

ORIGINAL ARTICLE

EFFECTIVENESS OF CATARACT SURGERY WITH INTRAOCULAR LENS IMPLANTATION: A COMPARATIVE STUDY BETWEEN EXTRACAPSULAR CATARACT EXTRACTION AND PHACOEMULSIFICATION

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ABSTRACT

Introduction: A randomised single blinded clinical trial comparing the effectiveness of two methods of cataract surgery with intraocular lens implantation: extracapsular cataract extraction (ECCE) and phacoemulsification (PEA) was carried out at Universiti Kebangsaan Malaysia Medical Centre (UKMMC) between March 2000 and August 2001.

Methodology: The effectiveness of cataract surgery was assessed from the quality of life specifically for vision via Visual Function 14 (VF-14) preoperatively, one week, two months and six months after surgery.

Result: The result showed that there was a significant increased in VF-14 scores after a week, two months and six months post-operation compared to the score before surgery for both techniques. However there was no significant difference in VF-14 scores when compared between ECCE and PEA.

Conclusion: This study indicated that both techniques give equal benefit to cataract patients. Since effectiveness of cataract surgery with intraocular lens implantation is unrelated to operative procedures, less costly technique should be promoted.

Keywords: Cataract surgery, effectiveness, extracapsular cataract extraction, phacoemulsification, Visual Function 14 (VF-14).

Received May 2011; Accepted June 2011

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INTRODUCTION

Cataract is the leading cause of blindness in Malaysia and worldwide, affecting more than 20 million individuals.¹ It continues to be a leading public health issue that will grow in importance as the population increases and life expectancy is extended.² Global prevalence of blindness is 0.7%, with 0.3% in developed countries and up to 1.4% in less developed countries such as Sub-Saharan, Africa.³ There are two main cataract surgery techniques performed in Universiti Kebangsaan Malaysia Medical Centre (UKMMC), i.e. phacoemulsification (PEA) which is relatively new and the older method of extracapsular cataract extraction (ECCE). Compared with ECCE, PEA requires a smaller corneal incision but needs special equipment and more expensive consumables⁴. Among the advantages of PEA are faster visual recovery, lower incidence of post-operative astigmatism, early stabilization of refraction and sustained intraocular pressure control during operation.^{5, 6}

Several instruments have been developed for measuring functional capacity related to impaired vision in patients with cataracts.⁷ Among those instruments, the Visual Function 14 (VF-14), has been shown to be reliable and valid⁷ and has high internal consistency (Cronbach's alpha = 0.85).⁸ It also quite responsive to clinical change after cataract surgery.⁹

Despite the large number of cataract extractions performed today in Malaysia, very

little information about the effectiveness of the cataract surgery performed between ECCE and PEA. The objectives of this study were to measure and subsequently compare the effectiveness of ECCE and PEA techniques performed in UKMMC by using VF-14 questionnaire.

PATIENTS AND METHODS

This longitudinal study covered a period of 18 months, from March 2000 to August 2001. During the study period, 100 patients who needed cataract surgery and fulfilled the inclusion and exclusion criteria were selected from patients who were referred to the hospital by public and private health care facilities within the operational area (Table 1). These patients were blinded and randomly allocated via computer generated randomized table into two groups; 50 in ECCE and 50 in PEA group. The patients underwent five visits during the study. In the first visit they were examined and recruited into the study. Patients were admitted and the operation was carried out in the second visit. After they were discharged, patients were required to come for follow-up visits. The third visit was carried out after one week. The following visit was carried out after two months operation. Six months after the cataract surgery, patients visited the hospital again for the final follow-up (Figure 1). VF-14 questionnaire was administered prior to operation, one week, two months and six months after surgery.

Table 1 Inclusion and Exclusion Criteria

INCLUSION CRITERIA

1. Patients aged above 44 years old
2. Patients who had best corrected visual acuity of 6/60 or better with symptoms due to cataract such as blurred vision, glare, altered colour sensation and progressive myopia
3. Patients who underwent first cataract surgery

EXCLUSION CRITERIA

A) General Factors:

1. Patients who are difficult to assess due to mental or physical handicap such as senile dementia, frailty or deformity
2. Patients who have past history of eye injury
3. Patients with cerebral vascular accident causing significant visual loss
4. Patients undergoing major surgery within the study period
5. Anxious patients who require general anaesthesia

B) Ocular Factors:

1. Any corneal opacity encroaching the central zone of 3 mm diameter
 2. Other causes of media opacity such as vitreous haemorrhage
 3. Difficult papillary dilatation
 4. Glaucoma
 5. Maculopathy of any pathology
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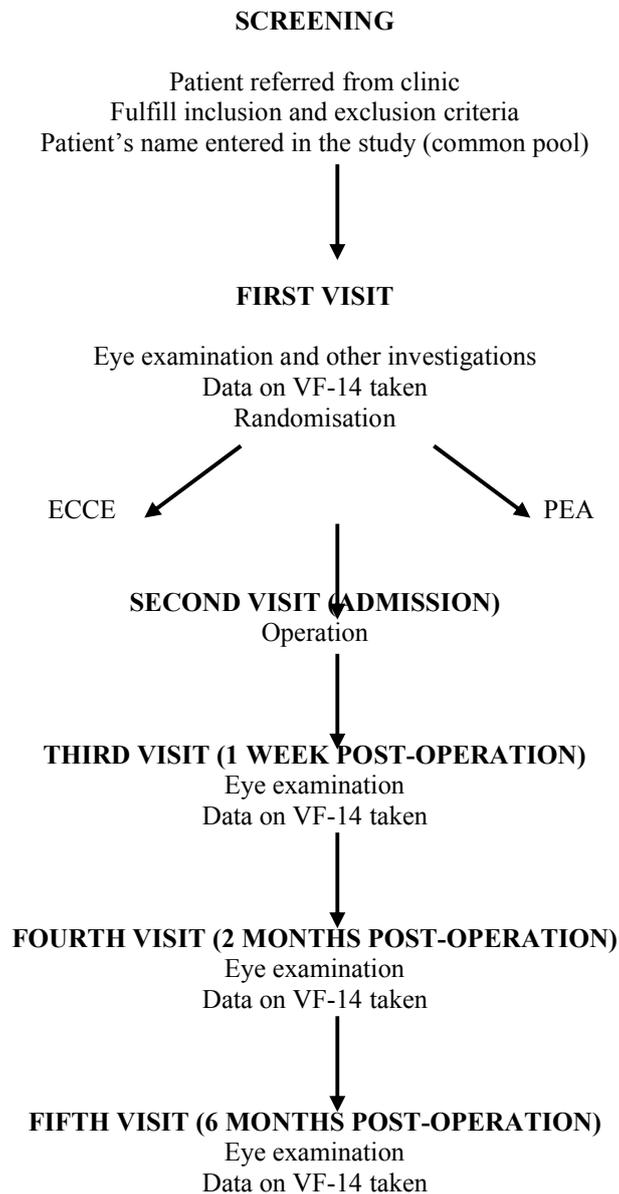


Figure 1 Flow Diagram of the Cataract Surgery Protocol

Assessment of Effectiveness

Effectiveness of cataract surgery was assessed by using the Visual Function 14 (VF-14) questionnaire. It is an instrument designed to provide a specific measure of visual functioning in cataract patients⁶. It contains 14

items that include a broad spectrum of vision dependent activities performed in everyday life that may be affected by cataract.⁸ Table 2 showed the 14 items in VF-14.

Table 2 14 Items in VF-14

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1. Reading small print, such as labels on medicine bottles, a telephone book
 2. Reading a newspaper or book
 3. Reading a large-print book or newspaper or the number on the telephone
 4. Recognizing people when they are close to you
 5. Seeing steps, stairs, or curbs
 6. Reading traffic, street, or store signs
 7. Doing fine handwork such as sewing, knitting, crocheting, or carpentry
 8. Writing checks or filling out forms
 9. Playing games such as bingo, dominos, card games, or mahjong
 10. Taking part in sports such as bowling, handball, tennis, or golf
 11. Cooking
 12. Watching television
 13. Daytime driving
 14. Nighttime driving
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Patients were asked whether they had any difficulty in performing the task even with their most recent glasses. The responses allowed were 'yes', 'no', or 'do not do that activity for reasons unrelated to vision'. For each activity in which patients responded to as 'yes', they were asked on how much difficulty they currently had with that activity – 'a little', 'a moderate amount', 'a great deal', or 'unable to do' because of their vision. The score was based on all applicable items and the amount of reported difficulty experienced in performing those activities. An item was not included in the scoring if patients did not do that activity for a reason other than their vision. No minimum number of applicable items was required. The final score produced by this index ranges from 0 (unable to do all applicable activities because of vision) and a maximum of 100 (able to do all applicable items without difficulty).

Longitudinal Follow-up

All patients turned up for the follow-up at one week and two months visits. However after six months follow-up, only 93 patients came for the visit (47 for ECCE and 46 for PEA).

Despite the attempts to contact them, the five patients did not turn up for the last follow-up and two patients were unable to be contacted due to change in address.

Data Analysis

Chi-square was used to determine any difference in patient's characteristics between ECCE and PEA. General Linear Model (repeated measures) was used to compare the VF-14 score between ECCE and PEA as well as difference within the group at four different times using Statistical Package for Social Science (SPSS) software version 9.0.

RESULTS

Characteristics of Patients

The socio-demographic characteristics, presence of co-morbidities, or prevalence of seeking eye treatment before the cataract surgery were homogenous in both the ECCE and PEA groups (Table 3).

Table 3 Comparison between ECCE and PEA patients based on socio-demographic and medical characteristics

Characteristics	ECCE (n=50)		PEA (n=50)		p value
	No.	%	No.	%	
Sex					
Males	22	51.2	21	48.8	0.840
Females	28	49.1	29	50.9	
Ethnic					
Malay	24	51.1	23	48.9	0.980
Chinese	25	49.0	26	51.0	
Indian	1	50.0	1	50.0	
Age (years)					
45 – 54	6	42.9	8	57.1	0.502
55 – 64	16	45.7	19	54.3	
65 – 74	22	51.2	21	48.8	
75 – 84	5	83.3	1	16.7	
85 – 94	1	50.0	1	50.0	
Level of Education					
No Schooling	18	50.0	18	50.0	0.604
Primary	26	53.1	23	46.9	
Secondary	4	33.3	8	66.7	
Tertiary	2	66.7	1	33.3	
Occupation					
Unemployed / Housewife	34	54.0	29	46.0	0.512
Pensioner	7	38.9	11	61.1	
Working	9	47.4	10	52.6	
Co-morbidity					
Yes	32	53.3	28	46.7	0.414
No	18	45.0	22	55.0	
Eye treatment before cataract surgery					
Yes	26	44.8	32	55.2	0.224
No	24	57.1	18	42.9	

VF-14 Score

There was significant difference in VF-14 score between the score taken prior to operation, one week, two months and six months after operation in both techniques

(GLM within subject effects, $p < 0.001$). However there was no difference in the score between ECCE and PEA as shown in Table 4 (GLM between subject effects, $p = 0.225$).

Table 4 Mean Score of VF-14

Time Interviewed	ECCE		PEA	
	Mean (Range)	s.d.	Mean (Range)	s.d.
Before Operation	64.05 (16.67-100.00)	19.79	68.37 (25.00-100.00)	18.68
One Week Post-Operation	89.21 (37.50-100.00)	11.42	92.10 (60.71-100.00)	8.51
Two Months Post-Operation	93.43 (75.00-100.00)	6.97	95.34 (75.00-100.00)	6.92
Six Months Post-Operation	96.76 (66.67-100.00)	6.02	95.40 (69.44-100.00)	6.14

GLM within subject effects, $p < 0.001$
 GLM between subject effects, $p = 0.225$

DISCUSSION

This randomised single blinded study showed that ECCE and PEA have similar outcome based on visual function assessed by VF-14 questionnaire. Theoretically, there are numbers of advantages in carrying out PEA. The PEA technique is less invasive. Only a smaller incision is required in PEA compared to ECCE. Through this small incision, the lens nucleus is phacoemulsified using low flow/high vacuum machine. In ECCE, the lens nucleus was expressed using bimanual technique. With a smaller incision, healing process and visual recovery are faster. There were lower incidence of post-operative astigmatism, early stabilization of refraction and sustained intraocular pressure control during operation.^{6, 10}

The result of this study was congruent with the study done by Schein et al.¹¹ They found that PEA and ECCE surgery provide similar magnitude of improvement in visual acuity and no difference in overall intraoperative, perioperative, and 4-month postoperative adverse event rates. Their study showed that 90% of all the cohort patients achieved visual acuity of 20/40 or better four months postoperatively.

Another study done in Denmark showed that there was no difference found between PEA and ECCE in visual acuity at final refraction¹². In this study, 54% of cataract surgeries were done by using PEA and another 46% by ECCE. A few studies also found that there was no statistically significant difference in the risk of anterior chamber contamination

in eyes having ECCE than in those having PEA¹³⁻¹⁵

This study has shown that both cataract surgeries are effective based on the vision related quality of life (VF-14) that increased significantly before and after operation. VF-14 is better measures of visual function in real situation compared to visual acuity since it takes into account daily activities of the patient and include binocular vision, something which is neither measured nor easy to estimate using the Snellen chart for determining visual acuity.¹⁶

In conclusion, ECCE and PEA were equally effective in restoring vision after cataract surgery with intraocular lens implantation. Since effectiveness of cataract surgery is unrelated to operative procedures, less costly technique should be promoted.

ACKNOWLEDGEMENTS

We would like to acknowledge the contributions of the staff of Universiti Kebangsaan Malaysia Medical Centre directly or indirectly in this study. This study was funded by the Intensification of Research in Priority Areas (IRPA) Project No. 06 – 02 – 02 – 0106, grant from the Ministry of Science, Technology and Innovation, Malaysia.

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