**Ciliary Sulcus Ahmed Valve Implantation**

Kun Moon, MD, Yu Cheol Kim, MD, Kwang Soo Kim, MD

Department of Ophthalmology, College of Medicine, Dongsan Medical Center, Keimyung University, Daegu, Korea

**Purpose:** Ahmed glaucoma valves were implanted into the ciliary sulcus of two patients diagnosed with neovascular glaucoma with favorable outcomes.

**Methods:** The study patients presented to our hospital with ocular pain caused by increased intraocular pressure (IOP). A thorough history was taken, and an ophthalmic examination was performed.

**Results:** A 71-year-old male patient and a 57-year-old female patient visited our hospital for ocular pain and persistent, elevated IOP. Each were diagnosed with neovascular glaucoma and underwent an Ahmed glaucoma valve implantation to the sulcus. After surgery, the patients maintained stable IOPs without major complications.

**Conclusions:** The method of Ahmed glaucoma valve implantation into the ciliary sulcus could reduce complications caused by implantation to the anterior chamber. It is thought to be an efficient method for the maintenance of appropriate IOP after surgery.


**Key Words:** Ahmed glaucoma valve, Ciliary sulcus, Neovascular glaucoma

---

Ischemia in the posterior segment of eye can occur in patients with neovascular glaucoma, and diverse therapeutic methods have been developed to combat this problem. It is known that by performing panretinal photocoagulation first, the synthesis of factors that induce new blood vessel growth in the posterior segment of eye is suppressed, and migration of these factors to the anterior segment of the eye is thus prevented, allowing for the regression of new blood vessels. The success rate of trabeculectomy and other general glaucoma surgeries varies widely, from approximately 10 to 78%. Nonetheless, for neovascular glaucoma, the tendency to bleed is high, and therefore the success rate has been reported generally to be poor.

For refractory glaucoma patients with a poor surgical prognosis, implants have been widely used, particularly the recently developed Ahmed glaucoma valve implant (New World Medical, Inc. Rancho Cucamonga, California, USA), which has been reported to reduce the initial hypotony after surgery, among other related complications.

We implanted Ahmed glaucoma valves (New World Medical, Inc. Rancho Cucamonga, California, Model FP7) in the sulcus of two patients diagnosed with neovascular glaucoma. We were able to obtain satisfactory intraocular pressures (IOP) without major surgical complications. Since this method that has not been yet been reported in the literature, the cases are reported here with a review of the literature.

**Case**

**Case 1.**

A 71-year-old male with diabetes mellitus presented to our hospital with a chief complaint of left ocular pain that progressively worsened over the course of three months. One year ago, he underwent bilateral cataract extraction with intraocular lens (IOL) implantation. The patient had also been experiencing visual disturbances and had been treated with eye drops prior to transfer to our hospital.

At the initial examination, the best corrected visual acuity of the right eye was 0.7, and the best corrected visual acuity of the left eye was 0.3. The IOP of the right eye measured by Goldmann applanation tonometry was 12 mmHg, and the left eye was 34 mmHg. On slit lamp examination of the left eye, new blood vessels on the iris surface and adhesion of the new blood vessels to the adjacent peripheral anterior synechiae were detected. Panretinal photocoagulation was performed on the left eye, and topical steroids and atropine were administered. For IOP control, a topical beta-blocker (Cilte®, Hanlim Pharm Co., Korea) and an oral carbonic
anhydrase inhibitor (Mezomin®, Keukdong Pharm Co, Korea) were administered. Nevertheless, the IOP of the left eye measured by the Goldmann applanation tonometry was 40 mmHg. Hence, an Ahmed glaucoma valve implantation was performed.

The implantation was performed under retrobulbar anesthesia. In the middle of the superior rectus muscle and the lateral rectus muscle, the fornix conjunctiva was incised approximately 8 mm from the limbus. The conjunctiva and the tenon's capsule were dissected from the sclera, and a limbal-based scleral flap 4×4 mm in size was prepared. The Ahmed glaucoma valve was implanted to the site between the superior rectus muscle and the lateral rectus muscle and fixed to the sclera with 10-0 nylon. Prior to the implantation of the Ahmed glaucoma valve, a 1 cc balanced salt solution (BSS®, Alcon, USA) was administered through the Ahmed glaucoma valve using a 26 G cannula in order to confirm correct functioning. Approximately 2 mm of the silicon tube was implanted on the inside of the posterior chamber, and the end of tube was cut at 30° degrees. Using a 23 G needle, the posterior chamber was perforated through the sulcus, and the tube was implanted (Figure 1). We confirmed that the tube was implanted in the correct position through dilated pupil. The area of the exposed tube was covered with the scleral flap and fixed to the sclera with 10-0 nylon, and the tenon's capsule and the conjunctiva were sutured with 10-0 nylon. One week after surgery, the left eye visual acuity was 0.04, the IOP was 5 mmHg, and on examination of the fundus, choroidal detachment was observed. Nonetheless, visual acuity two weeks after surgery improved to 0.08. The IOP was 8 mmHg, and on examination of the fundus, choroidal detachment was improved. One month after surgery, visual acuity was 0.4 and IOP had increased to 26 mmHg; consequently, a topical carbonic anhydrase inhibitor (Cosopt®, MSD, USA) was administered. Two months after surgery, visual acuity improved to 0.5, with a stable IOP of 17 mmHg. On slit lamp examination, regression of new vessels in the iris surface was seen.

Case 2.

A 58-year-old female presented to our hospital with a four month history of right ocular pain that had progressively worsened. Two years prior, she underwent cataract extraction with IOL implantation, and during the first year postoperatively, she received panretinal photocoagulation therapy. One year ago, she underwent a pars plana vitrectomy for proliferative diabetic retinopathy. The patient was diagnosed with diabetes 17 years ago, but otherwise did not have a significant past medical history.

At the initial examination, the best corrected visual acuity of the right eye was 0.08, and the left eye was 0.3. The IOP of the right eye was measured using the Goldmann applanation tonometry and was 35 mmHg; the left eye was 14 mmHg. On slit lamp examination, new vessels on the iris surface were detected, and in the anterior chamber angle examination, new vessels had formed. Due to the continuous proliferation of the fibrovascular membrane, closure of the right anterior chamber angle was detected. Topical beta-blockers and topical carbonic anhydrase inhibitors (Cosopt®, MSD, USA) were continuously administered, and photocoagulation for new vessels in the anterior chamber was performed. However, the ocular pressure could not be controlled; hence, an Ahmed glaucoma valve implantation was performed.

Surgery was performed by the method identical to the Case 1. In this case, however, due to the small size of her pupil, we examined the location of tube by using a Hirschman iris hook (Bausch & Lomb, Inc. St. Louis, Missouri). Four months after surgery, a slightly elevated IOP level at 20-22 mmHg was maintained. Five months after surgery, the visual acuity of the right eye was 0.08, and the IOP of the right eye stabilized to 17 mmHg. On slit lamp examination, the result of the regression of new vessels in the iris surface was detected (Fig. 2). Ten months after surgery, during the patient's final visit to our outpatient clinic, her visual acuity had not improved, but she did not...