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# Assessment of visual function in children with foldable intraocular lens implants

## *Ocena narządu wzroku u dzieci z wszczepem zwijalnej soczewki wewnątrzgałkowej*

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**Summary:** **Purpose:** The aim of the current study was to assess the results of cataract surgery involving implantation of foldable intraocular lenses in children.  
**Material and methods:** Cataract surgery with foldable lenses was performed in 60 children. Postoperative visual acuity, endothelial cell density, corneal pachymetry, postoperative astigmatism and complications were analyzed.  
**Results:** Quick visual recovery was observed in children after surgery. Only a few postoperative complications occurred.  
**Conclusions:** The foldable intraocular lenses are easy to insert. The surgical procedure with foldable lens implantation is a useful and safe method of treatment.

**Słowa kluczowe:** operacja zaćmy, wszczep soczewki zwijalnej, dzieci.  
**Key words:** cataract surgery, foldable intraocular lens implants, children.

### Introduction

Small incision cataract surgery with foldable lens implants is a great progress in the operative techniques. Advantages include a decrease in postoperative astigmatism, a reduction in the incidence of inflammatory reactions and quick improvement in visual acuity postoperatively (1,2,3,4,5,6).

The study objective was to assess the organ of sight in children with foldable intraocular lens implants in various types of cataract.

### Patients and methods

In the years 2001-2006, in the University Hospital Department of Children's Ophthalmology in Białystok, 300 cataract surgeries were performed. Foldable intraocular lenses were implanted in 60 patients with various types of cataract, in age of 3 months – 18 years (26 girls and 34 boys). All the patients were followed up after 24h, 7 days and one month postoperatively.

In the study patients, 20 had unilateral congenital cataract, 20 had unilateral posttraumatic cataract and in 20 unilateral postinflammatory cataract was diagnosed, including 8 with underlying toxoplasmosis, 6 with toxocarosis and 6 having idiopathic uveitis.

Prior to surgery, the children underwent a complete ophthalmic examination, autorefractometry, keratometry, pachymetry (above 6 years of age), A- and B-scan eyeball ultrasonography.

The SRK II method was used to calculate the implant power. The power was smaller by 20% in children under 2 years of age, by 15% in children 2-4 years old and by 10% in 4 to 8-year-old patients, as compared to the standard values.

Visual acuity was examined prior to surgery in children under 3 years old. In 10 patients we failed to determine visual acuity due to age. Ten eyes had visual acuity ranging between the correct projection and 2/50, 24 eyes had 3/50-5/50 and 16 eyes 5/25-5/16.

In children over 6 years old, pachymetry (Topcon Sp 2000P) was performed before and 1 day and one month after surgery. Astigmatism was assessed before and 1 month after surgery. The incidence of intraoperative and postoperative complications was estimated.

The t-Student test and Wilcoxon's pair sequence test were used for statistical analysis (level of significance at  $p < 0.05$ ).

All patients were operated under general anesthesia. Corneal incision (approximately 3.5 mm) was performed. Following administration of a viscoelastic agent to the anterior chamber of the eyeball, the anterior lens capsule was opened by circumferential incision with a capsulotome. Lens masses were irrigated and aspirated by using an AspiMat apparatus. Children under 5 years old underwent posterior capsulotomy with anterior vitrectomy. A one-piece foldable lens (AcrySof) was implanted through a corneal incision. Then, the viscoelastic agent was aspirated and the postoperative wound was closed with a 10/0 suture.

### Results

Visual acuity improved within a month after surgery and remained at the same level throughout the further follow-up period. In children with congenital cataract, visual acuity improved to 5/50-5/8cc (light sensitivity prior to surgery – 5/50), with posttraumatic cataract to 5/10-5/5 cc (before surgery – 5/25) and with postinflammatory cataract to 5/10-5/5 cc (prior to surgery 5/50-5/16).

One day after surgery, thickness of the central cornea was significantly higher than before operation. However, one month after the surgery, the corneal thickness returned to the preoperative level (mean 524.5  $\mu\text{m}$ ). Measurements of the central corneal thickness have been presented in Table I.

Central corneal thickness before and after surgery/ Centralna grubość rogówki przed zabiegiem operacyjnym i po zabiegu		
Before surgery/ Przed zabiegiem	1 day after surgery/ 1 dzień po zabiegu	1 month after surgery/ 1 miesiąc po zabiegu
524.5 $\mu\text{m} \pm 40.5$	560.3 $\mu \pm 58.3$	526.3 $\mu\text{m} \pm 52.8$
n=40 * test for dependent trials $p < 0.000001$ n=40* test dla prób zależnych $p < 0,000001$		

Tab. I. Central corneal thickness before and after surgery.

Tab. I. Centralna grubość rogówki przed zabiegiem operacyjnym i po zabiegu.

Corneal endothelial density was assessed before operation and one month after the procedure. The patients showed a 4-10% reduction in endothelial cell density after the procedure ( $p < 0.003$ ) (Tab. II).

Mean density of corneal endothelium before and after surgery/ Średnia gęstość komórek śródbłonka przed zabiegiem operacyjnym i po zabiegu	
Before surgery/ Przed zabiegiem	1 month after surgery/ 1 miesiąc po zabiegu
3267 $\pm 283 / \text{mm}^2$	3181 $\pm 363 / \text{mm}^2$
n=40 Wilcoxon's pair sequence test n=40 test kolejności par Wilcoxona	

Tab. II. Mean density of corneal endothelium before and after surgery.

Tab. II. Średnia gęstość komórek śródbłonka rogówki przed zabiegiem operacyjnym i po zabiegu.

Assessment of astigmatism before and one month and 3 months after the procedure revealed no significant change in the defect, which ranged from -1.5 to 1.5 D cyl (mean +0.5 D cyl),  $p > 0.7$ .

No intra-operative complications were observed.

In the postoperative period, 4 patients with posttraumatic cataract were found to have fibrinous exudate, which underwent resorption due to a local treatment, whereas 7 patients had pigment deposits on the lens. No patient developed intraocular pressure or retinal complications.

### Discussion

The major purpose of cataract surgery in children is to obtain the state allowing proper vision and/or facilitating effective convalescence. Implantation of an artificial lens is the optimal correction mode in children with aphakia (7,8). Advances in operative techniques and the use of foldable lenses in the treatment of cataract have reduced postoperative complications (9,10,11,12).

In all our patients the operative procedure significantly improved visual acuity. The findings resemble those of other authors (13), who observed the most numerous group of patients with visual acuity of 5/10 and better, postoperatively. In our material, the least improvement in visual acuity was observed in the group of children with congenital cataract, due to fixed amblyopia and late notification.

Corneal thickness and endothelial cell density are the essential factors that affect vision. We found no significant change in the corneal thickness in the late postoperative period, which is consistent with observations of other authors (13). The increase in the corneal thickness in an early postoperative period, caused by operative endothelial damage, is only transitory and thus corneal hydration and transparency disorders are temporary. Only a slight reduction was noted in corneal endothelial cell density, which indicates that the surgical method is safe. Our results are in agreement with the findings of other authors, who demonstrate that application of the small incision foldable lens technique does not cause a considerable reduction in endothelial cell density (14). Slight postoperative astigmatism is another factor in favor of the foldable lenses. In our group, in the late postoperative period, the defect was +0.5 D cyl on average. Similar data have been reported by Japanese authors, which thus confirms the effectiveness of the small incision technique (14). A decrease in the number of intra- and post-operative complications is also a great advantage. In the study group, we found single cases of fibrinous exudate in the anterior chamber and pigment deposits on the lens. This is consistent with the findings of other researchers who did not reveal retinal complications or intraocular pressure postoperatively (12).

### Conclusions

1. Foldable lens implantation is a safe surgical procedure in the case of various types of cataract in children.
2. The incidence of postoperative complications was not higher, as compared to other operative methods.

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