Anatomic and Histopathologic Findings Following A Failed Ahmed Glaucoma Valve Device

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Abstract. Ahmed glaucoma valve implant (AGV) is one of the more commonly used implants in difficult glaucomas. The histology of a functioning bleb following AGV implantation and its anatomic relationship to the optic nerve when placed in the superonasal quadrant has been described. We report the histology of a failed bleb and the anatomic relationship between the optic nerve and the AGV end-plate when placed 9 mm from the limbus in a patient with neovascular glaucoma.


CASE REPORT
An 80-year-old woman developed neovascular glaucoma secondary to proliferative diabetic retinopathy in her left eye. She underwent panretinal photocoagulation prior to her referral for the management of the neovascular glaucoma. Her visual acuity was 20/60 and the intraocular pressure (IOP) was 45 mm Hg on maximum tolerable medications. The patient underwent an uncomplicated Ahmed valve insertion in the superior- temporal quadrant, 9 mm from the limbus, using a fornix-based conjunctival flap. The postoperative phase was complicated by the hypertensive phase with IOP at 27 mm Hg at 1 month and 33 mm Hg at 3 months, despite the use of three topical antiglaucoma medications. Needling of the bleb and 5-fluorouracil injection (in the inferior fornix) was done without any response. Four months after the first operation, the IOP was still at 32 mm Hg on three topical medications. A second Ahmed valve was inserted in the superonasal quadrant 9 mm from the limbus, using a fornix-based conjunctival flap. One month after the second operation, the patient developed a wound leak, hypotony, and choroidal effusion. A wound repair with choroidal drainage was performed. Visual acuity at 2 months after the second Ahmed valve insertion was 20/60 and the IOP was 22 mm Hg. The patient presented a year later with hyphema, vitreous hemorrhage, and tube exposure with no leak and IOP of 24 mm Hg. Her vision was hand motions. Her vision continued to decline and she eventually lost her vision 2 years after her initial Ahmed valve surgery. The eye wasenucleated because of chronic pain.

During enucleation, care was taken not to disturb the Ahmed valves and the fibrous capsules around them. The anterior edge of the AGV measured 9 mm from the limbus in both nasal and temporal quadrants (Figure 1). The posterior edge of the end-plate was
within 2 mm of the optic nerve nasally and 4 mm temporal side (Figure 2). The fibrous capsule surrounding the end-plate did not involve the optic nerve on either side. The capsular tissue surrounding the valve was composed of active fibroblasts intermingled with occasional chronic inflammatory cells. Anteriorly, above the silicone tube, the scleral patch graft was surrounded by a zone of granulomatous inflammation (Figure 3). The granulomatous tissue adjacent to the patch graft was composed of numerous multinucleated, foreign body giant cells, histiocytes, plasma cells, and lymphocytes.

**COMMENT**

The granulomatous reaction of both the scleral patch graft and the underlying sclera in this patient was unusual and greater than has been reported in literature. This exuberant reaction may have contributed to the failure of the operation. The present case also demonstrates the relationship between the Ahmed glaucoma valve end-plate to the optic nerve when placed 9 mm from the limbus in both the superior quadrants. It was within 2 mm from the optic nerve on the nasal side and 4 mm on the temporal side. However, it should be noted that the fibrous capsule did not involve the optic nerve in any way. This is very similar to the previous reports.

The manufacturer recommends placement of the 16-mm implant at least 8 to 10 mm posterior to the limbus in either the superonasal or the superotemporal quadrant. The nasally placed implant end-plate is closer to the optic nerve because the optic nerve’s exit point from the globe measures 28 mm from the limbus in the superonasal quadrant and 33 mm in the superotemporal quadrants. Thus, an implant placed at 8 to 10 mm from the limbus in the superonasal quadrant might impinge on the optic nerve and may compromise the nerve function, especially on ocular movement. This may especially be true in eyes with shorter axial lengths. Also, if the patient develops a large bleb and/or severe inflammation, the fibrous reaction may involve the optic nerve (even though this was not the case in the present report). Because of this possibility, the AGV implant should be placed at 6 to 7 mm from the limbus on the superonasal side. Placement of the endplate at 7 mm from the limbus will facilitate access of the bleb during needling. Physicians must be aware that placing the endplate too anteriorly might increase the risk of conjunctival breakdown over the end-plate with persistent leaks.

In summary, scleral patch grafts following AGV surgery can induce an exuberant foreign body granulomatous reaction that could contribute to bleb failure. Because of the size of the AGV endplate, placement more than 7 to 8 mm from the limbus in the superonasal quadrant could impinge on the optic nerve.

**REFERENCES**