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Research Article

Two Ports via Ciliary Sulcus Vitrectomy with Modified Yamane Technique for Dislocated IOL

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Abstract

Purpose: To propose a new surgical technique that involves the realization of a via ciliary sulcus vitrectomy and the implantation of a sutureless scleral fixation IOL through only two sclerotomies with 27-gauge trocar. The aim is to develop a less invasive technique, reducing the number of surgical wounds compared to the commonly used techniques.

Methods: Two 27-gauge trocars are inserted at 3 and 9 o'clock, both 2 mm from the corneal limbus. The dislocated lens or IOL is removed and an anterior and, if necessary, posterior vitrectomy is performed through the same two trocars. Finally, a three-piece IOL is inserted and a scleral fixation without suture is performed according to the modified Yamane technique, making two flanges at the ends of the IOL haptics.

Results: The reduction of the number of surgical wounds allows for a lower risk of postoperative hypotony, a lower incidence of intra and post-operative complications and less patient discomfort in the postoperative period.

Conclusions: The technique we present for the implantation of a scleral fixation IOL without suture has the advantage of reducing the number of sclerotomies required, with a view to a less invasive surgery, and allowing both an anterior and posterior vitrectomy.

Keywords: Dislocation; Flanged haptics; Minimally invasive technique; Sutureless intrascleral intraocular lens fixation, Vitrectomy, Yamane technique

Introduction

In recent years several sutureless scleral fixation Intraocular Lens (IOL) implantation techniques with a three-piece IOL have been described for the treatment of aphakic patients or with lens or IOL dislocation who lack adequate capsular support. Insufficient capsular support is often secondary to trauma, previous complicated cataract surgery, pseudoexfoliation syndrome or Marfan syndrome [1,2]. The technique described by Yamane et al. [3] has become very popular, in which two 30-gauge thin-wall needles are used to engage and externalize the haptics of a 3-piece IOL, to minimize the size of the sclerotomies and therefore the risk of postoperative hypotony than previously used sutureless scleral fixation techniques. In a subsequent work, Yamane et al. [4] describes a new variant of the technique that involves the enlargement of the ends of the haptics induced by cauterization, to form flanges that increase the stability of the IOL decreasing the risk of dislocation. Multiple variations of the Yamane technique have been described, including some that use 27-gauge trocars instead of 30-gauge thin-wall needles to create scleral tunnels from which to externalize the haptics, suggesting greater versatility and handling in carrying out the procedure [5-13]. In this article we propose a new technique that involves the realization of a via ciliary sulcus vitrectomy and the implantation of a scleral fixation IOL without suture with a modified Yamane technique through only two sclerotomies with 27-gauge trocars. The aim is to develop a less invasive technique, reducing the number of surgical wounds compared to the commonly used techniques in which three sclerotomies are performed for vitrectomy and two others to extract the IOL haptics.

Surgical Technique

Two 27-gauge valved trocars are inserted at 3 and 9 o'clock, both 2 mm from the corneal limbus. The two trocars are inserted at 3 and 9 o'clock because these are the positions that most facilitate the execution of the vitrectomy. Furthermore, the eyes of patients who need to undergo this technique are affected by subluxation or dislocation of the lens/IOL, often related to Pseudoexfoliation Syndrome (PEX), trauma or other pathologies with the risk of developing ocular hypertony. Therefore in these patients it is useful to spare the conjunctiva and the sclera in the upper sectors for possible future glaucoma surgery.

Extrusion of Dislocated Lens/IOL and Vitrectomy

The Surgical Technique Differs Depending on the Situation that Arises:

Subluxated Cataract: In the case of subluxated cataracts, the corneal incision is performed at 12 o'clock by a 2.2 mm blade. A dispersive viscoelastic is introduced into the anterior chamber. A service corneal incision is made with a 15-degree blade, located at 90° clockwise from the main corneal incision. A continuous capsulorhexis is performed using a dedicated forceps. At this point, if necessary, four iris hooks can be placed at 1.30, 4.30, 7.30, 10.30 o'clock to support the anterior capsule. Finally, we proceed with the phacoemulsification of the cataract and the removal of the capsular sac.

Dislocated IOL in Vitreous Chamber: In the case of a dislocated IOL in the vitreous chamber, an anterior vitrectomy is first performed through the two trocars located at 3 and 9 o'clock, where the vitrectome and the infusion cannula are inserted, using the light emitted by the microscope. Subsequently, a service corneal incision is made with a 15-degree blade, located at 6 o'clock, in which the infusion cannula is inserted during the execution of the posterior vitrectomy, introducing the light source and the vitrectome into the two trocars at 3 and 9 o'clock. With a 27-gauge vitreous forceps the IOL is retrieved and brought to the anterior chamber. Once the IOL is placed on the iris, a corneal incision is made at 12 o'clock using a 2.2 mm blade. In the case of a folding IOL, the cut is widened to 3 mm and the IOL is extracted with forceps after folding it by introducing a spatula into the corneal incision at 6 o'clock (Figure 1). In the case of rigid IOL, the cut is widened to 5.5 mm and the IOL is extracted with forceps without being bent.

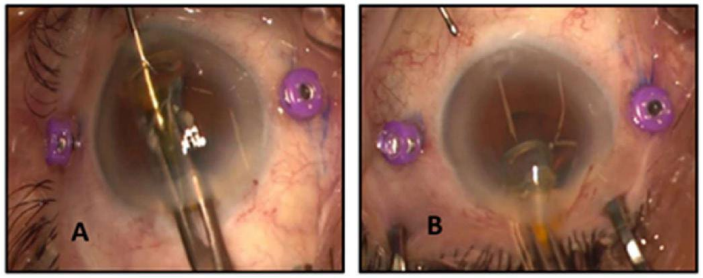

Figure 1: Extraction of the subluxated IOL without cutting it. The IOL is bent with the use of forceps and a spatula **(A),** it is extracted through the main corneal incision **(B).**

Subluxated IOL: In the case of subluxated IOL, the corneal incision is performed at 12 o'clock by a 2.2 mm blade. A dispersive viscoelastic is introduced into the anterior chamber. A service corneal incision is made with a 15-degree blade, located at 6 o'clock. The IOL is grasped with forceps, brought to the anterior chamber and placed on the iris. From here we proceed with the removal of the IOL as previously described in the case of the IOL dislocated in the vitreous chamber. In the case of cataract or IOL subluxation, after having removed them, an anterior vitrectomy is performed through the two trocars located at 3 and 9 o'clock, where the vitrectome and the infusion cannula are inserted, using the light emitted by the microscope. After the anterior vitrectomy, the retinal periphery is checked under indentation, introducing the infusion cannula in one trocar and the light source in the other.

IOL Injection and Fixation

A dispersive viscoelastic is introduced into the anterior chamber and a 3-piece acrylic IOL is inserted through the main corneal incision by an injector. The leading haptic is inserted behind the iris and at the same time it is grasped with a 27-gauge vitreous forceps inserted in one of the two trocars, while the trailing haptic is held outside the anterior chamber to prevent the IOL from falling into the vitreous chamber (Figure 2). The leading haptic is externalized on the conjunctiva with the extraction first of the trocar and then of the 27-gauge vitreous forceps that holds it (Figure 3). At this point the end of the haptic is cauterized to form a flange. The trailing haptic is brought into the vitreous chamber with a forceps, where it is grasped with a 27-gauge vitreous forceps inserted in the second trocar still in place (Figure 4). Similarly to the first haptic, the second one is also externalized with the extraction of the trocar and the forceps and a flange is formed at the end of

the haptic through cauterization. The flanges of the haptics are then pushed back and covered with the conjunctiva. The main corneal incision is sutured with 10/0 Nylon while hydration is performed to the service corneal incision.

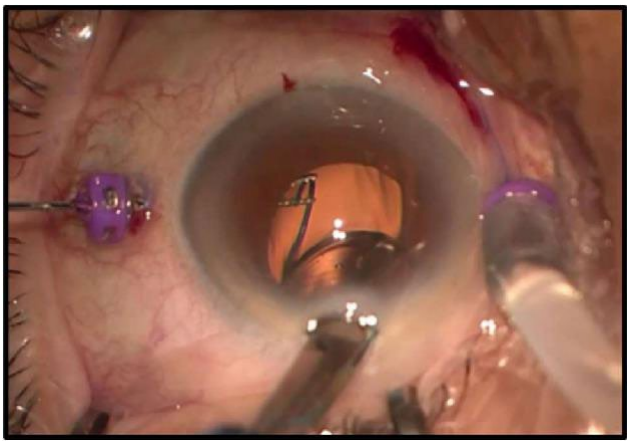

Figure 2: Injection of the IOL into the anterior chamber. The leading haptic is grasped with a 27-gauge vitreous forceps inserted into the trocar.

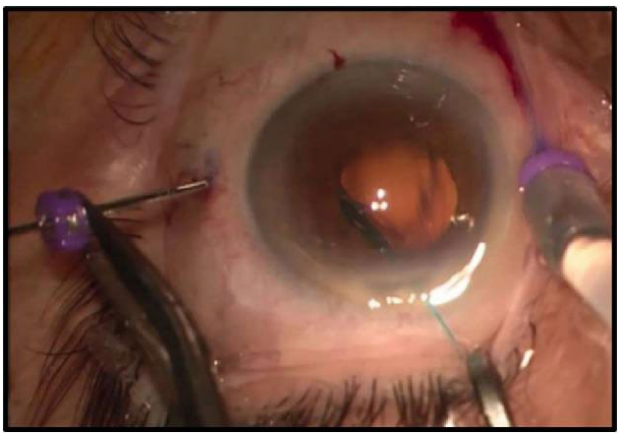

Figure 3: Haptic externalization. We proceed first with the extraction of the trocar and then with the extraction of the 27-gauge vitreous forceps with the consequent externalization of the haptic.

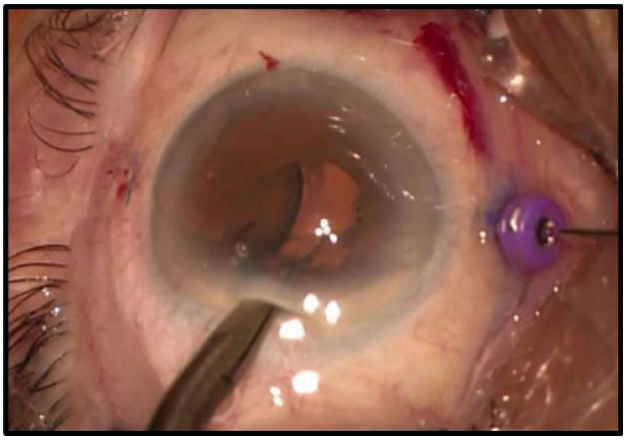

Figure 4: Fixation of the trailing haptic. The trailing haptic is brought into the vitreous chamber with forceps where it is grasped with a 27-gauge vitreous forceps inserted in the second trocar.

Discussion

IOL scleral fixation technique by forming flanges on the ends of the haptics proposed by Yamane et al. [4] has become very popular and several variations have started to spread. In particular, the stabilization of the IOL haptics using 27-gauge trocars, instead of the 30-gauge thin-wall needles as described by the original Yamane technique, is more manageable especially for surgeons who already have experience of vitreous-retinal surgery, as Walsh et al. describes in his work [5]. The author indicates that the use of trocars allows several advantages including an easier externalization of the haptics, both because it is no longer necessary to insert their ends into narrow needles and because it is possible to externalize one haptic at a time without having to do it for all and two simultaneously. However, the need for these patients without capsular support to undergo a vitrectomy means that the affected eyes must undergo at least five sclerotomies, counting the three standard accesses for vitrectomy and the two others for fixation of the haptics. The technique we present in this work has the advantage of reducing the number of sclerotomies required, performing a less invasive surgery. By reducing the number of surgical wounds, a lower risk of postoperative hypotony, a lower

incidence of intra and postoperative complications and less patient discomfort in the postoperative period is expected.

Ishikawa et al. proposed in his work [8] a modified Yamane technique that reduces the number of sclerotomies to only three accesses necessary to perform a vitrectomy. Instead of making two new accesses to insert the two 27-gauge needles to fix and stabilize the IOL haptics, the needles are inserted into two of the three trocars used to perform the vitrectomy, thus avoiding two surgical wounds compared to the original Yamane technique. In his study Ishikawa compared the two techniques, highlighting that there are no differences in terms of postoperative visual acuity between one technique and the other. In this context, the technique that we present aims to further reduce the number of sclerotomies necessary, making only two accesses, one at 3 and one at 9 o'clock, both at 2 mm from the corneal limbus. The same two accesses can also be used for an anterior and posterior vitrectomy. In this way an IOL scleral fixation technique is standardized and can be adaptable to any eventuality: vitrectomized eyes, non-vitrectomized eyes in which only anterior vitrectomy is required, non-vitrectomized eyes in which a complete vitrectomy is required.

This technique also involves performing an anterior vitrectomy via ciliary sulcus and this aspect allows to reduce the ensuing vitreous tractions compared to an anterior vitrectomy via a limbal access.

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