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Prevalence and Risk Factors of Glaucoma Following Pediatric Cataract Surgery with Primary Implantation in Tertiary Eye Hospital, Bangladesh

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Abstract **Original Research Article**

Background*:** Glaucoma is a typical side effect of juvenile cataract surgery. According to various research, it seems to have a bimodal occurrence. In Bangladesh, these difficulties constitute a hardship. ***Objective*:** In this study our main aim is to evaluate the prevalence and Risk Factors of Glaucoma Following Pediatric Cataract Surgery with Primary Implantation in Tertiary Eye Hospital. ***Method*:** This cross-sectional study was carried out at tertiary eye hospital, Bangladesh from August 2021 to June 2022. Where a total of 200 children who underwent unilateral or bilateral cataract surgery with primary IOL implantation in the first year of their life. All eyes presenting with an isolated cataract or an anterior form of persistence of fetal vasculature not requiring posterior vitrectomy or a moderate microphthalmia allowing primary IOL implantation and with a follow-up of ≥1year were included in the study. ***Results: During the study, 70% were female and majority were belong to 7-12 years age group, 55%. According to Intraoperative, and Postoperative Characteristics of study group where bilateral cataract was seen in 45% cases followed by 49% cases were capsular bag, 37% cases were sulcus, 46% used trypan bag. Comparing the SG group to the group that did not develop glaucoma, follow-up time was longer (mean 7,5 vs 5.6 years, P<.001), age at surgery was lower (mean 4 vs 5.0 years; P¼.045), reintervention was more frequent (P<.001), and trypan blue was used more frequently (P¼.008). In univariate analysis, the following factors were significantly associated with an increased risk of SG: axial length<16.5 mm, bilateral cataract, perioperative use of trypan blue, additional surgical procedures, and younger age at surgery. ***Conclusion*:** We may infer that the risk of SG increases with time, and that SG appears to have a bimodal occurrence, with an estimated linear incidence rate each year. Follow-up should begin quickly after surgery and last for a long time, and clinicians should be extra cautious in patients who have one or more risk factors for SG.

Keywords: Congenital cataract, intraocular lenses (IOLs), secondary glaucoma (SG).

INTRODUCTION

One of the most prevalent causes of visual impairment and blindness in children is congenital cataract. It poses a significant risk to the development of the visual system, resulting in severe amblyopia [1, 2]. Early surgery is essential for eliminating the visual axis and getting a good visual outcome. Following lens removal, several therapies for aphakia, including glasses, aphakic contact lenses, and intraocular lenses (IOLs), have been proposed. Primary posterior chamber IOL implantation is becoming increasingly prevalent, particularly in younger children, and for both unilateral and bilateral cataracts [3-5].

Despite advancements in congenital cataract therapy, secondary glaucoma (SG) continues to be a prominent postoperative sight-threatening complication, with open-angle glaucoma being the most common variety in both aphakic and pseudo pseudophakic youngsters [6]. Although the cause of glaucoma following cataract surgery is unknown, a number of risk factors have been discovered. In this study our main goal is to evaluate the prevalence and risk factors of

Glaucoma following pediatric cataract surgery with primary implantation in tertiary eye hospital, Bangladesh.

OBJECTIVE

To assess the prevalence and risk factors of Glaucoma following pediatric cataract surgery with primary implantation in tertiary eye hospital, Bangladesh.

METHODOLOGY

This cross-sectional study was carried out at tertiary eye hospital, Bangladesh from August 2021 to June 2022. All eyes presenting with an isolated cataract or an anterior form of persistence of fetal vasculature not requiring posterior vitrectomy or a moderate microphthalmia allowing primary IOL implantation and with a follow-up of >1year were included in the study.

Statistical analysis was done using the SPSS software (version 22.0; IBM Corp, Chicago, Illinois, USA). Categorical variables were tested for association with the incidence of SG using thex2test for the uni-variate analysis.

RESULTS

In table-1 shows age distribution of the study group where majority were belong to 7-12 years age group, 55% followed by 45% belong to 4-6 years. The following table is given below in detail:

Table-1: Age distribution of the study group

Age distribution	Percentage (%)
4-6 years	45%
7-12 years	55%

In Figure-1 shows gender distribution where 70% were female and 40% were male. The following figure is given below in detail:

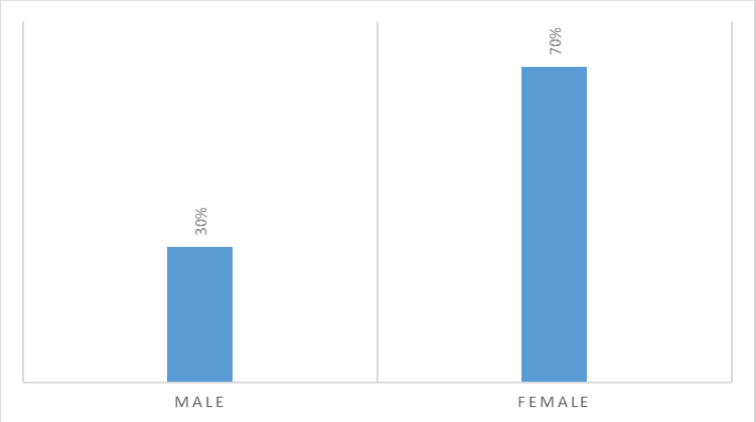

Figure-1: Gender Distribution of the study group

In table-2 shows Intraoperative, and Postoperative Characteristics of study group where bilateral cataract was seen in 45% cases followed by 49% cases were capsular bag, 37% cases were sulcus, 46% used trypan bag. The following table is given below in detail:

Table-2: Intraoperative and Postoperative Characteristics of study group

Variable	Percentage (%)
Bilateral cataract, %	45%
Mean age at surgery (days)	148.3
Mean Axial length (mm)	18.2
Follow-up (years) (SD	5.7
Age at follow-up (years)	6.2
IOL implantation	**%**
Capsular bag	49%
Sulcus	37%
Undetermined	14%
Trypan blue use	**%**
Yes	46%
No	37%
Undetermined	16%
Additional interventions	48%

In table-3 shows Effects of Different factors on the progression of Secondary Glaucoma where Comparing the SG group to the group that did not develop glaucoma, follow-up time was longer (mean 7,5 vs 5.6 years, P<.001), age at surgery was lower (mean 4 vs 5.0 years;P¼.045), reintervention was more frequent (P<.001), and trypan blue was used more frequently (P¼.008). The following table is given below in detail:

Table-3: Effects of Different factors on the progression of Secondary Glaucoma

	No glaucoma	Secondary Glaucoma	P value
Follow-up time (y)	5.6	7.5	<0.001
Age at surgery (months)	5	4	0.045
Age at surgery<3 months	31	52	0.03
Axial length (mm)	18.1	17.2	0.09
AL<16.5 mm	12%	25%	0.28
Preoperative IOP (mm Hg)	5.1	5.6	0.002
Bilateral cataract	58%	82%	0.009
Use of trypan blue	56%	81%	0.08
Bag implantation	55%	41%	0.02
Reintervention	40%	80%	0.001

In table-4 shows Multivariate Analysis in All Secondary Glaucoma Cases In univariate analysis, the following factors were significantly associated with an increased risk of SG: axial length<16.5 mm, bilateral cataract, perioperative use of trypan blue, additional surgical procedures, and younger age at surgery. The following table is given below in detail:

Table-4: Multivariate Analysis in All Secondary Glaucoma Cases

Variables	P value	OR (95% CI)
Years of follow-up	.001	1.3 (1.1-1.6)
Use of trypan blue	.02	4.1 (1.3-13.1)
Reintervention	.02	4.1 (1.2-13.4)
Bilateral cataract	.08	3.1 (0.8-11.4)
Age at surgery<3 months	.2	1.9 (0.7-5.7)
AL<16.5 mm	.5	1.4 (0.4-4.2)

DISCUSSION

The risk of developing SG after a mean follow-up was 5.7years, which was relevant to other study [7]. In recent meta-analysis reported17% of SG after an early congenital cataract surgery, with a median follow-up of 4.3 years. In this analysis, there were large discrepancies between included infants and different glaucoma definitions, and majority of infants were left aphakic [8].

IOL implantation does not seem to decrease the risk of developing SG [9, 10].

Multiple risk factors for the development of SG have been identified in previous studies and include early age at surgery, additional procedures, and bilateral cataract surgery [11-13].

In our cohort, we found in the univariate analysis that the risk factors were bilateral cataract, age at surgery, axial length<16.5 mm, additional procedures, and the use of trypanblue. Multivariate analysis of potential risk factors showed that only longer follow-up, additional interventions, and the use of trypan blue increased the risk of developing SG respective odds ratios of 1.3, 4.1, and 4.1 [14].

To our knowledge, this is the first description of the in-fluence of the use of trypan blue on the development of SG. We believe that the relationship is not causal, but that trypan blue was used for more complex surgeries, in severe cataracts or in smaller, more immature eyes. These are also the eyes that were at a higher risk of developing post-operative inflammation and on having an immature trabec-ular meshwork, thus resulting in a higher rate of SG. However, a direct effect of the trypan blue on the trabec-ular meshwork collagen, which could result in a stiffening of the collagen matrix via photochemical mechanisms, is also possible. Similar stiffening effects were reported in the use of trypan blue to dye the lens capsule and the Descemet membrane [15, 16].

Several studies have discussed the effect of follow-up period on the development of SG, noting that the onset of glaucoma occurs at a mean 4-5 years after cataract removal [12, 15].

This was also observed with an increased incidence noted between the 1- and 5-year follow-ups of the IATS [14, 11]. The location of IOL implantation (sulcus vs bag) did not seem to affect the development of SG as previously described in literature [16]. However, in our cohort we could not demonstrate in multivariate analysis the effect of young age at surgery on the risk of developing SG. It must be noted that in our practice we did not perform surgery before 1 month of age because this was suggested to be a significant risk factor for the development of glaucoma [3, 4].

CONCLUSION

We may infer that the risk of SG increases with time, and that SG appears to have a bimodal occurrence, with an estimated linear incidence rate each year. Follow-up should begin quickly after surgery and last for a long time, and clinicians should be extra cautious in patients who have one or more risk factors for SG.

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