


Research Article

Effect of Lensectomy on Incidence of Retinal Detachment in Non-Traumatic Ectopia Lentis

Fawzia M Al-Haimi* and Mohammed Al-Shamrani

Abstract

Purpose: To evaluate the effect of lens aspiration and anterior vitrectomy in the development of retinal detachment in eyes with non-traumatic ectopia lentis.

Methods: This retrospective study evaluated patients with non-traumatic ectopia lentis. Traumatic cases and patients with Stickler syndrome were excluded. The eyes were divided into two groups: eyes that had undergone lens aspiration and anterior vitrectomy (surgical group) and, eyes that had no surgical intervention (non-surgical group). The risk of developing retinal detachment in both groups was evaluated. $P < 0.05$ was considered statistically significant.

Result: The study sample was comprised of 115 eyes of 63 patients. There were 36 (57.1%) and 27 (42.9%) females. The median age of patients was 14 years (25% quartile, 8; minimum, 2 year and maximum, 55 years). There were 74 eyes in the non-surgical group. There were 41 eyes in the surgical group that had undergone Lensectomy (31 limbal approach and 10 pars plana) with intraocular lens implantation in 22 (19%) eyes. The incidence of retinal detachment ($n=25$) was 21.7% (95% confidence interval: 17.7 to 25.4). Seventeen (23%) eyes in the non-surgical group developed retinal detachment and 8 (19.5%) eyes in the surgical group developed retinal detachment ($P = 0.7$).

Conclusion: There was no difference in the incidence of retinal detachment between eyes with ectopia lentis that undergone lensectomy with or without IOL implantation compared to eyes that had not undergone any surgery. However, larger studies are required to evaluate the effect of lens aspiration on the development of retinal detachment in patients with ectopia lentis.

Keywords: Ectopia Lentis; Retinal Detachment; Lensectomy; Intraocular Lens Implantation.

Introduction

Ectopia lentis is the dislocation or displacement of the physiologic crystalline lens either due to trauma or due to non-traumatic etiology. Non-traumatic ectopic lens can be associated with systemic disease and/or hereditary causes [1]. It can occur as a manifestation of Marfan syndrome, homocystinuria, Weill Marchesani syndrome, hyperlysinemia, and sulfite oxidase deficiency. It may also occur as an isolated abnormality in otherwise healthy individuals such as in essential familial ectopia lentis or isolated idiopathic ectopia lentis [2].

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Marfan syndrome, Weill–Marchesani syndrome, and homocystinuria account for more than 75% of reported non-traumatic lens displacements. Up to 80% of patients with Marfan syndrome develop ectopia lentis, and 50% of these cases occur before 5 years of age. Up to 90% of patients with homocystinuria experience inferonasal lens displacement. All patients with non-traumatic lens dislocation without an obvious cause should undergo biochemical screening for homocystinuria [3].

The major symptom of ectopia lentis is decreased visual acuity because the progressive subluxation of the lens can cause frequent refractive changes and significant irregular astigmatism. Intermittent phakic and aphakic visual axes due to movement of the subluxated lens can also occur. In children, the optical defocus caused by severe astigmatism and frequent aphakia can cause amblyopia. Monocular diplopia also can occur. Displacement of the lens in the anterior chamber can induce acute angle-closure glaucoma [4,5]. Displacement of the lens into the vitreous cavity may cause lens protein-induced uveitis, vitreoretinal traction, and retinal detachment [4,5].

Management of an ectopia lens is challenging because of the risk of developing amblyopia. Most cases can be managed conservatively [6]. Medical treatment includes frequent cycloplegic refractions, spectacle or contact- lens vision correction and monitoring for amblyopia [1]. However, some patients fail to achieve optimal vision with conservative management [7,8]. Surgery is required when a dislocated lens causes glaucoma, corneal endothelial damage or in cases of marked or progressive lens displacement causing subsequent poor vision and amblyopia [1, 7].

Since the introduction of vitrectomy instruments, successful removal of these lenses has been possible without the significant complications [9]. Historically surgery for ectopia lentis has been associated with frequent complications and is consistently identified as a risk factor for retinal detachment. The present study evaluated whether lensectomy is a risk factor for postoperative retinal detachment in ectopia lentis compared to retinal detachment in cases that were managed conservatively.

Materials and Methods

This retrospective study was approved by King Khaled Eye Specialist Hospital (KKESH) Institutional review board. A retrospective chart review was performed of 115 eyes (63 patients) with ectopia lentis who treated at KKESH from 1985 to 2017. In this study of non-traumatic cases of ectopia lentis, eyes were divided into two groups: eyes that underwent lensectomy and anterior vitrectomy with or without IOL implantation (surgical group) and; eyes that did not undergo any surgery (non-surgical group).

Only patients with non-traumatic ectopia lentis with 9 years or longer follow up were included in this study. Patients were

excluded if they had other causes of retinal detachment such as trauma or other risk factors for RD such as chorioretinal coloboma. Patients with Stickler syndrome were excluded. In the surgical group, the indication for lensectomy was ectopia lentis causing decreased BCVA or fluctuating refraction due to lens mobility, or a dislocated crystalline lenses in the anterior chamber. Patients in the surgical group underwent lensectomy and anterior vitrectomy with a limbal approach with anterior vitrectomy or through the pars plana with or without intraocular lens (IOL) implantation.

Data were collected on patient age, gender, history of amblyopia or other visually significant comorbidities, preoperative best corrected visual acuity (BCVA), preoperative cycloplegic refraction, anterior segment examination, dilated fundus examination, final BCVA, final subjective refraction. BCVA acuity was with a Snellen chart, or pictures as appropriate. Intraocular pressure (IOP) was measured using the Goldmann applanation tonometer when feasible or the Tono-Pen (Reichert, Inc., Depew, NY, USA) for uncooperative children. Posterior segment examination was performed using slit-lamp indirect ophthalmoscopy or B-scan ultrasound. The risk of developing retinal detachment in both groups was evaluated. The 95% confidence intervals (CI) were calculated. $P < 0.05$ was considered statistically significant.

Results

The study sample was comprised of 115 eyes of 63 patients with ectopia lentis. There were 36 (57.1%) males and 27 (42.9%) females. The median age of patients was 14 years (25% quartile, 8 years; minimum 2 years and maximum 55 years). The median follow up period was 13 years (25% quartile, 10 years, minimum 9 years and maximum 29 years).

The refractive error at the initial visit was due to the position of crystalline lenses. There were 18 eyes with high myopia (more than -6D), 2 eyes with moderate myopia (from -2 D to -6 D), 3 eyes with low myopia (less than -2 D), 53 emmetropic eyes, 4 eyes with low hyperopia (less than +6 D) and 36 eyes with high hyperopia (more than +6 D).

There were 74 eyes in the non-surgical group which were all were managed conservatively with either spectacles or contact lenses. These eyes had no indication for lensectomy. The surgical group was comprised of 41 eyes. In this group lensectomy was performed through a limbal approach 31 eyes and with a pars plana approach in 10 eyes. Twenty- two (19%) eyes in the surgical group underwent IOL implantation. Six patients received an iris fixated anterior chamber IOL, 13 patients received a scleral fixated phakic IOL, 3 patients received an anterior chamber IOL and 2 patients received a posterior chamber IOL with a capsular tension ring.

The overall incidence of retinal detachment ($n=25$) was 21.7% (95% CI: 17.7 to 25.4) among the 115 eyes included in this study. Retinal detachments occurred in 17 (23%) eyes

in the non-surgical group and 8 (19.5%) eyes in the surgical group ($P = 0.7$). The mean time interval between lensectomy and retinal detachment was 1.40 ± 2.80 years.

Discussion

This study found no differences in prevalence of retinal detachment among patients with non-traumatic ectopia lentis who were managed conservatively or with lensectomy with or without IOL implantation. For example, 23% of eyes in the non-surgical group and 19.5% of eyes in the surgical group developed retinal detachment over a mean follow up period of 13 years (range, 9 years to 29 years). Our outcomes concur with a retrospective study by Fan and colleagues [10] who reported 17 % of eyes (11 of 64 eyes) developed retinal detachment post- lensectomy and vitrectomy.

Eyes with ectopia lentis may be predisposed to retinal detachment due to zonular deficiency that causes a constant pull on the ora serrata, the liquefied and mobile vitreous gel, traction on vitreoretinal adhesion, and increased axial length, thus causing retinal thinning increasing the risk of detachment [11-12].

Three retrospective cohort studies [13-15] of ectopia lentis post-lensectomy with long-term follow-up reported outcomes that differ from our study. These studies reported 1 retinal detachment after blunt eye trauma in 42 eyes at 5 years follow-up [13] and no retinal detachments in 9 eyes at 10 years follow-up [14]. and no retinal detachment in 30 eyes at 13 years follow up [15].

The increasing severity of ectopia lentis and increasing axial myopia over time are considered risk factors for retinal detachment [12-15]. Lens movement is thought to exert excessive pulling forces on the lens zonules and, by extension, traction to the vitreous base [12-15]. Fan and colleagues found that the eyes that developed retinal detachments had more severe lens dislocation and greater axial myopia that increased over time [10]. They reported a mean axial length of 27 mm in eyes with retinal detachment compared to 25.4 mm in eyes that did not develop retinal detachment. Due to these factors, Manning and colleagues suggested that younger age at lensectomy in patients with ectopia lentis patients may protect against retinal detachment [15].

Increases in axial myopia and the severity of ectopia lentis over time may explain the higher incidence of retinal detachment in post-lensectomy eyes in our study compared to the previous studies [13-15]. The median age of the patients our study was 14 years and ranged to 55 years however, the aforementioned studies enrolled patients with a mean age of 5 years to 10 years. However, the axial length was not available in our study [13-15].

Surgically, the limbal approach for lens aspiration requires less instrumentation, and is safer because of limited

anterior vitrectomy without a posterior infusion line. The lack of posterior infusion minimizes traction and trauma to the zonules, iris and the vitreous [13,10]. Retinal detachment in ectopia lentis patients has been reported to occur between 1 month and 2 years post-lensectomy [13,15,10,16]. In our study the mean interval between lensectomy and retinal detachment was 1.40 ± 2.80 years.

We did not quantify the degree of lens dislocation and axial length was not assessed which precluded the correlation of the incidence of retinal detachment to the degree of dislocation or increasing axial length. Other limitations of this study include the small sample size and the retrospective nature which limits the conclusions. Additionally, the causes of lens subluxation varied and different pathologies may affect the risk of developing retinal detachment.

Conclusion

The outcomes of the current study do not statistically support the hypothesis that early lens aspiration and anterior vitrectomy in eyes with non-traumatic ectopia lentis mitigates the risk if developing retinal detachment. Prospective studies with larger sample sizes are warranted to investigate the effect this surgery on the incidence of retinal detachments.

Declarations

Ethics approval and consent to participate:

This study received ethical approval from the research department of King Khalid Eye specialized hospital, Riyadh, KSA.

Consent for publication: Not applicable.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions

All authors made significant contribution for the design of the study. Collection of data, preparation of the manuscript. All authors read and approved the final manuscript

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