

(99)

# Comparative analysis of the eye function and complications after removal of complicated cataract due to uveitis and senile cataract

## Analiza porównawcza funkcji oka oraz powikłań po operacji zaćmy wikłającej zapalenie błony naczyniowej i zaćmy starczej

**Piotr Jurowski, Roman Goś, Katarzyna Kaszuba-Bartkowiak, Alicja Zeman-Miecznik**

Department of Ophthalmology and Visual Rehabilitation Medical University of Łódź  
Head: prof. dr hab. med. Roman Goś

**Summary:** Purpose: retrospective, comparative analysis of the effectiveness of the results among patients who underwent removal of complicated cataract due to uveitis and senile cataract.  
Material and methods: Patients with cataract enrolled in this study were divided into two groups. Group 1 comprised 30 eyes with complicated cataract due to uveitis. The main causes of uveitis were: rheumatoid arthritis in 8 eyes, ankylosing spondylitis in 7, Reiter syndrome in 3, psoriatic arthritis in 3, systemic sarcoidosis in 2, post-traumatic uveitis in 1. In 6 patients (6 eyes) the etiology of uveitis was unknown. Group 2 comprised 30 eyes with senile cataract. In 5 patients in each group there were coexisting glaucoma. In both groups phacoemulsification or phacoaspiration and foldable three piece IOL implantation were performed. The follow-up period was 12 months. Best corrected visual acuity and intra and postoperative complications were taken into consideration.  
Results: There were no differences in gender and cataract hardness between the two groups. Significantly younger patients were in group 1  $p < 0.01$ . Mean preop./ postop. visual acuity was better in group 2 as compared with group 1: 0.4/ 0.8 and 0.2/ 0.5, respectively,  $p < 0.01$ . In both groups however, the preoperative visual acuity was significantly lowest in patients with coexisting glaucoma: group 1, 0.1  $p < 0.01$  and in group 2: 0.25  $p < 0.001$ . Significantly more frequent intraoperative complications were observed in group 1 as compared with group 2 e.g., corneal burn 10% and 6.6%, local sphincter damage 10% and 0%, zonular rupture 10% and 3.3% respectively. Similarly, in the late postoperative period more frequent complications were observed in group 1 than in group 2 e.g.: secondary cataract 50% and 13.3%, IOL decentration 40% and 6.6%, capsule contraction 80% and 10%, glaucoma 10% and 3.3% respectively. Recurrence of uveitis was observed in 30% of eyes in group 1.  
Conclusions: Although the modern microsurgical technology and IOL implantation have led to more effective treatment of senile cataract, the surgery of complicated cataract due to uveitis is still not free from complications. Future surgical strategy of complicated cataract owing to uveitis has to comprise the most adequate qualification criteria e.g. choice of the optimal period for surgery and the most convenient surgical technique as well as the most effective perioperative anti-inflammatory treatment.

**Słowa kluczowe:** zapalenie błony naczyniowej, zaćma wikłająca, usunięcie zaćmy, wszczep wewnątrzgałkowy.  
**Key words:** uveitis, complicated cataract, cataract removal, intraocular lens.

Cataract formation is one of the most common complications of uveitis (1). The frequency of secondary cataract due to uveitis is nearly 50% in the cases of chronic uveitis and up to 75% in heterochromic iridocyclitis (2). As oppose to senile cataract decision about surgical removal of complicated cataract due to uveitis has to be considered basing on meticulous assessment of much more factors which in fact may affect the final functional outcomes eg, exact diagnosis of the current cause of uveitis and associated local and/ or

systemic diseases, remission period of ocular inflammation and therapeutic regiment used to maintain the remission, the most adequate time of surgery and surgical technique (3,4).

The aim of the study is retrospective, comparative analysis of surgical outcomes e. g. the best corrected visual acuity as well as intra and postoperative complications among patients with complicated cataract due to uveitis and senile cataract who underwent phacoemulsification and posterior chamber IOL implantation.

Basing on the results obtained in the examined groups the current concept regarding the strategy of removal of complicated cataract due to uveitis is summarized and considered.

### Material and methods

Sixty patients (60 eyes) scheduled for planned surgery were divided in two groups:

**Group I:** 30 patients, 20 female/ 10 male (30 eyes), mean age 46.6 years, range of age 25 to 62 years, comprised cases of complicated cataract due to uveitis e. g.: 8 patients (8 eyes – 26.6%) with rheumatoid arthritis, 7 patients (7 eyes – 23.3%) with ankylosing spondylitis, 3 patients (3 eyes – 10%) with Reiter syndrome, 3 (3 eyes – 10%) with psoriatic arthritis and 2 patients (2 eye – 6.6%) with systemic sarcoidosis. In 6 patients (6 eyes – 20%) with recurrent anterior uveitis non specific cause was found. In 1 case (1 eye – 3.3%) anterior uveitis was classified as a posttraumatic recurrent uveitis due to previous corneal perforation. Based on subjective classification of nucleus hardness (I<sup>o</sup> – soft, II<sup>o</sup> – moderately hard, III<sup>o</sup> – hard, IV<sup>o</sup> – very hard nucleus) the hardness of the nucleus was assessed between I<sup>o</sup> – III<sup>o</sup>. In all cases the surgery was performed during the remission period, which was at least 5 months long. Because of inadequate local treatment of coexisting secondary glaucoma, the time of surgery was shortened despite the length of remission in 4 cases (13.3%). Among patients with coexisting glaucoma only phacoemulsification and synechiaelisis were performed.

**Group II:** comprised 30 patients, 14 female/ 16 male (30 eyes), mean age of 64.6 years, range of age 60 to 88 years, with senile cataract. The hardness of the nucleus was I<sup>o</sup> – III<sup>o</sup>. In 5 patients (16.6%) there were coexisting glaucoma treated conservatively with only one medication e. g. miotics, beta blockers in 3 and 2 patients, respectively. In all these cases only phacoemulsification were performed.

The excluding factors from both groups were previous intraocular surgery, systemic diseases e. g. diabetes mellitus and PEX syndrome as well as cases with coexisting progressive glaucoma in which the combined surgery was needed. All surgical procedures were performed in local sub Tenon or intracameral anesthesia.

**The surgical technique.** The superior 2.7mm incision was made followed by an injection of 1% preservative free lidocaine and dispersive viscoelastic solution into anterior chamber. In 5 patients (16.6%) from group 1 and 3 patients (10%) from group 2 capsulorhexis assisted with the trypan blue dye and diathermic capsulotomy

in 1 (3.3%) were conducted. In all cases with small pupil and synechia iris retractors were inserted (Greishaber/ Alcon Labs.) Standard „divide and conquer“ or „phaco chop“ phacoemulsification techniques were performed. The pieces of nucleus were emulsified in the bag using pulse mode of ultrasound energy with the frequency 10-15 pulses per second and the smallest effective ultrasound power 35-40%. In one case, with recurrent uveitis due to previous perforating trauma of the cornea, the soft cataract was removed by phacoaspiration technique. On the completion of the surgery a foldable, three piece acrylic IOL (MA60BM Alcon Lab.) was inserted using injector into the bag in all except one patient who had the PMMA IOL inserted into ciliary sulcus due to capsule margin radial tear. The time of the follow-up was 12 months. The etiology of underlying disease, local changes before surgical procedure, intra- and postoperative complications and best corrected visual acuity (BCVA) assessed 12 months after surgery were taken into account in clinical assessment.

**Statistical analysis.** Coefficient of variance was used to compare the age of the patients in both groups. The  $\chi^2$  test was used to compare the gender, type and cataract hardness. The results of the visual acuity of both groups were compared with student's t-test for independent trials. A P value less than 0,05 was considered statistically significant.

### Results

There were no differences in gender and cataract hardness between the two groups however significantly younger were the patients in group 1  $p < 0.01$ . The mean preoperative visual acuity was statistically better among patients in group 2 as compared with group 1: 0.4 range from 0.1 to 0.6 and 0.2 range from 0.05 to 0.5,  $p < 0.01$ , respectively. In both groups however, significantly lowest preoperative visual acuity was observed in patients with coexisting glaucoma: group1, 0.1 range from 0.05 to 0.1 and group 2, 0.25 range from 0.1 to 0.4  $p < 0.01$ . Preoperative demographic data and characteristics of the patients from group 1 is shown in table I.

In 3 of 4 patients from group 2 (13.3%) small pupil was present due to coexisting glaucoma treated preoperatively with miotics and in 1 patient who had deep brown colour of the iris. During surgery the small pupil was bimanually stretched. The postoperative BCVA was significantly better in group 2, (0,8 range 1.0 to 0.5) within the whole follow-up time as compared with group 1, (0,5 from 1.0 to 0.1)  $p < 0.01$  (tab. II).

	Group 1	Group 2	Significance Poziom istotności
gender / płeć	15 F(k)/15 M(m)	14 F(k)/16 M (m)	$p > 0,05$
age (years range) wiek (rozpiętość lat)	46,6 (26-62)	68,6 (60-88)	$p < 0,01$
cataract hardness stopień twardości zaćmy	I - 20 II - 7 III - 3	I - 18 II - 8 III - 4	$p > 0,05$
type of cataract typ zaćmy	subcapsular anterior 17 subcapsular posterior 3 nuclear 5 complete 5	subcapsular posterior 16  nuclear 10 complete 4	$p > 0,05$ $p < 0,05$ $p < 0,05$ $p > 0,05$

Tab. I. Demographic data of operated patients.

Tab. I. Dane demograficzne operowanych chorych.

Diagnosed general disorder (amount) Schorzenie podstawowe (liczba)	Coexisting local disorder (amount) Współistniejące choroby miejscowe (liczba)	Mean preoperative BCVA Średnia skorygowana ostrość wzroku przedoperacyjna	Complications of inflammatory process Powikłania procesu zapalnego	Surgical procedure Technika operacyjna	Mean postoperative BCVA Średnia skorygowana ostrość wzroku po operacji
Rheumatoid arthritis (8)	Glaucoma (2) CMO (1)	0,1	Hypopion Posterior synechiae	Phaco + IOL PC + iris hooks (1)	0,3
Ankylosing spondylitis (7)	Glaucoma (1)	0,2	Anterior and posterior synechiae Pigment deposits	Phaco + IOL PC + iris hooks (2)	0,4
Reiter syndrome (3)	Iris atrophy	0,1	Posterior synechiae Corneal oedema	Phaco + IOL PC	0,3
Sarcoidosis (2)	Vitritis	0,3	Iris atrophy Posterior synechiae	Phaco + IOL PC + trypan blue (1)	0,5
Psoriatic arthritis (3)	Iris atrophy	0,1	Posterior synechiae	Phaco + IOL PC + trypan blue (1)	0,4
Posttraumatic cataract (1)	Corneal scar	0,1	Glaucoma	Phacoaspiration IOL implantation into ciliary sulcus	0,2
Unknown (6)	Glaucoma (3) CMO (1)	0,2	Posterior synechiae	Phaco + IOL PC phacotrabeculectomy + IOL PC et irydectomy (3)	0,4

Tab. II. Characteristics of patients with complicated cataract due to uveitis.

Tab. II. Charakterystyka chorych z zaćmą wnikającą zapalenie błony naczyniowej

Intraoperative complication Powikłania śródoperacyjne	Group 1	Group 2	Significance
synechiae and lack of red reflex zrosty, brak różowego refleksu	73%	16,6%	$p < 0,001$
corneal and iris burn oparzenia rogówki i tęczówki	10%	6,6%	$p < 0,05$
local sphincter damage uszkodzenie zwieracza tęczówki	10%	-	$p < 0,01$
hyphaema krwawienie do komory przedniej	10%	3,3%	$p < 0,05$
slight zonulae rupture zerwanie więzadełek soczewkowych	3,3%	3,3%	$p > 0,05$
Postoperative complications Powikłania pooperacyjne			
recurrence of uveitis nawrót zapalenia	30%	-	$p < 0,001$
secondary cataract wtórna zaćma	50%	13,3%	$p < 0,001$
IOL decentration przemieszczenie implantu	40%	6,6%	$p < 0,001$
capsule contraction obkurczenie torebki soczewki	80%	10%	$p < 0,001$
glaucoma jaskra	10%	3,3%	$p < 0,05$

Tab. III. Intraoperative and postoperative complications.

Tab. III. Powikłania śród- i pooperacyjne.

The final value of the mean visual acuity in group 2 was achieved within 3 months postoperatively as compared to group 1 where the improvement was observed up to 6 months of follow-up. In 3 cases (10%) from group 1 the postoperative funduscopy revealed the symptoms of glaucomatous neuropathy with noticeable, advanced visual field defects.

The most common intraoperative problems in group 1 were lack of the red reflex (22 patients – 73%) because of small pupil, posterior synechiae, postinflammatory pupillary membrane and pigmentary clumps covering the lens capsule within pupil and/ or behind posterior surface of the iris. Comparative analysis of intra and postoperative complications is shown in table III.

In 10 patients (33.3%) in whom the iris retractors had been inserted, slight haemorrhage from iris base and/ or papillary margin was seen. The most frequent intraoperative complications in group 1 were corneal and iris burn (3 patients – 10%). All of these patients had mechanical iris midriasis (iris retractors in 2 and iris stretching in 1). Local iris sphincter damage was found in 3 patients (10%), hyphema in 1 patient (3,3%) and slight rupture of the lens zonules without vitreous loss in 1 patient (3,3%). During 12 months of follow-up the recurrence of uveitis was observed in 9 patients (30%), lens capsule contraction in 24 patients (80%), secondary cataract 50%, decentration of intraocular lens in 12 patients (40%), posterior synechiae in 6 patients (20%) and high tension glaucoma in 3 (10%) of patients.

The most common intraoperative complications among patients in group 2 were: corneal burn close to the place of incision in 3 patients (10%), temporary corneal edema and hyphema in 2 patients (6,6%). In 12 months follow-up the most often late postoperative complications were: contraction of lens capsule and secondary cataract in 4 patients (13,2%), IOL decentration in 1 patient (3,3%), glaucoma in 1 patient (3,3%).

## Discussion

The pathogenesis of cataract due to uveitis is not fully explained yet. It is suggested that cataract formation is linked with the breakdown of intraocular homeostasis caused by uveitis (5). There is strong evidence of the aqueous humour water/ electrolytes balance disturbance as well as hypoxia of subcapsular lens cells within the area of posterior synechiae and local necrosis of the iris and ciliary body adjacent to the lens opacification. Place of lens opacities close to the focus of iris or ciliary body inflammation potentially confirms the aforementioned pathogenesis of complicated cataract formation (6). Anterior subcapsular opacification is the most common morphological type of cataract in the course of acute anterior uveitis, while in intermediate uveitis it is predominantly matched with posterior subcapsular cataract. According to some authors, cataract formation can be caused by toxic free radicals or by deposits of immune complexes on the capsule surface (7,8). The influence of proinflammatory cytokines, prostaglandin and nitric oxide is also emphasized as an important factor in the development of complicated cataract during uveitis. This statement is supported by examination of aqueous humour composition, showing significantly higher concentration of interleukins (IL-1, IL-6) as well as tumor necrosis factor alpha-TNF (9).

Decision about the removal of complicated cataract due to uveitis has to be considered individually. The surgery of complicated cataract should be performed at the optimal period of time and the most convenient procedure should be chosen. Owing to many local and/ or systemic coexisting diseases it is important to be sure that

the visual disability in these cases is primarily due to lens opacification (10). The presence of post-inflammatory macular degeneration, cystoid macular edema, glaucoma or optic nerve atrophy are not rare and have a significant impact on postoperative outcomes (11). This fact is supported by data of our patients with coexisting glaucoma having the lowest values of preop. and postoperative visual acuity in both groups. Although preoperative slit-lamp examination provides a good view of anterior segment structures, the risk of overlooking optic nerve and vitreoretinal diseases in the eye with opaque media and small pupil is relatively high. In such conditions previous medical history and ancillary examination can be helpful.

One of the most important factors affecting the final results of surgery of complicated cataract due to uveitis is the recurrence of uveitis. It is well known that frequent recurrence of uveitis before surgery as well as coexisting glaucoma have a higher risk of repeated uveitis postoperatively. Moreover, the length of remission period and the area of ischemic or atrophic changes of the iris are potentially important factors predicting recurrence of uveitis (12). Among our patients with coexisting glaucoma, the recurrence of uveitis was estimated as high as 50% of cases. There is also strong evidence that some disorders e. g. ankylosing spondylitis or collagen disorders are at higher risk of uveitis recurrence (1). It is well known that intraocular surgery breaks the blood-aqueous barrier what may provoke inflammatory reaction. Interestingly, some other data suggest, that there is no significant difference in recurrence of uveitis between patients subjected to cataract surgery and treated conservatively (13). In the 12 months of follow-up in group 1 we observed the recurrence of uveitis in 30% of patients including 5 patients with rheumatoid arthritis, 2 patients with ankylosing spondylitis and 2 patients with uveitis of unknown etiology. In all these patients however, intensive local treatment eg, more frequent drops application and/ or subconjunctival injection of steroids and antibiotics allowed to control inflammation.

The most adequate moment of the surgery and the choice of surgical method are essential factors affecting the final surgical results. According to some authors cataract removal should be performed at the time when there is lack of an active inflammatory process. It is also suggested that the remission period should not be shorter than 3 months (13). In our patients phacoemulsification of complicated cataract was performed after at least 5 months of remission. Only in some patients with uncontrolled coexisting glaucoma the remission period was shortened to 3 months. Phacoemulsification is a challenging technique in the cases of complicated cataract removal. Some drawbacks of this method concern not perfectly transparent cornea, low amount of corneal endothelium cells, narrow pupil, problems with red reflex making the capsulorhexis difficult. Moreover, despite the capsular tension rings, weakness of lens zonules in some type of uveitis e. g. in Fuch's heterochromic iridocyclitis is still considered to be a relative contraindication for phacoemulsification (14). Some of these complications were also main reasons of intraoperative complications in our patients. Despite all these drawbacks we believe that quicker visual recovery as compared with other techniques makes phacoemulsification the surgery of choice also in the cases of complicated cataract. One of the most important surgical problems of complicated cataract is the presence of inflammatory changes in the vitreous. Few publications indicate that there is no difference in intensity of postoperative inflammatory reaction between removal of phacoemulsification or

extracapsular techniques of complicated cataract removal as compared with vitrectomy with lensectomy however, improvement of visual acuity occurs in 63% of patient in the latter and only in 6% of cases in the former (15). We observed inflammatory membrane at the vitreous base in 2 cases of sarcoid iridocyclitis which in fact had no direct influence on postoperative visual acuity.

The last important factor affecting the outcome of complicated cataract surgery is the implantation of intraocular lens. Previous data emphasized that removal of complicated cataract without IOL had good postoperative outcomes however, optical defects due to postoperative aphakia and anisometropia as well as an intolerance of contact lenses in aphakic patients make the proper convalescence difficult. There are still some cases e. g. juvenile rheumatoid arthritis where violent cell reaction, formation of synechiae, deformation of the pupil and chronic hypotony are linked up by IOL implantation, however mostly IOLs are well tolerated and there are no differences in the recurrence of uveitis or frequency of complications, such as cystoid macular edema or glaucoma between patients with or without acrylic implant. In our group of complicated cataract patients the acrylic IOL was implanted into the bag. Although IOL is generally accepted method of treatment of complicated cataract, there are still a lot of controversies regarding the most adequate place of IOL implantation. Implantation in the bag potentially decreases direct contact of lens haptics with iris and ciliary body and prevents inflammation. Some authors suggest that ciliary sulcus support of IOL stabilises rather the proper position of IOL during late postoperative period diminishing IOL decentration. Moreover, such IOL position makes the possible IOL removal easier. In our patients postoperative inflammatory process was observed at least once in 30% of patients however, the removal of IOL was not necessary. Our study showed that capsule contraction was the most common complication of the late postoperative period, however the IOL decentration was found in 40% of patients. Another potential advantage of the in the bag IOL implantation is lower risk of posterior capsule opacification (PCO). However, despite careful posterior capsule cleaning, square edge of the IOL optics and in the bag lens implantation the secondary cataract was observed in 50% of cases of complicated cataract and in 13.3% of senile cataract. The PCO was noted among all of the patients with recurrence of uveitis due to ankylosing spondylitis, in 5 patients with rheumatoid arthritis and in 3 patients with unknown etiology what suggests the relevant impact of inflammatory process in the PCO formation.

Although the modern microsurgery technology and IOL implantation have led to more effective treatment of senescent cataract, the surgery of complicated cataract due to uveitis is still not free from complications. Taking into account our results we think that future surgical strategy of complicated cataract due to uveitis removal has to comprise the most adequate qualification criteria e. g. the optimal time for surgery and the most convenient surgical technique, as well as more effective perioperative anti-inflammatory treatment.

## REFERENCES:

1. Secchi A. G.: *Cataract and uveitis*. Trans. Ophthalmol. Soc. UK, 1982, 102, 390-394.
2. Ram J., Jain S., Pandav S., Gupta A., Mangat G.: *Postoperative complication of intraocular lens implantation in patients with Fuch's heterochromic cyclitis*. J. Cataract Refract. Surg., 1995, 21, 548-551.
3. Rojas B., Foster C. S.: *Cataract extraction in patients with uveitis*. Curr. Opin. Ophthalmol., 1996, 7, 11-16.
4. Bakunowicz-Łazarczyk A.: *Zapalenie błony naczyniowej u dzieci*. Okulistyka, 1999, 1, 39-43.
5. Iwaszkiewicz Bilikiewicz B., Glasner L., Raczyńska K.: *Leczenie zapalenia błony naczyniowej*. Okulistyka, 1999, 1, 44, 49.
6. Mark G. E., Rao N. A., Scott J. M., Duque R., Ward P. A.: *Antioxydant modulation of phacoanaphilactic endophthalmitis*. Ophthalmic. Res., 1985, 17, 279-301.
7. Jones N.: *Fuch's heterochromic uveitis: an update*. Surv. Ophthalmol., 1993, 37, 253-272.
8. Stankiewicz A., Mikita A.: *Zapalenie części pośredniej błony naczyniowej oraz wnętrza gałki ocznej*. Okulistyka, 1999, 1, 19-37.
9. Nishi O., Nishi K., Imanishi M.: *Synthesis of interleukin-1 and prostaglandin E2 by lens epithelial cells of human cataracts*. Br. J. Ophthalmol., 1992, 76, 338-341.
10. Foster D., Rao N., Smith R.: *Cataract extraction in intermediate uveitis*. Dev. Ophthalmol. 1992, 23, 204-211.
11. Wolter J. R.: *Posterior chamber IOL's inside or outside the capsular bag: a cytopathologic comparison of two eyes in one patient*. Ophthalmic Surg., 1987, 18, 745-750.
12. Barret B. T., Davison P. A., Eustace P.: *Clinical comparison of three techniques for evaluating visual function behind cataract*. Eye, 1995, 9, 722-727.
13. Pivetti-Pezzi P., Accorinti M., La Cava M., Abdulaziz M. A., Pantaleoni F. B.: *Long-term follow-up of anterior uveitis after cataract extraction and intraocular lens implantation*. J. Cataract Refr. Surg., 1999, 25, 1521-1526.
14. Tessler H. H., Farber M. D.: *Intraocular lens implantation versus no intraocular lens implantation in patients with chronic iridocyclitis and pars planitis; a randomized prospective study*. Ophthalmology, 1993, 100, 1206-1209.
15. Tabbara K., Chavis P.: *Cataract extraction in patients with chronic posterior uveitis*. Int. Ophthalmol. Clin., 1995, 35, 121-131.

Praca wpłynęła do Redakcji 29.11.2004 r. (670).

Zakwalifikowano do druku 4.05.2005 r.

**Adres do korespondencji (Reprint requests to):**  
 dr n. med. Piotr Jurowski  
 Żeromskiego 113  
 90-549 Łódź