EVALUATION OF CAUSES OF EARLY POSTOPERATIVE HYPHEMA IN MANUAL SMALL INCISION CATARACT SURGERY.

Ophthalmology

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ABSTRACT

BACKGROUND: Cataract surgery is the most commonly performed surgery in the world. Manual small incision cataract surgery (MSICS) is principally employed in resource poor settings and bulk of cataract surgeries are performed by this technique in the developing world. Results achieved by MSICS are comparable with phacoemulsification in achieving excellent visual outcomes with low complication rates. Hyphema is one of the common postoperative complications of MSICS. **AIM:** To estimate the incidence and evaluate the causes of early postoperative hyphema in MSICS. **DESIGN:** Cross sectional observational study done on hospital based patients who underwent manual small incision cataract surgery between August 2019 and July 2020. **MATERIAL AND METHODS:** The demographic data, operation notes and details of clinical examination done using slit lamp bio microscopy on the first postoperative day of 341 patients who underwent MSICS between August 2019 and July 2020 were obtained from the clinical records of the patients. Surgical technique of wound construction and its relevance to the incidence of postoperative hyphema on the first postoperative day was analysed. **RESULTS:** Out of 341 patients, 26 (7.6%) had hyphema on first postoperative day. The variation in the surgical technique and other causes that were frequently associated with postoperative hyphema were in the order as extension of the wound, deep tunnel, posterior incision site, premature entry and iridodialysis. In 3 patients hyphema could not be attributed to any known cause. **CONCLUSION:** A proper technique of wound construction helps avoid this potential complication and thus refinement goes a long way in keeping up the morale of the MSICS surgeon.

KEYWORDS

Manual Small Incision Cataract Surgery (MSICS), Postoperative Hyphema, Wound Construction.

INTRODUCTION

Cataract is one of the leading causes of vision impairment. The world health organization estimates 65.2 million to be blind or visually impaired due to cataract.¹ The number of people affected by blindness and moderate to severe visual impairment due to cataract increased from 50.5 million in 1990 to 65.2 million in 2015.² Cataract surgery is the most commonly performed surgery in the world. Manual small incision cataract surgery (MSICS) is principally employed in resource poor settings and bulk of cataract surgeries are performed by this technique in the developing world. Results achieved by manual SICS are comparable with phacoemulsification in achieving excellent visual outcomes with low complication rates.^{3,4} The technique is faster, not expensive and requires less technology.^{5,6} Hyphema is commonly encountered problem during intraoperative and the early postoperative period in manual SICS, and is also shown to be a common cause for resurgery.⁷ Knowledge about how to avoid hyphema and its potential effects on intraocular pressure, inflammation and endothelial cell health can help make the technique comparable to high quality cataract surgery techniques like phacoemulsification to a great extent. Not much data exists at one place in enumerating the causes and thus prevention of this complication. In this regard, we have conducted a retrospective review in evaluating the causes of early postoperative hyphema by detailed analysis of the various surgical steps in wound construction drawn from patient's operation notes.

METHODS

The operation notes and details of clinical examination done using slit lamp biomicroscopy performed by the operating surgeon on the first postoperative day of 341 patients who underwent manual small incision cataract surgery between August 2019 and July 2020 was analysed. Surgeries included in the present study were performed by two senior surgeons. All the patients included were individual patients who underwent surgery in one of their eyes. All the surgeries were performed under peribulbar block. The Surgical technique of cataract extraction included, making a fornix based conjunctival flap, a very sparing use of cautery if the incision involved the scleral perforator vessels and the bleeding from these vessels interfered with the wound construction, fashioning a 6.0 to 6.5 mm frown shaped scleral incision 1.0 - 2.5 mm behind the limbus, sclero corneal dissection at half the thickness of sclera made using a crescent knife the depth of the tunnel created was judged by how clearly the crescent knife was seen during the dissection, entry and extension into the anterior chamber by a 2.8

mm keratome, performing a continuous curvilinear capsulorhexis, hydroprolapsing the nucleus out into the anterior chamber and nucleus delivery using a wire vectis. Surgical steps of the site and type of incision, tunnel construction and configuration, wound entry and nucleus delivery drawn from the printed surgical format of the patient's operation notes duly filled by the operating surgeon were analysed. Slit lamp examination findings and intra ocular pressure recorded by Goldman applanation tonometry on the postoperative day 1 were noted. The grade of hyphema recorded as per the standard grading for postoperative hyphema in patients who had this complication was noted. Postoperative hyphema is graded as -Grade 0 is micro hyphema, Grade I-hyphema layered blood occupying less than one third of anterior chamber, Grade II- blood filling one third to half of the anterior chamber, Grade III- as half to less than total and Grade IV is total filling of the anterior chamber of the eye.⁸ Patients who were on oral antiplatelet drugs preoperatively were also included and analysed. Such patients were taken up for surgery after stopping the drug for 1 week as per the institution policy for cataract surgery. Institutional ethical committee approval was obtained. Percentage distribution of the data, p-value, chi-value and odds ratio were calculated. Use of information from medical records and analysing in detail the surgical record that is pre-formatted for all the steps, various techniques and complications that the operating surgeon has to check the appropriate option immediately after the surgery before the surgical outcome occurred, avoided bias.

RESULTS

In the present study age distribution ranged from 41- 90 years. Demographic characteristics of the study population is shown in Table 1. Majority of patients were among 61-70 years which was 47.5% (162 out of 341). Males were predominant and constituted 58.3% (199 out of 341) when compared to females 41.5% (142 out of 341). Male to female ratio was 1.4: 1. Out Of 341 patients, 26 (7.6%) patients had hyphema on postoperative day one. Incidence of Hyphema in the current study is shown in Table 2. Figure 1 gives the percentage distribution of various grades of hyphema. The variations in the surgical technique of wound construction and other causes that resulted in hyphema are shown in Table-3 and figure 2. Extension of the entry wound by sharp dissection at the time of nucleus delivery was found to be the commonest cause of postoperative hyphema. Variation in the surgical technique resulted in increased incidence of postoperative hyphema and was found to be statistically significant with a p value of <0.0000001 and Odd's ratio of 21.8 (Table 4). There

was no statistical significance in the incidence of postoperative hyphema in patients using oral anti platelet agents with $p > 0.86$ (Fisher's exact test) and in patients with diabetes mellitus ($p > 0.66$). There was no increased incidence of hyphema in hypertensive patients versus normotensive patients with a p value 0.41 (Fisher's exact test) and odds ratio being 0.71.

Table 1: AGE –SEX DISTRIBUTION

S. no.	Age (years)	Male (n=199)	Female (n=142)	No of patients n(%)
1	41-50	19 (5.6 %)	05 (1.4 %)	24 (7.0 %)
2	51-60	80 (23.4 %)	39 (11.4 %)	119 (34.8 %)
3	61-70	88 (25.8 %)	74 (21.7 %)	162 (47.5 %)
4	71-80	10 (2.9 %)	22 (6.4 %)	32 (9.3 %)
5	81-90	02 (0.6%)	02(0.6 %)	4 (1.2%)
Total		199 (58.3%)	142 (41.5%)	341 (99.8%)

Table 2: Incidence of Hyphema

HYPHEMA	FREQ	Ratio
ABSENT	315	92.4%
PRESENT	26	7.6%
Total	341	100.0%

Figure 1-Incidence of Hyphema-Grade wise

Table 3: Variation in surgical technique causing Hyphema

Variations In Surgical Technique	Frequency	Ratio
Deep Tunnel	6	23.1%
Extension of wound	9	34.6%
Iridodialysis	1	3.8%
Posterior Incision Site	4	15.4%
Premature entry	3	11.5%
No cause found	3	11.5%
Total variations	26	100.0%

Figure 2: Ratio of multiple variations

Table 4: Significance of patient variables and surgical technique to Hyphema

	HYPHEMA					
SEX	Present	Absent	Total	chi-value	p-value	Odds (95% CI)
Male	15	184	199	0.005	0.94	0.97(0.43,2.24)
Female	11	131	142			
Hypertension						
Present	9	135	144	0.67	0.41	0.71(0.30,1.63)
Absent	17	180	197			
Diabetes mellitus						
Present	4	33	37	0.19	0.66	1.55(0.50,4.78)

Absent	22	282	304			
ORAL ANTI-PLATELETS						
Absent	22	264	286	0.03	0.86	1.06(0.35,3.21)
Present	4	51	55			
Surgical Technique						
Known cause	23	82	105	41.05	0.000	21.8(6.4,74.5)
Unknown cause	3	233	236		0001	
Total	26	315	341			

DISCUSSION

Incidence of a complication is dependent on clinical status of the patient, type of cataract and the surgical preparedness. The basis of manual small incision cataract surgery is tunnel construction for entry into the anterior chamber.⁷ Hyphema, a common intraoperative and postoperative complication encountered even by an experienced cataract surgeon performing manual SICS may result in acute drop in vision, stimulate inflammation, accelerate capsular opacification and prevent pupillary movement by clot formation, leading to posterior synechiae.¹⁰ Intra operative hyphema was seen in all the nine eyes that had extension of the wound at the time of nucleus delivery and not in the others. Our study showed the incidence of hyphema to be 7.6% on day one of post cataract surgery by manual small incision cataract surgery in comparison to an average of 7.5% by various nucleus delivery techniques of SICS by Sharma U et al.¹¹ Another study by Singh P et al showed the incidence of postoperative hyphema on day one to be between 3.63 - 5.45% depending on the surgical technique of performing manual SICS with versus without a conjunctival flap.¹² Hyphema is a rare occurrence in cataract surgery involving smaller incision like Phacoemulsification surgery where we looked at 162 patients who underwent phacoemulsification cataract surgery during this study period, none of them had hyphema on the first postoperative day. The results are comparable to previous studies that showed incidence of hyphema to be less than 1% in the early postoperative period.¹³ The surgical technique was based on the surgeon's decision intra operatively, that gives the best outcome for the grade of the cataract. Posterior incisions were commonly used in soft cataract to produce an astigmatically neutral incision. There was an increased incidence of bleeding from scleral perforating vessels in such eyes and our study found this as a cause of hyphema in four patients. Our study showed deep incision to be the cause of hyphema in six patients. A very deep incision cutting through the floor of the tunnel resulting in scleral disinsertion increased the incidence of postoperative hyphema.¹⁴ Among 26 patients that had early postoperative hyphema, three patients had premature entry into the anterior chamber which underlines the need to create a self-sealing wound by dissection well into the avascular clear corneal limbus before entering into the anterior chamber. Premature entry into the anterior chamber allows the tunnel bleed to seep into the anterior chamber resulting in hyphema.¹⁵ Our study showed extension of the tunnel by sharp dissection at the time of nucleus delivery to be the commonest cause for occurrence of postoperative hyphema, which was seen in nine (34.6%) of the patients. All these patients had hyphema intraoperatively. The inner tunnel opening had to be enlarged to engage the nucleus at the time of nucleus delivery. Flaring up of the internal aspect of the tunnel and judging the size based on the nucleus size well ahead during surgery could have helped avoid cutting into the angle of the anterior chamber in such eyes.^{9,16} One patient who had hyphema, had iridodialysis intra-operatively. In three patients no evident cause for early postoperative hyphema was found. We managed 21 out of 26 patients conservatively with topical steroids and antibiotics. Raised intraocular pressure of more than 22.0 mm of Hg was noted in five patients (19%) of patients with hyphema, which was managed with addition of topical anti glaucoma medications. Raised intraocular pressure did not correlate with the grade of hyphema. One patient (4%) with grade 3 hyphema had resurgery due to non-resolving hyphema and consistently raised intra ocular pressure on day three of cataract surgery. Hyphema evacuation forms an important cause for re-surgeries following manual small incision cataract surgery, and can be a problem considering the inherent risks of repeat surgeries and the logistics involved in dealing with camp based population. Hyphema with raised intraocular pressure was an important cause for prolonged postoperative stay. Hyphema with re-bleed though rare in surgery related trauma was seen in one patient who was status post percutaneous coronary intervention and re-bleed occurred on day seven of cataract surgery after he was discharged and was managed conservatively. Re-bleed probably could be attributed to resumed oral anticoagulant use following resolution of hyphema. Aspirin due to its antiplatelet effect could have resulted in rebleed.¹⁷

CONCLUSION

Variation in surgical technique is an important cause for early postoperative hyphema and refining it in terms of proper wound construction and wound configuration with regard to the grade of cataract being operated by manual SICS helps prevent this common complication.

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