

Management of Subluxated Crystalline Lenses with Planned Intracapsular Cataract Extraction and Anterior Chamber Intraocular Lens Implantation

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ABSTRACT

Purpose: To review the visual and surgical outcome of planned intracapsular cataract extraction (ICCE) and anterior chamber intraocular lens (AC IOL) implantation for subluxated crystalline lenses.

Methods: Eight eyes of 7 patients with subluxated lenses which underwent planned ICCE, AC IOL implantation and peripheral iridectomy by one surgeon between September 1995 and November 1996 were prospectively followed-up to ascertain their visual and surgical outcome.

Results: There were 4 male and 3 female patients. Their mean age was 64.4 years (range, 39 – 86 years). Seven lenses were removed by cryoextraction while one was removed with the aid of a vectis. The mean post-operative follow-up was 11.6 months, (range, 3 – 22 months). Excluding 1 eye with pre-existing ocular pathology, all eyes achieved a best corrected visual acuity (BCVA) of 6/12 or better post-operatively. One of these eyes, in a schizophrenia patient, developed subluxation of the AC IOL and retinal detachment 11 months after the cataract surgery due to repeated eye rubbing. The final BCVA became 6/120 after successful repositioning of the AC IOL and retinal re-attachment surgery. One eye achieved a BCVA of 6/36 due to age-related macular degeneration.

Conclusion: Our results show that planned ICCE and AC IOL implantation is a useful and safe procedure in the management of subluxated lenses.

Keywords: cataract surgery, ectopia lentis, implant surgery, lens displacement, subluxated cataract

INTRODUCTION

Displacement of the crystalline lens or ectopia lentis may be hereditary or acquired. Hereditary forms of ectopia lentis may be associated with systemic or other ocular anomalies or may appear as an isolated anomaly. Acquired displacements of the lens are slightly more common than the hereditary varieties and are related to mechanical stretching of the zonule⁽¹⁾. Trauma is

the main factor in slightly more than 50% of all lens displacements⁽¹⁾.

In the past, attempts at treating subluxated lenses surgically have been considered hazardous because of a high incidence of complications and poor visual outcome^(2,3). Over the years, many different methods have been used to remove these lenses with varying degrees of success. In this paper, we review the outcome of planned intracapsular cataract extraction (ICCE), anterior chamber intraocular lens (AC IOL) implantation and peripheral iridectomy (PI) for subluxated lenses.

METHODS

Eight eyes of 7 patients with subluxated lenses operated between September 1995 and November 1996 by one surgeon (AEKG) were followed-up prospectively to determine their visual and surgical outcome following surgery.

All eyes underwent planned ICCE, AC IOL implantation with one-piece, all polymethylmethacrylate (PMMA), open-loop Kelman Multiflex lenses and PI. The technique of cryoextraction similar to that described by Choyce⁽⁴⁾ was used in 7 eyes while 1 subluxated lens was extracted with a vectis. Anterior vitrectomy was performed in cases where the vitreous was present in the anterior chamber pre- or intra-operatively.

RESULTS

There were 4 males and 3 females. Their mean age was 64.4 years (range, 35 – 86 years). The mean post-operative follow-up was 11.6 months (range, 3 – 22 months).

Case 1

A 35-year-old Chinese man with a ten-year history of schizophrenia from a mental institution presented with poor vision in both eyes. His pre-operative visual acuity (VA) was hand movement (EIM) in both eyes due to subluxated hypermature cataracts. He underwent planned ICCE, AC IOL implantation and PI under general anaesthesia in the left eye and then in the right eye after an interval of two months. There was no vitreous loss during surgery and his post-

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operative recovery was uneventful. The post-operative best corrected visual acuity (BCVA) was 6/9 in the both eyes about 2 months after surgery.

Case 2

An 86-year-old Chinese woman, an inmate of an old folks home, presented with bilateral poor vision for many years. She was found to have bilateral dense cataracts which was hypermature and subluxated in the right eye. The pre-operative VA was HM in the right eye. She underwent a planned ICCE, AC IOL implantation and PI in the right eye. Intraoperatively, an iatrogenic Descemet's membrane detachment occurred in the superior part of the cornea and this was treated at the end of the surgery by injecting a large air bubble into the anterior chamber to tamponade the detachment. There was corneal oedema in the area of the detached Descemet's membrane in the immediate post-operative period but this resolved with the use of topical steroids after 2 months. The BCVA was 6/12 at 3 months after surgery.

Case 3

A 49-year-old Chinese man with a history of schizophrenia, an inmate of a mental institution, presented with the complaint of decreased vision of the left eye for one year. The lens was found to be cataractous and subluxated superotemporally, with the inferonasal equator visible. There was vitreous in the anterior chamber. The pre-operative VA was perception of light (PL) in the left eye. A planned ICCE, AC IOL implantation, automated anterior vitrectomy and PI was performed under general anaesthesia. During the post-operative period, the patient rubbed his eyes against medical advice and caused a wound dehiscence 3 weeks after surgery. The wound was re-sutured under general anaesthesia in the operating theatre. His BCVA after the repair of his wound dehiscence was 6/12 4 months after the repeat surgery. During a routine follow-up visit 11 months after cataract surgery, the patient's VA was found to be counting fingers (CF). On examination, the superior haptic of the AC IOL had gone through the PI into the posterior chamber. There was also an inferior subtotal retinal detachment involving the macula. No retinal break was noted in the retina. The patient gave a history of eye rubbing and this was thought to be the cause of the IOL subluxation and retinal detachment. Cryopexy, encirclage, subretinal fluid drainage and repositioning of the AC IOL was performed. The retina was successfully reattached and the postoperative BCVA was 6/120.

Case 4

A 79-year-old Malay woman, an inmate of an old folks home, presented with a complaint of poor vision in the left eye. Her VA was CF in the left eye. Ophthalmic examination disclosed a subluxated hypermature cataract in the left eye. The dense cataract precluded ophthalmoscopy and B scan ultrasonography did not reveal any gross abnormality of the posterior segment. A planned ICCE, AC IOL

implantation and PI was carried out in the left eye. An anterior vitrectomy was performed for vitreous loss intra-operatively. Post-operative ophthalmoscopy revealed co-existing age-related macular degeneration in the posterior segment. The BCVA was 6/36 6 weeks after surgery because of the macular degeneration.

Case 5

A 71-year-old Chinese man, who had a history of chronic anterior uveitis in his left eye, presented with decreased vision in his left eye for many years. He has no history of pain or redness of his eyes. His VA was CF in his left eye. Ophthalmic examination disclosed a subluxated cataract and diffuse keratic precipitates and occasional cells in the left eye. The iris showed a washed-out appearance with "moth-eaten" pupillary margin. There was no posterior synechia or iris or anterior chamber angle neo-vascularisation. His right eye was normal. Blood investigations and X-rays did not reveal a systemic association for his chronic uveitis. He was diagnosed to have Fuch's uveitis syndrome. He underwent planned ICCE, AC IOL implantation and PI in his left eye. The subluxated cataract was prolapsed into the anterior chamber with a viscoelastic material and removed with a vectis. The anterior hyaloid face remained intact and no vitreous was lost. His post-operative BCVA was 6/9 2 months after surgery.

Case 6

A 66-year-old Chinese man presented with pain and redness in the left eye for 1 day. His vision was PL in the left eye. Ophthalmic examination disclosed corneal oedema, circumcorneal ciliary injection and an intraocular pressure of 52 mmHg due to secondary angle-closure glaucoma from a subluxated cataract. After the intraocular pressure was controlled with anti-glaucoma medications, a planned ICCE, AC IOL implantation and PI was done in the left eye. There was vitreous loss intra-operatively and an automated anterior vitrectomy was done. The glaucoma resolved after surgery and a mild macular pucker was detected in the eye post-operatively. The eye achieved a BCVA of 6/12 3 months after surgery.

Case 7

A 65-year-old Chinese woman presented with pain and redness in her left eye for 1 week. She gave a history of having been hit in the left eye by a plank of wood at the age of 42 years. Her presenting VA was 6/12 in the left eye. Ophthalmic examination disclosed circumcorneal ciliary injection, mild corneal oedema, a mid-dilated pupil and an intraocular pressure of 32 mmHg in the left eye. The intraocular pressure was elevated due to secondary angle-closure glaucoma from a subluxated crystalline lens. The eye also had iris sphincter rupture probably as a result of her previous ocular trauma. Planned ICCE, AC IOL implantation and PI were done for her left eye after the intraocular pressure was controlled with anti-glaucoma medications. There was no intra-operative complication. However, the intraocular pressure spiked post-operatively, but this was relieved with anti-

glaucoma therapy. She achieved a BCVA of 6/9 2 months after the surgery and the glaucoma completely resolved.

The results are summarised in Table I.

DISCUSSION

Lens subluxation may be associated with many complications, some of which are vision threatening. Progressive movement of the lens induces frequent refractive changes and high astigmatism. Changes between intermittent phakic and aphakic visual axes may cause marked visual disturbances. Forward dislocation of the lens into the anterior chamber can cause damage to the corneal endothelium and induce acute secondary angle-closure glaucoma. Posterior dislocation of the lens into the vitreous may result in uveitis or even induce retinal detachment.

The management of subluxated lenses has been a controversial issue for many years. Jarrett analysed retrospectively the indications for surgical intervention in a series of 114 cases of subluxated or dislocated lenses⁽³⁾. In general, the indications for removal of the lenses were: (1) to treat lens-induced glaucoma, (2) to improve vision in cases where the lens is cataractous or has become eccentrically subluxated, (3) to allow better visualisation of a detached retina behind the displaced lens, (4) to prevent a subluxated lens from becoming totally dislocated into the vitreous and (5) "because it was there"⁽³⁾. It is now generally agreed that the lens should not be removed just because it is subluxated^(2,3).

In our series, the indications for lens extraction were poor vision (6 eyes) and secondary angle-closure glaucoma (2 eyes).

In selected cases, appropriate optical correction through either a phakic or aphakic zone of the pupillary area is an option to improve vision. Tchah

reported limited success using Nd:YAG laser to lyse the zonules to obtain a clear aphakic visual axis in 9 eyes⁽⁵⁾. Two of the eyes finally required removal of the lens.

Both intracapsular and extracapsular cataract extraction (ECCE) have been described for the management of subluxated lenses. Techniques used include discission⁽⁶⁾, aspiration⁽⁶⁻⁹⁾ and cryoextraction^(9,10). The series described during the early 1970s generally had poorer visual outcomes and had more intra- and post-operative complications. For example, Jensen and Cross described 37 eyes with subluxated lenses treated with discission, aspiration and ICCE in which immediate complications such as vitreous loss and iris prolapse were encountered in 36% of cases⁽⁶⁾. Visual improvement was seen only in 25%. Sellyei and Barraquer described the use of aspiration, ICCE and ECCE for 222 eyes⁽⁸⁾ – 36% showed visual improvement and there was a vitreous loss of 6.7%. But by 1989, Malbran described uneventful ICCEs in two families with genetic spontaneous subluxation of lens⁽¹⁰⁾. In our series, 7 eyes achieved a BCVA of 6/12 or better post-operatively and 1 eye achieved a vision of 6/36 due to age-related macular degeneration. Jensen and Cross and Sellyei did not randomise their cases to ICCE or ECCE and they did not compare the outcomes of each method. Extracapsular extraction in a badly subluxated lens, even if successful, results in a capsular bag with poor zonular support. A posterior chamber intraocular lens implant placed in such a bag may become decentred or even dislocated into the vitreous. In contrast, an AC IOL implanted following ICCE is less likely to decentre.

Recently, several authors have reported using pars plana lensectomy for subluxated lenses with good surgical outcome⁽¹¹⁻¹⁴⁾. This technique unfortunately requires complex and expensive equipment with good

Table I – Clinical summary of results of 8 eyes which underwent ICCE, AC IOL implantation and PI for subluxated lenses

Patient No.	Age at op	Medical history	Eye	Pre-op VA	Indication for surgery	Pre-op compli-tion	Additional operation done	Intra-op complication	Post-op	Post-op VA	Follow-up (months)	Co-existing ocular pathology
1	35	Schizo-phrenia	Right	HM	Poor vision	Nil	Nil	Nil	Nil	6/9	10	Nil
			Left	HM	Poor vision	Nil	Nil	Nil	Nil	Nil	6/9	8
2	86	Nil	Right	HM	Poor vision	Nil	Nil	Descemet's membrane detachment	Corneal area of Descemet's membrane detachment	6/12	3	Nil
3	49	Schizo-phrenia	Left	PL	Poor vision	Vitreous AC	Anterior vitrectomy	Nil	Traumatic dehiscence, retinal detachment	6/12*	15	Nil
4	79	Nil	Left	CF	Poor vision	Nil	Anterior vitrectomy	Vitreous	Nil	6/36	10	Age-related macular degeneration
5	71	Nil	Left	CF	Poor vision	Nil	Nil	Nil	Nil	6/39	22	Nil
6	66	Nil	Left	PL	Secondary glaucoma	Secondary glaucoma	Anterior vitrectomy	Vitreous	Nil Glaucoma resolved	6/12	14	Macular pucker
7	65	Nil	Left	6/12	Secondary	Secondary	Nil	Nil	Nil	6/9	11	Nil

* before development of retinal detachment, 6/20 after retinal re-attachment surgery

technical back-up service as well as an ophthalmologist skilled in vitreous surgery. One or more of these requirements are often lacking in many centres in developing countries, especially in Asia, where subluxated hypermature cataracts are prevalent. The cryoprobe or the vectis used for planned ICCE, in contrast, are often standard instruments in operating theatres equipped to perform cataract surgery. In addition, the technique of ICCE, with or without anterior vitrectomy, is easily mastered by the general ophthalmologist who performs cataract surgery regularly.

In recent years, transscleral suture fixation of posterior chamber (PC) IOL has become an alternative to AC IOL implantation in eyes lacking capsular support⁽¹⁵⁾. This involves positioning an IOL in the ciliary sulcus and securing it to the sclera with non-absorbable sutures to prevent its subluxation or dislocation. A variety of techniques to accomplish this have been described⁽¹⁵⁻¹⁷⁾. The techniques are still evolving and are, in general, technically more difficult than AC IOL implantation. A number of complications of scleral-fixated PC IOL including ciliary body haemorrhage, hyphaema, vitreous haemorrhage, subluxation or dislocation of IOL, chronic uveitis, chronic episcleritis, secondary glaucoma, transscleral haptic erosion and endophthalmitis have been described⁽¹⁶⁾.

Surgeons who prefer scleral-fixated PC IOL to AC IOL have argued that this technique avoids the high rates of long-term complications associated with AC IOL including bullous keratopathy, glaucoma, uveitis, hyphaema and cystoid macular oedema⁽¹⁸⁾. These complications, however, are highest with the closed-loop AC IOLs while the newer open-loop designs have fewer complications. In an analysis of the complication rates of a very large series of closed-loop and open-loop AC IOLs conducted at the Centre for Intraocular Research in South Carolina, Lim and co-workers showed that flexible, open-loop AC IOLs have a post-operative complication rate that is significantly lower than that of closed-loop AC IOLs⁽¹⁹⁾. The authors concluded that open-loop AC IOLs should no longer be considered with the stigma associated with the closed-loop designs and that these AC IOLs are safe and effective alternatives in secondary and exchange procedures as well as for use as a primary implant⁽¹⁹⁾.

The comparative safety and efficacy of scleral-fixated PC IOL versus the one-piece, all PMMA, open-looped AC IOL has not been established. Although our article does not address this issue directly, it underscores the need for prospective, randomised studies to compare the safety and efficacy of scleral-fixated PC IOL with one-piece, all PMMA, open-loop AC IOL. We elected to use AC IOL following planned ICCE in our patients because these AC IOLs are generally safe and are easily implanted. However, in the absence of sufficient iris support for an AC IOL, we believe scleral-fixation of a PC IOL is a good alternative.

Our series has demonstrated good visual outcome with the "traditional" technique of intracapsular lens

extraction. This technique is beneficial in the treatment of subluxated lenses as the advent of better surgical tools, the improvement of lens design and lens polishing, and better post-operative care have markedly reduced the complications that used to be associated with this procedure. This is a relatively simple and safe alternative to the more difficult pars plana lensectomy and can be managed by the general ophthalmologist.

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