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Outcome of Sclera Fixated Intraocular Lens for Complicated Cataract Surgeries in an Eye Institute, Southwestern Nigeria

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ABSTRACT

Background: Fixating an intraocular lens to the sclera is a technique for managing aphakia that results from complications of cataract surgery when there is difficulty in placing the intraocular lens in the bag or sulcus due to loss of capsular support for the posterior chamber intraocular lens. The procedure involves various techniques aimed at securing an intraocular lens to the sclera to restore sight in the aphakic eye. This is a report of the outcome of 19 cases performed at Eleta Eye Institute, Ibadan, Nigeria and St Mary's Catholic Eye Hospital Ago Iwoye, Nigeria between April 2018 and February 2019, in which posterior chamber intraocular lenses were fixated to the sclera using polypropylene 10/0 sutures and subjects followed up for six months. Blindness and vision impairment was classified according to the international classification of diseases, ICD-10 for distance vision. Relevant data was retrieved from the medical records of the patients and analyzed using SPSS version 22.

Results: The age range was 27-88 years. Posterior capsule rupture from initial surgery accounted for 68.42% of the cases while traumatic cataract accounted for 15.79%. Weak zonules and dislocated intraocular lens accounted for 10.53% and 5.26% respectively. At 24 weeks, there was 89.5% reduction in the number of blind eyes (VA less than 3/60), with 68.4% achieving VA of 6/6-6/12 with pin hole. All the eyes had intraocular pressure ranging between 10 and 22mmHg preoperatively. Postoperatively, temporary hypotony and transient corneal oedema occurred in 8(42.11%) and 6 (31.58%) of the cases respectively, while raised intraocular pressure occurred in 1 (5.2%) of cases. The patient with elevated intraocular pressure was further managed by a glaucoma specialist.

Conclusion: The anchor suture technique in combination with the L-shaped scleral flap provides satisfactory visual outcome in managing aphakia or pseudo-aphakia and ensures that sutures do not irritate the ocular surface thereby reducing postoperative inflammation. When a PCIOL is used, it eliminates the challenges of stocking of SFIOLs in low resource settings.

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Abbreviations

IOL- Intraocular lens; IOP- intraocular pressure; MSICS- manual small incision cataract surgery; PCIOL-posterior chamber intraocular lens; SFIOL- scleral fixated intraocular lens; USS-ultrasound scan; VI- visual impairment.

Introduction

In the event of inability to place an intraocular lens in the bag during cataract surgery, fixating the lens to the sclera becomes a viable alternative. Surgical techniques for scleral-fixated intraocular lenses (SFIOLs) have improved over the years as innovative surgeons attempt modifications of existing techniques [1,2]. There are ab-interno and ab-externo techniques during which rigid or foldable IOLs can be used [3]. Some techniques may be associated with exposure of sutures which may cause irritation, delayed healing and poor cosmetic appearance [3]. To ensure adequate suture covering, a conjunctival flap, a scleral flap or a corneal tissue button can be used [4]. The American academy of ophthalmology technology assessment group reviewed various techniques for anterior chamber IOL, scleral fixated PCIOL and iris fixated PCIOL and did not find any compelling evidence to recommend one technique over the other [5]. Common indications for scleral fixation include; posterior capsular rent, weak zonules, traumatic cataracts, and dislocated intraocular lenses. According to the Nigerian blindness and visual impairment survey, uncorrected aphakia is responsible for 15.8% of severe visual impairment and 8.4% of blindness [6].

Materials and Methods

Eleta Eye Institute Ibadan is a residency training institution located in Nigeria owned by the Catholic Church. It has five centers among which is St Mary's Catholic Eye Hospital, Ago Iwoye. This is a report of the outcome of 19 cases in which posterior chamber intraocular lenses (PCIOL), were fixated to the sclera following complicated cataract surgeries. The surgeries were performed by the same surgeon at Eleta Eye Institute, Ibadan and St Mary's Catholic Eye Hospital Ago Iwoye between April 2018 and February 2019. Five of the cases were performed as primary procedures for traumatic cataract and zonular dehiscence while the rest of the cases were performed as secondary procedures following complications of initial surgery by trainees. Data was obtained from the medical records of the patients. The indication of surgery, preoperative and postoperative visual acuity and intraocular pressure were noted and values analyzed pre and post operatively using the Statistical Package for Social Sciences (SPSS version 22, SPSS Inc, IBM, New York, USA).

Surgical Steps

The preparation initial steps of surgery are the same for phacoemulsification or manual small incision cataract surgery. The conjunctiva is picked with conjunctival forceps and incised with conjunctival scissors at 3, 9 and 12oclock positions. The conjunctiva was dissected bluntly, exposing the underlying Tenon's capsule and wet field electro-cautery used to secure haemostasis. On the temporal and nasal sides (3 and 9oclock positions), an inverted L-shaped partial thickness sclera flap was created such that the L faces the corneal limbus, see figure 1. Anchor sutures were then placed in the middle of the L-shaped partial thickness sclera tunnel. A partial thickness scleral incision tunnel was made from 11 to 1 o'clock such that its closest point to the limbus is about 2mm.

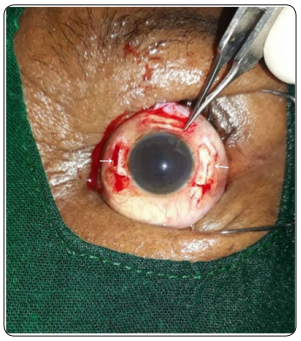

Figure 1: showing the L-shaped scleral tunnel placed at 3 and 9 o'clock positions indicated by the white arrows

Results

The age range was 27-88 years. Mean age was 62.52years. Age group 61-70 years had six patients which doubled the number of patients in the 31-40 age groups. See Figure 2.

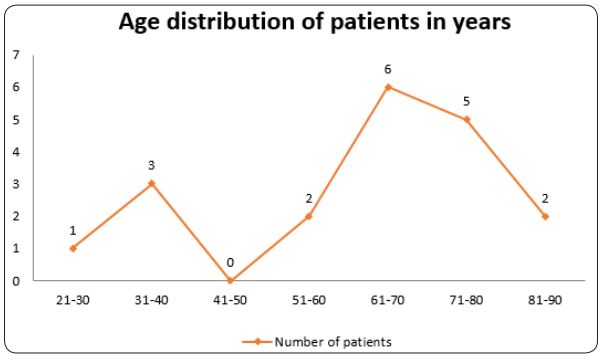

Figure 2: Age distribution of patients in years

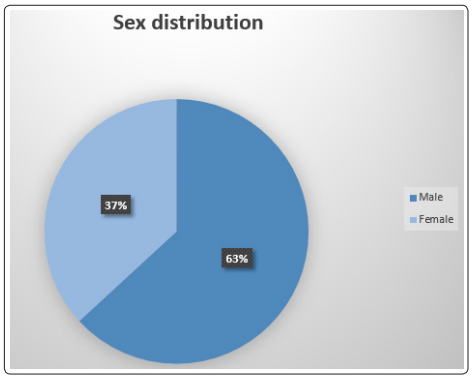

Figure 3: Shows the sex distribution of patients in the study

Posterior capsule rupture from initial surgery accounted for 68.42% of the cases, while trauma accounted for 15.79%. Weak zonules and dislocated intraocular lens accounted for 10.53% and 5.26% respectively. See Figure 4.

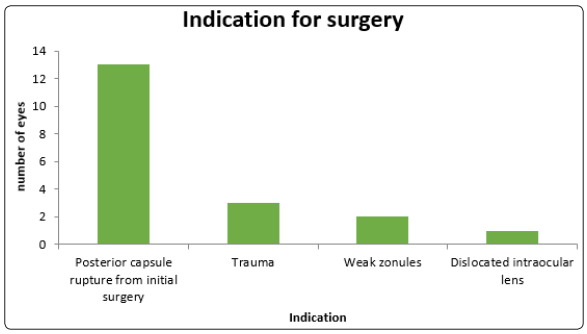

Figure 4: Indication for surgery

Unaided visual acuity shows a reduction in the number of blind eyes (VA less than 3/60) from a preoperative value of 89.47% to 36.845%, 31.57%, 10.53% and 0% at week one, week six, week twelve and week twenty-four respectively. Normal vision or mild visual impairment (VA of 6/12 or better) was achieved in two (10.5%), three (15.75) and five (26.32%) of the cases at week six, week twelve and week twenty-four respectively. See Figure 5.

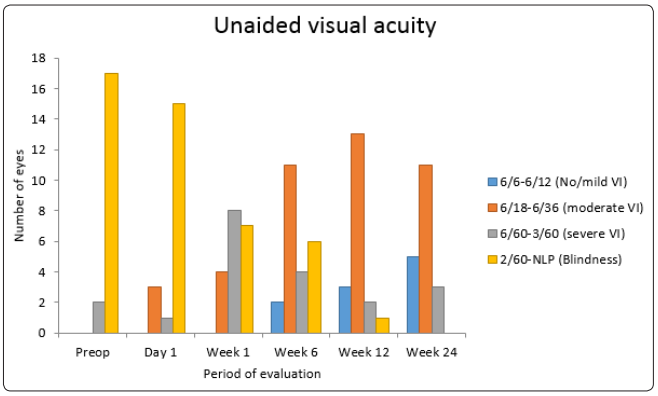

Figure 5: Unaided visual acuity

There was a steady improvement in aided visual acuity over the postoperative period, 1 (5.26%), 5(26.32), 7(36.84%) and 13(68.42%) at week one, week six, week twelve and week twenty-four respectively. The number of blind cases (VA less than 3/60) reduced steadily from a preoperative value of 10 to post-operative values 3 (15.79%), 1(5.26%) at week one, week six respectively, see Figure 6.

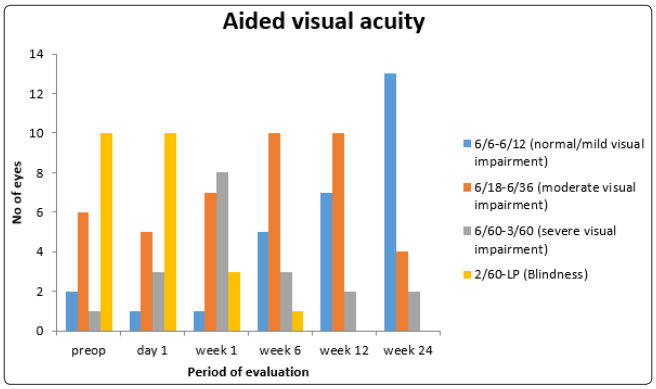

Figure 6: Aided visual acuity

The changes in intraocular pressure showed that all the eyes had intraocular pressure between 10 and 22mmHg preoperatively. Postoperatively, one eye had raised intraocular pressure. There was hypotony in eight (42.11%) patients on day one postop that resolved in the first week. See Figure 7.

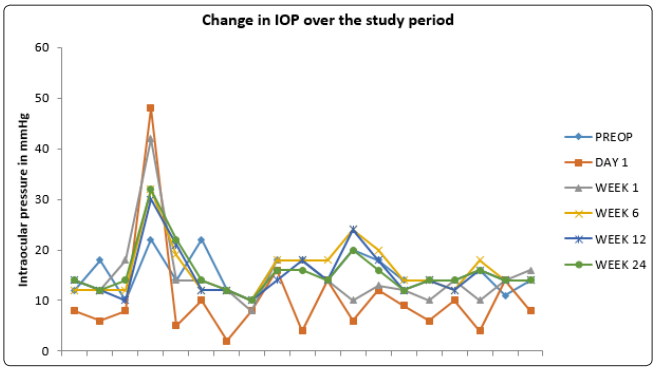

Figure 7: Intraocular pressure changes in mmHg over the study period

Temporary hypotony and transient corneal oedema occurred in 8(42.11%) and 6 (31.58%) of cases while raised intraocular pressure occurred in 1 (5.2%) of cases. See Figure 8.

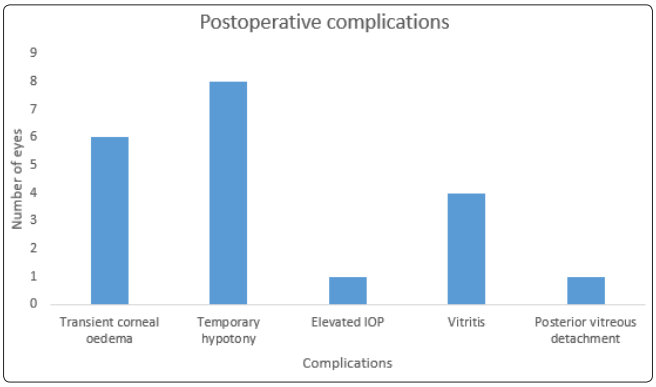

Figure 8: Postoperative complications

Discussion

The procedure used in the study is suitable for posterior capsular rupture during cataract surgery and it can be performed as a primary or secondary procedure at the discretion of the surgeon. As a primary procedure it is effective in traumatic cataracts where there is insufficient capsular or zonular support. The technique allows for complete burying of sutures under the scleral flap, unlike a technique described by Hoffman R et al that does not require dissection and scleral cauterization [2]. Rendering a patient aphakic from cataract surgery weighs down on the patient' trust and confidence in the cataract surgeon. In this part of the world where couching is still commonly practiced, the ophthalmologist will encounter patients with partially or completely dislocated cataracts that may require scleral fixation. So this technique becomes an invaluable skill for the cataract surgeon.

The L-shaped scleral incision used in this study allows the knot to sit within the scleral tunnel and eliminates the need for suture knot rotation. It also does not require suture closure as it flattens under the conjunctiva which is closed with bipolar coagulator. These advantages are similar to the findings of Hoffman R et al in a technique of performing scleral fixation that involved retrieving suture through a scleral tunnel. Anchor sutures help in adjusting the intraocular lens to the center of the pupil in cases of mydriatic or eccentric pupils that can occur due to trauma to the iris [7].

The age distribution of patients in this study showed that majority had age related cataracts and a smaller proportion of younger patients presented with traumatic cataract. This finding is similar to that ofwho found a mean age of 52.9 years and a range of 17-80years [3]. The sex distribution showed a higher male preponderance, similar to the findings of this suggests that trauma is higher among males and may be attributed to lifestyle differences between males and females [8].

The indications for surgery was mainly from posterior capsular rent during cataract surgery. Owing to the fact that the two hospitals used in the study are training centers for ophthalmology resident doctors from various centers in Nigeria, rupture of the posterior capsule during cataract surgery is expectedly higher among trainees. The three eyes that were due to trauma were young patients. Snellen unaided distance visual acuity showed that 89.47% and 10.53% of the eyes were blind and severely visually impaired respectively in the preoperative period, establishing that uncorrected aphakia/pseudo-aphakia is an important cause of blindness and severe visual impairment. Postoperatively, improvement in unaided visual acuity was noticeable as 7/19 eyes had visual acuity of 3/60 or less. The improvement was sustained up to week 12 when only 1/19 had visual acuity of 3/60 or less. By week 24, no eye was blind. Aided visual acuity with pin hole showed improvement in visual acuity such that by week 6, 15/19 eyes had visual acuity better than 6/60.

Transient hypotony was observed in the immediate postoperative period. This however resolved within one week. Other complications were transient corneal oedema, raised intraocular pressure, vitritis and posterior vitreous detachment. The intraocular lenses were all centered. These findings are similar to the findings of Lin C et al who found that in a series of 10 cases that underwent scleral fixation, intraocular lenses were well centered and sutures were completely buried in the scleral tunnel even though there was ciliary hemorrhage in one case. This could be attributed to the use of a 25 gauge needle in their study. In this study, the needle of the 10-0 polypropylene suture was used and there was no intraocular hemorrhage noted [9].

The anchor suture technique combined with an L-shaped scleral tunnel allows for the complete burying of the sutures in the scleral flaps to reduce irritation and inflammation. It also helps in reducing the perioperative complications associated with inaccurate suture placement during surgery. When a PCIOL is used, the suture is passed through the dialing holes of the optic of the PCIOL, the anchor sutures afford the surgeon the ability to gauge centration

of the IOL. The tension exerted by the suture on the PCIOL can be gauged and adjusted manually while tying the knots under the L-shaped scleral tunnel. The peculiarities of this procedure decrease the risk of IOL tilt and dislocation postoperatively. Poor prognostic factors for the outcome of scleral fixation in the initial cataract surgery include: excessive vitreous loss, poor or inadequate vitrectomy and damage to the iris sphincter while in the second surgery; good patient selection, minimal use of viscoelastic device and avoiding pupillary dilatation are positive prognostic factors.

Limitations

Performing macular optical coherence tomography would help detect the presence of subclinical macular edema which could affect the visual acuity during the postoperative period. There is need to follow up these cases for a longer period of time to monitor the long term outcome.

Conclusion

The anchor suture technique in combination with the L-shaped scleral flap gives satisfactory visual outcome in managing aphakia or pseudo-aphakia and ensures that sutures do not irritate the ocular surface thereby reducing postoperative inflammation. When a PCIOL is used, it eliminates the challenges of stocking of SFIOLs in low resource settings.

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