Trabeculectomy: More Effective at Causing Cataract Surgery than Lowering Intraocular Pressure?

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It is a truism in clinical medicine that an intervention should only be considered when its benefits outweigh its risks. Incisional surgery for glaucoma exemplifies this principle because the sole benefit of surgery—to halt the usually gradual vision loss that accompanies chronic glaucoma—must be weighed against the numerous risks associated with surgery. These risks range from minor nuisances, such as occasional foreign body sensation, to significant but correctable sequelae, such as cataract formation, to potentially permanent causes of vision loss, including retinal detachment, hypotony, maculopathy, and endophthalmitis.

Stein et al\(^1\) have recently reported on the incidence of adverse outcomes for trabeculectomy and drainage device surgery gleaned from their careful review of a Medicare database. In an accompanying editorial, Javitt\(^2\) commented on the high rate of serious complications, particularly in eyes receiving drainage devices. However, these analyses did not comment upon cataract extraction after trabeculectomy. In this editorial, stimulated by the results of 2 randomized clinical trials published in this issue of *Ophthalmology*, I will comment upon the relative effectiveness of trabeculectomy compared with its tendency to be followed by cataract extraction.

In the first randomized clinical trial (RCT), Wong et al\(^3\) compare intraoperative 5-fluorouracil (5-FU) to placebo in eyes undergoing primary trabeculectomy (defined as surgery in an eye with no previous intraocular surgery) in a largely Chinese population. At 3 years, the percentage of eyes with intraocular pressure (IOP) of 14 mmHg or lower was 19\% in the 5-FU group and 9\% in the placebo group and the percentage of eyes with IOP of 17 or less was only 42\% in the 5-FU group and 28\% in the placebo group. These results are even less encouraging when one realizes that about 30\% of the successful eyes still needed IOP-lowering medications after surgery.

Although these authors report no permanent vision loss secondary to complications of surgery in either the 5-FU or the placebo group, half of all the eyes in each group had undergone cataract surgery within 3 years of trabeculectomy! Thus, in this cohort from Singapore, eyes undergoing trabeculectomy with or without 5-FU were less likely to achieve an IOP of 17 mmHg than to undergo cataract surgery. Although many of these eyes may have had some degree of cataract before trabeculectomy (the mean preoperative visual acuity was logMAR 0.22 [Snellen equivalent of 20/33]), so do many of the eyes that undergo trabeculectomy in clinical practice. Therefore, we may expect a similar rate of cataract surgery following trabeculectomy in general as was found in this study.

In the other RCT, Palanca-Capistrano\(^4\) also report on eyes undergoing primary trabeculectomy. Unlike Wong et al\(^3\) who compared 5-FU with placebo, these authors compared intraoperative 5-FU with intraoperative mitomycin C (MMC). They found no difference between the 2 groups in terms of IOP control at 5 years (76\% for 5-FU and 66\% for MMC), but used a relatively lax definition of success of IOP 21 or lower with or without medications. The success rate for obtaining the lower IOPs that many eyes with severe glaucoma damage need, if it had been reported, would certainly have been considerably lower. Like Wong et al\(^3\) they report that at least 57 (50\%) out of 115 eyes (some subjects were lost to follow up) underwent cataract surgery after trabeculectomy. Unlike Wong et al\(^3\), these authors report a decrease in visual acuity in both treatment groups, whether pseudophakic or still phakic, from a mean logMar of approximately 0.2 (Snellen 20/30) preoperatively to 0.4 (Snellen 20/50) at the last follow-up. The authors speculate about this worrisome finding but were not able to offer a definitive explanation.

The data from the previously mentioned RCTs can be placed into further context by comparing them to the results of the Collaborative Initial Glaucoma Treatment Study (CIGTS) and the Advanced Glaucoma Intervention Study (AGIS). In the CIGTS, eyes with newly diagnosed glaucoma that underwent trabeculectomy had a 5-year cumulative probability of cataract extraction of 19.0\% compared with a probability of 6.5\% of eyes that were initially treated with medication. In the AGIS study, due to the complexity of the treatment sequence, it is difficult to ascertain exactly what the risk of developing cataract after trabeculectomy was, but multivariate regression analysis demonstrated that there was a 78\% increase in the risk of either developing cataract or undergoing cataract surgery in eyes that underwent trabeculectomy compared with those that did not. This analysis did not distinguish between eyes that developed some cataract but had not undergone cataract surgery from those that underwent cataract surgery. In summary, both of these large RCTs also demonstrate that eyes that undergo trabeculectomy have increased incidence of subsequent cataract extraction.

These compelling data concerning trabeculectomy surgery and cataract extraction must be tempered by the effect that other treatments for elevated IOP have upon lens opacity. Results from both the Ocular Hypertension Treatment Study and Early Manifest Glaucoma Trial suggest that eye drop treatment accelerates cataract formation. Therefore, it is possible that all treatments to lower IOP affect the lens adversely.

The realization of the high likelihood that phakic eyes undergoing trabeculectomy will need subsequent cataract surgery has several implications. First, it is important for surgeons explicitly to mention cataract development and
surgery when discussing the risks and benefits of trabeculectomy with patients. Second, the realization of the likelihood of cataract surgery following trabeculectomy might lower the threshold at which surgeons consider cataract extraction at the time of trabeculectomy. It may not be in the patient’s interest to leave a morphological obvious, but visually asymptomatic, cataract in the eye at the time of trabeculectomy. Lastly, in the process of comparing surgical alternatives to trabeculectomy, such as aqueous drainage devices, procedures that bypass the trabecular meshwork, alter Schlemm’s canal, or shunt aqueous into the suprachoroidal space, rigorous examination of these procedures upon cataract development, acceleration, and surgery will be critical.

References


Erratum

With apologies from the authors of “Fixation Preference and Visual Acuity Testing in a Population-based Cohort of Preschool Children with Amblyopia Risk Factors” (Ophthalmology 2009;116:145-53), the abstract has an error in the participants section. It was erroneously stated that the participants were children “. . . with amblyopia and/or strabismus . . . .” It should read: “Participants: 243 children with anisometropia and/or strabismus, aged 30 to 72 months, living in Los Angeles County, CA.”