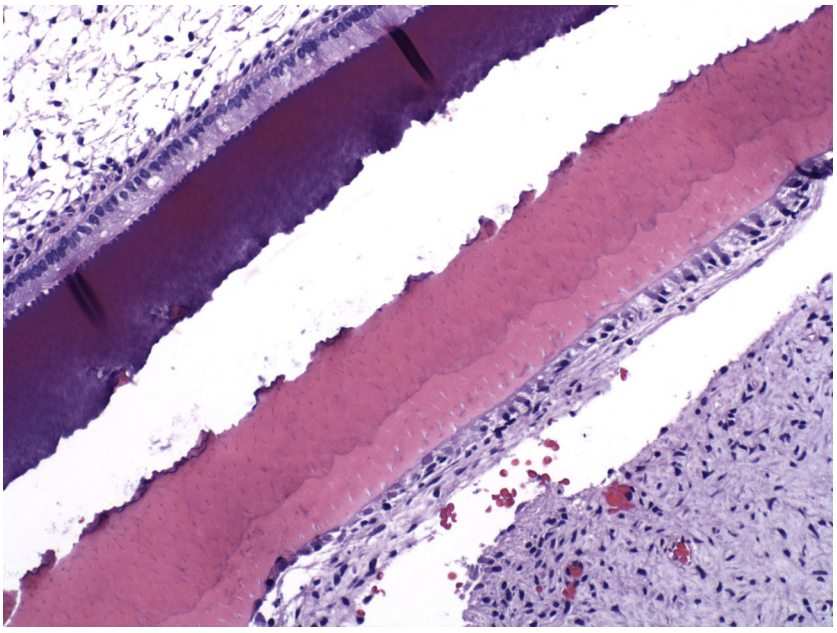

Fig. 1. Developing tooth with loose stellate reticulum adjacent to the ameloblastic layer that is secreting basophilic enamel. The enamel layer is juxtaposed (here, artifactually separated) against eosinophilic dentin with prominent tubules rimmed by odontoblasts. Note that ameloblastic epithelium is prominent in ameloblastoma, recapitulating odontogenesis.