

# Lateral Periodontal Cyst

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**Abstract.** *The lateral periodontal cyst (LPC) is a harmless developmental aberration derived from odontogenic epithelia lying between the roots of vital teeth. The exact histogenesis of LPC is a matter of debate but therapy is usually only required to maintain stable periodontal conditions and in case of evidence for growth of the cyst. We report on a case of LPC where successful surgical therapy had initialized osseous restoration. We further discuss the value of histological findings to substantiate a clinical and radiological diagnosis.*

The lateral periodontal cyst (LPC) is an odontogenic cyst arising in the alveolar process in close proximity to the roots of teeth. The term “LPC” is restricted to those intra-osseous cysts that arise in close proximity to the periodontal space of teeth and when an inflammatory pathogenesis is excluded (1). Furthermore, a gingival cyst of adults or an ortho-keratinized keratocyst/keratocystic odontogenic tumor of this site has to be excluded based on adequate clinical, radiological and pathological diagnosis (1). These criteria to distinct LPC from other cystic lesions of the jaws are not always appreciated, even in recent reports (2). The inconsistency of applying diagnostic criteria in reporting a “LPC”, e.g. the diagnosis of LPC in the absence of teeth, can result in a presentation of cases under different diagnostic terms with important overlaps of diagnostic features that were originally introduced to distinguish these entities. However, the different types of cysts originating in the periodontal region may indeed share common pathogenic pathways. On the other hand the pathogenesis of LPC is still a matter of debate (3) and thus,

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the phenotype may vary and can show overlaps to other cystic lesions diagnosed in the teeth-bearing parts of the jaws (1). Whereas the odontogenic origin of LPC appears to be beyond question, the epithelial cells of origin are still controversial. Furthermore, in rare cases LPC may remain after tooth loss and thereby may appear similar to a radicular cyst on radiographs of the jaws (2).

The most frequent site of origin of LPC is the premolar region of the mandible, followed by the anterior segment of the maxillary alveolar process (4, 5). LPC arise preferentially in individuals aged between 40 to 70 years and irrespective of gender. However, LPC were occasionally diagnosed in patients outside this age frame (4). LPC are very rare lesions that are predominantly reported as single cases. Only few case studies are available in literature (5-9). Recent calculations allow for presumption that LPC constitute less than 1% of jaw cysts (1). We present a case of LPC that fulfils the clinical, radiological and histological criteria of this entity.

## Case Report

A 56-year old male patient was submitted to our outpatient clinic to decide on the need for treatment of a mandibular radiotranslucency that was coincidentally found by his practitioner on a panoramic radiograph performed prior to treatment for severe periodontitis. Upon admittance, the patient was in good general health. He had lost some teeth over time and indeed had developed a generalized periodontitis with remarkable horizontal loss of bone. The right lower premolars reacted adequately to stimuli to prove their sensitivity. On the radiograph, a radiotranslucent lesion of oval shape was located between the lower half of the roots of both premolars of the right side of the mandible. The lesion showed no radiopaque structures inside the cavity, but the margins appeared sclerotic (Figure 1).

Following the application of local anaesthetics, a mucoperiosteal flap was detached from the alveolar process on the lateral side of the mandible, and the cystic lesion was excised after raising the thin cortical layer that covered the lesion. The mucoperiosteum was replaced and sutured. Wound healing was uneventful.

**Histology.** A solid specimen of 4 mm in diameter was prepared for histological investigation. The inner layer of the cystic specimen consisted of a thin layer of squamous epithelia without atypia, surrounded by a fibrous bellow (Figure 2A). Any indices for inflammation were missing. A discrete bulging of the cystic epithelia was focally found. Focally, the epithelia displayed plaque formation (Figure 2B). Comparing the histological patterns of the cystic lesion to the radiographic findings the diagnosis of LPC was established.

## Discussion

This report details some morphological features of a LPC. LPC is a harmless developmental anomaly most likely derived from odontogenic epithelium (1). Some authors suppose that LPC derive from remnants of the dental lamina (4). Another hypothesis on the pathogenesis of LPC suggests a de-squamation of some lateral parts of the reduced enamel epithelium in an apical direction prior to the eruption of the dental crown into the oral cavity (Figure 3).

LPC and gingival cysts share same morphological findings (1). Given the pathogenesis of LPC derived from reduced enamel epithelium, the distinction between both cysts is explained by temporo-spatial differences of growth directions of odontogenic epithelia during the emergence of the affected tooth. In contrast to the early detachment of the reduced enamel epithelium during the process of tooth eruption giving rise to the periodontal cyst, the development of the morphologically similar gingival cyst is proposed to arise from such post-functional epithelium after eruption of a tooth (Figure 4). Therefore, the gingival cyst is located outside the alveolar process and the LPC is developing inside the alveolar process. Assuming that both cysts are derived from post-functional epithelium the unaggressive character of these entities is easier to understand, in particular in the comparison to orthokeratinized keratocysts. LPC can show a multicystic growth pattern (10) which was not observed in the present case. The multi-cystic variant may show local recurrence that is extremely rare in monocystic variants.

Given this mechanistic view on the pathogenesis, LPC should share some morphological characteristics of a dentigerous cyst, which is the case (1). However, this hypothetical pathogenesis of LPC does not explain why these remnants of the dental lamina or reduced epithelium are hindered to open to the oral cavity but force the resorption of adjacent bone without demineralisation of the adjacent dental root. Furthermore, the predilection of LPC for certain tooth groups is not explained by these theories. Indeed, the cystic lining is usually completely covered by the alveolar process, maintaining a space between the tooth and the bone surrounding the cyst. In the present case the lamina dura surrounding the dental roots was not visible in the area of the lesion (Figure 1). In some cases, a bulging of the vestibular part of the alveolar process was noted in the place of LPC (1).

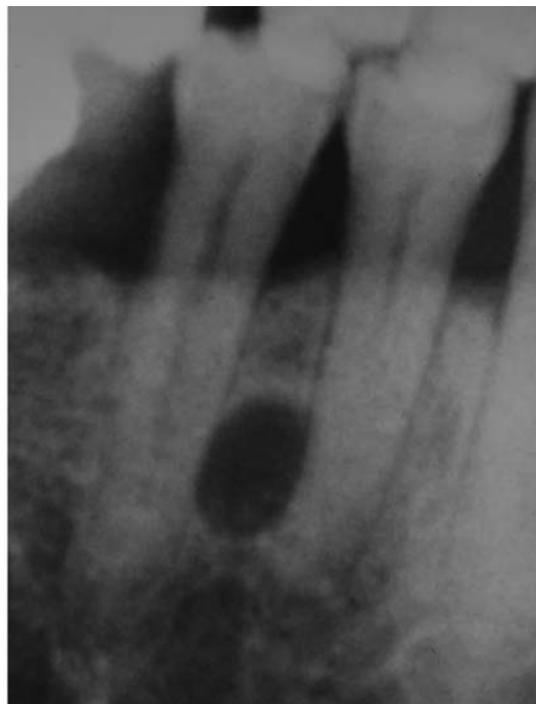


Figure 1. *Cropped image of the orthopantomography of the patient. Between the lower right premolars an oval radiotranslucency borders to the roots of both teeth, but shows no further outgrowth superimposing the roots. The periodontal space is not visible in the area of cyst extension. Both teeth adequately reacted to stimuli testing tooth vitality.*

Furthermore, LPC are predominantly diagnosed in the fifth and sixth decade of life (7). Following the hypothesis of LPC developing from reduced enamel epithelium from the covering of the crown of the adjacent tooth, these epithelia have to lie dormant for many years before emergence of the cyst. This known temporal preference of LPC to older individuals was recently re-addressed to support the hypothesis LPC are developing under genetic control (1). Furthermore, the development of epithelial plaques that degenerate to a cystic compartment gives evidence for active proliferation in this odontogenic epithelium (Figure 5). However, it is presently not clear why only such a tiny accumulation of epithelial cells separated early in life can give rise to a cyst decades later.

LPC are usually symptomless and occasionally diagnosed on radiographs of the jaws. On radiographs, the LPC is a round or slightly oval-shaped, well-defined radiolucent area, frequently with a sclerotic margin. The cyst lies between the apex and the crest of the alveolar process with no resorption of the adjacent root(s). The cyst usually does not exceed a maximum in diameter of 10 mm except for the rare multicystic variants (6, 7). In a radiographic follow-up of LPC growth spurts of the cyst became evident (6) supporting the claim for surgical intervention. On radiographs, LPC may appear similar to a lateral outgrowth of a dentigerous cyst (6).

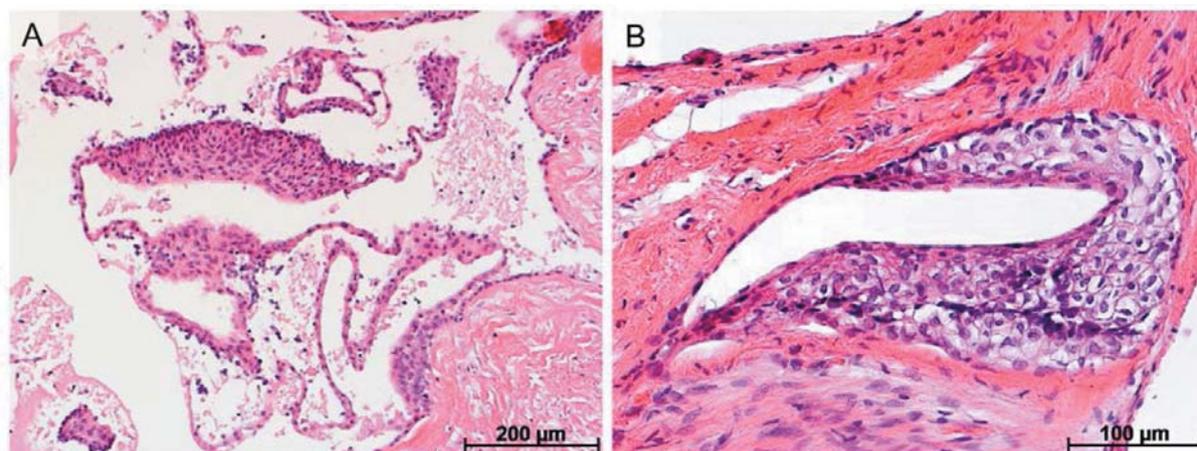


Figure 2. Lateral periodontal cyst, microscopic findings. (A) The cyst was lined-up with two- to three-layered odontogenic epithelium, there were neither goblet cells nor ciliated epithelia apparent within the epithelium. Multiple thickenings of the cyst epithelium and epithelial plaques were seen throughout the lesion. The fibrous cyst wall showed no inflammatory changes. (B) Under higher magnification, the odontogenic epithelia showed no atypia. (A/B stain: hematoxylin&eosin, original magnification: A  $\times 100$ , B  $\times 200$ ).

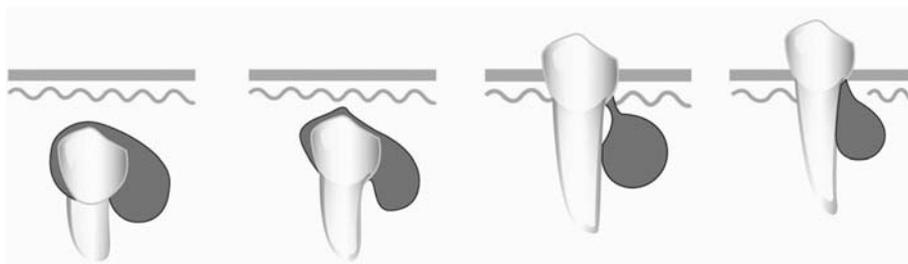


Figure 3. The sketches illustrate the hypothetical pathogenesis of the lateral periodontal cyst (from left to right). Initially, inside the bone the follicle expands asymmetrically with reference to the crown (left). A (lateral) radiograph would show a silhouette identical to a possible lateral dentigerous cyst that is frequently found in the third molar region of the mandible. During the process of tooth eruption (both medial Figures), a certain part of the follicle is left behind inside the bone. This remaining follicle represents the side of excentric follicular expansion. On the other hand the follicle gets completely resorbed in the region of the straightforward direction of tooth eruption. Finally, the encapsulated epithelial remnants lie intraosseously beside the root of the fully erupted tooth (sketches according to (1), modified).

Recent reports on LPC emphasize that the entity is primarily based on a histological diagnosis (2). Therefore, the radiological appearance should no more constitute a prominent feature to establish diagnosis. In particular, neither the complete osseous impaction of LPC nor the topographical association with a dental root is recommended for establishing the diagnosis of LPC. On the other hand, the epithelial bulges inside the cyst and the degeneration of epithelial cells were given weight to consider LPC (2). However, the plication of epithelia in the course of cyst formation is not unique to LPC.

## Conclusion

LPC is a rare odontogenic cyst. Therapy is surgical enucleation without damage to adjacent dental roots. LPC are usually incidental findings on dental radiographs. LPC

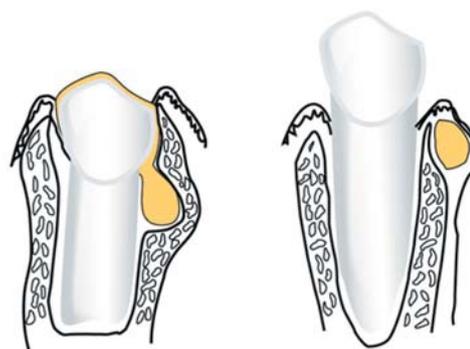


Figure 4. The Figures illustrate the different topographies of lateral periodontal (left) and gingival cysts (right). Both cysts are derived from the epithelia constituting the dental follicle. In LPC, the cavity forming epithelia detach from the emerging tooth prior to the contact of the crown to the alveolar limbus. In gingival cysts, these cystic epithelia lose the contact to the dental follicle above the alveolar crest (sketches adapted from (1), modified).

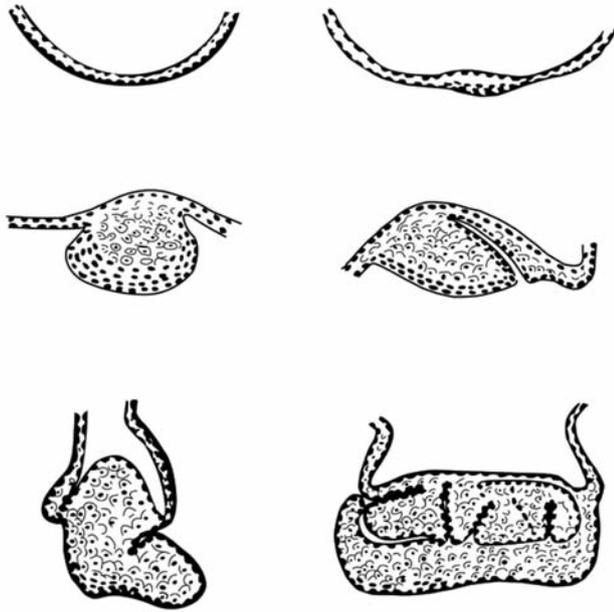


Figure 5. Schematic drawing of epithelial plaque formation in LPC. Upper line: On the left side a thin epithelial lining covers the luminal side of the cyst. These cells resemble to reduced enamel epithelium. On the right side focal swelling inside the epithelial lining occurs that is caused by proliferation of basal cells. Middle line: On the left sketch the continuous basal cell proliferation is shown. The superficial cells lose contact to the basal layer and swell by accumulation of intracellular fluid. On the right sketch the proliferation of the basal cells slows down in the region of first plaque forming, but lateral to the initial plaque further basal proliferation occurs. Bottom line: On the left sketch, the plaque detaches partially from the basal layer and protrudes into the cyst lumen. Attachment of the protruding plaque to adjacent cystic epithelia causes epithelially lined gaps. On the right sketch the slowly-growing plaque can cause convolutions that can give rise to the development of daughter cells (sketches are according to (1), modified).

represent a predominantly radiologically-defined phenotype of cystic odontogenic epithelia probably associated with the process of cyst formation. Current morphological investigations emphasise the discriminative value of plaque formation in the epithelial cyst wall.

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