

# Evaluation of Complications of Extracapsular Cataract Extraction Performed by Trainees

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## Abstract

**Background:** Cataract extraction is the most common intraocular surgery taught to residents. **Aim:** This study aims to review the complications of trainee-performed extracapsular cataract extraction (ECCE) so as to identify the steps in which the trainee can benefit from closer supervision and practice. **Subjects and Methods:** This was a descriptive retrospective study of complications in the initial 150 ECCE with intraocular lens implant performed by two Ophthalmologists, from the University of Nigeria Teaching Hospital, Enugu, who visited a high volume training center. Both the intraoperative and early post-operative complications were studied. Data entry and analysis were performed descriptively using the Statistical Package for the Social Sciences, SPSS version 15.0 (Chicago, IL, USA). **Results:** The age range of the patients was 40-95 years. The intraoperative complications included capsular flaps 12/161 (7.5%), posterior capsule rent, 10/161 (6.2%) and vitreous loss, 8/161 (5.0%). Corneal complications (striate keratopathy, superior corneal edema, generalized corneal edema and corneal folds) ranked highest in post-operative complications accounting for 34% (56/164). **Conclusions:** Performance of adequate and proper anterior capsulotomy, minimal handling of the cornea and avoidance of posterior capsular rent are some of the challenges of the trainee in mastering ECCE. Stepwise supervised training can help a trainee master these steps while keeping the complications at acceptably low levels.

**Keywords:** Cataract, Cataract extraction, Complications, Developing country, Trainee

## Introduction

Cataract has remained the leading cause of blindness world-wide despite the changing patterns in the causes of blindness globally in the last two decades.<sup>[1-3]</sup> The need for a good outcome after cataract surgery cannot be overemphasized. The outcome of cataract surgery depends in part on the surgeon's skills.<sup>[4]</sup> Complications arising from cataract extraction can convert cataract a treatable cause of blindness to irreversible blindness.

In the western world, phacoemulsification is the gold standard for cataract surgery.<sup>[3,5-8]</sup> Small incision cataract surgery (SICS) is widely practiced in India and other Asian countries. It is

less expensive than phacoemulsification; the intraoperative complications and final visual outcome of the two procedures in the hands of an experienced surgeon are comparable.<sup>[9,10]</sup> In many centers in Nigeria manual extracapsular cataract extraction (ECCE) with intraocular lens (IOL) implant is the routine surgery for cataract. Many Ophthalmologists in the country are gradually converting to SICS while phacoemulsification is practiced in very few centers.

Thomas *et al.*<sup>[11]</sup> have argued that confidence in ECCE is desirable before learning phacoemulsification to maintain complications at acceptably low levels. While phacoemulsification is the preferred surgery for a cataract in the developed world, ECCE is still useful in complex cataract and when some complications arise during phacoemulsification.<sup>[8,10]</sup> In some training centers mastering standard ECCE is required before admission to learn SICS.<sup>[10,12]</sup>

Cataract extraction is the most common intraocular surgery taught to residents. Since ECCE is the basic cataract surgery taught in developing countries, it is important to evaluate the complication rate of a trainee as a guide to the learning curve

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of the procedure. This should serve as a valuable tool to the trainers in identifying the specific steps, in which trainees can benefit from closer supervision and practice. Moreover, it can help in evaluation of the efficiency of the surgical training of a residency program.

## Subjects and Methods

This was a descriptive retrospective study of the complications in the initial 150 manual ECCE with IOL implant done by two Ophthalmologists, from the University of Nigeria Teaching Hospital, Enugu, who visited a high volume training center. The Ophthalmologists had obtained their fellowships. Ophthalmologist A did 85 surgeries while Ophthalmologist B did 65 surgeries. Each trainee spent a period of 2 months and the patients were followed-up for 1 week post-operatively.

The ECCE was performed under retrobulbar anesthesia. After raising a conjunctival flap, ECCE was performed through a 10-12 mm superior corneoscleral incision. A can-opener anterior capsulotomy was performed followed by nucleus delivery by pressure and counter pressure at the superior and inferior limbus. Cortical clean-up was carried out manually with Simcoe cannula. A polymethyl methacrylate IOL was implanted and wound closed with interrupted nylon sutures (5 on the average). Viscoelastic was used to maintain the anterior chamber and protect the endothelium during the procedure.

Data on complications of surgery were obtained from their logbooks. The logbook has a section for recording intraoperative complications and a section for post-operative complications. The entries of the trainees were reviewed by the supervisors.

Patients with known ocular comorbidity, hypermature cataract and subluxated cataract were excluded during the recruitment of the patients. Data was analyzed descriptively using the Statistical Package for the Social Sciences, SPSS version 15.0 (Chicago, IL, USA).

Ethical clearance was obtained from Health Research and Ethics Committee of the University of Nigeria Teaching Hospital Enugu.

## Results

The age range of the patients was 40-95 years. The intraoperative complications are displayed in Table 1. Some eyes had more than one complication. The most common complications were capsular flaps 12/161 (7.5%), posterior capsule rent 10/161 (6.2%) and vitreous loss 8/161 (5.0%). The post-operative complications are shown in Table 2. Corneal complications (striate keratopathy, superior corneal edema, generalized corneal edema and corneal folds) ranked highest

**Table 1: Intra-operative complications\***

Complications	Number	Percentage
Capsular flaps	12	7.5
Posterior capsule rent	10	6.2
Positive pressure	8	5.0
Vitreous loss	8	5.0
Descemet's membrane stripping	5	3.1
Hyphema	5	3.1
Ragged incision line	4	2.5
Section too small	4	2.5
Anterior chamber entry too small	3	1.9
Section too wide	2	1.2
Epithelial defect	2	1.2
Lamellar corneal separation	1	0.6
Anterior chamber entry too wide	1	0.6
Endothelial touch	1	0.6

\*Some eyes had more than one complication

**Table 2: Post-operative complications\***

Complication	Number	Percentage
Corneal edema	34	20.7
Striate keratopathy	15	9.1
Residual cortical matter	12	7.3
Anterior chamber reaction	10	6.1
Non-radial sutures	9	5.5
Irregular pupil	6	3.6
Too tight sutures	5	3.0
Superior corneal edema	4	2.4
Decentered intraocular lens	4	2.4
Corneal folds	3	1.8
Too loose sutures	3	1.8
Fibrinous membrane	2	1.2
Iritis	2	1.2
Hyphema	1	0.6
Iris prolapse	1	0.6
Poor wound apposition	1	0.6

\*Some eyes had more than one complication

accounting for 34%, (56/164) of complications. The next most common group is inflammations (anterior chamber reaction, iritis and fibrinous membrane) accounting for 8.5% (14/164) while residual cortical matter accounted for 12/164 cases, 7.3%.

## Discussion

SICS is judged to be the answer to the backlog of cataract blindness in the developing world.<sup>[3,9,10]</sup> It is safe and less expensive than phacoemulsification.<sup>[9,10]</sup> Compared with ECCE, the surgically induced astigmatism is less.<sup>[2]</sup> Ang *et al.*, in a major review comparing SICS and ECCE; however, concluded that there are insufficient data on the cost-effectiveness of each procedure.<sup>[2]</sup> It is important to master ECCE as it is still widely practiced in Nigeria. Moreover, some major training centers in the developing world teach cataract surgery as a package in a stepwise manner: First large incision ECCE, then manual SICS and finally phacoemulsification.<sup>[10]</sup>

Diverse complications are encountered in ECCE carried out by trainees. In general, the intra-operative complications in this series are acceptably low. The posterior capsule rent rate of 6.2% is less than 11.4% and 11.3% reported from Sierra Leone<sup>[13]</sup> and Western Nigeria<sup>[14]</sup> respectively. It was higher than 4.5% rate each reported from USA<sup>[15]</sup> and South-Eastern Nigeria.<sup>[16]</sup> Both in training and in practice posterior capsule rent and attendant vitreous loss are potentially serious complications. It has been advocated that the surgical training of a resident should include the management of these complications; thus, discouraging the practice where the supervisor takes over when these complications occur.<sup>[17]</sup>

Capsular flaps were noted in 7.5% of the series. Adequate anterior capsulotomy whether by can opener or continuous curvilinear capsulorhexis is essential for a good outcome. It is one of the steps, which must be mastered well in learning ECCE. The trainees in this series were taught can opener anterior capsulotomy.

Corneal complications were the most important post-operative complications. It was much higher than 6.7% reported from Northern Nigeria.<sup>[18]</sup> Whereas older patients and those with uveitis or glaucoma may have compromised endothelium,<sup>[19]</sup> touching of the cornea with instruments, prolonged surgery and excessive manipulations all contribute to corneal edema and Descemet's folds post-operatively. A trainee's attention needs to be drawn to minimal handling of the cornea.

Iritis and other inflammations were also noted. As with corneal edema excessive manipulations encourage inflammation and should be avoided. Late complications were not evaluated in the present study.

The trainees in this series had been trained in intracapsular cataract extraction (ICCE). In the late 90s and early 2000s when there was a paradigm shift in cataract surgery in Nigeria from ICCE to ECCE, they were re-trained in ECCE. Perhaps the type and rate of complications of surgery may have been different if they were green horns in eye surgery.

In conclusion, capsular flaps and posterior capsular rent/vitreous loss are some of the intraoperative complications encountered by a trainee performing ECCE. Corneal complications and iritis/other inflammation are common post-operative complications. Stepwise supervised training can minimize these complications and achieve a good outcome even in the hands of trainees.

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