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THE INITIAL EXPERIENCE OF USING THE DRAIN IMPLANT TO ELIMINATE EPIPHORA IN PATIENTS WITH RHINOGENOUS PATHOLOGY

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✧ The pathology of upper lacrimal pathways associated with cicatrical strictures and obliteration, anatomical features of this zone is an essential problem of epiphora occurrence. The diseases of nasal cavity and paranasal sinuses play a significant role in the etiopathogenesis of this kind of epiphora. The search of new methods of preventing or eliminating epiphora, also caused by rinological pathology, is reasonable. ***Aim:*** To estimate the efficacy of drainage implant HEALAFLOW (Aptissen, Switzerland) in patients with complains on epiphora and concomitant nasal cavity pathology. ***Material and methods.*** 29 patients (50 eyes) with complains on permanent (more than 6 months) epiphora were under the supervision. Generally accepted ophthalmological, dacryological, rhinological examinations, including cone-ray computer tomography of the paranasal sinuses with preliminary contrast of the lacrimal pathways were carried out. Patients were divided into two groups. 15 people (28 eyes) composed the main group (I). 14 people (22 eyes) formed a control group (II). In I group the drainage implant HEALAFLOW (Aptissen, Switzerland) was inserted in 1 day after operation aimed on elimination of nasal cavity pathology. Patients of the II group instillation of Tobradex according to the scheme and moistening drops were prescribed. ***Results.*** According to dacryological examination 29 patients (50 eyes) with complains on epiphora had normal passive lacrimal pathway passablness, but delayed or negative results of probes characterizing active passablness. All 29 patients had a rhinological pathology, which was eliminated by the otorhinolaryngologist with the operation at the first stage. In I group 9 patients noticed an increased epiphora immediately after the administration of HEALAFLOW in lacrimal pathway, which lasted during the first 24 hours after the procedure. Based on the results of the follow-up examination, after 3 months, all patients showed an improvement, expressed in the absence or decrease of epiphora. It should be noted that in the I group (after the insertion of the implant) the positive effect was more expressed. In the I group 12 of 15 patients didn't have epiphora and in 3 patients it decreased. In the II group — 7 patients didn't have epiphora and in 6 patients it decreased. ***Conclusion.*** Insertion of drainage implant HEALAFLOW in the lacrimal pathway after elimination of rhinological pathology in patients with complains on epiphora is safe, well tolerated and produces a positive drainage effect. This allows to recommend the implant to patients with tear-off device abnormality in the complex treatment of tear outflow disorders.

✧ ***Keywords:*** lacrimal pathways; tear-off device; drain implant HEALAFLOW; paranasal sinuses; epiphora; phinopathy.

ПЕРВЫЙ ОПЫТ ПРИМЕНЕНИЯ ДРЕНАЖНОГО ИМПЛАНТАТА ДЛЯ УСТРАНЕНИЯ ЭПИФОРЫ У ПАЦИЕНТОВ С РИНОГЕННОЙ ПАТОЛОГИЕЙ

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✧ Важной проблемой возникновения эпифоры является патология вертикального отдела слезоотводящих путей (СОП), связанная с формированием рубцовых стриктур и облитераций, особенностями анатомического строения этой зоны. В этиопатогенезе такого слезотечения особая роль принадлежит заболеваниям полости носа и околоносовых пазух [4, 6]. Поиск новых способов профилактики или устранения эпифоры, вызванной в том числе и ринологической патологией, вполне целесообразен. ***Цель*** — оценить эффективность дренажного имплантата HEALAFLOW фирмы Aptissen (Швейцария) у пациентов с жалобами на слезотечение и сопутствующей патологией полости носа. ***Материал и методы.*** Под наблюдением находилось 29 человек (50 глаз) с жалобами на постоянное (более 6 месяцев) слезотечение. Им проведены общепринятое офтальмологическое и дакриологическое, ринологическое обследования, включая конусно-лучевую компьютерную томографию околоносовых пазух с предварительным контрастированием СОП. Всех пациентов разделили на две группы. Основную (I) группу исследования составили 15 человек (28 глаз). Во II (контрольную) группу вошли 14 человек (22 глаза). В I группе, после устранения патологии полости носа, в СОП вводили дренажный имплантат HEALAFLOW фирмы Aptissen (Швейцария) в течение первых суток после операции. Пациентам II группы назначали только закапывание тобрадекса по схеме и увлажняющие капли. ***Результаты и обсуждение.*** По данным дакриологического исследования было установлено, что у всех 29 человек (50 глаз), предъявлявших жалобы на слезотечение, отмечалась нормальная пассивная проходимость СОП, но выявлялись замедленные или отрицательные результаты проб, характеризующих активную проходимость. У всех 29 пациентов была выявлена ринологическая патология, которую устранял оториноларинголог оперативным путём первым этапом. В I группе сразу после введения HEALAFLOW в СОП 9 человек отмечали усиление слезотечения в течение первых суток после процедуры. По результатам контрольного осмотра через 3 месяца у всех пациентов наблюдалось улучшение, выражавшееся в отсутствии или уменьшении эпифоры. Таким образом, в I группе (после введения имплантата) положительный эффект был более выраженным. Слезотечение отсутствовало у 12 человек из 15 пациентов, уменьшилось у 3 человек. Во II группе слезотечение отсутствовало у 7 человек, уменьшилось у 6 пациентов. ***Выводы.*** Введение дренажного имплантата HEALAFLOW в СОП после устранения ринологической патологии у пациентов с жалобами на слезотечение безопасно, хорошо переносится ими, обеспечивая положительный дренажный эффект (I группа). Это позволяет рекомендовать препарат пациентам с нарушением слезоотведения в комплексном лечении нарушений оттока слезы.

✧ ***Ключевые слова:*** слезоотводящие пути; слезоотводящий аппарат; дренажный имплантат HEALAFLOW; околоносовые пазухи; эпифора; ринопатология.

INTRODUCTION

Epiphora is a significant health problem caused by disorders of the vertical portion of the lacrimal drainage system (LDS), including inflammation in the lacrimal sac mucosa or nasolacrimal duct and narrowing or other anatomical changes in this area [6]. Diseases of the nasal cavity and paranasal sinuses (PNS) play an important role in the pathogenesis of such lacrimation [4]. The role of nasal disorders in LDS pathology is now widely discussed. According to the literature, the most-frequent rhinogenic disorders are vasomotor rhinitis (14.5%) and nasal septal deviation (7.4%) [4]. Indeed, rhinitis with concomitant edematous nasal mucosa can cause mechanical compression of the lower segment of the nasolacrimal duct, which is possible if the nasolacrimal duct ends below the bony nasolacrimal canal [4, 6]. Later, other authors also demonstrated an association between excessive lacrimation and rhinogenic disorders, which was diagnosed in 60%–70% of cases [4]. There are several case reports describing the development of epiphora after nasal cavity and PNS surgeries, including those after endoscopic surgery. The risk of injury is closely associated with anatomical characteristics, disease stage and severity, results of previous surgeries, and experiences of the surgeons [3]. Cicatricial strictures and postoperative obliterations often develop in the nasolacrimal duct, becoming the main cause of dacryocystitis and dacryostenosis. Therefore, searching for new methods to prevent or eliminate rhinogenic epiphora (including those caused by surgical injury) is relevant.

This study aimed to assess the efficacy of the Healaflow® drainage implant (Aptissen, Switzerland) in patients with excessive lacrimation and various concomitant nasal disorders.

MATERIALS AND METHODS

The study included 29 patients (50 eyes) complaining of permanent (for >6 months) excessive lacrimation. The study population comprised of 9 males and 20 females aged between 20 and 63 years. All study participants had already undergone long-term treatment for lacrimation, ranging from instillation of various eye drops (including antibiotics, non-steroidal anti-inflammatory, lubricant, and hormonal drops) to

multiple LDS probings and irrigations (2 patients had undergone surgical extension of the lower lacrimal points). All patients underwent conventional ophthalmological and dacryological examinations, including color nasolacrimal test, tubular test, diagnostic LDS flushing, biomicroscopy of the anterior segment, and consultation of an otorhinolaryngologist with endoscopic examination of the nasal cavity. In addition, all patients underwent contrast-enhanced cone-beam computed tomography using the Galileos Comfort System (Sirona Dental Systems GmbH, Bensheim Germany) and Galaxis software. We used the Ultravist Contrast Media. The scanning parameters were as follows: 85 kV, 4 mA, 28 mA/s, isotropic voxel size of 0.15 mm, and effective dose of 70 μSv. The assessed volume was 15 cm^3. We used positioning along the orbitomeatal line. The scans were evaluated in the "MPR/X-ray examination" mode in 3 planes. We performed qualitative and quantitative assessment of the nasal structures, PNS, and LDS.

The results of LDS examination in 29 patients (50 eyes) are given in Table 1.

All 29 participants (50 eyes) demonstrated normal passive permeability of the LDS with minimal lacrimal dysfunction, as evidenced by delayed or negative results of the tests investigating active permeability.

All participants also complained on difficulty in nasal breathing and reduced olfaction. The following disorders were identified by an otorhinolaryngologist:

1) nasal septum deviation (functionally significant): 5 patients (Fig. 1, *a*);
2) swell body: 4 patients (Fig. 1, *b*);
3) *Concha bullosa*: 2 patients (Fig. 1, *c*);
4) vasomotor rhinitis: 18 patients (Fig. 1, *d*).

After nasal surgery, all patients underwent a control lacrimal syringing test. In the postoperative period, patients received 2 sprays of nasonex in each nostril for 1 month with gradual dosage decrease.

Next, all patients were divided into 2 groups: group I (study group) including 15 patients (28 eyes), and group II (control one) including 14 patients (22 eyes).

Patients from the study group were implanted with the Healaflow® drainage implant within 1 day of surgery (Figs. 2, *a*, *b*)

The control group participants received tobradex eye drops for 2 weeks, followed by lubricating eye drops for 1 month.

RESULTS AND DISCUSSION

The Healaflow® is a slowly absorbable drainage implant designed for glaucoma surgery. It is an isotonic, sterile, apyrogenic, viscoelastic, pure, colorless, and transparent gel containing reticular sodium hyaluronate and phosphate buffer (pH 7.0) [2]. It is an easy-to-handle seamless implant that is compatible with mitomycin C [1].

We used the following technique to place the Healaflow® implant into the lacrimal ducts:

1) the syringe was removed from the sterile packaging; the cannula from the package (similar to a disposable cannula used for lacrimal syringing test) was tightly fixed at the end of the syringe;
2) an anesthetic (Inokain or Alcaine) was instilled into the conjunctival sac twice at an interval of 3 min;
3) the patient was asked to sit down, look up, and press his chin to the chest. In this position, the cannula was introduced through the lower lacrimal point and then pushed forward through the lower lacrimal canal to the lateral wall of the nasal bone. Then, the gel was injected until it appeared in the lower nasal passage;
4) the cannula was slowly removed from the lower lacrimal canal while injecting the gel. To control the process of gel injection, we checked filling of the lacrimal sac with gel (by palpation) and gel escape from the lower lacrimal point (gel drops could also come out from the upper lacrimal point).

In group 1, 9 patients reported increased lacrimation during the first day after the implantation. The procedure was well tolerated by all participants in general.

The results of the control examination performed at 3 months after treatment completion are shown in Table 3.

Patients from both groups experienced improvement after nasal surgeries, including reduced lacrimation, improved nasal breathing, and better olfaction. The effect was more pronounced in patients from the study group. Out of 15 patients, 12 reported absence of excessive lacrimation, whereas remaining 3 patients reported reduced lacrimation. In the control

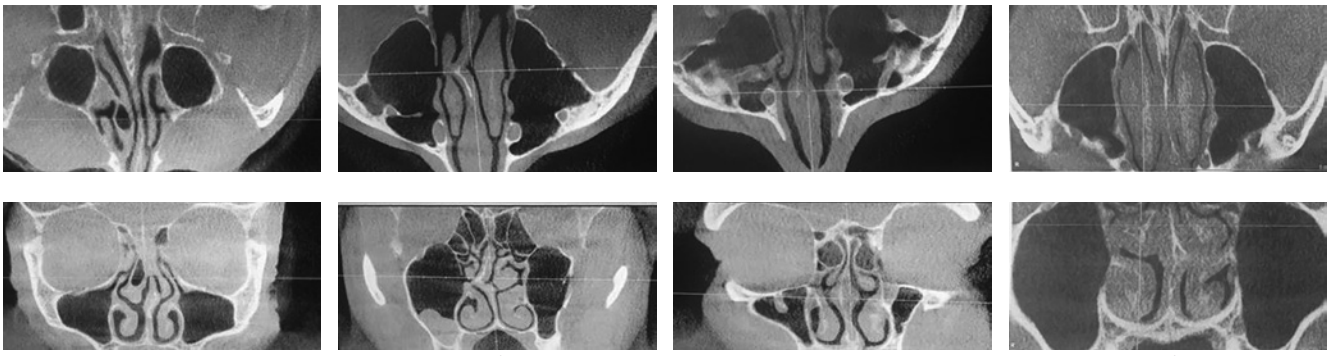
Table 1

The results of dacryology samples

Таблица 1

Результаты проведения дакриологических проб

Test	Results			Total (eyes)
	positive	delayed	negative	
Fluorescein dye disappearance test	44	6	–	50
Jones test I	14	26	10	50
Lacrimal syringing test	50	–	–	50



a *b* *c* *d*

Fig. 1. CBCT of the patient: *concha bullosa* right (*a*); nasal septum deflection to the right. Bilateral inferior nasal concha increase. Right maxillary sinus' cyst (*b*); Swell-body (*c*); bilateral middle and superior nasal concha increase (*d*)

Рис. 1. Конусно-лучевая компьютерная томография больных: *concha bullosa* справа (*a*); искривление носовой перегородки полости носа вправо. Увеличение в размерах нижних носовых раковин с двух сторон. Киста правой верхнечелюстной пазухи (*b*); Swell body (*c*); увеличение в размерах нижних и средних носовых раковин с двух сторон (*d*)

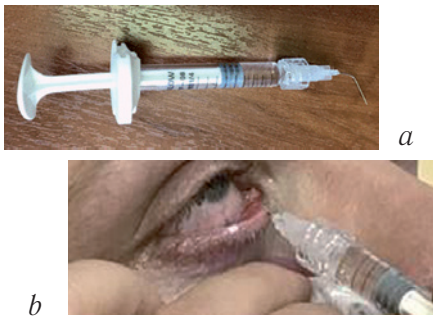
Table 2

Revealed pathology of the nasal cavity performed surgery to eliminate it

Таблица 2

Выявленная патология полости носа и оперативные вмешательства, выполненные для её устранения

Nasal disorder	Surgery
Nasal septum deviation (functionally significant)	Reconstruction of the nasal septum
Swell body	Laser surgery
Concha bullosa	Partial middle turbinectomy
Vasomotor rhinitis	Laser coagulation of inferior turbinates; lower submucosal vasotomy with disintegration and lateropexy



a

b

Fig. 2. Drain implant HELAFLOW (Aptissen, Switzerland): *a* — syringe with cannula; *b* — introduction of the drug in the tear-off pathways

Рис. 2. Дренажный имплантат HELAFLOW фирмы Aptissen (Швейцария): *a* — шприц с канюлей; *b* — введение препарата в слезоотводящие пути

Table 3

The results of the control examination after 3 months after treatment

Таблица 3

Результаты контрольного осмотра через 3 месяца после проведённого лечения по группам

Excessive lacrimation	Group I	Group II
None	12	7
Reduced	3	6
No change	–	1
Total (patients)	15	14

group, 7 patients showed no excessive lacrimation, 6 patients showed reduced lacrimation, and 1 experienced no changes. The Healaflow® implant could maintain the volume of the lacrimal ducts and prevent scarring due its long life-time in the LDS.

CONCLUSION

1. The use of the Healaflow® drainage implant in the LDS of patients with epiphora after nasal surgery is a safe and well-tolerated procedure that ensures a good drainage effect. It reduces the patient complaints of excessive lacrimation and improves the quality-of-life.
2. This is a simple and easily available method, without any side-effects.
3. We recommend this method for patients with lacrimal disorders and epiphora to improve the drainage effect as well as to prevent scarring in the complex treatment of lacrimation system impairments.

The authors declare no conflicts of interest related to the current manuscript.

Authors' contribution:

Research concept and study design: N.Yu. Beldovskaya, M.A. Shavgulidze, and S.A. Karpischenko.

Data collection and processing: N.Yu. Beldovskaya, M.A. Shavgulidze, and E.E. Farikova.

Data analysis and drafting the manuscript: N.Yu. Beldovskaya and E.E. Farikova.

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