

Case Report

The Effectiveness of Trabeculectomy with Mitomycin C and Releasable Suture in Posner-Schlossman Syndrome with Secondary Glaucoma: A Case Series

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ABSTRACT

The aim of this study is to describe the effectiveness of trabeculectomy with mitomycin C and releasable suture in Posner-Schlossman syndrome (PSS) with secondary glaucoma. Early treatment is the key to successful management of PSS with secondary glaucoma. However, unremitting exposure of high intraocular pressure (IOP) because of the high recurrence rate of PSS may cause further optic nerve damage and visual field defect. It is assumed that trabeculectomy may become the surgical treatment of choice in order to prevent further damage to the optic nerve despite recurring attack of PSS. Trabeculectomy with mitomycin C and releasable suture was performed in 5 patients (3 females and 2 males) with recurring attacks of PSS and secondary glaucoma after acute attack had subsided. Before surgery, these patients had already suffered more than 3 acute attacks which were alleviated with antiglaucoma and anti-inflammatory medications; however, optic nerve damage and visual field defect had already developed. After trabeculectomy, 4 patients experienced no recurrent attacks during the follow-up period. One patient only suffered another episode of acute attack; however, an abrupt increase in IOP of more than 22 mmHg did not occur. In all cases, blebs were well formed, and no further optic nerve damage or visual field defects were observed up until final follow-up. In PSS with secondary glaucoma, medication may alleviate the IOP increase and inflammation; however, there is still a chance of damage occurring to the optic nerve each time an attack recurs. Trabeculectomy may be considered a safe and effective surgical treatment modality in PSS with secondary glaucoma in order to prevent further optic nerve damage due to the extreme IOP spike in each recurrent attack.

KEYWORDS: *Mitomycin C, Posner-Schlossman syndrome, releasable suture, secondary glaucoma, trabeculectomy*

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INTRODUCTION

Glaucomatocyclitic crisis or Posner-Schlossman syndrome (PSS) is a recurrent unilateral ocular hypertension with mild anterior uveitis. The incidence of PSS is relatively rare, and it usually affects young adults. Symptoms include blurred vision, pain surrounding the affected eyes, and halos around lights.^[1-3] The intraocular pressure (IOP) is highly elevated, at approximately 40-60 mmHg. During the time when patients do not suffer an attack, their IOP is usually normal.^[1,2] Although it is, in general, a self-limited condition, some cases

have been reported with advanced optic nerve cupping and associated visual field loss.^[4,5]

A very high recurrent rate and the unremitting exposure of high IOP may result in retinal nerve fiber layer, optic nerve damage, and visual field defect, particularly in cases when high IOP is not treated properly.^[4] Prompt diagnosis

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and adequate treatment are paramount to the successful management of PSS. Pharmacological treatment is still the mainstay therapy; however, surgical treatment is also highly recommended for relief of symptoms.^[1,6] Trabeculectomy with mitomycin C has been reported to be beneficial in cases of glaucomatocyclitic crisis.^[7] The aim of our case series is to describe the effectiveness of trabeculectomy with mitomycin C and releasable suture as a surgical treatment modality in PSS with secondary glaucoma.

CASE REPORTS

Five cases of PSS with secondary glaucoma were presented, all of whom underwent trabeculectomy with mitomycin C and 2 releasable sutures. The inclusion criteria were based on clinical history, unilateral presentation, and recurrent attacks, as well as characteristic findings. The ethical committee approved this study in accordance with the Helsinki Declaration and all patients gave their consent of the surgical procedure before signing the informed consent forms.

Case 1

A 42-year-old female had a history of recurrent pain and blurred vision on her right eye since 2008. Such complaints had been recurring about 1-2 times a year over a period of 3 years. She responded well to timolol eye drops, brimonidine eye drops, oral acetazolamide, and steroid eye drops administered during each attack. She reported no complaints of arthritis disease, tuberculosis, or other immunological diseases.

Another attack occurred in 2011 presenting an IOP of 48 mmHg and visual acuity of 6/6. Slit lamp examination showed a few fine, distinct keratic precipitates, diffuse epithelial edema of the cornea with mild anterior uveitis without posterior synechiae [Figure 1]. A cupping of optic nerve head (vertical cup disc ratio of 0.8), nasalization

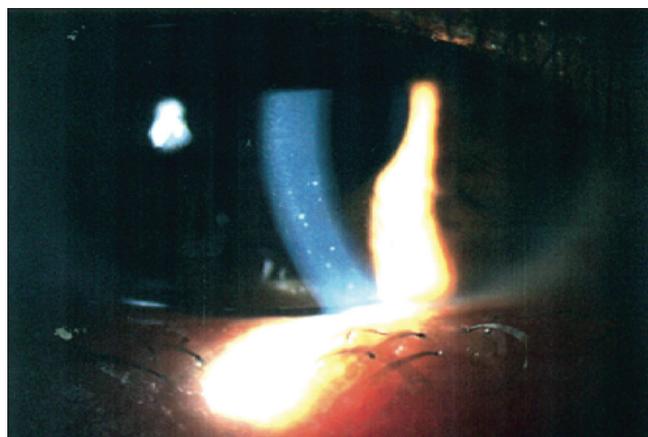


Figure 1: Biomicroscopic findings during episode of acute attack in 2011 showed a few fine, distinct keratic precipitates in the inferior cornea with mild anterior chamber reaction and diffuse epithelial edema of the cornea without posterior synechiae

of retinal vessels, and thinning of neuroretinal rim were also observed in a fundus photograph [Figure 2] with progression comparable with previous examination. Humphrey visual field (HVF) perimetry examination using Swedish Interactive Thresholding Algorithm (SITA)-standard 24-2 showed an inferior arcuate defect [Figure 3]. Optical coherence tomography (OCT) examination [Figure 4] showed thinning of the retinal nerve fiber layer as demonstrated graphically by the flattened double hunchback of the retinal nerve fiber layer on her right eye. Abnormalities found in OCT imaging were consistent with visual field defects.

The patient was diagnosed with PSS with secondary glaucoma. Trabeculectomy with mitomycin C and 2 releasable sutures was performed 1 month after the acute episode due to progressive damage of the optic nerve. Two weeks after surgery, the bleb was well-formed, and the 2 releasable sutures were released. During the 4 years of follow-up following trabeculectomy, no recurrent attack was observed and IOP was within normal limits. A visual field test was performed annually and showed no sign of visual field progression.

In 2015, the patient returned with another episode of acute attack after trabeculectomy. Visual acuity was not altered and IOP was 21 mmHg. Slit lamp biomicroscopy showed 2 white, medium-sized, distinct spots of keratic precipitates with mild anterior uveitis [Figure 5]. There were no signs of progression on the optic nerve head or visual field. Prednisolone acetate eye drops were administered and then discontinued in a stepwise manner along with fixed combinations of timolol-brinzolamide. Within 3 days, IOP was reduced to 12 mmHg and maintained at a similar level throughout the follow-up period.

Case 2

A 42-year-old female had a history of 3 recurrent attacks of red eyes and blurred vision since 2007, the symptoms of which had been treated elsewhere. In 2010, the patient came to our hospital with another episode of acute attack. Visual acuity was 6/7.5 with IOP of 51 mmHg.

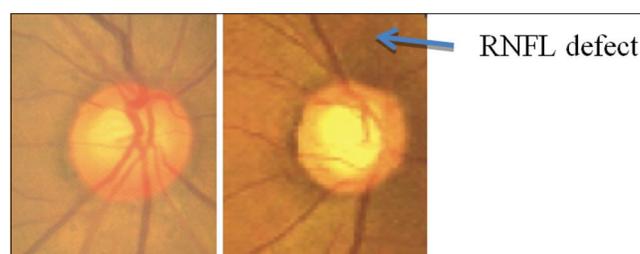


Figure 2: Results of the fundus photograph (I). In 2010, Cup-disk ratio (CDR) was 0.4 with nasal superior notching optic nerve with fine neuroretinal rim (r). In 2011, CDR was 0.8 with a cupping, nasalization, bayonet sign, peripapillary atrophy, and pallor of the optic nerve, as well as a defect in the retinal nerve fiber layer of superior

The findings on slit lamp biomicroscopy showed minimal cells and flares with a few white, fine keratic precipitates in the lower cornea without posterior synechiae. The posterior segment showed notching of the optic nerve head superiorly with cup disc ratio of 0.6. Gonioscopy showed a wide-open anterior chamber angle. The HVF 24-2 test revealed an inferior nasal step defect [Figure 6]. The patient was diagnosed with presumed PSS and secondary glaucoma. She was initially managed with oral acetazolamide, timolol 0.5% eye drops, brimonidine eye drops, and prednisolone acetate eye drops. The attack resolved in 4 days, but timolol 0.5% eye drops were continued to maintain the IOP.

Another attack occurred in early 2010 which subsided after similar treatment. Two months after the attack, trabeculectomy with mitomycin C and 2 releasable

sutures was performed due to glaucoma progression as seen in HVF test and optic nerve OCT [Figure 7]. In addition, aqueous tap and immunological examinations were performed, followed by consultation with immunologists from the internal medicine department. Aqueous polymerase chain reaction (PCR) analysis revealed no Herpes simplex virus (HSV) or Cytomegalo virus (CMV) infection. Consultation with immunologists

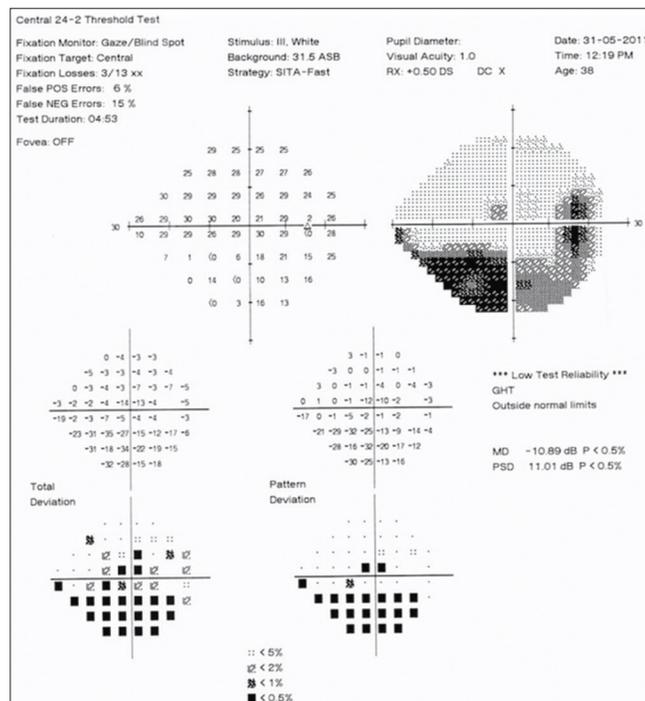


Figure 3: Humphrey visual field perimetry examination revealed inferior arcuate defect

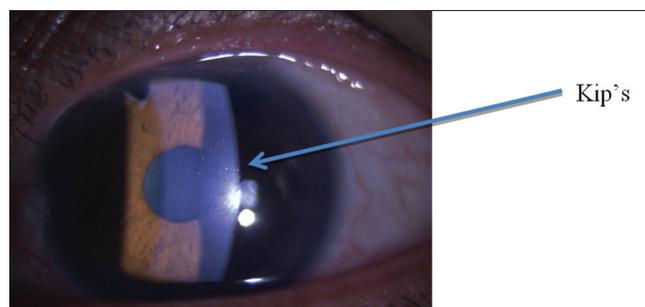


Figure 5: Biomicroscopic examination in 2015 showed 2 dots of fine keratic precipitates and mild anterior uveitis with IOP 21 mmHg 4 years after trabeculectomy

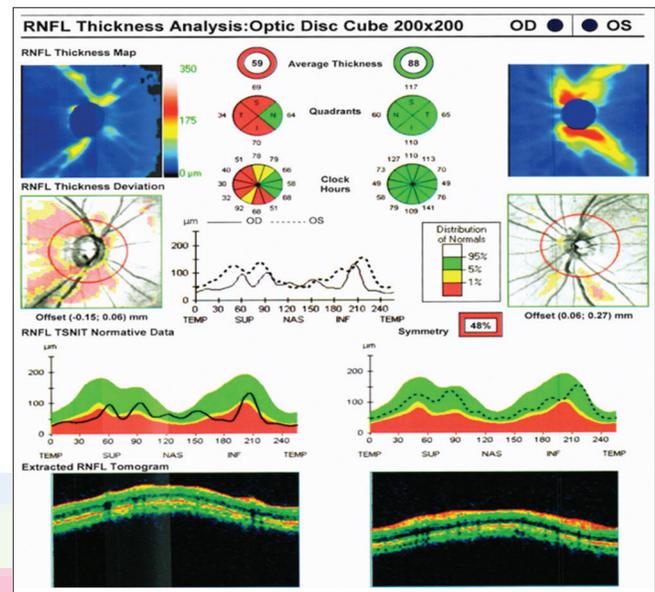


Figure 4: Results of optical coherence tomography examination in 2011 of the retinal nerve fiber layer showing thinning of retinal nerve fiber layer of the right eye; left eye was within normal limits

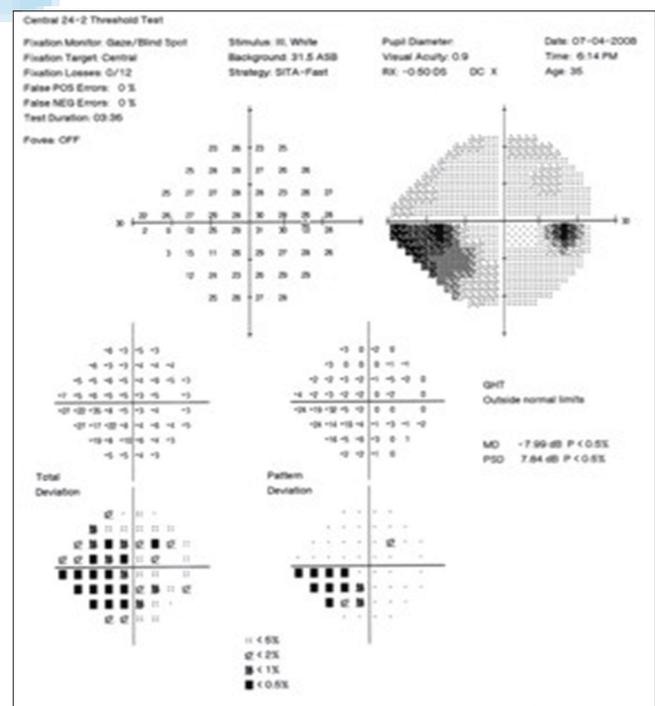


Figure 6: Humphrey visual field examination in 2008 showed inferior nasal step defect

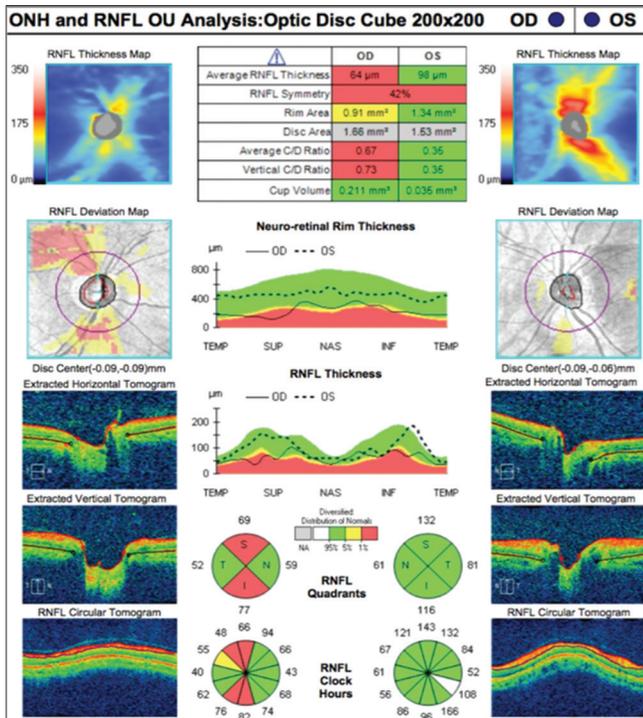


Figure 7: Optical coherence tomography of optic nerve head, retinal nerve fiber layer, and macula in 2016 showing marked thinning of superior and inferior retinal nerve fiber layer of the right eye

confirmed no suspicion of immunological or autoimmune disease in this patient. After surgery, the sutures were released to maintain a good bleb. No further treatment was given.

During 6 months of follow-up after surgery, no further acute attack was observed. IOP was 16 mmHg and no progression was seen in optic nerve OCT, besides thinning of the superior and inferior Retinal nerve fiber layer (RNFL).

Case 3

A 45-year-old female reported suffering from unilateral recurrent acute mild anterior uveitis, a 6/6 visual acuity, with high IOP ranging from 38 to 42 mmHg on her right eye. Attacks had been recurring 2-3 times a year for 2 years. The slit lamp examination showed 3 dots of white, medium-sized, keratic precipitates with mild flares and cells without posterior synechiae. A notched optic nerve head was seen at temporo-inferior position corresponding to a nasal paracentral visual field defect. OCT revealed depression of the temporal retinal nerve fiber layer area. Patient was diagnosed with presumed PSS. Toxoplasma, Rubella, cytomegalovirus, herpes simplex virus (TORCH) examination revealed low positive CMV Immunoglobulin G (IgG). PCR analysis from aqueous humor confirmed negative CMV. Antiglaucoma medication, timolol 0.5% eye drops, brimonidine eye drops, oral acetazolamide, along with

prednisolone acetate eye drops were administered at every acute attack. Secondary glaucoma was confirmed, and the acute attack resided after 3 days. Two weeks later, trabeculectomy with mitomycin C and 2 releasable sutures was performed. No further attacks were observed up to 2 years of follow-up, nor were there any signs of progression of optic nerve damage. Although disease etiology was not known until last visit, further examination was planned in the case of another attack.

Case 4

A 38-year-old male experienced recurrent acute mild anterior uveitis that had been recurring every year for 5 years. IOP ranged between 35 and 45 mmHg on his right eye with 6/6 visual acuity. Slit lamp examination showed 2 white, medium-sized dots surrounded by pigmented keratic precipitates with mild cells and flares, no posterior synechiae, and an open angle. On HVF examination, nasal paracentral loss with vertical cup disc ratio of 0.7 was seen. Diagnosis of presumed PSS was then made. TORCH examination also showed low positive CMV IgG; however, aqueous PCR analysis showed negative results. Similar medication, namely, timolol 0.5% eye drops, brimonidine eye drops, oral acetazolamide, and prednisolone acetate eye drops were administered to alleviate each acute attack. This was followed by trabeculectomy with mitomycin C and 2 releasable sutures after the last acute attack. Following surgery, no further attacks were found on 2 years of observation follow-up and no signs of optic nerve damage progression were detected.

Case 5

A 40-year-old male presented a similar history to that of Case 4. The patient had recurrent acute attacks with IOP spikes once a year for 5 years, with 6/6 visual acuity. Fine distinct keratic precipitates were found in the lower cornea with cells and flares detected in the anterior chamber. Nasal superior notching of optic nerve head corresponded with nasal depression in VFH examination. Diagnosis of presumed PSS was then established. TORCH examination was performed but the results showed low positive CMV IgG. Aqueous PCR analysis was carried out to rule out CMV and the result was confirmed negative. During the course of every attack, timolol 0.5% eye drops, brimonidine eye drops, prednisolone acetate eye drops, and oral acetazolamide were administered as initial treatment. Trabeculectomy with mitomycin C and 2 releasable sutures was performed 1-2 months after the last acute episode. No further attacks were observed up to 2 years of follow-up and no signs of progression of damage to the optic nerve were detected.

DISCUSSION

To date, there is still a lack of consensus on the definitive guidelines for PSS management. It is widely believed that glaucoma in PSS is “benign,” therefore necessitating no immediate glaucoma surgical procedure, since the IOP is normal between acute episodes. However, there have been contradictory opinions regarding PSS as being termed a benign disease and whether or not surgery should be performed. Jap *et al.*^[4] concluded that PSS cannot be termed as benign, as previously believed, as secondary glaucoma may also be present.

Treatment generally prioritizes on controlling inflammation and reducing IOP. The initial treatment should aim to overcome the inflammatory process, as well as to lower the elevated IOP as quickly as possible and only then, if necessary, treat any underlying systemic disease. However, when acute attacks occur more frequently and the IOP is not reduced immediately, optic nerve damage may take place, resulting in the damage or death of ganglion cells, thinning of retinal nerve fiber layer, and visual field defects, suggesting the development of secondary open angle glaucoma.^[1,4,5] The choice of treatment between medication only and surgical intervention needs to be selected based on the unique circumstance of each individual patient. Medication may alleviate the IOP increase and inflammation; however, damage to the optic nerve may still take place each time an attack recurs. Kanda *et al.*^[8] mentioned that the prevalence of high IOP was 100% in cases with PSS.

Approximately 30% of eyes with inflammatory glaucoma presenting with progressive visual field defects and optic neuropathy may require glaucoma surgery.^[9,10] Selecting the most appropriate method of surgery depends on patient’s age, inflammatory activity, any previous ocular surgeries, conjunctival scarring, pathophysiology of the IOP elevation, surgical experience, and postoperative IOP goals.^[11]

All our patients were diagnosed with PSS with characteristic clinical symptoms and recurrent episodes of unilateral mild uveitis. All responded well to steroids. However, all our cases had secondary glaucoma due to recurrence of acute episodes of PSS. We are in accordance with the view that PSS cannot be considered as a benign disease, resulting possibly in glaucomatous damage.^[5] Endothelial dysfunction leading to an unstable oxygen supply and disturbance of small vessel autoregulation due to spikes of high IOP is the most likely mechanism for development of optic neuropathy in PSS eyes.^[12]

Aqueous analysis by PCR is a reliable diagnostic tool for revealing the possible etiology of the disease and

differentiating between CMV and other viruses.^[13] In the case of recurring attacks, a test of DNA PCR analysis should be performed whenever possible to evaluate the presence of either CMV or herpes simplex in the aqueous humor.^[13-15] PCR analysis was performed in 4 cases; however, no cases revealed positive results for CMV or other viruses.

Classically, trabeculectomy has been the procedure of choice for treating uveitic glaucoma with success rates of up to 82.86%,^[16,17] except in the case of aphakic eyes, neovascularization, or poor visual function.^[18] In uveitic glaucoma, studies reported that trabeculectomy achieved lower IOPs from baseline with higher chance of postoperative success and lower IOPs compared to deep sclerotomy.^[19-21] Trabeculectomy was reported to have similar IOP control and glaucoma medication compared to Glaucoma drainage device (GDD) implantation.^[9]

Dinakaran and Kayarkar^[7] have reported the effectiveness of trabeculectomy in PSS. During the follow-up period of more than 4 years, IOP was reported to be well-controlled with no further attacks. Maruyama *et al.*^[22] also reported the use of trabeculectomy with mitomycin C in 17 patients with intractable PSS. Filtering surgery was performed since these patients had progressive visual field loss and failed to respond to antiglaucoma medication. In their study, it was shown that the group of patients requiring surgery had higher IOP and greater visual field loss compared to the nonsurgical group. Thus, these clinical features can be considered as indicators of the need for glaucoma surgery in PSS patients.^[22]

The use of antimetabolite therapy in trabeculectomy has been shown to improve the success rate in patients with a high risk of failure. A study by Kaburaki *et al.*^[23] concluded that initial trabeculectomy with mitomycin C in uveitic glaucoma eyes showed results comparable to those of primary open angle glaucoma when uveitis is under control.

Releasable sutures were placed to increase optimal formation of the bleb. A filtering bleb may help drain inflammatory cells from the anterior chamber and reduce the severity of uveitis attack. However, the possibility of bleb failure could not be entirely ruled out despite mild inflammation only. The conjunctiva in uveitic eyes contains fibroblast, lymphocytes, and macrophages which, due to scarring, can increase the risk of surgical failure. Thus, it is crucial to undertake close observation during the wound healing process to acquire a good bleb in PSS.

Our case series have demonstrated that PSS potentially leads to glaucomatous damage. In cases presenting

with inevitable recurrent attacks, trabeculectomy with mitomycin C and releasable sutures may be considered as the optimal intervention. Following trabeculectomy, further acute episodes after a long period of observation were not found in most of our cases. Even in the case of further acute episodes, IOP was anticipated to be within the normal range. The formed bleb was expected to be adequate in controlling the IOP and inflammatory reaction, thus preventing progression of disease.

This case series suggests that PSS may develop into secondary glaucoma with glaucomatous optic nerve damage and visual field defect in the case of repeated episodes of acute attack. Trabeculectomy can be recommended in PSS cases with frequent recurrent attacks and IOP spikes, especially in those with developed signs of optic nerve damage and visual field defect. Trabeculectomy with mitomycin C and releasable suture may be beneficial for those patients with frequent recurrent attacks as this form of intervention might prevent further optic nerve damage, despite abrupt increase in IOP.

In conclusion, trabeculectomy with mitomycin C and releasable sutures may be considered a safe and effective surgical procedure in chronic recalcitrant PSS in order to avoid progression of glaucomatous damage and possible further acute attacks.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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