

## Current Approaches to Diagnosis and Treatment of Chronic Dacryocystitis in Lor

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**Abstract** Diseases of the lacrimal duct can be caused by congenital anomalies, specific and nonspecific inflammatory processes, tumours and injuries. The most frequent complaints are lacrimation, lacrimation, pus in the lumen of the eye cavity. The integration of ophthalmologists and rhinologists in treatment of diseases of the lacrimal passages has led to the development of easy to learn, minimally invasive, but guaranteeing a lasting positive results in diagnosis and treatment in dacryology.

**Key words:** *lacrimal tract, dacryocystitis, diagnostics and treatment of dacryostenosis, radiosurgery.*

### Introduction

The most important thing in diagnostics of the lacrimal organs diseases is to differentiate whether the lacrimal duct or the lacrimal drainage part is involved in the pathological process [1]. It should be taken into account that in practice both components are often afflicted together, which complicates the diagnosis and eventual treatment. Complaints of lacrimation, lacrimation, purulent or mucous discharge from the lacrimal passages are the main manifestations of pathology of the part of the lacrimal apparatus of the eye responsible for the disposal and conduction of tears to the lower nasal passage, where they are involved in moistening the nasal mucosa after performing their main function of forming a pre-throat film. When collecting complaints and medical history, the timing and sequence of onset of symptoms must be carefully analysed. Examination of the structures that make up the lacrimal system begins with the examination of the lacrimal points: their position, size, shape, relation to the lacrimal lake, and the presence of inclusions and discharge in the lumen are evaluated. The lacrimal ducts, lacrimal sac and nasolacrimal duct can only be inspected instrumentally, so the first step is to assess the presence of skin changes in the projection of these formations. The skin may be hyperemic, swollen, swollen and bulging.

Among the clinical and functional tests, attention should be paid to those that can be performed without resorting to instrumental invasion, because the mucosa lining the inner surface of the horizontal knee of the lacrimal ducts (tubules and their orifices) are prone to granulation and scarring even with minor trauma, which can aggravate the course of the disease. These tests are the tubule test, the nasal lacrimal test and the reflux test (backward extrusion) (2).

A canalisation test is carried out using a 3% collargol solution. After injecting it into the conjunctival sac, it is observed to discolour and be absorbed through the lacrimal points into the lacrimal tubules. Normally the collargol solution disappears after 5 minutes and can soon be found in the nasal cavity (to do this the patient is asked to blow into a white napkin,

alternately covering first the left and then the right half of the nose). Alternatively, a nasolacrimal lacrimal test is performed with 0.25% levomycetine solution and a bitter taste of levomycetine is waited for in the mouth. The reflux test is performed by pressing on the area of the lacrimal sac and the tubules and then observing the appearance of dye or (and) the contents of the lacrimal duct in the conjunctival sac.

Only in necessary cases can the examination be supplemented by lavage and probing of the lacrimal ducts. In dacryological diagnosis, methods that do not even involve accidental trauma to the tubular epithelium should be considered preferable. These include X-ray, magnetic, ultrasound and endoscopic methods (NMRI, CT, contrast-enhanced radiography, B-scan, endorhinology, dacryoendoscopy, diaphanoscopy, scintigraphy, etc.).

Diseases of the lacrimal duct as well as disorders of the tear-producing apparatus of the eye may result from congenital anomalies, specific and non-specific inflammatory processes, tumours and trauma. The most common complaints are lacrimation (epiphora), lacrimation, and the appearance of pus in the lumen of the eye cavity.

Malformations of the horizontal part of the lacrimal ducts (LPD) can affect only the lacrimal point or the lacrimal ducts, or both. Changes on the side of the lacrimal points and tubules can be manifested by complete atresia, narrowing, deformation, cleavage, dislocation, diverticula, doubling, etc. Acquired changes include constriction at different levels, contractures and eversion. The biggest problem is caused by traumatic tears and burn injuries of the tubules, which can lead to a large area of obstruction. In such cases, the restoration of the lacrimal secretion, especially if a lot of time has passed since the trauma, may be impossible without an elaborate plastic reconstruction of the lacrimal duct or without using special prostheses of the lacrimal ducts.

## **Methods**

Inflammation of the tubule (dacryocanalculitis) more often occurs as a consequence of inflammation of the eye itself. Recently, the use of antibacterial and anti-inflammatory therapy has been widespread with fungal dacryocanalculitis, the treatment of which is problematic and often requires the intervention of a surgeon. Symptoms of dacryocanalculitis include skin hyperemia along the tubule, pronounced lacrimation, and mucopurulent discharge from lacrimal points. Fungal canalculitis is characterized by a significant enlargement of the tubule filled with pus and fungal concretions.

The most severe and widespread disease of the lacrimal sac and the nasolacrimal duct which make up the vertical knee of the lacrimal tract, dacryocystitis. It occurs mostly at the age of 30-60, much more frequently in women. Most authors consider the presence of pathological processes in the nasal cavity and paranasal sinuses to be the main cause of dacryocystitis. The nasolacrimal duct in rhinitis, due to the swelling of the cavernous tissue is compressed by the dense venous network, which is an extension of the cavernous tissue of the inferior nasal concha, and lacrimation occurs. Prolonged swelling of the nasal mucosa, hypertrophy of the nasal shells or polyposis of the nose and sinuses mechanically constricts the nasolacrimal duct, causing venous and lymphatic stasis, creating conditions for the development of virulent microflora in the lacrimal ducts [3]. Pneumo-, staphylo- and

streptococci are most often found in dacryocystitis, but Pfeiffer's bacilli, Frankel and Friedländer pneumobacilli, E. coli, fungi, etc. are also found.

Chronic inflammation of the lacrimal sac accounts for 2.0-7.5% of ophthalmic diseases.

### **Solution**

The clinical classification of dacryocystitis is divided into three main groups: acute, chronic and newborn dacryocystitis. Chronic dacryocystitis is subdivided into simple catarrhal, catarrhal ectatic, purulent ectatic (lacrimal sac empyema), purulent, complicated by phlegmoma, and stenotic (dry, adhesive). This division is rather relative, but allows the stage of the process, the discharge character and complications to be reflected in the diagnosis [4].

Dacryocystitis of the newborns, which is widespread in infants, occurs more often because at the time of birth the child has a membrane (a mucous-gelatinous plug) in the mouth of the nasolacrimal duct that prevents normal lacrimal outflow.

In most children in the first days to months of life the lacrimal passages are spontaneously restored, but in cases where the stagnant contents of the lacrimal passages with an admixture of pus enters the conjunctival sac with the risk of developing secondary inflammatory diseases of the eye, probing (antegrade or retrograde) of the nasolacrimal duct must be performed. Probing is usually done when the child reaches 3-5 months of age. The persistence of symptoms of congenital dacryocystitis is an indication for repeated probing with drainage or a delayed dacryocystorhinostomy (DCR) until 2-3 years of age. A noteworthy suggestion is to replace probing by filling the lacrimal sac with viscous preparations such as viscoelastic, followed by lacrimal sac compression. Indications for extended examination and intraoperative anesthesia are repeated unsuccessful probing, age over 6 months, presence of complications, and signs of concurrent dacryopathology and rhinopathology. In these cases, temporary drainage of the DIS is performed. In cases of obstruction at the level of the horizontal knee, drainage is prolonged (up to 6 months) and depends on the extent of the occlusion. Detection of atresia of the bony nasolacrimal duct is an indication for endonasal DDC.

Acute dacryocystitis or phlegmon of the lacrimal sac and surrounding tissue is characterised by redness, thickening, swelling and pain at the inner corner of the eye, spreading to the cheek. Treatment of acute dacryocystitis is conservative at first, then (after the acute symptoms have subsided), as with chronic dacryocystitis, surgical.

Occurring at the most employable age, inflammation of the lacrimal sac poses a permanent threat to the visual organ, obstructs professional activity, can cause chronic inflammation of the conjunctiva and the deeper parts of the eye, including orbital phlegmon and septic complications. Constant tearing and purulent discharge from the eye cause severe mental suffering and are a cosmetic problem. The results of attempts to treat dacryocystitis conservatively have been disappointing so far. Meanwhile, vast and traumatic operations in both ophthalmology and rhinology are being replaced by more sparing methods, using endoscopic and microscopic techniques [5]. The development of new technologies in ophthalmology and otorhinolaryngology, such as computed tomography and magnetic resonance imaging, endoscopy using rigid and flexible endoscopes, radiosurgery, operations

using automatic high-speed cutting instruments, The use of lasers and various polymeric materials has led to the search for the possibility of applying these innovations in dacryological practice, to the desire to assess the etiology of diseases of the lacrimal ducts from a new perspective and to approach the problem of dacryocystitis treatment on a different level [6, 7].

Surgery for dacryocystitis involves the formation of an anastomosis between the lacrimal sac, the nasolacrimal duct, and the nasal cavity, bypassing the natural lacrimal flow pathway. More than a hundred modifications of dacryocystitis surgery differ in principle in the access to the lacrimal sac: external, endonasal, transcanalicular. All provide a high cure rate [8]. The question of how to avoid recurrence of the disease after DIC arising as a consequence remains relevant:

- Insufficient diagnosis and inadequate assessment of tear production disorders;
- Inappropriate choice of access and surgical technique
- The errors in the surgical technique;
- Inappropriate postoperative management of patients [9].

In spite of the fact that the problem appeared to be "at the junction" of ophthalmology and rhinology, the overwhelming majority of dacryocystitis patients turn to eye clinics, where most often they do not receive adequate treatment due to the fact that up to now the main part of ophthalmologists, who take care of patients with dacryopathology, profess a commitment to external access to the lacrimal sac only [10].

Throughout the history of modern dacryology, external and endonasal access to the lacrimal sac have formed the basis for the parallel surgical treatment of dacryocystitis. Proponents of both approaches, in an effort to improve their effectiveness, have made many useful improvements. However, the innovations created in the various fields of medicine are not fully utilized. In addition, the close relationship between the lacrimal ducts and nasal cavity structures expands the range of possible triggers of this pathology and dictates the need for cooperation between doctors of different specialties, to develop common tactics for treating inflammation of the lacrimal sac and the nasal lacrimal duct.

Most dacryology specialists believe that this pathology should be treated in large ophthalmology facilities by a specialized group of doctors who understand the anatomy, physiology, and clinic of lacrimal apparatus diseases, have modern equipment and surgical skills with a variety of approaches [11]. Moreover, Order № 115 H of the Ministry of Health and Social Development of the Russian Federation dated February 27, 2010 defines the order of medical care provision to the population of the Russian Federation for diseases of ophthalmic apparatus, assuming that such care is provided exclusively in ophthalmological clinics [12].

Although endoscopic DCR requires expensive equipment, this approach is widely used in all foreign clinics and is gaining more and more supporters among domestic ophthalmologists dealing with dacryology problems. Technical difficulties mainly resulting from narrow operating field are not an insurmountable obstacle for ophthalmic surgeons in

mastering endonasal DCR technique [13]. The emerging integration of ophthalmologists and rhinologists in dacryocystitis treatment has determined the next step - creation of easy-to-learn, minimally invasive, but guaranteeing stable positive result, diagnostic and treatment methods of dacryocystitis, universal for any its clinical form, performed by the access, which would be the most justified according to results of multidimensional examination.

The criteria for selecting an operative access for DCR are:

- topography of the lacrimal sac;
- The anatomy of the lacrimal fossa, the labyrinth and medial nasal concha, and other anatomical variants of the nasal structures;
- presence of concomitant rhinosinusopathy;
- the width of the nasal cavity and middle nasal passage;
- the nature of post-traumatic deformation of the facial skull;
- presence of lacrimal sac ectasia, phlegmonic inflammation,
- condition of the vertical knee of the lacrimal drainage system;
- variants of the lacrimal sac structure (diverticulae, neoplasms, adhesions);
- age and gender of the patient;
- general medical condition.

The central points of the lacrimal sacs in the CT scan in the coronal view are often at the level of the apices of the middle nasal concha, while in the axial view the sac is located at the anterior end of the middle nasal concha. In other cases, a different position of the lacrimal sac in relation to this landmark may be detected. In some patients, the approach to the lacrimal sac from the nasal side is limited by a hypertrophied turbinate, base of the hooked process, deformed septum, or nasal roll cells. The latter structure is observed with hyperpneumatisation of the agger nasi cell, which extends anteriorly and adjoins the wall of the lacrimal sac. In this case, the wall separating the cell from the lacrimal sac is severely thinned, causing inflammation of the lacrimal sac to spread to the nasal tubercle cell, causing ethmoiditis, which also involves other anterior cells. The resulting osteolytic process leads to the formation of chronic purulent inflammation that integrates the lacrimal sac and the affected sinuses (14).

When choosing access to the lacrimal sac, the following circumstances are also taken into account: previous surgeries, the functional state of the lacrimal system, the clinical form of the disease, convenience and possibility of access, the need for one-stage or staged surgery for concomitant diseases.

In most patients with dacryocystitis, endorinoscopic examination reveals concomitant pathology of the nasal cavity and paranasal sinuses, and it is obvious that not all rhinopathy is causally related to dacryocystitis. Finding out the influence of the existing

disease of the nose and paranasal sinuses on the pathological process in the lacrimal passages is one of the mandatory tasks of primary diagnosis in patients with dacryocystitis.

When it appears necessary and possible to perform a simultaneous correction of the nasal septum, paranasal sinuses, nasal cavities, etc. in addition to endonasal DCR, the endonasal approach is preferred. Simultaneous operations are also performed using radiosurgery, as it is the gentlest of all known methods of tissue dissection and excision. In addition, the indications for rhinologic surgeries may include: difficulties in access to the projection zone of the lacrimal sac on the lateral nasal wall caused by hypertrophy of the nasal cavities or deviation of the septum, as well as acute and chronic inflammations of other paranasal sinuses combined with dacryocystitis in a common pathological process. In addition to creating a nasolacrimal junction, eliminating epiphora and pus in these cases, nasal breathing improves, associated inflammation is eliminated, and conditions are created for better healing of the surgical wound and unimpeded passage of tears. All surgical interventions in this area must be anaesthetised using a combination of terminal and conduction anaesthesia.

Based on the fact that the main stage of DR is the plastic surgery of lacrimal-nasal anastomosis formation, during which various tissue types are sequentially dissected, which ultimately determines the treatment outcome, soft tissue incisions during operations on the lacrimal sac are advisable to perform using radiowave energy, known from other medical fields for its prisciplinarity [15]. The absence of significant edema and necrosis, the predominance of epithelialization over granulation during healing, a combined hemostatic effect, and painlessness fully meet the requirements of minimally invasive surgical treatment of dacryocystitis. It is also important that the use of dosed opening of nasal mucosa along the contour of created rhinostomy, as well as the use of radio-wave generator in fulguration mode, which can stabilize the contact between the mucosa, eliminated the need for labor-intensive and traumatic suture fixation of anastomosis elements, increasing the risk of granuloma formation [16].

Regardless of the access chosen, the main causes of failure of the newly formed lacrimal drainage pathway are bleeding, crusting, granulation, synechiae, and persistence of a long-term inflammatory process in the dacryorhinostomy area. Advantages of radiosurgery in comparison with knife techniques of surgeries on the lacrimal sac can reduce the frequency of these processes due to minimisation of trauma and biophysical peculiarities of exposure, namely bactericidal properties of radio-magnetic currents. Prevention of the formation of fibrin, crusts and adhesions in the de-epithelised zones is performed using a complex of measures including the introduction of gel tampons after the operation, postoperative rhinoendoscopy including treatment, irrigation of the nasal lacrimal passages with antibacterial drugs, irrigation of the nasal mucosa with saline solutions 2 days after the operation and also administration of corticosteroids after 1 week[16].

### **Conclusion**

The use of shaver and aspiration systems greatly facilitates the surgical stages, which are traditionally accompanied by poor visibility of the surgical field. The illumination of the

manipulated area through a rigid endoscope inserted endonasally in external and transcanalicularly in endonasal SCR is also useful in lacrimal sac surgery.

In a large proportion of patients, in addition to dacryocystitis and the inherent obstruction of the lacrimal duct, other levels of lacrimal obstruction are diagnosed, necessitating the addition of temporary stenting to DCR. The use of transcanalicular endoscopy of the lacrimal ducts improves the efficiency of recanalization surgeries and opens up prospects in dacryology in terms of its minimally invasive nature as a way to significantly improve functional and cosmetic outcomes of dacryopathology treatment [17].

## LITERATURE

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