Commentary: Surgical outcomes in uveitic glaucoma and steroid-induced glaucoma in children: Between the two evils

The incidence of glaucoma following uveitis in children varies in the literature with figures up to 35% regardless of the form or type of uveitis. It is interesting to compare the surgical outcomes of steroid-induced glaucoma (SIG) in vernal keratoconjunctivitis (VKC) and uveitic glaucoma as these secondary glaucomas are a therapeutic challenge with many cases becoming unresponsive to medical treatment and sharing a predisposition to cataractogenesis.

Anterior uveitis followed by intermediate uveitis and specific types such as juvenile idiopathic arthritis (JIA) and anti-nuclear antibody positive uveitis without arthritis are notorious with higher rates of secondary childhood glaucoma.[1] Cataract, glaucoma, band keratopathy, and cystoid macular edema are the common causes of vision loss in children with uveitis. The inflammatory cells, the mediators they release, corticosteroid therapy, angle closure with extensive anterior and posterior synechiae, and trabecular scarring because of chronic trabeculitis play a cumulative role in elevating the intra-ocular pressure (IOP).[2] Most cases of VKC are self-limiting, but chronic mixed forms seen in Asian eyes are at higher risk of permanent visual impairment because of corneal scarring, cataracts, and glaucoma. The reported incidence of glaucoma in patients with VKC receiving corticosteroid therapy is 2–7%[3].

Pediatric eyes differ from adults in terms of surgical care. Distorted anatomy in buphthalmic and chronic inflammatory eyes, increased inflammatory response in young, and risk of repeated general anesthesia restricting the option of post-operative titration using suture lysis and anti-metabolite augmented needling are some peculiar challenges.

The mixed form of VKC, higher recurrences per year, and corneal involvement with limbal vascularization exhibit greater response to corticosteroids with a 30% higher risk of trabeculectomy and blindness in one-third.[4] VKC eyes with

the use of ocular corticosteroids and contralateral IOP elevation and the uveitic eyes with high pre-operative IOP and poor inflammatory control are difficult-to-treat scenarios.[5,6]

Most children with glaucoma will require surgery in their lifetime. Among the available surgical repertoire, angle surgery remains the preferred initial surgery for primary and most secondary glaucomas. Goniotomy, trabeculotomy and the newer modifications (circumferential suture/illuminated micro-catheter), and combined trabeculectomy–trabeculectomy especially in the Middle East and Indian populations with advanced disease on presentation and at greater risk of failure from angle surgery are the preferred techniques which have all stood the test of time.[7] Modified deep sclerectomy also shows a marked reduction of IOP, yet trabeculectomy has a higher probability of achieving overall success and lowering IOP in juvenile uveitic glaucoma.[8]

The use of anti-metabolites to prevent fibroblast proliferation improves surgical outcome but shifts the balance in the opposite direction toward over-filtration, resulting in hypotony and bleb-related infections, and children younger than 2 years of age are less susceptible to the effects of Mitomycin C (MMC).[9] JIA eyes that were treated with TNF inhibitors at the time of their MMC-augmented trabeculectomy achieved better control of IOP.[10] The success of trabeculectomy in eyes with VKC is reported to be lower compared with other causes of SIG. This has been attributed to chronic conjunctival inflammation in VKC eyes predisposing to long-term failure of glaucoma filtering surgeries and a higher rate of repeat surgeries.[6,11] In high-risk filtering surgeries, intra-operative MMC may be a better alternative to 5-fluorouracil as it results in lower overall lOP and decreased dependence on anti-glaucoma medications.[12]

A noteworthy observation in the study series was the reduction in the number of recurrences because of the peri-operative escalation and the prolonged use of anti-inflammatory therapy. Also, the number of pre-operative uveitic attacks was found to be protective in terms of IOP control as we are aware of the compromise of the function of the ciliary body in chronic inflammatory eyes. Although the confounding effect of glaucoma because of steroid response in uveitic eyes cannot be excluded, there was no significant difference in terms of IOP control achieved surgically in both entities. Overall, the surgical success achieved reduces with time.

The uncontrolled IOP despite maximum medical and progressive glaucomatous optic neuropathy would warrant additive procedures such as glaucoma drainage implants (GDD). Good immuno-modulatory control and appropriate follow-up prevent shallowing of the anterior chamber, tube block from fibrin, hypotony, and suprachoroidal hemorrhage. Ahmed Glaucoma Valve has a unidirectional valve designed to reduce post-operative hypotony.[2] An alternative strategy to minimize hypotony is the implantation of the GDD in a two-stage procedure or with a supramid suture. Baer veldt valve with a reduced surface area of 250 $mm^{[2]}$ is preferred for uveitic eyes that are prone to aqueous hypo-secretion to prevent hypotony.[7]

Approximately 24% of young patients undergoing trabeculectomy are at an increased risk of needing cataract extraction within an average of 26 months. Both uveitis and steroid use are risk factors for cataract development, independent of trabeculectomy. It is reported that there was no significant increase in the incidence of cataract extraction in the uveitic and steroid-induced glaucoma eyes when compared with other types of glaucoma in young.[13]

A comprehensive peri-operative regimen for elective surgeries with hourly topical prednisolone and oral prednisone 40 mg daily 1 week before surgery and post-operatively and, in emergency cases, a high dose of 1–1.5 mg/kg/day and hourly topical corticosteroid drops to be given before and tapered after surgery result in lower IOP levels and less AC inflammation over 2 years post-operatively.[14]

Secondary glaucomas in children can engender significant visual impairment. Both these entities are equally complex, and their surgical management is in no way lesser challenging than the other. Proper monitoring of IOP and considering steroid-sparing agents to treat VKC and uveitis whenever possible can prevent unnecessary childhood blindness. Blindness in the young is especially significant in economic terms, and its prevention would save many blind years.[6,11]

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