

(3)

# Analysis of causes of intraocular lens explantations in the material of Department of Ophthalmology, Medical University of Lodz

*Analiza przyczyn eksplantacji soczewek wewnątrzgałkowych w materiale Kliniki Chorób Oczu Uniwersytetu Medycznego w Łodzi*

Wilczyński Michał, Wilczyńska Olena, Omulecki Wojciech

1<sup>st</sup> Chair and Department of Ophthalmology, Medical University of Lodz  
Head: Professor Omulecki Wojciech, MD, PhD

## Summary:

**Purpose:** Implantation of intraocular lenses (IOLs) has become a standard practice in cataract surgery, however, similar to any other type of surgery, using IOLs is not complication-free and sometimes explantation of intraocular lenses may be necessary. This study was to gather data and analyze causes of intraocular lens explantations, performed in the Department of Ophthalmology, Medical University of Łódź.

**Materials and methods:** The data were gathered from medical documentation of all patients who underwent intraocular lens removal from January 2003 to July 2006. The examined group consisted of 16 patients (16 eyes): 9 women (fraction 0.56), and 7 men (fraction 0.44), at the age from 21 to 82 years (mean age 62.4 years, SD  $\pm$  15.5). In all patients IOL explantation was performed under local, peribulbar anaesthesia.

**Results:** Two groups of patients were distinguished: patients who had an anterior chamber lens explanted (3 patients, fraction 0.19) and patients who underwent posterior chamber lens explantation (13 patients, fraction 0.81). Causes of AC IOL explantations were: vaulting of the IOL (1 eye, fraction 0.06), luxation of the IOL to the vitreous cavity (1 eye, fraction 0.06), and painful eyeball after anterior chamber lens implantation (1 eye, fraction 0.06). Causes of PC IOL explantations were: subluxation of the IOL (6 eyes, fraction 0.38), luxation of the lens to the vitreous cavity (3 eyes, fraction 0.19), luxation of the lens to the anterior chamber (1 eye, fraction 0.06), endophthalmitis (2 eyes, fraction 0.13) and incorrect lens power (1 eye, fraction 0.06).

**Conclusions :** In the majority of eyes (n = 13, fraction 0.81) the removed implant was replaced by another intraocular lens, but 3 eyes (fraction 0.19) were left aphakic. We did not observe serious intra- or early postoperative complications which might influence the final result of the operation.

## Słowa kluczowe:

eksplantacja, soczewki wewnątrzgałkowe, powikłania, chirurgia zaćmy, fakoemulsyfikacja.

## Key words:

explantation, intraocular lens, complications, cataract surgery, phacoemulsification.

## Introduction

Every cataract surgeon will encounter some complications in his practice, from time to time. Implantation of intraocular lenses (IOLs) has become a standard practice in cataract surgery, however, similar to any other type of surgery, using IOLs is not complication-free and sometimes explantation of artificial lenses may be necessary. In this study we have examined retrospectively a consecutive series of all patients undergoing artificial lens removal.

## Purpose

The purpose of the study was to gather data and analyze causes of intraocular lens explantations, performed in the Department of Ophthalmology, Medical University of Łódź.

The number of publications concerning this subject both in Polish and international literature is very limited.

## Material and methods

The data were gathered from medical documentation of all patients who underwent artificial intraocular lens removal from January 2003 to July 2006.

The following data were analyzed: age, gender, diagnosis and cause of IOL explantation, present and past ophthalmologic treatment, best corrected visual acuity measured preoperatively, 1 day and 7 days postoperatively, intraocular pressure and the state of the anterior and posterior segment evaluated by biomicroscopy and indirect ophthalmoscopy using a slit lamp and a Volk Superfield NC lens. We also evaluated presence of intraoperative and early postoperative complications.

In the records, we found 16 eyes in which IOL explantation was performed.

The examined group consisted of 16 eyes (16 patients): 9 women (fraction 0.56 of the examined group), and 7 men (frac-

tion 0.44), at the age from 21 to 82 years (mean age 62.4 years, standard deviation ± 15.5). In all patients IOL explantation was performed under local, peribulbar anaesthesia.

**Results**

Two groups of patients were identified: patients who had an anterior chamber lens explantation (3 patients, fraction 0.19) and patients who underwent posterior chamber lens explantation (13 patients, fraction 0.81). Causes of IOL explantation are shown in Table I. Patients are characterized in Table II.

Among the explanted intraocular lenses, posterior chamber implants prevailed. The most frequent causes of IOL explantation were either subluxation or complete luxation of the PC IOL to the vitreous cavity (in total these causes constituted a fraction of 0.62).

Best corrected visual acuity is shown in table 3. It can be observed that after an initial decrease in visual acuity in early postoperative period, there was an increase in the percentage of eyes with best corrected visual acuity better than 5/25 (fraction amounted to 0.56 preoperatively and increased to 0.88 seven days postoperatively) (Table III).

Visual acuity improved in 7 eyes (fraction 0.44), remained unchanged in 5 eyes (fraction 0.31) (improved or remained unchanged in 11 eyes in total, which constituted a fraction of 0.69), and decreased postoperatively in 5 eyes (fraction 0.31). The main reason for a postoperative decrease in visual acuity was corneal edema. The mean intraocular pressure was within normal range during the whole period of observation (Table IV).

In the examined group, in the majority of eyes (n = 13, fraction 0.81), the removed implant was replaced by another artificial lens, but 3 eyes (fraction 0.19), were left aphakic.

AC IOL/ Soczewka przedniokomorowa	Number/ Liczba	Fraction/ Frakcja
Dislocation and vaulting / Przemieszczenie i uwypuklenie	1	0.06
Luxation to the vitreous/ Zwichnięcie do ciała szklistego	1	0.06
Painful eye/ Bolesna gałka	1	0.06
<b>PC IOL/ Soczewka tylnokomorowa</b>		
Subluxation/ Podwichnięcie	6	0.38
Luxation to the vitreous/ Zwichnięcie do ciała szklistego	3	0.19
Luxation to the anterior chamber/ Zwichnięcie przedniej komory	1	0.06
Endophthalmitis/ Zapalenie wewnątrzgałkowe	2	0.13
Incorrect lens power/ Niewłaściwa moc wszczepu	1	0.06

Tab. I. Causes of AC and PC IOL explantation.

Tab. I. Przyczyny eksplantacji soczewek przednio- i tylnokomorowych.

Nr	Gender/ płeć	Age/ wiek	Cause of explantation/ przyczyna eksplantacji	Removed lens/ usunięta soczewka	Implanted lens/ wszczepiona soczewka	New lens' position/ umiejscowienie nowego wszczepu
1	M	21	SUBLX	PC	PC SF	Correct
2	F	74	AC-VLT	AC	AC	Correct
3	M	57	SUBLX	PC	AC	Correct
4	F	50	LUX-VB	AC	AC	Correct
5	F	75	SUBLX	PC	AC	Correct
6	F	43	SUBLX	PC	AC	Correct
7	M	60	LUX-VB	PC	AC	Correct
8	F	74	ILP	PC	PC	Correct
9	M	61	LUX-VB	PC	PC (sulcus)	Correct
10	M	77	LUX-VB	PC	AC	Correct
11	F	69	SUBLX	PC	AC	Correct
12	F	75	PE	AC	None	-
13	M	56	LUX-AC	PC	AC	Correct
14	F	66	ENDO	PC	None	-
15	M	58	SUBLX	PC	AC	Correct
16	F	82	ENDO	PC	None	-

Tab. II. Characteristics of patients.

Tab. II. Charakterystyka pacjentów.

**Legend/ Legenda:**

- SUBLX – subluxated lens/ podwichnięta soczewka
- AC-VLT – vaulting of AC IOL/ uwypuklenie wszczepu przedniokomorowego
- LUX-VB – luxation of the lens to the vitreous/ zwichnięcie wszczepu do ciała szklistego
- ILP – incorrect lens power/ niewłaściwa moc wszczepu
- PE – painful eyeball/ bolesna gałka
- LUX-AC – luxation of the PC IOL to the anterior chamber/ zwichnięcie wszczepu tylnokomorowego do przedniej komory
- ENDO – endophthalmitis/ zapalenie wewnątrzgałkowe

In the group of patients who had an anterior chamber lens removed, in 1 eye (fraction 0.06,) which had received an AC IOL because of aphakia, the AC IOL showed a marked vaulting towards the cornea because of a too large lens diameter. In this eye the removed implant was replaced with another anterior chamber lens.

In 1 eye with an AC IOL, a blunt trauma to the eye resulted in a luxation of the lens to the vitreous. Similarly, in this eye, after removing the luxated lens, another anterior chamber intraocular implant was used.

In the next case, the reason for AC IOL explantation was strong pain of the eyeball which started some time after the AC IOL was implanted. During an ophthalmic examination it turned out that the haptic of the IOL pierced the iris, it was also partially ingrown in the iris. After the implant was explanted, the eye was left aphakic, the previously-described pain disappeared.

In the group of patients, who had a posterior chamber lens (PC IOL) removed, in 6 eyes (fraction 0.38), there was a subluxation of the artificial lens. One patient from this group suffered from Marfan’s syndrome. In this patient the subluxated PC IOL

	Preoperatively/ Przed zabiegiem		1 day postoperatively/ 1 dzień po zabiegu		7 days postoperatively/ 7 dni po zabiegu	
	N	Fraction/ Frakcja	N	Fraction/ Frakcja	N	Fraction/ Frakcja
≤ 5/50	7	0.44	8	0.50	2	0.13
5/25 - 5/12	4	0.25	5	0.31	8	0.50
5/10 - 5/5	5	0.31	3	0.19	6	0.38

Tab. III. Best corrected visual acuity.

Tab. III. Ostrość wzroku z najlepszą korekcją.

To (mmHg)	Preoperatively/ Przed zabiegiem	1 day postoperatively/ 1 dzień po zabiegu	7 days postoperatively/ 7 dni po zabiegu
Mean	15.94	14.91	13.13
±SD	4.42	9.51	5.12

Tab. IV. Mean intraocular pressure (mmHg).

Tab. IV. Średnie ciśnienie wewnątrzgałkowe (mmHg).

was replaced with a sclerally-fixated PC IOL. In other patients from this group, the subluxated PC IOLs were replaced with an AC IOL.

In 3 eyes (fraction 0.187), with luxation of the PC IOL to the vitreous cavity, pars plana vitrectomy was performed with the use of perfluorocarbon liquid (DK-line), in order to elevate the artificial lens to the retropupillary space and to aid the exchange of the luxated lens for an AC IOL.

In 1 eye (fraction 0.06), the reason for IOL removal was luxation of the PC IOL to the anterior chamber. In this eye, after anterior vitrectomy was performed, and AC IOL was implanted.

In 1 eye (fraction 0.06), the reason for lens exchange was a biometric error in an eye with mature cataract. In this eye, a PC IOL was replaced with another PC IOL which was implanted in-the-bag.

In 2 eyes (fraction 0.13), the cause of PC IOL explantation was endophthalmitis with a thick inflammatory membrane on the surface of the IOL (in 1 eye the lens was also subluxated). In these eyes, explantation of the IOL was combined with pars plana vitrectomy and intravitreal injection of vancomycin. These eyes were left aphakic.

In the examined group we did not observe serious intraoperative complications. We found that in 2 eyes (fraction 0.13), there was a minor bleeding to the anterior chamber and in 1 eye (fraction 0.06,) there was a rupture of the haptics during explantation (the broken fragment of the haptic was subsequently removed completely).

Similarly, we did not observe early postoperative complications which might influence the final result of the procedure. We found that the most frequent early postoperative complications were: corneal edema (7 eyes, fraction 0.438), and Descemet's membrane folds (6 eyes, fraction 0.38). We also found other minor postoperative complications, such as: dispersed blood in the anterior chamber (2 eyes, fraction 0.13), transient intraocular pressure rise (2 eyes, fraction 0.13), minor fibrinoid

reaction in the anterior chamber (2 eyes, fraction 0.13), pupil deformation (1 eye, fraction 0.06), and transient hypotony (1 eye, fraction 0.06). Frequencies of the above-mentioned complications should not be added, as some of them occurred simultaneously.

## Discussion

In the literature, there have been a few papers published, analyzing causes of intraocular lens explantations. In many publications decentration or subluxation are frequent reasons for IOL removal. There are many possible complications of anterior chamber IOL dislocation, such as uveitis, glaucoma, hyphema, cystic macular edema and corneal decompensation. It is generally thought that complications of posterior chamber IOL dislocation are not so severe and include monocular aphakia, diplopia (which is caused by image shift due to prismatic effect), as well as glare. It is always reasonable to consider conservative observation and medication before the decision about surgery is made. In such cases it is also important to take into consideration the type and location of the lens, patient's age and symptoms, visual acuity, corneal endothelial cell count, the presence of intraocular inflammation and the status of the other eye (1).

Severe symptoms can be managed by either repositioning, explanting, or exchanging the IOL. Explantation of an AC IOL is usually performed in cases of chronic uveitis, glaucoma, hyphema syndrome (UGH), resistant to medical therapy, tenderness (often indicating a lens which is too large), luxation to the vitreous, as well as unwanted optical images (1).

If a posterior capsular remnant is present and offers adequate support, it may be possible to rotate the displaced PC IOL and to position it in the ciliary sulcus or replace it with a single-piece all-PMMA lens with a large diameter (13 mm), and position it in the ciliary sulcus. If this is not possible the lens may be replaced with a sclerally-sutured PC IOL or an AC IOL (also fixated to the iris) (1).

Walkow et al. (2) investigated causes of IOL dislocation and found that asymmetric implantation, asymmetric capsular shrinkage, posterior synechiae, rupture of the posterior capsule, zonular defects and extensive secondary cataract all caused dislocation of the IOL.

In a survey by Mamalis (3) the most frequent cause for IOL explantation was incorrect lens power (38%), glare and optical aberrations (31%), glare and optical aberrations combined with incorrect lens power and IOL dislocation (16%, and dislocation or decentration 15%), dislocation constituted 31% of cases in total.

In our study the number of cases with incorrect lens power was much smaller, on the other hand the percentage of dislocation or subluxation cases was similar.

In another paper Mamalis (4) stated that decentration or dislocation and incorrect lens power, as well as glare and optical aberrations are leading indications for explantation. He also noted that visual results after exchange of modern intraocular lenses are good, which is probably a result of a small number of severe complications leading to explantation of the lenses.

In a large study by Schmidbauer et al. (5) it was found that the most frequent reason for explantation was decentration or dislocation of the IOL. The authors have also found that in case

of foldable IOLs optic and haptic damage and posterior capsule rupture were more frequent than in rigid implants, whereas rigid lenses led more often to corneal decompensation.

In a survey conducted by Dick et al. (6), authors have found that the most frequent causes of IOL explantation were: incorrect lens power, glare or other photic phenomena and IOL damage or opacification of the optics (the last cause was present only in case of Hydrogel IOLs). Authors do not mention IOLs luxation to the vitreous cavity, which was the second most frequent condition leading to explantation in our series of patients.

In two studies published recently by Mamalis et al. (7,8) authors confirmed previous findings and stated that the most common reasons for removing an IOL were intraocular lens calcification, incorrect lens power, optical aberrations and decentration/dislocation.

Recently Dick et al. (9) published an update to their previous report on causes leading to IOL explantation. They found that in 2000 and 2001 the most common causes of IOL explantation were: incorrect lens power, IOL dislocation and opacification (of hydrophilic IOLs).

Nicula et al. (10) found that, in their series of patients, edematous keratopathy, chronic uveitis and IOL decentration were the most frequent causes for IOL removal. Nevertheless, it is noteworthy that in their material they had a significant proportion of anterior chamber lenses (51.85%).

Auffarth et al. (11) in their study of incidence and outcome of IOL explantation suggest that clinical outcome depends more on the quality of surgery than on the type of selected lens.

Sinsky et al. (12) performed a retrospective study of a large series of intraocular lens exchanges and found that the most frequent indications for lens exchange were displaced IOL (41.7%), corneal decompensation (27.7%), incorrect IOL power (12.6%), and uveitis-glaucoma-hyphema syndrome (10.0%).

Price et al. (13) obtained similar results – in their series of patients 58.8% of IOLs were removed because of dislocation or improper fixation, 12.6% because of anisometropia, and 18.15% because of chronic inflammatory reaction.

In another study Mamalis et al. (14) stated that in case of anterior chamber IOLs pseudophakic bullous keratopathy, UGH syndrome and cystoid macular edema were the main causes for IOL explantation, whereas in case of posterior chamber IOLs lens dislocation/decentration was the leading indication for IOL removal.

In many publications artificial lens luxation to the vitreous is not a frequent cause for IOL explantation. In the management of posteriorly dislocated intraocular lenses there are a few options available to the surgeon. If there is an adequate capsular support, the luxated lens may be repositioned into the ciliary sulcus, however, if the capsular support is inadequate or absent, the lens must either be fixated to the sclera or iris or exchanged for an anterior chamber IOL (15).

In our group of patients there were 2 eyes which underwent IOL explantation because of endophthalmitis. It is generally held that IOL explantation in the course of endophthalmitis can help restore useful vision and prevent recurrence. Busin et al. (16) described a series of 11 patients who had an IOL removed because of chronic low-grade endophthalmitis after cataract extraction. They concluded that IOL removal with partial or total

capsulectomy provided a good surgical approach to the treatment of endophthalmitis which is not responsive to medical therapy.

Also Foster et al. (17) described a series of patients treated for uveitis who underwent phacoemulsification complicated by intraocular inflammation not responding to anti-inflammatory treatment, who finally required IOL explantation. The authors concluded that intraocular lens removal may help maintain useful vision in patients who had complications secondary to uveitis after cataract extraction with intraocular lens implantation.

There are other causes of IOL explantation that can be found in the literature, for instance: cracked intraocular lens (18), lens implantation in patients with chronic uveitis causing prolonged inflammatory reaction (19), calcification of hydrogel intraocular lenses (deposits of calcium phosphate on the explanted lens' surfaces), which caused decrease in vision and reduced contrast sensitivity (20,21), a posterior chamber IOL that was implanted in the anterior chamber following a complicated extracapsular cataract extraction (22).

In our series of patients we observed an improvement of visual acuity in the majority of patients, which is consistent with other reports. Mamalis et al. (14) found that in 39% of patients after IOL exchange their vision improved, 46% of patients had the same vision, and in 15% vision decreased postoperatively. They stated that the most common reason for the worsening of vision postoperatively was corneal decompensation, as well as glaucoma and cystoid macular edema. Our results are in accordance with their findings. Similarly, Sinsky et al. (12) stated that 72% of the cases had postoperative visual acuity better than or equal to 20/30, and 8% had a loss of one or more lines of visual acuity. Among the complications occurring after IOL exchange were retinal detachment, glaucoma, corneal decompensation, and anisometropia.

In conclusion, despite significant advances of ophthalmology in the recent years, explantation of the intraocular lenses is sometimes necessary. Considering the large number of lenses which is implanted each year, the rate of IOL explantation is low.

Good surgical technique, accurate calculation of IOL power and constant improvement in technology and IOL designs are important in avoiding complications and in minimizing the number of explantations. If an IOL explantation is necessary, careful intraoperative and postoperative management will help to perform the procedure safely, ensuring a favourable outcome.

**This study was presented at the VIII Symposium of the Section of Intraocular Implants and Refractive Surgery of the Polish Ophthalmologic Society, Lodz, 05-07.10.2006.**

#### References:

1. Steinert RF, Cionni RJ, Osher RH, Blumenkranz MS, Koch DD, Novak KD, Kalina PH, Shingleton BJ, Richter CU, Pesavento R, Fong DS, Topping TM, Duker JS, Raizman MB: *Complications of Cataract Surgery* (w:) Albert DM, Jakobiec FA: Principles and Practice of Ophthalmology, 2nd edition, W. B. Saunders Company, Philadelphia. 2000, CD-ROM.
2. Walkow T, Anders N, Pham DT, Wollensak J: *Causes of severe decentration and subluxation of intraocular lenses*. Graefes Arch Clin Exp Ophthalmol 1998, 236, 9-12.

3. Mamalis N: *Complications of foldable intraocular lenses requiring explantation or secondary intervention – 1998 survey*. J Cataract Refract Surg 2000, 26, 766-772.
4. Mamalis N: *Explantation of intraocular lenses*. Curr Opin Ophthalmol 2000, 11, 289-295.
5. Schmidbauer JM, Apple DJ, Auffarth GU, Peng Q, Pandey SK, Werner L, Escobar-Gomez M, Vargas LG: *Complication profiles of posterior chamber intraocular lenses IOL. An analysis of 586 foldable and 2077 rigid explanted intraocular lenses*. Der Ophthalmologe 2001, 98, 1029-1035.
6. Dick HB, Tehrani M, Brauweiler P, Haefliger E, Neuhann T, Scharrer A: *Complications with foldable intraocular lenses with subsequent explantation in 1998 and 1999. Results of a questionnaire evaluation*. Der Ophthalmologe 2002, 99, 438-443.
7. Mamalis N: *Complications of foldable intraocular lenses requiring explantation or secondary intervention – 2001 survey update*. J Cataract Refract Surg 2002, 28, 2193-2201.
8. Mamalis N, Davis B, Nilson CD, Hickman MS, Leboyer RM: *Complications of foldable intraocular lenses requiring explantation or secondary intervention – 2003 survey update*. J Cataract Refract Surg 2004, 30, 2209-2218.
9. Dick HB, Tehrani M, Brauweiler P, Haefliger E, Neuhann T, Scharrer A: *Complications of foldable intraocular lenses requiring explantation. Results of the 2000 and 2001 survey in Germany*. Der Ophthalmologe 2003, 100, 465-470.
10. Nicula C, Nicula D, Blidaru M: *Explantation and replacement of intraocular lenses*. Oftalmologia 2004, 48, 82-86.
11. Auffarth GU, Wilcox M, Sims JC, McCabe C, Wesendahl TA, Apple DJ: *Analysis of 100 explanted one-piece and three-piece silicone intraocular lenses*. Ophthalmology 1995, 102, 1144-1150.
12. Sinskey RM, Amin P, Stoppel JO: *Indications for and results of a large series of intraocular lens exchanges*. J Cataract Refract Surg 1993, 19, 68-71.
13. Price FW Jr, Whitson WE, Collins K, Johns S: *Explantation of posterior chamber lenses*. J Cataract Refract Surg 1992, 18, 475-479.
14. Mamalis N, Crandall AS, Pulsipher MW, Follett S, Monson MC: *Intraocular lens explantation and exchange. A review of lens styles, clinical indications, clinical results, and visual outcome*. J Cataract Refract Surg 1991, 17, 811-818.
15. Mittra RA, Connor TB, Han DP, Koenig SB, Mieler WF, Pulido JS: *Removal of dislocated intraocular lenses using pars plana vitrectomy with placement of an open-loop, flexible anterior chamber lens*. Ophthalmology 1998, 105, 1011-1014.
16. Busin M, Cusumano A, Spitznas M: *Intraocular lens removal from eyes with chronic low-grade endophthalmitis*. J Cataract Refract Surg 1995, 21, 679-684.
17. Foster CS, Stavrou P, Zafirakis P, Rojas B, Tesavibul N, Baltatzis S: *Intraocular lens removal from [corrected] patients with uveitis*. Am J Ophthalmol 1999, 128, 31-37.
18. Lee GA, Dal Pra ML: *Cracked acrylic intraocular lens requiring explantation*. Austr New Zealand J Ophthalmol 1997, 25, 71-73.
19. Harper SL, Foster CS: *Intraocular lens explantation in uveitis*. Int Ophthalmol Clin 2000, 40, 107-116.
20. Fernando GT, Crayford BB: *Visually significant calcification of hydrogel intraocular lenses necessitating explantation*. Clin Exper Ophthalmol 2000, 28, 280-276.
21. van Looveren J, Tassignon MJ: *Intraocular lens exchange for late-onset opacification*. Bulletin de la Societe Belge D'ophtalmologie 2004, 293, 61-68.
22. Mandal AK, Bagga H: *Pupillary block glaucoma following implantation of a posterior chamber pseudophakos in the anterior chamber*. Indian J Ophthalmol 2002, 50, 54-56.

The study was originally received: 21.11.2008 (1099)/  
Praca wpłynęła do Redakcji 21.11.2008 r. (1099)  
Accepted for publication: 20.01.2009/  
Zakwalifikowano do druku 20.01.2009 r.

**Adres do korespondencji (Reprint requests to):**  
dr n. med. Michał Wilczyński  
I Katedra i Klinika Chorób Oczu  
Uniwersytetu Medycznego w Łodzi  
Szpital Kliniczny Nr. 1 im. N. Barlickiego  
ul. Kopcińskiego 22  
90-153 Łódź  
e-mail: [michalwilczynski@wp.pl](mailto:michalwilczynski@wp.pl)