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Mature cataract - An intra-operative complications assessment

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Abstract

Objective: To evaluate an intra-operative complication of mature cataract.

Material and Methods: In this observational cross-sectional study, 200 eyes with mature cataract underwent cataract extraction through Small Incision Cataract Surgery and Phacoemulsification technique. Intra-operative complications such as difficulty in performing capsulorhexis, zonular dehiscence, subluxation of the lens, difficulty in nucleus delivery, posterior capsular rent, vitreous loss, nucleus/IOL drop were analysed and their frequency were observed and the data was statistically analysed.

Results: Intra-operative complication rate was 31.5%, more than one complication were noticed in single surgery in few cases. Total 58 eyes (29.5%) had difficulty in performing capsulorhexis out of which 21 eyes (10.5%) developed large capsulorhexis, 16 eyes (8.5%) failed to complete capsulorhexis in one stage. Argentinian flag sign occurred in 13 eyes (6.5%) and small capsulorhexis occurred in 8 eyes (4.0%). Intra-operative subluxation of lens and zonular dehiscence were noted in 10 (5.0%) and 9 (4.5%) eyes. Difficulty while performing delivery of nucleus from anterior chamber occurred in 9 (4.5%) eyes. Posterior capsular rent and vitreous loss were noted in 7 (3.5%) and 5 (2.5%) eyes respectively. Intraocular lens could not be implanted in the capsular bag in 4 (2%) eyes of mature cataract. Nucleus/IOL drop did not occur in any surgery in our study.

There was no significant difference between complication rates in SICS and Phacoemulsification group (p=0.82).

Conclusion: Difficulty in performing capsulorhexis was the most frequent complication confronted during surgery amongst the all-happened complications succeeded by zonular dehiscence and subluxation.

Which insinuates that characteristic of mature cataract accounts for its liability. Type of surgery does not imply much significance on the nature of complications. Importantly it counts on the characteristics of cataract. Adequate implication of preventive measures with the timely detection and appropriate management of complications can reduce ocular morbidity.

Keywords: Mature cataract, Intraoperative complications, Capsulorhexis, SICS, Phacoemulsification.

Introduction

According to World Health Organization, cataract is the leading cause of preventable blindness and the second most common cause of moderate and severe vision impairment around the world. 1 In India, the estimated prevalence of blindness is 0.36% and cataract is responsible for 66.2% of blindness. 2 As medical science advances it increases the lifespan of the human population, so the cataract which basically is an age-related entity that will continue to grow. Cataract surgery is the most commonly performed ophthalmic procedure worldwide with the major anatomical and optical goal being, a well-centered posterior chamber IOL.

According to the National Programme for Prevention and Control of Blindness (NPCB) survey (2015-2019), cataract surgical complications accounts for 7.2% of total blindness. 2 In view of various characteristics of mature cataract such as nuclei of varying hardness, absence of red reflex obscuring fundus, thinned and fragile capsule, absence of epinucleus; mature cataract 3–5 has a greater risk of complications, even an experienced surgeon face challenges intra-operatively and hence meticulous care and vigilance has to be provided while operating these cases.

Different intraoperative complications were identified in this study attributable to mature cataract. Detailed assessment of complications considering types and their frequency in both the types of surgeries Small Incision Cataract Surgery and Phacoemulsification done. The purpose of this study is preemptive identification of various intra-operative complications in patients with mature cataract undergoing surgery so that they can be managed accordingly and the best visual outcome can be achieved.

Above all an adequate implication of preventive measures with the timely detection and appropriate management of complications can reduce ocular morbidity.

Materials & methodology

This study was conducted during November 2019 to September 2021 on 200 patients with mature cataract undergoing cataract surgery at Tertiary Health Centre in South Gujarat. Permission to conduct the study was obtained from Human Ethical Research Committee. Informed written consent were taken from the patient. Pre-operative detailed examination like slit lamp examination was done to rule out preoperative phacodonesis or subluxated lens. Patients with traumatic mature cataract, pseudo exfoliation syndrome, glaucoma, pediatric cataract were excluded from this study. B-scan ultra-sonography was done to rule out any posterior segment pathology. A scan biometry, keratometry and

IOL power calculation were done prior to surgery. In all patients, preoperative intraocular pressure was taken using non contact tonometer and accordingly oral acetazolamide was given 1 hour prior to surgery for cases with IOP more than 22 mm Hg. Tropicamide 0.8% and phenylephrine 5% applied 4 times 15 minutes apart 1 hour prior to surgery to achieve maximum mydriasis. Surgical procedures were selected as per the six experienced surgeon's preference and surgeries were performed under peribulbar anaesthesia.

SICS

A superior rectus bridle suture was fixed. A fornix based conjunctival flap was created superiorly and haemostasis achieved with diathermy. A partial thickness 6-6.5 mm straight scleral incision was made 1-1.5 mm behind the limbus. Corneo-scleral tunnel was constructed using a crescent knife (2.6 mm) and paracentesis was made at 9 o'clock position with 15-degree side port knife. Through paracentesis, first air bubble was injected to reform the anterior chamber and to protect the endothelium, then 0.1ml of 0.06% trypan blue was injected below air bubble using 26 g cannula to stain anterior capsule. Then Hydroxypropyl methyl cellulose -dispersive viscoelastic substance was injected to remove air bubble and deepen the anterior chamber. Capsulorhexis was made of 5.5–6 mm size by using cystitome made with 26 G ½ inch needle. Hydro procedures were done with 26 G cannula. Nucleus prolapsed into anterior chamber with plain dialer and under a good cover of Vis coagent protecting the endothelium, nucleus was extracted from anterior chamber using non-irrigating wire Vectis. The cortex was washed using 23G Simcoe cannula and IOL implanted into the capsular bag inflated by HPMC viscoelastics. The viscoelastic material was replaced by a balanced salt solution and stromal hydration was performed by injecting fluid to the side of paracentesis. The integrity of self-sealing scleral incision was ensured and conjunctival flap was reposited using diathermy.

Phacoemulsification

A side port entry made with 19G mvr paracentesis knife at 3 and 9 o'clock or 12 and 6 o'clock. The anterior chamber was formed with air bubble and the anterior lens capsule was stained with trypan blue dye followed by anterior chamber formation with viscoelastic substance. CCC was made with cystitome. The Anterior chamber was then entered with 2.8 mm keratome blade and anterior chamber was deepened with viscoelastic agent. The nucleus was fragmented by the divide and conquer technique. If nucleus was excessively mobile, the phaco chop technique was used. The residual cortex was removed using irrigation/ aspiration cannula. The foldable Posterior Chamber IOL was implanted into the capsular bag with the aid of viscoelastic material. In eyes with larger posterior capsular tear, anterior vitrectomy of prolapsed vitreous done with vitrectomy cutter and non-foldable PMMA lens was implanted in the sulcus. The residual viscoelastic material was removed and the anterior chamber was formed with saline and integrity of wound tested.

Various intraoperative complications were identified and compiled into tabular form. Nature of complications such as small capsulorhexis (less than size of 5 mm), large capsulorhexis (more than size of 6 mm), incomplete capsulorhexis (fail to complete CCC in one stage), Argentinian flag sign, zonular dehiscence, subluxation of the lens, difficulty in nucleus delivery, posterior capsular rent, vitreous loss, nucleus drop and their frequency were observed and the data was statistically analysed with SPSS version 26.0 data processor for Windows. Pearson chi-square tests were

used to compare the incidence of intraoperative complications between SICS and PE group. A value of less than 0.05 was considered statistically significant.

Results & discussion

In this cross-sectional observational study, 200 eyes having mature cataract underwent cataract extraction, out of 95 were of male (47.5%) and 105 were of female (52.5%) with mean age of 58.33 (SD 12.68) years (range 22-90 years). Of which 173 patients underwent manual small incision cataract surgery and 27 patients underwent phacoemulsification surgery. Surgery was done on 103 (51.5%) Cortical Mature cataract and 97 (48.5%) Nuclear Mature Cataract.

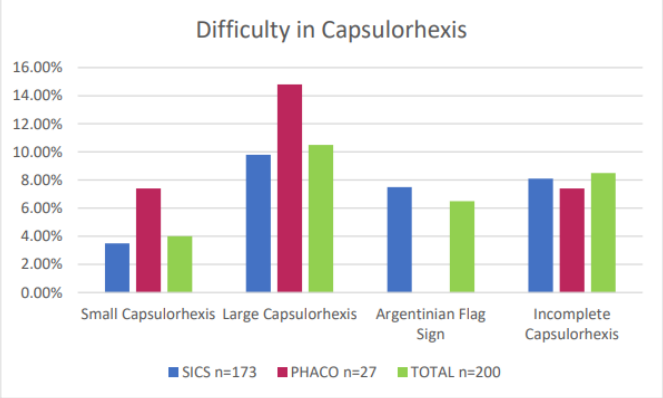
Table 1: Demographic details of the patients with mature cataract

Characteristics	No.	(%)
age distribution		
<50	53	26.5%
>50	147	73.5%
Gender distribution		
Male	95	47.5%
Female	105	52.50%
Type of Cataract		
Cortical Mature Cataract	103	51.5%
Nuclear Mature Cataract	97	48.5%
Type of Surgery done		
SICS	173	86.5%
PHACO	27	13.5%

In study, 31.5% of total surgeries were associated with some form of intraoperative complications while 68.8% surgeries were uneventful. On sub-group analysis we found that difference between complication rates depending upon the types of surgeries was statistically insignificant (p=0.82).

In this study, difficulty in performing capsulorhexis was the most common complication encountered (29%). In total 58 eyes (29.5%), we had difficulty in performing CCC out of which 21 eyes developed large CCC, 16 eyes failed to complete CCCS in one stage. Argentinian flag sign occurred in 13 eyes and small CCC occurred in 8 eyes. While 70.5% eyes had successfully completed CCC in one stage. There was no statistically significant difference between complication rate of capsulorhexis in SICS and PE (p=0.93)

Figure 1: Frequency of various complications related to capsulorhexis performed during surgery.

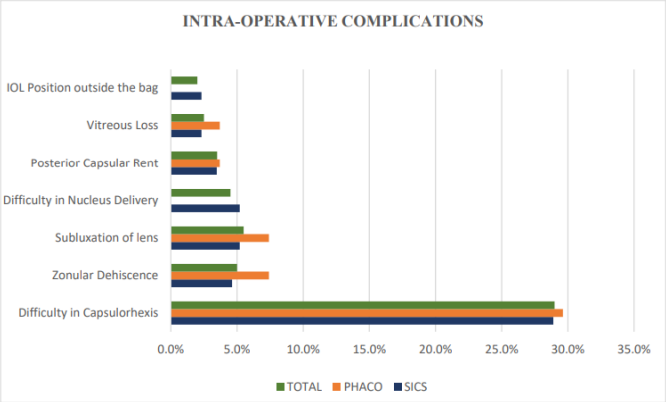


In accordance to ours, study results of A Chakrabarti et al. 6 and Brazitikos PD et al. 7 also showed similar intraoperative complication rates (38.2% and 38% respectively) with complication related to capsulorhexis being the most common (28.3% and 21% respectively).

Intra-operative subluxation of lens and phacodonesis were noted in 5.0% eyes, while zonular dehiscence was noted in 4.5% eyes. Surgeons also faced difficulty in delivery of nucleus in 4.5% eyes during 0.00% 2.00% 4.00% 6.00% 8.00% 10.00% 12.00% 14.00% 16.00% Small Capsulorhexis Large Capsulorhexis Argentinian Flag Sign Incomplete Capsulorhexis Difficulty in Capsulorhexis SICS n=173 PHACO n=27 TOTAL n=200 SICS. Posterior capsular rent and vitreous loss were noted in 3.5% and 2.5% eyes respectively. IOL

could not be implanted in the capsular bag in 2% eyes of mature cataract. Nucleus/IOL drop did not occur in any surgery in our study.

Figure 2: Frequency of various intra-operative complications of mature cataract.



During SICS, Zonular Dehiscence was noted in 8 eyes, out of which 2 eyes also had subluxation of lens. Hard and large size of nuclei lead to difficulty in prolapse and delivery of nucleus in 9 eyes. PCR occurred in 6 eyes with an associated vitreous loss seen in 3 eyes. Of these 6 eyes, in the bag IOL implantation was performed in three eyes and outside the bag IOL implantation in the remaining three eyes (a sulcus fixated intraocular lens in two eyes and an iris fixated lens in one eye). The latter was performed as these three eyes also developed peripheral extension of capsulorhexis. One eye had vitreous loss intraoperatively due to zonular dehiscence and subluxation of lens, however no PCR was noted. A sulcus fixated lens was implanted in this case due to weak bag support.

Suresh Patil M et al. 8 conducted a study in which they found that 0.8% patient had zonular dehiscence. In 6.1% patient with mature cataract, iris prolapse occurred due to difficulty in nucleus delivery. In 6.1% patients PCR was noted along with vitreous loss and PCIOL was implanted in ciliary sulcus in 3.05% cases.

In PE group, zonular dehiscence was noted in 3.7% eyes and subluxation was noted in 3.7% eyes. Excessive manoeuvring during emulsification of hard nucleus can increase stress on weakened zonules which could be the reason for high zonular dehiscence rate. There was PCR that occurred in one eye during nucleas emulsification along with vitreous loss (3.7%). This case was managed by pars plana vitrectomy and iris fixated claw lens was implanted. In large and hard nucleus, posterior capsule is often thinned and stretched and also absence of epinucleus and milky cortex may tend to wash out leaving no protective cushion for posterior capsule during emulsification process makes it more prone to PCR.

A Study done by S Ermis et al. 9 showed similar PCR rates (3.6%) and 1.2% eyes ended up with a sulcus fixated IOL as this case had peripheral extension of capsulorhexis. A randomized study conducted by R Venkatesh et al. 10 showed that PCR rate was 2.2% in the PE group and 1.4% in SICS group. An IOL could not be implanted in 0.9% eyes in PE group due to insufficient capsule support.

Anterior capsulorhexis remains the most important and the most challenging aspect of the surgery. Generally, if one can complete the capsulorhexis, all else is likely to get succeed. The lack of red refle, friable nature of the capsule, high intra-lenticular pressure, presence of capsular fibrosis and liquefied cortical matter leak from the anterior capsule puncture site are likely to be the obstacles in performing an effortless and smooth CCC in mature cataract. 3–5,11 This may be prevented by use of highly retentive Vis coagent prior to initiating capsular tear and this also helps to avoid peripheralization of CCC by creating tamponade against the rapid escape of milky cortex arising from raised intralenticular pressure.

12 The key factor in determining successful completion of a circular capsulorhexis in mature cataract is visualization of the anterior capsule and the advancing torn edge of the capsule. Use of trypan blue was found to be safe and effective in performing capsulorhexis.13–15 An intralenticular fluid aspiration can significantly reduce the bag pressure and reduce the risk of radial extensions in cases of subcapsular liquefactions. Upon peripheral run away of rhexis margin, the use of vannas scissor to make another nick at the tearing edge and the use of Uttara forcep for further processing of capsulorhexis can be helpful as a safeguard in reducing complications related to capsulorhexis.

Conclusion

This study concluded that difficulty in performing capsulorhexis happened to be the most common complication confronted during surgery irrespective of type of surgery. Other complications such as zonular dehiscence, subluxation of the lens, posterior capsular rent, vitreous loss, were also witnessed but lesser in frequency and were not significant. In some patient's multiple complications were noticed, suggesting that one complication begets another. Hence it is imperative to take utmost precaution from the very beginning. The results of this study will enable surgeons to identify the potential complications and provide an insight to the surgeon regarding the steps that need to be taken care of the most, thereby being more vigilant and cautious prior to each step of surgery.

Limitations

Lesser number of participants in phacoemulsification group may lead to skewed variation in results rendering it non-compatible for generalization.

References

1. WHO. World Health Organization, Geneva: Blindness and vision impairment [Internet]. 2021 [cited 2021 Oct 21].

2. National Blindness and Visual Impairment Survey 2015-2019; National Programme for Control of Blindness and Visual Impairment. [Internet]. [cited 2021 Oct 12].

3. Rao SK. Capsulorhexis in White cataracts. 2000;

4. Venkatesh R, das M, Prashanth S, Murali Krishnan R. Manual small incision cataract surgery in eyes with white cataracts. Indian J Ophthalmol [Internet]. 2005 Sep 1 [cited 2021 Oct 17];53(3):173–6. Available from: http://europepmc.org/article/MED/16137961

5. Chakrabarti A, Singh S, Krishnadas R. Phacoemulsification in eyes with white cataract. J Cataract Refract Surg. 2000;26(7):1041–7.

6. Chakrabarti A, Singh S, Krishnadas R. Phacoemulsification in eyes with white cataract. J Cataract Refract Surg. 2000;26(7):1041–7.

7. Brazitikos PD, Tsinopoulos IT, Papadopoulos NT, Fotiadis K, Stangos NT. Ultra-sonographic classification and phacoemulsification of white senile cataracts. Ophthalmology [Internet]. 1999 Nov 1 [cited 2021 Nov 26];106(11):2178–83.

8. Suresh Patil M, Namdeo Balwir D, Dua S. Study of Intraoperative Complications in Small Incision Cataract Surgery, its Management and Visual Outcome. MVP Journal of Medical Sciences [Internet]. 2016;3(1):2348–263.

9. Ermis SS, Ozturk F, Inan ÜÜ. Comparing the efficacy and safety of phacoemulsification in white mature and other types of senile cataracts. Br J Ophthalmol [Internet]. 2003 Nov [cited 2023 Jan 26];87(11):1356– 9.

10. Venkatesh R, Tan CSH, Sengupta S, Ravindran RD, Krishnan KT, Chang DF. Phacoemulsification versus manual small-incision cataract surgery for white cataract. J Cataract Refract Surg. 2010 Nov;36(11):1849– 54.

11. Carifi G, Miller MH, Pitsas C, Zygoura V, Deshmukh RR, Kopsachilis N, et al. Complications and outcomes of phacoemulsification cataract surgery complicated by anterior capsule tear. Am J Ophthalmol [Internet]. 2015 Mar 1 [cited 2021 Nov 29];159(3):463–9.

12. Robinson MS, Olson RJ. Simple approach to prevent capsule tear-out during capsulorhexis creation in hyper mature cataracts. J Cataract Refract Surg. 2015 Jul 1;41(7):1353–5.

13. Dada VK, Sharma N, Sudan R, Sethi H, Dada T, Pangtey MS. Anterior capsule staining for capsulorhexis in cases of white cataract: Comparative clinical study. J Cataract Refract Surg. 2004 Feb;30(2):326–33.

14. Horiguchi M, Miyake K, Ohta I, Ito Y. Staining of the lens capsule for circular continuous capsulorrhexis in eyes with white cataract. Arch Ophthalmol [Internet]. 1998 [cited 2021 Sep 26];116(4):535–7. Available from: https://pubmed.ncbi.nlm.nih.gov/9565058/

15. Kothari K, Jain SS, Shah NJ. Anterior capsular staining with trypan blue for capsulorhexis in mature and hyper mature cataracts. A preliminary study. Indian J Ophthalmol [Internet]. 2001 Sep [cited 2021 Nov 29];49(3):177.

Abbreviations

ω CCC- Continuous curvilinear capsulorhexis

ω HPMC- Hydroxy Propyl Methyl cellulose

ω IOL- Intraocular lens

ω NPCB- National Programme for Prevention and Control of Blindness

ω PCIOL- Posterior Chamber Intraocular Lens

ω PCR- posterior Capsular Rent

ω PE- Phacoemulsification

ω SICS- Small Incision Cataract Surger