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# Evaluation of the efficacy of upper eyelid gold implant surgery in the treatment of lagophthalmos

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## HIGHLIGHTS

This study presents the results of treating patients with upper eyelid lagophthalmos using gold implant insertion into the upper eyelid.

## ABSTRACT

**Material and method:** The study included 12 eyes of 12 patients, comprising 5 men and 7 women, with an average age of 55 years. Surgeries were performed on 6 right upper eyelids and 6 left upper eyelids affected by lagophthalmos due to various causes. The average duration of symptoms before surgery was 3 years and 6 months. Patients were eligible for surgery at least 6 months after the onset of paralysis. During the qualification examination, the weight of the implant was estimated using steel trial weights attached to the skin of the upper eyelid, and 0.2 g was added to this measured weight to determine the final implant weight. All patients underwent gold implant insertion into the upper eyelid, with the implants fixed to the tarsal plate using absorbable sutures to prevent prosthesis migration. Special attention was paid to precise layered tissue suturing. Subsequent ophthalmological examinations were conducted at various intervals post-surgery to evaluate the outcomes.

**Results:** Complete eyelid closure was achieved in 50% of the cases, while 100% of the patients reported subjective satisfaction with the surgical outcomes. The patients' quality of life improved by an average of 85%. The average frequency of using moisturizing eye drops decreased from 7 times daily to 2 times daily. Improvement in the ocular surface condition was noted in all patients.

**Conclusions:** Gold implant insertion into the upper eyelid facilitates improvement in eyelid function and ocular surface condition, significantly enhancing the quality of life for patients with paralytic lagophthalmos.

**Key words:** upper eyelid lagophthalmos, lagophthalmos, facial nerve paralysis, gold implants

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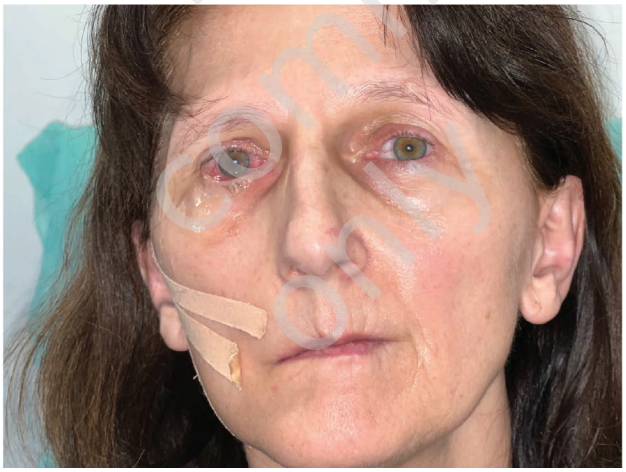
## INTRODUCTION

Upper eyelid lagophthalmos is a disorder characterized by incomplete or improper eyelid closure. Facial nerve paralysis is the most common cause of lagophthalmos. In 95% of cases, the paralysis is temporary, and eyelid function returns within a few weeks. However, permanent paralysis can lead to severe consequences due to the loss of protective functions provided by the upper eyelid. Lack of proper tear film distribution over the ocular surface predisposes patients to chronic conjunctivitis and dry eye syndrome. Exposure keratopathy, associated with the drying of the ocular surface, can lead to ulceration, perforation, and even vision loss (fig. 1). The loss of eyelid function forces patients to frequently moisturize the ocular surface, which is burdensome, frustrating, and often ineffective according to most patients. Vision disturbances, burning sensations, and tearing often prevent patients from working or performing daily activities. Additionally, patients are dissatisfied with their appearance and are reluctant to use moist chambers continuously, desiring a quick return to normal functioning. These factors contribute to additional anxiety and depressive disorders.

FIGURE 1

Exposure keratopathy.



In the United States, paralytic upper eyelid lagophthalmos affects 30 to 40 people per 100,000 annually [1–3]. In Poland, it is estimated that approximately 1,000 patients face this issue yearly. The facial nerve consists of about 10,000 fibers and innervates 15 muscles, including facial expression muscles like the forehead muscles, corrugator supercilii, orbicularis oculi, stapedius, auricular, mentalis, and platysma muscles. Sensory fibers are responsible for taste sensations from the tongue. Parasympathetic (secretory) fibers control the function of the submandibular and sublingual glands, minor palatine and oral glands, and tear secretion from the lacrimal gland. Eyelid closure is facilitated by the orbicularis oculi muscle [4]. The most common cause of upper eyelid lagophthalmos (80%) is facial nerve paralysis. The causes of facial nerve paralysis are listed in table 1. Other causes of lagophthalmos include cicatricial lagophthalmos (related to eyelid scarring due to trauma, burns etc.), nocturnal lagophthalmos (eyelid opening during sleep), and incomplete blinking in conditions like Parkinson's disease or myotonic dystrophy [1, 2].

The House–Brackmann scale is commonly used for clinical evaluation of facial nerve paralysis, allowing assessment of the degree of nerve damage and tracking the healing process. The scale includes 6 degrees of nerve damage:

**I degree** (normal function) – normal function of all facial muscles.

**II degree** (slight weakness) – normal symmetry and tone at rest; complete eye closure with minimal effort; slight mouth asymmetry.

**III degree** (moderate weakness) – visible asymmetry during movements; synkinesis, contractures, or hemifacial spasm present; normal symmetry at rest; impaired forehead muscle function, complete eye closure with effort, mouth asymmetry during movements.

**IV degree** (significant weakness) – marked asymmetry during movements; symmetry and tone at rest; lack of forehead muscle movements; incomplete eyelid closure; mouth asymmetry even with maximal effort.

**V degree** (severe weakness) – barely perceptible movements; facial asymmetry at rest; lack of forehead muscle movements; incomplete eyelid closure; minimal mouth movements.

**VI degree** (total paralysis) – no movements [5] (fig. 2, 3).

FIGURES 2, 3

V degree paralysis.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Treatment methods for upper eyelid lagophthalmos are divided into non-surgical and surgical approaches. Non-surgical methods include using moisturizing eye drops, artificial tear preparations, soft contact lenses, protective tape, patches or plastic wrap, occlusive moisturizing chambers, scleral contact lenses, and external eyelid weights (fig. 4–7).

The therapeutic value of self-massage, relaxation, and breathing exercises combined with facial movements and pronunciation of letters and words has also been confirmed. Some practitioners use botulinum toxin for treating paralytic lagophthalmos, causing temporary ptosis of the upper eyelid. Such injections into the levator palpebrae muscle reduce its contraction, allowing better eye closure. Unfortunately, botulinum toxin's effect is temporary, making it less valuable for permanent paralysis. Surgical methods include tarsorrhaphy (partial eyelid suturing to narrow the palpebral fissure), gold implant insertion into the eyelid, and levator resection (in patients with eyelid retraction-related lagophthalmos) [1–3, 6]. This study describes the results of treating upper eyelid lagophthalmos with gold implant insertion.

## MATERIAL AND METHODS

This is a retrospective study that included 12 eyes from 12 individuals, consisting of 5 men and 7 women, with an average age of 55 years. 6 right upper eyelids and 6 left upper eyelids, affected by incomplete closure due to various causes, were operated on. The average duration of symptoms before the surgery ranged from 3 years to 6 months. Patients were eligible for surgery at least 6 months after the onset of paralysis. During the preoperative assessment, the weight of the implant was estimated using steel probes attached to the skin of the upper eyelid. An additional 0.2 g was added to the determined weight to finalize the implant weight (fig. 8–10). In all patients, a gold implant was inserted into the upper eyelid and secured with absorbable sutures to the tarsal plate to limit prosthesis migration. Special attention

FIGURES 4–7

Non-surgical methods for treating upper eyelid lagophthalmos.

FIGURE 8

Gold implants.

FIGURES 9, 10

Estimating the weight of the implanted prosthesis using steel probes.

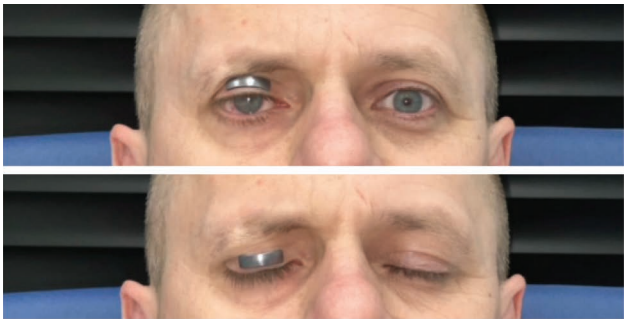


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TABLE 1

Causes of facial nerve paralysis.

| | |
|---|---|
| Infection | • Otitis (external, otitis media)<br>• Mastoiditis<br>• Viral (Herpes simplex, Herpes zoster, influenza, coxsackievirus, polio, mumps, mononucleosis)<br>• Bacteria (tuberculosis, syphilis, leprosy, cat scratch disease, Lyme disease, botulism)<br>• Fungal (mucormycosis)<br>• Immunocompromised (AIDS) |
| Trauma | • Facial injuries<br>• Birth trauma<br>• Fractures to the skull base, temporal bone fracture |
| Tumour | • Parotid lesion<br>• Cholesteatoma<br>• Facial nerve tumor<br>• Schwannoma<br>• Teratoma<br>• Neurofibromatosis type 2<br>• Fibrous dysplasia<br>• Haemangioblastoma<br>• Acoustic neuroma<br>• Sarcoma<br>• Leukemia<br>• Meningioma<br>• Carcinoma (primary or metastatic) |
| Metabolic | • Diabetes mellitus<br>• Hypertension<br>• Vitamin A deficiency<br>• Hyperthyroidism |
| Toxic | • Thalidomide<br>• Alcohol excess<br>• Arsenic<br>• Tetanus<br>• Diphtheria<br>• Carbon monoxide |
| Iatrogenic | • Parotid surgery<br>• Mastoid surgery<br>• Post-immunization<br>• Post-tonsillectomy/adenoidectomy<br>• Embolization<br>• Mandibular block anesthesia<br>• Antitetanus serum<br>• Dental surgery<br>• Eyelid surgery (excessive tissue removal from blepharoplasty)<br>• Squint surgery (vertical muscle recession surgery) |
| Neurological | • Millard–Gubler syndrome<br>• Foix–Chavany–Marie syndrome |
| Congenital | • Mobius syndrome<br>• Goldenhar syndrome<br>• Ichthyosis |
| Idiopathic | • Bell's palsy<br>• Amyloidosis<br>• Temporal arteritis<br>• Guillain–Barre syndrome<br>• Multiple sclerosis<br>• Myasthenia gravis<br>• Sarcoidosis<br>• Osteopetrosis<br>• Thrombotic thrombocytopenic purpura<br>• Hereditary hypertrophic neuropathy<br>• Melkersson–Rosenthal syndrome |

was given to the precise layered suturing of the tissues. Subsequently, each patient underwent an ophthalmological examination at different intervals from the surgery date to assess the outcomes of the procedure. All gold implant insertion procedures were performed under analgosedation by the same surgeon.

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## SURGICAL TECHNIQUE

Anesthetizing the eyelid skin with 2% lidocaine. Marking the incision line on the upper eyelid skin at the level of the upper edge of the tarsal plate (fig. 11, 12). Placing traction sutures on the edge of the upper eyelid. Making a linear incision in the designated area of the upper eyelid skin and separating the skin from the fibers of the orbicularis muscle. Incising the orbicularis muscle, dissecting the tarsal plate, and creating a pocket for the implant (fig. 13). Marking the implant hole locations on the surface of the tarsal plate. Fixing the implant (of the previously calculated weight) to the tarsal plate with 3 sutures approximately 1 mm medial to the center of the eyelid (fig. 14). Placing absorbable 8.0 sutures on the orbicularis muscle and non-absorbable sutures on the skin.

FIGURES 11, 12

Marking the incision line on the upper eyelid skin at the level of the upper edge of the tarsal plate.

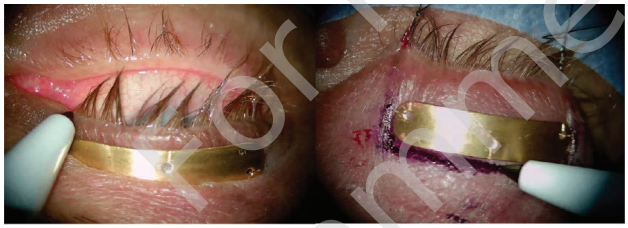
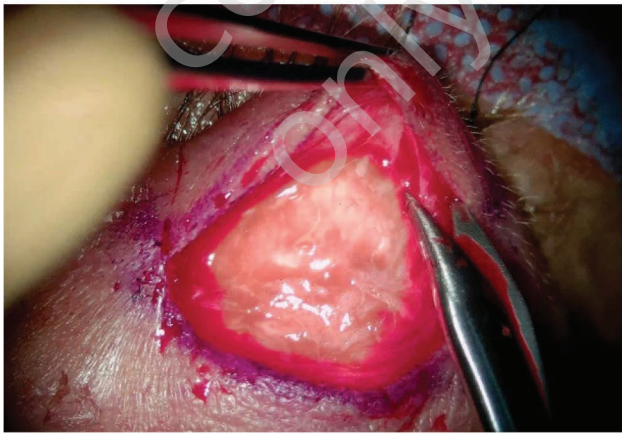


FIGURE 13

Dissecting the tarsal plate.



Postoperatively, patients were advised to use eye drops containing levofloxacin and dexamethasone, and an ointment containing gentamicin and dexamethasone on the eyelid for a period of 3 weeks. Subsequently, at different times from the surgery date, each patient underwent a medical interview to assess the outcomes of the procedure. Patients were informed about the purpose of the meeting and gave informed consent to participate in the study. Each participant answered the same 12 questions (tab. 2).

FIGURE 14

Fixing the implant to the tarsal plate with sutures.

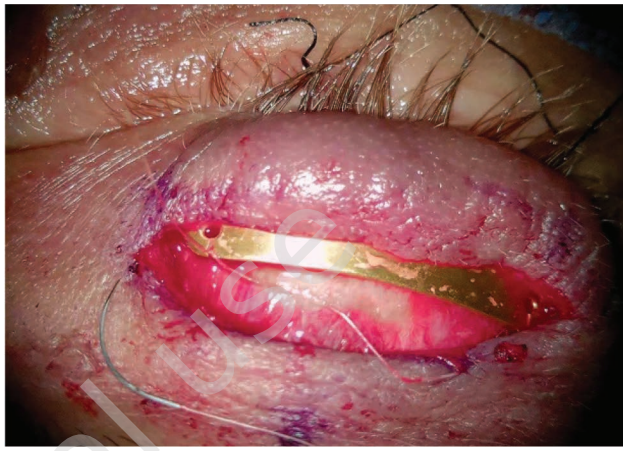


FIGURE 15

Placing absorbable sutures on the orbicularis muscle.

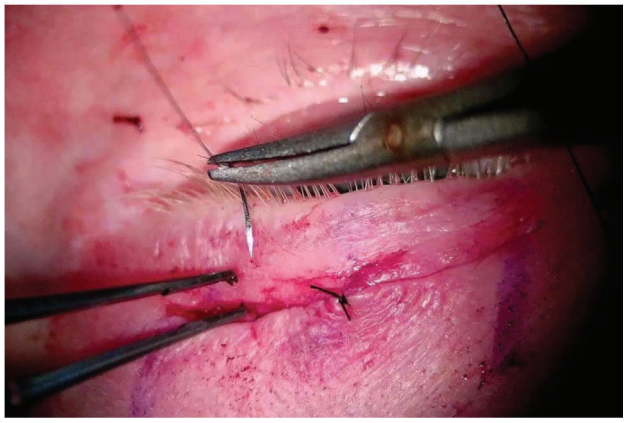
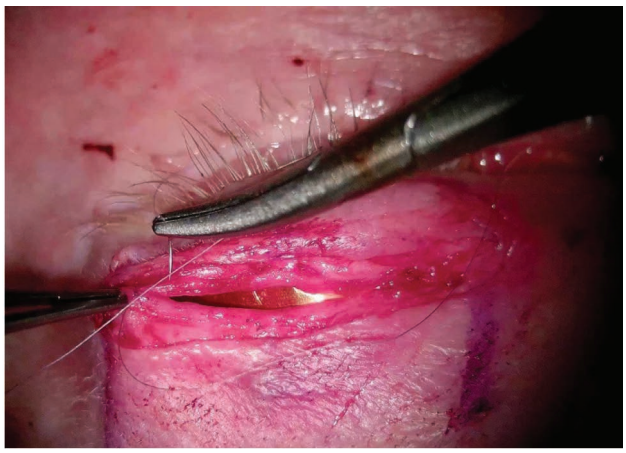


FIGURE 16

Placing non-absorbable sutures on the eyelid skin.



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1. Duration of the disease before surgery.
2. Cause of VII nerve paralysis.
3. Implant weight.
4. Frequency of using drops/other treatments before surgery.
5. Frequency of using drops/other treatments after surgery.
6. Severity of symptoms before surgery (0 – no symptoms, 10 – maximum severity of symptoms).
7. Severity of symptoms after surgery (0 – no symptoms, 10 – maximum severity of symptoms).
8. Complete eyelid closure.
9. Presence of a scar.
10. Discomfort caused by the implant.
11. Satisfaction with the surgical outcome.
12. Improvement in quality of life (0–100%).

## RESULTS

Before the surgery, 100% of the study participants used intensive moisturizing treatments for their eyes. 5 individuals used a humid chamber for many hours each day in addition to drops, while 1 person taped their eye shut at night. All participants used moisturizing drops or ointments an average of 7 times a day.

After the surgery, 4 individuals reported not using any treatment, 1 person described it as occasional, 1 used a humid chamber (only at night) and drops 4 times a day during the day, and the remaining 6 individuals used only drops an average of 2 times a day. Before the surgery, 9 patients rated the severity of their symptoms (0 – no symptoms, 10 – maximum severity) at 10 points, 1 person at 9 points, and 2 people at 8 points. After the surgery, 10 patients rated this aspect at 2 points, 1 person at 3 points, and 1 person at 0 points. Half of the patients achieved complete eyelid closure (fig. 17–20). Only 1 person reported the presence of a scar, describing it as minimal. None of the participants

TABLE 2

Patient responses to questions.

| Patients | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | P10 | P11 | P12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age | 73 | 69 | 47 | 66 | 44 | 31 | 23 | 79 | 78 | 46 | 42 | 58 |
| Sex | M | F | F | F | F | M | M | F | M | M | F | F |
| Eye | R | L | R | L | R | R | L | L | L | R | L | R |
| 1. | 1 year | 3 years | 2 years | 25 years | 1 year | 4 years | 6 months | 6 months | 2 years | 1 year | 3 year | 6 months |
| 2. | postoperative | postoperative | postoperative | postoperative | trauma | trauma | trauma | postoperative | stroke | congenital | postoperative | postoperative |
| 3. | 1.4 g | 1.2 g | 1.4 g | 1.2 g | 1.8 g | 1.9 g | 1.8 g | 1.6 g | 1.6 g | 1.6 g | 1.6 g | 1.6 g |
| 4. | 3 times a day drops | moist chamber during the day, drops | 20 times a day drops, moist chamber during the day and at night, sealing the eye at night | 3–4 times a day drops | 8 times a day drops and gels, sealing the eye at night | 2 times a day drops | 12–15 times a day drops | moist chamber during the day and at night, 3 times a day drops | 4 times a day drops, taping the eye at night | 3 times a day drops | moist chamber for sleep, several dozen drops a day | moist chamber during the day and at night, ointment every hour |
| 5. | no treatment | 2–3 times a day drops | 3 times a day drops | occasionally drops | 1–2 times a day drops | no treatment | 2–3 times a day drops | 2 times a day drops | no treatment | no treatment | 3 times a day drops | 4 times a day drops, chamber damp at night |
| 6. | 10 | 10 | 10 | 10 | 10 | 8 | 10 | 10 | 10 | 10 | 8 | 9 |
| 7. | 2 | 2 | 2 | 0 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 |
| 8. | no | no | yes | yes | no | yes | no | no | no | yes | yes | yes |
| 9. | no scar | no scar | minimal | no scar | no scar | no scar | no scar | no scar | no scar | no scar | no scar | no scar |
| 10. | no | no | no | no | no | no | no | no | no | no | no | no |
| 11. | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes | yes |
| 12. | 85% | 95% | 99% | 100% | 85% | 80% | 100% | 80% | 90% | 80% | 80% | 50% (short period after the procedure) |

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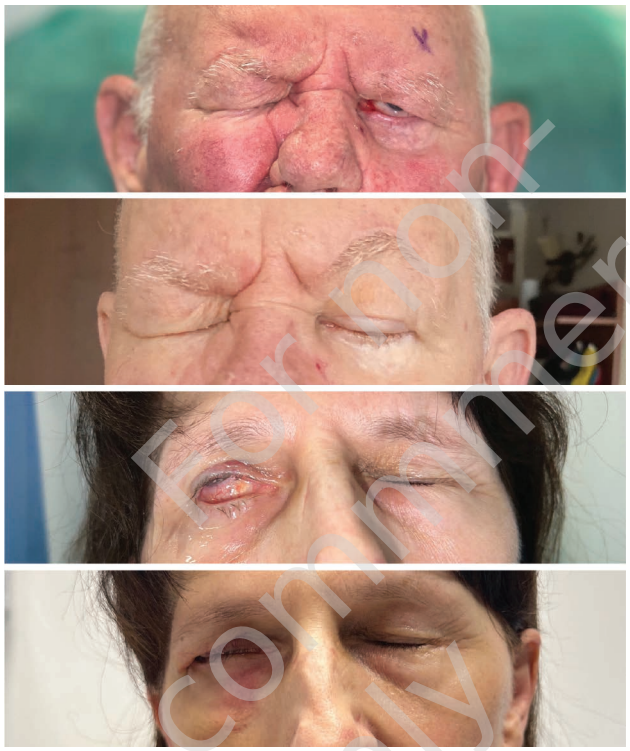
reported discomfort caused by the implant. 100% of the patients declared satisfaction with the surgical outcomes. According to the patients, their quality of life improved by an average of 85%. The weight of the implanted prosthesis ranged from 1.2 g to 1.9 g. None of the patients regretted their decision.

FIGURES 17–20

Photos of patients before and after the implantation of a gold eyelid implant. Complete eyelid closure was achieved.



## CONCLUSIONS

Upper eyelid incomplete closure is a clinically significant condition requiring prompt and effective treatment, as prolonged corneal exposure can lead to keratopathy, abrasions, ulcers, and ultimately blindness. One method of treating upper eyelid incomplete closure is the implantation of a gold prosthesis, which closes the eyelid through gravitational action.

In 2004, a prospective cohort study was conducted in the UK involving 22 patients with upper eyelid incomplete closure due to unilateral facial nerve paralysis, who received a gold plate implant. Complete eye closure post-surgery was achieved in 18 patients (82%). Documented complications occurred in 5 patients (23%) – 2 patients had implants removed due to infection, 2 patients experienced excessive eyelid drooping requiring implant replacement with a lighter one, and 1 patient had lateral implant migration. During long-term follow-up, 14 patients completed a more detailed questionnaire. All patients noted improvement in eye closure post-surgery. Overall satisfaction with the procedure was high – 11 patients (79%) reported satisfaction (satisfied or very satisfied) with comfort, and 12 (86%) were satisfied with eye function. 57% were satisfied with the cosmetic appearance [7].

In a 2009 clinical study involving 16 eyelids with incomplete closure, no intraoperative or immediate postoperative complications occurred. 1 implant (6%) was extruded, and 1 patient (6%) had residual incomplete closure requiring a heavier implant. 15 out of 16 patients were satisfied with the outcome, and all had adequate eyelid closure at the last follow-up [8]. The results presented above are consistent with those obtained by our center.

Considering the results of the above studies and primarily evaluating the procedure's effectiveness (eyelid closure), resolution of symptoms related to corneal exposure, and patient satisfaction, gold eyelid implant surgery can be considered an effective and safe procedure with a low rate of postoperative complications. The vast majority of patients declared satisfaction with the surgical outcomes, both in terms of eye function and good aesthetic results. However, other symptoms associated with facial nerve paralysis should not be forgotten.

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## *References*

1. Fu L, Patel BC. Lagophthalmos. 2023 Jul 24. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024 Jan.
2. Pereira MV, Glória AL. Lagophthalmos. Semin Ophthalmol. 2010; 25(3): 72-8. http://doi.org/10.3109/08820538.2010.488578.
3. Nowak-Gospodarowicz I, Różycki R, Rękas M. Quality of Life in Patients with Unresolved Facial Nerve Palsy and Exposure Keratopathy Treated by Upper Eyelid Gold Weight Loading. Clin Ophthalmol. 2020; 14: 2211-22. http://doi.org/10.2147/OPTH.S254533.
4. Kochhar A, Larian B, Azizzadeh B. Facial Nerve and Parotid Gland Anatomy. Otolaryngol Clin North Am. 2016; 49(2): 273-84. http://doi.org/10.1016/j.otc.2015.10.002.
5. Spencer CR, Irving RM. Causes and management of facial nerve palsy. Br J Hosp Med (Lond). 2016; 77(12): 686-91. http://doi.org/10.12968/hmed.2016.77.12.686.
6. Vásquez LM, Medel R. Lagophthalmos after facial palsy: current therapeutic options. Ophthalmic Res. 2014; 52(4): 165-9. http://doi.org/10.1159/000365519.
7. Lavy JA, East CA, Bamber A et al. Gold weight implants in the management of lagophthalmos in facial palsy. Clin Otolaryngol Allied Sci. 2004; 29(3): 279-83. http://doi.org/10.1111/j.1365-2273.2004.00817.x.
8. Baheerathan N, Ethunandan M, Ilankovan V. Gold weight implants in the management of paralytic lagophthalmos. Int J Oral Maxillofac Surg. 2009; 38(6): 632-6. http://doi.org/10.1016/j.ijom.2009.03.718.

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**Authors' contributions:**
Katarzyna Różycka: study concept development, recruitment of the study group, data analysis, table preparation, manuscript preparation.
Radosław Różycki: study concept development, patient clinical examination, text revision, taking photographs for the text.
Krystian Bakalarski, Małgorzata Różycka, Piotr Nesterowicz, Alan Chamernik, Katarzyna Ulaszewska, Kacper Kranc: patient clinical examination, assistance in manuscript preparation.
All authors have read and agreed to the published version of the manuscript.

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The content presented in the article complies with the principles of the Helsinki Declaration, EU directives and harmonized requirements for biomedical journals.


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