Glaucoma Management in High Myopia: A Case of Hypotony-Related Serous Retinal Detachment Following Trabeculectomy and Successful Treatment with Intravitreal SF6 Gas

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Dear Editor,

Glaucoma management in highly myopic eyes presents significant diagnostic and therapeutic challenges.[1,2] Surgical intervention, particularly trabeculectomy, carries an increased risk of complications in this population, including hypotony and subsequent hypotony maculopathy or serous retinal detachment (SRD).[3,4]

A 22-year-old female patient with a known diagnosis of degenerative myopia and primary open angle glaucoma presented for follow-up. Her axial length was measured at 27.04 mm in the right eye, classifying her as highly myopic. She had no family history of glaucoma. In the right eye, her best-corrected visual acuity (BCVA) was 0.7 (with full correction) and initial intraocular pressure (IOP) was 31 mmHg. Gonioscopy revealed open angles (Shaffer grade 4). Fundus examination showed bilateral tilted discs and tigroid retinas, consistent with high myopia. The left eye had a BCVA of 1.0 with full correction, and its IOP remained stable between 18-21 mmHg throughout the follow-up period, with no vision loss. The optical coherence tomography (OCT) image illustrating the thickness of the right and left retinal nerve fiber layers is shown in Figure 1.

In December 2023, initial medical treatment was commenced with a fixed combination of dorzolamide/timolol (Tomec; Abdi İbrahim, Türkiye) and brimonidine (Brimogut; Bilim İlaç, Türkiye). Three weeks later, the patient showed an excellent response to the medical therapy, with her IOP dropping to 8 mmHg in the right eye.

In October 2024, ten months later, the patient presented with an acute increase in IOP after admitting that she had discontinued her medication for one week. Her IOP had acutely elevated to 44 mmHg in the right eye. Slit-lamp examination of the right eye revealed follicular conjunctivitis. The medical treatment was discontinued, and pattern scan laser trabeculoplasty (Topcon Medical Laser Systems, Santa Clara, CA, USA) was performed. Despite the laser treatment, the IOP remained high and uncontrolled, indicating a failure of conservative management and the need for more definitive intervention. Given the acute and significant IOP elevation and the patient's young age, which often correlates with more aggressive glaucoma, proceeding directly to surgical intervention was deemed necessary to prevent irreversible vision loss. Consequently, a trabeculectomy with 5-fluorouracil (5-FU) was performed

Keywords: Glaucoma, myopia, trabeculectomy

Cite this article as: Kaderli A, Tekin O, Kaya Bal C, Tamer Kaderli S, Sül S. Glaucoma Management in High Myopia: A Case of Hypotony-Related Serous Retinal Detachment Following Trabeculectomy and Successful Treatment with Intravitreal SF6 Gas. Turk J Ophthalmol. 2026;56:290-293

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Received: 23.12.2025
Revision Requested: 10.02.2026
Last Revision Received: 11.02.2026
Accepted: 05.03.2026
Publication Date: 26.08.2026

DOI: 10.4274/tjo.galenos.2026.05950

in November 2024. Her preoperative IOP was 38 mmHg and BCVA was 0.2.

On postoperative day 1, she developed acute ocular hypotony, with an IOP of 5 mmHg. Clinical examination revealed a shallow anterior chamber, Descemet's membrane folds in the cornea, and a formed, diffuse bleb with a negative Seidel test. There was no iridolenticular touch. She was immediately started on cyclopentolate hydrochloride 1% (Sikloplejin; Abdi İbrahim, Türkiye) twice daily and a tight bandage was applied on the bleb region.

On postoperative day 2, SRD was detected as a complication, confirmed by OCT (Figure 2). Given the persistent hypotony and the presence of SRD, an intervention was planned. On postoperative day 4, an

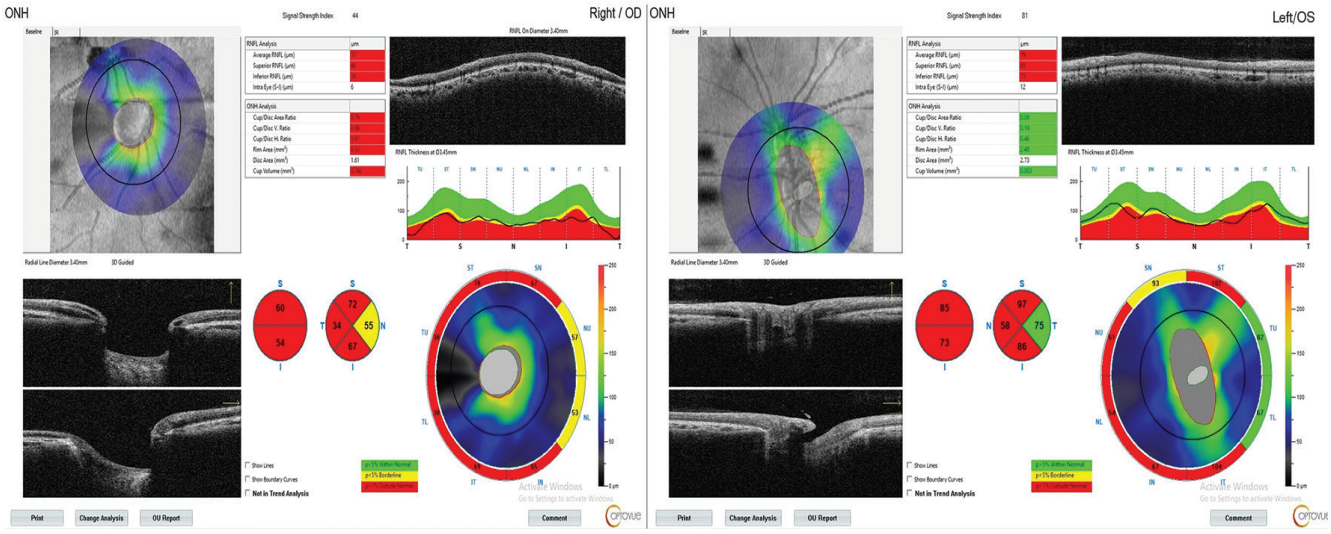

Figure 1. Combined preoperative optical coherence tomography images of the right and left eyes showing the optic nerve head and retinal nerve fiber layer analysis. Note: Color fundus photographs were not available due to clinical limitations

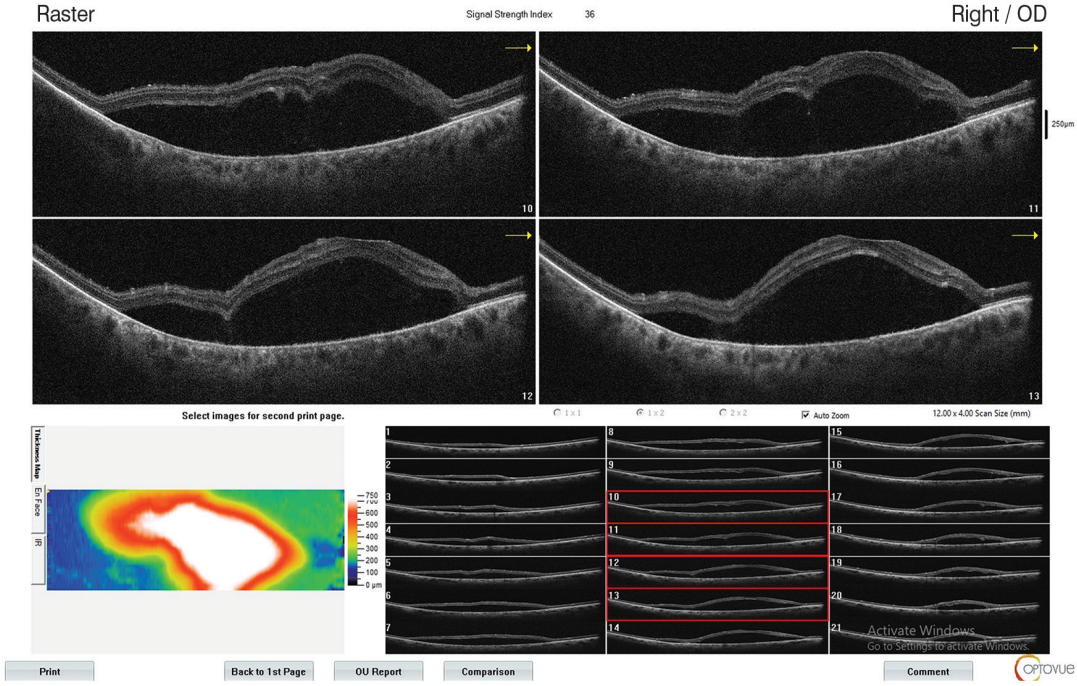

Figure 2. Optical coherence tomography image of the right eye on day 2 postoperatively, confirming the presence of subretinal serous fluid due to hypotony

intravitreal injection of 0.4 mL of SF_6 gas was administered and the patient was instructed to maintain a prone position.

She showed rapid improvement. On day 1 post-SF_6 injection, the retina was reattached, and the IOP was 10 mmHg. On day 3, the retina remained attached, and the IOP was 14 mmHg. At the final follow-up in February 2025, her BCVA was 0.1. OCT demonstrated complete resolution of the SRD (Figure 3). IOP was stable at 13 mmHg. The anterior chamber was formed (Figure 4), and the retina remained attached with no peripheral tears detected.

The management of glaucoma in highly myopic eyes is a complex clinical scenario, primarily due to the diagnostic difficulties and the increased risk of surgical complications. Our case highlights these challenges, particularly the development of acute ocular hypotony and subsequent SRD following trabeculectomy with 5-FU, and the successful management of this complication with intravitreal SF_6 gas injection. The occurrence of SRD after trabeculectomy is a known, although rare, complication that is typically associated with profound hypotony.[3,4]

The literature reports various approaches for managing post-trabeculectomy SRD. Many cases, particularly those without underlying high myopia or other predisposing factors, resolve spontaneously with conservative management (e.g., topical steroids and cycloplegics) as IOP normalizes.[5,6] For instance, Aydin et al.[7] reported a case of SRD following trabeculectomy for traumatic glaucoma, which was managed conservatively. However, in cases of persistent or severe hypotony, surgical intervention is often required. It is important to note that for early hypotony cases, techniques such as transconjunctival flap suturing can also be an effective and less invasive solution, as supported by published literature.[8] Our case is distinct from previous reports. Roy and Padhy[3] reported a case of SRD following trabeculectomy for angle recession glaucoma, which was successfully managed conservatively with steroids. These cases, while sharing the complication of post-trabeculectomy SRD, are rooted in a traumatic etiology, which may introduce confounding factors such as pre-existing angle damage or inflammation.

The most notable difference is the aggressive and rapid intervention with an intravitreal injection of 0.4 mL of SF_6 gas.[9,10,11] While intravitreal gas injection is generally considered safe, a potential concern is the exacerbation of anterior chamber shallowing. However, careful patient

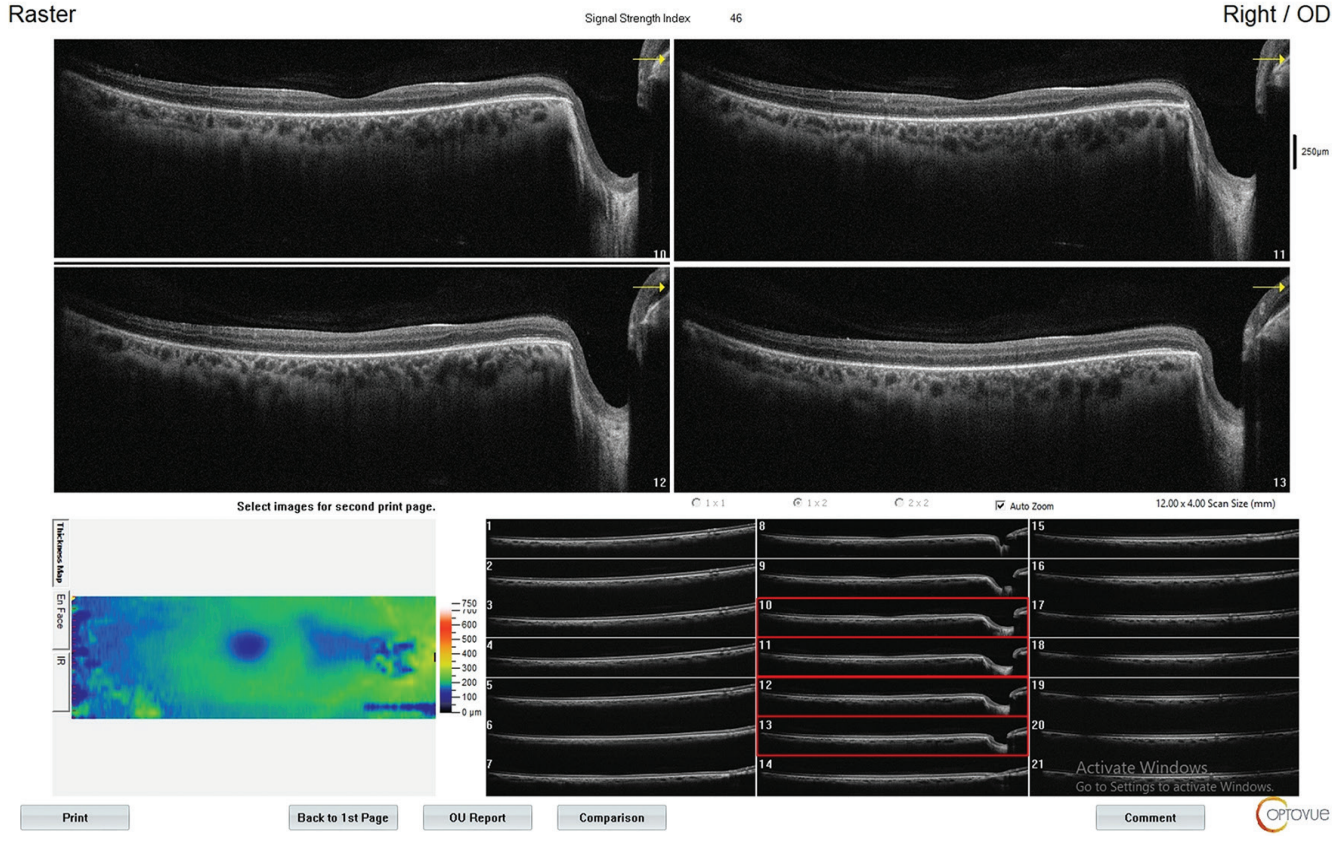

Figure 3. Optical coherence tomography image of the right eye after the intravitreal SF6 gas injection, showing the reattached retina

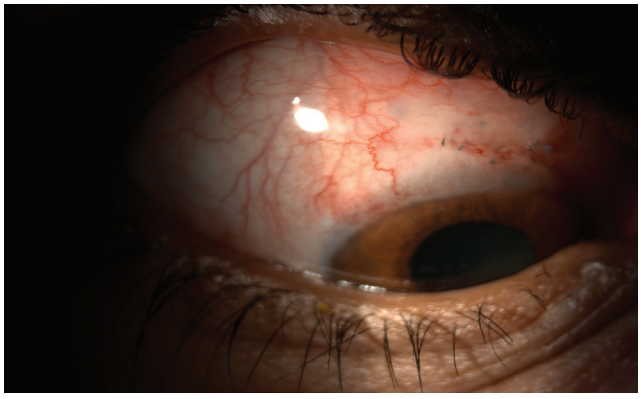

Figure 4. Final follow-up anterior segment photograph of the right eye. Note: An additional photograph demonstrating anterior chamber depth with a narrow-slit beam was not available due to clinical limitations

positioning and monitoring can mitigate this risk, and the rapid resolution of hypotony often outweighs this concern. The rationale for using an expansile gas is two-fold: first, the gas bubble mechanically increases the IOP, which helps to re-establish the pressure gradient and push the subretinal fluid back into the choroid; and second, the increased pressure is thought to reactivate the retinal pigment epithelium (RPE) pump mechanism, promoting the reabsorption of the subretinal fluid. The rapid resolution of the SRD (within 24 h) and the stabilization of the IOP following the SF_6 injection underscore its effectiveness as a minimally invasive and rapid intervention for hypotony-related SRD, especially in high-risk eyes like those with high myopia, where prolonged hypotony could lead to irreversible vision loss.

Finally, while the OCT images in our case did not clearly demonstrate an RPE tear, the possibility of an occult or small RPE tear could not be entirely excluded, especially given the high myopic status and the acute, profound hypotony. The mechanical stress on the thinned RPE layer in a highly myopic eye, combined with the acute pressure drop, may predispose the eye to a micro-tear, which would further impair the RPE's ability to pump fluid out of the subretinal space. The rapid resolution of the SRD after the SF_6 injection, which mechanically increased the IOP, suggests that the primary issue was the pressure gradient failure, but the possibility of a concurrent, small RPE defect remains a point for discussion and further investigation in similar cases.

This case report emphasizes the need for a high index of suspicion for glaucoma in young, highly myopic patients and the critical role of patient compliance in medical management. Furthermore, it demonstrates that while trabeculectomy in high myopia carries a significant risk of hypotony and SRD, this complication can be effectively and rapidly managed with an intravitreal injection of SF_6 gas, leading to anatomical and functional recovery.

Ethics

Informed Consent: Written informed consent was obtained from the patient for the publication of this case report and the accompanying images.

Declarations

Authorship Contributions

Surgical and Medical Practices: A.K., O.T., S.S., Concept: A.K., S.T.K., S.S., Design: O.T., C.K.B., Data Collection or Processing: O.T., C.K.B., Analysis or Interpretation: A.K., S.T.K., S.S., Literature Search: A.K., O.T., S.T.K., Writing: A.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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