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Original Research Article

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Profile of intraoperative complications in cataract surgery SEHEDS: Sitapur eye hospital eye disease study

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ABSTRACT

Background: Over the past several decades there have been many advances in the equipment, instrumentation and techniques of performing cataract surgery. This article will address the profile of intraoperative complications in cataract surgery.

Methods: In this retrospective study all cataract procedures performed (n=18775) during the two years period (i.e. 2017 and 2018) were analysed and total 1401 (7.46%) valid cases (those having complications) were seen with 686 (49.0%) and 715 (51.0%) cases in the year 2017 and 2018 respectively. The age, gender, and side of the eye operated on were noted. The yearly incidence of the profile of complications was analysed.

Results: Out of the total 1401 cases of eventful cataract surgery majority of the cases were of the age range of 51-70 years 1140 (6.07%) males were slightly higher in number i.e. 710 (3.78%) whereas females were 691 (3.68%), right eye was majorly operated for cataract i.e. 760 (4.05%). Manual small incision cataract surgery (MSICS) was done in the majority of the patients followed by phaco. The patients faced the complications due to cataract surgery in which posterior capsular rent- vitreous disturbance was the major complication occurred in majority of the patients 965 (5.15%).

Conclusions: Patients who underwent eventful cataract surgery the most common intra-operative complications which were mainly posterior capsular rent- with vitreous disturbance and iridodialysis. Patients with higher risk factor should be identified and appropriate measures must be taken to minimize intraoperative complications to get better visual outcomes.

Keywords: Complications, Cataract surgery, Posterior capsular rent, Manual small incision cataract surgery

INTRODUCTION

Cataract is the most common cause of curable blindness in India and worldwide. It has been estimated that 3.8 million people develop blinding cataract every year in India as against 2.7 million cataract surgeries done every year. Cataract is a significant and increasing global problem with vast economic and social incriminations. In India, it is the principal cause of blindness accounting for 62.6%.¹

Along with the increase in the number of cataract surgeries in past decade, surgical methods have evolved from intra-capsular cataract extraction to extra-capsular cataract extraction to small incision cataract surgery and phaco emulsification. Reports indicate that more than 99.0% of surgeries in Ireland and the US is performed using the phaco-emulsification technique. The popularity of phaco-emulsification is because of the small corneal incision which increases the safety of cataract surgery, better postoperative visual quality, and faster recovery; however, the surgery is also associated with certain risks and complications.²

The commonest complication is posterior capsular rupture with prevalence rates ranging from 0.45–4.40%.³

Other complications include vitreous loss with prevalence rates from 1.92–2.76%, suprachoroidal haemorrhage ranging from 0.20–0.26% endophthalmitis and choroidal rupture have been reported as well.⁴ Factors that contribute to these complications include surgeon experience, surgical method, and the quality of equipment, any of which can affect the surgical outcome causing long-term visual defects including irreversible blindness.⁵

India is a populous Southern Asian country where population has increased over the past decade, and thus, cataract surgery has also increased in popularity. Enhanced quality and outcome of cataract surgery are goals of the World health organization vision 2020 global initiative for the elimination of avoidable blindness, therefore, knowledge of possible intra-operative complications of the cataract surgery is necessary for training and planning in order to limit them. There is currently a lack of any study on intra-operative complications of cataract study in India.

The objective of our study was to evaluate the profile of intraoperative complications in cataract surgery.

METHODS

This retrospective study was conducted in 2019 on the profile of complications in cataract surgery. The target population of the study were total 18775 cataract patients who underwent cataract surgery at a tertiary eye care centre in India from January 2017 to January 2018. The study duration was one year for data collection in 2019. The study was approved by institutional review board of the parent institution and adhered to the tenets of the Declaration of Helsinki. Informed consent was obtained from all patients before undertaking treatment options.

Patients who were diagnosed as having senile cataract and who gave the consent to undergo cataract surgery were included in this study. Patients with traumatic, complicated and paediatric cataract were excluded from this study.

All patients fulfilling the inclusion criteria underwent a comprehensive ophthalmic and systemic examination including unaided and best corrected visual acuity (BCVA), detailed slit lamp examination, fundus examination, intraocular pressure (IOP) measurement, lacrimal sac syringing, keratometry, A-scan biometry and IOL power calculation.

Complete hemogram, blood sugar level, urine examination and ECG were done for all included patients.

Our medical staff was trained by an ophthalmologist. Training included explaining the procedure for using patient charts to retrieve underlying disease, type of cataract, method of surgery, type of implanted lens, and intra-operative complications of cataract surgery. Other extracted information included data such as age, sex, date of surgery, discharge date, and surgeon rank. To ensure repeatability, five charts were given to the staff, and repeatability was tested after completion. Discrepancies were reviewed and resolved by the ophthalmologists for consistency.

Patients were given para-bulbar block. Immediately before the surgery, one drop of 5% povidone iodine was put for at least 3 minutes in the eye to be operated.

MSICS- After superior fornix-based conjunctival flap, a partial thickness 6.0-6.5 mm sclera incision was made 2 mm behind the limbus and a scleral tunnel was extended 1 mm into clear cornea. An additional paracentesis was made at the 10 o'clock position. The anterior chamber was filled with an air bubble and 0.1 ml of trypan blue was injected under the air bubble. After several seconds, viscoelastic was used to displace the air bubble. The anterior chamber was entered with a 3.2 mm keratome. Anterior chamber was deepened with viscoelastic and capsulorrhexis (CCC) was done. A Sinskey hook was used to hook out one pole of the nucleus outside the capsular bag and the rest of the nucleus was rotated out anticlockwise or clockwise into the anterior chamber. The nucleus was extracted out of the eye using an irrigating vectis. After aspiration of the remaining cortex, a 6-mm optic polymethyl methacrylate (PMMA), intraocular lens was implanted. The viscoelastic material was aspirated and both the wound and paracentesis were hydrated. The conjunctival flap was opposed using a forceps fitted to bipolar diathermy.

Phacoemulsification was done using the AMO compact machine. Phacoemulsification was done through clear cornea and also through sclera-corneal approach. A 2.8 mm main entry was used for clear cornea phaco. A capsulorrhexis (CCC) was performed. After initially aspirating the liquid cortex the nucleus was emulsified by direct chop. Care was taken during emulsification of the last piece. A foldable IOL was implanted in clear corneal phaco and PMMA IOL was implanted in sclera-corneal phaco surgeries and the wounds were hydrated. Intra operative complications were noted and managed accordingly.

Collected data was analysed using IBM SPSS Statistics software version 22.0 (IBM Corp, Armonk, NY, USA). First, we determined the overall percentage of intra-operative complications and 95.0% confidence intervals (CIs) by age, sex, was compared by chi square test. The level of statistical significance was 5.0% in this study.

RESULTS

A total of 1401 (7.46%) patients had intraoperative complications out of the 18775 patients underwent cataract surgery (Figure 1). The patients with complications were in 38 to 85 years age groups with 691 (3.68%) females and 710 (3.78%) males.

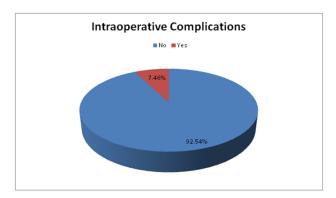


Figure 1: Prevalence of intraoperative complications in cataract surgery.

In terms of age, 1.4% patients were aged \leq 40 years, 7.5% were 41–50 years, 39.8% were 51–60 years, 41.6% were 61–70 years, 8.9% were 71–80 years, and 0.9% of cases were older than 80 years (Table 1).

Table 1: Demographic characteristics of patients.

Variables		No. of patients (n=1401)	Percentage
Age in years	≤40	19	1.35
	41-50	105	7.5
	51-60	557	39.8
	61-70	583	41.6
	71-80	125	8.9
	>80	12	0.9
Gender	Male	710	50.7
	Female	691	49.3
Right/Left Eye	Right	760	54.2
	Left	641	45.8

Table 2: Prevalence of intraoperative complications in cataract surgery.

Intraoperative Complications	No. of surgeries (n=18775)	Percentage
No	17374	92.54
Yes	1401	7.46

The prevalence of intraoperative complications of cataract surgery was 7.46%, (Table 2). Out of 1401 patients having intraoperative complications, majority patients had posterior capsular rent with vitreous disturbance (254/18.1%), followed by iridodialysis (106/7.6%), scleral tunnel with premature entry

(93/6.6%), descemet stripping (30/2.1%), nucleus drop into the vitreous (25/1.8%), zonular dialysis with vitreous disturbance (17/1.2%), IOL drop (12/0.9%), positive pressure (11/0.8%), button holding of the flap (8/0.6%) and expulsive haemorrhage (5/0.4%), (Table 3).

Table 3: Type of Intraoperative complications.

Intraoperative complications	No. of patients (n=1401)	Percentage
Descemet stripping	30	2.1
Iridodialysis	106	7.6
Nucleus drop into the vitreous	25	1.8
PC rent - vitreous disturbance	254	18.1
Scleral tunnel - premature entry	93	6.6
Zonular dialysis -vitreous disturbance	17	1.2
IOL drop	12	0.9
Positive pressure – wound	11	0.8
Button holding of the flap	8	0.6
Expulsive haemorrhage	5	0.4

According to the type of surgery done the number of patients having intraoperative complications were, one (0.07%) in conventional ECCE with PCIOL, one (0.07%) in phaco with foldable IOL, 77 (5.49%) in phaco with non-foldable IOL, 1165 (83.14%) in MSICS with PCIOL, 150(10.7%) in MSICS with ACIOL and 7(0.49%) in MSICS+PCIOL+trabeculectomy, (Table 4).

Table 4: Type of surgery in the patients who have complication.

Type of Surgery	Total (n=1401)	Percentage
Conventional ECCE With PCIOL	1	0.07
Phaco with foldable PCIOL	1	0.07
Phaco with non-foldable PCIOL	77	5.49
MSICS with PCIOL	1165	83.14
MSICS with AC IOL	150	10.7
MSICS+PCIOL+TRAB	7	0.49

DISCUSSION

The aim of our study was to evaluate profile of intraoperative complications in cataract surgery and we found that the age at presentation ranged from 38-85 years. In our study of the 18775 eyes, 1401 (7.46%) had intraoperative com-plications. Our study findings were

similar to the study performed by Patil et al who reported the intraoperative complications in 8.8% patients.¹ Gogate et al evaluated 358 patients who underwent Manual SICS.⁶ Intraoperative complications were seen in 29 patients (8.1%). Intraoperative complications were seen in 6.05% cases in the study performed by Hosamani et al.⁷

A total of 12,992 eyes underwent cataract surgery from 2007 to 2014 with 6.1% registering intraoperative Complications in a study conducted by Thevi et al in Malaysia. Other centres recorded fewer complications of 1.4%. Venkatesh et al in 2003 analysed the outcome of high volume cataract surgeries in a developing country on 593 patients and reported intraoperative complications in 11(1.9%) cases but higher rates than ours were also found (8.5%). This may be because of geographical and climatic differences and it may also majorly because of the sample size differences.

Cataract surgery is now the most common surgical procedure performed in the Western world. The only national survey of cataract surgery outcomes in the United Kingdom found that for 55,567 cases reported, there were no complications in more than 95 per cent of cases. Ninety-one percent of patients with no ocular comorbidities achieved a post-operative visual acuity of 6/12 or better, with 45.9 percent of all eyes achieving 6/6 or better. ^{12,13}

Despite ongoing advances in cataract surgical technology, a small number of complications will always exist. This article outlines some of the more common intraoperative complications in a cataract surgery. The article draws on our experience from our own clinical practice, discussions with colleagues, and data presented at international conferences and from electronic literature searches performed on the PubMed database focusing on the various topics discussed.

Demographic details

In the present study out of the total 1401 patients with complications majority were in the age range 61-70 years (41.6%) followed by 51-60 years (39.8%) and males and females were 50.7% and 49.3% respectively while with respect to the total 18775 patients 3.68% and 3.78% male and females were affected by intraoperative complications respectively. Our study was in accordance with Patil et al who reported the maximum number of patients 134 (53.6%) were in the 61 to 70-year age group in their study. Females and extremes of ages (below 40 years and above 80 years) had more complications by Thevi et al. Females and extremes of the study.

Females and those above 70 were found to have more complications in other studies too.¹³ Complications were not affected by ethnicity. In 2011, Greenberg and colleagues reported a cataract surgery complication rate of 3.8% for 2005–2007 in the US.¹⁴ In the>90 years age

group, approximately 13% of cataract surgeries had complications.¹⁵

Hashemi et al reported that in their study 48.1% was from male patients, 51.0% from female patients, and in 0.9% of cases, sex was not specified. In terms of age, 0.4% of charts belonged to patients aged 10 years or younger, 3.7% were 11–40 years, 7.6% were 41–50 years, 17.9% were 51–60 years, 28.3% were 61–70 years, 30.8% were 71–80 years, and 11.2% of cases were older than 80 years which is almost similar to the present study.

Type of Surgery and intraoperative complications

In the present study out of the total 1401 patients with complications majority were of small incision cataract surgery (SICS) (1322/1401 i.e. 94.36%) followed by phaco (5.6%). PC rent was the commonest intraoperative complication 254 (18.12%) in all the studied patients followed by iridodialysis 106(7.6%) and scleral tunnel with premature entry 93 (6.6%).

Our findings were in accordance with Patil et al who had performed manual small incision cataract surgery with PCIOL implantation was the procedure performed in majority of the cases i.e 247 cases (98.8%). Posterior capsular tear occurred in 6 patients (2.4%) being the most common intraoperative com-plication in present study followed by iris prolapse in 5 patients (2%), premature entry in 3 patients (1.2%), descemet detachment in 3 patients (1.2%), capsular extension (0.8%), zonular dialysis (0.8%) & others, which included superior iridodialysis, a rare complication occurred in one case (0.4%).

Khanna et al evaluated 522 who underwent manual SICS and reported posterior capsular rent (PCR) followed by zonular dialysis as the most common intraoperative com-plication occurring in their study. PCR was seen in 36 eyes (6.9%) and zonular dialysis in 20 eyes (3.8%). Descemet detachment was seen in 7 cases (1.3%).¹⁷

Gogate et al in his study evaluated posterior capsular rent as the most common intraoperative complication.⁶ It was seen in 18 out of 358 patients (5.02%) & the incidence of PC rent was higher in hyper mature and hard cataract & those with small size pupils.¹⁸

Neekhra et al analysed 1820 patients who underwent cataract surgery. Out of 1820, manual SICS was performed in 600. They found that the incidence of posterior capsular tear in patients who underwent SICS was 4.0% i.e. in 24 patients.

Hennig et al reported posterior capsular rent in 0.2% cases whereas Khan et al reported 3.33%. 20,21

Hosamani et al reported that posterior capsule rupture without vitreous leak occurred in 2.42%, posterior capsule rupture with vitreous leak occurred in 1.21%.⁷

Other intraoperative complications were Descemet's membrane detachment (0.72%), iridodialysis, premature entry and iris tear in 0.48% cases in their study.

Advanced techniques, instrumentation, and technology have reduced PCR rate to 0.45%-5.2%. 22,7 The incidence of PCR in surgeries performed by experienced surgeons is placed at 0.45%-3.6%. 17 For surgeons converting from capsular cataract extraction (ECCE) phacoemulsification, the PCR incidence is around 4.8%- $11.0\%.^{23,24}$ The outcome of uncomplicated phacoemulsification in the present scenario is excellent. However, despite the advances in the field of cataract surgery, surgical complications still occur. Posterior capsular rent (PCR) is the most common potentially sight-threatening intraoperative complication during cataract surgery. ²⁵

Limitations

Overall, the study was not immune to limitations and it lies in the inherent nature of the study, that is, being retrospective and non-randomized. We could not look at the fact that the outcomes differed by the grade of the nucleus as the retrospective nature of the study limited our ability to standardize this grading. Similarly, the surgeon factor could not be taken into account.

CONCLUSION

The study results show that in high quality cataract surgery (93.54% without intraoperative complications). Complications of cataract surgery in India had a decreasing trend during the last decade. Our technique has all the inherent advantages of the suture less cataract surgery in terms of universal applicability, greater wound stability, lesser complications and early visual rehabilitation. However, results from our study indicate that cataract surgical complications still need to be focused on. The incidence of PCR can be decreased significantly by identifying the presence of predisposing factors and appropriate modification of the surgical plan. Early recognition of posterior capsular tear along with prompt management of capsular tear and vitreous prolapse is the key to the good surgical outcome.

Recommendations

A prospective randomized controlled trial would be more robust and would take care of the above-mentioned limitations. Future research should be done using multicentre data.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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