



Day-care patients and inpatients have similar visual acuity

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ABSTRACT

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Cataract is a cause of avoidable blindness and its prevalence increases with age. Cataract surgery is the only possible therapeutic modality for improving visual function in cataract patients. The rising numbers of cataract patients require a type of cataract surgery with minimal side effects and without hospitalization. In this connection the day care cataract surgery has been introduced, with excellent results. Therefore the aim of the present study was to compare the visual acuity of day-care patients and inpatients after extracapsular cataract extraction (ECCE). A comparative observational study was carried out on 30 mature senile cataract patients with regard to type of care after ECCE surgery. The study subjects were allocated to two groups of 15 subjects each, i.e. the day-care group and the in-patient group. The patients were observed postoperatively on the first day, first week, fourth week, and eighth week. They subsequently were corrected for best visual acuity. Hypothesis testing was done using independent t-test and the Mann-Whitney test. The study results indicated that the visual acuity of the subjects after the eighth postoperative week did not differ significantly between both groups ($p>0.05$). There was no significant difference in outcome or risk of postoperative complications between day care and in-patient cataract surgery. This study therefore presents evidence that both post-ECCE day-care as well as post-ECCE inpatients had similar visual acuity levels.

Keywords: Cataract, in-patient, day-care, visual acuity, postoperative

INTRODUCTION

More than 40% of cataract cases ultimately suffer from blindness, with the majority of blind patients being found in the developing countries of Asia.^(1,2) The results of Indonesian studies showed that 63% of bilateral blindness was due to cataract.⁽²⁾

Because of the high prevalence of cataracts, coupled to the fact that cataract is the most frequently encountered cause of blindness, cataracts constitute a considerable community health problem requiring special attention. The prevalence of all-cause blindness is three to four times higher in low-income countries than in industrialized countries, and more than 75%

of global blindness is either preventable or treatable.⁽³⁾

Several non-surgical therapeutic modalities for cataract can effectively improve vision, but only temporarily. For permanent improvement of visual functions, cataract surgery is the only treatment option.⁽⁴⁾ Currently three types of surgical operations for cataract are in existence, viz. extra-capsular extraction, phaco-emulsification, and intra-capsular extraction.⁽⁵⁾ One study demonstrated that both extracapsular cataract extraction (ECCE) and manual small incision cataract surgery (MSICS) are both safe and effective techniques for treatment of cataract patients in community eye care settings. MSICS needs similar equipment to ECCE, but gives better uncorrected vision.⁽⁶⁾

Cataract surgery has increased 400% during the last 10 years⁽⁸⁾ to become the most common surgical procedure in the developed world, exceeding 1.6 million operations in the United States alone because of an aging population and dramatic expansion of indications following improvements in technology.⁽⁷⁾ In Indonesia, the cataract surgical coverage rate among adults aged 40 years and over was 19.3%.⁽⁸⁾ The prevalence of blindness was significantly higher in poor households and poor households were also more likely to have had less than optimal cataract surgery; this was also reflected in the higher prevalence of blindness due to uncorrected aphakia.⁽⁹⁾ Cataract surgery requires substantial financial expenditures, which are increased by additional by administrative costs such as hospitalization costs, such that they become a heavy economic burden to the patient. The economic advantage of the day surgery has been emphasized in a recent randomized clinical study, which reported lower costs for outpatients than for inpatients. This difference in cost was largely due to the higher cost associated with an overnight stay in hospital, while the costs of surgical intervention and of follow-up were similar in both patient groups.^(10,11)

This is the reason most frequently given by patients for declining to undergo cataract surgery and the associated follow-up treatment for returning vision to the patients. On the other hand, with the remarkable advances in the techniques of cataract surgery and the skill of the ophthalmologists, there is a corresponding improvement in surgical outcomes. These considerations led to the abandonment of postoperative hospitalization procedures by several countries and to the application of one day care (ODC) procedures, where the patient receives postoperative care on the same day only, instead of inpatient care, so that the care may be safely administered. The result is to keep the costs to a minimum, while the patient is more comfortable living at home instead of in a hospital. One of the indicators of a successful outcome of cataract surgery is visual acuity.

The majority of the Indonesian people belongs to the middle and low social classes, with unequal distribution of educational levels and relatively inaccessible health facilities, which is in contrast with the situation in developed countries that have instituted the non-hospitalization procedure, where educational level and health facilities are superior. In view of the fact that most of the Indonesian communities have a low educational level and many people are still uneducated, while health facilities are still limited, there is a need for a study that compares the visual acuity of post-ECCE inpatients and day-care patients at "Prof. dr. R. D. Kandou" Hospital (PDRDK Hospital), Manado.

METHODS

Study design

The present study was a comparative observational study conducted on two groups of post-ECCE patients, i.e. the inpatient group and the day-care group, at the Department of Ophthalmology of PDRDK Hospital from June 2007 until March 2008.

Study subjects

The subjects of the present study were all patients attending the abovementioned department, who were diagnosed as having senile cataract and fulfilled the inclusion and exclusion criteria.

The sample size was calculated with the following formula: ⁽¹²⁾

$$n1 = n2 = 2 \left[\frac{(Z\alpha - Z\beta)s}{\mu1 - \mu2} \right]^2$$

where $\alpha = 0.05$; $\beta = 0.20$; $s = 2.2$; $\mu1 - \mu2 = 2.3$, thus giving:

$$n1 = n2 = 2 \left[\frac{[1.96 - (-0.84)]2.2}{2.3} \right]^2 = 14.2 = 14$$

Thus each group consisted of ≥ 14 eyes.

The inclusion criteria used in this study were the following: i) age 50-70 years; ii) mature senile cataract; iii) intraocular pressure (IOP) <22 mmHg; iv) blood pressure <140/90 mmHg; v) fasting blood glucose <150 mg/dL, random blood glucose <200 mg/dL; and vi) cooperative and willing to participate in the study by giving informed consent. Exclusion criteria were: i) traumatic cataract; ii) other ocular disease, apart from cataract; iii) previous intra-ocular surgery in the eye to be operated; iv) intra-operative complications of ECCE (hemorrhage, vitreous loss, capsular tear; and v) posterior segment abnormalities.

Operative procedure

From every patient a signed letter of consent was obtained for surgery/research, then the past history was elicited in connection with the inclusion and exclusion criteria, and the identity of the patient was recorded. Ophthalmological examinations performed on the subjects were among others visual acuity testing, assessment of intra-ocular pressure, and biomicroscopic examination. In addition,

measurement of blood pressure and laboratory tests were done (routine blood tests, blood glucose, clotting time, bleeding time), EKG, and keratometry and biometry for determining strength of the intra-ocular lenses to be implanted. Before the patient was brought into the operating room, the blood pressure and IOP was rechecked. All cataract surgery was done under an operating microscope by residents in ophthalmology using standard ECCE techniques. The ECCE was initiated by standard incision and was completed by the insertion of an intra-ocular lens (IOL), in the following sequence: superior limbal incision of 140-160°, anterior capsulotomy by the "can opener" method, removal of lens nucleus, removal through a cannula of cortical matter by aspiration with Ringer lactate solution, implantation of a posterior chamber IOL, and suturing of the corneal incision with five 10.0 nylon sutures. After the operation the patient received eye drops containing an antibiotic and a corticosteroid (tobrosolon), analgetic eye drops (noncort) for one to two weeks, a systemic antibiotic (cefadroxil 500 mg) and analgesic (mefenamic acid 500 mg) for five days. The inpatient group was hospitalized for three days, starting from the time of cataract surgery up to two days after the operation. The day-care group received care for one hour after surgery only, after which the patients were allowed to return home.

Postoperative examination

All subjects were monitored for one day, one week, four weeks and eight weeks after surgery. Subsequently there was an assessment of visual acuity, which is the capacity of the eye to discern the smallest letters on the Snellen optotype at a given distance. This was followed by correction of refractive errors for best attainable visual acuity. In addition the postoperative IOP level was also measured.

Statistical analysis

For hypothesis testing, the collected data

was statistically analyzed using the computer software program Statistical Package for Social Sciences (SPSS) for Windows version 15.0. The statistical tests used were independent t-test for normally distributed data and Mann-Whitney test for non-normally distributed data. The level of significance for this study was set at $p < 0.05$.

RESULTS

The purpose of the present study, conducted from June 2007 until March 2008, was to compare the visual acuity of day-care patients and inpatients after extracapsular cataract extraction (ECCE). Among 30 patients with mature senile cataract who attended the ophthalmology clinic at PDRDK Hospital, only 27 were found to meet the criteria of the study, two of whom required bilateral surgery. During the study period, three patients were dropped out for the following reasons: one patient came only twice for follow-up, one had diabetic retinopathy, and the last had vitreous loss. The distribution of males and females was not significantly different ($p > 0.05$) (Table 1). Mean age of the subjects in the inpatient group was

61.1 years (SD = 7.49 years), while in the day-care group mean age was 63.3 years (SD = 5.74 years).

The results of the t-test showed that age was not significantly different in both groups ($p > 0.05$). Median IOP was 14.6 mmHg in the inpatient group and 17.3 mmHg in the day-care group. The IOP in both groups was shown by the Mann-Whitney U-test to be similar. Mean visual acuity in the inpatient group on the first day after surgery was 0.3 (6/20) with SD = 0.20, while in the day-care group mean visual acuity was 0.3 (6/20) with SD = 0.19. According to the t-test the visual acuity on the first day after surgery was not significantly different in both groups ($p > 0.05$) (Table 2).

Median visual acuity one week after surgery in the inpatient group vs. the day-care group was 0.4 (6/15) and 0.5 (6/12), respectively. These values were shown by the Mann-Whitney U-test to be not significantly different ($p > 0.05$). Identical results were obtained at four and eight weeks after surgery, where median visual acuity values in both groups of subjects were identical (all amounted to 0.6 or 6/9), and Mann-Whitney U-test results were also not significantly different ($p > 0.05$).

Table 1. Distribution of important characteristics of respondents in the inpatient group (n=15) and the day-care group (n=15)

Variable	Inpatient (n=15)	Day-care (n=15)	p
Age (years)	61.1 (7.49)	63.0 (5.74)	0.434*
Gender			
Male	9 (60.0%)	11 (73.3%)	0.600**
Female	6 (40.0%)	4 (26.7%)	
IOP	14.6	17.3	0.230***

*Independent t-test; **Chi-square test; *** Mann-Whitney U-test

Table 2. Differences in visual acuity values on first day, one week, four weeks and eight weeks after surgery between inpatient and day-care subjects

Postoperative period	Inpatient (n=15)	Day-care (n=15)	p ^a
First day*	0.3 (0.20)	0.3 (0.19)	0.402
First week**	0.4	0.5	0.407
Fourth week**	0.6	0.6	0.352
Eighth week**	0.6	0.6	0.334

*Mean (SD); **Median; ^aIndependent t-test

Table 3. Postoperative complications in the inpatient group and the day-care group

Postoperative complication	Inpatient (n=15)	Day-care (n=15)	p ^a
Corneal edema	15	15	0.0648
Cortical rests	1	0	
Dislocation of haptic	0	1	
Astigmatism	6	5	

^a chi-square test

As seen in Table 3, 100% of subjects in both groups had postoperative corneal edema as a complication of cataract surgery. In the inpatient group at one week after surgery, cortical rests were found in one patient (6.6%), whereas in the day-care group dislocation of the haptic occurred in one patient (6.6%) one week after surgery. In the eighth week after surgery both groups had a corrected visual acuity of 1.0 (6/6). Astigmatism was found in five patients (33.3%) in the day-care group and in six patients (40%) in the inpatient group. The chi-square test found no significant difference in complication rate between the inpatient group and the day-care group ($p=0.065$).

DISCUSSION

The present study involved 30 patients with mature senile cataract, of whom three patients were dropped out of the study due to death of one patient (after only 2 follow-ups), while one patient was found on funduscopy to have diabetic retinopathy, and the last one had vitreous loss upon insertion of the IOL. Among the remaining 27 patients, 3 had bilateral ECCE. Of the initial 30 eyes, 15 were assigned to the inpatient group and 15 to the day-care group. Both groups were monitored on the first day, first week, fourth week, and eighth week after surgery, and were corrected for best attainable visual acuity.

Postoperative visual acuity on the first day was identical in both groups (0.3 or 6/20), presumably because of postoperative corneal edema and inflammation in all patients of both groups. There are several factors that may

affect the occurrence of corneal edema, namely mechanical trauma and prolonged irrigation-aspiration with subsequent endothelial damage.⁽¹³⁾ Visual acuity of the subjects on the first postoperative day was not significantly different between groups.

In comparison with the visual acuity value of 0.3 on the first postoperative day in both groups, the visual acuity scores were slightly better in the first week after surgery, being respectively 0.4 (6/15) and 0.5 (6/12) for the inpatient group and day-care group. This improvement in visual acuity was due to clearing of the corneal edema. As a rule corneal edema disappears spontaneously within 4-6 weeks,⁽¹³⁾ when the inflammatory process is considerably reduced. In the first postoperative week, in one inpatient cortical rests were found that had not been apparent on the first postoperative day due to corneal edema. In this patient no further invasive measures were taken, since the cortical rests were relatively few and small and thus likely to be reabsorbed. The finding of cortical rests may be due to their unobtrusive location behind the iris or to inadequate irrigation-aspiration. In the day-care group one patient experienced blunt trauma resulting in dislocation of the haptic, which was immediately repositioned. As was the case in the first postoperative day, the visual acuity of the patients in the first postoperative week also did not show statistically significant differences between both groups.

The visual acuity in the fourth postoperative week was identical in both groups, having the score of 0.6 (6/9), which was an improvement over the visual acuity of 0.4 in the first week. This may have been

caused by stabilization of the wound repair process, by completion of corneal clearing, or by the absence of inflammation. To minimize the chances of astigmatism, the sutures were removed in this postoperative period. In this fourth postoperative week also the visual acuity did not differ significantly between the two groups.

The visual acuity in the eighth postoperative week was identical in both groups and also identical to the visual acuity in the fourth week (0.6 or 6/9). In general, the refractive power of the patients commence to stabilize between the sixth and the eighth week after surgery. All patients of both groups in the present study received best correction of visual acuity, which was 1.0 (6/6) in all patients. Astigmatism was found in 5 patients of the day-care group and in 6 of the inpatient group, possibly due to refractive variability, a normal postoperative finding resulting from the wound repair process. Another cause of decreased visual acuity in these postoperative patients was inaccuracy of keratometric and biometric measurements, resulting in incorrect preoperative computation of the IOL dimensions. In this postoperative period visual acuity was also not significantly different between both groups ($p>0.05$). These findings were consistent with a review by Fedorowicz et al., where no difference was found in visual acuity and risk in post-ECCE inpatients and day-care patients.⁽¹⁾ Similar results were found in the study by Castells in 2001, where visual acuity, safety, effectiveness and cost-effectiveness did not differ between ECCE with postoperative day care and inpatient care.⁽¹⁴⁾ One retrospective study in India showed that the number of patients wishing to undergo cataract surgery increased after the introduction of day care cataract surgery,⁽¹⁵⁾ suggesting that day care cataract surgery is a viable health service in developing countries. A prospective studied 851 cataract surgery extraction at a tertiary centre in Vancouver showed after 3 months postoperatively, the

visual acuity had improved in 786 eyes (92.4%), remained the same in 42 (4.9%) and had worsened in 23 (2.7%).⁽¹⁶⁾

Cataract is the leading cause of visual impairment and is associated with lower levels of self-reported quality of life.⁽¹⁷⁾ A study showed a low cataract surgical coverage rate (19.3%) and even among urban subjects the rate was only 23.2%.⁽¹⁸⁾ Cataract surgery visual outcome can be used as an indicator by ophthalmologists to monitor the quality of their services. The outcome can be assessed with full spectacle correction ('best vision') or with available correction ('functioning vision'). Good outcome is defined as 6/6-6/18 (available and best correction grades $\geq 85\%$ and $>90\%$ respectively), borderline outcome as $<6/18$ - $6/60$ (available and best correction $\leq 15\%$ and $<5\%$ respectively), and poor outcome as $<6/60$ (available and best correction $\leq 5\%$ for each type). These broad categories can further be subdivided into: 6/6 excellent, 6/9 very good and 6/12 good.⁽¹⁹⁾ With advances in technology, it has been found that phaco-emulsification and manual small incision cataract surgeries achieve excellent visual outcome with lower complication rates.⁽¹⁹⁾

The VISION 2020 initiative aims to reduce the number of people with blindness or impaired vision as a result of cataract, especially in low- and middle-income countries. However, in spite of VISION 2020 programs, cataract surgery coverage in women of these countries still remains lower than in men. Although previous research showed the need to increase utilization of cataract services by women, only a few programs report efforts to meet women's needs,^(20,21) and some blindness surveys still do not report important indicators by gender.

CONCLUSIONS

No significant difference in visual acuity was found among inpatients and day-care post-ECCE patients at PDRDK Hospital. There was no significant difference in outcome or risk of

postoperative complications between day care and in-patient cataract surgery There is a need for studies on larger samples for extended periods of time to detect long-term complications, which presumably may substantially influence the visual acuity of inpatients and day-care post-ECCE patients.



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