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Case Report

Complication of an Ahmed glaucoma valve implant: tube exposure with methicillin-resistant *Staphylococcus aureus* infection

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Summary

Neovascular glaucoma is commonly treated surgically with implantation of glaucoma drainage devices. We report the case of a 57-year-old man who underwent an uneventful Ahmed glaucoma valve (AGV) placement for radiation-induced neovascular glaucoma but later developed early postoperative infection with tube exposure. The infection was identified 3 weeks postoperatively and antibiotic treatment was immediately initiated. However, the conjunctival melt progressed, and the AGV had to be removed. Culture of the device revealed methicillin-resistant *Staphylococcus aureus* (MRSA). There is a potential increased risk of postoperative infection and tube exposure following glaucoma valve implantation in patients with previous radiation therapy. To our knowledge, this is the second case in the literature of MRSA causing early postoperative infection following drainage device placement that required explantation.

Introduction

Neovascular glaucoma (NVG) may occur in patients with central retinal vein occlusion, proliferative diabetic retinopathy, ocular ischemic syndrome, and less commonly, following radiation therapy.[1] The management of NVG can be challenging. Despite the use of panretinal photocoagulation and anti-VEGF agents, 80% of patients require surgical intervention.[2–4] Surgical management for elevated intraocular pressure (IOP) in NVG usually entails the placement of a glaucoma drainage device, although some studies have also found trabeculectomy with mitomycin C to be effective.[5] Wound healing problems in general are seen less with glaucoma drainage devices than filtering surgery. However, late tube exposure associated with endophthalmitis is not uncommon following placement of a glaucoma drainage device. The tube exposure rate in the Tube versus Trabeculectomy (TVT) Study was 5%, with all cases occurring >1 month following surgery.[6] We report a case with early tube exposure associated with a Ahmed glaucoma valve (New World Medical Inc, Rancho Cucamonga, CA) infected with methicillin-resistant *Staphylococcus aureus* (MRSA).

Case Report

A 57-year-old man with a history of left lagophthalmos presented for a follow-up eye examination. His past medical history was significant for metastatic squamous cell carcinoma of the nose. His cancer was previously treated with total rhinectomy, salvage neck dissection, partial chemotherapy, and radiation, because he could not tolerate full treatment. In addition, he had diabetes, hepatitis C and a history of substance abuse. His examination findings in the left eye included a visual acuity of 20/200, lagophthalmos, rubeosis iridis, hyphema, and IOP of 36 mm Hg (Figure 1). The retinal examination was unremarkable, without cotton wool spots or hemorrhages. NVG was diagnosed, and maximal IOP-lowering medical therapy was initiated, as well as treatment with intravitreal ranibizumab and panretinal photocoagulation. The patient's IOP remained elevated at 1 week, and he underwent AGV insertion.

During placement, the tube was covered by Tutoplast pericardium (Innovative Ophthalmic Products Inc, Costa

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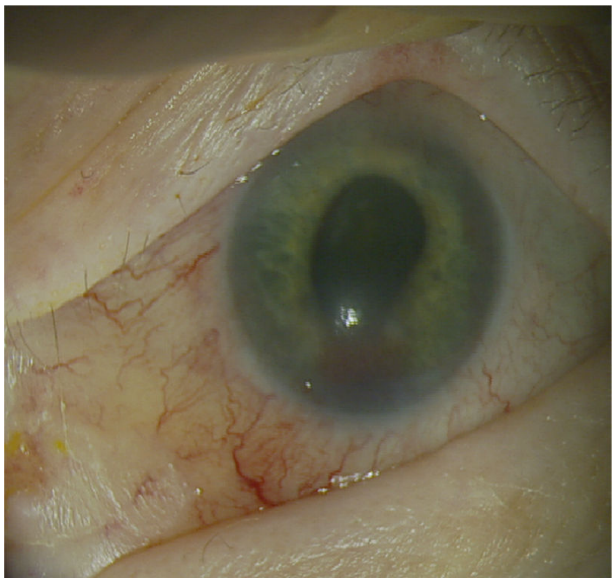

Figure 1. Preoperative photograph at the time of neovascular glaucoma diagnosis showing rubeosis iridis, hyphema, and exposed conjunctiva with keratinization.

Mesa, CA) and conjunctiva. Preoperative and postoperative moxifloxacin eyedrops were instilled, along with intraoperative cefazolin. The IOP remained stable around 5 mm Hg, and the conjunctiva was well approximated throughout the first 2 weeks postoperatively. However, at his 3 week postoperative visit, purulent necrotic tissue involving the conjunctiva and pericardium was identified, with tube exposure. There was no evidence of intraocular inflammation suggestive of endophthalmitis, and the patient was relatively asymptomatic at this time. Fortified topical vancomycin, tobramycin, and oral moxifloxacin were started to treat the external infection. His condition did not improve, however, and 2 days later he underwent debridement of the necrotic tissue involving the conjunctiva and pericardium, with resultant further tube exposure (Figure 2). The device was removed and sent to microbiology. The conjunctival defect could not be closed primarily, so a conjunctival autograft from the same eye was obtained. The culture of the drainage device grew MRSA.

Further review of his past medical history revealed a previous diagnosis of MRSA involving his neck wound after neck dissection. Infectious disease was consulted, after which oral doxycycline and cephalexin were started, owing to moxifloxacin resistance. Topical vancomycin was also continued. He had no postoperative complication in the 4 months following removal of the device, and the wound healed without evidence of repeat infection, wound exposure, or leak. At last evaluation, the

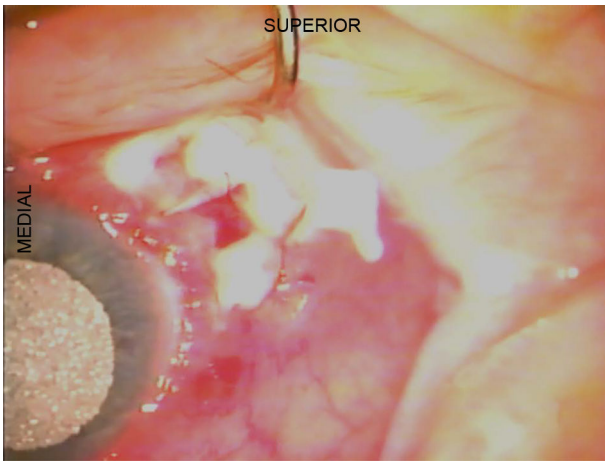

Figure 2. Intraoperative photograph showing necrotic tissue, conjunctival hyperemia, and tube exposure.

visual acuity was 20/400, and IOP was elevated to 30 mm Hg on maximal medical therapy. Treatment with transscleral diode cyclophotocoagulation was discussed.

Discussion

The treatment of NVG is often difficult and usually requires a multidisciplinary approach. Early diagnosis permits timely decrease of the VEGF load and close monitoring of IOP. Despite treatment with panretinal photocoagulation, anti-VEGF agents, and maximum glaucoma medications, a majority of patients will require surgical intervention for NVG.[2–4] The AGV is a commonly placed glaucoma drainage device for treatment of NVG.

While an AGV may help achieve IOP control, it is not without complications. The Ahmed versus Baerveldt Study followed patients for 3 years postoperatively and reported a 52% complication rate in the Ahmed group. These findings included tube related problems (15%), shallow anterior chamber (15%), choroidal effusion (13%), encapsulated bleb (11%), persistent corneal edema (7%), persistent iritis (6%), and endophthalmitis/episcleritis (2%).[7] Awareness of complications, preventative measures, and early recognition is important for favorable outcomes. We believe that in the present case early diagnosis and repair of the conjunctival erosion with tube exposure prevented endophthalmitis despite the aggressive nature of MRSA.

Our patient's early wound infection and tube exposure may be due to multiple predisposing conditions that influenced his outcome. Prior radiation exposure is

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known to cause modification of ocular tissues leading to tear insufficiency and poor wound healing.[8,9] His lid and sinus anatomy were altered from multiple facial surgeries, and the preexisting MRSA infection likely caused colonization with involvement of the ocular surface, although there was no sign of active infection involving the head and neck area at the time of surgery.

MRSA has been a rare cause of endophthalmitis or external infection following Ahmed valve placement, with the most common organisms including *Streptococcus* species and *Hemophilus* influenza.[10] Our search of the literature identified only one previous report of extraocular infection with MRSA following Ahmed valve insertion, involving an 87-year-old woman who developed MRSA-positive endophthalmitis 4 days after complex intraocular surgery that included AGV placement. In that case the patient was treated with intravitreal and systemic antibiotics, but the infection persisted in the AGV with purulent conjunctival discharge from the peritomy. In contrast to our case, the external ocular infection appeared after the onset of endophthalmitis.[11]

Although MRSA has previously been an uncommon organism involved in ocular infection, the incidence is increasing.[12–13] Trends in ocular MRSA infection were reported by Amato et al and showed rising incidence and resistance in their patient population over an 8-year period.[13] Another recent study evaluated antibiotic resistance in 44 clinical isolates of methicillin-resistant *Staphylocci*. There was a high resistance to fluoroquinolones (87%), azithromycin (87%), and tobramycin (100%); while MRSA isolates had a high sensitivity (87.5%) to vancomycin and netilmicin.[14] Our patient's MRSA was resistant to moxifloxacin and treatment with this antibiotic may have selected for this bacteria to proliferate.[15] The presence of multidrug-resistant bacteria strains should be considered and evaluated through the patient medical history during the planning of surgical management. It may be of benefit to have known MRSA carriers undergo preoperative nasal mupirocin treatment, chlorhexidine baths, use antibiotics known to have a high sensitivity to MRSA, and avoid those with high resistance, such as fluoroquinolones.[15]

Clinicians must be aware of conditions that could lead to poor postoperative outcomes, including previous radiation therapy, altered anatomy, tear insufficiency, and previous MRSA infection, as in our patient. Patients with any of these risk factors may benefit from alternative nonincisional therapies such as transscleral diode cyclophotocoagulation, which does not have an associated infection risk and has shown to have similar outcomes at 2 years compared to AGV in patients with NVG and preoperative visual acuity of hand motions or worse.[16] Surgery selection and perioperative treatment should be based on patient characteristics influencing visual potential, wound healing, and known bacterial colonization.

Literature Search

The authors searched PubMed in May 2013 for English-language articles using the following search terms: *neovascular glaucoma treatment*, *glaucoma drainage device exposure* AND *infection*, *Ahmed glaucoma valve*, *Baerveldt glaucoma implant*, *Ahmed versus Baerveldt study*, *Tube versus Trabeculectomy Study*, *radiation* AND *wound healing*, *methicillin-resistant* Staphylococcus aureus *rates*.

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