

# Outcome of 2000 Cases of Phacoemulsification

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## Abstract

**Background:** To evaluate the outcome of phacoemulsification cases performed at Fauji Foundation Hospital, Rawalpindi.

**Methods:** This study was conducted in the Department of Ophthalmology, Fauji Foundation Hospital, Rawalpindi, from October 2004 to March 2007. It comprised 2000 cases of phacoemulsification with intraocular lens (IOL) implantation which were performed at Fauji Foundation Hospital in two and a half years. Variables analysed included patient's age and sex, pre-existing conditions limiting final visual acuity (VA), and type of anesthesia used. Outcome measures included intra operative and postoperative complications and final visual acuity.

**Results:** Of the 2000 cases, there were 72% female and 28% male patients. 62% of patients were given periocular whereas 38% were operated in topical anesthesia. 15.35% of patients suffered intra operative complications. Intra operative complications were: radial tear in 5% cases, posterior capsular (PC) rent without vitreous loss in 3.45% and PC rent with vitreous loss in 4.85% of patients, iris damage in 0.83%, zonular dehiscence in 0.6% of cases, and nuclear fragment drop in 0.3% of patients. Of total patients, 91% of patients kept their appointment for 8 weeks follow up. Postoperatively corrected visual acuity after elimination of factors reducing best corrected visual acuity (BCVA) was 6/9 or better in 89% of cases. Postoperative complications were seen in 20.83% of patients, which included mild to moderate striate keratitis in 11.98%, mild to moderate anterior uveitis in 4.01%, raised intra ocular pressure (IOP) in 0.73%, wound leakage in 0.3%, ophthalmoplegia in 0.05% and endophthalmitis in 0.10% of cases. Posterior capsular opacification (PCO) was seen in 3.65% of patients in 8 weeks of followup. Post operative astigmatism was from 0 - 4.5 D.

**Conclusion:** Phacoemulsification is much safer, predictable, relatively atraumatic procedure and it provides early rehabilitation. It is associated with more patient as well as surgeon satisfaction.

## Introduction

Phacoemulsification was introduced in 1966 by Charles Kelman<sup>1</sup>. It took a very long time to be accepted as a procedure of choice by majority of surgeons. The main reason for this delay was probably a long and difficult learning curve and high cost of procedure<sup>2</sup>. With the description of capsulorrhexis by Neuhann and Gimbel<sup>3</sup>, advent of much improved microsurgical techniques, good supervision and readily available guiding material like books, CDs and videos and with the availability of new and better viscoelastic agents, the technique has now become the procedure of choice for the surgeons all over the world<sup>4</sup>. Phacoemulsification permits removal of cataract through 3 - 5.25 mm self sealing incision thus eliminating many complications associated with the wound. It also allows faster visual rehabilitation. It is associated with decreased post operative inflammation, lesser astigmatism and early refractive stability<sup>5</sup>.

The purpose of this study was to evaluate the outcome of phacoemulsification in the setting of this hospital, and to find the ways of reducing complications.

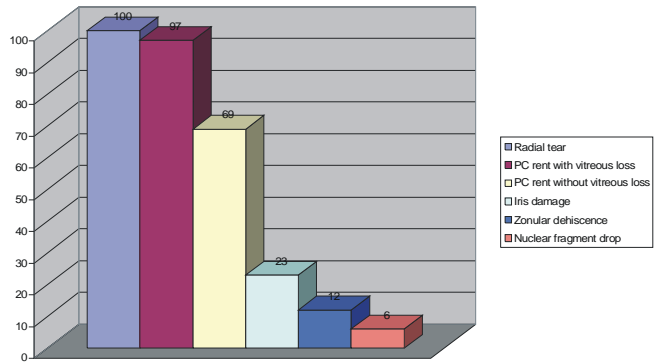
## Patients and Methods

This study was conducted in the Department of Ophthalmology, Fauji Foundation Hospital, Rawalpindi from October 2004 to March 2007. A total of 2000 cases of phacoemulsification were included. 91% (n=1820) of total patients kept their 8 weeks follow up. 72% (n=1440) of patients were females and there were 28% (n=560) male patients.

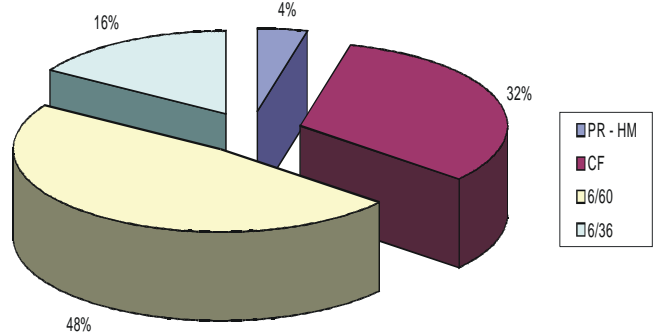
Preoperative examination included visual acuity (VA), slit lamp examination, tonometry and fundus examination. Preoperatively, the associated ocular problems which could decrease the final visual acuity were noted such as band keratopathy, corneal

opacities, pseudoexfoliation, diabetic retinopathy,

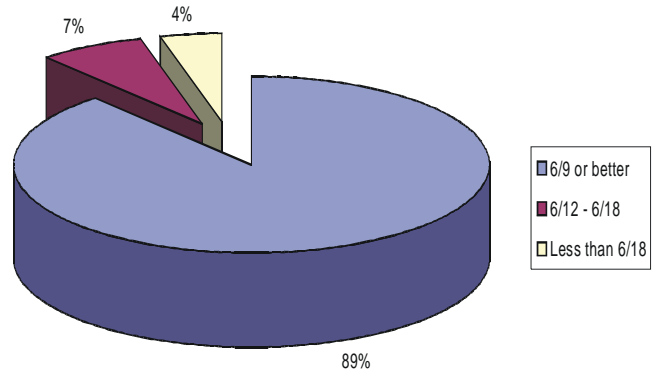
**Fig. 1: Intra Operative Complications of Phacoemulsification**



**Fig. 2: Pre Operative Visual Acuity**

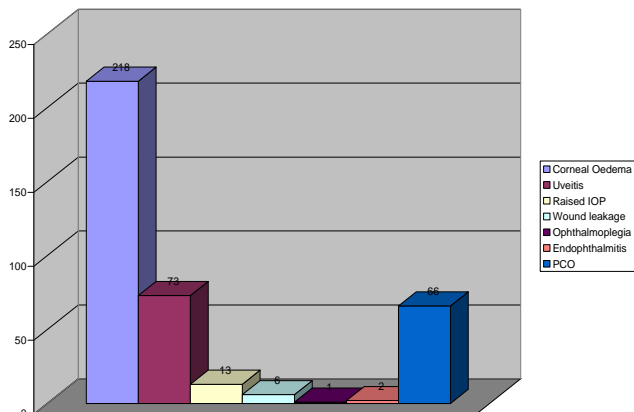


**Fig. 3: Post Operative Visual Acuity**



early age related macular degeneration and squint. Previous refractive history was taken. All patients were admitted one day prior to surgery and were screened and treated for hypertension, diabetes and chest problems. Before surgery, the pupils were dilated with 1% tropicamide eye drops, one drop every 10 minutes and 10% phenylephrine eye drops

**Fig. 4: Post Operative Complications**



once or twice. NSAIDs like diclofenac sodium were also used in some patients. 62% (n=1240) of patients who received peribulbar anesthesia were injected with 4-5 ml of local anesthetic (equal quantities of 0.5% bupivacaine and 2% xylocaine) in the peribulbar space. Whereas 38% (n=760) patients were given topical anesthesia in the form of 0.5% proparacaine eye drops in conjunctival sac, one drop every 5 minutes starting half an hour before surgery.

Two types of tunnel incisions were employed. In 88% (n=1760) of patients clear corneal incision, and in 12% (n=240) of patients scleral tunnel incision was given. Anterior chamber (AC) was entered with 3.25 mm keratome. Two 1- 1.5 mm side port incisions were made on the nasal and temporal sides. After filling the AC with viscoelastic, capsulorrhexis was done with a 29 gauge bent tip needle through the side port on the right side of main corneal incision. Hydrodissection and hydrodelineation was performed with 23 gauge cannula attached to a syringe filled with ringer lactate solution. Endocapsular phacoemulsification and aspiration was carried out. Residual cortical matter was removed by irrigation and aspiration cannula. AC and capsular bag was filled with viscoelastic substance. Incision was enlarged with 5.25 mm keratome to implant 5.25 or 5.50 mm optic diameter PMMA intraocular lens (IOL) in 89% (n=1780) of patients. In 11% (n=220) of patients hydrophilic acrylic foldable IOLs were implanted through 3.25 mm incision. The wound was left unsutured. Only in 0.65% (13) patients a single or a kratz suture had to be applied. In majority of cases stromal hydration was enough to seal the incision in doubtful cases. Subconjunctival injection of 4 mg

dexamethasone and 20 mg gentacin was given in all cases. Oral antibiotics were given for five days and topical steroid antibiotic combination was given for 4-6 weeks. The postoperative visits were scheduled at second, fourth and eighth week. At each visit slit lamp examination was done, unaided and pin hole vision was recorded. Refraction was done at 2nd and 8th week, which was found to be more or less the same. Final refraction was given at 8th week.

## Results

The patients varied in age from 46-83 years. Out of these 2000 patients 8.7% had systemic hypertension, 11.2% had diabetes mellitus, and 2% had established but controlled glaucoma.

Of the total of 2000 cases of phacoemulsification. 15.35% (n=307) patients suffered Intra operative complications. Radial tear was seen in 5% (n=100) (Table 1 & Fig. 1). These cases ended up uneventful without extension of the tear or any further complication and in all these cases in the bag IOL implantation was ensured. PC rent without vitreous loss occurred in 3.45% (n=69) and PC rent with vitreous loss occurred in 4.85% (n=97), which was managed by anterior vitrectomy and IOL implantation on the anterior capsule. Most of these rents occurred as a result of an attempt to chase nuclear fragment, or as an extension of radial tear. Iris damage was seen in 1.15% (n=23) cases which was due to pupil constriction during surgery. 0.6% (n=12) cases were complicated by zonular dehiscence (mostly in the cases of pseudoexfoliation, hypermature cataract or during attempts to break the hard nucleus), 7 of these patients were managed by putting in a capsular tension ring and the remaining 5 patients having less than 90° of dehiscence ended safely with in the bag IOL implantation. Nuclear fragment drop occurred in 0.3% (n=6) patients. 0.5% (n=10) patients had to be converted to extracapsular cataract extraction (ECCE) because of difficulty in phacoemulsification due to very hard cataract and due to fear of extension of radial tear.

Eight weeks follow up was 91% (n=1820). Preoperative VA of patients varied from light projection (PR) to 6/36. Postoperative VA at 8 weeks was 6/12 or better in 80.5% (n=1465) of patients. When pre existing conditions limiting final BCVA (best corrected visual acuity) were eliminated 89% (n=1611) of patients achieved BCVA of 6/9 or better. Refraction done at 2nd week and 8th weeks was more or less the

same (Figs. 2 & 3).

**Table 1: Intra Operative Complications of Phacoemulsification (n=2000)**

Intra Operative Complications	No. of Patients	Percentage
Radial tear	100	5.00%
PC rent with vitreous loss	97	4.85%
PC rent without vitreous loss	69	3.45%
Iris damage	23	1.15%
Zonular dehiscence	12	0.60%
Nuclear fragment drop	6	0.30%
Total	307	15.35%

Postoperative astigmatism in patients with 5.25 - 5.50 mm incision was between 0.50 to 4.50 D whereas, in patients with 3.25 mm incision the astigmatism was from 0 to 1.75 D. In majority of patients, astigmatism was less than 2.00 D with surprises in 4 cases where astigmatism was upto 4.50 D (Table 2).

**Table 2: Post Operative Astigmatism (n=1820)**

Astigmatism	No. of Patients	Percentage
0 - 0.5 D	400	21.98%
0.62 - 1.0 D	437	24.01%
1.12 - 1.5 D	765	42.03%
1.62 - 2.25 D	214	11.76%
2.50 - 4.50 D	4	0.22%

20.83% (n=379) of patients had postoperative complications (Table 3 & Fig. 4). Corneal oedema was the commonest complication with the incidence of 11.98% (218). In most of the cases it was mild to moderate and resolved in one week. Only in 0.15% (n=3) it ended up in pseudophakic bullous keratopathy. 4.01% (n=73) patients had mild to

moderate anterior uveitis, out of which 5 patients developed pupillary membrane which settled with medical treatment, one patient needed Nd:YAG laser later on for removal of membrane. Postoperative rise of IOP was seen in 0.73% (n=13) which settled well with medicines. Wound leak was seen in 0.31% (n=6), all of them responded well to patching, no one needed suturing.

One patient 0.05% (n=1) had ophthalmoplegia on 1st post operative day which settled in one day without any treatment. Posterior capsular opacification (PCO) was seen in 3.65% (n=66) in first 8 weeks of follow up. 2% (n=40) cases of PCO causing gross visual impairment were treated with Nd:YAG laser posterior capsulotomy later on. Endophthalmitis occurred in 0.10% (n=2) patients. Both were diabetics and unfortunately the eyes could not be saved.

**Table 3: Post Operative Complications of Phacoemulsification (n=1820)**

Post Operative Complications	No. of Patients	Percentage
Corneal Oedema	218	11.98%
Uveitis	73	4.01%
Raised IOP	13	0.73%
Wound leakage	6	0.31%
Ophthalmoplegia	1	0.05%
Endophthalmitis	2	0.10%
PCO	66	3.65%
Total	379	20.83%

## Discussion

Our study had a predominantly large number of females, 72% (n=1440) compared to males, 28% (n=560). The reason for this gender difference is that our hospital is entitled for the families of ex-service men.

Phacoemulsification is much superior to planned extra capsular cataract extraction (ECCE) for many reasons. Operation time is less. There

is small incision which results in shorter stay in hospital and early physical and visual recovery. Post operative astigmatism is also less. Tunnel incision provides a secure wound with rapid healing. AC is maintained throughout the procedure which allows better cortical cleanup and decreased incidence of PC rent. Even in case of PC rupture, vitreous disturbance is less because of closed chamber. There is decreased post operative reaction in phacoemulsification than in planned ECCE.

No surgery is without the risk of complications. Those like corneal oedema, iris trauma, sphincter damage, PC rent, vitreous loss, loss of nuclear fragments in vitreous and zonular dehiscence are more common in learning phase. With experience, good patient selection and precautions the incidence of complications decreases.

Radial tear formation and its extension is quite a common intra operative problem. This was seen in 5% of our cases. This can be minimized by keeping AC deep and tight with viscoelastic especially during later half of capsulorrhexis. A relatively common complication of cataract surgery especially during learning curve is PC rupture with or without vitreous loss. Our series had 3.45% of patients with PC rents without vitreous loss and 4.85% with vitreous loss. Commonly the rupture occurred as a result of direct damage to the capsule during phaco and secondly due to extension of radial tear. This can be avoided by keeping the capsulorrhexis directly under observation and doing the phaco in central 5-6 mm zone initially in the bag and then in iris plane with fully dilated pupil. Another reason for PC rupture is temptation to chase nuclear pieces. Nuclear fragments should be engaged by using high vacuum. It is important to be careful while sculpting the nucleus in the peripheral part as the nucleus is thickest in the centre and becomes thinner in periphery. Cruz et al<sup>6</sup> reported the incidence of PC rupture in 9.9% of 181 eyes, whereas Hasmani et al reported 8% of cases to be complicated by PC rupture<sup>7</sup>. We managed our cases by doing anterior vitrectomy and putting in 6.5 mm PMMA IOL over anterior capsule.

Another serious complication which haunts phaco surgeons is dislocation of nucleus or nuclear fragments into the vitreous. This happened in 6 of our patients and was managed by giving systemic and topical steroids with pressure lowering medicines. Two of our patients with nucleus drop were referred

to vitreoretinal surgeon. Tommica et al<sup>8</sup> and Gilliland and colleagues recommended early vitrectomy as it allows early restoration of vision, rapid resolution of uveitis and glaucoma<sup>9</sup>.

In this study our patients achieved visual acuity of 6/12 or better in 80.50 % of cases. When conditions decreasing BCVA were eliminated the corrected vision was 6/9 or better in 89% of patients. Hussain et al showed that 70% of their patients achieved VA of 6/12 or better<sup>10</sup>. Whereas in another series of 150 patients by Hashmani et al 89.3% of patients achieved VA of 6/12 or better<sup>7</sup>. Seward and colleagues did a study on 400 cases and the BCVA came out to be 6/9 or better in 83.6% of cases<sup>11</sup>. Our results are comparable and perhaps a little better than others probably because these studies were carried out during learning phase of phacoemulsification. Astigmatic changes in our cases range between 0 - 4.50 D, which is comparable to other studies<sup>12</sup>. Astigmatism is less with 3.25 mm incision for foldable IOLs. Because of high cost, most of our patients could not afford foldable IOLs.

Most common post operative complication was corneal oedema. This was also noted by Prince et al in their study<sup>13</sup>. To avoid this complication viscoelastic should be used more freely and frequently. Phaco should be avoided in AC to prevent damage to endothelium, and wound burn. Larger fragments of hard nucleus should not be allowed to touch the endothelium, so it is better to chop the nucleus into smaller pieces within the capsular bag and aspirate them with high vacuum. To prevent iris damage, it is important to have a fully dilated pupil. Careful tunnel construction can also prevent iris prolapse during the procedure and wound leakage after surgery.

During learning phase one should avoid surgery in deep sunken eyes, brunescant cataract and eyes with shallow AC (hypermetropic). The surgeon must avoid surgery with cloudy cornea in the beginning. Avoid phacoemulsification in semi dilated pupil. It is extremely important not to do any procedure blindly during any part the surgery. Lastly, in order to avoid problems it is important to understand all the features of the phaco unit completely. It would be better to write down all important points told by the technical staff regarding

phaco machine, and paste it close to the unit in the theatre.

## Conclusion

Our study reinforces this impression that phacoemulsification is much superior to planned ECCE. It is safer, more predictable and almost atraumatic procedure in experienced hands. It provides more patient as well as surgeon satisfaction.

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