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Sulcus Suture Fixation of a Foldable IOL over Preserved Capsule for Managing Lens Subluxation in Marfan's syndrom

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Abstract

Aim: To study the feasibility and efficacy of removal of the subluxated lens and sclera fixation of a foldable intraocular lens on top of the decentered preserved capsular bag. Patients and methods. Seventeen eyes of 10 patients (9 - 15 years) were done by phacoaspiration followed by trans-scleral fixation of foldable IOL in the sulcus on top of the decentered capsular bag of the subluxated lens.

Results: Postoperative refraction spherical equivalent amplitude ranged from 0.25 to 1.38 diopters with a mean of 1.35 ± 1.13 diopters. The final postoperative BCVA ranged from 6/18 to 6/6 with a mean of 6/9 (0.67 ± 0.25 decimal). Intraoperative complications were hyphema in one case and accidental small zonular injury without vitreous prolapsed during needle passage in two cases. Postoperative complications were transient iridocyclitis in one case. Posterior capsular opacification (PCO) occurred in all cases but in thirteen cases the bag gets contracted and the opacity was away from the visual axis and only four cases needed YAG posterior capsulotomy.

Conclusion: Combined sulcus and scleral fixation of foldable intraocular is a safe and effective method. This technique of keeping the decentered bag attached to the stretched zonules will prevent IOL tilt and avoid working on the vitreous with its known complications. Scleral fixation of the foldable IOL guarantees the long term stability and gets the benefits of small incision surgery.

Introduction

Marfan's syndrome is a connective tissue disorder characterized by skeletal, cardiac and ocular abnormalities. Lens subluxation occurs in 50-80% of the Marfan cases. It tends to be bilateral, symmetrical and displaced almost always toward the super temporal direction. Lens subluxation induces myopia and irregular astigmatism which are uncorrectable with glasses in most cases [1]. Many surgical techniques for removal of the subluxated lens were described. ICCE (Intracapsular cataract extraction) or ECCE (extracapsular cataract extraction) have been associated with many intra and postoperative complications including vitreous prolapse, CME (Cystoid macular edema), retinal detachment and endophthalmitis [2]. Parsplana lensectomy with closed system is proven to prevent scleral collapse and vitreous loss. After lens removal aphakia is corrected by glasses, contact lenses, anterior chamber IOL or sutured IOL to the iris or the sclera [3]. The aim of this work was to study the feasibility and efficacy of phaco-extraction of the subluxated lens and scleral fixation of a foldable intraocular lens (IOL) on top of the decentered capsular bag.

Materials and Methods

This prospective study was carried out in the ophthalmology department of Zagazig university hospitals in the period from May 2008 to November 2009. The study included 17 eyes of 10 patients with subluxated lens due to Marfan's syndrome (Figure 1). Informed, written consent was obtained from parents of all patients according to a protocol compliant with the Declaration of Helsinki and approved by our local ethics committee. Ophthalmic examination including preoperative refraction, best corrected visual acuity (BCVA), intraocular pressure (IOP) measurement, fundus examination and intraocular lens (IOL) power calculations using SRK II formula was performed. All cases were operated under general anesthesia after medical consultation. The follow up period ranged from 12 to 18 months. We certify that all applicable institutional and governmental regulations concerning the ethical use of human volunteers were followed during this research.

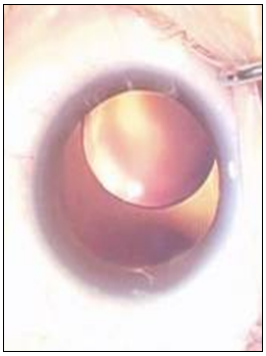

Figure 1: Subluxated lens in Marfan syndrome.

The surgical procedure

Two rectangular partial thickness 3 by 3 mm scleral flaps were placed at 4 and 10 o'clock positions in the right eyes and at 8 and 2 o'clock positions in the left eyes. Through a 3.5 mm clear corneal tunnel capsulorhexis, hydrodissection and irrigation/aspiration of the lens matter were performed leaving an empty decanted bag attached to the zonules (Figure 2). The anterior chamber was filled with viscoelastic substance and a double armed 10/0 prolene suture with straight needle (STC-610/0 Prolene 16 mm, 23 cm; Ethicon New Jersey, USA) was passed under the flap 1 mm behind the limbus to enter the posterior

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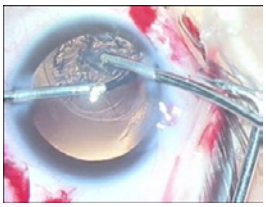

Figure 2: Lens removal by irrigation aspiration.

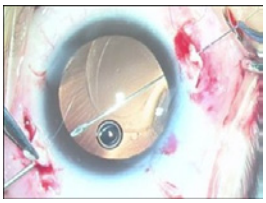

Figure 3: Passage of the needle above the bag.

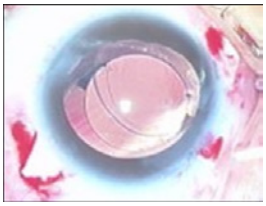

Figure 4: The foldable IOL is centered in the sulcus above the bag.

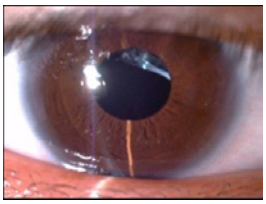

Figure 5: Postoperative view of the opacified decentered bag.

chamber and was passed above the empty decentered bag to be retrieved through a 27 gauge needle from below the other flap (Figure 3). The prolene suture was hooked out of the eye, through the main tunnel, cut and each end was tied to the corresponding haptic of the foldable IOL (Acrysof SA60, Alcon, Fort Worth. Texas). The knot was made in a 3, 2, 1 fashion just behind the terminal knob of the haptic. The knot was oriented outward to avoid twisting of the haptic. The IOL was folded and implanted then a gentle equal traction was applied until centeration was achieved (Figure 4). The needle on each side was passed in the sclera just in front of the exit making a loop on which the suture was tied. This was followed by closure of the scleral flaps and the conjunctiva. The corneal tunnel was closed by a 10/0 nylon suture after removal of the viscoelastic substance.

Results

This study was carried out on 17 eyes of 10 patients their age ranged between 9 and 15 years with a mean of 12.4 ± 2.12 years. They were 4 males and 6 females. The preoperative best corrected visual acuity (BCVA) ranged from 4/60 to 6/18 with a mean of 6/30 (0.20 ± 0.089 decimal). The power of intraocular lenses (IOLs) implanted ranged between 11 and 22 diopters with a mean of 17 ± 3.2 diopters. Postoperative refraction spherical equivalent amplitude ranged from 0.25 to 1.38 diopters with a mean of 1.35 ± 1.13 diopters. The postoperative cylindrical error amplitude ranged from 0 to 1.75 diopters with a mean of 0.71 ± 0.58 diopters. The postoperative intraocular pressure ranged from 13 to 17 mmHg with a mean of 14.47± 1.23 mmHg. The final postoperative BCVA ranged from 6/18 to 6/6 with a mean of 6/9 (0.67 ± 0.25 decimal). Intraoperative complications were hyphema occurred in one case and accidental small zonular injury without vitreous prolapse during needle passage in two cases. Postoperative complications were transient iridocyclitis occurred only in one case during the first two weeks and resolved with medical treatment. Posterior capsular opacification (PCO) occurred in all cases but in thirteen cases the bag gets contracted and the opacity was away from the visual axis (Figure 5) and only four cases needed YAG posterior capsulotomy.

Discussion

Many surgical techniques were described for the management of hereditary lens subluxation. Parsplana lensectomy with scleral fixation of either large optic PMMA or foldable IOLs gave favorable results in comparison with old techniques of ECCE or ICCE. Intraoperative complications were common as intraocular hemorrhage, hypotony with difficult needle passage and incomplete lens removal [4]. Working on the vitreous increases the incidence of postoperative cystoid macular edema, retinal detachment, glaucoma and endophthalmitis. Most of anterior segment surgeons are not familiar with parsplana lensectomy. Moreover two point scleral fixation of IOL carries the risk of IOL tilt due to lack of capsular support [5]. Other techniques tried to achieve centeration of the bag using CTR and Cionni ring followed by foldable IOL implantation in the bag [6,7]. This technique achieves a good degree of centeration but doesn't give safety if the process of zonulolysis continues throughout life [8]. And in many cases traction on the bag is so difficult due to strong zonules on one side so a good centeration can't be reached [9,10]. Our technique avoids working on the vitreous and with no disruption of the natural barrier between the anterior and posterior segment. It also prevents IOL tilt by the presence of the capsulozonular support behind the IOL. Fixation of the foldable IOL gives the advantages of small incision surgery. We used Acrysof SA60 (Alcon, Fort Worth, Texas) and tied the prolene suture just behind the terminal knob in each haptic which ensured equidistance of both knots. The knot is directed outwards so any traction on the suture will not cause twisting of the haptic with perfect IOL poisoning. The main concern is about PCO which can be reduced by large capsulorhexis, posterior capsule polishing and can be treated by YAG laser capsulotomy although in many cases the opacified bag contracted away from the center and need no interference. No cases of suture erosion, endophthalmitis or retinal detachment were detected.

Conclusion

Combined sulcus and scleral fixation of foldable intraocular lens for the management of hereditary lens subluxation in Marfan's syndrome is a safe and effective method. This technique of keeping the decentered bag attached to the stretched zonules will prevent any degree of IOL tilt and avoid working on the vitreous with its known complications. Scleral fixation of the foldable IOL guarantees the long term stability and gets the benefits of small incision surgery.

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