The salivary glands may be classified from three aspects: size: large and small (or accessory) salivary glands; the position of the efferent outlet: outside or within the dental arch; the character of the secretion produced: serous or mucinous. When the classification is made on the above basis, the large salivary glands are as follows: the parotid gland, which is situated outside the dental arch and whose secretion is serous; the submandibular gland, which is situated within the dental arch and whose secretion is mixed (but mainly serous); the sublingual gland, which is situated within the dental arch and whose secretion is mixed (but mainly mucinous). A classification can similarly be made for the accessory salivary glands, which are to be found in all parts of the oral cavity.

Classification of salivary gland diseases
There is not a uniform classification and nomenclature for the salivary gland diseases. The classification due to Rauch was for a long time, and to a considerable extent continues today to be the best. This classification distinguishes five large groups: inflammations, sialoliths, sialoses (sialadenoses), tumors and developmental anomalies. We follow the Rauch classification, with the widely accepted modification that we discuss Sjögren's syndrome and Heerfordt's disease among the inflammatory diseases. Before a detailed account of the diseases, it is necessary to deal with one of the common signs of a pathological condition of the salivary glands: a state of saliva deficiency. Two situations may be distinguished: true xerostomia and asialia without xerostomia. In cases of true xerostomia, changes occur in the mucosa in consequence of the defective functioning of the salivary glands. Diagnosis of the clinical symptoms of xerostomia is simple. The patients complain of some degree of dryness of the mouth. In a more serious case, there is some difficulty, in speaking, swallowing, mastication and gustation. This may be accompanied by and excruciating burning sensation in the mouth. The oral mucosa has a dull appearance, it is sometimes a burning-red in colour, and it is covered in places by a thick, adherent exudate. The tongue is cracked and furrowed (lingua
scrotalis), its papillae are atrophied, the teeth may be in a strikingly poor condition, and they may be extracted at an early age. The use of a removable prosthesis almost always causes a complaint because of the dry mucosa. It is difficult or even impossible to express saliva from Stenon's duct or Wharton's duct; if it is possible, then this saliva is usually thick, white or sometimes purulent.

Asialia without xerostomia may be partial, when, because of some disease, one or more salivary glands do not function, or to only a reduced extent (e.g. sialoliths or inflammation), and it may be temporarily total. These conditions can in fact be regarded as functional xerotomia: histologically, there are no-demonstrable changes.

**Sialadenitis**
The most frequent of all the salivary gland diseases are the inflammations. The data of Rauch indicate that, for every 100 cases involving inflammation, there are 10 cases of sialosis, 5 sialoliths and 1 salivary gland tumor. The sialadenites are rather uniform as concerns their clinical appearance. They generally involve a painful swelling (acute or chronic), with or without fever, and a decreased function. Establishment of the correct diagnosis is often greatly hampered by the largely uniform clinical picture of inflammations with different aetiologies. Certain methods of examination (sialography, isotopes, sialochemistry, etc.) may provide great help towards recognition of the morphological and functional changes characteristic of the various forms of sialadenites.

**Epidemic parotitis (mumps)**
Mumps is a viral, contagious disease, which can occur sporadically and epidemically. It is mainly a disease of children of school age (6-15 years). The incubation period is 2-3 weeks. The unilateral or bilateral swelling of the parotid is preceded by a general indisposition, loss of appetite, fever and a sore throat. (One important differential diagnostic sign is that the fever precedes the swelling of the salivary gland.) The patient is infectious as long as the parotid swelling persists. In cases free from complications, the prognosis is good. The complications may be local, if purulent parotitis develops as a consequence of a bacterial superinfection, which later leads to chronic parotitis. A relatively frequent complication is orchitis or oophoritis. Its treatment is only symptomatic: antipyresis and the consumption of succulent foods. It is important to know that there is now a compulsory vaccination against it. In spite of this, it does occur rarely.

**Acute sialadenitis**
This occurs mainly in elderly, weakened and exsiccated patients. The infection takes place in a retrograde manner, from the oral cavity. The diseased gland suddenly swells and becomes painful. After 2-3 days, a purulent
discharge may be observed from Stenon's duct. As the process advances, the swelling becomes circumscribed and liquefaction may ensue.

Treatment: With the improvement of the basic disease, the adenitis too is cured. Targeted treatment may be performed on the basis of the result of antibiotic sensitivity testing on the discharge from the parotid. Systematic expression of the pus from the parotid is important, as is the stimulation of salivation.

**Chronic sialadenitis**

This is usually localized to the parotid or the submandibular gland, but it occurs rarely in the sublingual salivary gland too. It may develop as a consequence of acute sialadenitis, or following a chronic inflammatory process that causes few symptoms. Some disease that reduces the resistance (such as diabetes, for example) may play a role in its development. The chronic inflammation leads to impairment of the gland tissue. Mainly the serous acini of the parotid and the submandibular salivary glands undergo damage; the mucinous gland structures are more resistant. The amount of the saliva and its excretion decrease, and the stagnating mucinous saliva promotes further bacterial infection. This leads to a vicious circle, and consequently to a complete loss of the glandular substance. The affected gland is moderately painful, and a mucinous-purulent discharge can be expressed form the glandular duct. It mainly occurs in girls in the age range 4-15 years. One special forms is "chronic, recurring childhood parotitis", which may be a consequence of epidemic parotitis. The diagnosis is set up via the typical sialographic picture.

Treatment: Prevention of acute exacerbation; enhancement of salivation (chewing-gum, lemon, acidic sugar); expression of the discharge from the gland; antibiotics. Surgery is rarely necessary, never in childhood.

**Specific inflammations**

The occurrence of syphilis and actinomycosis in the salivary glands is a literature rarity. Tuberculosis is more common, but is only encountered sporadically.

**Sjöögren's syndrome**

The classical symptoms of the syndrome are kerato-conjunctivitis sicca, rheumatic polyarthritis and dryness of the mouth (with or without salivary gland swelling). Of these three symptoms, two are sufficient for establishment of the diagnosis. The picture may be completed by chronic, atrophic mucositis, laryngotracheobronchitis gastritis, glossitis and intermittent parotid and submandibular sialadenitis. As concerns its origin, it is considered by the WHO to be "perhaps a manifestation of an autoimmune or rheumatoid disease localized to the salivary glands". It has a characteristic histological
picture: atrophy of the acini and replacement by lymphocytes, chiefly of the T-type. At the sites of the intralobular canaliculi, islands of epithelial or myoepithelial cells are to be seen; accordingly, the diagnosis histologically is benign lymphoepithelial lesion. In contrast with the general medical belief, the disease is not rare. It occurs mainly among elderly, postmenopausal women. The diagnosis may be established by means of sialography. There may be a number of variants between the initial and later stages of the disease, but these may be influenced to a great extent by the frequently occurring "superinfection". Authors agree that a miliary shadow of the parenchyma of the salivary gland is to be seen at the beginning of the disease, but a similar picture may be observed in cases of chronic inflammation. A feature of diagnostic value is the diffusion of the contrast material through the wall of the ducts.

Treatment: The treatment is only symptomatic, or consists in preventing superinfection of the salivary glands, whereby exacerbation may be slowed down substantially. The treatment must be prescribed in accordance with which of the symptoms predominates. It is usually advantageous to enhance the function of the residual salivary gland substance (by the chronic administration of Pilocarpine and Bisolvan injection), and to apply antiphlogistics, artificial tears and mild sedatives. If it proves resistant to chronic conservative treatment and there is extensive swelling of the salivary gland, removal of the gland must be considered.

Heerfordt's syndrome (subchronic uveoparotid fever)
Heerfordt's syndrome, also called uveoparotitis, is an extremely rare syndrome characterised by swelling of the parotid gland, fever and facial paresis or other symptoms of the nervous system. Histologically, epithelial cell granulomatosis may be seen. It is assumed to be caused by a viral infection. Spontaneous healing has been described.

Sialoliths
Sialoliths occur most frequently in the excretory duct of the submandibular salivary gland (83%), and much more rarely in the parotid gland (10%) or the sublingual gland (7%). Sometimes the calculus formation takes place in the gland itself. Sialolithiasis of the accessory salivary glands is a extremely rare. The symptoms of stones formed in the large salivary glands, and of the secondary disease, are produced by mechanical and inflammatory causes. The primary mechanical cause is the obstruction caused by the stone, which may be partial or total. In the event of a partial obstruction, the salivary gland suddenly swells before or during a meal, but this swelling disappears within 1-2 hours (it may occur that a considerable quantity of saliva is
These symptoms are accompanied by mild, spasmodic pain. If a total obstruction develops, the swelling may last for even several days. In such cases, the chronic sialostasis favours the development of inflammation; if this arises, the salivary gland and its environment become increasingly more painful. When the submandibular salivary gland is infected, the character and extent of this inflammation largely depend on the localization of the stone. When it located in the anterior floor of the mouth, "periwhartonitis" develops, which is a circumscribed inflammatory process of the floor of the mouth. The oedematous swelling arising here pushes the tongue aside, and eating and speaking become difficult. Pus is usually discharged from the orifice. If the duct is palpated with both hands (from outside and inside the mouth), the sialolith can often be felt. The more closely the calculus is situated to the gland, the greater the extent to which the glandular substance takes part in the inflammation. The swelling extends mainly to the submandibular region, to the accompanyment of difficulty in swallowing, shivering fifts and fever, and it is difficult to palpate the stone. Deep-lying sialoliths may be discharged through Wharton's duct, possibly with the formation of a fistula opening towards the oral cavity. A sialolith situated in the gland or in its vicinity will probably lead to the development of chronic sialadenitis. It is much more difficult to establish whether inflammation of the parotid is induced by a stone. Stones to be found here are smaller than those associated with the submandibular salivary glands (they are rarely larger than a gain of rice). Parotid stones can be palpated only if they are situated directly in the distal part of Stenon's duct. Here too, the character of the inflammation depends on the location of the stone. A stone occluding Stenon's duct may cause acute purulent inflammation extending to the whole salivary gland. In response to pressure (which gives rise to great pain), pus is discharged from Stenon's duct, around the opening of which a red, inflammatory areola may be seen. The face is swollen; there is no trismus. It very frequently occurs that the inflammation affects only part of the parotid. Since this most often takes place in the superficial lobe, purulent liquefaction may develop under the skin of the face. The process may become chronic, when periods of acute recrudescence accompanied by purulent liquefaction follow one another frequently. The occurrence of sialoliths may be established with certainty in most cases on the basis of the typical case history, the characteristic symptoms and X-ray examination. The stones do not always give an X-ray shadow, but with the aid of sialography accurate information may be obtained on the site and size of the stone and on the morphology of the salivary gland.

**Treatment:** In cases of submandibular sialoliths, the salivary gland is usually removed. In cases of parotid sialoliths, primarily conservative treatment is recommended.
**Tumors**
Salivary gland tumors (SGT), and particularly parotid tumors, comprise a classical chapter in medicine. Every possibility is given for an early establishment of the diagnosis: the patient soon observes the problem, clinical examination is easy, and the tumor grows slowly; if the patient presents, the physician has time to refer the patient for specialist treatment.

The great variety of the tumors may be confusing, but in a large majority of the cases in practice it is sufficient to simplify the picture to the occurrence of only four types of tumors: pleomorphic adenoma (60-80% of all SGT), papillary cystadenolymphoma, (whartin’s tumor 20% of all SGT), cylindroma and the various carcinomas (10-15% of all SGT).

**Developmental anomalies**
Rauch distinguishes three forms: aberrant salivary gland formations, a deficiency of large salivary glands, and systemic diseases.

**Investigative techniques**
Attention should primarily be paid to the significance of the case history, and the clinical examination. The information obtained in this way is important in other disease too, but it is sometimes of decisive importance in the diagnosis of pathological states of the salivary glands, making other examinations unnecessary. It may be established from the case history, for example, whether sialolithiasis is present (a swelling connected with eating), and whether the inflammatory symptoms accompanying sialolithiasis are acute or chronic. This may be sufficient to permit a diagnosis, but for better accuracy sialography is necessary; in this way, it is possible to establish the size, number and location of the calculus, and the morphological state of the salivary gland. In this case, these is no need for sialochemistry or scintigraphy, unless information is desired on the functional state of the salivary gland. The essence of these examinations will be summarized below.

**Sialography.** This involves X-ray examination of the large salivary glands with contrast material in a retrograde way. A plastic or metal catheter is inserted into Stenon's or Wharton's duct, and through this a water-soluble or oily contrast material is injected into the gland. X-ray pictures are then taken from various directions, and it becomes possible to assess the size of the gland, its relation to its environment, and the state of the out-flow duct system and the parenchyma. **Scintigraphy.** The basic principle of these examination is that certain radioactive substances administered into the organism concentrate more in the salivary glands than in their immediate environment. (Technetium
pertechnate is used.) The isotopic activity measured at various points on the surface of the salivary gland affords a picture of the distribution of the radioactive substance in these organs. Information may thereby be obtained on the shape, position, size and number of the glands. In many cases, such isotopic examinations yield more data than previous examination procedures on the function of the small and large salivary glands.

**Sialometry, sialochemistry.** Determination of the rate of secretion of the saliva and of the chemical composition of the saliva provides valuable information relating to functional disturbances of the salivary glands. The essence of the technique of the examination is that the quantity of saliva (under resting or stimulated condition) flowing through a tube introduced into Stenon's or Wharton's duct is measured, and is composition is examined. This is mainly of aid in differentiating parotid diseases of a non-tumorous nature.

**Computerized Tomography (CT) and Magnetic Resonance imaging (MRI).** Both types of examinations are playing an ever greater role in morphological studies of the salivary glands. They may be of pathognostic value for both tumors and various inflammation. Their application is particularity important as regards the spreading of tumorous diseases.

**Ultrasonographic examinations.** These are simple and fast examinations. They provide invaluable assistance in the pathognostics of stones, cysts, fluid and minor resistances. **Cytology.** Aspiration cytology (FNAB – Fine Needle Aspiration Biopsy) can be very helpful when dealing with a lesion of the salivary glands. It causes little discomfort to the patient. It is of great importance of preoperative diagnosis of tumors.
References


