

OPHTHALMOLOGY: INTERNATIONAL SCIENTIFIC CONFERENCE ON MEDICINE AND HEALTH SCIENCES OF THE UNIVERSITY OF LATVIA, 2026

On 26 March 2026, the University of Latvia hosted the International Scientific Conference on Medicine and Health Sciences.

The section “Ophthalmology” features a collection of abstracts that highlight diverse developments in surgical techniques, advanced diagnostic imaging, and the ocular manifestations of systemic diseases. These studies emphasise a transition toward precision medicine through the evaluation of novel interventions and the identification of early biomarkers for chronic eye conditions.

A significant portion of the research evaluates surgical efficacy and postoperative outcomes. Studies compare modern interventions, such as CO₂ laser blepharoplasty against conventional scalpel surgery, noting improvements in procedural efficiency and haemostasis. In the field of vitreoretinal surgery, different internal limiting membrane (ILM) peeling techniques — standard, “plug-in”, and temporal inverted flap — are analysed for their effectiveness in treating long-standing macular holes, revealing significant improvements in visual acuity across all methods. Glaucoma management is also a primary focus, with research examining intraocular pressure (IOP) fluctuations following Gonioscopy-Assisted Transluminal Trabeculotomy (GATT) versus trabeculectomy. Furthermore, the long-term impact of GATT on cataract development is explored, alongside a four-year analysis of surgical trends that highlights a shift toward non-incisional options like micropulse cyclophotocoagulation.

Diagnostic advancements and biomarkers form another central theme. Several abstracts investigate the role of Optical Coherence Tomography Angiography (OCTA) in detecting early microvascular and neurodegenerative changes in diabetic retinopathy, correlating these findings with advanced glycation end products (AGEs) and retinal nerve fibre layer (RNFL) thickness. Additionally, the functional impact of optic nerve head drusen is assessed through electrophysiological tools like pVEP and mfERG, which reveal subclinical conduction defects even when visual acuity remains intact.

Finally, the section addresses the ocular implications of broader health challenges, specifically evaluating the frequency and severity of ophthalmic complications following COVID-19 infection, such as retinal oedema and optic neuritis. Collectively, this section illustrates the vibrant and interdisciplinary nature of ophthalmic research, integrating clinical surgical experience, sophisticated diagnostic insights, and population-based perspectives to improve patient care.

Kristīne Baumanė

SURGICAL TREATMENT OF SECONDARY GLAUCOMA: A FOUR-YEAR ANALYSIS OF SURGICAL TRENDS AT RĪGA EAST CLINICAL UNIVERSITY HOSPITAL (2021–2024)

Kristine Baumanē^{1,2}, Gunta Blezūra-Ūdre^{1,2}, Elīza Briede^{1,2}, Beate Pēterfelde^{1,2}

¹ Ophthalmology Clinic, Rīga East Clinical University Hospital, Rīga, LATVIA; kbaumane75@gmail.com

² Faculty of Medicine and Life Sciences, University of Latvia, Rīga, LATVIA

Background. Secondary glaucoma is caused by underlying ocular or systemic pathology leading to increased resistance to aqueous humour outflow and elevated intraocular pressure (IOP). Its incidence has risen in recent years, mainly due to an increase in complex intraocular surgeries and lifestyle-related systemic diseases. Compared to primary glaucoma, secondary glaucoma often requires earlier surgical intervention and is associated with a higher risk of inflammation and postoperative fibrosis.

Aim. To analyse surgical trends, procedure selection, and complication profiles in patients with secondary glaucoma treated surgically at Rīga East Clinical University Hospital between 2021 and 2024.

Methods. A retrospective analysis of hospital surgical records was conducted. All glaucoma surgeries performed from 2021 to 2024 were reviewed, with subgroup analysis of secondary glaucoma cases. Annual numbers of primary and secondary glaucoma surgeries were recorded. For secondary glaucoma, the distribution of surgical techniques by year and documented early and late postoperative complications were analysed. Surgical methods included trabeculectomy with mitomycin C (Trab+MMC), gonioscopy-assisted transluminal trabeculotomy (GATT), glaucoma drainage implants (Ex-PRESS shunt, PreserFlo), and micropulse cyclophotocoagulation (MP CPC).

Results. A total of 2318 glaucoma surgeries were performed during the study period. Secondary glaucoma surgeries increased annually: 79 cases in 2021, 99 in 2022, 104

in 2023, and 110 in 2024. In the same years, primary glaucoma surgeries numbered 374, 503, 511, and 538, respectively.

Trabeculectomy with MMC remained the most frequently used procedure for secondary glaucoma, though its relative use declined over time (75% in 2021, 73% in 2022, 65% in 2023, and 66% in 2024). The use of MP CPC increased steadily from 10% in 2021 to 23% in 2024. GATT accounted for 6%, 4%, 8%, and 5% of cases, while glaucoma drainage implants represented 9%, 6%, 7%, and 6%, respectively..

Trab+MMC was associated with early complications related to insufficient preoperative inflammation control and late failure due to fibrosis, often linked to limited postoperative follow-up. GATT was mainly complicated by early hyphema and showed reduced effectiveness when underlying pathology persisted. Implants demonstrated late distal fibrosis. MP CPC showed a favourable safety profile with no major early or late complications.

Conclusions. Secondary glaucoma surgeries increased steadily from 2021 to 2024. While trabeculectomy with MMC remains the most effective IOP-lowering procedure, the increasing use of MP CPC reflects increased use of safer, non-incisional IOP-lowering options. Surgical management should be individualised, with careful consideration of underlying pathology and fibrosis risk.

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INCIDENCE OF CATARACT SURGERY IN PSEUDOEXFOLIATIVE GLAUCOMA PATIENTS AFTER GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY

Gunta Blezūra-Ūdre, Kristine Baumanē

Department of Neuromedicine and Neuroscience Faculty of Medicine and Life Sciences, University of Latvia, Rīga, LATVIA; gunta.blezura-udre@lu.lv

Background. Cataract formation after glaucoma surgery is one of the long-term complications. There are no data on the incidence of cataracts after gonioscopy-assisted transluminal trabeculotomy (GATT).

Aim. To determine the incidence of cataract surgery in patients with pseudoexfoliative glaucoma (PXG) one year after GATT with polypropylene suture. Determine the risk of complications for cataract surgery after GATT.

Methods. The prospective study included 85 patients who underwent 360-degree GATT with polypropylene suture due to elevated intraocular pressure (IOP) > 21 mmHg and decompensated PXG on maximum tolerated therapy. Data were analysed for 70 patients who had data on follow-up visits after 12 months.

Results. The average age of patients with PXG in the study was 69.6 ± 8.8 years, with a self-reported disease duration

of 4.26 ± 4.43 years. One year after surgery IOP decreased statistically significantly from 26.2 ± 5.58 mmHg to 12.2 ± 3.10 mmHg ($p < 0.0001$). Before GATT, 19 (27.1%) patients had pseudophakia and 49 (70%) patients were detected various grades of cataract. Six (8.6%) patients underwent combined GATT and cataract surgery. Over the course of the year, uneventful cataract surgery was performed on 8 (18.6%) patients due to deterioration of visual acuity (VA). Before the operation best corrected VA was 0.623 ± 0.27 logMAR and 12 months after operation improved statistically significant — 0.730 ± 0.247 logMAR ($p < 0.001$).

Conclusions. GATT increases the risk of cataract development one year after surgery. Cataract phacoemulsification after GATT is not associated with an increased risk of complications during surgery.

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INTRAOCULAR PRESSURE FLUCTUATIONS AFTER GONIOSCOPY-ASSISTED TRANSLUMINAL TRABECULOTOMY AND TRABECULECTOMY

Ieva Briede, Eliza Briede, Gunta Blezura-Udre, Kristine Baumanė

Rīga East Clinical University Hospital, Rīga, LATVIA; priedniece.ieva@gmail.com

Background. Glaucoma is a chronic, progressive optic neuropathy often associated with elevated intraocular pressure (IOP), and in cases where pharmacological or laser therapy is insufficient, surgical intervention is required. Two commonly used surgical techniques are Trabeculectomy (TE) and Gonioscopy-Assisted Trans-luminal Trabeculotomy (GATT). While both are effective in reducing IOP, postoperative IOP fluctuations are frequently observed and may negatively impact visual outcome, particularly in advanced glaucoma.

Aim. The aim of the study was to compare the extent and frequency of IOP fluctuations following GATT and TE, to identify potential risk factors associated with these changes.

Methods. Altogether 30 patients were enrolled in this prospective, comparative study which was conducted at the Ophthalmology Clinic of Rīga East Clinical University Hospital from 1 May 2025 to 30 June 2025. All patients were divided into two groups, GATT and TE group, all participants underwent a standardised assessment, which included medical history collection, IOP measurement, arterial blood pressure evaluation, anterior chamber depth assessment, and pain level scoring preoperatively and 1, 7,

and 30 days postoperatively. All data were statistically analysed using IBM SPSS Statistics software, version 31.0.

Results. GATT showed greater mean postoperative IOP fluctuation amplitude than TE ($p = 0.116$). Preoperative IOP strongly correlated with one month fluctuation amplitude ($rs = 0.850$, $p < 0.001$), slightly stronger in GATT ($rs = 0.868$) than TE ($rs = 0.840$). Preoperative pain moderately correlated with fluctuations ($rs = 0.394$, $p = 0.031$). Non-significant trends were observed for secondary glaucoma, systemic therapy, prior cataract surgery, hypertension, absence of diabetes, and episcleral venous fluid wave.

Conclusions. Early postoperative IOP fluctuations were comparable between GATT and TE procedures, although GATT showed a tendency toward greater variability. Higher preoperative IOP and pain scores were significant predictors of larger postoperative fluctuations, while other clinical factors showed no significant prognostic value. These findings may help identify patients at increased risk of early postoperative IOP instability.

Acknowledgements. No financial support was received for the study. There is no conflict of interest.

ELECTROPHYSIOLOGICAL CHANGES OF THE OPTIC NERVE IN PATIENTS WITH OPTIC NERVE HEAD DRUSEN

Jurijs Kosnarevičs, Kristīne Fomina

Riga East Clinical University Hospital, Rīga, LATVIA; kosnarevich@gmail.com

Background. Optic nerve head drusen (ONHD) are calcified deposits within the optic

nerve head that may be superficial or deeply buried. They are often an incidental finding during comprehensive ophthalmic examination, usually bilateral, with a reported prevalence of 3.4 cases per 1000 individuals. Although ONHD are considered benign, they are frequently associated with progressive visual-field loss.

Aim. To assess the impact of optic nerve head drusen on functional and structural ocular parameters using electrophysiological evaluation of the visual pathway.

Methods. This prospective study analysed 40 eyes from 20 patients with clinically or imaging-confirmed ONHD. For each patient, complete ophthalmological examination was performed pattern visual evoked potentials (pVEP), and multifocal electroretinography (mfERG) were recorded with a Roland Consult RETI-port/scan21 system to determine axonal conduction in the visual pathway.

Results. Mean participant age was 58.8 ± 16.5 years. Mean N75 latencies for 1.0° and $15'$ pVEP stimuli did not differ significantly ($p > 0.05$). Mean P100 latency was significantly longer with the $15'$ stimulus than with the 1.0° stimulus ($p > 0.05$); N75–P100 amplitudes did not differ between stimulus sizes ($p > 0.05$). P100 latencies for the two stimuli showed a positive correlation ($r = 0.36$), while their N75–P100 amplitudes were strongly positively correlated

($r = 0.50$). A strong negative correlation existed between P100 latency with the $15'$ stimulus and N75–P100 amplitude ($r = -0.58$). P100 latency at $15'$ correlated positively with mfERG P1 latency ($r = 0.336$); P100 latency at 1.0° correlated negatively with mfERG P1 amplitude ($r = -0.345$); P100 latency at $15'$ correlated negatively with mfERG P1 amplitude ($r = -0.362$).

Conclusions. Optic nerve head drusen impair visual pathway function, which can be objectively demonstrated with pVEP and mfERG. Affected eyes commonly show reduced P100 amplitude and prolonged latency, indicating conduction defects and possible axonal loss. While mfERG waveforms and latencies are generally preserved, central P1 amplitude is often decreased, suggesting secondary ganglion-cell dysfunction. Using different pattern sizes revealed that the $15'$ stimulus is more sensitive to macular-level conduction defects, whereas 1.0° amplitude changes reflect more diffuse damage. Correlations between pVEP and mfERG parameters highlight the role of ganglion cells in overall visual-pathway function in ONHD.

Electrophysiology can uncover subclinical changes even when visual acuity is intact and should be incorporated into disease monitoring. Although therapeutic options are limited, early diagnosis and functional follow-up help predict visual-field loss.

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ASSOCIATION BETWEEN ADVANCED GLYCATION END PRODUCTS AND RETINAL MICROVASCULAR CHANGES ASSESSED BY OCT ANGIOGRAPHY IN DIABETES MELLITUS

Beate Pēterfelde^{1,2}, Zane Svīkle², Dace Pētersone³, Jūlija Janceva¹, Renāte Plaude¹, Jānis Valeinis³, Jeļizaveta Sokolovska², Kristīne Baumanė^{1,2}

¹ Ophthalmology Clinic, Riga East Clinical University Hospital, Rīga, LATVIA; beate.peterfelde@gmail.com

² Faculty of Medicine and Life Sciences, University of Latvia, Rīga, LATVIA.

³ Faculty of Physics, Mathematics and Optometry, University of Latvia, Rīga, LATVIA

Background. Diabetes mellitus is a major global health burden, and diabetic retinopathy (DR) remains a leading cause of vision loss among working-age adults. Retinal neurodegenerative and microvascular changes precede clinically detectable DR, highlighting the need for sensitive early biomarkers. Optical coherence tomography angiography (OCTA) enables non-invasive assessment of retinal microvasculature, while advanced glycation end products

(AGEs) reflect cumulative metabolic stress in diabetes. The combined assessment of OCTA metrics and AGEs may improve early risk stratification in diabetic patients.

Aim. To evaluate the association between AGEs levels, OCTA-derived retinal microvascular parameters, and diabetic retinopathy in patients with type 1 and type 2 diabetes retinopathy in patients with type 1 and type 2 diabetes (T1D

(T1D, T2D), and to determine whether increasing AGEs severity is reflected in OCTA biomarkers.

Methods. This prospective observational study was conducted at Riga East Clinical University Hospital. A total of 150 patients with T1D and T2D were enrolled; 92 were included in the final analysis after exclusion of conditions that could affect OCTA measurements. DR was graded using the International Clinical Diabetic Retinopathy classification. All participants underwent OCTA imaging (Optovue Solix FullRange, AngioVue Expert), assessing vessel density (VD) in the superficial capillary plexus (SCP), deep capillary plexus (DCP), and radial peripapillary capillary plexus (RPCP), as well as foveal avascular zone (FAZ) area. AGEs levels and risk categories (0–3) were measured using an AGE Reader (Diagnoptics). Statistical analysis was performed in RStudio using Kruskal–Wallis, ANOVA, Fisher exact, and chi-square tests.

Results. The analysed cohort was predominantly female (79.4%), with a median age of 66 years (IQR 49.3; 73) and median diabetes duration of 13 years (IQR 8.0;19.3). Of the

participants, 33.7% had T1D and 63.7% had T2D. Higher AGEs risk groups were significantly associated with lower vessel density in the SCP ($p = 0.024$), DCP ($p = 0.036$), and RPCP ($p = 0.012$), as well as longer diabetes duration ($p < 0.001$). No significant associations were found between AGEs risk groups and FAZ area ($p = 0.76$), outer retinal flow ($p = 0.71$), or choriocapillaris flow ($p = 0.66$).

Conclusions. Differences in superficial and deep retinal vessel density were observed between AGEs risk groups, with the highest AGEs group showing the lowest vessel density on OCTA. However, the relationship was not linear across increasing AGEs categories, suggesting heterogeneity in microvascular changes with increasing metabolic burden. AGEs and OCTA capture overlapping aspects of diabetic microvascular disease and may provide complementary information for early risk stratification.

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EXPLORING THE DIAGNOSTIC VALUE OF OCT ANGIOGRAPHY AND FUNDUS IMAGING IN DIABETIC RETINOPATHY

Renāte Plaude¹, Kristīne Baumanė^{1,2}

¹ Department of Ophthalmology, Riga East Clinical University Hospital, Riga, LATVIA; nagobade.renate@gmail.com

² Department of Neuromedicine and Neuroscience, Faculty of Medicine and Life Sciences, University of Latvia, Riga, LATVIA

Background. Diabetes mellitus is a global public health problem affecting millions of people worldwide. Diabetic retinopathy is one of the leading causes of vision loss globally. Optical coherence tomography angiography (OCTA) enables the detection of microvascular changes in the retina earlier than clinical signs. Timely diagnosis and treatment can significantly reduce the risk of irreversible vision loss; therefore, regular eye examinations are an essential part of care for patients with diabetes mellitus.

Aim. To evaluate the diagnostic value of optical coherence tomography angiography and fundus photography in patients with diabetic retinopathy.

Methods. The study included 92 patients. Data recorded in medical documentation and results from computer-based imaging examinations were analysed. The data used for analysis included OCTA results and fundus photographs. The obtained data were analysed using the statistical software RStudio.

Results. No statistically significant differences were found between diabetic patients with and without diabetic retinopathy when analysing parameters of the foveal avascular zone and capillary density. A significant influence of diabe-

tes duration on the risk of developing diabetic retinopathy was observed, reaching statistical significance. The median disease duration among patients with diabetic retinopathy was 22 years, whereas among those without diabetic retinopathy it was 9 years ($p = 0.0001$). A statistically significant difference in retinal nerve fibre layer thickness was found between the patient groups ($p = 0.0135$). The retinal nerve fibre layer thickness in patients with diabetic retinopathy was 87.00 μm , while in those without diabetic retinopathy it was 91.00 μm .

Conclusion. The retinal nerve fibre layer is thinner in patients with diabetic retinopathy compared to those without, indicating not only vascular but also neurodegenerative changes in the retina due to diabetes mellitus. A significant impact of diabetes duration on the risk of developing diabetic retinopathy was observed; therefore, this factor plays an important role in the diagnosis of diabetic retinopathy. No statistically significant differences were found in the parameters of the foveal avascular zone and retinal capillary density between patients with and without diabetic retinopathy.

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POSTOPERATIVE OUTCOMES OF LONG-STANDING FULL-THICKNESS MACULAR HOLES

Līga Radecka¹, Uldis Malinovskis², Kristine Baumanė^{1,3}

¹ Riga East Clinical University Hospital, Riga, LATVIA; ligaradecka@inbox.lv

² Institute of Chemical Physics, Faculty of Science and Technology, University of Latvia, Riga, LATVIA

³ Faculty of Medicine and Life Sciences, University of Latvia, Riga, LATVIA

Background. A macular hole is a full-thickness retinal defect at the fovea that significantly impairs central vision, leading to reduced visual acuity and visual distortion (metamorphopsia), with a negative impact on patients' quality of life. Most long-standing (>12 months) macular holes tend to be large and are more difficult to treat, resulting in less predictable anatomical and functional outcomes.

Aim. To evaluate and compare the anatomical and functional outcomes of surgical treatment in long-standing full-thickness macular holes using three different ILM peeling techniques.

Methods. This retrospective case series included 40 patients with long-standing full-thickness macular holes of more than twelve months' duration who were treated at Riga East Clinical University Hospital by a single surgeon between 2020 and 2024. Patients were divided into three groups according to the ILM peeling technique used: standard ILM peeling (Group 1, $n = 15$), ILM "plug-in" technique (Group 2, $n = 10$), and temporal inverted ILM flap (Group 3, $n = 15$). Preoperative and 6-month postoperative data on best-corrected visual acuity (BCVA), measured in ETDRS letters, metamorphopsia score (M-CHARTS Type II), and macular hole closure type (Rossi classification) were collected and compared among the three groups.

Results. All patients in Groups 1 and 3 achieved type 1 macular hole closure, whereas in Group 2, type 1 closure occurred in 30% of cases and type 2 closure in 70% of cases.

BCVA improved from 40.9 ± 8.4 at baseline to 65.9 ± 10.6 letters 6 months postop in Group 1, from 39.8 ± 7.3 to 57.4 ± 5.1 in Group 2 and from 40.3 ± 6.4 to 65.3 ± 6.4 in Group 3 accordingly ($p < 0.0001$).

Vertical M-CHARTS score improved from 0.90 ± 0.52 to 0.26 ± 0.27 ($p < 0.0001$) in Group 1, from 1.12 ± 0.47 to 0.64 ± 0.36 ($p = 0.015$) in Group 2, from 1.19 ± 0.36 to 0.43 ± 0.31 ($p < 0.0001$) in Group 3. Horizontal M-CHARTS score improved from 0.93 ± 0.56 to 0.22 ± 0.26 ($p < 0.0001$) in Group 1, from 1.06 ± 0.42 to 0.49 ± 0.26 ($p = 0.00012$) in Group 2, from 0.92 ± 0.31 to 0.35 ± 0.31 ($p < 0.0001$) in Group 3.

Conclusions. The improvement in BCVA six months after successful surgery for long-standing macular holes was significant compared to baseline, regardless of the ILM peeling technique used. The best visual outcomes were achieved with standard ILM peeling and the temporal inverted flap technique. There was a significant reduction in metamorphopsia scores in all three groups, but no statistically significant difference between groups.

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OPHTHALMIC COMPLICATIONS AFTER COVID-19 INFECTION

Leman Sadikhova¹, Flora Agamaliyeva², Sariya Guliyeva²

¹ General Medicine Faculty, Azerbaijan Medical University, Baku, AZERBAIJAN; sadixovalyaman@mail.ru

² Department of Ophthalmology, Educational-Surgical Clinic, Azerbaijan Medical University, Baku, AZERBAIJAN

Background. COVID-19 can affect anterior and posterior eye segments, causing conjunctivitis, keratopathies, retinal changes, and neuroophthalmic complications. Post-COVID ophthalmic manifestations remain insufficiently studied.

Aim. To evaluate frequency, severity, and treatment outcomes of ophthalmic complications after COVID-19.

Methods. Between January and November 2025, 201 individuals were included. Of these, 151 respondents (mean age

34 ± 10.2 years; 87 women, 64 men) completed structured questionnaires, and 50 patients (100 eyes; mean age 28 ± 6.1 years; 27 women, 23 men) underwent clinical ophthalmologic evaluation. Examinations included visual acuity testing, slit-lamp biomicroscopy, ophthalmoscopy, and optical coherence tomography (OCT). Therapeutic approaches included lubricating eye drops (100%), anti-inflammatory therapy (42%), combined therapy (38%), specialised ophthalmic interventions (11%), and surgical procedures (2%).

Results. Among 151 respondents, 96 (63.6%) reported previous COVID-19 infection. The most frequent ocular complaints were eye fatigue ($n = 72$, 47.7%), tearing ($n = 65$, 43.0%), eye pain ($n = 63$, 41.7%), and visual disturbances ($n = 61$, 40.4%). Less common symptoms included dryness, redness, blurred vision, and photophobia, while 31 respondents (20.5%) reported no ophthalmic symptoms. Symptoms most commonly appeared early: 81 respondents (54.4%) developed ocular manifestations during the acute phase of COVID-19, and 52 (34.9%) within the first week after recovery. More than half of respondents ($n = 83$, 55.0%) sought ophthalmologic consultation, whereas 50 (33.3%) did not seek medical care and 18 (11.7%) reported persistent symptoms without consultation. Clinical evaluation of 50 patients (100 eyes) revealed retinal edema in 20 eyes (20.0%), vitreous hemorrhage in 12 eyes (12.0%), optic neuritis in 8 eyes (8.0%), diplopia in 7 patients (14.0%), and sixth cranial nerve palsy in 5 patients (10.0%). Visual recovery with normalisation of OCT findings was achieved

in 95 eyes (95.0%) following treatment. Patients who presented earlier (months after COVID-19) demonstrated significantly faster recovery compared with those presenting later ($p < 0.05$).

Conclusions. COVID-19 can lead to mild-to-moderate ophthalmic complications, some of which may threaten vision. Early diagnosis and comprehensive therapy are associated with improved outcomes, highlighting the importance of ophthalmologic monitoring after COVID-19. This study provides a substantial prospective dataset from 2025, illustrating patterns of symptom onset, clinical manifestations, and treatment response.

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CO₂ LASER VERSUS CONVENTIONAL SURGERY IN UPPER BLEPHAROPLASTY: CLINICAL OUTCOMES AND HEALING PROFILE

Dineja Veinberga¹, Kristīne Baumanē²

¹ Riga East Clinical University Hospital, Riga, LATVIA; nejstep@inbox.lv

² Department of Neuromedicine and Neuroscience, Faculty of Medicine and Life Sciences, University of Latvia, Riga, LATVIA

Background. Upper eyelid blepharoplasty is one of the most frequently performed procedures in oculoplastic surgery. The CO₂ laser has been increasingly introduced as an alternative to conventional scalpel surgery, potentially offering improved hemostasis and reduced tissue trauma.

Aim. To compare clinical outcomes and postoperative healing after upper eyelid blepharoplasty performed using a CO₂ laser versus a conventional scalpel technique.

Methods. Forty patients undergoing bilateral upper eyelid blepharoplasty were included in this comparative study. Each patient received CO₂ laser surgery on one eyelid and conventional scalpel surgery on the other. Postoperative haematoma severity, operative time, and scar healing were evaluated. Scar quality was assessed using the Patient and Observer Scar Assessment Scale (POSAS) at postoperative

days 7 and 30. Patient-reported satisfaction with scar appearance was also analysed.

Results. The CO₂ laser technique resulted in significantly lower haematoma severity and shorter operative time compared with the scalpel method. Overall scar quality did not differ significantly between techniques at either follow-up point. However, patient self-assessment at 30 days suggested slightly better scar smoothness and elasticity in the scalpel-treated eyelids.

Conclusion. CO₂ laser blepharoplasty appears to provide better intraoperative haemostasis and procedural efficiency while achieving comparable short-term scar outcomes to conventional surgery. Both techniques remain clinically effective, and selection may depend on surgeon preference and individual patient factors.

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