MANAGEMENT OF HYPOTONY AFTER GLAUCOMA SURGERY

Approaches differ between microshunt and trabeculectomy eyes.

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Although numerical and clinical hypotony after subconjunctival filtration surgery both warrant attention, the latter may indicate an overfiltering bleb or decreased aqueous production and should trigger intervention. If a patient presents with a low IOP (usually < 6 mm Hg) and is experiencing visual impairment or choroidal effusion or showing signs of hypotony maculopathy, these structural complications must be addressed.

The bleb's appearance can signal overfiltration. If a bleb is leaking, diffusely sweating, ischemic, and pale, it is likely overfiltering and at risk of infection. This would also be a reason to intervene.

If intervention is warranted, it is safer and more efficient to manage an overfiltering microshunt bleb than an overfiltering trabeculectomy bleb. To shut down a bleb after the implantation of a Xen Gel Stent (AbbVie) or Preserflo MicroShunt (Santen/Glaukos), the stent is removed, and the small hole in the eye is closed with one suture. With an overfiltering trabeculectomy bleb, however, the scleral defect in the eye is larger, and the scleral flap is sometimes thin and difficult to manage. It is therefore typically necessary to place a pericardial or scleral patch to shut down the bleb, which is an involved and challenging approach.

This article discusses the occurrence of overfiltration after microshunt surgery and describes techniques for modifying aqueous flow.

AFTER XEN IMPLANTATION

Chronic hypotony after Xen implantation is rare and almost always due to peritubular flow. Less often, the cause is aqueous shutdown. The Xen's length and inner diameter should protect against hypotony in eyes that produce aqueous at a normal rate.

The primary cause of peritubular flow in microshunt surgery is a short scleral tunnel. If a patient has a thin sclera (eg, due to high myopia) and a short tunnel, peritubular flow is more likely to occur.

Although leaving an OVD in the anterior chamber could theoretically protect against early hypotony, I strongly advocate against this approach because I find it usually clogs the Xen and leads to a significant IOP spike. If a patient has a persistent choroidal effusion and chronic hypotony that is refractory to medical treatment, a trip back to the OR is warranted. One method to check for peritubular flow is to inject diluted trypan blue dye into the anterior chamber; in the setting of peritubular flow, the dye will pass around rather than through the Xen. On gonioscopy, the sclera will have a fish-mouth appearance and be stained with the trypan blue dye.

In a patient with chronic hypotony, it is hard to predict how the eye will behave and when it will "wake back up" and start to produce a "normal" amount of aqueous. When I take a patient back to the OR for persistent choroidal effusions after Xen implantation, I therefore drain the choroidal once and assess the degree of peritubular flow with trypan blue dye, as described earlier.

If, after an uncomplicated choroidal drainage (and scleral windows if the scleral wall is very thick), the choroidal effusion returns, then I typically remove the Xen and drain the choroidal effusions once more. When the IOP increases, the next surgical steps can be determined. If the conjunctiva is scarred, it may be worth considering tube shunt surgery rather than the placement of another Xen implant. Regardless of approach, a frank discussion with the patient that sets appropriate expectations is essential. I emphasize that addressing their low IOP is our first priority and that, after this problem has been resolved, another operation may be required 2 or 3 months later.

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AFTER TUBE SHUNT SURGERY

Tube shunt–associated hypotony occurs either because of overfiltration or because the patient's aqueous production has gradually declined with age and cannot keep up with the degree of filtration through the tube. There are several methods to modulate flow using an ab interno approach that avoids the need to open the conjunctiva and perform a big dissection.

To shut off flow entirely, a 3-0 or a 4-0 polypropylene suture can be used. The tip of the suture is blunted with cautery to make a bulb. Microsurgical forceps are used to insert the bulb through a few small corneal paracenteses and into the tube via an ab interno approach. It looks like a snake swallowing an egg. Flow through the tube should stop completely, and the IOP may increase to very high levels but sometimes normalizes. The option to completely shut the tube down via a minimally invasive approach is useful.

In other scenarios, the goal is to limit flow. One approach is to cauterize a 3-0 polypropylene suture to create a small, blunted tip that does not fully occlude flow. The suture is passed through the tube to the tube-plate junction via an ab interno approach. Most of the tube is filled with the suture, limiting its volume and increasing resistance to outflow. This maneuver can increase IOP by 3 or 4 mm Hg. Because the polypropylene material has a memory, the suture can be used to curve the tube posteriorly. Once I have placed the 3-0 polypropylene suture in the tube and am happy with the length and position of the suture, I pull a few millimeters out of the tube and use microsurgical forceps to curve it almost 270° posteriorly so that inserting the suture back in the tube redirects it away from the cornea. The ability to move the tube away from the cornea increases safety and helps minimize the risk of damage to the corneal endothelial cells.

This ab interno tube revision can be performed under topical anesthesia. Patients can see immediately afterward, and they do not have to deal with a large conjunctival dissection and sutures. The approach is safer, less invasive, and more efficient than an open revision, which requires a large conjunctival dissection.

AFTER PRESERFLO IMPLANTATION

The technique used to implant the Preserflo MicroShunt in the current FDA trial leaves a 10-0 nylon suture ripcord at the time of surgery to protect against early hypotony. This ripcord is removed in the early postoperative period depending on the IOP. To date, I have not seen clinically significant chronic hypotony due to the Preserflo. The device's wings prevent peritubular flow, and the implant is inserted into a scleral pocket with a tight fit. Some cases of early hypotony have been reported in studies outside the United States, but usually the hypotony has been self-limited and short-lived.

CONCLUSION

Recognizing and troubleshooting overfiltration and/or hypotony are a necessary aspect of glaucoma outflow procedures (tube shunt surgery, trabeculectomy, and microshunt implantation). Although the management of an overfiltering bleb is safer and more efficient after microshunt implantation than trabeculectomy, careful consideration of the approach is warranted. It is also essential to recognize the importance of managing tube-associated hypotony. ■

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