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COMPARISON OF VISUAL OUTCOME AND COMPLICATIONS IN TWO DIFFERENT TECHNIQUES OF SCLERAL FIXATED INTRAOCULAR LENS IMPLANTATION

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ABSTRACT
Aim: To compare the visual outcome and complications in scleral fixated intraocular lens implantation by using ab externo two point fixation technique and true knotless technique. Setting: Eye department, NKP Salve Institute of Medical Sciences and Lata Mangeshkar Hospital. Design: Retrospective, comparative study. Methods: A consecutive series of 40 scleral fixated intraocular lens(IOL) surgeries using ab externo two point fixation technique and true knotless technique from July 1, 2014 to December 31, 2015 was analyzed. Main outcome measures included the best corrected visual acuity (BCVA) and post-operative complications. Results: There were 19 eyes in the ab externo two point fixation group and 21 eyes in the true knotless group. At last follow up (5 months), there was no statistically significant difference in the BCVA of the two techniques. Complications like IOL tilt (p= 0.13) and raised IOP (p=0.51) were also comparable in both the techniques. Conclusion: The visual outcomes in eyes that underwent ab externo two point fixation technique and true knotless technique were similar at the end of 5 months and the complications were also statistically insignificant.

KEYWORDS: aphakia, scleral fixation, true knotless technique, complication.

INTRODUCTION
Cataract surgery has improved radically from the first mentioned method of treatment of cataract by couching. The first written history of couching comes from Sushruta, an ancient Indian surgeon during 800 BC.[1] Major breakthroughs in cataract surgery include the first successful intracapsular cataract extraction by Sharp in 1753, implantation of the first IOL by Ridley in 1949 and introduction of phacoemulsification by Kelmen in 1967. The most dreaded intra operative complication is a posterior capsular tear. For many years anterior chamber (AC) intraocular lenses (IOLs) have been an established method of IOL implantation in those eyes with deficient posterior capsules.[2] But they have also been the cause of explantation of IOLs in the past two decades because of complications like corneal decompensation and glaucoma.[3,4] Thus techniques to fixate an IOL in an aphakic eye has constantly been improvised. Suturing a PCIOL to the iris is another option and is also technically easy but inability of pupillary dilatation is a big drawback.[5]

Scleral fixated IOL (SFIOL) is a safe and effective option for the visual rehabilitation of an aphakic eye with inadequate posterior capsule support. Different techniques have been evolved for SFIOL. The purpose of this study was to compare the visual outcomes in ab externo two point fixation technique and true knotless technique.

MATERIALS AND METHODS
This study was approved by the institutional board. Patients of age 40 and above, either sex and patients without posterior capsular support were included in the study.Patients with a follow up period of less than 5 months were excluded.

Preoperative ocular evaluation included uncorrected distance visual acuity (UDVA), spectacle-corrected distance visual acuity (CDVA), intraocular pressure (IOP) using noncontact tonometry, slit-lamp biomicroscopy, dilated fundus examination, gonioscopy, fundus photography, and clinical slit-lamp photography.

Post operative BCVA and Intra operative and post operative complications was noted and follow up was done on post-operative day 1,3 and 7 and then after 1 month,3 months and 5 months.

All patients were started on topical antibiotics, cycloplegics and steroid eye drops which were tapered over a period of 6 weeks.

Post- operative visual acuity was the main outcome measure and complications like hyphema, secondary glaucoma, IOL tilt or dislocation, suture erosion, macular edema, vitreous hemorrhage or incarceration, endophthalmitis, etc were noted as the secondary outcome measures.

The surgical steps of the two techniques used were as follows:

1. Ab externo two point fixation with scleral flaps.

- A superior conjunctival peritomy is fashioned from 4 to 10 o'clock.
- Triangular scleral flaps 3 mm high by 2mm wide are fashioned at 4 and 10 o'clock.
- A 5.5 mm corneoscleral wound is made followed by anterior vitrectomy.
- A straight needle attached to a10-0 polypropylene suture is passed through the bed of a scleral flap 1.5mm posterior to the limbus in a direction parallel to the iris, until its tip is visualized through the pupil.
- A 26-G hollow needle passed through the opposite scleral bed is used to retrieve the straight needle, via its barrel. The needle is then pulled out leaving the suture traversing the eye.
- A sinsky hook is used to pull out a loop of this suture out through the superior corneoscleral wound.
- This loop is cut, with one end tied to the superior haptic and the other to the inferior haptic of the IOL.
- The IOL is inserted into the ciliary sulcus and the sutures gently pulled to secure the position of the lens.
- A second 10-0 polypropylene suture is used to take a bite just anterior to the original suture's exit within a prepared scleral bed and is tied to the lens- fixing suture.
- This is repeated at the other scleral bed.
- The scleral flaps and conjunctival peritomy are closed.

2. True knotless technique

-A scleral tunnel incision centered at 12 o'clock position, with the width of 6-7 mm is made.
- A double-armed polypropylene suture with straight needle is used.
- One straight needle is passed perpendicularly through the full thickness scleral, 1.5 mm behind the limbus at 3 o'clock position in a direction parallel to the iris, and is retrieved in the hollow of a 26-G needle on the opposite side.
- The stretched suture is pulled out of a previously made corneoscleral wound at12 o'clock.
- After cutting the sututre in the centre it is passed through the eyelets in the two haptics of the IOL
- The sutures are then pulled to secure the IOL
- The wound is closed with 10-0 nylon
- The needle of the 10-0 prolene suture is then bent and 'Z' shaped intrascleral passes with atleast five indentations are made.
- The suture is then cut without making any knot and covered with conjunctiva

RESULTS

There were 19(47.5%) eyes in the ab externo two point fixation group and 21(52.5%) eyes in the true knotless group. The most common indication of scleral fixated IOL was posterior capsule rupture during cataract surgery (32/40[80%]). The median age was 65 years and 67 years in the ab externo and true knotless techniques respectively. The patients were categorized into 3 subgroups according to their visual acuity, viz <6/60, 6/60-6/24 and >6/24, in both the groups(Table1). The pre- and post –operative visual acuity was not statistically significant in the two techniques in each subgroups (p> 0.05).

Complications (Table2) occurred in 7(36.8%) patients in the ab externo technique and 7(33.3%) patients in true knotless technique.IOL tilt was seen in 2 (10.5%) patients in the ab externo technique while it was seen in 0(0%) patients in true knotless technique, hence was statistically insignificant(p=0.13). Similarly complications like vitreous hemorrhage, pupil distortion, raised IOP, astigmatism and CME were comparable in the two techniques. Complications like endophthalmitis, hypotony, retinal detachment or spontaneous dislocation of the IOL caused by breakage of the polypropylene sutures during follow-up were not seen.

Table1 statistical comparison of visual acuites between the two groups.(Chi square Mc newar test)

V/A	Ab externo two point fixation technique	True knotless technique method	p
Pre –op vision <6/60	10	12	
Post–op vision <6/60	6	3	
			0.97
Pre- op 6/60- 6/24	7	8	
Post-op 6/60- 6/24	6	7	
			0.18
Pre-op >6/24	2	1	
Post-op >6/24	7	11	

Table2 statistical comparison of post-operative complications of the two groups.(Z score test)

complication	1st method	2nd method	p
Vitreous hemorrhage	- (0%)	1 (4.7%)	0.34
Pupil distortion	1 (5.2%)	1 (4.7%)	0.94
Raised IOP	2 (10.5%)	1 (4.7%)	0.51
Astigmatism	1 (5.2%)	1 (4.7%)	0.94
IOL tilt	2 (10.5%)	-	0.13
CME	1 (5.2%)	3 (14.2%)	0.36
None	12 (63.1%)	14 (66.6%)	0.89

DISCUSSION

Malbran et al first reported trans scleral sulcus fixation of PCIOLs in aphakics post ICCE in 1986.[6]

Since then the technique has been modified several times and today there are various options for placing a scleral fixated IOL.

In 1995, Erylidirim published a technique for inserting a sutured PCIOL through an ab externo approach. But there is always a possibility of knot exposure and sometimes that of devastating complication of endophthalmitis.[5,7] This lead to the development of various other techniques of SFIOL like glue- fixated IOL and the truly knotless technique which was described by Szurman.[8]

A study done by Ram J,et al proposed the use of steel suture for the use of fixation of SF PCIOL[9].

Asadi R,et al reports suggest that long-term results of the SF PCIOLs fixated with 10.0 polypropylene sutures is associated with dislocation of the IOLs to the extent of 24%.[10] Hence there has been a constant need for improvisation in the various techniques of SFIOL surgery.

A newer technique where in a quick-acting surgical fibrin sealant derived from human blood plasma, which has both hemostatic and adhesive properties, is used to seal the scleral flaps[11]. But this technique is less economical than the sutured technique. Hence in developing countries like India, the sutured technique is still more popular. But, as most suture-related complications occur years after the procedure, longer follow up is needed to confirm the conclusion.

CONCLUSION

The visual outcomes in eyes that underwent ab externo two point fixation technique and true knotless technique were similar at the end of 5 months and the complications were also statistically insignificant. Thus the choice of technique depends on the surgical skill of the operating surgeon.

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