

The Ahmed Glaucoma Valve Flexible Plate

A look at how this device may fit into practice.

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Previous models of the Ahmed Glaucoma Valve (New World Medical, Inc., Rancho Cucamonga, CA) have been constructed with a rigid polypropylene plate. Recently, the manufacturer has released a new model of the device, which we have used in our patients. This article provides a brief overview of the Ahmed Glaucoma Valve Flexible Plate and its potential role in surgical practice.

THE TRADITIONAL AHMED GLAUCOMA VALVE

For several years, the Ahmed Glaucoma Valve and other restrictive glaucoma drainage devices have been popular in surgery for refractory glaucomas. These devices have proven to be excellent additions to the surgeon's armamentarium when traditional, guarded filtration surgery has failed or is not possible due to conjunctival scarring, inflammation, or other problems. The valve helps minimize postoperative hypotony and the complications associated with hypotony, including a flat anterior chamber, choroidal effusions, and suprachoroidal hemorrhage.^{1,2} After receiving an Ahmed Glaucoma Valve, patients may require adjunctive anti-glaucoma medications for adequate control of their IOP.¹⁻⁴

The plate for the traditional Ahmed Glaucoma Valve is composed of polypropylene. Due to the rigidity of the device, the implant may slide anteriorly during insertion, even after several attempts by the surgeon to enlarge the opening in the intermuscular Tenon's capsule. Moreover, the height of the implant can cause difficulty when the surgeon attempts conjunctival wound closure due to existing tension on the conjunctiva.

The pseudocapsule on the scleral side of the plate is probably not involved in filtration, with the majority of aqueous flow occurring on the side of the plate away from the sclera. Also, polypropylene may be less biocompatible than other materials, perhaps causing more inflammation and scarring during the encapsulation of the device.^{5,6} This encapsulation could contribute to a longer

or more persistent "hypertensive phase" (the period of increased IOP during the time when an encapsulated bleb is forming around the implant).

THE AHMED GLAUCOMA VALVE FLEXIBLE PLATE

The Ahmed Glaucoma Valve Flexible Plate was designed to address the aforementioned issues. Figures 1 and 2 show both the polypropylene (Models S2 and S3) and silicone (Model FP7) implants. Several differences between these models are apparent. The most obvious, perhaps, is that the silicone implant is much thinner than the traditional polypropylene device. The former's tapered profile was designed to promote easier insertion. The plate's flexibility also facilitates implantation. Upon implantation of the FP7, we stretch open the posterior Tenon's capsule with a large scissors and have found that the device does seem to insert with ease. The plate is not so flexible as to bend or roll, however, owing to so-called stiffeners—two raised diagonal lines between the holes on the dorsal side of the plate, posterior to the location of the tube and valve system.

The device's lower profile also seems to help with the wound closure, thanks to its tapered profile and lack of a



Figure 1. A top-view of the single-plate Ahmed Glaucoma Valves reveals the stiffening ridges and fenestrations on the silicone plate (model FP7).

posterior ridge. Whereas the lower edge thickness of the model S2 is 0.075 inches, the lower edge thickness of the FP7 is 0.033 inches—a 60% reduction in edge thickness. In our experience, the thinner lower edge has facilitated the closure of the conjunctival wound at the limbus. Less stretching of the conjunctiva should also result in fewer buttonholes, better healing, and perhaps superior bleb formation. This thinner profile may help reduce the need for posterior relaxing incisions or conjunctival autografts in the event that there is not sufficient conjunctiva to reach the limbus upon wound closure. We prefer the autograft approach if there is still not enough tissue to pull up to the limbus. Even if it is necessary to perform an autograft when using the FP7, the amount of conjunctival graft required should be less with a plate that is 60% thinner.

Also of interest are the fenestrations on the Ahmed Glaucoma Valve Flexible Plate. The three holes are located posterior to the valve and outside or between the two stiffeners. In theory, these fenestrations will allow aqueous to percolate through to the lower side of the implant, thereby increasing the effective area available for aqueous drainage. Over time, tissue growth into the fenestrations may also limit the bleb's height. The concept behind these fenestrations is similar to that of those on the Baerveldt implant plate (Pfizer Inc., New York, NY): they form fibrous tissue “rivets” to limit the height of the bleb.

Many physicians have anecdotally described lower, thinner blebs with the flexible silicone valve compared with the traditional Ahmed Glaucoma Valve. If there is less tissue reaction to silicone versus polypropylene, then the implant should induce less inflammation and reduce the thickness of the surrounding pseudocapsule, resulting in lower long-term IOPs.

THE VERDICT

Based on the virtues of its design, the Ahmed Glaucoma Valve Flexible Plate should be easier to insert, improve bleb formation, and possibly produce lower long-term IOP. Blebs of lower profile may reduce the incidence of complications such as diplopia, strabismus, bleb dysaesthesia, and undesirable cosmesis.

There has been no scientific comparison of the two plates. Only anecdotal evidence now exists in demonstrating an appreciable difference, and it is difficult to say in our own patients if their blebs are thinner, lower, or more diffuse without a standard system of measurement. We are performing measurements of the blebs using ultrasound biomicroscopy, which may provide useful information. To date, we have not had to excise any pseudocapsules for bleb revision, which would provide additional information about the biocompatibility of the implants.



Figure 2. A side-view of the single-plate Ahmed Glaucoma Valves demonstrates that the flexible silicone plate (model FP7) has a thinner profile compared with the polypropylene plate (model S2).

There are potential disadvantages of the silicone plate. It may be a less desirable option in eyes containing silicone oil after vitreoretinal surgery. In such patients, we prefer to use the polypropylene implant for the same reason most ophthalmologists avoid implanting a silicone IOL during cataract surgery in a patient with coexistent silicone inside his eye. The adhesion of the silicone oil to the silicone implant plate could interfere with the intended function of the implant.

Only time and scientific study will demonstrate the true advantages of the Ahmed Glaucoma Valve Flexible Plate. Nonetheless, it seems, from our experience, to be a thoughtfully designed and helpful surgical option. □

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