Editorial

Complications and Management of Glaucoma Surgery

Despite major advances in the development of novel drugs and laser techniques for intraocular pressure (IOP) reduction in eyes with glaucoma, a significant proportion of glaucoma patients ultimately require surgery to achieve target pressure.

Trabeculectomy (Trab) still remains the gold standard in management of uncontrolled glaucoma. Many studies have compared initial trab versus medical treatment and confirmed trab providing consistently low IOP[1,2]. Other potential advantages of this surgical procedure include stabilization of IOP without any diurnal fluctuation, less reliance on patient's compliance and cost effectiveness, which is of great significance in our present socio-economic environment.

Since its first description by Cairns[3] in 1968, trab has also gone through various additions and modifications with adjunctive use of antimetabolites such as mitomycin-C (MMC) and 5-fluorouracil (5FU), use of releasable and adjustable sutures and maintenance of anterior chamber with balanced salt solution (BSS) and viscoelastic substance such as Hydroxy propyl methyl cellulose (HPMC) and Sodium hyaluronate (Healon).

The use of 5-FU and MMC with glaucoma filtration surgery has become routine over last couple of decades. The benefit of postoperative subconjunctival 5-FU injections in eyes at high risk for filtration failure undergoing trab was demonstrated in the Fluorouracil Filtering Surgery Study[4]. Subsequently, two randomized clinical trials showed intraoperative MMC application to be more beneficial than postoperative 5-FU injections in patients at high risk for filtration failure[5,6]. The complicated nature of postoperative 5-FU injections and associated corneal side effects led to the use of 5-FU, intra-operatively in similar fashion to MMC application[7].

MMC is currently in widespread use in primary trab to improve the success rate of IOP control. Controversy and variation exists with regard to optimum MMC concentration, exposure time and delivery method. However use of MMC is not without its own complications. The short term risks such as wound leak, corneal epithelial defects, shallow anterior chamber, choroidal detachment and late complications including pale atrophic blebs, bleb leaks,hypotony and late endophthalmitis are well known and described in literature[8,9].

The technique to improve the function of filtering blebs and to treat postoperative complications has progressed over last several years. The appearance of filtering bleb is an important factor in evaluating the outcome of glaucoma filtration surgery. Functioning bleb contain small cystic spaces and show changes in appearance and size over time. There are still some issues related to trab and management of these complications are important for a successful outcome.

Hypotony (IOP < 6mm Hg) although less common but is serious complication of drainage surgery. It occurs due to decreased aqueous production caused by inflammation and cilio-choroidal detachment or excessive aqueous outflow caused by bleb leak or cyclodialysis cleft. Fortunately most cases resolve in early postoperative period. Chronic hypotony persisting for at least 3 months can be associated with hypotonymaculopathy and decrease in visual acuity. To prevent hypotony occurring, one must use tight sutures over scleral flap, prevent any buttonhole formation of conjunctiva and maintain anterior chamber depth with BSS or viscoelastic substances. Patients with persistent hypotony caused by excessive filtration require several therapeutic options such as pressure patching, large bandage contact lens, injection of autologous blood, use of argon laser to shrink symptomatic bleb and thermal cautery using continuous-wave Nd-YAG laser. As last resort, re-suturing of scleral flap can be tried.

Bleb leaks can occur in the early postoperative period or later after filtration surgery. A buttonhole in the conjunctiva during surgery or a wound leak through the conjunctival incision especially in fornix based conjunctival flaps can be responsible for an

early leaking bleb. Late bleb leaks are more frequent in avascular thin blebs, which occur more frequently with the use of antimetabolites. Bleb leaks are detected with Seidel sign. Leakage of bleb can be associated with hypotony, shallow anterior chamber and choroidal detachment. Several options are at hand to treat leaking bleb including use of pressure patching, bandage contact lens, tissue adhesives and lastly surgical revision.

An elevated IOP shortly after trabeculectomy occurs due to variety of causes such as tight closure of scleral flap, aqueous misdirection or suprachoroidal hemorrhage. In first week after surgery, a high IOP with deep anterior chamber usually suggest tight closure of scleral flap. With gonioscopy, one should, however ensure patency of internal sclerostomy site, so that there is no obstruction to aqueous flow by iris, blood or viscoelastic substance. With tight closure of scleral flap, lower IOP can be achieved by point pressure with cotton applicator adjacent to sclerostomy site or closed lid massage through upper or lower lid. Permanent decrease in IOP is possible by argon suture lysis using Hoskins lens, usually after one week after the surgery. High IOP with shallow anterior chamber usually suggest pupillary block, aqueous misdirection or suprachoroidal hemorrhage. Pupillary block can occur with non-patent iridectomy. Once this is confirmed with gonioscopy, Nd-YAG laser can be used to penetrate through intact epithelium or separate laser iridectomy can be fashioned. Aqueous misdirection (cilliary block glaucoma) can be suspected with patent iridectomy and is usually treated with aggressive mydriatic-cycloplegic therapy. In pseudophakic eyes, the anterior vitreous can be disrupted with Nd-YAG laser or anterior vitrectomy is performed. Hemorrhage into suprachoroidal space appears dark brown dome shaped choroidal elevation confirmed on B-mode ultrasonography. Treatment modality includes sclerotomy and drainage of blood.

The failing filtering bleb is typically low or flat with vascularized conjunctiva, occurring due to inadequate aqueous outflow at the site of scleral flap. This occurs many weeks or months after surgery. Application of regular digital pressure and laser suture lysis can work in limited cases. Some of these patients can benefit with needle revision of the bleb with MMC.

In the past years, search for a low risk and effective glaucoma surgery has prompted renewed interest in techniques other than trab and particulary in non-penetrating glaucoma surgery (NPGS). In the early 1980s, Zimmerman et al[10] described deep sclerectomy (DS), later on modified by Koslv[11] using collagen implant placed under scleral flap. In 1999, Stegmann[12] introduced viscocanalostomy (VC) in patients with open angle glaucoma using high molecular weight visoelastic substance opening the schlemm's canal. In modification to this procedure called canaloplasty, a microcatheter is inserted 360 degrees in schlemm's canal. In NPGS, as entry into anterior chamber is avoided, over filtration and hypotony are less troublesome. To facilitate IOP lowering efficacy, numerous modifications of both DS and VC have been introduced. There are various types of implants inserted into scleral space or into schlemm's canal and even antimetabolites are used along. Hondur[13] carried out meta-analysis of NPGS studies published in literature over last 5 years and concluded that NPGS seems to provide, IOP reduction in high teens. The potential to achieve low target IOPs seems to be less.

In the traditional stepped treatment, patient requiring surgery typically undergoes trab as a primary procedure. If trab fails then many surgeons will opt for various seton implantation. The tube-shunt insertion is also reserved for complicated cases such as inflammatory or neovascular glaucoma.

Recently conducted tube versus trab study[14] (TVT) showed, equal IOP reduction in both groups of patients at the end of three year follow up. However there are certain reservations about this study. The TVT study enrolled patients who already had failed trab or were pseudophakics, which could have favored the success of the tube. Secondly, patients with IOP of ≤ 5 mm Hg in trab group were termed as failure. One has also to understand that, this study was not designed to answer the selection of primary surgery with the inclusion of a mix of non-homogenous subjects.

The best primary surgery for glaucoma could be quite different for each individual patient. Considering the various options, trabeculectomy is still preferred mode of surgical procedure.

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Glaucoma

Combining the cataract and glaucoma surgery (Phaco Trabeculectomy) might work but the results are not predictable always.

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