
CYSTS OF THE JAWS

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CYSTS OF THE JAWS MADE EASY

A CYST IS A SPACE-OCCUPYING LESION WITH an outer wall of fibrous connective tissue that surrounds a central cavity called the cyst lumen. On the inner aspect of the wall is a lining of epithelium, most commonly stratified squamous epithelium (Fig. 1). As you will see, some are lined by epithelium other than squamous epithelium and one cyst, the traumatic bone cyst, has no lining at all.

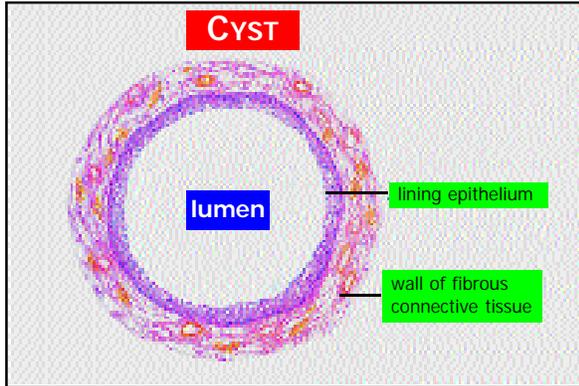


FIGURE 1: SCHEMATIC OF TYPICAL CYST.

Cysts and tumors have some things in common:

1. They occupy space and may displace or replace normal tissues.
2. They may resorb adjacent teeth or push the teeth out of their normal alignment.
3. They may cause expansion of the bone, usually painless expansion.
4. They may compress nerves and cause numbness
5. Although they may occupy the same space as teeth, cysts generally do not interrupt the blood supply to teeth so tooth vitality is unaffected. This is also true of most tumors.
6. Some cysts and tumors are radiographically similar and microscopic diagnosis may be required to make the diagnosis.
7. All cysts have a central lumen as illustrated in *Figure 1*. Tumors, by contrast, are usually solid growths. Some tumors may develop small cystic spaces within the solid portions. When this occurs, the term "cystic" is incorporated in the name; for example, mucous cystadenoma of the ovary and adenoid cystic carcinoma of the salivary gland.

Periapical Cyst (radicular cyst, apical periodontal cyst)

This cyst arises around the apex of a tooth with a necrotic pulp. In most instances the cause of the pulp necrosis is dental caries, but trauma in the form of blunt force or thermal injury during dental procedures are other possible causes. The periapical cyst is a

close relative of the periapical dental granuloma and periapical abscess. All three of these lesions are the sequelae of pulp infection and necrosis.

The epithelium that lines this cyst is stratified squamous and since the cyst arises in an inflammatory environment, there is inflammation in the cyst wall. The epithelial rests of Malassez are the source of the lining epithelium.

This cyst is ordinarily centrally positioned over the apex of the offending tooth, but they may be found on the lateral aspect of the root as seen in *Figure 6*.



FIGURE 2

Periapical cyst around lateral incisor tooth. The lesion around the central incisor was not removed but was probably a dental granuloma.

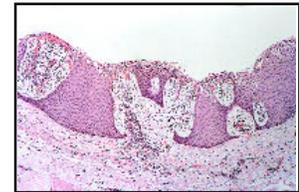


FIGURE 3

Representative section of a cyst. The lumen is at the top and the wall at the bottom. The lining of squamous epithelium is the more blue (hematoxylin stained) tissue facing the lumen.



FIGURE 4

This periapical cyst arose from the carious and fractured central incisor but overlapped the apex of the adjacent tooth.



FIGURE 5

A periapical cyst around a lower incisor tooth with pulp necrosis secondary to blunt trauma.



FIGURE 6

A periapical cyst of the lateral incisor that is positioned laterally. Not all periapical cysts are centered directly over the apex of the offending tooth.

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A word of caution. To be confident that a periapical radiolucent lesion is truly a cyst, you must show that the tooth has a necrotic pulp. This is done by electric pulp testing and observing the response of the tooth to thermal (hot and cold) stimulation. If the tooth responds normally, the lesion around the apex is not a periapical cyst and a root canal procedure is contraindicated.

A residual cyst (Fig. 7) is a periapical cyst that persisted after the tooth was extracted. This does not happen often because extracting the tooth usually results in a cure even if the cyst is not removed.



FIGURE 7
A residual cyst, formerly a periapical cyst that remained following extraction of the tooth from which it arose.

Dentigerous Cyst (follicular cyst)

A cyst that occurs around the crown of an unerupted tooth is called a dentigerous cyst or follicular cyst. They are thought to arise as a result of the accumulation of tissue fluid between the crown of the tooth and the adjacent reduced enamel epithelium that lines the dental follicle. Why this occurs is unknown. Dentigerous cysts are developmental in origin (not inflammatory) and may have little or no inflammation in the cyst wall. The lining epithelium is stratified squamous type. The size ranges from small (barely larger than a normal follicle) to huge. The wall of the cyst is attached to the neck of the tooth from which it arose. *Figure 10* shows the relation of the cyst to the tooth. This cyst may be multilocular but far more often is unilocular. Since it produces no calcified product, it is purely radiolucent. Another cyst, the keratocyst, and a tumor, the cystic ameloblastoma, may radiographically mimic a dentigerous cyst. The risk of developing a dentigerous cyst has been cited as a reason to have all unerupted teeth removed. But the risk is low, probably on the order of 1%.



FIGURE 8
A dentigerous cyst associated with an unerupted lower third molar. This is the most common site followed by the maxillary cuspid and maxillary third molar. Any impacted tooth may develop a dentigerous cyst. The risk has been placed at about 1%.



FIGURE 9
A large dentigerous cyst. The tooth seems to float in the cyst but the cyst wall invariably is attached to the neck of the tooth.

All unerupted teeth have a pericoronal radiolucency, the dental follicle, as shown in *Figure 11*. The question arises, how do you tell a large dental follicle from a small dentigerous cyst? Most follicles will measure 4 mm or less from the surface of the tooth to the outer edge of the follicle (the follicle is 4 mm thick or less). Anything beyond this is probably a cyst.

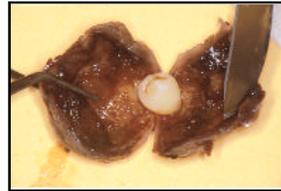


FIGURE 10

A dentigerous cyst opened to reveal the relationship to the crown of the tooth, in this case a bicuspid tooth.



FIGURE 11

A normal dental follicle. Any follicle thicker than 4 mm, 5 mm at the most, should be regarded as a dentigerous cyst.

(For more information see: "The small dentigerous cyst." *Oral Surg, Oral Med, Oral Path* vol.79 p.77-81 1995). Treatment of dentigerous cyst is by surgical enucleation, but large ones will respond to marsupialization. They do not recur.

Eruption Cyst (eruption hematoma)

An eruption cyst is a dentigerous cyst that forms after the erupting tooth has broken through bone but has not penetrated the overlying gingival tissue. Bleeding into the cyst lumen may cause blue discoloration leading to the inappropriate term, eruption hematoma. They do not require treatment because they rupture spontaneously as the tooth erupts.



FIGURE 12
An eruption cyst, blue tinged by blood in the cyst lumen.

Nasopalatine Duct Cyst (incisive canal cyst)

The incisive canal is a midline bony canal, single or paired that traverses the anterior maxilla connecting the floor of the nasal cavity with the anterior hard palate. The oral entry to the canal is the anterior palatine foramen. Through the canal passes the nasopalatine nerves and vessels and remnants of the epithelial nasopalatine duct. The ducts are thought to be derived

from a primitive olfactory organ, the vomeronasal organ of Jacobson, present in lower forms of life but vestigial in humans. (Human behavior sometimes leads us to believe that there may not be lower forms of life.) At any rate, the epithelial lining of nasopalatine cysts is derived from the ducts and is a mixture of squamous epithelium and pseudostratified ciliated columnar epithelium. The cyst wall characteristically has large nerve trunks and arteries coincidentally removed with the cyst. There is a tendency to over-diagnose this cyst. A large funnel-like opening to the anterior palatine foramen may produce a large radiolucent shadow that is mistaken for a cyst. And the vitality of the adjacent teeth should be confirmed because a periapical cyst on the central incisor teeth may radiographically resemble a NPD cyst.



FIGURE 13

A typical nasopalatine duct cyst. The vitality of central incisor teeth should be confirmed to rule out a periapical cyst masquerading as NPD cyst.



FIGURE 14

Typical nasopalatine duct cyst.

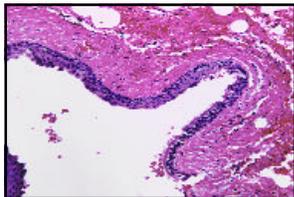


FIGURE 15
Histology of NPD cyst, squamous epithelium middle and left, and respiratory epithelium on the right.

Lateral Periodontal Cyst

The lateral periodontal cyst is a developmental cyst that typically is found in the cuspid-bicuspid region of the mandible and less frequently in the maxilla. They are radiolucent with a sharp border and seldom are larger than a centimeter. They are asymptomatic, do not interfere with the vitality of adjacent teeth and are usually discovered on routine dental radiographs. Unilocularity is the rule, but they may be multilocular in which case they are said to be botryoid (Gr: resembling a bunch of grapes). Histologic diagnosis rests on the recognition of a characteristic and peculiar finding. The lining epithelium is usually thin and squamous, but there is localized thickening of the epithelium (mural plaques). The cells in these thickened areas

are a little larger, more round and the cytoplasm appears clear or empty (clear cells). The cause of this change is unknown. This cyst is usually removed to confirm the diagnosis and does not recur following curettage.

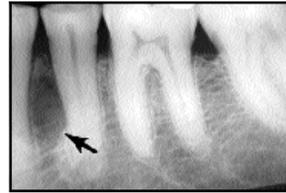


FIGURE 16

Typical lateral periodontal cyst.



FIGURE 17

Typical lateral periodontal cyst.

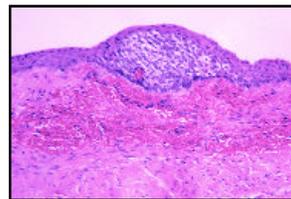


FIGURE 18
Mural plaque of clear cells in lining of lateral periodontal cyst.

Gingival Cyst

Take a lateral periodontal cyst out of bone, place it on the surface of bone in the gingiva and you have a gingival cyst. This cyst appears as a taunt but compressible translucent bubble. If the cyst lumen is tinged with blood, it will have a blue color. Prick one and a watery or viscous mucous material can be expressed. Upon removal, a shallow, scooped-out depression in the cortical bone may be seen, the result of pressure resorption. Histology and treatment are the same as for the lateral periodontal cyst.



FIGURE 19

Typical gingival cyst.



FIGURE 20

Typical gingival cyst, blood-tinged blue.

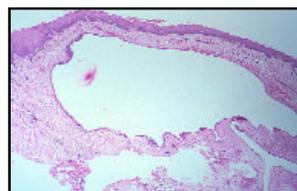


FIGURE 21
Whole mount of gingival cyst. Gingival surface epithelium is seen at top of slide.

Odontogenic Keratocyst (OKC)

This is the most interesting of jaw cysts. It is named keratocyst because the cyst epithelium produces so much keratin that it fills the cyst lumen. Furthermore, flattening of the basement membrane and palisading of the basal epithelial cells is reminiscent of odontogenic epithelium, therefore the name odontogenic keratocyst. The epithelial rests of Malassez and Serres are the probable source of this cyst as is true for most of the cysts in the jaws. There are several important things to remember about the OKC:

1. Unlike other jaw cysts, this cyst has a high recurrence rate estimated to be about 30%
2. Radiographically it is a great mimic. It may resemble periapical cyst, dentigerous cyst, lateral periodontal cyst, nasopalatine duct cyst, traumatic bone cyst and even tumors such as ameloblastoma. They are usually unilocular but may be multilocular.
3. A person may have multiple keratocysts at the same time, a little unusual for other jaw cysts.
4. If a person has more than one OKC, that person should be investigated for the nevoid basal cell carcinoma syndrome (next section).

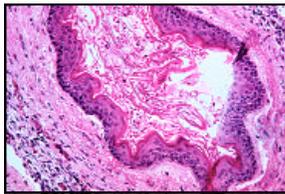


FIGURE 22

Odontogenic keratocyst, the cyst lumen is filled with keratin.

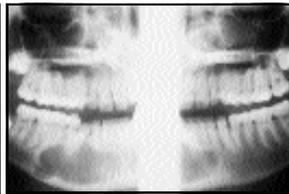


FIGURE 23

Keratocyst of the mandible, all teeth were vital. It resembles a traumatic bone cyst somewhat.



FIGURE 24

OKC mimicking a dentigerous cyst.



FIGURE 25

OKC mimicking a nasopalatine duct cyst.



FIGURE 26

OKC mimicking a periapical cyst.

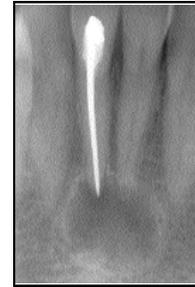


FIGURE 27

OKC that was thought to be a periapical cyst.

The captions under the radiographs say it all. But one, the globulomaxillary cyst requires an explanation. It has long been thought that a developmental cyst may form in the line of fusion of the premaxilla and the maxilla. This line passes between the maxillary lateral incisor and cuspid teeth. A cyst developing at



FIGURE 28

OKC that has the "globulomaxillary" appearance.

this site would grow between the two teeth and cause the roots to become divergent. The cyst would assume an upside-down teardrop shape, conforming to the space allotted to it. Such a cyst has been recognized as a globulomaxillary cyst but probably does not exist. It seems that any space-occupying lesion that occurs at this site will cause the roots of the teeth to separate. Most so-called globulomaxillary cysts turn out to be keratocysts, laterally positioned periapical cysts, tumors such as myxoma and other lesions.

The keratocyst is treated by enucleation or marsupialization with close follow-up.

Remember it has a high recurrence rate.

The Nevoid Basal Cell Carcinoma Syndrome (Gorlin's syndrome)

This syndrome is characterized by a host of abnormalities including multiple keratocysts, early onset basal cell carcinomas of the skin, bifid ribs, medulloblastoma of the brain, calcified falx cerebri, mental retardation and others. It is ordinarily inherited as an autosomal dominant trait and the gene has been mapped to the long arm of chromosome #9, the "patched" gene. Although the function of the patched

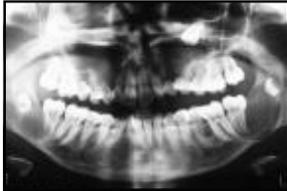


FIGURE 29
Multiple keratocysts in a child with Gorlin's syndrome.



FIGURE 30
Basal cell tumors of the skin in the child in figure #29.

protein is not fully understood, it plays a role in signal transduction from the cell surface through the cytoplasm, but the nature of the signal being sent is not clear. As far as the skin tumors are concerned, the gene behaves like a tumor suppressor gene. Both copies must suffer an inactivating (loss of function) mutation before skin tumors appear. A germ line mutation in one allele accounts for the first hit and somatic mutations provide the second hit. Because of the protean manifestations of this syndrome, many different medical and dental specialties are involved in the treatment. Naturally the jaw cysts fall within the realm of dentistry.

Lymphoepithelial Cyst

This cyst is an intramucosal cyst and appears as an asymptomatic, small yellow to white submucosal mound as seen in the illustrations. The floor of the mouth is a common site for this cyst as is the posterior lateral tongue, oropharynx and soft palate. Their origin is unclear and is of insufficient interest to pursue here. On microscopic examination, a lymphoepithelial cyst is found to consist of a small, keratin-filled cyst lined by flattened squamous epithelium. A mantle of

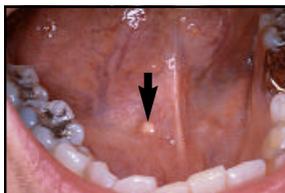


FIGURE 31
Small lymphoepithelial cyst in the floor of the mouth.

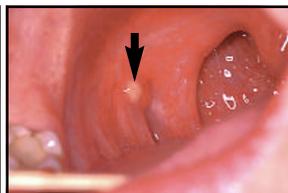


FIGURE 32
Lymphoepithelial cyst, right oropharynx.



FIGURE 33
Lymphoepithelial cyst with a thick mantle of lymphoid tissue surrounding cyst from 2:00 to 10:00 o'clock position. The pale, round zones in the lymphoid tissue are germinal centers.

lymphoid tissue partially or completely surrounds the cyst, thus the name lymphoepithelial. They are harmless but usually removed to confirm the diagnosis. This cyst is thought to be a miniature variety of the larger branchial cleft cyst (cervical lymphoepithelial cyst) that occurs in the neck anterior to the sternocleidomastoid muscle from the ear to the clavicle.

Traumatic Bone Cyst (simple bone cyst, hemorrhagic extravasation cyst)

Misnomers abound in pathology and this is one of them. The name implies that trauma causes this cyst but there is little evidence that this is so. It occurs mainly in children and young adults, and the body of the mandible is the most common site. It is purely radiolucent as are most cysts and is usually unilocular. The size ranges from 1 cm. to those that are so large that they hollow out much of the jaw. Large traumatic bone cysts may expand the jaw, but they seldom cause pain.



FIGURE 34
Traumatic bone cyst, left body of mandible.

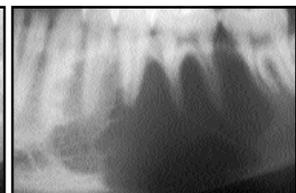


FIGURE 35
Enlarged view of cyst in figure #34.

Dome-shaped scalloping between the teeth as illustrated in Figure 36 is a characteristic feature that is not always present. They are biopsied for diagnostic purposes but on entering the cyst, the surgeon encounters



FIGURE 36
Traumatic bone cyst showing typical dome-shaped scalloping between roots of teeth.

an entirely empty cavity. Small shards of fibrous connective tissue may cling to the wall of naked bone, and a small amount of fluid may be present, but there is little to submit for microscopic examination. At this point, the diagnosis is made and the treatment has

been rendered. The lesion will fill with bone in a few months following the exploratory procedure. Some putative traumatic bone cysts have been reported to heal without treatment.

Calcifying Odontogenic Cyst (COC, Gorlin's cyst)

This is the only cyst that may produce calcifications so that it may have a mixed radiolucent / radiodense appearance radiographically. It may be an isolated entity or appear in conjunction with another lesion. For example, an odontoma may have a surrounding COC. The histologic characteristics are unique and pathognomonic. The lining epithelium has an "odontogenic" appearance created by a flattened basement membrane, palisading of the basal cells with reverse nuclear polarity, loose areas resembling stellate reticulum, and finally, the epithelial cells acquire an eosinophilic (pink) cytoplasm and the nucleus disappears leaving a clear hole formerly occupied by the



FIGURE 37

Calcifying odontogenic cyst, mostly radiolucent but a small area of calcification can be seen. Calcified ghost cells produce the radiodensity.

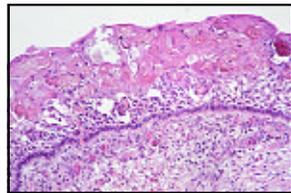


FIGURE 38

Low power of COC. Cyst lumen at top and wall at bottom. The cyst epithelium has a flat basement membrane, the basal cells are palisaded and the top of the epithelium is eosinophilic (pink) because of large number of ghost cells.

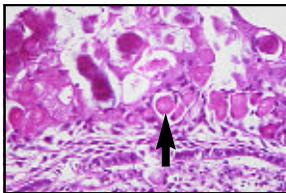


FIGURE 39

Higher power of COC. The deep blue-purple areas are calcified ghost cells. A typical ghost cell can be seen at tip of arrow.

nucleus. Such cells, called ghost cells, occur singly or in sheets. It is these cells that calcify. This cyst rarely assumes a non-cystic more solid form that behaves more like a tumor. In this form it has been referred to as a ghost-cell tumor, what else? The COC was originally described by Dr. Robert Gorlin of the University of Minnesota and is known as Gorlin's cyst. It should not be confused with the cyst that occurs in Gorlin's syndrome, the keratocyst. Treatment for the COC is the same as for most of the other cysts, surgical enucleation.

Glandular Odontogenic Cyst

Little is known about this cyst because so few cases have been reported. The cyst may reach an impressive size and derives its name from the observation that the lining epithelium has small duct-like spaces that make it look glandular. It may recur following curettage, a property it shares with the keratocyst.

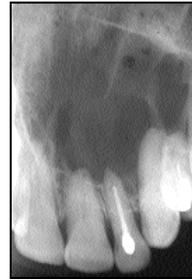


FIGURE 40

Recurrent glandular odontogenic cyst in maxilla.

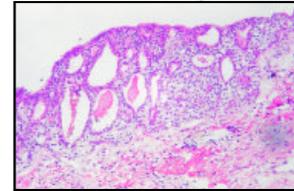


FIGURE 41

Cyst epithelium shows microcystic spaces lending a "glandular" appearance.

Pseudocyst of the maxillary sinus (Antral mucocele)

This lesion in the maxillary sinus is neither a cyst nor a mucocele as the names imply. They are asymptomatic and ordinarily discovered accidentally. They appear as a pale, gray dome with a smooth border expanding upwards into the maxillary sinus. Histologically they consist of extraordinarily edematous sinus mucosa. The cause is unknown and they require no treatment.

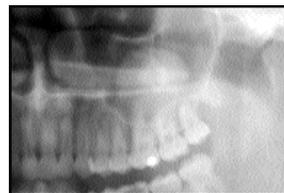


FIGURE 42

Typical pseudocyst of maxillary sinus.

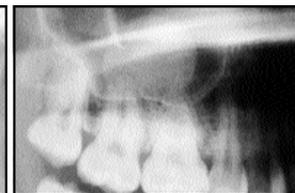


FIGURE 43

Typical pseudocyst of maxillary sinus.

Aneurysmal bone cyst

Another cyst that is not a cyst. It is a rapidly developing tumor-like swelling that may seem to "balloon" out of the jaw. They are found in all parts of the skeleton. In the jaws, they occur more often in the mandible. The cause is unknown. The one illustrated here occurred following blunt trauma caused by a baseball. Microscopically they consist of large pools of blood incompletely lined by endothelial cells. The connective tissue between the pools may contain a few multinucleated giant cells and a few trabeculae of bone. The treatment is curettage, they sometimes recur.



FIGURE 44

Aneurysmal bone cyst, right body of mandible. The lesion seems to hang suspended from the inferior aspect of the mandible.

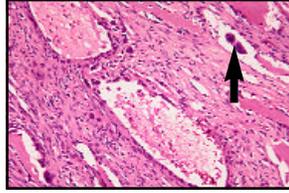


FIGURE 45

Histology of aneurysmal bone cyst showing pools of blood separated by fibrous connective tissue. A single giant cell can be seen (arrow).

One Final Word

This study set does not cover all known jaws cysts, just the important ones. Please consult your text on the following:

Nasolabial cyst (nasolabial cyst) — A cyst in soft tissue where the upper lip meets the nasal ala. (This has appeared on the National Board.)

Gingival cyst of the newborn — Small, single or multiple keratin-filled cysts on the edentulous alveolus.

Epstein's pearls and Bohn's nodules — Small keratin-filled cysts in the palatal mucosa of newborns.

Buccal bifurcation cyst — A developmental cyst in the bifurcation of molar teeth.

Paradental cyst — A cyst usually found adjacent to a 3rd molar tooth — maybe a dentigerous cyst left behind?

Primordial cyst — A cyst that develops at the site where a tooth fails to develop. Most if not all primordial cysts are keratocysts histologically.



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