Original Article

Effect of Hydroxypropylmethylcellulose as Compared to the Technique of Hydro-implantation of Intraocular Lens During Phacoemulsification on Post Operative Intraocular Pressure.

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ABSTRACT

Objective: To compare the effect of hydroxypropylmethylcellulose as compared to the technique of hydro-implantation of intraocular lens during phacoemulsification on post operative intraocular pressure.

Methodology: This prospective interventional study included 90 patients who were divided into two groups A & B. All patients underwent routine phacoemulsification with intraocular lens implant. In group A, lens was implanted after inflating the capsular bag with hydroxypropylmethylcellulose where as in group B, the technique of hydro-implantation was used. Pre operative and post operative intraocular pressure was measured and compared. Results were considered significant when p-value was < 0.05.

Results: In Group A, the difference in pre and 24 hours post operative intraocular pressure was statistically significant (p-value 0.028) whereas in Group B, the difference was not statistically significant (p-value 0.67). Also there was statistically significant difference in the 24 hours post operative intraocular pressure between Group A and B (p-value 0.036). At one week post intervention, there was no statistically significant difference between post operative intraocular pressure of Group A and B (p-value 0.39).

Conclusion: Hydro-implantation does not result in the spike of intraocular pressure as observed in the first 24 hours post phacoemulsification as compared to implantation of intraocular lens using hydroxypropylmethylcellulose.

Keywords: *Intraocular pressure. Hydroxypropylmethylcellulose. Phacoemulsification. Intraocular lens.*

INTRODUCTION

Ophthalmic Viscosurgical Devices (OVDs) have become an essential tool for successful cataract surgeries and have been used in routine for a long time now with good results.[1,2] The concept of OVDs sprouted in 1934 when Karl Meyer and John Palmer of Columbia University, NY separated a substance from cow's vitreous. It was called "Hyaloronic acid" as it was composed of uronic acid and was sourced through hyaloid. After decades of efforts of Endre Balazs, hyaloronic acid reached a point of purity that it was considered safe for human use and suggested the possibility of safe ophthalmic surgical use.

OVDs have been classified into dispersive and cohesive varieties based on their different physical properties.[3] Dispersive OVDs have the tendency to disperse when used intraocularly; thus making them less likely to maintain intraocular space but it makes them good candidates for coating surfaces. On the other hand, cohesive OVDs are good at maintaining spaces. Also, dispersive OVDs are difficult to remove from anterior chamber and cohesive OVDs are easier to remove.[4] An ideal OVD should protect the delicate internal structures of eye during surgery and also should be removed easily at the end of surgery by irrigation and aspiration. It has been shown that residual OVDs have the tendency to clog trabecular meshwork and give rise to transient intraocular pressure (IOP) spike during post operative period.[5] This IOP spike can some times be severe enough to warrant the use of topical or systemic pressure lowering drugs.[6]

The surgeon may choose to use an OVD which is easier to remove after surgery combining with the properties dispersive OVDs. There are OVDs with dual properties like DisCoVisc (Alcon) which harbour the combined properties and advantages of both dispersive and cohesive OVDs.[7] Also, the surgeon may use different cataract surgery techniques like "soft shall technique" where advantages of both types of OVDs can be benefited from.[8,9]

As an alternative to above mentioned strategies to avoid post operative spike in IOP, a technique called "hydro-implantation' can be employed to avoid the use of OVD at the time of intraocular lens (IOL) implantation. In this technique, the IOL is implanted under continuous irrigation by Simcoe cannula which is inserted in the eye through one of the surgical ports.

The aim of this study was to evaluate the effect of conventional OVD and hydro-implantation on post operative rise in IOP.

METHODOLOGY

This comparative, prospective interventional study was

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conducted at Sharif Medical City Hospital and Al-Ehsan Welfare Eye Hospital from October 2015 to December 2015. All patients involved in this study signed an informed consent document. Approval of this study was taken from Hospital Ethics committee. All surgeries were performed by a single experienced consultant.

Inclusion Criteria:
Age 50 years onwards, male or female, senile cataract, open angles.

Exclusion Criteria:
History of trauma, glaucoma, steroid use, complicated ocular surgery.

Ninety patients were selected after meeting inclusion and exclusion criteria and were randomised in 2 groups A & B (45 patients in each group) using random number table. Pre operative IOP was measured 1 day before surgery using applanation tonometer. All surgeries were performed under local peribulbar anaesthesia. All patients were implanted acrylic hydrophilic intraocular lens through an incision of 2.75 mm after performing standard phacoemulsification. Surgeries with any untoward events like posterior capsular breach, vitreous loss, iris trauma or prolonged post operative inflammation were excluded from the final analysis and new patients were recruited in the study.
In all the surgeries, all the surgical steps were similar except in Group A, IOL was implanted in capsular bad after inflating the anterior chamber (AC) with 2% Hydroxypropyl methylcellulose (HPMC). After implantation of IOL, complete removal of HPMC was attempted with Simcoe cannula taking special care to remove HMPC from capsular bad and from anterior chamber angle. In case of Group B, IOL was implanted in the capsular bad while maintaining AC with irrigation through Simcoe cannula inserted through one of the surgical ports (Figure 1). There was no need of washing the AC afterwards.

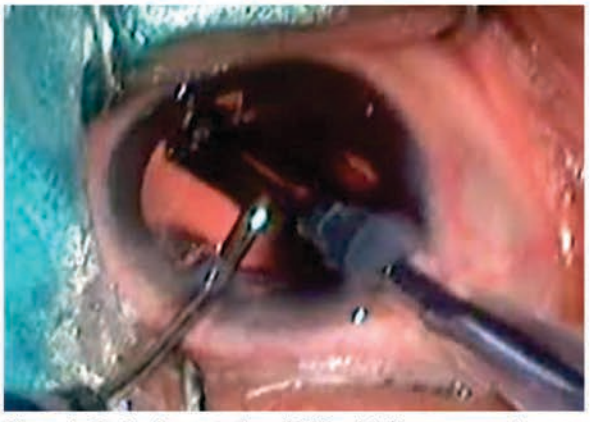

Figure 1: Hydro impantation of IOL with Simcoe cannula

In both groups, surgeries were completed in standard manner and were prescribed standard post operative topical and systemic medications. IOP was measured 24 hours and 7 days after surgery via standard applanation tonometry.
Statistical analysis of data was performed using SPSS software version 20.0. Student t-test was used for comparison between groups and comparison of IOP before and after surgeries. A p-value <0.05 was taken as statistically significant.

RESULTS

In Group A (45 patients), 24 (53.3%) patients were male and 21 (46.6%) were females. In Group B, 27 (60%) were male and 18 (40%) were female patients. Group A had patients ranging in age from 54 to 77 years (Mean/SD 63.23+/-6.5) years and Group B had age range of 51 to 82 years (Mean/SD 66.86+/- 5.66).
There was no statistically significant difference in pre operative IOP of Group A and B. In Group A, the difference in pre and 24 hours post operative IOP was statistically significant (p-value 0.028) where as in Group B, the difference was not statistically significant (p-value 0.67). Also there was statistically significant difference in the 24 hours post operative IOP between Group A and B (p-value 0.036). At one week post intervention, there was no statistically significant difference between pre operative and post operative IOP of both groups and between post operative IOP between Group A and B (p-value 0.39). Two patients in Group A needed topical pressure lowering medications for reducing IOP to base line. At the end of one week followup, nearly all the patients in both groups had their respective IOP returned to preoperative values.

DISCUSSION

Surgeons have described many techniques for adequate removal of OVD from eye during the concluding steps of phacoemulsification.[10] But, sometimes it becomes difficult to remove the OVD completely from the eye especially from the AC angle and behind the IOL. Studies have also shown that incomplete removal of any type of OVD results in post operative spike of IOP.[11,12]
In our study, we used the novel technique of hydro implantation of IOL instead of using OVDs to inflate the AC. The technique turned out to be very effective in controlling post operative IOP spike and also helped in saving surgical time. We encountered no untoward complications during or after surgery. Our technique was similar to Tak where he used Simcoe cannula with continuous irrigation to stabilise the AC and implantation of IOL. He also reported excellent results and minimal complications during and after the use of this technique.[13]

The strength of our study was good sample size and single surgeon operating all the cases. Also we had a control group where conventional OVD assisted IOL implantation was carried out. The weakness of this study was lack of specular microscopy to evaluate corneal endothelial health after hydro-implanntaion of IOL.

CONCLUSION

We can safely advocate the technique of hydro-implantation of IOL during routine phacoemulsification procedure. This technique avoids any post operative spike in IOP and also reduces surgical time and cost of surgery. This technique has a minimal learning curve and can be easily adapted by most of the experienced cataract surgeons.

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