

Postoperative Complications in Children with Primary Congenital Glaucoma: Clinical Recommendations and Practical Aspects

Turakulova Dilfuza Mukhitdinovna, Nazirova Zulfia Rustamovna

Tashkent Pediatric Medical Institute, Bogishamol Street 223, Tashkent, Republic of Uzbekistan

Abstract Introduction. The mainstay of treatment for congenital glaucoma is surgical, aiming to achieve target intraocular pressure (IOP) without reliance on medications. Early complications include shallow anterior chamber syndrome, hyphema, ciliochoroidal detachment, excessive hypotony, and ocular hypertension. The incidence of these complications is fairly high – according to some data, up to 50%, underscoring the importance of this issue. **Aims and Objectives.** To study early postoperative complications in children with primary congenital glaucoma, and the methods of their correction following antiglaucomatous surgery via a combined technique that simultaneously targets three outflow pathways. **Methods.** 151 children (270 eyes), who underwent antiglaucomatous surgery by a combined method, were examined and early postoperative complications were identified. **Results.** Analysis of the early postoperative period following antiglaucomatous surgery showed that on day one, 62.6% of patients had complications. By day three, that proportion increased to 67.4%. Among these, the most frequent complications were severe hypotony (33.3%), hyphema (10.0%), and ocular hypertension (6.7%). After conservative treatment, by day seven, the overall complication rate declined to approximately 10%. **Conclusion.** Thus, after conservative treatment the number of complications in the early postoperative period was reduced by 52.6%. No re-surgical intervention was required for these patients. Patients were discharged home under ophthalmologic follow-up in their place of residence.

Keywords Primary congenital glaucoma, Antiglaucomatous surgery, Early postoperative complications

1. Introduction

Glaucoma has become one of the leading causes of blindness and a major cause of primary disability worldwide, which determines the importance of improving diagnostic and therapeutic approaches [1]. Primary congenital glaucoma (PCG) remains a severe pediatric condition characterized by photophobia, tearing, blepharospasm, enlargement of the globe, corneal edema, and progressive optic nerve damage [2].

The pathogenesis of primary congenital glaucoma is based on dysgenesis of the anterior chamber angle and a critical rise in intraocular pressure (IOP), leading to irreversible structural changes [3]. Modern ophthalmology emphasizes the need for early surgical intervention as the only effective method for stable IOP control in children [4]. Various surgical approaches have been proposed, including trabeculotomy, trabeculectomy, combined techniques, and microcatheter-assisted procedures, which demonstrate different levels of effectiveness and complication rates [5,6,7]. Comparative studies show that the long-term outcome of congenital

glaucoma surgery strongly depends on surgeon experience, anatomical features of the anterior chamber angle, and intraoperative conditions [8].

Despite the continuous improvement of operative techniques, early postoperative complications remain frequent and significantly influence final visual outcomes. Large clinical audits and multicenter surveys indicate high rates of hyphema, ciliochoroidal detachment (CCD), shallow anterior chamber, and postoperative IOP fluctuations [9,10]. The literature reports that the incidence of CCD varies extremely widely—from 0.9% to 90%—reflecting heterogeneous diagnostic criteria and surgical approaches [11]. In addition, the postoperative course is influenced by ocular surface condition and exposure to topical medications, which may alter healing processes and the risk of excessive scarring after glaucoma surgery [12,13]. This is especially important in pediatric practice, where wound-healing reactions are more active and unpredictable. Furthermore, the choice of postoperative therapeutic tactics and management algorithms is still not supported by unified criteria, which is emphasized in modern clinical guidelines [14].

Thus, despite significant progress in surgical treatment of primary congenital glaucoma, early postoperative

complications remain a pressing clinical problem. There is a clear need for pathogenetically grounded, individualized approaches to the prevention, early detection, and management of complications in children.

Objective of the study. To evaluate early postoperative complications in children with primary congenital glaucoma and the methods for their correction following antiglaucomatous surgery via the combined technique affecting all three outflow pathways simultaneously.

2. Materials and Methods

From 2020 to 2023, 151 children (270 eyes), aged from 20 days to 3 years, were operated in the ophthalmology department of Tashkent Pediatric Medical Institute. Children with secondary or combined glaucoma, or with systemic diseases, were excluded. All were hospitalized emergently. Following careful preparation, all underwent the antiglaucomatous operation developed by our department, which involves simultaneous influence on three outflow pathways: Burian's sinus-trabeculotomy into the scleral sinus; cyclodialysis-cycloretraction with an autoscleral pedicle into the suprachoroidal space; basal iridectomy with sclerectomy under a scleral flap into the episcleral venous system (patented under "Method for surgical treatment of congenital glaucoma" No. IAP 04890 dated 12.05.2014) [2]. Of the examined children, 54% (81) were male, 46% (70) female. All underwent comprehensive clinical and ophthalmologic examinations including visometry, biomicroscopy, ophthalmoscopy, gonioscopy, echobiometry, and tonometry. Tonometry was performed using the Maklakov method 3–5 minutes after induction. Premedication was with 1% diphenhydramine and 0.1% atropine sulfate; induction used a combination of 0.5% sibazon, 40% sodium oxybutyrate (GOMK) and 0.005% fentanyl.

3. Results and Discussion

Data collection spanned 2016-2023. A retrospective analysis (2016-2019) of medical histories of patients with primary congenital glaucoma hospitalized at the ophthalmology clinic of TashPMI was performed; from 2020-2023, prospective examination and surgical treatment was carried out. At diagnosis we used the ICD-10 classification and the A.P. Nesterov & E.A. Egorov (2001) classification. For detailed description of pathologic process in congenital glaucoma we used classification by N.A. Kachan, T.K. Toykuliev (2004) [2].

Distribution of eyes by disease stage showed: initial stage in 36 eyes (13.3%), developed stage in 53 (19.6%), advanced in 149 (55.2%), and terminal in 32 (11.9%). All patients underwent surgery using our proposed method. In the early postoperative period complications were observed. The most frequent early (within 7 days) postoperative complications

included CCD, hyphema, elevated IOP, shallow anterior chamber syndrome, and hypotony.

On the first day after surgery, hypotony (-0.5 to -1.0) and slight choroidal edema were diagnosed in 122 eyes (45.2%) with the typical clinical picture of such complication. These patients were prescribed atropine sulfate drops in age-appropriate dosage twice daily. In 47 eyes (17.4%) a rise in IOP by $+1.0$ was observed. The probable reason for postoperative IOP elevation was viscoelastics and presence of sterile air introduced into the anterior chamber for its restoration during the final stage of surgery. As it resorbed, the IOP normalized to planned levels. Normal IOP was observed in 101 eyes (37.4%).

On day three postoperative, in 18 eyes (6.7%) high pressure persisted. In 88 eyes (32.6%) IOP was within normal limits; in 74 eyes (27.4%) it had decreased by -0.5 . In 90 eyes (33.3%) hypotony (-1.0) and on B-scan pronounced choroidal edema were found. These patients received conservative treatment: atropine sulfate eye drops twice daily, caffeine sodium benzoate 3% instilled 4-5 times daily into the conjunctival sac. On day five pronounced hypotony worse than -1.0 and CCD detachment were observed in 70 eyes (25.9%). These were treated with caffeine sodium benzoate 3% instillation into the conjunctival sac 4-5 times per day, 0.4% dexamethasone lymphotropic 0.5 ml once daily, and a pressure patch once daily.

On the seventh day postoperative, in 9 eyes (3.3%) ocular hypertension persisted, for which IOP-lowering medications were recommended: Arutimol 0.25% eye drops twice daily or VisiPres 2% eye drops twice daily. In 18 eyes (6.67%) hypotony was severe and CCD detachment observed. This developed in the context of shallow anterior chamber syndrome and unsuccessful conservative therapy. These patients were recommended continued conservative treatment in hospital (dexamethasone drops 2 drops 6 times a day and continuing dexamethasone lymphotropically). Following conservative treatment IOP normalized, and patients were discharged home under ophthalmologist follow-up in their places of residence.

Thus, the total proportion of patients with CCD on the fifth day post-operation was 25.97%; these figures decreased to 6.57% on the seventh day post-conservative treatment. The present data align with literature reporting that early complications include shallow anterior chamber syndrome and CCD. The probability of such complications is quite high—some reports put it up to 50%.

Any presence of blood in the anterior chamber—from formed elements to visible bleeding—was considered hyphema. In total, there were 42 eyes (15.57%) with hyphema on day one; on day three hyphema persisted in 27 eyes (10.0%); on day seven hyphema with hypotony in 17 eyes (6.59%). These patients were treated with Emoprox 1% eye drops, 2 drops twice daily. After treatment, IOP normalized, the hyphema resolved, and all patients were discharged home under ophthalmologist supervision.

4. Conclusions and Findings

Analysis of the structure of early postoperative complications following combined antiglaucomatous surgery (simultaneous action on three outflow pathways) showed that on day one 62.6% of patients had complications; by day three this rose to 67.4%. Of these, severe hypotony was observed in 33.3%, hyphema in 10.0%, and ocular hypertension in 6.7%. After conservative management, by day seven the overall complication rate reduced by 52.6% to about 10%. All patients were discharged home under local ophthalmologic follow-up.

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