

# The results of surgical treatment to correct eyelid retraction with blepharotomy – preliminary report



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## HIGHLIGHTS

Among 10 individuals undergoing upper eyelid retraction surgery, the average satisfaction rate is 8/10. The blepharotomy procedure is effective.

## ABSTRACT

The study presents early results of the surgical treatment of patients with fixed upper eyelid retraction exceeding 1 mm as a complication of Graves' disease, trauma, or high myopia.

10 patients (8 women and 2 men), with an average age of 45, participated in the study. A total of 17 upper eyelids were operated on using the full-thickness blepharotomy method. According to the EUGOGO scale for the surgery 2 patients had mild retraction, 7 – moderate retraction, and 1 – severe retraction. The procedures were performed under local anesthesia, following current knowledge and described operative techniques.

Each operated patient achieved both aesthetic and functional improvement compared to the baseline. The results were evaluated based on the reduction of the upper eyelid relative to the corneal limbus, reaching a level covering the corneal limbus. The average satisfaction score obtained was 8 points in 0–10-point scale.

Blepharotomy is an effective therapeutic procedure for upper eyelid retraction, reducing eye exposure symptoms and restoring a normal appearance of the eyelids. The procedure has rare serious side effects, and patients are content with the results.

**Key words:** blepharotomy, eyelid retraction, orbitopathy, Graves' disease, ophthalmic surgery

## INTRODUCTION

Eyelid retraction is a condition in which the sclera is exposed above or below 1 mm from the corneal margin. It most commonly affects the upper eyelids, and among the population with thyrotoxicosis, the condition affects 0.5% of women and 0.05% of men. Patients suffering from Graves' disease are particularly prone to eyelid retraction [1], with approximately 30% of them experiencing clinical orbitopathy. As a result of eyelid retraction and exposure of the cornea, many patients experience difficulty in closing their eyelids, leading to symptoms of exposure, such as conjunctival irritation, blurred vision, photophobia, a foreign body sensation, keratopathy, or corneal ulceration [2]. Additionally, eye protection is less effective because these patients blink less frequently and more slowly [3]. Often, patients suffer from psychosocial problems [4] related to the unacceptable appearance of their eyes. Eyelid retraction gives the patient's eyes a protruding appearance, making them seem fearful and aggressive. Therefore, patients with this condition tend to avoid social interactions and struggle with appearance-related insecurities.

The severity of orbitopathy is classified according to the EUGOGO scale (European Group on Graves' Orbitopathy) in 2021 (tab. 1) [5] based on the degree of advancement. Clinical examples of different degrees of advancement are presented in photographs (fig. 1, 2). Depending on the severity, clinicians aim to tailor pharmacological or surgical treatment to each patient [6].

FIGURE 1

Bilateral moderate eyelid retraction.



FIGURE 2

Unilateral mild eyelid retraction.

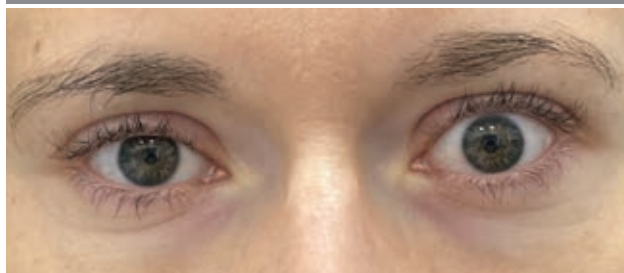


TABLE 1

Classification of EUGOGO Severity.	
Mild	Slight retraction of the eyelid < 2 mm
	Eye protrusion < 3 mm above normal
	Absence or occasional double vision
	Corneal dryness responsive to moisturizing agents
Moderate	Retraction of the eyelid > 2 mm
	Eyelid protrusion > 3 mm above normal
	Intermittent or constant double vision
Severe	Optic nerve neuropathy
	Corneal damage

## MATERIALS AND METHODS

### Study group

Ten patients, with an average age of 45 ( $\pm 9$ ) years, were included in the study, and their characteristics are described in table 2 (tab. 2). Upper eyelid retraction occurred unilaterally in 3 patients and bilaterally in 7 patients, attributed to Graves' disease, trauma, or high myopia. A total of 17 eyelids were operated on in 8 women and 2 men. The degree of eyelid retraction was assessed using the EUGOGO scale, classifying 1 patient with severe retraction, 7 with moderate retraction, and 2 with mild retraction. Full blepharotomy of the eyelid or upper eyelids was performed on all patients by the same surgeon at the Orbita Medical Center in Warsaw. The procedures were carried out under local anesthesia to facilitate patient cooperation with the operator and to correct eyelid positioning during eye movement. Results were evaluated based on the reduction of the eyelid relative to the corneal margin. Follow-up assessments were conducted on the day of suture removal, 10 days post-surgery, and at 1<sup>st</sup>, 3<sup>rd</sup>, and 6<sup>th</sup> months post-surgery. Additionally, the patient's subjective satisfaction level with the outcome of the procedure was assessed on a scale from 0 to 10, with 0 points indicating the worst aesthetic and functional outcome and 10 points indicating the best aesthetic and functional outcome.

### Surgical technique

Incisions were made in the eyelid crease, followed by sequential incision of the orbicularis muscle and the orbital septum, approaching carefully towards the conjunctiva. Using a Desmarres' retractor, the upper eyelid was inverted, and a full blepharotomy was performed by cutting the conjunctiva while preserving an uncut "bridge" in the corneal projection. The extent of tissue incision was checked by positioning the patient upright and assessing the degree of eyelid lowering. The skin incision was then closed with 6.0 silk sutures (fig. 3–8). A contact lens dressing was applied to the cornea until suture removal to minimize pain symptoms. A compressive dressing applied for 24 h minimized

TABLE 2

Characteristics of patients.					
Patient	Age	Gender	Degree of retraction	Cause	Subjective assessment of the procedure outcome on a scale from 0 (poor result) to 10 (excellent result)
1	48	Male	Mild	Trauma	6
2	56	Male	Severe	Graves' disease	6
3	41	Female	Mild	High myopia	9
4	43	Female	Moderate	Graves' disease	7
5	40	Female	Moderate	Graves' disease	9
6	48	Female	Moderate	Graves' disease	7
7	52	Female	Moderate	Graves' disease	10
8	38	Female	Moderate	Graves' disease	10
9	39	Female	Moderate	Graves' disease	9
10	45	Female	Moderate	Graves' disease	7

blood leakage and swelling of the operated tissues. Sutures from the eyelid skin were removed after 10 days. Results were evaluated based on the reduction of the eyelid relative to the corneal margin. Example documentation from the procedure is presented in photos (fig. 3–8).

FIGURE 3

Bilateral moderate eyelid retraction.



FIGURE 4

Bilateral moderate eyelid retraction.



FIGURE 5

Unilateral mild eyelid retraction.



FIGURE 6

Unilateral mild eyelid retraction.



## RESULTS

In all patients, a reduction of the upper eyelid to the level covering the corneal margin was achieved. The average satisfaction score for the obtained results on a scale from 0 to

FIGURE 7

Bilateral moderate eyelid retraction.



FIGURE 8

Bilateral moderate eyelid retraction.



FIGURE 9

Unilateral mild eyelid retraction.

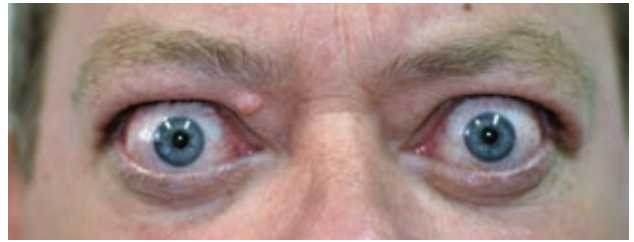


FIGURE 10

Unilateral mild eyelid retraction.



FIGURE 11

Bilateral moderate eyelid retraction.



FIGURE 12

Unilateral mild eyelid retraction.



10 was 8 points (tab. 1). The aesthetic results of the surgery were documented in photos (fig. 9–13). Among the adverse events, ptosis was observed in 3 patients, and 6 cases experienced lymphatic stasis lasting more than 2 months. One patient was dissatisfied due to a too high eyelid crease causing asymmetry in the appearance of both eyes. The best subjective outcome, according to patient assessment, was achieved by a patient with mild and moderate retraction in the course of Graves' disease. The patient with post-traumatic retraction gave the lowest postoperative score – despite the mild degree of advancement, post-traumatic tissue has unfavorable conditions for healing, as it tends to result in increased scarring. A significant postoperative effect is that all patients reported a reduction or complete discontinuation of eye moisturizing drops, indicating more efficient eyelid function.

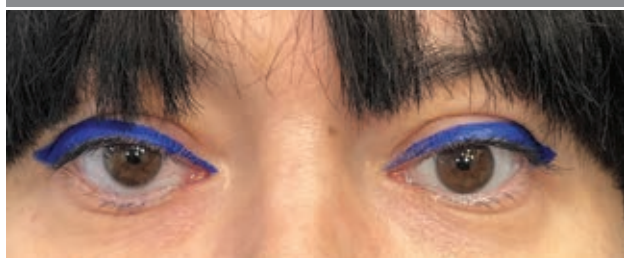
## DISCUSSION

Mechanisms of eyelid retraction are likely multifactorial. It is believed that patients with thyroid diseases experience

excessive stimulation of the sympathetic nervous system, leading to eyelid retraction [7], along with perivascular infiltration of lymphocytes in the dermis [8]. The clinical condition associated with Graves' disease may affect the Müller muscle, causing inflammation and fibrosis [9], as well as enlargement of the levator palpebrae muscle [10]. Another

FIGURE 13

Unilateral mild eyelid retraction.



contributing factor is the weakened force of the orbicularis oculi muscle and excessive activity of the levator muscle [11]. Here are also other causes of clinical orbitopathy and eyelid retraction, including:

- congenital and familial factors [12]
- myasthenia gravis [13]
- high myopia
- orbital tumors
- use of sympathomimetics, and
- trauma [14].

Due to not fully understood pathomechanisms and hypotheses, there is no ideal method for treating eyelid retraction. The treatment algorithm involves orbital decompression in cases of worsening vision and strabismus correction in the presence of double vision. Subsequently, when eyelid retraction is present, surgical intervention is recommended [15]. There is a possibility of performing a single-stage treatment without decompression and strabismus correction [16]. The history of surgical procedures used in upper eyelid retraction dates back to 1934, when the removal of the levator palpebrae superioris muscle was described as a therapeutic method. In 1965, the first surgical method involving the removal of both the levator muscle and the Müller muscle was developed [17]. These and subsequent procedures were characterized by the unpredictability of the outcome, and clinicians have been striving to find the ideal method to date. Putterman, in an effort to refine Müllerectomy, described the procedure using local anesthesia and observing eyelid movements during surgery. He noted that not all patients required the removal of the levator muscle, and leaving the conjunctiva incompletely sutured was a viable option [18]. A retrospective review examining the effect of transconjunctival recession of the Müller muscle and gradual levator recession on 107 eyelids demonstrated less than 10% failures, which were corrected by reoperation.

A contemporary method is blepharotomy, described in 2005 [19] involving a full-thickness incision of the eyelid with the central part of the conjunctiva left intact. Assessing the outcomes of 32 operations on 50 eyelids of varying

severity, the effectiveness of blepharotomy was estimated at 93% [20]. Postoperative effects compared to the preoperative state showed an increase in satisfaction with the quality of life, a reduction in conjunctival and eyelid closure symptoms, and symmetrical alignment of eyelid fissures in 92% of patients [21]. Unfortunately, it is not a universal procedure; for Asian patients, due to anatomical differences in eyelid crease placement, modification of the procedure is necessary. In most cases, Müller muscle is only cut from the conjunctival side, known as Müllerotomy. The absence of surgical incision on the skin side does not alter the position of the natural eyelid crease [22]. While success rates are high in cases of retraction associated with Graves' disease, surgical techniques are supplemented with the need for tissue grafts in cases of post-traumatic, scar-related, or tissue-deficient retraction, often using tissue from the upper eyelid or hard palate. In our study, this hypothesis proved to be true, as the lowest subjective assessment was assigned after surgery for post-traumatic retraction. Rarely (in approximately 2% of patients), blepharotomy may be associated with complications such as subsequent eyelid drooping or wound dehiscence [23], and postoperative asymmetry exceeding 1 mm occurs in only 3% of patients. Due to the cutting of lymphatic vessels during full-thickness blepharotomy, lymphatic drainage and lymphatic stasis occur [24], and patients should be informed about this. This condition, similar to what occurred in our patients, lasts for approximately a year. The best results are achieved when the retraction is initially mild, the thyroid disease is of relatively short duration, and there is no significant tissue fibrosis. Similar results were obtained in our patients, with the best outcome observed in mild retraction. Decades after the description of Henderson's operation, it has been demonstrated that leaving the conjunctiva unsutured is a significant part of the procedure. It eliminates eyelid elevation due to fibrosis of the conjunctival substantia propria, allows blood drainage and better healing, and also protects the patient from pain associated with the uneven posterior surface of the operated eyelid. Non-surgical methods used in the treatment of upper eyelid retraction include injections of triamcinolone, botulinum toxin, hyaluronic acid, or biological treatment [25].

## CONCLUSIONS

The blepharotomy procedure performed in cases of upper eyelid retraction proves to be an effective method for treating this condition. It allows for the reduction or elimination of exposure-related eye symptoms and restores a normal appearance to the eyelids. A positive aspect is the rare occurrence of serious side effects, along with the option for reoperation and result improvement. This procedure facilitates an improvement in the quality of life and well-being of patients. Additionally, the blepharotomy procedure is

relatively simple and quick, and it can be performed under local anesthesia. None of the operated patients regretted the decision to undergo surgery, confirming a high subjective assessment score (8 points) of the procedure's outcome. Considering its high effectiveness and the limited amount of qualitative scientific evidence, it is advisable for researchers and surgeons to invest more time in refining

and describing the blepharotomy method. This procedure holds great promise for patients suffering from upper eyelid retraction.

*Figures: The images of the surgical procedure are sourced from the archive of Radosław Różycki, MD, PhD.*

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Resources: M.R.

Data curation: R.R., K.U.

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Writing – review and editing: R.R. K.U., K.R., A.C., M.R., P.N.

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Project administration: K.U.

**Conflict of interest:**

None.

**Financial support:**

None.

**Ethics:**

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