

Phacoemulsification: Complications in First 300 Cases

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Purpose: To find out complications of phacoemulsification in our first 300 cases.

Material and Methods: Retrospective analysis of our first 300 cases of phacoemulsification was done. Operations were performed in different hospitals of city. After thorough examination and investigations, patients were operated. Most were operated under retrobulbar anaesthesia. First examination was on first post operative day and then followed up after one week, three weeks and eight weeks. Their operative and postoperative complications were analysed.

Results: Posterior capsular rupture was the most common intraoperative complication in our initial cases. Corneal edema on first postoperative day was significant problem and because of this vision on first post operative day was low in most of our initial cases. After three weeks the vision was 6/12 or better in 83% of cases.

Conclusion: Complications rate in initial learning curve was higher, which was dissatisfying for both surgeon and patients. Better outcome was achieved with more experience and adopting better techniques.

In the era of modern cataract surgery phacoemulsification is most demanding procedure by cataract patients and similarly patients' expectations are also high about the out come. To stay in practice it is becoming essential to learn the art and science of phacoemulsification as once stated by Durrani J "We must not succumb to inertia and stay static or else the world will pass us by"¹.

In this study we retrospectively evaluated our first 300 cases of phacoemulsification to find out various complications.

METHODS AND PATIENTS

We started after proper wet lab. Operations were done in different hospitals of the city on company and private patients. Phacoemulsifications done in free eye camps are not included in this study.

Complete thorough eye examination was done. Routine laboratory investigations were done. In all patients I/V cannula was passed before operation. After all aseptic precautions operation was started. In majority of patients retrobulbar anaesthesia was given. Facial block was given in 15.7% of cases (Table 1). Superior rectus suture was given in 34% of cases. Pupils were dilated with tropicamide 1% and phenylephrine 10% eye drops.

Three step tunnel incision was given at about 11 O' clock position with 3.2 mm keratome. Anterior chamber was filled with methylcellulose 2%. Capsulorhexis was done in all cases by bent 27G needle. Capsulorhexis was not central and circular in few cases. Side port was made with 15 degree knife and in few cases with No.11 knife. Peritomy was done at incision site. Hydrodissection was done in 99% of cases and in few cases especially with posterior subcapsular cataract hydrodelineation was also done.

Bimanual phacoemulsification technique was used in all cases. Machine parameters were set at two memories. At first setting phaco power was 70%, vacuum at 30mm of Hg and flow rate at 25mm, after sculpting and nucleus division, vacuum was changed to 70mmHg keeping same phaco power and flow rate. The remaining lens matter was removed and aspirated by Simco I/A cannula. The anterior chamber and bag were refilled with methylcellulose 2%. The incision was enlarged by 5.2 or 5.5 mm keratome. In few cases the enlargement was done by No 11 knife. In about 85% cases phaco PMMA intraocular lens (IOL) were implanted in the bag. In few patients we were not sure about position of superior haptic whether it was in or out of bag. Where there was large posterior capsular break, larger optic IOL was implanted in the sulcus.

In few patient miosis was achieved by intracameral injection of miotics. One or two 10/0 nylon sutures were given at phaco port in 75% of cases.

Subconjunctival antibiotic gentamycin 40 mg and steroid dexamethasone 2 mg injections were given. These injections were not given in topically anaesthetized patients. No pad and dressing was done in topically anaesthetized patients after operation. Patients were followed in OPD on next day, after one week and then after four weeks and two months. Average follow up was of 2 years.

RESULTS

Patients were operated in different hospitals of city. On first post operative day the vision was less than 6/60 in majority of patients (Table 2) and was 6/12 and better in majority of patients (Table 3) after three weeks. The complications were analysed as occurred during operation (Table 4) and those faced after the operation (Table 5). The commonest intraoperative complication was posterior capsular rupture. Corneal edema was present in 61.7% of cases, which was the main cause for reduced vision on first post operative day.

DISCUSSION

Surgeons' main concern is minimal operative and post operative complications. The complications correlate themselves with the surgeon experience². We faced problems in the initial phase of conversion to the phacoemulsification till we became experienced in that procedure. In this study we have analysed our complications in phacoemulsification cases.

Anaesthesia

Retrobulbar anaesthesia was the commonest technique for this procedure we adopted. In few cases the experience of topical technique was very bad. In only 16% of cases facial block was given and there was no problem without facial block.

Post operative Vision

The main concern of the patient is their vision in first few days after operation. Other wish of patients is to have 6/6 vision without glasses. In our initial cases this patients' concern was very upsetting as vision was not good in first few days postoperatively. (Table 2). The main reason was corneal edema and striate keratopathy in early post operative period. As the cornea cleared the vision improved in majority of the cases (Table 2) which is comparable to the other studies^{3,4}.

Table 1: Type of anaesthesia

| Type | No of cases n (%) |
|--------------|-------------------|
| Peribulbar | 75 (25) |
| Retrobulbar | 179 (45) |
| Topical | 46 (30) |
| Total | 300 (100) |
| Facial block | 47 (15.67) |

Table 2: Vision on 1st postoperative day

| Snellen's vision | No of cases n (%) |
|------------------|-------------------|
| 6/12-6/6 | 53 (17.67) |
| 6/60-6/18 | 83 (27.67) |
| CF-6/60 | 159 (53) |
| <CF | 5 (1.67) |
| Total | 300 (100) |

CF= Counting finger

Table 3: Post-operative vision after three weeks

| Vision | No of cases n (%) |
|-----------|-------------------|
| 6/12-6/6 | 251 (83.67) |
| 6/60-6/18 | 37 (12.33) |

| | |
|------------------------------|-----------|
| CF-6/60 | 7 (2.33) |
| <CF | 3 |
| No perception of light (NLP) | 2 (0.67) |
| Total | 300 (100) |

NLP= No perception of light

Table 4: Complications during operation

| | No of cases n (%) |
|--------------------------------|-------------------|
| Corneal abrasion | 48 (16) |
| Long tunnel incision | 7 (2.3) |
| Iris prolapse | 11 (3.7) |
| Iris damage | 28 (9.3) |
| Descemet's membrane detachment | 3 (1) |
| Subconjunctival haemorrhage | 35 (11.7) |
| Hyphaema | 6 (2) |
| Corneal hydration | 7 (2.3) |
| Conjunctival chemosis | 12 (4) |
| Posterior capsular rupture | 49 (16.3) |
| Nucleus drop | 2 (0.7) |
| Nucleus fragments | 4 (1.3) |
| Machine problem | 3 (1) |
| Conversion to manual ECCE | 5 (1.6) |

Table 5: Complications after operation

| | No of cases n (%) |
|---|-------------------|
| Transient corneal edema and striate keratopathy | 185 (61.67) |
| Uveitis | 8 (2.67) |
| Endophthalmitis | 2 (0.67) |
| Decentration of IOL | 6 (2) |
| Bullous keratopathy | 1 (0.33) |
| Iris atrophy | 39 (13) |

Corneal abrasion and damage

For incision, 3.2 mm keratomes were used and eye was fixated by corneal forceps at 180 degree from incision site. In few cases corneal damage was with keratome. That was healed in 24 hours and post operatively there was no problem.

Long tunnel incision was developed in 2.3% of cases. Descemet's membrane detachment was developed in 4% of cases of Popiela G et al⁵. In our cases detachment of descemet's membrane was noted in 1% of cases. The cause was direct mechanical damage by the chopper and in one case by phaco tip.

Corneal hydration was one of the complications, which occurred in those cases where the incision tunnel was longer. The major problem with this complication was decreased visibility through hazy cornea.

Subconjunctival haemorrhage

Subconjunctival haemorrhage developed especially at site of fixation of globe by forceps. In few cases the haemorrhage was large to make the eye ball red and angry looking. It took few days to weeks to clear. Usually if the vision was good the patients were not very much worried about the redness but in those cases where redness was with corneal edema and decreased vision, these patients were difficult to handle.

Iris damage, chewing and prolapse

Iris prolapsed during surgery was the problem in those posterior incisions in which three or two step tunnel was not achieved and the keratome went directly in to the anterior chamber at phaco tip incision or side port incisions.

In 9.3% of our cases there was damage to the iris either by phaco tip or by the chopper. This developed in those cases where pupil was not fully dilated and when there was iris prolapse through incision site. Other phaco surgeons also reported this problem with the rate ranging from 2% to 7.5%^{6,3,7}. They also had iris damage because of poor pupillary dilatation. Popiela G et al had iris damage in 4% of their cases⁵.

Posterior capsular rupture

Posterior capsular rupture was the commonest operative complication in our study. When we recalled the incidence of posterior capsular rupture in our cases where we did ECCE, it was very low. In our

initial cases of phacoemulsification, this rate was high upto 13%. It occurred in different stages of phacoemulsification procedure. This was mainly because of the lack of knowledge of the phacodynamics and machine parameters. In the initial learning curve of the phacoemulsification, other colleagues also faced posterior capsular rupture as major complication^{3,7-10}. In most of their cases they had this problem while chasing the nuclear fragments and hitting the rhexis rim. Posterior capsular rupture occurred in 7% to 9 % of cases in different studies^{3,6,8}. In 400 phacoemulsification operations capsular tear occurred in 6.3 % of cases of Seward et al¹¹. Rate was 9.9% in Cruz et al cases¹². In Juneijo study posterior capsule rupture rate was 4.5 %⁷. In one study posterior capsular rupture rate was 4% in supervised and 15% in unsupervised surgeries¹³.

In those patients where we had posterior capsular rupture majority had vitreous and loss prolapse. Hashmani had vitreous loss in all posterior capsular rupture cases³. In Juneijo study out of the 4.5% of posterior capsular rupture cases vitreous loss was in only 1% of cases⁷. Out of 6.3% posterior capsular rupture, vitreous loss occurred in 1.5% of cases of Seward et al¹⁰. Incidence of vitreous loss was 14.7% in study of Allinson et al¹⁴. When there is posterior capsular rupture, early recognition and proper management would decrease the risk of vitreous loss.

Nucleus, its fragments and cortex drop in vitreous

Nearly all phaco surgeons faced the problem of nucleus drop in their learning phase. Rate of nucleus drop into vitreous ranged from 0.25% to 0.79% mentioned by national and international surgeons in their initial cases of phacoemulsification^{2,3,7,10}. In one study analysis was done for incidence of complications and visual outcomes in the initial 70 phacoemulsification procedures performed by first two residents learning phacoemulsification, both were experienced in standard manual ECCE. No nuclei were lost into the vitreous⁴.

Nucleus drop was the problem, which developed in 0.67% of our cases. This is the complication in which patients faced problems. We referred these cases to vitreoretinal surgeons for proper management.

In 1.33% of cases of posterior capsular rupture, nucleus was removed successfully but cortical and small fragments of nucleus, dropped in the vitreous were managed conservatively.

Corneal edema and striate keratopathy

Corneal edema is the second most common complication of phacoemulsification which cleared within one to two weeks^{3,7}. It was between 4% to 7% in different series during learning phase of phacoemulsification procedure^{2,3,4,15}. It was also fairly high 20% in one study by Popiela G et al⁵.

The incidence of this complication was high in our cases on first post operative day, which took about 2-3 weeks to clear. This period, till the clearance of corneal edema and improvement of vision, was very much annoying for the patients. The main reason for this high rate was that we did phacoemulsification in pupillary area or slightly above in anterior chamber because of fear of damaging the posterior capsule, which might have caused increased endothelial cell damage and loss. In one study the risk factors for endothelial cell loss after phacoemulsification cataract surgery performed by a junior resident were assessed. The mean overall endothelial cell loss was 11.6%. They found different factors significantly associated with endothelial cell loss on univariate analysis. Multivariate analysis identified a grade 3 nucleus (severely dense) and long absolute phaco time as independent predictors for endothelial cell loss, with longer absolute phaco time being the stronger predictor¹⁶. Phacoemulsification in the capsular bag by directing probe away from the corneal endothelium and keeping the lens fragments at deeper plane are the measures which would be helpful in minimizing the chances of corneal edema and striate after phacoemulsification as suggested by Zetterstrin C¹⁷.

IOL decentration and dislocation

The most significant complication of posterior capsule disruption during phacoemulsification is the inability to implant an intraocular lens¹⁸.

In our posterior capsular rupture cases we implanted IOLs in the sulcus. We got IOL decentration in 2% of cases and IOL dislocation in 0.7% of cases.

Uveitis

Mild to moderate uveitis occurred in 2.67% of our cases. They were managed conservatively. This was in the form of fibrin exudation in 1.18% to 2% of cases in different series^{2,5}. Only 0.7% of our cases developed severe endophthalmitis and vision was NPL. Endophthalmitis developed only in cases where cortex or nucleus fragment dropped in the vitreous.

Endophthalmitis developed in 0.59% of cases of Gavris M et al².

Conversion to ECCE

In 1.67% of our initial 300 cases we converted to ECCE and by radial incision in rhexis. nucleus was delivered. It was difficult to extend the incision to deliver the broken nucleus pieces especially in cases of topically anaesthetized patients.

CONCLUSION

Phacoemulsification is good technique for cataract extraction though in our initial cases few complications were higher than others surgeons. Corneal problems can be decreased by doing chopping and phacoemulsification in the bag and keeping the phacotip away from the cornea. In order to avoid iris damage pupillary dilatation is important. We think that in order to minimize complications during and after phacoemulsification we should start phacoemulsification after wet labs and perform initial surgeries under supervision. Beginner should attend workshops for phacoemulsification surgery.

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Glaucoma and Cataract Management

1. Combined surgery is safe in experienced hands.
2. Cataract extraction first followed by filtration surgery. If filtration is done first followed by cataract extraction

the post operative reaction after cataract extraction has a tendency to compromise the already functional filtration bleb.

Prof. M Lateef Chaudhry