

**I. I. LENKOVA, S. N. KACHALOV**

**DIFFERENTIAL DIAGNOSIS  
OF JAW CYSTS**

Minsk BSMU 2020

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ  
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КАФЕДРА ЧЕЛЮСТНО-ЛИЦЕВОЙ ХИРУРГИИ

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**ДИФФЕРЕНЦИАЛЬНАЯ ДИАГНОСТИКА  
КИСТ ЧЕЛЮСТЕЙ**

**DIFFERENTIAL DIAGNOSIS  
OF JAW CYSTS**

Учебно-методическое пособие



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На английском языке

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The issue of diagnosis, differential diagnosis, treatment and prevention of cysts of the jaws is one of the most important for surgeons, dentists and maxillofacial surgeons.

Odontogenic jaw cysts are a very common pathology. Among operations performed by dental surgeons on an outpatient basis, operations for odontogenic jaw cysts occupy one of the first places after a tooth extraction operation. Among patients admitted to hospitals of maxillofacial surgery, patients with perforated cysts account for about 8 %. Half of them (46 %) are patients with suppurative cysts of the jaws [1].

This handbook provides basic information regarding the most common jaw cysts, the issues of diagnosis, differential diagnosis and their treatment.

Purpose: based on the results of clinical examination, clinical and radiological data and the results of additional examination methods, to be able to diagnose jaw cysts, to conduct differential diagnostics with benign growths of the maxillofacial area.

### **Tasks of the lesson:**

1) to learn how to make an examination plan for patients with cysts of the jaws, to collect history, to identify clinical symptoms; to be able to carry out differential diagnostics with benign bone growths of the maxillofacial region;

2) to learn how to read the radiological signs of cysts of the jaws and carry out a comparative description with the x-ray picture of the jaw tumors, how to make a plan for the integrated treatment of patients with tumor-like formations of the jaws.

**Requirements for the initial level of knowledge.** In order to fully master the topic, it is necessary to revise the material from the following sections:

- Human morphology:
  - topography-anatomical features of the bones of the face;
  - blood supply to the head and neck;
  - innervation of the maxillofacial region;
  - morphology of benign tumors of the bones of the facial skeleton.

### **Test questions and tasks from related disciplines:**

1. List the bones involved in the structure of the maxillofacial region.
2. Anatomical features of the upper jaw.
3. Anatomical features of the localization of the teeth of the upper jaw in relation to the maxillary sinus.
4. Anatomical structure of the lower jaw.
5. Blood supply and innervation of the upper and lower jaw.

## LEARNING MATERIAL

Odontogenic cysts are referred to as cavity formations localized inside the bone, having a connective tissue capsule, lined from the inside with stratified squamous epithelium, and filled with liquid or semi-liquid contents with cholesterol crystals. The cavity of an odontogenic cyst is usually filled with yellow liquid, opalescent due to the presence of cholesterol crystals in it, which are clearly visible in the form of sparkles when they are absorbed on the surface of a gauze pad. Sometimes the cyst cavity is filled with a curd gray-white mass. The epithelium, lining the cyst cavity, originates from the remnants of the tooth-forming epithelial plate, i.e. Malasse epithelial islets or from the epithelium of the dental follicle.

Cysts of the jaws are divided into odontogenic and non-odontogenic. The jaw bones, with some exceptions, are the only bones in which cysts with epithelial lining are found.

The most detailed classification of jaw cysts is the clinico-morphological classification of tumors and tumor-like jaw formations, designed by I. I. Ermolaev, V. V. Panikarovskiy, A. I. Paces, B. D. Kabakov took part., V. M. Benzianova and S. Ya. Balsevich (1975). Cysts of the jaws are presented in the section "B. Tumor-like formations" and are divided into:

### I. Epithelial cysts.

#### 1. Odontogenic cysts:

- a) primary cyst;
- b) eruption cyst;
- c) paradental cyst;
- d) gingival cyst;
- e) a tooth-containing cyst;
- e) follicular cyst;
- g) root (radicular) cyst.

#### 2. Non odontogenic cysts:

- a) cyst of the incisal canal (naso-palatine);
- b) a globulomaxillary (fissural) cyst;
- c) cholesteatoma.

### II. Non-epithelial bone cysts:

- a) aneurysmatic cysts;
- b) traumatic cysts;
- c) hemorrhagic cysts.

The morphological classification of odontogenic tumors according to Yermolaev (1964), which distinguishes two groups of cysts, those of inflammatory origin and those due to a developmental defect of the tooth-forming epithelium, is considered to be successful and still used by many specialists.

1. Odontogenic cysts of inflammatory origin:
  - radicular;
  - tooth-containing;
  - paradental.
2. Odontogenic cysts due to a developmental defect of the tooth-forming epithelium:
  - primary;
  - follicular;
  - teething cysts;
  - gingival.

**Methods for diagnosing jaw cysts.** For the diagnosis of cysts of the jaws, the following methods are used:

- clinical data;
- X-ray diagnostics;
- morphological diagnosis.

## **ETIOLOGY AND PATHOGENESIS OF ODONTOGENIC JAW CYSTS**

A cyst is referred to as an abnormal space inside the epithelium lining. Odontogenic cysts are connected with the teeth, are localized in the bone, and form a connective tissue capsule lined with epithelial tissue, the cavity of which is filled with yellowish fluid. Odontogenic cysts are divided into two groups: inflammatory and dysontogenetic.

The etiology and pathogenesis of the odontogenic jaw cysts are based on various factors. In the development of cysts of inflammatory genesis, the primary role is played by chronic inflammatory processes in the periapical tissues, which lead to the development of radicular cysts of the jaws, since such formations are in the root zone. The pathogenesis of a radicular cyst has three stages: initiation, cyst formation, and growth. At the initiation stage, the stimulation and proliferation of epithelial cells that make up the complex granulomas, as well as the growth of granulation tissue, occur. Under the influence of frequent exacerbations of apical periodontitis and malnutrition of the central divisions of the granuloma, necrosis of some of its sections, located between epithelial cords (islets), occurs. As a result, cavities are formed in the thickness of the granuloma, surrounded by the epithelium, which is the inner lining of the future cyst. The growth of the cyst occurs due to the intracystic pressure resulting from the accumulation of transudate, which is constantly produced by the membrane of the formation (Fig. 1). The increase in the volume of the cyst further occurs due to an increase in the internal

hydrostatic pressure with an increase in oncotic pressure in the cyst cavity due to the presence of such protein macromolecules as albumin, globulin, fibrinogen.

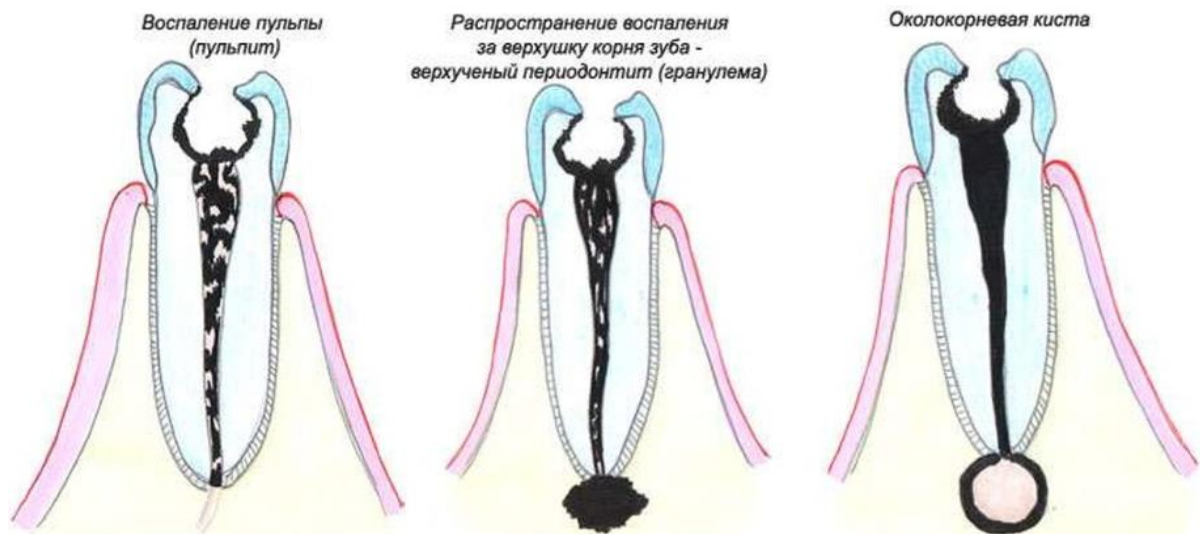


Figure 1. Diagram of the formation of an odontogenic cyst of inflammatory genesis

In the pathogenesis of the formation of dysontogenetic odontogenic cysts lies a spontaneous proliferation of odontogenic epithelial islets that remain inside the jaws. Associated with the influence of exogenous and endogenous factors on epithelial tissue remaining in the bone as a result of a violation of the laying of the tooth-forming organ (islets Malasse). But the development of cysts can also be the result of metaplasia of endothelial cells and the growing season of the epithelium from the surface of the oral mucosa through the marginal periodontium (Schuster, I. G. Lukomsky) (Fig. 2). The increase of the cyst size is associated with accumulation of cystic fluid.

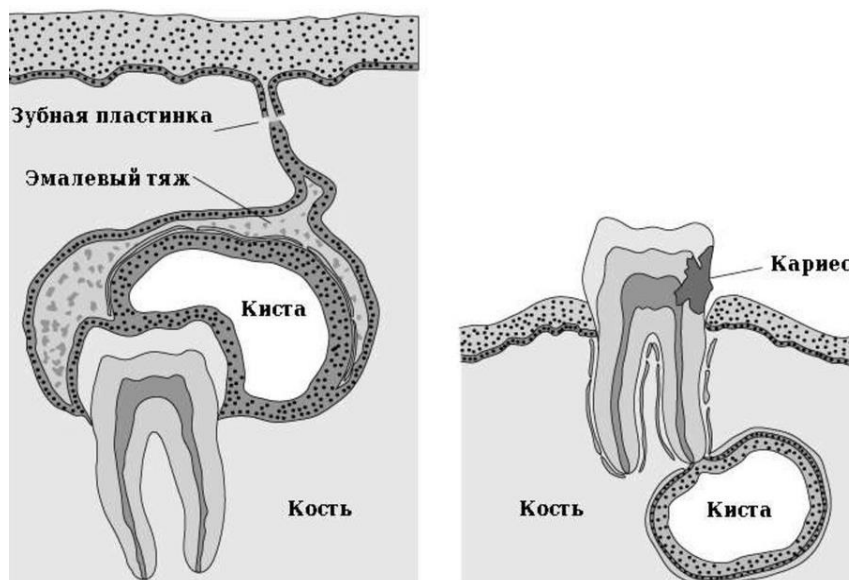


Figure 2. On the left: diagram of the formation of a dysontogenetic cyst, on the right: cysts of inflammatory genesis

## INFLAMMATORY ODONTOGENIC CYSTS

Clinic of a radicular (root) cyst. As a rule, a cyst is found in the region of a previously treated or “periodontitis” tooth (Fig. 3), as well as the tooth that was injured, less frequently in the region of the extracted tooth (residual cyst). The absence of any clinical symptoms is characteristic of the initial period of cyst development, except symptoms of periodontitis in case of its aggravation. The cyst grows slowly over many months and even years. In the lower jaw, the first signs of bone destruction are found on the vestibular surface of the alveolar process; they are characterized by prolapse (protrusion) of the cyst under the mucous membrane. If the cyst comes from the roots of the second or third molar of the lower jaw, then it may be located closer to the lingual surface, since from the vestibular side there is a thick layer of compact and spongy bone. The neurovascular bundle on the lower jaw is pushed aside by the cyst as it grows and is not involved in the pathological process (Fig. 4).

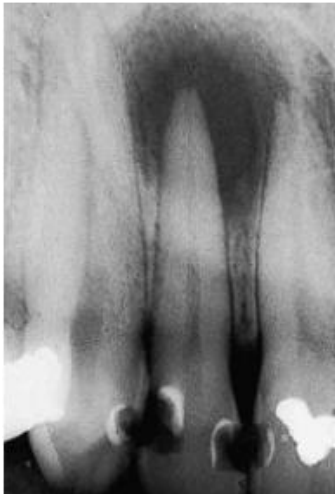


Figure 3. Radicular cyst of the upper jaw



Figure 4. Radicular cyst of the mandible

In 1 % of cases, we encounter a calcified odontogenic cyst. It is a rare type of cyst and can occur at any age, mostly between second and third decade of life. The diameter ranges from 2 to 4 cm and swelling pain may be present. Intrabony expansions may produce hard bony expansion and may perforate cortical bones. It can also extend to soft tissue. It can present asymptotically (Fig. 5).

In the case of a cyst from a tooth, whose root is facing the palate, thinning and even resorption of the palatal plate is observed. The cyst, which develops within the boundaries of the maxillary and nasal cavities, extends in their direction (Fig. 6).

On external examination, the deformation of the face, as a rule, is not marked. Regional lymph nodes are not enlarged. Smoothness or protrusion of the transitional fold of the arch of the vestibule of the oral cavity of a rounded shape with fairly clear boundaries is revealed in the oral cavity. The mucous



membrane covering the cyst does not change in color. On palpation, the overlying bone tissue bends; with a sharp thinning, the so-called parchment crunch (Dupuytren's symptom) is determined, in the case of the absence of a bone there is fluctuation. If there is a significant defect in the jaw bone under the mucous membrane, a bone window is palpated. A convergence of crowns of adjacent teeth may be observed. Percussion of the causal tooth is painless. Electroodontal diagnostics of intact teeth located in the cyst zone reveals a decrease in electrical excitability (the pulp reacts to a current of more than 6–8 mA) due to compression of the nerve endings by the cyst.



Figure 5. Calcified odontogenic cyst of the lower jaw (Turtle Cyst)

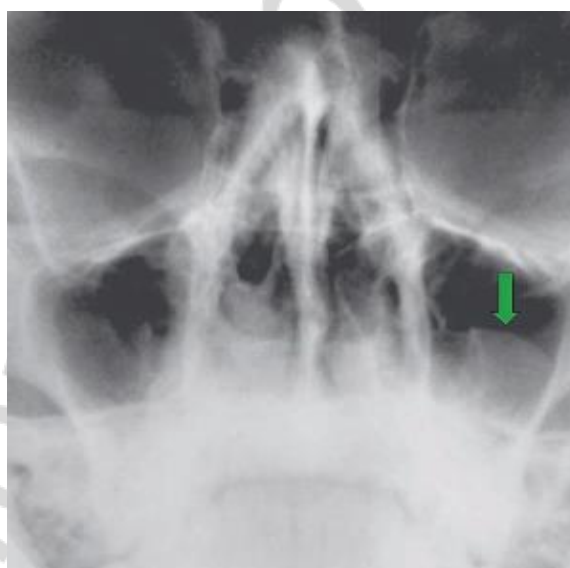


Figure 6. Root cyst, germinated in the maxillary sinus on the left

The inflammation of a radicular cyst is accompanied by the following symptoms: fever, pain, swelling, and hyperemia of the mucous membrane in the area of the cyst. **Clinically**, the process proceeds according to the type of odontogenic inflammatory disease (periostitis, less often osteomyelitis), accompanied by regional lymphadenitis, purulent-inflammatory processes in

soft tissues. Developing in the upper jaw, a cyst can cause chronic inflammation of the maxillary sinus, or emit a clinic of odontogenic sinusitis. The transition of the root cyst to the malignant form is not observed. **Radiologically**, a cyst is characterized by the presence of a single homogeneous section of bone tissue destruction, round or oval in shape with clear boundaries. The root of the causative tooth is turned into the cystic cavity, periodontal gap is absent. The root of the causative tooth in the cyst cavity is not resorbed.

**Pathological anatomy.** The cyst sheath is formed by connective tissue tight to the bone, and inside there is a lining of stratified squamous epithelium, which is well supplied by the middle vascular layer. When germinating into the nasal cavity or maxillary sinus, cysts can be lined with a cylindrical, cubic or ciliated epithelium. In the shell of a cyst, almost always there are areas of hyperplasia, erosion or necrosis of part or all of the shell, which is explained by the presence of an inflammatory process. Characteristic of radicular cysts is the presence of free cholesterol in the cystic contents and walls.

**Differential diagnosis** is carried out with other types of cysts of the jaws and with cystic forms of tumors of the jaw bones (ameloblastoma, osteoblastoma). A radicular cyst differs from an adamantinoma (an odontogenic tumor of epithelial origin) in that a clearly defined (rather than a bay-shaped) defect in the bone is associated with a causal “periodontitis” tooth. In addition, the history of the disease will be significantly different. A radicular cyst is differentiated with an osteoblastoclastoma (cystic and cellular form) — an osteogenic non odontogenic tumor. Clinically, a tumor is characterized by a spindle-shaped thickening of the jaw. The tumor has 2 types: central (localized in the bone) and peripheral, which is localized on the mucous membrane of the alveolar process. However, the leading in the diagnosis is the result of morphological studies of formations.

**Treatment** of radicular cysts is surgical or conservative surgical. The treatment plan includes the removal of a cyst and a causal tooth (if indicated). In the case of the preservation of the causal tooth, it is necessary to fill the root canal to the apex with a non-absorbable filling material in the preoperative period. If the intact teeth, standing nearby, are turned into the cyst cavity, endodontic treatment is also carried out. During the resection of the root apex, only 1/3 of its length can be removed in order to maintain a stable tooth fixation. If more than 1/3 of the length of the root stands in the cavity of the cyst, the tooth must be removed.

**Treatment. According to the indications, 2 methods of treating cysts are used: cystotomy (Parch-1), and cystectomy (Parch-2).**

**Cystotomy** (Parch-1) is a method of surgical treatment (partial removal), in which the external wall of the cyst and the adjacent cortical jaw plate are resected. The remaining intraosseous cavity, lined with cystic membrane, is connected with the vestibule of the oral cavity (Fig. 7).

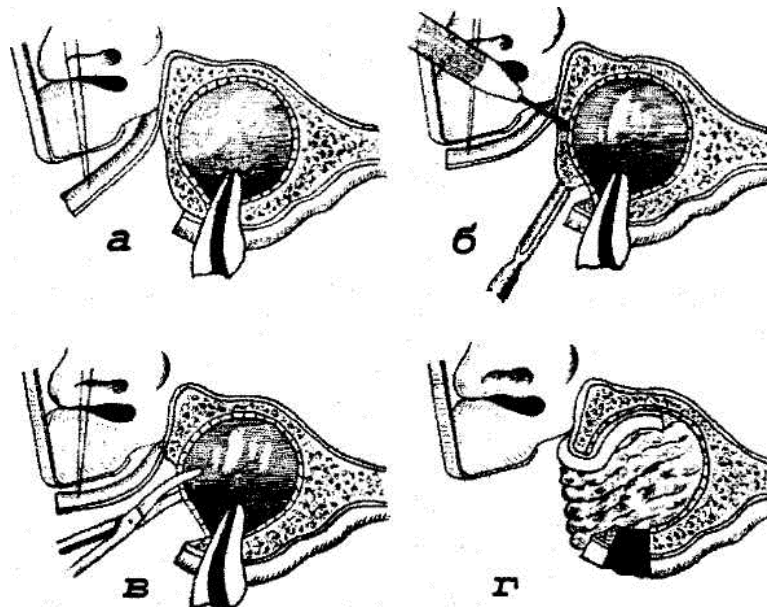


Figure 7. Cystotomy scheme

**Indications for cystotomy:**

- 1) old age, debilitated and depleted patients (due to the low potential of bone tissue regeneration);
- 2) patients with concomitant diseases, when prolonged traumatic (radical) surgery is undesirable or impossible;
- 3) extensive cysts of the lower jaw with a sharp thinning of the base of the jaw (thick bone less than 1–0.5 cm);
- 4) early age, in view of the impossibility of complete removal of the cyst membrane without injuring the rudiments of the teeth.

**Cystectomy** (Parch-2) is a radical operation consisting in the complete removal of the cyst membrane with subsequent suturing of the surgical wound.

**Indications for cystectomy are:**

- 1) a cyst of small size, located within 1–2 intact teeth;
- 2) an extensive cyst of the lower jaw, in which there are no teeth in its zone and a sufficient thickness (up to 1 cm) of the jaw base is preserved;
- 3) a large cyst on the upper jaw, which has no teeth in this area, with a preserved bony wall of the bottom of the nasal cavity;
- 4) a cyst adjacent to the maxillary sinus or pushing it without symptoms of sinus inflammation.

**Residual cyst** occurs as a consequence of incomplete surgical extirpation of the apical cytogramule after tooth extraction. Its clinical and histological characteristics are identical to the root cyst. Radiographically, it manifests itself as radiolucency of various sizes in the area of the previous extraction of the tooth (Fig. 8). Treatment is cystectomy.

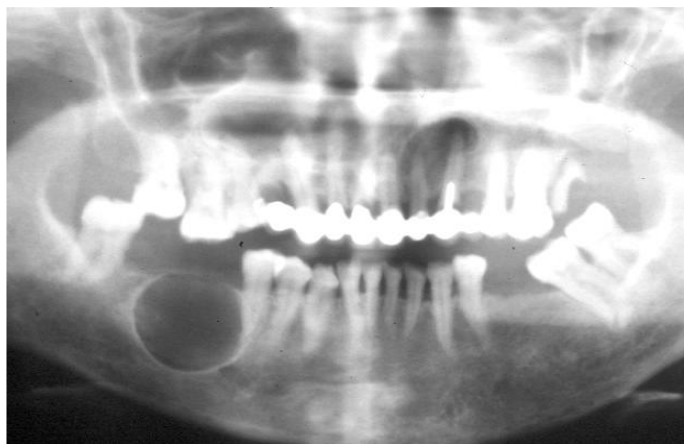


Figure 8. Residual cyst in the region of the extracted tooth 46, adjacent to the intact 45

**Paradental cyst** (eruption cyst, retromolar cyst). In the case of difficulty in the eruption of the third molar of the lower jaw, a bone pocket filled with fibrous tissue is formed between the jaw bone and the tooth. Paradental cysts develop from epithelial cells (squamous epithelium of the oral cavity) ectopied into the fibrous tissue from the mucosal surface. In the presence of inflammation, epithelial cells, differentiating, form small cavities. Over time, the message of the bone pocket with the oral cavity is stopped and the epithelial cavities are isolated. As they grow, they merge into a single cavity with the formation of a cyst. A feature of this cyst is the presence of fibrous strands connecting the shell with the periodontal of impacted tooth. Macroscopically, the cyst envelope and its contents are no different from radicular and follicular cysts.

**Clinic.** The cyst grows asymptotically, so it is extremely difficult to identify it in the initial stage of development. As it grows, it appears as a small, limited and slightly painful swelling in the area of an impacted wisdom tooth (Fig. 9). The inflammation is accompanied by the symptoms characteristic of retromolar periostitis.



Figure 9. Paradental cyst in the area of a dystopic lax lower wisdom tooth (covering an impacted tooth)

**X-ray** determines the destruction of bone tissue behind the impacted lower wisdom tooth in the form of a sickle-shaped half moon (Wassmund semi-moon).

A small paradental cyst encloses the crown of an impacted tooth in part, for large ones, the tooth is completely covered. **Differential diagnosis** is performed with cysts of the jaws and cystic forms of tumors of the jaw bones. **Treatment:** Both cystotomy and cystectomy are used with mandatory removal of the causative tooth.

**Tooth-containing cysts** are formed in children, in the period of mixed bite, localized in the area of temporary, caries-affected molars, repeatedly subjected to unsuccessful treatment or untreated (root cyst of a temporary tooth). In this case, the crown of the forming permanent tooth is immersed in the cavity of the cyst, and the root with the growth zone is located outside the shell. **The treatment** consists of cystotomy, in order to preserve the germ of a permanent tooth and remove the causal temporary one.

### **ODONTOGENIC CYSTS DUE TO A DEVELOPMENTAL DEFECT OF THE TOOTH-FORMING EPITHELIUM**

A follicular cyst is more often found at a younger age but can be observed at any age, developing around a crown of the impacted tooth. Localization site in either the upper or lower jaw. These cysts are associated with impaired development of the tooth germ, may occur at any stage of tooth formation. Most often, a follicular cyst occurs after the end of tooth development (contains a fully formed tooth).

**Clinic** of follicular cyst is in many respects similar to that of radicular cyst. Cyst growth is asymptomatic. On examination of the patient, it is possible to identify a preserved milk tooth and the absence of a permanent tooth in the dentition (except for the development of a cyst from a supernumerary tooth). Follicular cysts rarely suppurate.

**Pathological anatomy.** A follicular cyst is characterized by the presence of a single-chamber cavity filled with clear liquid with cholesterol crystals. The crown of an impacted tooth is facing the cyst cavity.

**Radiographically** determined are the focus of destruction of bone tissue, homogeneous structure, round or oval in shape with clear even boundaries like a monocystic lesion and the presence of a retained tooth with a crown facing the cyst cavity. The root of the tooth is usually located outside the cyst (Fig. 10).

**Differential diagnosis** should be performed with cysts of the jaws and cystic forms of tumors of the jaw bones (ameloblastoma, osteoblastoclastoma).

**The treatment** consists in the complete removal of the cystic formation together with the causative tooth; in children it is cystotomy, in view of impossible complete removal of the cyst membrane without trauma to the rudiments of the teeth.



Figure 10. Follicular cyst in the lower jaw on the right (impacted tooth 43)

**The primary cyst** (keratocyst) develops, as a rule, on the lower jaw and makes up 1 % of all jaw cysts. It is found in middle-aged and older people. It has the ability to epithelium of the cyst envelope to keratinization, it can recur and turn into a malignant form. With a considerable size, the cyst spreads into the body, the angle and the branch of the jaw, causing great destruction of the bone.

**Clinic.** The disease begins imperceptibly and does not manifest itself for a long time. In some patients, a cyst is detected due to the addition of the inflammatory process, sometimes it is found by chance during X-ray examination for other diseases, and it is also determined if it is large when the body, angle, and jaw branch are affected. There is no connection between the appearance of a cyst and the pathology of the teeth. In general, the clinical symptoms of a primary odontogenic cyst are not different from other jaw cysts.

**Radiographically** it appears as a focus of destruction of bone tissue with clear contours. With a significant cyst size, uneven destruction of the bone creates the impression of a multi-chamber formation. The coronary and condylar processes are involved in the process, the cortical plate becomes thinner and absent in some areas, the periodontal crevices of the roots of the teeth projecting to the cyst area are usually determined (Fig. 11).

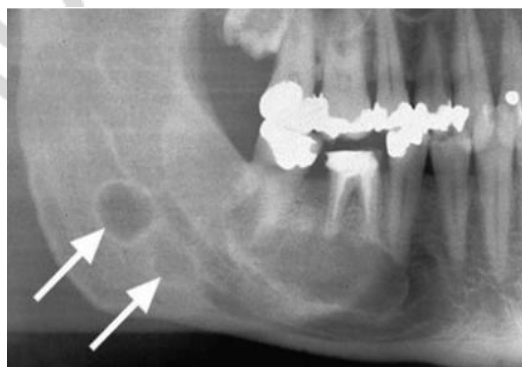


Figure 11. Primary cysts in the body and the angle of the mandible

Keratocyst must be differentiated from ameloblastoma, osteoblastoma and other jaw cysts. Treatment is usually cystectomy. Teething cysts are formed during the permanent teeth eruption in children, less often during milk teeth eruption. If we consider the official statistics, in 40 % of all reported cases this is the eruption of milk teeth; in the remaining 60 % in the permanent bite.

### NON-ODONTOGENIC JAW CYSTS

Pathogenetic non-odontogenic cysts of the jaws are not associated either with the teeth or with impaired development of the tooth-forming epithelium. They are formed due to the violation of facial embryogenesis (embryonic dysplasia). These are so-called fissural (fissure) cysts and develop in the embryonic period on the border of the embryonic facial processes. Localization in the upper jaw is rare. Depending on the location site, the following fissural cysts are distinguished: nasopalatine, globulomaxillary, and nasoalveolar cysts.

**Nasopalatine** duct cysts (NPDC), also known as **Incisive canal cysts**, develop from the embryonic remnants of the epithelium. The latter connects the bottom of the nasal cavity and the oral cavity. A cyst can form in any part of the canal, but much more often in its lower parts. *Pathological structure* of the cyst depends on its localization. In the upper section of the canal (closer to the nasal cavity), the cysts are lined with a cylindrical or shimmering epithelium, in the lower sections — with multi-layered flat.

*Clinic.* The nasal cyst is located between the central incisors. Cyst growth is slow, painless. With an increase in its size, destruction of the palatine bone occurs in the anterior section, behind the intact central incisors, a hemispherical protrusion with clear boundaries appears. On puncture, clear liquid with cholesterol crystals can be found. The cysts can be inflamed.



Figure 12. Cyst of the incisive canal

*Radiographically*, in the area of the site where the incisive foramen should be located, the center of bone tissue destruction with clear boundaries, rounded in shape, located strictly along the midline is determined. The intact roots of the incisors are projected onto it with the periodontal gap preserved (Fig. 12).

When conducting a **differential diagnosis** with a radicular cyst, it is necessary to determine on the radiograph the presence or destruction of the periodontal gap of the tooth, which is projected onto the cyst. The latter indicates an existing radicular cyst. The final diagnosis is established after histopathological examination.

**Treatment:** cystectomy with preservation of the central incisors, but in the preoperative period endodontic treatment of the latter is carried out.

**Globulomaxillary cyst** (intramaxillary, spherical — maxillary) is localized between the intact lateral incisor and the canine of the upper jaw. It is formed from epithelial cells at the junction of the frontal (*processus globularis*) and the maxillary (*processus maxillaris*) facial embryonic processes. The sheath is thin, containing flat cubic and cylindrical epithelium (Fig. 13, *a*).

The clinic is similar to other cysts, but it can grow into the nasal cavity or the maxillary sinus. The inflammation is rare. The contents of the cyst are clear liquid with cholesterol crystals. Diagnosis is complicated if the lateral incisor or canine is destroyed (periodontal), in this case the differential diagnosis with a radicular cyst is carried out.

**Treatment:** cystectomy with tooth preservation; endodontic treatment in the preoperative period (Fig. 13, *b*).



Figure 13. Globulomaxillary cyst:  
*a* — condition before cystectomy; *b* — condition after cystectomy

**Nasoalveolar cyst** (nasolabial cyst of the nasal vestibule). This congenital soft tissue cyst is localized in the region of the upper lip between the canine and the lateral incisor. It develops from the remnants of the embryonic epithelium on the border of three embryonic processes, i.e. frontal, external nasal and maxillary. The cyst sheath is lined with flat, cubic, transitional or ciliated epithelium.

**Clinic.** The cyst size increase causes deformation (depression) of the outer cortical plate. It is palpable as a sedentary, elastic protrusion of a rounded shape with clear boundaries and disconnected with the surrounding tissues in the area of the nasolabial sulcus under the base of the wing of the nose (Fig. 14).

There may be a narrowing of the entrance to the nose. Its content is clear, yellowish, somewhat viscous, liquid with cholesterol crystals. **On X-ray**, the cyst is extraossal and cannot be detected on the roentgenogram, in some



cases small rounded enlightenment (due to the deepening) of the bone tissue at the site of the cyst is determined. The teeth in the cyst zone are intact. *The diagnosis* is specified during surgery.



Figure 14. Nasopalveolar cyst

### NON-EPITHELIAL BONE CYSTS

**Aneurysmal bone cyst (ABC).** According to WHO, ABC is a benign tumor with an osteolytic pattern of spread, consisting of spaces of different volume, filled with blood and separated by connective tissue septa. Aneurysmal bone cyst is in fact pseudocyst because it is not lined with epithelium. 12 % of this pathology affects the head and neck, 2 % specifically the jaw bones. Most often, the lower jaw bone is affected. Pathology often affects the body, branch, and region of the angle of the mandible, and is less common in the condylar and coronary processes, occurs in patients under 20 years old, and is not characterized by any gender predisposition.

*The etiopathogenesis* of tumor may be post-traumatic, inflammatory or genetic in nature. The growth may also occur as a result of dilatation of the local vascular network due to an increase in venous pressure caused by local disorders of the circulatory system.

*The ABC clinic* is quite changeable: sometimes the cyst is small, asymptomatic, does not cause any symptoms, but sometimes begins to grow rapidly, destroying the surrounding bone tissue, causing deformation of the face profile, pain, swelling, and perforating the area of the cortical plate. *The X-ray* picture of the ACT can also vary: the structure of the tumor can be either single-cell or multi-chamber, while an osteolytic expansion of the formation is observed with the thinning of the surrounding bone tissue (Fig. 15).

*Histologically*, ABC consists of a multitude of sinusoidal spaces filled with blood, surrounded by a fibrous stroma, in which giant osteoclast-like giant cells and osteoid tissue can be found. A different number of inclusions of hemosiderin may be detected. A solid form, in contrast, consists of a dense stroma with very small vascular spaces, including also a small number of vessels and blood cavities. The mixed form of ACT includes the histological features of the two aforementioned forms of pathology.



Figure 15. Aneurysmal cyst of the large mandible in a 10-year-old patient

**Treatment.** The size, topography, and prevalence of the cyst determine the amount of necessary intervention, which can vary from conventional curettage to extended resection. Also, when choosing a method of treatment, the patient's age and the aggressiveness of the lesion are taken into account. Aneurysmal cysts are also characterized by a high level of recurrence.

### **SOLITARY BONE CYST (TRAUMATIC, HEMORRHAGIC)**

A characteristic feature of the structure of these cysts is that they lack not only the epithelial lining of the sheath but also the actual connective tissue sheath. They represent the brush-like cavities in the jaw bones, made with a straw-yellow liquid or without any content at all.

**Pathogenesis of traumatic cysts.** The theory of traumatic genesis is dominant with the greatest number of supporters. According to it, a bone injury causes bleeding in the bone marrow. If the bone marrow hematoma is not absorbed, resorption of the bone beams occurs with the subsequent development of a cyst.

**Clinic.** Such cysts are observed more often in young men. They are usually localized in the lower jaw, are asymptomatic or manifest by deformation of the jaw, are rarely suppurate. On the X-ray, a homogeneous rarefaction of the bone is found, round or oval in shape, with even sharp edges. For large cysts, their upper boundary arises into the interdental spaces. If the roots of the teeth are projected onto the center of enlightenment, it is usually possible to trace the periodontal gap; the pulp of teeth remains intact.

**Traumatic** cysts should be differentiated with cystic forms of osteoblastoclast and adamantine, as well as with primordial cysts.

*The diagnosis* of a traumatic cyst can usually be established only during the operation on the basis of the absence of a cystic membrane. Surgical treatment involves the simple opening of the cystic cavity, followed by suturing the wound tightly. The blood clot formed in the cavity leads to further bone regeneration in the cyst area.

## TEST QUESTIONS

1. What is the classification of jaw cysts used in practical work of maxillofacial surgeons and dentists.
2. List the methods for diagnosing jaw cysts.
3. Give the definition of a cyst.
4. Name the structure of the sheath of the cyst.
5. Name the types of odontogenic cysts of inflammatory genesis.
6. Name the types of odontogenic cysts developing in the process of dysontogenesis.
7. What are the possible options for the surgical treatment of cysts of the jaws, the indications for them.
8. Identify the characteristic clinical signs of a root cyst.
9. Specify the growths with which the differential diagnosis of cysts of the jaws is required.
10. Name non-epithelial bone cysts.

### Answers to test questions:

1. Classification of odontogenic tumors according to Yermolaev (1964), clinical and morphological classification of tumors and tumor-like formations.
2. Clinical data, radiological and morphological diagnostics.
3. A cyst is understood as an “abnormal” space inside the lining of the epithelium.
4. The outer layer is the connective tissue, the inner layer is the epithelium, between them there is a lesion.
5. Radicular, tooth-containing, paradental.
6. Follicular, primary, cyst of the incisal canal (naso-palatine), globulomaxillary (fissural) cyst, cholesteatoma.
7. Cystotomy — Parch 1, cystectomy — Parch 2.
8. When the cyst is small in size, the process is asymptomatic, with a large size, deformity of the alveolar process, Dupuytren symptom, convergence of dental crowns associated with the cyst. In inflammation there appear corresponding signs.
9. The differential diagnosis of cysts of the jaws is required with other cyst types as well as with cystic forms of tumors of the jaw bones (ameloblastoma, osteoblastoma).
10. Aneurysmal, traumatic, hemorrhagic.

## CASE STUDIES

**Case 1.** A 54-year-old man turned to a dental surgeon to resolve the issue of implant placement, wanted to replace the existing orthopedic structures. An orthopantomogram (OPG) available. During external examination without pathological changes. Regional lymph nodes not palpable. The mouth opens in full. Palpation of the lower jaw did not reveal its deformation, oral mucosa was pink, moist, without pathological elements. Orthognathic bite. Dental rows are made of non-removable metal structures.

The OPTG shows a focus of bone tissue destruction, with clear even boundaries, associated with the tips of the roots of the tooth 47. The tooth 47 has been previously treated endodontically. The buccal canals are sealed to 1/2 the length of the root. Buccal roots protrude 1/2 to the cyst cavity. The size of the cyst is  $1.5 \times 2.0$  cm.

### **Questions:**

1. Suggest a clinical diagnosis.
2. Specify the complications that are possible with the further course of the disease.
3. Specify other additional and appropriate examination methods.
4. Offer a method for the treatment of identified pathology.

### **Answers:**

1. Radicular cyst of the lower jaw on the right in the area of the tooth 47.
2. Traumatic neuropathy of the third branch of the trigeminal nerve on the right, pathological fracture of the lower jaw body on the right, suppuration of the radicular cyst.
3. Cone-beam computed tomography (CBCT).
4. Tooth extraction 47, cystectomy on the lower jaw on the right.

**Case 2.** A man, 30 y.o. turned to a dental surgeon about the displacement of the medial incisors of the upper jaw. OPTG was available. External examination without pathological changes. Regional lymph nodes are not palpable. The mouth opens in full, the oral mucosa is pink, moist, without pathological elements. Palpation of the upper jaw did not reveal its deformation. Orthognathic bite. The OPTG is a center of bone tissue destruction between the roots of the teeth 11 and 12, with clear even borders, 1.5 cm in diameter. The teeth 11 and 21 are intact.

### **Questions:**

1. Suggest a clinical diagnosis.
2. Specify the complications that are possible with the further course of the disease.
3. Suggest additional survey methods.
4. Offer a method for the treatment of identified pathology.

**Answers:**

1. Cyst of the nasolabial (incisal) canal.
2. Suppuration of the cyst.
3. Cone-beam computed tomography (CBCT), conducting electrical donor diagnostics (EDI) of teeth 11 and 12.
4. Cystectomy with endodontic dental treatment in the preoperative period.

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