Sutureless intrascleral intraocular lens implantation after ocular trauma

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PURPOSE: To report the results and safety of sutureless intrascleral haptic fixation in traumatized eyes and to compare this procedure with retropupillary iris-claw intraocular lens (IOL) fixation.

SETTING: University Hospital of Strasbourg, Strasbourg, France.

DESIGN: Interventional case series.

METHODS: Patients with traumatic cataract and severely damaged capsular bags were divided into 2 groups (Group 1: intrascleral IOLs [Acrysof MN60 AC]; Group 2: retropupillary iris-claw IOLs [Verisyse]). The main outcome was the final visual acuity. The surgically induced astigmatism (SIA) was calculated by the vectorial method.

RESULTS: Twenty-six eyes of 23 patients were studied, 8 eyes in Group 1 and 18 eyes in Group 2. The mean follow-up was 14 months. There was no difference in corrected distance visual acuity (CDVA) at the time of the surgery ($P>.05$). The mean CDVA (logMAR) was 1.68 $\pm$ 1.15 (SD) preoperatively and 0.55 $\pm$ 0.9 postoperatively in Group 1 ($P = .03$) and 1.11 $\pm$ 1.13 and 0.32 $\pm$ 0.47, respectively, in Group 2 ($P = .003$). The final CDVA was not different between groups ($P>.05$). The mean SIA was 1.91 $\pm$ 1.66 diopters (D) in Group 1 and 2.74 $\pm$ 1.92 D in Group 2 ($P>.05$). No intraoperative complications occurred in Group 2; a haptic broke in Group 1. Macular edema occurred in both groups.

CONCLUSIONS: Sutureless intrascleral IOLs corrected posttraumatic aphakia. The SIA was comparable between groups. This procedure should be considered after trauma when other implantation techniques are not possible.

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Online Video

Cataract formation or lens dislocation is commonly observed as a result of direct injury by a foreign object or of blunt trauma to the globe.[1,2] In most cases, the traumatic cataract leads to loss of vision and requires lens removal. In this context, damage to the zonules and/or to the iris is frequent. Because capsule support is often missing in these traumatized eyes, implantation of a standard posterior chamber intraocular lens (PC IOL) in the crystalline bag or in the sulcus is not always possible. The alternative options are implantation of an angle-supported anterior chamber IOL (AC IOL), a PC IOL sutured to the sclera, or an iris-supported PC IOL when the iris is intact. More recently, a technique of sutureless intrascleral haptic fixation was described with several variants.[3,4] Because each technique has advantages and specific complications, it is difficult to determine which is the most suitable for the management of traumatic cataract or lens dislocation. Sutureless intrascleral implantation seems to be an interesting option because it relies on the injection of a 3-piece foldable IOL through a 3.0 mm corneal incision. In this study, we compared the clinical outcomes of sutureless intrascleral 3-piece acrylic IOL implantation with those of retropupillary fixation of an iris-claw IOL in eyes having traumatic cataract or lens dislocation.

PATIENTS AND METHODS

A retrospective review of files was performed between December 2009 and June 2011 to identify patients with acute traumatic cataract or lens dislocation who had lens

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extraction after blunt trauma. All patients had a pars plana vitrectomy combined with cataract surgery. The IOL implantation was performed during the same procedure or in a delayed manner. Two groups of patients were constituted. Group 1 comprised aphakic patients who had sutureless intrascleral IOL implantation. Group 2 comprised patients who had had retropupillary iris-claw IOL fixation.

The data retrieved from the files included age, cause of the ocular trauma, initial corrected distance visual acuity (CDVA), preoperative biometry, type and power of the implanted IOL, length of follow-up, final visual acuity, and refraction. Spectral optical coherence tomography imaging (Spectralis, Heidelberg Engineering) of the macula with central macular thickness measurements was also performed during the follow-up. Control visits were scheduled at 1 week and 1, 3, 6, and 12 months. The astigmatism induced by the surgery was measured by a vectorial method. Each astigmatic value was considered to be a vector quantity with a magnitude as well as a direction; then, the vectors were drawn manually. The vector-analysis method has been described.[A] Preoperative biometry was performed in both groups using the IOLMaster device (Carl Zeiss Meditec AG) the SRK/T formula.[5]

Surgical Technique

Central or complete 23-gauge vitrectomy was performed in both groups under general anesthesia before the IOL implantation.

Group 1: Sutureless Intrascleral Intraocular Lens Implantation First, 4.0 mm fornix-based peritomies were made temporally and nasally. A superior 3.0 mm corneal tunnel incision was created. Sodium hyaluronate 3.0%–chondroitin sulfate 4.0% (Viscoat) was infused into the anterior chamber to protect the corneal endothelium. A 23-gauge cannula was introduced at 2.0 mm of the limbus at a 7 o'clock position and maintained while a foldable Acrysof MN60AC IOL (Alcon Laboratories, Inc.; 13.0 mm length, 6.0 mm anterior asymmetric biconvex optic, 10-degree monoflex haptics) was partially injected through the corneal incision. The exteriorization of the haptics was a key step in the procedure: The tip of the haptic was introduced into the end orifice of the 23-gauge catheter needle, which served as a guide for the haptic to cross the sclera (Figure 1, *A*) (Video, available at http://jcrsjournal.org). When approximately 3.0 mm of the haptic tip was introduced in the needle lumen, the latter was gently removed from the sclera to externalize the haptic. The haptic was then grabbed with a forceps by the aide and maintained in this position. Next, the injection was resumed until full intraocular deployment of the IOL. The same 23-gauge catheter needle was introduced exactly 180 degrees from the first entry point, and the same maneuvers were performed with the tailing haptic to externalize it. At this stage, the 2 haptics were on either side of the limbus (Figure 1, *A*, *arrows*). The degree of IOL centration could be assessed and corrected if necessary. Haptics were buried under 3.0 mm scleral flaps sealed with 10-0 nylon buried sutures to avoid conjunctival erosion. The conjunctiva was closed with 8-0 polyglactin (Vicryl) sutures (Figure 1) (Video, available at http://jcrsjournal.org).

Group 2: Retropupillary Iris-Claw Fixation One paracentesis was created at the 9 o'clock position. A 5.0 to 6.0 mm corneal tunnel incision was made superiorly. A cohesive ophthalmic viscosurgical device (OVD) gel was injected to protect the corneal endothelium. A Verisyse IOL (Abbott Medical Optics, Inc.) was inserted with a forceps, with the vaulting optic leading posteriorly. The haptics were rotated with a hook to reach a horizontal position. The center of the optic was handled tightly with a forceps, and the haptics were placed 1 after the other behind the iris through the pupil before being clipped to the iris by pushing the iris with the hook against the slotted center of the haptic (Figure 1, *B*). The OVD gel was removed and the incision sealed with 3 or 4 10-0 nylon buried sutures.

The surgical procedures were recorded and the time of IOL implantation was counted for every patient.

Statistical Analysis

All values represent the mean ± standard deviation. Descriptive statistics and nonparametric Mann-Whitney tests were used for statistical comparisons between groups, and Wilcoxon tests for comparison between before surgery and after surgery. A *P* value less than 0.05 was considered significant. Statistics were calculated using Graphpad Instat software (Graphpad Instat, Inc.). Induced astigmatism was calculated through the vectorial technique.

RESULTS

Table 1 shows the epidemiologic data and the initial and final visual acuities in all eyes.

Group 1

Eight eyes of 8 patients (5 men, 3 women) had sutureless intrascleral IOL implantation. The mean age in this group was 55.1 ± 23.3 years and the mean axial length, 23.7 ± 0.5 mm. The mean delay between the aphakic state and implantation was 7.4 ± 7.1 months.

The mean time of the surgical procedure was 50.5 minutes ± 10.2 (SD). The learning curve played a role in the surgical time. There was a 20-minute additional time between the last and the first procedures. However, the longer time in Group 1 was principally related to the creation of scleral flaps to avoid haptic exposure.

Six eyes (75%) obtained a final CDVA of 20/40 or better. No patient had a drop in CDVA. Before surgery, the mean CDVA was 1.68 ± 1.15 (median 1.65; 95% confidence interval (CI), 0.71-2.64). It improved

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