Secondary Intraocular Lenses in Eyes with Aphakia or Dislocated IOL: Impact Of Suture Fixation On Early And Late Complications

Sekundäre IOL-Implantation bei Aphakie, Kernfragment-Versenkung und IOL-Dislokation: die Rolle der Nahtfixation auf frühe und späte Komplikationen

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Schlüsselwörter
- sekundäre Kunstlinsen-Implantation
- IOL
- Nahtfixierung
- postoperative Komplikationen
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- Kunstlinsen-Luxation
- Makulaödem

Key words
- secondary IOL implantation
- suture fixation
- cystoid macular edema
- postoperative complications
- cataract surgery
- IOL luxation
- aphakia

Zusammenfassung

Hintergrund: Die sekundäre Kunstlinsen-Implantation ist mit einem erhöhten Risiko früher und später postoperativer Komplikationen, namentlich Amotio und Endophthalmitis, vergesellschaftet. In der vorliegenden Fallserie wurde deshalb das eigene konsekutive Patientenkollektiv entsprechend der IOL-Fixationstechnik stratifiziert und die Ergebnisse und Komplikationen erfasst.

Patienten und Methoden: Retrospektiv wurden die Daten einer konsekutiven Serie eigener Patienten ausgewertet, die durch zwei Chirurgen in Bern in einem Zeitraum von acht Jahren eine sekundäre IOL-Implantation mit oder ohne Nahtfixation erhalten hatten und über mindestens vier Monate nachuntersucht worden waren.

Ergebnisse: 75 Patienten erhielten eine sulkusgestützte IOL ohne Nahtfixation (Gruppe 1), in 137 Fällen wurde eine IOL-Nahtfixation (Gruppe 2) zur Positionierung der IOL benötigt. Eine Visusverbesserung wurde in beiden Gruppen erreicht (Gruppe 1: präoperativ 0,36 ± 0,39 (0,01 – 1,2), postoperativ 0,73 ± 0,33 (0,02 – 1,0; p = 0,18); Gruppe 2: präoperativ 0,33 ± 0,34 (0,02 – 1,0), postoperativ 0,46 ± 0,33 (0,01 – 1,0; p = 0,006), der Visusanstieg war jedoch größer, wenn eine Nahtfixation nicht erforderlich war (p = 0,012). Eine Endophakoemulsifikation war in der Gruppe ohne Nahtfixation häufiger erforderlich (12,7 vs. 5,3%). Netzhautdefekte (10,6 vs. 8,6%) und Netzhautablösung (5,3 vs. 2,2%) wurden in gleicher Häufigkeit diagnostiziert. In der frühen postoperativen Phase war der Augendruck bei Nahtfixation niedriger, ebenso die Häufigkeit kleinerer Glaskörperblutungen und eines zystoiden Makula-Oedems (5,3 vs. 8,0%), die Spätkomplikationen waren aber in beiden Gruppen gleich verteilt.

Schlussfolgerungen: Die präoperative Situation der vorderen Augenabschnitte und das postoperative Auftreten eines zystoiden Makula-

Abstract

Background: Secondary intraocular lens (IOL) implantation is exposed to an increased risk of complications, including endophthalmitis and retinal detachment. The present analysis compares the outcomes and complications experienced in our own series of patients.

Patients and Methods: We retrospectively reviewed a consecutive series of secondary posterior chamber IOL implantations performed in a single centre, two surgeon setting over a period of 8 years and with a follow up-time of at least 4 months.

Results: Between 1997 and 2005, 75 patients received a sulcus-supported secondary IOL without suture fixation, whereas suture fixation was required in 137 instances. Visual acuity improved in both groups (group 1: from 0.36 ± 0.39 (0.01 – 1.2) to 0.73 ± 0.33 (0.02 – 1.0; p = 0.18); group 2: from 0.33 ± 0.34 (0.02 – 1.0) to 0.46 ± 0.33 (0.01 – 1.0; p = 0.006), but more pronounced in eyes not requiring suture fixation (p = 0.012). IOL placement was more likely to be combined with endophakoemulsification in the not suture-fixed IOLs (12.7 vs. 5.3%). In contrast, retinal tears (10.6 vs. 8.6%, respectively) and retinal detachment (5.3 vs. 2.2%, respectively) were equally distributed. In the early postoperative phase, IOP was lower in suture-fixed eyes, which showed a higher incidence of minor intraocular haemorrhages and cystoid macular edema (5.3 vs. 8.0%); late complications up to 5 years postoperatively were equally distributed.

Conclusion: A preoperatively less complicated anterior segment situation and a lower incidence of postoperative macular edema may account for a better visual outcome after placement of a sulcus supported IOLs without suturing. If required, suture fixation may be performed without exposing the eye to an increased risk of late postoperative complications.

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ödems bei Nahtfixation erklären vermutlich den besseren Endvisus der Augen, die eine Sekundärimplantation ohne Nahtfixation erhielten. Wenn eine Nahtfixation sinnvoll erscheint, so ist sie nicht mit einem erhöhten Risiko für Spätkomplikationen vergesellschaftet.

Introduction

Options for the secondary implantation of an intraocular lens (IOL) in aphakic eyes or those with a luxated IOL and insufficient capsular support include the implantation of an anterior chamber IOL, an iris fixed IOL (Artisan®, Verisyze®) and a suture fixed posterior chamber IOL. The anatomic situation in secondary IOL implantation is frequently compromised due to pre-existing secondary tissue damage including reduced corneal transparency, namely due to corneo-endothelial atrophy, iris pathology with sphincter damage, secondary glaucoma and macular scars [12]. These arise in consequence of severe ocular trauma (5 – 10%), complicated cataract surgery (60 – 75%), complex vitreoretinal surgery (8 – 15%) or for endogenous reasons, such as in Marfan's disease, pseudoexfolation syndrome or idiopathically (15 – 30%) [3, 4, 9, 25].

The suture fixation of an IOL is deemed to be a safe option for secondary implantation in cases of insufficient capsular or zonular support [13, 22]. Erosion of the suture material with redislocation of the IOL is a recognised complication, requiring a re-fixation of the IOL after several years. Consequently, the primary care nowadays tends towards the implantation of iris-fixed IOLs [1, 10, 14]. In case of a dislocated IOL, an exchange of the IOL implies a significant surgical trauma, namely to the corneal endothelium, which is not obviously so well tolerated, depending on the pre-existing tissue damage. Moreover, the exchange with an iris-fixed IOL requires a stable iris situation which is not given in any case. In this situation, suture fixation of an IOL which already lies within the eye may be an interesting option, if it does not interfere with retinal stability or visual outcome [11].

We therefore wished to assess the impact of suture fixation in the setting of secondary implantation of a posterior chamber IOL on the postoperative outcome, regarding visual function, refractive error, secondary IOL decentration, intraocular pressure dysregulation, macular edema and retinal detachment.

Patients and Methods

In this observational case series, patients were included who were referred to the Vitreoretinal Clinic, Department of Ophthalmology, University of Bern between 1997 and 2005 for treatment of their functional aphakia (aphakia, dislocated lens or intraocular lens), as identified from the internal vitreoretinal surgery survey. Patients were divided into two groups according to the stability of capsular or zonular support for an intraocular lens. If the support was deemed to be sufficient, the IOL was placed into the sulcus without suturing (Group 1: n = 75; age 66 [26 – 91] years), if not, the IOL was fixed with two Prolene 10 – 0 sutures using a transscleral suturing technique (Group 2; n = 137; age 68 [20 – 97] years). Patients who were younger than 18 years (n = 7), who had received an anterior chamber or iris-supported IOL (n = 17), after combined surgery, including penetrating keratoplasty (n = 4) or who had a follow-up of less than four months (n = 33) were excluded.

The age and gender of each patient, as well as information respecting the situation of the IOL and previously performed surgeries, intraoperative complications, were recorded together with the functional and anatomic findings on admission. In patients whose retinal visibility was preoperatively reduced, the preoperative data were supplemented with intraoperative findings.

Data relating to secondary IOL implantation surgery

The type of surgery performed, the duration of surgery, specific intraoperative findings relating to surgery, and the type of anaesthesia administered, were recorded for each patient.

On admission, all eyes had been subjected to a thorough examination. All patients undergoing surgical correction were scheduled for postoperative visits on day 1, after 1 – 2 weeks, and after 1 and 4 – 9 months. On each occasion, information regarding the following parameters was recorded: best-corrected decimal visual acuity (BCVA), intraocular pressure (IOP), and anterior- and posterior-segment morphology, which included a description of the centration of the intraocular lens, of pre-existing and new pathologies of the optic-nerve head, the macula and the peripheral retina, and of any optically relevant irregularities and disturbances. Additional examinations were performed if new or changing ocular signs or symptoms became manifest. Hypertension was defined as an IOP above 21 mmHg whereas hypotony was defined as one below 6 mmHg.

The statistical analysis was performed using SPSS for Windows version 11.5 (Chicago, Illinois; USA). Quantitative data were expressed as means (± standard deviations), and minimal and maximal values (range). Qualitative data were displayed in absolute numbers and percentages. The data were confirmed to be normally distributed using Shapiro-Wilk statistics. Qualitative data were compared using Pearson's chi-square test. Quantitative data were compared by t-test. Differences between sets of data were considered to be significant if p values were ≤ 0.05 (on the basis of two-tailed tests).

Results

The most frequent cause for functional aphakia was iatrogenic (56%), followed by endogenous (idiopathic or pseudoexfoliation glaucoma associated zonular instability; **Fig. 1**). In group 1 visual acuity improved from 0.36 ± 0.39 (0.01 – 1.2) to 0.73 ± 0.33 (0.02 – 1.0; p = 0.18), whereas in group 2 visual acuity improved from 0.33 ± 0.34 (0.02 – 1.0) to 0.46 ± 0.33 (0.01 – 1.0; p = 0.006). Thus, final visual acuity was significantly better in eyes with a sulcus supported IOL (group 1) compared to those with a suture fixed IOL (group 2; **Fig. 2**; p = 0.012). The compensation of the refractive error at last examination was well comparable between the two groups regarding spheric (**Fig. 3a**) and cylindric (**Fig. 3b**) corrections.

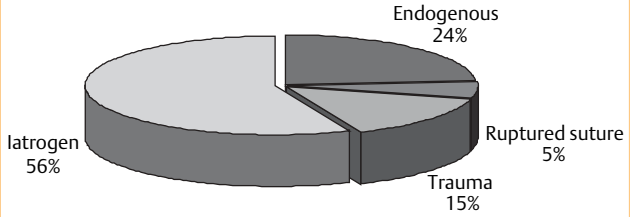

Fig. 1 Underlying pathology necessitating secondary IOL placement: The majority of patients referred for secondary IOL placement had previously undergone complicated cataract surgery.

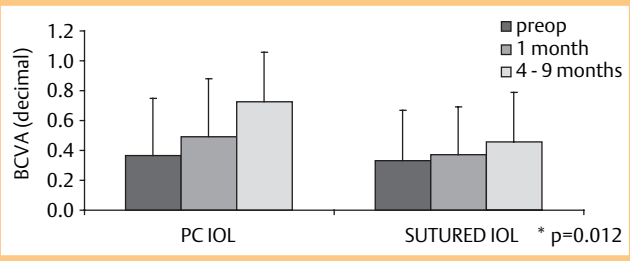

Fig. 2 Visual outcomes after secondary implantation of a posterior chamber IOL are more favourable without (PC IOL) than with suturing (Sutured IOL).

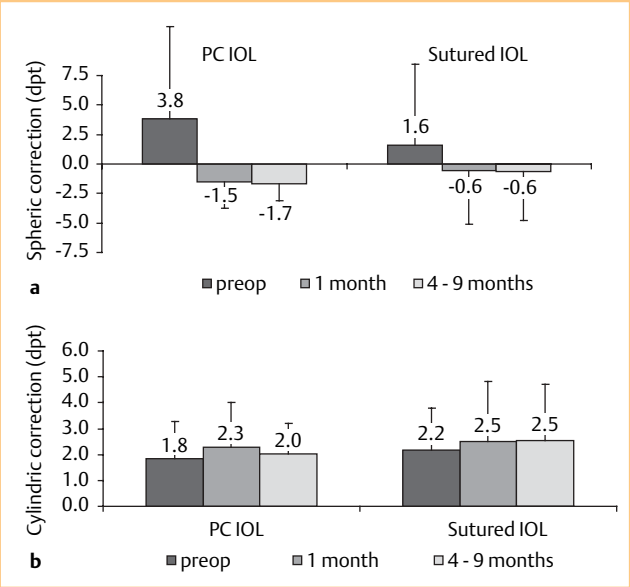

Fig. 3 **a** The residual spheric refractive error after secondary implantation of a posterior chamber IOL is comparable without (PC IOL) and with suturing (Sutured IOL). **b** The astigmatism at the last examination after secondary implantation of a posterior chamber IOL tends to be slightly less without (PC IOL) than with suturing (Sutured IOL).

Moreover, suture fixation had no impact on the intraocular pressure at last examination (▶ **Fig. 4**).

As expected, the duration of surgery was shorter if suture fixation was not necessary (group 1: 70.5 ± 24.1 [25 – 150] min; group 2: 87.3 ± 42.1 [15 – 260] min; p = 0.002). Complications were equally distributed between both groups, but corneo-endothelial decompensation, postoperative macular edema and

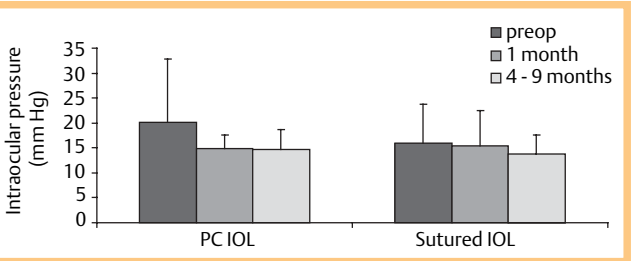

Fig **4** The intraocular pressure (IOP) after secondary implantation of a posterior chamber IOL may be lower in the early postoperative phase after suture fixation, but similar at the last examination without (PC IOL) and with suturing (Sutured IOL).

Table 1 Early and late complications after secondary intraocular lens (IOL) implantation without (PC IOL) and with suturing (Sutured IOL)

complication	PC IOL	sutured IOL
corneal decompensation	4 (5.3 %)	11 (8.0 %)
hypotony	3 (4.0 %)	1 (0.7 %)
decompensated glaucoma	0	4 (2.9 %)
IOL subluxation	8 (10.7 %)	7 (5.1 %)
new suture fixation	8 (10.7 %)	4 (2.9 %)
IOL exchange	4 (5.3 %)	3 (2.2 %)
vitreous hemorrhage	4 (5.3 %)	4 (2.9 %)
newly observed retinal detachment	4 (5.3 %)	4 (2.9 %)
newly observed retinal break	1 (1.3 %)	0
postoperative macular edema	4 (5.3 %)	11 (8.0 %)
optic atrophy	1 (1.3 %)	4 (2.9 %)
diplopia	1 (1.3 %)	0

secondary optic atrophy were more frequently observed in suture-fixed IOLs, whereas IOL subluxation requiring secondary suturing of the IOL was, as expected, more frequently found in the first group of sulcus-supported IOL (▶ **Table 1**).

Discussion

This study directly compared secondary IOL placement without and with suture fixation, thus allowing us to estimate the impact of suturing itself. Our data support that suture fixation itself has a low impact on late complications, as described previously [2, 6, 7, 17, 18, 25], although the anatomic ground is more delicate in eyes requiring suture fixation, as evidenced by the significantly higher rate of corneo-endothelial dysfunction in this group. The operation times are significantly longer which has been reported previously [5], but the primary positioning of the intraocular lens is more stable than in eyes with sulcus-supported lenses, which is well in accord with published evidence [19, 26]. The relative risk for the development of a postoperative cystoid macular edema (CME) is 1.5-fold higher in eyes requiring suture fixation. In a larger series, Lanzetta [15, 16] and Mimura [20] described incidences of CME of 5.6% in sulcus-supported IOLs compared to 8.3% in suture-fixed IOLs. But CME may not be the only reason for a reduced visual expectation. A more delicate anatomic ground due to the pre-existing surgical trauma prior to secondary IOL placement may account for a limited visual recovery. Not surprisingly, visual acuity at last examination was worse in our series (▶ **Fig. 2**) due to macula edema, optic atrophy and corneoendothelial decompensation (▶ **Table 1**).

Clearly, late rupture of the sutures is a possible disadvantage which has to be expected after approximately ten years from suture fixation according to our experience and may necessitate revision surgery [19, 23].

Our results indicate that the visual outcome is better if suture fixation is not required. Preoperative anterior segment findings and postoperative macular edema may partially account therefore. If the zonular support is not sufficient and an IOL is already within the eye the technique of suture fixation is still an option [21, 22]. However, if in an aphakic eye without zonular support a secondary IOL implantation is required we would tend to implant an iris-supported IOL depending on the preoperative anterior segment findings [8, 14]. Nevertheless, this decision has to be made on an individual basis in any case and should be left to surgical experience and discretion [24].

Conflict of Interest: None

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