

Oral cavity and pharynx

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Comments on embryology of the oral cavity and pharynx

The development of face starts in the 5th week of intrauterine development. The first element of the oral cavity is the stomodeum coated by the ectoderm. Caudally, it is limited by the lower processes of the mandible arches which grow together in the middle line into the base of the mandible. Cranially, the frontal fornix is wide; on sides there are maxillary processes for the upper jaw. Above the frontal fornix, there are placodes formed from the ectodermal olfaction. The ectoderm proliferates and forms a thick septum which connects olfaction sockets with the stomodeum. It gradually disintegrates and on its place is inserted the mesenchyme which forms primary palate. From ectodermal septum remains only a two-layered oronasal membrane and this membrane divides in the dorsal part nasal vesicles from the primitive oral cavity. In 38th -40th day cells of this membrane perish and primitive choanas are formed.

Maxillary processes grow medially around the lateral edges of the nasal fornices and surround the primitive oral cavity with medial nasal fornices. The biggest part of the upper jaw and lip develops from the mesenchyme with the exception of interjaw segment; this one is formed from the mesenchyme of the medial nasal fornices and forms the philtrum – the part of jaw with incisors and the primitive palate.

The primitive oral cavity is opened by the primitive mouth entrance and the nostrils it is placed directly on the base skull. The bottom is formed by the oropharyngeal membrane which ruptures at the end of the 3rd week and merges with the ventral wall of the pharynx. After this rupture, the oral cavity and the pharynx are formed. The mesodermal palatal

plates grow from the processes for the upper jaw in the 6th week; they grow at first caudally with the tongue descended have horizontal position. Plates meet in the middle line, but grow together in the 9th week. The uvula is formed from the uvular processes which grow together. The hard palate is formed by the ossification of maxilla and the ossification of the frontal part of the palate. The dorsal part of the palate stays as a soft palate and forms the uvula.

With the end of the development of the definitive palate, the primitive oral cavity is divided into the definitive oral cavity and the nasal cavity which is divided from the beginning into the left and the right half. Fossa tonsillaris coated with the entoderm is formed from the 2nd branchial evagination, which gets smaller. The entoderm in fossa tonsillaris proliferates into the surrounding mesenchyme by processes which form the bases of tonsillar crypts. Nodes of lymphatic tissue are formed along these crypts in the 5th embryonic month. This development continues even after the birth, mostly in the first 6 months. The embryonic pharynx is meatusodorsally flat funnel, extended in the frontal plane, caudally narrowing into the esophagus. On the sides there are ectodermal branchial evaginations; against them there are ectoderm-coated branchial sulci. Between the ectoderm and the entoderm stays a thin layer of the mesenchyme and from the epithelium of the branchial evaginations, branchiogenic organs are formed.

The tongue develops in the 4th week from several elements. Tuberculum impar evolves on the inner face of the ventral wall of the primitive pharynx medially before the foramen caecum. On its sides, paired lingual lateral tuberculi develop from the mesenchyme of the 1st branchial arch. Those 3 elements of tongue merge together. It grows cranially and frontally and form the dorsum and the apex linguae, which includes frontal 2/3 of the tongue (innervation n.mandibularis, taste – chorda tympani). Radix linguae is formed from the mesenchyme of the 3rd and the 4th branchial arch (innervation n. glossopharyngeus). After the birth, sucklings have filled the oral cavity with the tongue. The tongue touches the hard and the soft palate and the mucosa of cheeks and it does not have an apex. This tight contact is very important during the suction. As the child grows and the teeth develop, the tongue gains same role as in adults.

Tonsilla pharyngea is formed on the craniodorsal wall of the pharynx in the 6th month from the entodermal epithelial plugs in the form of mucosal plicae. Lymphocytes penetrate into those plicae. In the 8th month, tonsilla lingualis in the radix linguae is similarly formed.

Salivary glands are formed as solid cellular buttons; they grow from the primitive oral cavity into the surrounding mesenchyme. Large salivary glands are formed sooner than small ones in the 2nd embryonic month. Glandular differentiation is the same. Button formations lengthen, branching dichotonically on the basics of ducts; their endings are differentiated into acini. From surrounding mesenchyme, the fibrous intersticium and the capsule of gland are formed. First months after the birth, salivary glands are relatively small with small salivary production. This is no problem for suckling. With the growth of teeth and food change, the glands enlarge and produce a sufficient amount of saliva.

Clinical anatomy of the oral cavity and nasopharynx

Oral cavity

Its borders are formed by the lips, the base of the oral cavity, the hard and the soft palate and the plane of the anterior palatal arches. It continues towards the oropharynx through the isthmus faucium (pharyngeal entrance, formed by palatal arches with tonsils, soft palate with uvula and base of tongue). In the oral cavity there is spinocellular uncornificational epithelium. In some parts, there is periosteum (processus alveolares, hard palate). In oral cavity, there are multiple subepithelial small salivary glands.

- Vestibulum oris is a space between the lips and the face on one side and processus alveolares and teeth on the other side.
- Tongue – we divide it into: base, body, apex, dorsum and lateral edges. Under apex there are plica sublingualis and caruncula sublingualis where there are located the openings of the submandibular and sublingual glands.
- Base of oral cavity – is formed especially by m.mylohyoideus
- Glandula parotis opens in the face mucosa in the level of the 2nd molar tooth by the ductus parotideus (Stenoni)
- Glandula submandibularis and sublingualis open under the tongue (Whartin's duct), gl.sublingualis can have a separated duct (Bartolini)

Vascularization

- Arterial:

A.carotis externa – a.lingualis, a.sublingualis, a.facialis

A.maxillaris – a.pharyngica superior, a.palatina inferior

- Venous:

Venous drainage to v.facialis through veins of same name, to v.jugularis interna through pterygoideal plexus. Clinically important is the connection through the plexus pterygoideus to the sinus cavernosus.

- Lymphatic

Drainage through submental, submandibular and parotidal nodes to the string of nodes along v.jugularis interna. Lymph drainage forms the base of the oral cavity and the tongue can be homolateral and even contralateral

Innervation

- Tongue

Motoric: n.hypoglossus

Sensitive: anterior part of n.lingualis, posterior part of n.vagus

Sensoric: n.glossopharyngeus, n.lingualis (posterior third), chorda tympani (anterior two thirds)

- Base of oral cavity

Motoric: n.mandibularis

Sensitive: n.trigeminus

- Muscles

Motoric: mastication muscles - n. mandibularis, mimic muscles – n.facialis

- Salivary glands

Parasympathetic – n.VII – chorda tympani – ggl.submandibulare (gl.submandibularis, submental), n.IX – n.tympanicus – n.petrosus minor – ggl.oticum (gl.parotis)

Sympathetic – plexus carotideus

- Temporomandibular joint

N.mandibularis, n.auriculotemporalis

Pharynx

- **Nasopharynx** – the superior part is formed by the nasopharynx vault, which is connected to the skull base (sphenoidal bone). The posterior wall is formed by the mucosa, submucous tissue and muscles laying on neck spondyles. In nasopharyngeal vault there is lymphoepithelial tissue in children – tonsilla pharyngea. The lateral wall is formed by the cartilage of torus tubarius, here is opened ET (connect nasopharynx with the middle ear). Dorsally from torus tubarius, there is a shallow fossa Rosenmulleri. The lateral and dorsal nasopharyngeal wall goes dorsally to the lateral and the dorsal oropharyngeal wall. It is formed by mucosa, submucous tissue and muscles of neck. The anterior wall of the nasopharynx is formed by choanas and the soft palate. On the dorsal wall of the nasopharynx, there can be persistent bursa pharyngea. In the nasopharynx, there is the ciliary epithelium, on the way to mesopharynx it is changed into a multi-layer flagstone epithelium.
- **Oropharynx** – it is an oral part of the pharynx – a space formed by the pharynx entrance (anterior) – isthmus faucium, wall from mucosa, submucous tissue and muscles laying on neck spondyles (posterior). The lateral wall is near the big vessels and nerves. Cranially it goes to the nasopharynx, caudally to the hypopharynx - they are divided by the upper edge of epiglottis.

- **Hypopharynx** – the laryngeal part of the pharynx, lateral and posterior walls have the same structure as the walls of the mesopharynx – the space from the upper edge of the epiglottis to the lower edge of the ring cartilage. On both sides along the pharynx there are mucosal evaginations – recessus piriformes, which are opened during swallowing. Mucosa is formed by spinocellular epithelium

Vascularization

- Arterial – a.carotis externa
- Venous – v.facialis, v.jugularis interna, plexus pterygoideus
- Lymphatic – retropharyngeal nodes, deep neck nodes, paratracheal nodes

Waldeyer's circle

It is formed by lymphatic tissue in pharynx and larynx:

- Tonsilla pharyngea – in nasopharyngeal vault
- Tonsillae tubariae (Gerlachi) – in fossa rosenmulleri
- Tonsillae palatinae – between palatal arches, they are divided from pharyngeal muscles by fibrous capsule
- Tonsilla lingualis – on the base of the tongue
- Lymphatic tissue in the pharyngeal wall – on the dorsal and lateral walls
- Lymphoepithelial tissue of meatusriculus laryngis Morgansky

Tonsils of Waldeyer's circle are established embryonally, in childhood they can be enlarged as a result of developing immunity (especially in the first 6 years of age) as well as a result of recurrent infections. Lymphatic tissue of tonsils evolves after adolescence.

Innervation

- Motoric: n.glossopharyngeus, n.hypoglossus, n.vagus
- Sensitive: n.trigeminus, n.maxillaris, n.glossopharyngeus

Comments on the anatomy and physiology of salivary glands

Salivary glands are located in maxillofacial area and their ducts open into the oral cavity. We differentiate 3 big paired salivary glands (gl.parotis, submandibularis, sublingualis) and unpaired, small accessory glands (about 700) in mucosa of oral cavity and pharynx.

Glandula parotis

The biggest of the salivary glands lies in fossa retromandibularis; it is located subcutaneously and have fibrous capsule (fascia parotidea), which is the strongest on the lateral side, medially the capsule is not whole. The gland cranially reaches the zygomatic arch, caudally goes about 1-2 cm under the mandible angle to the m.sternocleidomastoideus, ventrally goes to the edge of the ascending branch of the lower jaw, dorsally reaches the meatus acusticus externus. The main duct – ductus parotideus Stenoni – is about 57 cm long; it goes from the ventral part of the gland, through m.maseter, penetrates m.buccinator and facial mucosa. It opens in mucosa on the level of 2.molar tooth as a papilla parotidea. Clinically important is the relation of the gland to the facial nerve. N.facialis leaves the base skull through foramen stylomastoideum and enters the glandular parenchyma as a short stem (0,5 - 1,5 cm in adults). It divides into 3 braches which can have mutual anastomoses and form plexus parotideus. We differentiate terminal temporofrontal, zygomaticobucal and cervical branching. The frontal branch and ramus marginalis mandibulae do not have usually any anastomosis, otherwise the course of branches is very variable. Medially from the nerve fan (which divides the gland into the surface and the deep part) lie branches of a.carotis externa providing the gland with blood (a.maxillaris, a.retroauricularis,a.transversa faciei). Venous drainage is into v.jugularis interna. Lymphatic nodes (located intraglandularly and periglandularly) drain the lymph through submandibular lymphatic nodes or directly into the deep upper lymphatic nodes. Histologically, it is a serous gland; secretion cells form acini. N.facialis innervates the mimic muscles of the face and the m.platysma.

Glandula submandibularis

It is located in the trigonum submandibulare, surrounded by m.bimeatuser, ligamentum stylomastoideum and mandible. The main part of the gland lies caudally from m.mylohyoideus; it is covered by neck fascia. Its ductus submandibularis Whartoni is about 5-7 cm long, goes under mucosa of the oral cavity base ventrally and opens near frenulum linguae in caruncula sublingualis. Near gland goes ramus marginalis mandibulae n.facialis (between the upper part of gland and the mandible), n.lindualis and n.hypoglossus, which must be spared during surgery on this gland. Vegetative innervation – n.lingualis. The gland is histologically mixed with serous and mucinous secretion cells.

Glandula sublingualis

The smallest paired salivary gland lies under the mucosa of the oral cavity base in plica sublingualis, dorsally from frenulum linguae, it touches the anterior part of submandibular gland. Posterior group usually have separated ducts on carunculae sublinguales. Vegetative innervation – n.lingualis. The gland is histologically mucinous.

Small salivary glands

They are located in mucosa of mucinous oral cavity; mucinous density is variable; they are marked according to localization (e.g. gl.labiales, gl. buccales, gl.palatines, gl.linguales posterior et laterals). We can find them in the oral cavity mucosa, in the inner side of lips, on the palate, inside the mucosa of cheeks, pharynx, tongue, paranasal sinuses and larynx. They produce about 5-8% of all saliva, but in case of damage or removal of several big salivary glands they are able to maintain sufficient humidity of mucosa. Small salivary glands are usually mucinous, serous are only Ebner's glands around papillae of tongue.

Function of the salivary glands

Saliva production is stimulated by physical, chemical and psychic factors. Salivary glands in sucklings are small and produce only a limited amount of saliva. With change of food they start to enlarge and produce a bigger amount of saliva. After 24 hours, about 1-1.5 liters of mixed saliva is produced in adults. Saliva is colorless or whitish viscid fluid composed of 99,5% of water and 0,5% of organic, inorganic and cellular substances. In saliva viruses are excreted in viremia, also metals, microelements etc. The proportion of particular glands on saliva production is variable (the biggest amount is formed in submandibular glands – over 50%). Saliva production can be influenced pharmacologically (e.g. pilocarpine).

- Xerostomia (sicca syndrome): dryness of oral cavity mucosa caused by insufficient saliva production – in case of dehydration, after irradiation, disease of salivary glands, central affliction of autonomous nerve system of salivary glands, in Sjörgeń's syndrome.
- Sialorrhoea – excessive saliva production – e.g. during teeth eruption, psychological factors
- Ptyalism- increased saliva efflux (ptyalismus gravidarum) – can be pathological e.g. in case of neurologic diseases (epilepsy, morbus Parkinson)

Saliva function:

- Digestion – pestle food, moisten mucosa of the oral cavity, starts digestion with ptyalin, contains even lipolytic and proteolytic enzymes.
- Teeth protection – with help of enzymes and mechanically removes rests of food, with fluorine helps maintain the teeth enamel, participate in the teeth plaque formation.
- Taste – taste calyces
- Immunological defense – antiinfectious function – contains bactericide and bacteriostatic substances (lysozyme, properdine, immunoglobulins – especially IgA)
- Substances excretion from organism – I, Ca, Fe, Hg, Pb, As, alkaloids, halogens, coagulation factors, viruses (EBV, CMV, coxsackie, rubeola, poliomyelitis)

Examination methods of oral cavity and pharynx

Nasopharynx examination

- Posterior rhinoscopy – is performed by a small mirror and oral spatula. The mirror is guided behind the soft palate. We see choanas, torus tubarius, tonsilla pharyngea.
- Epipharyngoscopy – endoscopic examination through the nasal or oral cavity

- Palpation –now in anesthesia with finger through oral cavity into nasopharynx
- Imaging methods – CT, MRI, X-ray (nasopharynx can be seen on the lateral projection of the skull), angiography

Oral cavity and mesopharynx examination

- Sight – lips, circumoral area, tongue, salivary glands openings, gingival, teeth. In mesopharynx assessed are pharyngeal hilum, symmetry of arches, mobility of soft palate. We describe mucosa, its surface, color and roughness. During examination of tonsils we describe their size, symmetry (asymmetry is suspected from tumor), color and surface. Considerably increased tonsils can touch themselves in the middle line. Physiologically tonsils have a smooth surface and pink color with jagged crypts. If we press on the anterior palatal arch, healthy tonsil is medially luxated with ease, afflicted one stays in bed. Necessary for examination is the artificial light and a solid spatula.
- Palpation
- Imaging methods – USG, X-ray, CT, MRI
- Sialography – examination of salivary glands with contrast fluid

Hypopharynx examination

- Indirect hypopharyngoscopy – examination by the laryngoscopic mirror. It is advantageous to pull out the tongue from mouth. We examine the structures of the hypopharynx and the larynx in reversed picture - the base of tongue, epiglottal valleculae, epiglottis, arytenoid tubers in dorsal part of the laryngeal entrance, recessus piriformes laterally and dorsally which verge into the esophagus. Recessus piriformes is physiologically without content, in case of esophagus impassability we can see saliva lakes.
- Direct hypopharyngoscopy – necessary is premedication and local mucosal anesthesia, in children usually general anesthesia and hospitalization. A metal tube is guided through the oral cavity while the head is bent deeply backward. We see structures in direct picture.
- Imaging methods – X-ray, CT, MRI

Salivary glands examination

- History: general state of the patient, clinical findings, epidemiological relationships, change and growth speed of formations, pain
- Findings according to age:
- Neonates – often congenital lymphangiomas, hemangiomas

- Scholl age – parotitis epidemica (mumps – even in adolescents), recurrent parotids (morbus Payen)
- Middle age – adenomas, sialoadenomas. The number of malignant tumors is increased with age.
- Sight and palpation: asymmetry of face, edema, erythema, displacement of auricle, changes on skin, size and character of swelling, mobility of formation, function of n.facialis, sensitivity on pressure. In oral cavity: character and erythema of salivary glands openings, amount and character of saliva flowed out of salivary ducts during compression, concretion in Whartin's duct.
- Imaging methods
- USG - used to be the first imaging method
- X-ray – can prove only contrast stone
- Sialography – X-ray with contrast fluid application into salivary gland duct. It is made in two mutually perpendicular levels. Application of contrast is made by catheter inserted into duct. It is possible to make CT after contrast application.
- Scintigraphy – salivary glands can accumulate particles of intravenously administered isotopes. Technecium 99 is used and its distribution in gland is recorded on special camera.
- CT
- MRI
- Biopsy: fine needle biopsy can give knowledge for surgical intervention indication.

Congenital defects of oral cavity and pharynx

Cleft defects

- Cheilognathopalatostaphylouvuuloschisis – split of the upper lip, upper jaw, palatal bone, soft palate and uvula

Split can be unilateral or bilateral, total or partial. It is genetically conditioned and treated surgically. Necessary is a tight cooperation of plastic surgeon, ENT specialist and phoniatician.

Defects of tongue

- Split of tongue – rarely found, together with palatoschisis

- Frenulum linguae breve – movement restriction of the tongue because of sublingual frenulum (suction in neonates, speech in older children). Therapy is surgical – frenulectomy.
- Macroglossia – in M.Down, hypothyreosis, acromegaly. We must exclude congenital tumors (hemangioma, vascular anomalies, neurofibromatosis)
- Accessory thyroid gland of tongue – it is more frequent in girls in case of not descending or not obliterating ductus thyreoglossus. Can be without symptoms, sometimes can be the accessory gland the only functional thyroid gland. Diagnostics: scintigraphy, endocrinological and ENT examination

Adenoids and hypertrophy of palatal tonsils

Adenoids

Definition: pathologic tonsilla pharyngea

Etiology: genetic predisposition, nutrition, immune system

Pathophysiology: hypertrophy of lymphatic tissue restricts nose breathing and that is why it can lead to airways infections. Obstruction of ET orifice decreases its function which can lead to middle ear inflammation. Chronic inflammation of lymphatic tissue can cause recurrent local and distant infections.

Symptoms:

Caused by restricted nose patency:

- mouth breathing
- snoring
- recurrent infections of airways and middle ear
- development disorder of facial skeleton
- facies adenoidea – face with open mouth and without nasolabial sulci
- enuresis nocturna – centrum of urination is stimulated during night due to hypoxia

Caused by chronic infection of lymphatic tissue:

- bacterial superinfection in viral infections of airways and middle ear
- distant (focal) infection: damaged tissues and organs by antigen-antibody complexes (joints, kidneys, heart, skin, eyes, ...)

Diagnostics:

- history: adenoid have all children (excluding those after adenotomy, however, recurrences are possible)
- examination of nose and nasopharynx (endoscopy)

Therapy: adenotomy

Hypertrophy of palatal tonsils

Definition: lymphatic tissue hypertrophy of palatal tonsils, which overreach palatal arches. Possible is coincidental chronic inflammation (tonsillitis chronica hypertrophica)

Etiology: genetic predispositions, nutrition, immune system, age (mostly in 6-7 years of age)

Symptoms:

- OSAS (obstruction sleep apnea syndrome) causing apneic pauses (due to relaxation of pharyngeal muscles), child repeatedly wake up and fall asleep
- Mouth breathing
- Snoring
- Damaged development of facial skeleton (gothic palate, occlusion disorder)
- Enuresis nocturna – centrum of urination is stimulated during night due to hypoxia
- distant (focal) infection: damaged tissues and organs by antigen-antibody complexes (joints, kidneys, heart, skin, eyes, ...)

Diagnostics: history, mesopharynx examination, nasopharynx examination, examination in sleep laboratory

Therapy: tonsillotomy in case of simple hypertrophy, tonsillectomy in case of coincidental chronic tonsillitis

Inflammations of oral cavity and pharynx

Inflammations of oral cavity**Angulus infectiosus**

Definition: fissures in labial angle

Etiology: bacterial or mycotic infection

Diagnostics: local finding, microbiological examination

Differential diagnostics: sideropenic anemia, decreased stamina of organism, diabetes mellitus in adults or lip carcinoma

Therapy: local therapy with silver nitrate 2-5%, ATB locally

Stomatitis aphtosa

Definition: vesicles with red rim (aphthae) on oral cavity or tongue mucosa. They break up and cause mucosal defect covered by fibrin film.

Etiology: unknown

Symptoms: elevated temperature or fever in first 2-3 days, child doesn't want to eat

Diagnostics: local finding

Differential diagnostics: histiocytosis X, bowel parasites

Therapy: vitamins, analgetics, gentian violet, chamomile, accented hygiene of the oral cavity, in recurrent or chronic forms ATB is recommended because of bacterial infection risk.

Thrush

Definition: small or large coating on buccal mucosa, tongue, soft palate, arches and tonsils

Etiology: most frequently Candida

Pathogenesis: in sucklings and children with depression of the immune system, insufficient hygiene of the oral cavity

Diagnostics: local finding

Therapy: gentian violet, chamomile, in more extended forms antimycotic therapy according to cultivation results

Herpes simplex

Definition: vesicles on the lip or mucosa of oral cavity, crusts are forming

Etiology: virus herpes simplex

Pathogenesis: in case of immune system depression (fevers, infectious disease, exhaustion, etc.), it last about 1-2 weeks. It is the most prevalent viral disease, up to 90% of population are carriers of the virus.

Symptoms: pain

Diagnostics: local finding

Therapy: zinc unguent, Zovirax ung., or Zovirax p.o. in case of extensive infection or if generalization menace.

Complications: herpetic meningitis

Herpes zoster

Definition: fast forming vesicles along nerves (e.g. branch of n. trigeminus), causes surface fibrous-epithelial defects

Etiology: virus herpes zoster

Symptoms: very painful disease, rare in children

Diagnostics: clinical finding – typical segmental course, or serologic examination

Therapy: Zovirax, vitamin B group, analgetics, ATB in case of bacterial superinfection

Noma oris

Definition: progressing inflammation – wet gangrene, starting in lip angle and spreading laterally, cause a tissue necrosis

Pathogenesis: develops in children with severe malnutrition

Diagnostics: local finding, general state of child

Therapy: ATB, surgical removal of necrosis, vitamin supplementation (especially B and C)

Abscess of tongue base

Etiopathogenesis

Develops after penetration of infected foreign body into tongue or by infection spreading from singular tonsil, rare in children

Symptoms: restricted movement of tongue, strong pain with impossible food intake, fever

Diagnostics: history, local finding, USG

Therapy: surgical – incision and drainage of abscess, parenteral nutrition, wide spectrum parenteral ATB. It is life threatening disease.

Angina Ludowici

Definition: flegmon of oral cavity base

Etiopathogenesis: injury, foreign body, salivary glands infection

Symptoms: submental erythema, firm edema, pain

Diagnostics: history, local finding, USG

Therapy: surgical – incision, parenteral nutrition, wide spectrum parenteral ATB

Inflammations of pharynx

Acute inflammation of pharynx

Tonsillopharyngitis acuta

Definition: inflammation of mucosa and lymphatic tissue in the pharynx

Etiology: respiratory viruses, possible bacterial superinfection

Course: they occur through the whole year. It spreads usually air-borne, incubation time is 2-4 days.

Symptoms: Pain in the throat, dysphagia, odynophagia, fever, flu, cough, swelling of regional lymphatic nodes

Diagnostics: mesopharynx examination, erythema and edema of mucosa and lymphatic tissue of tonsils

Therapy: analgetics, NSAIDs, ATB in bacterial superinfection

Tonsillitis acuta purulenta

Definition: acute inflammation afflicting lymphatic tissue around pharyngeal opening

Etiology: bacterial (streptococcus beta-hemolyticus, staphylococcus, pneumococcus, haemophilus). Scarlet angina – beta hemolytic streptococci

Pathogenesis: decreased constitution of organism (cold, other diseases)

Symptoms: throat pain, fever (above 38°C), swelling of regional lymphatic nodes (most frequently Wood's nodes in mandible angle), dysphagia, odynophagia. In case of scarlet angina we can see maculopapulous exanthema in upper part of body, raspberry tongue (erythema and hyperplasia of papillae), vesicles near nails on hands. Skin on fingers can desquamate around 8th day if the disease is not treated or is treated too late.

Diagnostics:

- Lab tests: CRP, leucocytes, bacteriology, serology – scarlet exotoxin

- Mesopharynx examination: whitish coating of variable extent on palatal tonsils (tonsillitis lacunaris, follicularis, confluens)

Therapy: ATB (penicillin, cephalosporins, in case of allergy on previous ones macrolides). CAVE aminopenicillins – see mononucleosis. Scarlet fever – patient isolation.

Infectious mononucleosis

Etiology:

- Epstein-Barr virus
- Cytomegalovirus (less severe course)

Pathogenesis: infection is transmitted via mucosal contact (“kissing disease”) or air-borne. Often it is a collective infection. Incubation is 2-6 weeks.

Symptoms: usually asymptomatic, can be light flu, chronic fatigue syndrome. In more severe cases, there can be seen symptoms as in purulent tonsillitis with significant reactions of regional lymphatic nodes and possible hepatosplenomegaly.

Diagnostics:

- Mesopharynx examination, examination of the lymphatic nodes in axillae, groins, size of spleen and liver
- Lab test:
- leukocytosis with monocytes prevalence and cellular atypies
- Paul-Bunnell test, antigen examination – EBV, CMV (IgM – acute disease, IgG – infection in the past), liver test – often are increased (AST, ALT, LD)

Therapy: symptomatic, liver diet, hepatoprotective medication, tranquility (6 months without physical stress – rupture of spleen!). In case of secondary infection ATB (not aminopenicillins – cause toxoallergic reactions and liver damage). Corticosteroids only in the most severe forms.

Herpangina

Etiopathogenesis: coxsackie virus. Usually children of pre-school and school age in summer time. Incubation is 2-6 days.

Symptoms: fever with throat pain, loss of appetite, dysphagia, swelling of regional lymphatic nodes

Diagnostics: mesopharynx examination: on mucosa of pharyngeal hilum are vesicles with red rim, after rupture erosions develop.

Therapy: symptomatic: antipyretics, analgetics, local antiseptics, anesthetics, gentian violet. ATB only in case of secondary microbial infection.

Pharyngitis phlegmonosa

Etiopathogenesis: streptococcal infection after hypopharynx or esophagus injury by foreign body. Acute course with septic state, infection can spread into the larynx and the mediastinum.

Therapy: intensive parenteral application of wide spectrum ATB, parenteral nutrition until we assess extent of injury in swallowing pathways

Plaut-Vincent's angina

Etiology: Bacillus fusiformis together with Spirocheta buccalis

Symptoms: throat pain, elevated temperature, swelling of regional lymphatic nodes

Diagnostics: mesopharynx examination: gray-white coating of triangle shape in upper pole of tonsil, unilateral affliction

Therapy: ATB

Chronic inflammations of pharynx

Tonsillitis chronic

Definition: chronic inflammation of lymphatic tissue of the palatal or the nasopharyngeal tonsil

Etiopathogenesis: S.pyogenes, often result of acute tonsillitis

Symptoms: often asymptomatic. Scratching, burning in neck, dysphagia, odynophagia, stench from mouth, swelling of regional lymphatic nodes, recurrent infections of the respiratory airways (acute rhinosinusitis tonsillitis, etc.), otitis, metatonsillar complications (damage of distant tissues and organs: kidneys, joints, heart, eyes, skin, etc.)

Diagnostics:

- Mesopharynx examination: erythema of palatal arches, fixation of tonsils, hypertrophy and asymmetry of palatal tonsils, presence of plugs in tonsillar crypts
- Examination of nasopharynx: presence of plugs in nasopharyngeal tonsil, hypertrophy
- Lab tests: ASLO, bacteriology

Therapy:

- Adenotomy
- Tonsillectomy if patient has clinical problems or if complications occur

Pharyngitis chronica

Definition: chronic inflammation of the pharynx

Pathogenesis: functional disorders of mucosa, chronically acting exogenous noxious agents, chronic disease, state after tonsillectomy. It is more often in adults.

Symptoms:

- Pharyngitis chronica simplex – dry pharyngeal mucosa or on the contrary erythema with secretion increase, usually without fever
- Pharyngitis chronica hypertrofica (granulomatosa) – thickness, swelling of pharyngeal mucosa with prominences of islets or strips of lymphatic tissue, production of sero-suppurating secretion, which often irritates and forces cough (especially in the morning), sense of foreign body in the throat
- Pharyngitis chronica atrophica (sicca) – in children only exceptionally, rather in older, especially in women. Posterior wall of pharynx is dry, flat with senses of dryness and burning in throat, which forces repeated swallowing, often with sense of foreign body. Laryngitis sicca and atrophic rhinitis is often present as well.

Diagnostics: pharynx examination, bacteriology

Dif.dg.: specific pharyngitis, M.Sjögren, M.Plummer-Vinson

Therapy: symptomatic – fluids, inhalation, local antiseptics, antiflogistics, vitamins, immunostimulants, according to general state eventually ATB

Specific inflammations

Tuberculosis

Etiology: Mycobacterium tuberculosis, bovis

Pathogenesis: it is very rare in the oropharynx. Primary complex develops after the consummation of the infected food.

Symptoms: ulcers on the pharyngeal mucosa and the tonsils with affliction of the regional lymphatic nodes or sometimes with fistulae formation

Diagnostics: history, local finding, microbiology, serology, USG of lymphatic nodes, X-ray of chest, histology.

Therapy: antituberculous, therapy is controlled by pulmonologist

Lues (syphilis)

Etiology: Treponema pallidum

Pathogenesis: congenital or gained syphilis in suckling

Symptoms:

- Congenital lues:
- early symptoms: pseudomembranes of the pharynx and the palatal arches, radial Parrot's scars around the mouth, syphilitic coryza, painless enlargement of the regional lymphatic nodes
- late symptoms: Hutchinson's trias (barrel-like incisive teeth, parenchymatous keratitis, labyrinthitis)
- Gained lues:
- I.stage: tonsillitis with coating and lymphatic nodes swelling without fever
- II.stage: maculopapulous exanthema
- III.stage: gumma (destruction of the palate and the facial skeleton), lingua lobata – flat and grooved tongue

Diagnostics: history, local finding, serology (Bordet-Wasserman reaction)

Therapy: ATB, therapy is controlled by venerologist

Inflammatory complications of oral cavity and pharynx diseases

Abscessus intratonsillaris

It is formed by several deep suppurating follicles of the tonsil. It looks like a yellow formation of variable size.

Therapy: ATB, incision, dilatation, tonsillectomy

Phlegmona et abscessus peritonsillaris

Definition: infection of peritonsillar space (between the tonsil capsule and the pharyngeal muscles) during acute or chronic tonsillitis

Etiopathogenesis: inflammation spreads through the tonsil capsule into the surrounding space via fissures or along vessels. It is most frequent in 15-30 years of age. At first it has a character of phlegmon, in several hours abscess is formed.

Classification:

- Supratonsillar phlegmon or abscess in the upper pole of the tonsil (99%)
- Infratonsillar phlegmon or abscess in the lower pole of the tonsil
- Retrotonsillar phlegmon or abscess near the posterior palatal arch
- Symptoms: throat pain, dysphagia, odynophagia, fever, snuffing voice, difficult opening of the mouth (trismus caused by spasms of the chewing muscles), dyspnea in case of spreading into the larynx (infra and retrotonsillar phlegmon or abscess)

Diagnostics:

Mesopharynx examination: usually unilateral affliction, bilateral is exceptionally rare

- Supratonsillar phlegmon or abscess: asymmetry of the anterior palatal arches, bulge of the arch on the afflicted side
- Infratonsillar phlegmon or abscess: asymmetry of the tongue base, bulge on the afflicted side
- Retrotonsillar phlegmon or abscess: asymmetry of the posterior palatal arches, bulge of the arch on the afflicted side

Therapy: ATB, in case of abscess surgery

- Supratonsillar abscess :
- Tonsillectomy á chaud (in the day, when diagnosis is determined)
- Tonsillectomy á tied (after the treatment of acute state – after 1 week) with previous puncture, incision and abscess dilatation
- Tonsillectomy á froid (after several weeks) with previous puncture, incision and abscess dilatation
- Infra and retrotonsillar abscess:
- Tonsillectomy á chaud

Recurrences after paratonsillar abscess are in 10-30% and the only premeatusion is tonsillectomy.

Phlegmona et abscessus retropharyngealis

Definition: inflammation of the retropharyngeal space between the posterior part of the oropharynx and the paravertebral fascia

Etiology: most often *S.pyogenes*

Pathogenesis: in sucklings and toddlers, it is the most frequent infection spreading from surroundings (infection of the upper respiratory airways), in adults rather by injury of the pharyngeal wall by foreign body

Symptoms: life threatening, fever, snuffing voice, odynophagia, pharyngeal stridor (in inspiration and expiration), dyspnea, enlargement and pain of the regional lymphatic nodes, paramedical bulge of posterior pharyngeal wall.

Diagnostics: history, local finding, clinical state, CT, lab tests (CRP, leucocytes, FW)

Therapy: incision and abscess drainage (transoral or external approach), parenteral ATB, general stabilization (secure airways)

Complications: intracranial infection, mediastinitis

Phlegmona et abscessus parapharyngealis

Definition: soft tissue infection of parapharyngeal space out of the lateral wall of the pharynx

Etiopathogenesis: in tonsillitis, infection of airways. Infection spreads:

- Per continuitatem
- Via blood
- Via lymphatic system

Symptoms: swelling and edema of soft tissues on the neck, erythema, fluctuation in abscess, fever, dysphagia, odynophagia, dyspnea

Diagnostics: history, local finding, USG, CT, lab tests (CRP, leucocytes, FW)

Therapy: incision and drainage of phlegmona or abscess (transoral or external approach), parenteral ATB, general stabilization (secure airways)

Thrombophlebitis

Definition: inflammation of veins on the neck with partial or total thrombus obstruction

Etiopathogenesis: during tonsillitis or respiratory infections – hematogenous infection spreading. V.jugularis is afflicted most frequently. Affliction of v.facialis is described as a Lemier's syndrome.

Symptoms: swelling and edema of soft tissues on the neck, erythema, septic fever, strong pain along the vein

Diagnostics: history, local finding, USG, CT, lab tests (CRP, leucocytes, FW), microbiology

Therapy: anticoagulation with cooperation with hematologist (warfarin), ATB. Surgical intervention (resection of vein) if conservative treatment is unsuccessful. Infection source treatment (tonsillectomy, adenotomy)

Complications: intracranial infection, mediastinitis

Sepsis

Pathogenesis: bacteria or their toxins are present in the blood

- Sepsis tonsillogenes: septic focus is in palatal tonsil

Symptoms: septic fever, shake, weakness in acute tonsillitis

Diagnostics: history, local finding, leucocytes, CRP, positive cultivation from blood, sepsis

Therapy: tonsillectomy á chaud with the administration of a wide spectrum ATB

- Sepsis post angina: thrombophlebitis of neck veins after consolidation of suppurating angina

Symptoms: swelling and edema of soft tissues on the neck, erythema, septic fever, strong pain along the vein

Diagnostics: history, local finding, leucocytes, CRP, positive cultivation from blood, sepsis, USG, CT

Therapy: anticoagulation with cooperation with hematologist (warfarin), ATB. Surgical intervention (resection of vein) if conservative treatment is unsuccessful. Infection source treatment (tonsillectomy, adenotomy)

Complications: intracranial infection, mediastinitis

Metatonsillar complications

Definition: affliction of distant tissues and organs (most frequently: joints, kidneys, heart, eyes, skin) in chronic or acute inflammations of lymphatic tissue of Waldeyer's circle.

Etiology: beta-hemolytic Streptococcus

Pathogenesis: antibody formation against antigens from destroyed microbial cells. Complexes antigen-antibody are created.

Symptoms:

- Febris rheumatica – in children and adolescents. It appears after days or weeks after pharyngeal inflammation. Fever, joints pain, pathologic ECG.
- Nephritis – secondary streptococcal kidney disease. Appears 2-4 weeks after scarlet fever or streptococcal infection of tonsils.
- Affliction of heart, skin, eyes, etc.

Therapy: penicillin followed by premeatusive therapy by depot penicillin, tonsillectomy, adenotomy

Disease of salivary glands

Injuries of salivary glands

- Surface injury above salivary glands -suture in local anesthesia
- Injury of gland duct – reconstruction in case on injury of the main duct
- Salivary fistula –if main duct is intact, it usually closes itself. We restrict secretion by atropine. If it does not close, we must surgically extirpate the fistula.

Inflammations of salivary glands

Parotitis epidemica (mumps)

Etiology: paramyxoviruses

Symptoms: swelling of mostly glandula parotis with swelling and erythema of its duct. Simultaneously can be afflicted pancreas, testes, ovaria, CNS. Hearing can be irreversibly damaged due to neurotropy of the virus (unilateral or bilateral deafness). After disease is lifetime immunity.

Diagnostics:

- History: incubation time is about 20 days
- Serology: direct prove of virus is possible only at the beginning of the disease (saliva, urine, CSF)
- Amylase in blood and urine – maximum during 3.and 4.day.

Therapy: symptomatic – fluids, tranquility, analgetics, antipyretics, corticosteroids if orchitis is present

Complications: meningoencephalitis, hearing loss or deafness, orchitis, epididymitis

Cytomegalia of salivary glands

Etiology: cytomegalovirus (CMV)

Symptoms: possible kidneys, liver, lung and GIT affliction in case of generalized form in neonates and children till 2nd year of age. In adults, it has non-characteristic symptoms of infection, noticeable is great fatigue without apparent cause. In children, there are present swellings of salivary glands with cyst formations, in severe cases hepatosplenomegaly with jaundice, thrombocytopenia, hemolytic anemia, chorioretinitis.

Diagnostics: history, local finding, general state, serologic confirmation of antibodies

Therapy: symptomatic, immunoglobulins

Complications: psychomotoric and psychic retardation, affliction of written organs, death in neonates

Sialoadenitis acuta

Definition: bacterial inflammation of ascendant type from general and local causes.

Pathogenesis: onset in decreased saliva creation, decreased hygiene of oral cavity, diabetes decompensation, caries in teeth, sialolithiasis

Symptoms: swelling of the gland, erythema and swelling of its duct with discharge of small amount of turbid or suppurating saliva. Skin above the gland can be red, painful, in colliquation there is present fluctuation with possible spontaneous perforation.

Diagnostics: history, local finding, bacteriology

Therapy: wide spectrum ATB, increased fluids intake, vitamin C. Pilocarpine, increased hygiene of the oral cavity

Parotitis recidivans (M.Payen)

Definition: recurrent bacterial inflammation of mostly gl.parotis in children

Symptoms: unilateral painful swelling of the gland with decreased production of turbid and suppurating saliva. Recurrences usually stop after adolescence.

Diagnostics: history, clinical course

Therapy: ATB, removal of infectious focus (adenotomy, tonsillectomy, caries in teeth)

Sjögren's syndrome (myoepithelial sialoadenitis)

Definition: autoimmune disease, afflicts usually women

Symptoms: xerostomia, scleroderma, parotitis, keratoconjunctivitis sicca and atrophy of salivary glands

Diagnostics: immunology, biopsy

Therapy: frequent drinking of small amounts of water, saliva production stimulation, corticosteroids according to state

Mikulicz's syndrome

Definition: autoimmune disease, afflict usually women

Symptoms: atrophy of salivary glands

Diagnostics: immunology, biopsy

Therapy: frequent drinking of small amounts of water, saliva production stimulation

Sialolithiasis

Definition: stone or more stones in the duct or the salivary gland parenchyma of variable size

Symptoms: swelling and pain of submandibular gland occurs after meal because of obstruction in the duct

Diagnostics: history, palpation, USG, X-ray with contrast

Therapy: massage, surgery, ATB therapy in case of inflammation

Complications: abscess in the gland, phlegmona of the oral cavity base

Tumors of salivary glands

Benign

- **Ranula** – retention cyst – develops by obliteration of one of the small duct of glandula sublingualis. It looks like painless, mobile formation, usually contains fluid. It can restrict the tongue movement or can cause swallowing problems. Ranula can rupture itself.

Therapy: marsupialization or excision

- **Mucocele** – retention cyst of salivary gland in the oral cavity mucosa

Therapy: marsupialization or excision

- **Hemangioma** – endothelial proliferation in several months after the birth with followed regression in years. More frequent in girls.

Therapy: observation, corticosteroids

- **Vascular malformations** (lymphatic, venous, arterial) – congenital, they grow proportionally with the child

Therapy: embolization, excision, extirpation

- **Pleomorphic adenoma** –possibility of malignant change, recurrences

Therapy: excision, parotidectomy

Malignant

Malignant tumors in comparison with benign cause a duct destruction (noticeable in sialography), or paresis of nerves (n.VII). Probability of malignant tumor presence increased with decreased size of salivary gland (parotis – submandibularis – sublingualis – small salivary glands)

- **Rhabdomyosarcoma** – embryonal type in 2-5 years of age, alveolar in adolescents

Therapy: excision, chemotherapy

- **Mucoepidermoid carcinoma** – if surgical removed it has good prognosis

Therapy: excision, chemotherapy, radiotherapy

Tumors of oral cavity and pharynx

They are rare in children, benign are in 90%. Vascular tumors are present usually at the age below 6 years, odontogenous tumors in older.

Examination: history – change of size, pain, bleeding, inflammations, ulcers, speech, swallowing, breathing. Endoscopic examination, CT, MRI in large tumors. Biopsy.

Benign tumors

Hemangioma

It afflicts usually the lips, face and tongue. Mucosal hemangiomas are red, submucosal blue or violet. Small symptomatic hemangiomas have to be observed until involution. Larger can cause pain, bleeding or obstruction of breathing and swallowing – in this time is needed surgery.

Therapy: corticosteroids (30-60% respond), CO2 laser, interferon-alfa-2a

See also Hemangioma in Tumors and expansive processes in children

Vascular malformations

See Vascular malformations in Tumors and expansive processes in children

Others

Mucocele: painless, soft, flat formation on the tongue, oral cavity base, in vallecula it can cause obstruction of airways. Mucocele of oral cavity base is called ranula, it can spread on the external neck.

Therapy: excision or marsupialization

- **Squamous papilloma:** small, slowly growing formation on the palate, the tongue or the lips

Therapy: excision, recurrences are uncommon with the exception of rare oral papillomatosis

- **Dermoid:** usually in the ventral part of the oral cavity base (20% dermoids of the head and the neck)

Therapy: excision

- **Choristoma:** histologically normal tissue in uncommon localization (most frequently cyst with gastric mucosa on tongue or oral cavity base)

Therapy: excision

- **Desmoid (fibromatosis):** probably from muscular fascia, locally aggressive, often recurrences

Therapy: wide local excision

- **Lingual thyroid gland:** spherical red formation in middle plane between foramen caecum and vallecula. It causes dysphagia, dyspnea, dysphonia and sometimes bleeding. In 70% it is the only functional thyroid gland.

Therapy: autotransplantation

- **Epulis:** congenital tumor from granular cells – a hard submucous node

Therapy: excision

- **Neural tumors:** multiple neurinomas of lips and tongue in MEN 2a (together with pheochromocytoma, medullar carcinoma and hyperparathyroidism). Neurofibromas in patients with neurofibromatosis type I.

Malignant tumors

- **Rhabdomyosarcoma** is usually located on the tongue, soft palate or face. It expresses itself as a fast growing swelling often with bleeding and ulcers. In the time of diagnostics, metastases are usually present in the lungs and the bones. See also Rhabdomyosarcoma in Tumors and expansive processes in children
- **Other sarcomas:** most frequent fibrosarcoma, leiomyosarcoma, angiosarcoma, Kaposi's sarcoma. Usually develops large infiltrating submucous swelling with bad prognosis
- **Spinocellular carcinoma:** of the tongue, lips and palate develops in children on genetic base or in case of immunity defect e.g. after transplantation (no influence of tobacco and alcohol). Children tumors are more aggressive with worse prognosis than in adults.
- **Other tumors:** rare cases of neuroblastoma, melanoma, lymphoma, mucoepidermoid carcinoma, adenoid-cystic carcinoma, hemangiopericytoma

Therapy: radiotherapy 6 500 – 7000 cGy, prophylactic irradiation of neck lymphatic nodes, neck dissection, resection of residual or recurrent tumor. Adjuvant chemotherapy in case of dissemination. 5 years survival in children is 40%.

Injury of oral cavity and pharynx

Mechanical injuries

- punctured, cutting, gunshot

Pathogenesis:

- manipulation with sharp items
- fall of child on things in its mouth (pencils, toys, spoon)
- fall on sharp edge of furniture

Diagnostics: history, clinical examination (examination of teeth and jaw is necessary), eventually imaging methods

Therapy: mostly outpatient (ambulatory) – small wounds heal spontaneously, regimen precautions are sufficient (spoon food, chamomile). Larger wounds – suture of wound, according to type of injury administer antibiotics

Insect bite

Wasp or bee bite in this area is dangerous especially for possible great tissue edema or allergic reaction with respiratory problems

Therapy: calcium, antihistaminics, corticosteroids, observation is suitable for possible worsening of patient

Acid or alkali burn

Pathogenesis: drink of lye or acid caused by replacement of bottles, in small children out of curiosity

Symptoms: erythema, tissue coating, ulcers. Sometimes dysphagia, odynophagia or salivation is present.

Diagnostics: history, local state, swallow pathways endoscopy, toxicology center

Therapy: antishock therapy with ATB therapy, by suspicion of swallow etching perform after 24 hours esophagoscopy . Young organisms react with global symptoms to a local damage more expressively than adults. The development of metabolic breakdown can be faster.

Foreign body in pharynx

Pathogenesis: the most common cause is part of food (fish bones), followed by pins, glass fragments, coins

Symptoms: dysphagia, odynophagia, bleeding, breathing difficulties

Diagnostics: history, local state, X-ray

Therapy: foreign body extraction, treatment of wound, possibly ATB. If the foreign body is stuck in hypopharynx or swallow, endoscopic extraction in anesthesia is necessary.

Odontogenous complications in ENT

- **infectious complications**

Odontogenous infections can spread out of gingiva and jaw to the surrounding tissues. Infection can spread from the lower jaw to the face, tongue, base of the oral cavity and neck, from upper jaw to the face and maxillary sinus. In soft tissues abscess or phlegmona can develop. Inflammation can spread even from these parts further to the eye socket, intracranial space or to the mediastinum.

- **non-infectious complications**

After tooth extraction there can occur aspiration or swallowing of tooth, surgical instruments or dental plate