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CONDITIONS FOR IMPROVING THE EFFECTIVENESS OF SURGICAL TREATMENT OF PATIENTS WITH CHRONIC DACRYOCYSTITIS IN ENDONASAL ENDOSCOPIC PROCEDURES

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✧ ***Introduction.*** Surgical treatment of patients with chronic dacryocystitis is a complex interdisciplinary problem. Lacrimal sac can be reached externally and internally (endonasally). The effectiveness of the treatment largely depends on the results of complete diagnosis and choice of a treatment method. ***Purpose.*** To analyze the effectiveness of surgical treatment of patients with chronic dacryocystitis in endonasal access. ***Materials and methods.*** The study of 225 patients consisted in the analysis of two groups of patients (2015–2019) with chronic dacryocystitis: the first group (110 patients) underwent an endonasal endoscopic dacryocystorhinostomy in the form of monooperation, the second underwent endonasal endoscopic dacryocystorhinostomy with additional intranasal interventions (115 patients). All patients underwent endoscopic examination of the nasal cavity and midface multispiral computed tomography (MSCT). ***Results.*** The results of the obtained data convincingly showed a higher efficiency of treatment in the group of patients with combined operations with the pathological processes revealed in intranasal localization in comparison with the group of monoperations. ***Conclusion.*** According to the study data, patients with chronic dacryocystitis should undergo full ophthalmologic and endonasal diagnostics, including multispiral computed tomography-dacryocystorhinography of the middle facial zone according to the described algorithm. When detecting pathological processes hindering the standard endonasal endoscopic dacryocystorhinostomy, it is necessary to perform an expanded scope of surgical interventions which will contribute to the efficiency of treatment of patients with chronic dacryocystitis up to 91.3%.

✧ ***Keywords:*** endonasal endoscopic dacryocystorhinostomy; MSCT-dacryocystorinography; chronic dacryocystitis.

УСЛОВИЯ ПОВЫШЕНИЯ ЭФФЕКТИВНОСТИ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ БОЛЬНЫХ ХРОНИЧЕСКИМ ДАКРИОЦИСТИТОМ ПРИ ЭНДОНАЗАЛЬНЫХ ЭНДОСКОПИЧЕСКИХ ВМЕШАТЕЛЬСТВАХ

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✧ ***Введение.*** Хирургическое лечение больных хроническим дакриоциститом — непростая междисциплинарная проблема. Известны наружные и внутренние (эндоназальные) доступы к слёзному мешку. Эффективность лечения во многом зависит от результатов полноценной диагностики и выбора метода лечения. ***Цель.*** Анализ эффективности хирургического лечения пациентов с хроническим дакриоциститом при эндоназальных доступах. ***Материалы и методы.*** Исследование 225 пациентов с хроническим дакриоциститом за период 2015–2019 гг. состояло из анализа двух групп: в первой

группе (110 человек) выполнена эндоназальная эндоскопическая дакриоцисториностомия в виде монооперации (ЭЭДЦР), во второй группе — ЭЭДЦР с дополнительными внутриносовыми вмешательствами (115 больных). Всем пациентам проведено эндоскопическое исследование полости носа и МСКТ средней зоны лица. ***Результаты.*** Результаты полученных данных убедительно показали более высокую эффективность лечения в группе пациентов с комбинированными операциями (ЭЭДЦР+) при выявленных патологических процессах внутриносовой локализации, по сравнению с группой монооперций. ***Заключение.*** По данным исследования, больным хроническим дакриоциститом необходимо проведение полноценной офтальмологической и эндоназальной диагностики, включая выполнение МСКТ-дакриоцисториографии средней зоны лица по описанному алгоритму. При выявлении патологических процессов, затрудняющих проведение стандартной ЭЭДЦР, необходимо выполнять расширенный объём хирургических вмешательств, что будет способствовать повышению эффективности лечения пациентов с хроническим дакриоциститом до 91,3 %.

✧ ***Ключевые слова:*** эндоназальная эндоскопическая дакриоцисториностомия; МСКТ-дакриоцисториография; хронический дакриоцистит.

INTRODUCTION

Dacryocystitis is an inflammatory disease of the lachrymal sac, and according to various sources, it constitutes 4%–8% of all diagnosed diseases of the lacrimal system [1]. Currently, there are two surgical approaches to the treatment of chronic dacryocystitis: external, in which a skin incision is made to access the lacrimal sac, and internal, which is endonasal [2, 3]. There are many publications in the literature regarding the effectiveness of using each of these methods in various modifications. At the same time, the undeniable advantage of the endonasal approach is the preservation of the skin in its original state without any scars in the area of the lacrimal sac projection. Nevertheless, when performing a dacryocystorhinostomy with endonasal approach, one could face a recurrence of epiphora and complications [4–7].

In this study, we attempted to understand the endonasal causes that, in our opinion, can affect the outcome of surgical treatment – the free passage of tears along the formed pathways.

This study aimed to analyze the effectiveness of surgical treatment for patients with chronic dacryocystitis using endonasal approach

MATERIALS AND METHODS

The study included patients with complaints of long-term lacrimation and suppuration (more than 6 months). The patients were diagnosed and treated at various institutions – at otorhinolaryngological and ophthalmological departments of the Pirogov State clinical hospital (Moscow) and hospitals of the MEDSI group of companies (Moscow) with the established diagnosis of "chronic dacryocystitis" during the period from 2015 to 2019. The clinical examination of patients included disease history, biomicroscopy of the anterior segment with evaluation of the eyelids, and anterior rhinoscopy. Endoscopic examination of the nasal cavity was performed using rigid endoscopes of 0° and 30° and 4 mm in diameter, after local application anesthesia with 10% lidocaine hydrochloride solution, with examination of all the endonasal structures of the nasal cavity: inferior nasal meatus, nasal floor, inferior nasal concha, middle nasal meatus, osteomeatal complex, area of the hamate bone, front end of the middle turbinate, and lacrimal tubercle of the nasal septum (Fig. 1–3).

All the patients underwent multislice spiral computed tomography (MSCT) of the middle zone of the face with a contrast of the tear-removing system. The contrast was made using a standard method with a water-soluble radiopaque substance "Omnipak" 320 mg I/ml. MSCT was made on the multislice spiral computer tomographs Phillips Brilliance 64 (Phillips, USA) and TOSHIBA AQULION PRIME in a spiral scanning mode with a slice thickness of 0.6–0.9 mm. A positioning was carried out by laser marks with the patients lying on their back with a standard headrest, and the view is directed straight. The anatomical area of the scan was determined by the tomogram (surview), during the initial examination with the capture of the entire skull. The slices were parallel to the solid sky. According to the results of the MSCT dacriocystography, the degree of patency of the lacrimal pathways, the location of the tear outflow disorder and pathological changes in the lacrimal sac, possible deformity of the facial bones, and changes in bone structures and soft tissues were evaluated [8, 9] (Fig. 4, 5).

Totally, we examined 225 patients who were divided into 2 groups. Patients in group I (n = 110)

(control) underwent a surgical intervention – an endoscopic endonasal dacryocystorhinostomy (EEDCR) in the form of a mono surgery. Group II (n = 115) (the main group) consisted of patients with chronic dacryocystitis who underwent combined surgical interventions – EEDCR with simultaneous correction of the intra-nasal structures (Fig. 6, diagram).

Patients with an acute phlegmon of the lacrimal sac were not included in this study.

To assess the severity of lacrimation of the patients in both groups before surgery and in the postoperative period, the Munk scale was used where 0 points indicates a complete absence of lacrimation; 1 point indicates that the patient removes the tear less than 2 times a day; 2 points indicates tears removal from 2 to 4 times a day; 3 points from 5 to 10 times a day; 4 points more often than 10 times a day.

Endotracheal anesthesia was used.

The EEDCR surgical technique consisted of 3 stages: bone exposure of the lateral wall of the nasal cavity; trepanation of the bone wall with exposure of the lacrimal sac; and removal of the wall of the lacrimal sac with the formation of a dechlorinator according to the standard technique. To confirm the patency of the formed lacrimal pathways, a thin cannula was inserted intraoperatively through the lower lacrimal point and the lacrimal pathways were washed with an antiseptic solution. The zona of the surgical area was tamponed with an ointment turunda. In group II patients with a diagnosis of vasomotor rhinitis, 30 (26%) patients underwent thermodestruction of the lower nasal conchae using a radio knife in combination with classical vasotomy. When a curved nasal septum was detected, 52 (45.2%) patients underwent septoplasty with endoscopic support and the additional use of silicone splints to reduce the reactive postoperative edema. With inflammation of the maxillary sinus, 21 (18.2%) patients underwent endoscopic maxillary sinus surgery through the middle nasal passage with partial resection of the hook-shaped process. In the presence of a lacrimal tubercle hyperplasia, 12 (10.4%) patients underwent removal of the underlying perpendicular plate of the lattice bone and then performed EEDCR.

In the early postoperative period, all the patients, in addition to regular instillation of anti-inflammatory drops into the conjunctival cavity of the surgical area, made a thorough toilet of the general and middle nasal passage and the postoperative area, with the removal of blood clots and fibrinous plaques using an aspiration system. In addition, the surgical lacrimal pathways were washed with a warm saline solution in combination with a dexamethasone solution. The frequency of such washing is 2–3 times within 5 days, then on the 7th and 10th days after the surgery.

RESULTS

In this study that included patients with a diagnosis of "chronic dacryocystitis", we identified that the most of the patients were women aged older than 60 years [89 (80,9%) patients of the first group and 71 (61.7%) in the second one)] (table. 1).

Among the surveyed patients with chronic dacryocystitis, we showed that the predominant pathological processes in the nasal cavity and paranasal sinuses were deviated septum, involving 48 (43,6%) patients in group I and 52 (45,2%) in group II; vasomotor rhinitis, involving 20 (18,1%) patients in group I and 30 (26%) of group II.

As shown in table 2, 98 patients in group I had 4 points before the surgery on the Munk scale, and 83 (80.6%) patients in this group had no lacrimation 6 months after the surgery, while in 76 (66%)

Table 1 / Таблица 1

Distribution of patients with chronic dacryocystitis by age and sex
Распределение пациентов с хроническим дакриоциститом по возрасту и полу

Groups	Sex	Age			Total
		under 44	45–59	60–74	
Group 1	Men	1	4	2	7
	Women	3	11	89	103
Group 2	Men	–	1	3	4
	Women	7	33	71	111
Total		11	49	165	225

Fig. 1. Endoscopy of the nasal cavity. Endoscope 4 mm 0°. The lacrimal tubercle covers the area of projection of the lacrimal sac

Рис. 1. Эндоскопия полости носа. Эндоскоп 4 мм 0°. Слёзный бугорок прикрывает область проекции слёзного мешка

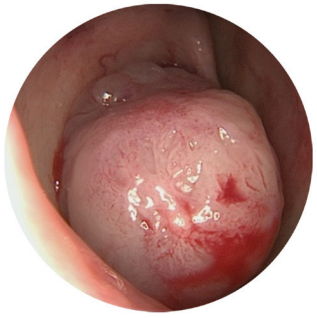


Fig. 2. Endoscopy of the nasal cavity. Endoscope 4 mm 0°. The enlarged *concha bullosa* obstructs access to the operating field

Рис. 2. Эндоскопия полости носа. Эндоскоп 4 мм 0°. Увеличенная *concha bullosa* закрывает доступ к операционному полю

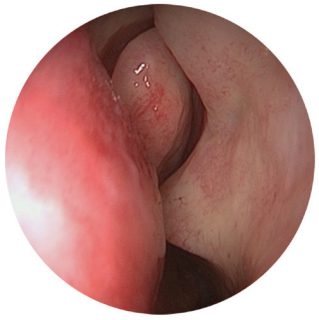


Fig. 3. Endoscopy of the nasal cavity. Endoscope 4 mm 0°. Pronounced septal crest and vasomotor rhinitis

Рис. 3. Эндоскопия полости носа. Эндоскоп 4 мм 0°. Выраженный гребень перегородки носа и вазомоторный ринит

Table 2 / Таблица 2

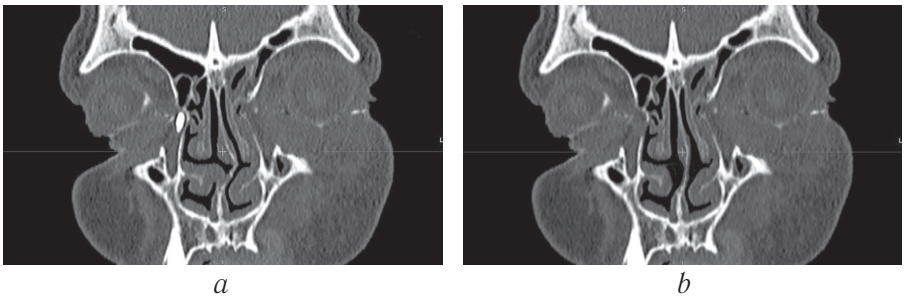
Assessment of lacrimation in the patients of groups I and II according to the Munk scale
Оценка слёзотечения у больных I и II групп по шкале Munk

Munk points	Before a surgery				6 months after a surgery*			
	Group 1 (*n* = 110)		Group 2 (*n* = 115)		Group 1 (*n* = 103)		Group 2 (*n* = 101)	
	n	%	*n*	%	*n*	%	*n*	%
0	0	0	0	0	83	80.6	92	91.3
1	1	0.9	0	0	9	8.7	5	4.9
2	6	5.5	9	7.9	5	4.9	3	2.9
3	15	13.6	30	26.1	2	1.9	1	0.9
4	98	89	76	66	4	3.9	0	0
Total	110	100	115	100	103	100	101	100

Note. * The examined groups did not include all operated patients.

Fig. 4. MSCT – dacryocystorhinography. Ectasia of the lacrimal sac. Deviation of the nasal septum

Рис. 4. Мультиспиральная компьютерная томографическая дакриоцисториография. Эктазия слёзного мешка. Девиация носовой перегородки



a *b*

Fig. 5. Patient G., 64 years old. Multispiral dacryocystorhinography: *a* – on the right, the contrast agent fills the lacrimal sac. Deviation of the nasal septum. Difficult nasal breathing; *b* – 6 months after. After endoscopic endonasal dacryocystorhinostomy with correction of the nasal septum and thermal destruction of the inferior turbinate. On the right, a bone window is visualized on the lateral wall in the area of the lacrimal sac projection. The tear passes freely. Free nasal breathing

Рис. 5. Пациентка Г., 64 года. Мультиспиральная дакриоцисториография: *a* — справа контрастное вещество заполняет слёзный мешок. Девиация носовой перегородки. Затруднённое носовое дыхание; *b* — через 6 мес. после эндоскопической эндоназальной дакриоцисториностомии с коррекцией носовой перегородки и термодеструкции нижней носовой раковины. Справа визуализируется костное окно на латеральной стенке в области проекции слёзного мешка. Слеза проходит свободно. Носовое дыхание свободное

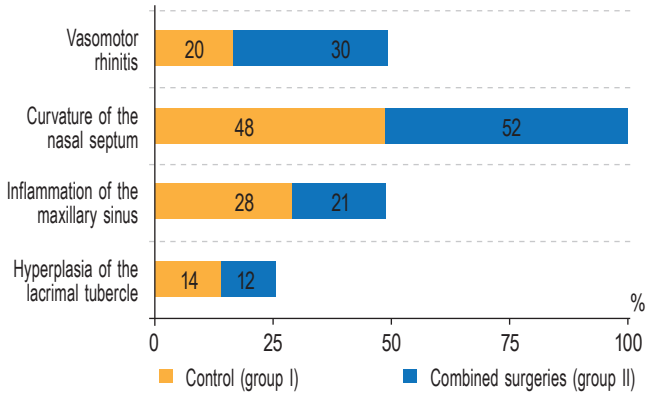


Fig. 6. Concomitant pathological processes in the nasal cavity in the examined patients

Рис. 6. Сопутствующие патологические процессы в полости носа у обследованных пациентов, $n = 225$

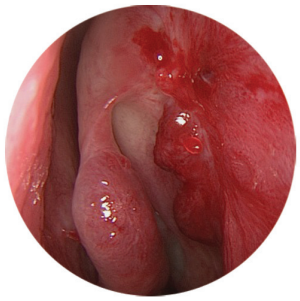


Fig. 7. Patient K., 38 years old. Endoscopy of the nasal cavity. Granulation in the area of dacryorhinostomy 1 month after endoscopic endonasal dacryocystorhinostomy

Рис. 7. Пациентка К., 38 лет. Эндоскопия полости носа. Грануляции в области дакриориностомы через месяц после эндоскопической эндоназальной дакриоцисториностомии

Fig. 8. Endoscopy of the nasal cavity. 2 months after endoscopic endonasal dacryocystorhinostomy (group I). Synechiae in the region of the anterior end of the middle turbinate. Curvature of the nasal septum

Рис. 8. Пациент П., 53 года. Эндоскопия полости носа. Через 2 мес. после эндоскопической эндоназальной дакриоцисториностомии (I группа). Синехии в области переднего конца средней носовой раковины. Искривление перегородки носа

patients of group II, lacrimation before treatment on the Munk scale was assessed at 4 points, and 6 months after the surgery, 92 (91.3%) patients had no lacrimation, but 3 (2.9%) patients had a minor discharge during the cold period of the year.

Our observations of patients in the postoperative period reliably showed that 11 (10.6%) out of 103 patients of group I who were examined, and 4 (3.9%) of those in group II had repeated persistent lacrimation in the period from 1–6 months. The causes of repeated development of lacrimation included the development of granulation tissue in the area of the dacryostoma (Fig. 7) for 2 (1.9%) patients in group I and 3 (2.9%) patients in group II; the formation of synechiae (Fig. 8) for 9 (8.7%) patients on group I and 1 (0.9%) patient in group II.

These patients were repeatedly performed a procedure with the removal of the scar tissue in the area of the formed anastomosis and the removal of the curved septum and synechiae with bicanalicular stenting of the lacrimal pathways.

DISCUSSION

According to the literature data on the determination of the cause of chronic dacryocystitis, the most significant is the rhinogenic nature of its occurrence. Taking into account the known data on the anatomical features of the location of the lacrimal pathways and mucous membrane, the presence of a close vascular and cavernous connection with abundant anastomoses, and the fact that the vascular network of the lacrimal apparatus occupies two-third of the bone channel and is caudally connected to the cavernous tissue of the lower nasal conch, all this confirms the rhinogenic nature of the development of dacryocystitis [10].

For many years, there have been two approaches to the surgery for lacrimal drainage disorders in dacryocystitis – external and endoscopic. Each of the methods has its own characteristics, which are as follows: with an external approach, access to the lacrimal sac occurs through an external skin incision with the formation of a scar in the medial corner of the eye. The intervention is traumatic as

the thick bone of the frontal process of the upper jaw is perforated. Even if the operating doctor performed the intervention under a microscope and does not use an endoscopic equipment, it is difficult for him to see the area of intervention from the nasal mucosa in order to assess the specific topographic and anatomical intercourses in the area of the formed mouth, which results in a considerable frequency of various complications [11].

Carrying out a dacryocystorinostomy with an endonasal access under the control of an endoscope allows you to perform the dacryorinostomy under a complete visual control, with dosed perforation of the thin wall of the lacrimal bone under which the wall of the lacrimal sac (often tightly fused) lies straightaway. Taking into account the capabilities of modern endoscopic systems and instruments, it is possible to make other endonasal interventions aimed at eliminating the nasal septum deviation, shell hypertrophy, etc. At the same time, the traumatic impact on the intranasal structures is minimal, and with adequately selected pharmacological support and in conditions of controlled hypotension, hemorrhage is insignificant; the surgery is characterized by high functionality and a low percentage of relapse [12]. Of 83 (80.6%) patients who underwent EEDCR had no lacrimation 6 months after the surgery. In addition, in the group of patients in whom other endonasal interventions were performed together with EEDCR, to improve the conditions for nasal breathing and tp eliminate the conditions for maintaining chronic inflammation, 6 months after the surgery, the effectiveness of the surgical treatment was even higher; for 92 (91.3%) patients, lacrimation was completely absent.

CONCLUSION

Thus, based on the results of our observations, we can draw the following conclusions: patients with impaired lacrimal drainage should be carefully diagnosed, and special attention should be paid to the results obtained during rhinoscopy using an endoscope, while it is necessary to assess the condition of the nasal mucosa, the presence and degree of curvature of the nasal septum, the severity of te nasal hypertrophy and the nature of the pathological discharge; the main method for diagnosing the level of obliteration of the lacrimal system in patients is through the x-ray method – conducting MSCT dacriocystorinography using a specific algorithm, according to which the surgeon can plan the upcoming volume of a surgery and options for performing a surgery for a specific patient; the detection of a nasal septum deviation, nasal hypertrophy, and conditions that make it difficult to perform standard endonasal dacryocystorinostomy during rhinoscopy dictates the need to perform an expanded volume of surgical interventions aimed at correcting the anatomical features of the intra-nasal structures and facilitating nasal breathing along with EEDCR; careful care and monitoring of wound healing processes in the early postoperative period after EEDCR and combined nosocomial interventions and dynamic control of the formed dacryorinostoma for patients will significantly reduce the number of patients with excessive scarring in the surgical area and reduce the number of relapses of lacrimation for patients after endonasal endoscopic dacryocystorinostomy.

Conflict of interest. The authors declare no conflict of interest.

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