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# Complications after Primary and Secondary Transsclerally Sutured Posterior Chamber Intraocular Lens Implantation

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## ABSTRACT

*This retrospective study analyses and compares early complications during the first month after primary and secondary posterior chamber implantation of transsclerally sutured IOL. The analysis covered medical records of 65 patients who underwent posterior chamber implantation of transsclerally sutured IOL at the Eye Clinic in Rijeka between 1998 and 2003. In 30 patients (group 1) lenses were implanted in one eye during complicated cataract surgery (primary implantation), whereas 35 patients (group 2) had lenses implanted afterwards (secondary implantation). There were 77 early complications, equally represented in both groups, i.e. 40 in (51.9%) the first and 37 (48.1%) in the second group. The most frequent complications were: vitreous hemorrhages 24.7% (14.3% and 10.4%), cystoid macular edema 19.5% (9.1% and 10.4%), keratopathy 14.3% (6.5% and 7.8%), pupil distortion 11.7% (9.1% and 2.6%), IOL decentration and tilt 10.4% (6.5% and 3.9%), high intraocular pressure 9.1% (2.6% and 6.5%), inflammation 6.5% (2.5% and 3.9%). Retinal and choroidal detachment had low incidence: 2.6% (1.3% and 1.3%) and 1.3% (0% and 1.3%) respectively. As concerns early complications, there were no statistically significant differences between the two groups, except for pupil distortion, which was more frequent in primary IOL implantation ( $p=0.045$ ). After primary implantation of IOL, the average visual acuity was  $0.38\pm 0.27$ , whereas after secondary implantation visual acuity was  $0.52\pm 0.21$ . The difference was not statistically significant.*

**Key words:** IOL, complications

## Introduction

In complex cataract surgery, with posterior capsule rupture and concurrent prolapsus of the *corpus vitreum*, when the remaining capsule provides insufficient support for lens implantation in the posterior chamber, there are several options for IOL implantation: in the anterior chamber, lens anchored to the iris (iris claw of the lens) in the anterior chamber, lens implanted in the sulcus with iris anchor, lens implantation in the posterior chamber transsclerally sutured or iris sutured. The report by the American Academy for Ophthalmology for the year 2003 presented the results of an analysis of papers discussing IOL implantation with insufficient capsular support published from 1980 to 2001. The lenses are implanted in the anterior chamber (open-loop IOL) or in the posterior chamber – iris sutured or transsclerally sutured. The report concludes that all three methods were successful, but that there was insufficient evidence to demonstrate the superiority of one single method<sup>1</sup>.

In 2004 Guell et al. evaluated the results of 15 years of experience with transsclerally fixed IOL and IOL implantation in the anterior chamber. They concluded that there were fewer complications with iris fixation of the lens<sup>2</sup>.

Some authors maintain that lens implantation in the anterior chamber is suitable for elderly persons with good anterior segment and poor posterior segment situations (changes on the retina and the *corpus vitreum*), while posterior chamber suture fixation IOL is suitable for the young with relatively poor anterior segment and good posterior segment conditions<sup>3</sup>. However, though the iris claw method in the case of insufficient capsular support has become increasingly popular over the last few years, transscleral suture fixation in the sulcus is still being carried out. Our Clinic applies the method of transsclerally sutured posterior chamber IOL, perfor-

med *ab externo*. This method was introduced by Malbran in 1986<sup>4</sup>, and the basic method has since undergone several modifications<sup>5–10</sup>. However, the dilemma whether to implant IOL immediately during cataract surgery or later in a separate procedure has not been solved yet: there is only one paper presenting an evaluation of results and complications ensuing after primary or secondary transsclerally sutured lens implantation<sup>11</sup>.

Therefore we decided to assess the results and ensuing complications after primary and secondary transsclerally sutured IOL implantation. To the best of our knowledge, this is the second study about above mentioned issue.

## Patients and Methods

We carried out a retrospective analysis of medical records of patients who had undergone cataract surgery with ECE or phacoemulsification at the Eye Clinic in Rijeka between 1998 and 2003. The study encompassed only patients with complications caused by rupture of the posterior capsule, where the remaining capsule provided insufficient support for the lens implanted in the posterior chamber, so that transscleral suture was applied. Other patients with lens implantation transsclerally sutured in sulcus, or with traumatic and subluxated cataracts were not included in this study.

The average age of patients was 60.2 years. Men (34) and women (31) were equally represented. The patients were monitored for one month after surgery and all complications occurring in this period were duly recorded. Visual acuity was measured before and one month after surgery. Implantation of posterior chamber IOL transsclerally sutured was performed *ab externo* using 10-0 polypropylene (prolene) with two straight needles. The implanted lenses were made of polymethylacrylate (PMMA), single piece, 5 degree »SLANT« (TM) haptic, 12.5 mm diameter, optic 5.5 mm. The procedure was performed by several surgeons (6 in total).

Statistical analysis was carried out using the proportion differences test. Visus distribution was examined

with Kolmogorov-Smirnov and Lilliefors tests, whereas visus comparison was measured by applying the Wilcoxon Matched Pairs test.

## Results

A total of 65 patients had transsclerally sutured posterior chamber IOL. 11 patients (16.9%) underwent ultrasound cataract surgery, whereas the remaining 54 (83.0%) had classical extracapsular extraction.

The difference of 66.1 % is statistically significant ( $p < 0.05$ ), i.e. transsclerally sutured IOL was more frequent after classical cataract surgery than after phacoemulsification. In 30 patients the lens was implanted and transsclerally sutured in the sulcus immediately after cataract surgery (primary implantation), whereas 35 patients were submitted to a later procedure (secondary implantation). All patients had been previously submitted to anterior vitrectomy. Complications ensuing during the first month after surgery are showed on Table 1.

A total of 77 complications occurred. In primary implantation there were 40 (51.9%) of early complications on 30 eyes, that is 1.3 complications per eye. In secondary implantation there were 37 (48.1%) early complications on 35 eyes, i.e. 1.05 per eye. Early complications were more frequent with primary implantation, but the difference in complications incidence between the two groups was not statistically significant ( $p > 0.05$ ).

The most frequent complication in both groups of patients was hemorrhage, followed by cystoid macular edema, corneal edema, pupil distortion, IOL decentration and tilt, increased IOP, inflammations, choroidal detachment and retinal detachment. The difference in complications incidence between the two groups was not statistically significant, with the exception of pupil distortion, which was statistically much more frequent in primary implantation ( $p < 0.05$ ).

The mean value of visual acuity before surgery was  $0.08 \pm 0.13$ , whereas after surgery it was  $0.38 \pm 0.27$ . Visus difference before and after surgery was statistically significant (Wilcoxon Matched Pairs Test,  $p < 0.05$ ). The average

TABLE 1  
EARLY COMPLICATIONS

Early complications	Primary IOL implantation N=30	Secondary IOL implantation N=35	Statistical test t	Statistical test p	Total (%)
Vitreous haemorrhage	11 (14.3%)	8 (10.4%)	0.690	0.245	19 (24.7%)
Cystoid macular oedema	7 (9.1%)	8 (10.4%)	0.258	0.398	15 (19.5%)
Corneal oedema	5 (6.5%)	6 (7.8%)	0.302	0.381	11 (14.3%)
Pupil distortion	7(9.1%)	2 (2.6%)	1.698	0.045	9 (11.7%)
IOL decentration and tilt	5 (6.5%)	3 (3.9%)	0.709	0.239	8 (10.4%)
Increase IOP	2 (2.6%)	5 (6.5%)	1.143	0.126	7 (9.1%)
Inflamation	2 (2.6%)	3 (3.9%)	0.448	0.327	5 (6.5%)
Choroidal detachment	1 (1.3%)	1 (1.3%)	0	0.500	2 (2.6%)
Retinal detachment	0	1 (1.3%)	1.007	0.157	1 (1.3%)
Total	40 (51.9%)	37 (48.1%)	0.342	0.366	77 (100%)

**TABLE 2**  
VISUAL ACUITY BEFORE AND AFTER SURGERY

Average visual acuity	Primary IOL implantatio	Secondary IOL implantation	Differentio	Statistical test
Before	0.08±0.13	0.18±0.2	0.1	p<0.05
After	0.38±0.27	0.52±0.2	0.1	p>0.05
Differentio	0.3	0.34		
Statistical test	P<0.05	P<0.05		

**TABLE 3**  
DISTRIBUTION OF VISUAL ACUITY AFTER SURGERY

Visual acuity after IOL implantation	Primary IOL implantation (30)	Secondary IOL implantation (35)	Total
> 0.5	18 (60%)	31 (88.5%)	49 (27.6%)
0.1–0.5	5 (16.6%)	1 (2.8%)	6 (50.7%)
< 0.1	7 (23.3%)	3 (8.5%)	9 (21.55)

Statistical test: X<sup>2</sup>-test=6.415 p<0.05 (p=0.04)

visus value increased 2.89 times (282%) after surgery. Visus distribution measurements by Kolmogorov-Smirnov and Lilliefors tests in the first and second groups gave abnormal results. Therefore the non-parametric Mann-Whitney U test was used for visus comparison. Preoperative visus comparison using the above-mentioned test showed that there was a statistically significant difference in the first and second group, on the level of p<0.05. However, postoperative visus comparison showed no statistically significant difference (p>0.05): in other words, equal visual acuity was achieved with both primary and secondary IOL implantation.

However, the X<sup>2</sup> test of visus distribution after implantation (visus above 0.5, between 0.1 and 0.5, under 0.1) showed statistically significant differences between primary and secondary implantation. Namely, more patients had visus values from 0.1 to 0.5 or 0.5 and higher after secondary implantation, whereas visus values lower than 0.1 were more frequent in patients after primary implantation.

## Discussion and Conclusions

In complicated cataract surgery, when the remaining capsule does not offer sufficient support for the intraocular lens, the surgeon can choose one of the following options: anterior chamber lens, iris claw lens, iris sutured lens, posterior chamber iris-sutured, sutureless with iris anchors or transsclerally sutured lens implantation. Although many papers and comparative studies have been written on this issue, there is no consensus on the superiority of one method or intraocular lens type as compared to others; there are only recommendations on the suitability of one or another of the above-mentioned methods<sup>1–3,12</sup>.

IOL transsclerally fixed in the sulcus lies in the site where the lens is normally found, so this position is

more physiological. This positioning of the lens is more suitable for eyes with damaged corneas, anterior peripheral sinechia, shallow anterior chamber, glaucoma and for younger persons whose posterior segment is good, while their anterior segment is poor<sup>13</sup>. Lens implantation in the anterior chamber is more adequate for persons with a good anterior segment and a poor posterior one<sup>3</sup>. In combination with *pars plana* vitrectomy and silicon oil, posterior chamber transsclerally sutured IOL is a better option than anterior chamber implantation<sup>14</sup>. In addition to IOL selection and implantation method, complicated cataract surgery with insufficient capsular support requires also that the »timing« of the surgery be selected: a decision should be made whether to carry out the procedure immediately or postpone it until a later date. The literature offers many guidelines as to method selection, but information very scant when it comes to »timing«. We have found only one study which compared results of primary and secondary transsclerally sutured lens implantation<sup>11</sup>.

Our results show that the total number of early complications was equal in both primary and secondary implantation, whereas the above-mentioned study had more early complications in primary implantation. However, the two studies cannot be fully compared because we found 9 types of early complications, whereas the other study mentions only five. In comparing the incidence of certain early complications as evaluated in the two studies, the results were similar, with the exception of those referring to corneal edema. Both studies show no statistically significant differences between primary and secondary implantation in the case of vitreous hemorrhage, inflammations, high IOP. In the above-mentioned study, corneal edema is more frequent with primary implantation, whereas we saw no statistically significant differences between primary and secondary implantation.

The higher incidence of pupil distortion we observed in our patients was most probably caused by an insufficient anterior vitrectomy that sometimes is difficult to perform on such an unstable location during complex cataract surgery. IOL decentration and tilt were equally frequent both after primary and secondary implantation. Our results tally with those obtained by Lee<sup>11</sup> and Durak<sup>12</sup>, neither of whom found statistically significant differences between primary and secondary transsclerally sutured IOL implantation. The complications we detected with secondary implantation are consistent with those published in literature<sup>15</sup>: vitreous hemorrhages from 1.1 to 25.3% (we found 10.4%), corneal edema from 0 to 26.3% (we found 7.8%), IOL decentration and tilt from 0 to 15.3% (we found 3.9%) and retinal detachment from 1.1 to 6% (we found 1.3%).

Postoperative visual acuity was equal in primary and secondary implantation patients. However, visual acuity ranging from 0.1 to 0.5 or higher was achieved by a larger

number of patients after secondary implantation. Postoperative visual acuity up to 0.1 was more frequent in primary than in secondary implantation. The result we obtained, visual acuity of 0.5 or higher in 88,5 % of patients after secondary implantation, is consistent with published researches, where the range went from 57.1% to 92% of patients<sup>16–18</sup>. Visual acuity of 0.5 or higher was found in 60% of our patients after primary implantation, which is again very close to results published in literature (58.6%)<sup>11</sup>. The outcome of surgery depends also on the skill of the surgeon; we could not dismiss this factor as irrelevant, since 6 different surgeons had performed the procedure. Data collected so far do not tip the scale in favour of either primary or secondary implantation (timing). During complex cataract surgery the surgeon can therefore rely on his or her experience and decide on the basis of existing conditions whether to proceed with lens implantation or postpone it until the implantation can be carried out in a calmer and more stable site.

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## KOMPLIKACIJE NAKON PRIMARNE I SEKUNDARNE IMPLANTACIJE IOL-a U STRAŽNJU SOBICU FIKSIRANE ŠAVOVIMA NA SKLERU

### SAŽETAK

U ovoj retrospektivnoj studiji analiziraju se i uspoređuju rane komplikacije u prvom mjesecu nakon operacije primarne i sekundarne implantacije IOL –a u stražnju sobicu fiksirane šavovima za skleru. Analizirani su medicinski kartoni 65 pacijenata kod kojih je implantirana IOL u stražnju sobicu i šavovima fiksirana na skleru na Očnoj klinici u Rijeci u razdoblju od 1998 do 2003 godine. U 30 pacijenata (skupina 1) leće su implantirane u jedno oko za vrijeme komplicirane operacije mrežnice (primarna implantacija) a u 35 pacijenata (skupina 2) leće su implantirane kasnije (sekundarna implantacija). Ukupno je bilo 77 ranih komplikacija, podjednako zastupljenih u obje skupine. U prvoj skupini bilo je 40 (51,9%) a u drugoj skupini 37 (48,1%) ranih komplikacija. Najučestalije komplikacije bile su: krvarenja u staklovinu 24,7% (14,3% and 10,4%), cistoidni edem makule 19,5% (9,1% i 19,4%), keratopatija 14,3% (6,5% i 7,8%), iskrivljenost zjenice 11,7% (9,1% i 2,6%), nagibanje i decentracija IOL-a 10,4% (6,5% i 3,9%), povišeni očni tlak 9,1% (2,6% i 6,5%), upala 6,5% (2,5% i 3,9%). Odljepljenje mrežnice i žilnice imali su nisku učestalost : 2,6% (1,3% i 1,3%) i 1,3% (0% i 1,3%). Nije bilo statistički značajnih razlika ranih komplikacija u obje skupine osim za iskrivljenje zjenice koje je bilo učestalije nakon primarne implantacije IOL-a ( $p=0,045$ ). Nakon primarne implantacije IOL-a prosječna vidna oština bila je  $0,38\pm 0,27$ , a nakon sekundarne implantacije vidna oština bila je  $0,52\pm 0,21$ . Razlika nije statistički značajna.