# RESULTS AND COMPLICATIONS OF SCLERAL FIXATED (SUTURED) POSTERIOR CHAMBER INTRAOCULAR LENS IMPLANTATION

*J. Amoozadeh*[1], *AR. Naderi*[2] *and F. Rahimi*[1]

1) Department of Ophthalmology, Farabi Eye Hospital, Tehran University of Medical Sciences, Tehran, Iran

2) Department of Ophthalmology, Rafsanjan School of Medicine, Rafsanjan, Iran

*Abstract - Optical rehabilitation of the patient with aphakia who cannot tolerate contact lenses present a therapeutic challenge. In the absence of capsular support, anterior chamber lenses have been widely used. On the other hand intraocular lens implantation of scleral sutured postreior chamber intraocular lens during penterating keratoplasty or insufficient iris support is recommended. The purpose of this study is to evaluate the clinical outcome and complications in 17 patients who underwent scleral- fixation of an intraocular lens.*

*We studied prospectively the results of posterior chamber intraocular lens implantation by scleral fixation in 17 eyes of 17 patients without a complete psoterior lens capsule support at Farabi Eye Hospital. Uncorrected visual acuity improved from counting finger to 20/40 or better in 9 eyes (53 percent). The following complications were observed during the mean postoperative follow - up of 7.2 (range 3-12) months; Increased intraocular pressure in 5 eyes, vitreous hemorrhage and ier hyphema in 2 eyes, cystoid macular edema (CME) and vitritis in one eye, and endophthalmitis and retinal detachment in one eye. Posterior chamber intraocular lens implantation by scleral fixation is a relatively safe procedure and can be recommended for many patients.*

*Acta Medica Iranica 39 (4): 195-198; 2001*

*Key Words: Scleral sutured, posterior chamber intraocular lens, secondary posterior chamber intraocular lens, scleral fixation*

## INTRODUCTION

Optical rehabilitation of the patient with unilateral aphakia who cannot tolerate contact lenses present a therapeutic challenge. Options include epikeratophakia, unilateral aphakic spectacle, an anterior chamber intraocular lens (IOL) implant, an iris-fixated IOL Implant, or a scleral fixated posterior chamber IOL implant. Each of these approaches has problems (1). In the absence of capsular support, anterior chamber lenses had been widely used (2). Anterior chamber intraocular lenses (IOLs), specially the closed-loop type, are known to cause a higher rate of ocular complications such as corneal edema, uveitis, glaucoma, and macular edema than the posterior chamber IOL's (3). On the other hand, in situations such as glaucoma, absence of sufficient iris for implantation of anterior chamber IOL, or in eyes which undergo coincident penetrating keratoplasty, anterior chamber IOLs have limitation. Furthermore, transscleral suture fixation of a posterior chamber IOL is proposed as an appropriate alternative to anterior chamber IOLs (4). This procedure has become increasingly popular in the recent years because the postoperative results have shown visual acuity to be excellent and incidence of complications low (4,5,6,7,8,9,10).

The purpose of this study was evaluation of results and complications of scleral fixated posterior chamber IOL implantation in different ocular conditions.

## MATERIALS AND METHODS

We examined prospectively 17 eyes from 17 consecutive patients who had undergone trans-scleral posterior chamber IOL suture fixation at Farabi Eye Hospital, Tehran University of Medical Sciences. All procedures were performed between Feb. 2000 and April 2001. These eyes were selected because they all had not sufficient posterior capsule for posterior chamber lens implantation and/or sufficient iris for anterior chamber lens implantation, and all had a minimum follow-up of 3 months. Preoperatively, a complete eye examination was performed. Of the 17 eyes that received scleral suture fixation, 4 eyes underwent this procedure because of a posterior capsule rupture or zonular dialysis at the time of cataract surgery; 3 eyes had undergone intracapsular cataract extraction previously, 2 eyes had traumatic lens subluxation, 2 eyes were aphakic because of previous cataract extraction due to trauma:

1 eye had traumatic cataract, repaired corneal laceration and cyclitic membrane due to trauma of expulsive material, and 5 eyes had vitrectomy and lensectomy procedure in the past. Of 5 vitrectomy eyes, 3 eyes had bollous keratopathy and penetrating keratoplasty also performed coincidentally with scleral suture fixation IOL implantation, and 2 eyes contained silicon oil that was removed coincidentally with this procedure (table 1).

All surgical procedures were performed by a single surgeon. All IOLs implanted were one-piece polymethyle methacrylate IOLs. Lens powers were calculated by use of A-constant as provided by the manufacturer. Informed consent was obtained from all patients in the study.

### Surgical procedure

For the scleral suture IOL fixation, the surgeon used the ab extemo method. A superior conjunctival incision was made extending for approximately 120°. An additional small limbal incision was made inferiorly temporally or nasally. Two limbal base triangular partial thickness scleral flaps about 4x4mm were made at 1 and 7 or at 5 and 11 o'clock position of limbus 180° opposite from one another. Next, superior 7.0mm limbal incision was made. Anterior vitrectomy was performed to remove the vitreous in the anterior chamber and above and beneath the iris. If present, capsular remnants were removed as much as possible so as not to interfere with IOL position. For endothelial support from damage, viscoelastic agent was injected only to anterior chamber. A double-armed 10-0 polypropylene suture (prolene) with a cured needle (TG 140-6; Ethicon, Inc.) was used. The suture was cut from the middle and the end of suture was threaded into the 27-gauge needle barrel. The 27-gauge needle was passed under the flap through the sclera approximately 0.5 to 0.6mm posterior to the surgical limbus and directed across the eye toward ciliary sulcus and anterior chamber and the suture was withdrawn from the eye through the superior limbal incision by a Mc Pherson forceps. And needle was removed backward. This process was repeated from 180° opposite sites. The appropriate ends of suture were passed through the haptic eyelet of an all-polymethylmethacrylate IOL and tied with 3,1,1 square knot. If we used IOLs that had not haptic eyelet the suture were tied around haptics 180° opposite each other with 1,1,1,1 square knot. This type of knot prevents suture slippage.

Next, the IOL was inserted into the posterior chamber in an attempt to introduce the haptics to the ciliary sulcus. The bilateral sutures were drawn tight until the IOL was well centered. If present, the vitreous and viscoelastic in anterior chamber were removed with a vitreous cutter. The groove incision was closed using interrupted 10-0 nylon sutures. Finally, the IOL was well centered and after another superficial bite had been taken in the sclera under the flap, the suture was tied to itself on the bilateral sides. The scleral flaps were sutured with a 10-0 nylon suture in a manner that covered IOL fixation suture completely and the sutures of flaps were buried in a manner similar to that used in standard cataract wound closure. The conjunctiva was closed using 8-0 silk sutures. Subconjunctival injection of Betamethasone and Gentamicin were given and eye was patched and shielded. If penetrating keratoplasty also was needed, after preparation of scleral flaps; the eye was trephined and the process was continued as above.

Postoperative evaluations were performed on days 1,3,7 then during weeks 2,3,4 and 8 and thereafter monthly. Glaucoma was diagnosed if intraocular pressure was greater than 21 mmHg on two or more consecutive examinations and necessitated long-term glaucoma medication.

## RESULTS

The average patient age was 40 years (range 5 to 76). The mean follow-up period was 7.2 months (range, 3 to 12). The patients were 9 men and 8 women. Preoperative uncorrected visual acuity was 20/400 or less in all patients and was hand-motion in 5 eyes. Postoperative visual acuity increased in all patients. Postoperative uncorrected visual acuity was 20/40 or better in 9 eyes (53 percent), 3 eyes (17.6 percent) had uncorrected visual acuity between 20/400 and 20/40 and 6 eyes had uncorrected visual acuity equal to or less than 20/400. General technical difficulty of precedure, resulted in increased operating time.

Two eyes developed hyphema and vitreous hemorrhage occurred in one. Intraoperatively when the needle penetrated the sclera, the IOL was not implanted. The bleeding resorbed within few weeks with no long - term sequellae. In another eye which underwent scleral-fixated posterior chamber IOL and penetrating keratoplasty; vitreous hemorrhage developed on the first postoperative day and resolved spontaneously after 4 months. This eye also developed high intraocular pressure which returned to normal after blood resorbtion.

Iris deformity was present in 3 eyes which in all cases was due to previous trauma or surgery. Glaucoma occurred in 5 eyes (29.5 percent) as new onset. The glaucoma occurred in one eye due to extensive peripheral anterior synechia, in one eye due to vitreous hemorrhage, in one eye due to uveitis and in two eyes probably due to remaining viscoelastic agent. Glaucoma was controlled medically in one case which had vitritis,

| Cause | ECCE | ICCE | Aphakic Bollous Keratopathy | Aphakia & V Vitrectomy | Traumatic aphakia | Traumatic Sub-Luxation | Cataract & corneal laceration & cyclitic Membrane |
|---|---|---|---|---|---|---|---|
| No | 4 | 3 | 3 | 2 | 2 | 2 | 1 |

in one case it occurred due to peripheral antrerior synechia needed for cryotherapy at two times, and in the remaining three cases antiglaucoma medication was discontinued gradually. Clinically significant cystoeid macular edema occurred in one eye which also had vitritis and responded to subtenon injection of methyleprednisolone. Postoperative endophthalmitis occurred in one eye 14 days after surgery. This eye developed retinal detachment after vitreous aspiration and was managed by deep vitrectomy. This patient had carcinoma of testis and was under chemotherapy. Other complications such as iridodialysis, lens tilt or decentration which had clinical significant bollous keratopathy, wound leake and IOL subluxation or dislocation did not occur.

## DISCUSSION

Because the optically and physiologically preferable location for the IOL is posterior chamber, the implantation of IOL has gained widespread acceptance as the optimal method of visual rehabilitation of the cataractous eye(s). Trans-scleral suture fixation of posterior chamber IOL initially developed as an alternative to anterior chamber IOLs (13).

The major concern in assessing the efficacy of transscleral fixation of posterior chamber IOLs is the likelihood of operative and postoperative complications (1). Increased intraoperative risks are associated with the manipulation necessary to pass a suture through the scleral wall, to attach an IOL and then to secure the IOL to the suleus with suture (1). Intraoperative hypotony, hyphema, and suprachoroidal hemorrhage can occur (5,11).

In this study, we evaluated results and intraoperative and postoperative complications in patients who underwent scleral-fixation of intraocular lens implantation in different ocular conditions. General technical difficulty of procedure resulted in increased operating time.

Our method was Ab- Externo technique. By this technique localization of ciliary body is better and anterior vitreous is not disturbed with needle holder or other surgical instrument.

Bleeding from the iris and ciliary body may occur at the time of surgery or in the immediate postoperative periods (2). We observed 2 innocent vitreous hemorrhage, in 1 eye intraoperatively due to trauma to ciliary body and in 1 eye spontaneously on first postoperative day. The source of bleeding usually is long posterior ciliary arteries, iris circle artery and hypervascular tissue of ciliary body. Since the long posterior ciliary artery enter the ciliary body in the posterior chamber at 3.00 and 9.00 o'clock meridians and enter the anterior chamber at 3.00 6.00, 9.00 and 12 o'clock meridians, we prefer to suture in the oblique meridians to reduce the risk of intraocular bleeding. Other complications of entry of needle into ciliary body is vascular thrombosis that has no clinical significance. Ayse et al reported one case of intraocular bleeding in 29 cases. Glaucoma that developed newly after surgery occurred in 5 eyes (29.5 percent), in 2 of which it was probably due to retained viscoelastic agent in eye and intraocular pressure gradually returned to normal and antiglaucoma medication was discontinued. Thus it is appropriate that viscoelastic agent is only injected into the anterior chamber and washed out completely at the end of operation.

Theoretically, trabecular meshwork damage is reduced by the anatomic placement of the lens in the posterior chamber compaired with an anterior chamber angle fixated IOL (2). Kocak, Alitintas et al observed glaucoma in 17.2 percent of eyes which had undergone penetrating keratoplasty and scleral-fixation posterior chamber IOL (2). Soong and Colagues observed new onset glaucoma in 15.8 percent of triple procedures(12). Holland et al also reported new glaucoma in 30.3 percent of triple procedures. We observed glaucoma more than the other studies because most cases in our study were traumatic.

Postoperative endophthalmitis occurred in 1 eye. Exposure of scleral suture increased the theoretical risk of endophtbamitis long-term by producting a communication with the interior of eye (14). In our technique scleral suture was covered with a flap of sclera. Our patient had carcinoma of testis and had received chemothrapy drugs, and endophthalmitis was probably due to immune deficiency. This eye developed retinal detachment after vitreous aspiration and intravitreal injection. In our opinion the cause of retinal detachment was strike of the needle to opposite site of the entry.

Uveitis and vitritis and increased intraocular pressure and cystoid macular edema occurred in one eye and resulted to decrease visual acuity from 20/3 0 to 20/400 which responed to subtenon injection of methyleprednisolone and visual acuity reached to 20/100.

Cystoid macular edema remains as a problem after intraocular surgery (15). Vitreous adherent to the

operative wound or left within the anterior chamber may become entangled with IOL, lead to traction on the retina, and produce chronic inflamation, cystoid macular edema or retinal detachment (15). An intact capsule provides a barrier against anterior movement of the vitreous and posterior movement of vasoactive substances. This barrier affect may reduce endophthalmodonesis and the incidence of retinal detachment, corneal decompensation, and cyctoid macular edema (12). Posterior chamber lens implantation in the absence of a capsule may provide a mechanical barrier to some degree (12).

Lens tilt or decentration was not evaluated in our study because the scheimpflug videophotography system was not available; but the clinically significant lens tilt or decentration and also IOL dislocation were not observed. Uncorrected visual acuity was 20/40 or better in 9 eyes (53 percent), refractive error and astigmatism were not evaluated.

Despite the fact that this procedure was done in complicated eye conditions, surgical results were encouraging and the incidence of complications was acceptable. In the survey of Sen and Smith, the results seems to reflect a" learning curve", surgeons with the greatest experience reported the fewest complications (5). On the other hand the same survey suggested that there is no true consensus to any one "best" technique of suturing in posterior chamber IOL; for example, in response to question," would you suture in a PCIOL without capsular support of any kind, in a one eyed patient "the answer was "no, In 13 per cents, " yes" in 2 percents and " unsure~~ in 85 percents of 220 responders (5). We suggest that long term complication may occure and further study must be performed, and that this procedure should be performed by surgeons who are expert with this technique.

## REFERENCES

1. Buckley EG. Scleral fixation (sutured) posterior chamber intraocular lens implantation in children . Journal of AAPOS. 3: 289-294; 1999.

2. Kocak AG, Kocak Al. Dengisk MF. et al. Implantation of scleral -sutured posterior chamber intraocular lenses During penetrating Keratoplasty . J Refract Surg. 16: 456-458; 2000.

3. Stark WJ, Gottsch JD, Goodman, DF. et al. Posterior chamber intraocular lens implantation in the absence of capsular support. Arch. Ophthalmology. 107: 1078-83; 1989.

4. Hayashi K. Hayashi H, Nakao FD. et al. Intraocular lens tilt and decen tration. anterior chamber depth, and refractive error after trans- scleral suture fixation surgery. Ophthalmol. 106:878-882; 1999.

5. Solomon K. Gussler JR. Gussler C, van Meter W S . Incidence and management of complication of transsclerally sutured posterior chamber lenses, J Cataract Refract Surg. 19: 488-93; 1993

6. Cluskey P MC, Harrisberg B. Long-term results. Using scleral Fxed posterior chamber intaocular lenses. J. Cataract Refract Surg. 20 : 34-9; 1994.

7. Bleckmann H, Kacz marek U, Furctional results of posterior chamber lens Implantation with scleral fixaton J Catraract Refract Surg, 20: 32 1-6; 1994.

8. Lyle WA ,Jin Jc. Secondary intraocular lens implantation: anterior chamber vs posterior chamber lens. Ophthalmic surg. 24 : 375-81; 1993.

9. Uth.FFD, Teicbmann KD. Secondary implantation of scleral fixed intraocular lenses. J cataract Refract Surg. 50-945:24; 1998

10. Lee JG, Lee JH , Ghung H. Factors Contributing to retinal detachment after transscleral fixation of posterior chamber intraocular lenses. J Cataract Refrac Surg. 24: 697-702; 1998.

11. Helal M, Sayyad FE, Elsherifz , el-Maghraby A, Dabees M. Transscleral fixation of posterior chamber intraocular lenses in the absence of capsular support. J cataract Refract Surg. 22 : 347-5 10; 1996.

12. Soong KH, Mush DC, Kowel v. sugar A , Meyer RF. Implantation of posterior chamber intraocular lenses in the absense of lens capsule during penetrating keratoplasty. Arch ophthalmol. 107 : 660-664; 1989.

13. Holland EJ , Daya SM. Evangelista A, Ketchom JM , Lubniewski AJ. Doughman DJ, lenses. Penetrating keratoplasty and transscleral fixation of posterior chamber lens. AM J ophthalmol. 114:182-187; 1992.

14. Davis RM , Best D, Gilbert GE. Compairsion of lens Fixation techniques performed during penetrating Keratoplasty. AM J ophthalmol. 111: 743-749; 1991.

15. Price FW, Whitson WE. Visual result of suture fixated posterior chamber lenses during penetrating keratoplasty. Ophthalmology. 96:1239-1240; 1989.

16. Harsha A. sen, Patricia w. Smith. Currernt trends in suture fixation of posterior chamber intraocular lenses. Ophthalmic Surg. 21 :689; 1990.