



RESEARCH ARTICLE

COMPARATIVE STUDY BETWEEN PHACOCAPSULOTOMY AND NEEDLE ASPIRATION IN
PHACOEMULSIFICATION OF WHITE INTUMESCENT CATARACT

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ABSTRACT

Purpose: To evaluate the phacocapsulotomy technique for management of capsulorhexis in white intumescent cataracts regarding safety and effectiveness in comparison with needle aspiration.

Methods: This prospective study included 100 patients with white intumescent cataracts. Patients were randomized into two groups comprising 50 each. Group I underwent phacocapsulotomy technique to facilitate CCC, where phaco probe is used to decompress the lens. Group II underwent needle aspiration technique to facilitate CCC, where 26 gauge needle is used to aspirate cortical fluid. Intraoperative variables such as flap elevation, radial extension of CCC, centration of CCC, posterior capsule rupture and vitreous loss were assessed. Postoperative best corrected visual acuity was also assessed.

Results: In our study we found that 1(2%) patient out of 50 patients who underwent phacocapsulotomy technique had radial extension of CCC compared to 8(16%) out of 50 patients in needle aspiration group which was statistically significant ($p=0.04$) and also there was decrease in intralenticular pressure noted in 44(88%) in phacocapsulotomy group and 26(52%) in needle aspiration group which was statistically significant (p value= 0.03).

Conclusion: Phacocapsulotomy technique is a simple, controlled and effective technique that extends the possibility of routinely achieving a CCC and thus prevent radial extension of CCC. It also allows for safe phacoemulsification and well centered in the bag IOL implantation.

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INTRODUCTION

Phacoemulsification has become the standard technique for cataract surgery. No step in contemporary cataract surgery is as important as the anterior capsulorhexis. (Bhattacharjee *et al.*, 1999) White intumescent cataract constitutes a significant volume of the cataract surgical load in our practice. Continuous curvilinear capsulorhexis (CCC) can be difficult in these eyes because of compromised red reflex and high intralenticular pressure. Hence the rhexis has an inherent tendency to run out to the periphery, when this occurs the appearance of the stained blue anterior capsule beside the white cataract mimics the blue-white-blue pattern of the Argentinean flag and was named the Argentinian Flag Sign.

Various strategies have been described in the literature to achieve stable rhexis in these situations. The aim of this study was to present and evaluate the phacocapsulotomy technique for management of capsulorhexis in white intumescent cataracts regarding safety and effectiveness in comparison with needle aspiration.

Patients and Methods

This prospective study comprised of 100 patients with white intumescent cataracts undergoing phacoemulsification with posterior chamber IOL implantation during the period December 2013 and July 2015. The exclusion criteria were corneal opacity, glaucoma, retinal abnormalities, zonular dialysis and preexisting significant co-morbidity. Preoperative examination included visual acuity by Snellen chart, detailed slit lamp evaluation, applanation tonometry, B-scan, keratometry, axial length measurements. The selected patients were randomly divided into two groups. 50eyes in group I

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underwent phacocapsulotomy and the other 50 eyes in group2 underwent needle aspiration followed by capsulorrhexis. The initial steps are identical to a cataract extraction in which capsular stain is used this includes creating a paracentesis, using a capsular stain, injecting highly cohesive and/or dispersive OVD, and creating a main wound. In group1, the phacoemulsification tip was introduced in non irrigating mode with bevel of the tip facing upwards as it facilitated easy removal of liquefied cortex and underlying nucleus, directed in a downward angle towards the centre of anterior capsule. The settings on the phacoemulsification machine was in the sculpting mode, with no phacoemulsification power but, low vacuum, and moderate aspiration. When the foot pedal of the phacoemulsification unit was depressed, irrigation and aspiration was introduced at a steady rate. Subsequently, the anterior capsule was punctured with the phaco tip, introduced into the lens and milky cortex was quickly aspirated into the handpiece. Next the phaco tip was further embedded into the nucleus to sculpt it and further remove the milky cortex. Then using a capsulorrhexis forceps, a leaflet of the anterior capsule was grasped and capsulorrhexis was completed in a curvilinear fashion.

In group2, 26 gauge needle was used to puncture the intact anterior capsule and the liquefied cortex was aspirated which depressurized the lens and the CCC was carried out. Intraoperative variables were observed by the surgeon including, flap elevation, radial extension of CCC, centration of CCC, posterior capsular rupture and vitreous loss. All surgeries were performed by a single surgeon with stop and chop phacoemulsification technique. A central groove was made in the centre of the nucleus with the phaco tip until the red reflex start to appear. The nucleus was divided into two halves. Then each half is chopped into small pieces and emulsified. Aspiration of the cortex was done by bimanual I/A pieces. Insertion of foldable acrylic one piece IOL was done using a disposable spring loaded injector. Postoperative treatment included antibiotic eye drops (Moxifloxacin) four times per day for 10 days and steroid eye drops (Prednisolone acetate 1%) tapered over four weeks.

Statistical Analysis

1. Data was be analysed using the statistical program for social sciences (SPSS) software.
2. A probability value (p value) <0.05 was considered statistically significant.

RESULTS

This study included 100 eyes of 100 patients with white intumescent cataracts. The data for 100 patients were available for statistical analysis regarding the intraoperative variables and follow up period. Regarding the demographic data there was no statistically difference between the two groups. The surgeon observed that flap elevation was observed in all patients (100%) in group I and only 46(92%) patients in group II, which was not statistically significant (p =0.117). We see that extension into periphery was seen in 1(2%) patient in group I and 8(16%) patients in group II with p value 0.041 which was statistically significant. 44(88%) patients in group I

had centration of capsulorrhexis while only 41 patients in group II had, with p value 0.401 which was not statistically significant. Decrease in intralenticular pressure was observed in 44(88%) patients in group I and 26(52%) patients in group II which was statistically significant (p=0.037). There was 1(2%) posterior capsule rupture observed in group I and 3(6%) in group II which was not statistically significant (p value = 0.617). Vitreous loss was not observed in Group 1 but 1(2%) patient had in group II (p value=1%), which was not statistically significant. Corneal edema was observed in 3(6%) cases in group I and 5(10%) cases in group II (p value=0.715), which was not statistically significant. Four (8%) patients in group I and 6(12%) patients in group II had iritis with p value 0.505 which was not statistically significant. Also postoperatively there was rise in IOP in 2 (4%) patients in group I and 4 (8%) patients in group II (p value = 0.625), which was not statistically significant.

Table 1. Intraoperative Complications

Intraoperative complications	Group I (n=50)		Group II (n=50)		P value
	No	%	No	%	
Flap elevation	50	100.0	46	92.0	0.117
Extension into periphery	1	2.0	8	16.0	0.041
Centration of capsulorrhexis	44	88.0	41	82.0	0.401
Decrease in intralenticular pressure	44	88.0	26	52.0	0.037
Posterior capsule rupture	1	2.0	3	6.0	0.617
Vitreous loss	0	0.0	1	2.0	1.000

DISCUSSION

Phacoemulsification is traditionally considered as challenging in patients with white intumescent cataracts. The challenge is said to stem from the difficulty in accomplishing an intact rhexis in these cases. The intumescent cataract has large amount of liquefied cortex which elevate the pressure inside the capsular bag more than the anterior chamber. During attempt to open the anterior capsule the tear may go rapidly towards the periphery with difficulty in maintaining CCC. Many surgeons have tried different techniques to make CCC easy and predictable.

Christopher C Teng has described phacocapsulotomy technique as an effective technique to debulk the lens and remove the impetus for the argentinian flag sign to occur. The main complication that he encountered using this technique was wound burn which occurred when phaco tip embedded immediately into the nucleus and occluded leading to interruption of aspiration. He also suggested that wound burn could be effectively countered by pulsing the footpedal upon entry of the phaco tip or by using the burst mode. (Teng, 2013)

Mahalingam P concluded that phacocapsulotomy as a safe and effective technique which prevents sudden extension of capsulorrhexis by depressurizing the intralenticular pressure and debulking the lens. Furthermore he also suggested that this technique also prevented the spontaneous peripheral migration of the capsulorrhexis edge, thus reducing the concurrent complications. (Mahalingam and Sambhav, 2014)

Guimbel and associates analyzed 2,967 consecutive cataract cases in a prospective observational study of the incidence of

intumescent cataracts and showed that 45.45% of the needle aspiration groups had leakage of the liquefied cortex; in addition, the surgeon detected high intracapsular pressure in at least 61% of cases in the needle aspiration group. Gimbel and associates revealed that 11.7% of intumescent cases had anterior capsule tears during the first capsulotomy. (Gimbel and Willerscheidt, 1993) In a retrospective study of 212 consecutive patients with white cataracts, Chakrabarti *et al.* showed incomplete capsulorhexis in 28.3% of cases, a posterior capsular tear in 1.9% of cases, and the conversion to a manual non-phacoemulsification technique in 1.9% of cases, using needle aspiration technique. (Chakrabarti and Singh, 2000) Vasavada *et al.* examined 60 eyes (60 patients) with senile white mature cataracts in which a small capsulorhexis was attempted initially, and endophacoemulsification was performed. The capsulorhexis was enlarged before intraocular lens implantation. In that series, CCC was achieved in 57 eyes (95%); in addition, the intracapsular pressure rose in 24 eyes (40%). (Vasavada *et al.*, 1998) Kara junior *et al.* in their study showed in needle aspiration, discontinuity of capsulorhexis occurred in 30% of cases. CCC was achieved in 53.80% of cases, and the intracapsular pressure was judged to be increased in 45.16% of cases using needle aspiration technique. (Kara-Junior *et al.*, 2009)

A prospective randomized study where needle aspiration technique in intumescent cataract was studied revealed that high intracapsular pressure was noticed in 66% of cases. During CCC, there was more tendency of the edge of the capsule to go peripheral in 18 cases (60.0%). Centralisation of the capsulorhexis was found in (86.6%). (Abdel Rahman El-Sebaey Sarhan, 2011) The higher success rate achieved for CCC using phacocapsulotomy technique is assumed to result from controlled aspiration and increased safety when compared to needle aspiration technique. The two major limitations of our study are the small sample size and the fact that the observer was not masked for a subjective analysis.

Conclusion

In conclusion, phacocapsulotomy technique is a simple, controlled and effective technique that extends the possibility of routinely achieving a CCC and thus preventing argentinian flag sign. It also allows for safe phacoemulsification and well centered in the bag IOL's inspite of increased intralenticular pressure if guidelines adopted in this study are adhered to.

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