

Odontogenic cysts: comparing the growth of radicular cysts and keratocysts

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A cyst is a pathological cavity with fluid or semi-fluid contents which is not created by the accumulation of pus. Cysts are usually lined by epithelium (avascular). Odontogenic cysts have an epithelial lining which derives from the epithelial residues of the tooth-forming organ (glands of Serres, rest of Malassez, or the reduced enamel epithelium). The great majority of diagnosed odontogenic cysts (60 and 75%) are the so-called radicular cysts. These develop at the apex of a tooth root that has undergone pulp necrosis, usually following tooth decay. The origin of the epithelium in the cyst lining is from the remnants of the tooth's root-forming sheath of Hertwig.

The Study Group is asked to test two hypotheses that have been postulated to describe the growth of radicular cysts and to predict whether such cysts grow indefinitely or to a limiting size.

The first hypothesis is that inflammation mediators released following the necrosis of the tooth's pulp induces the proliferation and the epithelial rests. After a critical mass is achieved, degeneration and death of cells of the central epithelial mass creates an initial void in the epithelial mass. The products of epithelial cell degeneration create an osmotic potential between the interior and exterior of the cyst.

The second theory is that proliferation of the epithelial tissue (which is avascular) may isolate areas of granulation tissue by enclavement of proliferating strands of epithelium which eventually degenerate (liquefaction necrosis) and create a cavity with increased osmotic potential. Epithelial proliferation surrounds the area of necrosis and results in the formation of the cyst.

In both cases, the osmotic potential in the cyst cavity leads to an influx

of water (epithelium is a semi-permeable membrane) which contributes to an increase of the hydrostatic pressure of the cyst and therefore to its enlargement. The epithelial cells lining the cyst are stimulated to divide at a rate that is consistent with the increase in volume and maintains the width of the lining.

Epithelial cells that line radicular cysts are not malignant (ie they do not proliferate unless stimulated by appropriate environmental cues) but the epithelial cells that line another type of odontogenic cyst called odontogenic keratocyst (which has a developmental origin rather than inflammatory), undergo active mitosis. Keratocysts comprise 5–10% of diagnosed cysts; they can become extremely large, causing bone resorption and are associated with the Gorlin-Goltz Syndrome (a hereditary condition).

The Study Group is asked to investigate the additional impact that active mitosis of the epithelial cells lining keratocysts has on their rate of growth and to compare their growth characteristics with those of radicular cysts.