Needle Bleb Revision of Encapsulated Filtering Bleb With Bevacizumab

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Abstract. The utility of needle bleb revision with bevacizumab in a patient with a failing bleb following trabeculectomy is explored. The patient had previously failed needle bleb revision with mitomycin C. After needling and injection of 1 mg of bevacizumab, the bleb was noted to be more diffuse with a decrease in surface neovascularization. Bevacizumab may be an effective medication for rescuing failing filtering blebs that exhibit neovascularization. [Ophthalmic Surg Lasers Imaging 2006;37:148-150.]

INTRODUCTION

Vascular endothelial growth factor (VEGF) is a 45-kD mitogen protein with specificity for vascular endothelial cells. It has been implicated in the pathogenesis of macular edema and proliferative retinopathy in diabetic retinopathy, as well as neovascularization in age-related macular degeneration. An anti-VEGF antibody, bevacizumab (Avastin; Genentech Inc., San Francisco, CA), has recently been used as a chemotherapeutic agent for colorectal cancer. Research showed that treating colorectal cancer with 5-fluorouracil and bevacizumab led to improved outcomes compared to 5-fluorouracil alone. Intravenous and intravitreal injections of bevacizumab have shown promise in treating neovascularization in the eye.

Following trabeculectomy, bleb failure occurs due to increased vascularization of the conjunctiva with associated migration of fibroblasts secondary to cytokine release. The effect of angiogenesis inhibitors on Tenon’s fibroblasts has been studied in the past. There are no reported cases of bevacizumab use in bleb needling procedures. We report a case of needle bleb revision with bevacizumab, and describe the clinical course and future implications.

CASE REPORT

A 64-year-old patient presented 2 months following trabeculectomy with mitomycin C (MMC) with increasing intraocular pressure (IOP) and a vascularized bleb. Visual acuity was 20/100 and IOP was 26 mm Hg. He underwent needle bleb revision with 0.04 mg of MMC twice without sustained benefit. IOP remained elevated at 25 mm Hg and the bleb height decreased (Fig. 1). Options, including repeat of needle bleb revision with MMC and operating to revise the bleb, were discussed with the patient. We also discussed the use of bevacizumab as an alternative, while fully explaining its experimental medication status for ocular neovascular disease. The patient opted for needle bleb revision with bevacizumab and signed a consent form outlining the risk factors, possible side effects, and experimental status of this medication.

After installation of 1 drop of gatifloxacin, bleb revision was performed with a 27-gauge needle. One mg of bevacizumab (0.04 mL of 25 mg/mL) was injected at the temporal base of the bleb at the end of the needling procedure. Topical gatifloxacin was prescribed four times per day for 4 days and he was instructed to return 2 days later.

On return examination, the patient reported no ocular discomfort. IOP improved from 25 to 7 mm Hg. Bleb diffuseness increased and neovascularization of the bleb decreased (Fig. 2). The regression of bleb neovas-
cularization lasted for 2 weeks, at which time the IOP began to increase slightly to 16 mm Hg. The needle bleb revision procedure with bevacizumab was repeated, after which the patient's condition remained stable 6 weeks later with a diffuse, mildly vascularized bleb and IOP of 6 mm Hg.

DISCUSSION

The development of new blood vessels is necessary for many biologic processes, such as wound healing, tissue remodeling, and tumor formation. VEGF is an important protein involved in signal transduction and regulation of the neovascularization process. Bevacizumab, an anti-VEGF protein, has been used for ocular conditions that involve neovascularization. Michels et al. studied the short-term safety and efficacy of bevacizumab in treating age-related macular degeneration with subfoveal choroidal neovascular membranes. Side effects noted during follow-up included a transient increase in blood pressure, which was controlled with oral anti-hypertensive medication. Visual acuity, retinal thickness, and choroidal neovascular membrane size by angiography all improved. Reports have also illustrated the utility of bevacizumab as an intravitreal injection for age-related macular degeneration and central retinal vein occlusion.

Bleb failure is a major factor limiting the long-term success of trabeculectomy surgery. The process of bleb failure involves vascularization with fibroblast migration and eventual scarring of the fistula tract. Although VEGF is a unique mitogen specific to vascular endothelial cells, the signal cascade leading to fibroblast migration and proliferation involves a dynamic interplay between many proteins. Blocking the neovascular signal cascade with anti-VEGF proteins may lead to a decrease in fibroblast proliferation by affecting the supply of mitogenic cytokines such as fibroblast growth factor carried in by new vessel formation and decreasing the known synergism that exists between VEGF and fibroblast growth factor.

Our patient had trabeculectomy surgery with adjunctive MMC followed by bleb vascularization and encapsulation. Needle bleb revision procedures with MMC failed to fully disrupt the neovascular and fibroblast response and bleb encapsulation resulted in increased IOP. The injection of bevacizumab led to decreased neovascularization of the bleb, marked decrease in IOP, and improved function of the bleb. The bleb remained functional 6 weeks after injection with bevacizumab. Needle bleb revision with bevacizumab may be a valuable tool to control bleb failure due to the wound healing response and could increase the survival rate and function of blebs exhibiting exuberant neovascularization following trabeculectomy.

REFERENCES


