

# Goniosynechialysis for secondary angle closure glaucoma in a pseudophakic patient after vitrectomy and silicone oil injection

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**Dear Sir,**

I am Jonghoon Shin, from the Department of Ophthalmology of Pusan National University Hospital, Busan, Korea. I write to present a patient with secondary angle closure glaucoma (SACG) after vitrectomy and silicone oil (SO) injection who was successfully treated by goniosynechialysis.

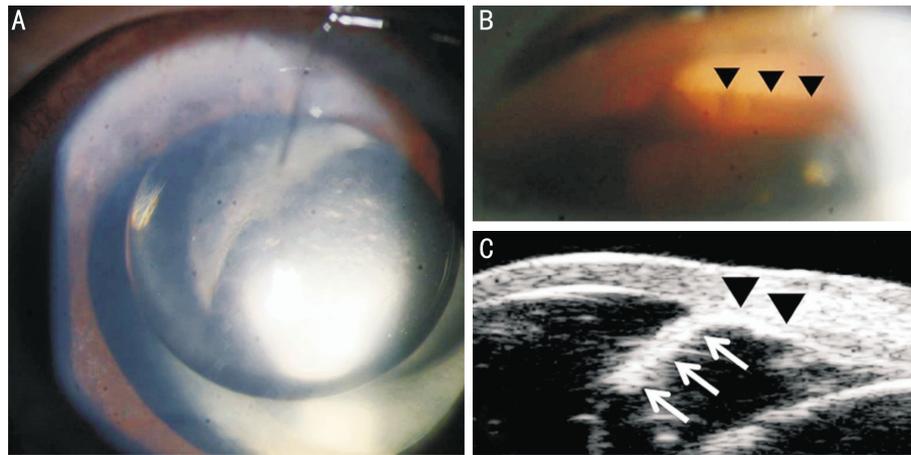
Goniosynechialysis is a surgical procedure which strips peripheral anterior synechiae (PAS) from the angle wall to reestablish the trabecular function <sup>[1]</sup>. Goniosynechialysis was effective in reducing PAS and intraocular pressure (IOP) in primary angle closure glaucoma and SACG after vitreoretinal surgery <sup>[1,2]</sup>. However, goniosynechialysis in pseudophakic patient with SO filled eye has not been described previously. A 45-year-old man presented with a decrease in visual acuity of left eye after blunt trauma. Best corrected visual acuity (BCVA) was 20/25 OD and hand motion OS. IOP was 20 mm Hg OD and 12 mm Hg OS. Slit lamp examination revealed traumatic hyphema and cataract. Fundus was invisible due to vitreous hemorrhage. B-scan ultrasonography revealed retinal detachment. Retinal detachment resulted from blunt trauma was suspected in the left eye and he underwent phacoemulsification with intraocular lens (IOL)

implantation in the bag, total vitrectomy, encircling band implantation, 5000-centistoke SO injection. Giant retinal tear was located nasally from 7- to 12-o'clock position.

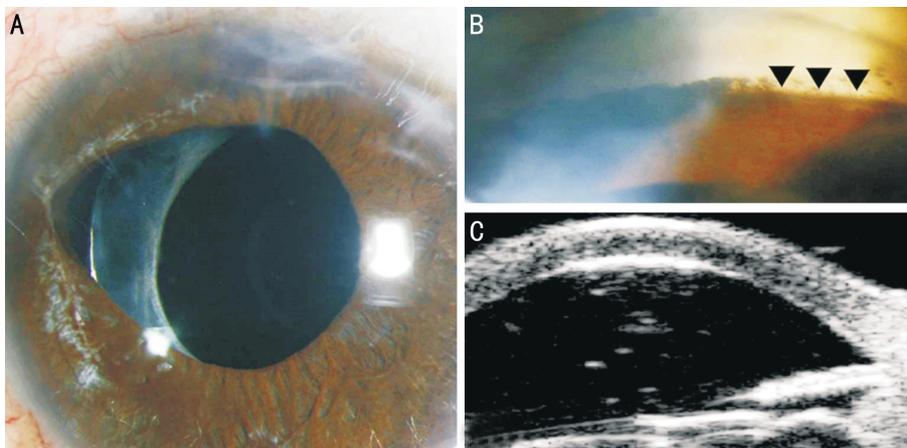
Two days after surgery, IOP increased to 30 mm Hg in the left eye. He complained of ocular pain in the left eye and headache. Slit lamp examination revealed SO filled anterior chamber with cornea edema and SO was 90% volume. Five days after surgery, IOP was raised to 40 mm Hg despite maximally tolerated medical therapy. SO overfilling was postulated as the cause for IOP elevation. However, two times of partial SO removal failed to control the glaucoma.

On presentation to the glaucoma service, BCVA was hand motion and IOP was 34 mm Hg in the left eye. Slit lamp examination showed cornea edema and SO globule in the anterior chamber between iris and IOL, forcing the iris anteriorly and the IOL posteriorly in the left eye (Figure 1A). Indentation gonioscopy revealed 360° synechial angle closure with a flat iris approach which was confirmed by ultrasound biomicroscopy (UBM) (Figures 1B, 1C).

He was diagnosed as having SACG with synechial angle closure after vitrectomy and SO injection. Inferior laser iridotomy failed to reduce the IOP and PAS. Four weeks after his vitreoretinal surgery, goniosynechialysis was performed. SO bubble in the anterior chamber was removed with automated aspiration and intraoperative direct gonioscopy using Swan-Jacob goniolens confirmed the presence of persistent PAS for 360°. Therefore, goniosynechialysis through three separate paracenteses evenly spaced 120° apart was performed for 360° with the anterior chamber formed with viscoelastics. A blunt iris spatula was pressed against the most peripheral edges of the iris next to the points of angle adhesion. After applying pressure toward the posterior of the iris, the trabecular meshwork was exposed. One week after goniosynechialysis, IOP decreased to 14 mm Hg in the left eye. One month after goniosynechialysis, BCVA increased to 20/100 and IOP measured 15 mm Hg in the left eye. Slit lamp examination showed absence of cornea edema (Figure 2A). Gonioscopy revealed newly exposed trabecular meshwork with pigmentation and PAS reduced from 360° to 30° (Figure 2B). UBM showed separation of PAS and widening of anterior chamber angle (Figure 2C).



**Figure 1 Preoperative images to demonstrate secondary angle closure before goniosynechialysis** A: Slit-lamp photographs showing SO globule in the anterior chamber and behind the iris and displacement of the IOL posteriorly with cornea edema; B: Gonioscopic finding of synechial angle closure (black arrowheads) in the left eye; C: UBM showing peripheral anterior synechia (black arrowheads) and a flat iris contour without pupillary block (white arrows).



**Figure 2 Postoperative images at one year after goniosynechialysis** A: Slit-lamp photographs showing an absence of corneal edema; B: Gonioscopic finding of newly exposed trabecular meshwork with pigmentation (black arrowheads); C: UBM showing separation of the peripheral anterior synechia and widening of the anterior chamber angle.

The SO was removed completely without complication at 2mo after goniosynechialysis. One year after goniosynechialysis, BCVA was 20/63 and IOP was 11 mm Hg without anti-glaucoma medication in the left eye. Gonioscopy showed that an angle remained open to scleral spur over 330°. Fundus examination revealed well attached retina with closure of all tears and a cup disc ratio of 0.9.

The success rate of the procedure depends on the preoperative duration of the PAS. The therapeutic window is probably closer to six months in these cases [3]. Our patient received goniosynechialysis at one month after the initial IOP increase. He had no previous history of glaucoma or any other ocular disease and most likely had previous normal trabecular meshwork function. The short duration of the PAS presumably increased the possibility of preserved function of the trabecular meshwork in this patient.

Since slit lamp examination revealed traumatic hyphema, the patient could not undergo angle examination with gonioscopy before surgery. Therefore, the possibility that PAS formed

due to post-traumatic inflammatory response cannot be excluded in this patient [4]. Previous study also reported that PAS occurred 33 of 190 eyes examined (17.4%) after contusional eye injuries [5]. However, Read and Goldberg reported that no notable PAS formation was seen in the eyes of any patient until the hyphema had lasted 8d [4]. Our patient received a vitreoretinal surgery for retinal detachment repair on the day of injury. In addition, IOP was measured within normal range before surgery. A prophylactic inferior surgical iridectomy at the time of SO injection was not done. IOP increased to 30 mm Hg two days after vitreoretinal surgery and slit lamp examination revealed that SO filled anterior chamber. These findings are in agreement with those of pupillary block glaucoma caused by SO in the absence of a surgical iridectomy [4,5]. Therefore, it seems reasonable to suggest that PAS is more likely to be attributable to pupillary block following vitreoretinal surgery with SO injection than to post-traumatic inflammation.

Glaucoma is not a rare complication after vitrectomy and SO

injection. There are several mechanisms suggested to cause glaucoma after SO injection. These include synechial angle closure, pupillary block, inflammation, and migration of emulsified or non-emulsified SO into the anterior chamber<sup>[6]</sup>. SO overfilling is also a risk factor for elevated IOP<sup>[7]</sup>.

In the early postoperative period, SO may escape from the vitreous cavity to block the pupil and act as a barrier to forward aqueous movement<sup>[8]</sup>. While aphakic eyes are especially prone to this complication, it has also been shown to occur in 6% of pseudophakic and phakic eyes, presumably as a result of partial zonulysis<sup>[9]</sup>. Also, as in our case, zonular weakness due to trauma may be the reason for SO migration into anterior chamber.

Although most patients in whom glaucoma develops after vitrectomy and SO injection can be controlled medically, many require surgical intervention<sup>[10]</sup>. Partial SO removal for overfill or inferior laser iridotomy for pupillary block angle closure glaucoma can be curative in the early postoperative period<sup>[8]</sup>. However, the risk of retinal detachment recurrence is a concern for lowering IOP in cases of early SO removal. Furthermore, patients with extensive synechial angle closure like this case would not be expected to experience normalization of IOP with SO removal and laser iridotomy alone<sup>[10]</sup>.

Glaucoma surgery would be indicated in such cases. However, patients who undergo concurrent SO removal and glaucoma surgery are more likely to develop hypotony<sup>[11]</sup>. Senn *et al*<sup>[12]</sup> reported that some patients who were managed with a glaucoma drainage implant for IOP elevation after vitrectomy and SO injection experienced chronic inflammation because SO escaped through the tube. In addition, conjunctival scarring and recession from prior retinal surgery including sclera buckling procedures in the presented patient may have made filtering surgery less successful<sup>[10,13]</sup>.

In contrast, goniosynechialysis was effective in reducing IOP in the present patient. In addition, the SO was removed completely without complication two months after goniosynechialysis. The results obtained from this patient indicate that goniosynechialysis may reestablish aqueous outflow through the trabecular meshwork in SACG after

vitrectomy with SO injection and avoid complications of early SO removal and other glaucoma surgery for patients with evidence of significant angle synechia.

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**Conflicts of Interest:** Shin J, None; Jeon H, None; Byon IS, None; Lee JW, None.

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