Original Article/นิพนธ์ต้นฉบับ

วิธีการดำเนินการและผลการผ่าตัดต้อกระจกในเขตชนบทของจังหวัดนครราชสีมา

อัจฉรา นิธิอภิญญาสกุล, พ.บ.*
จิรภัส อนันตชัย, พ.บ**
คุณไธวดี ดุลยจินดา, พ.บ.**
ละอองศรี อัชชนียะสกุล, พ.บ.**

บทคัดย่อ

วัตถุประสงค์: เพื่อพัฒนาระบบและประเมินผล การผ่าตัดต้อกระจกในเขตชนบทของจังหวัดนครราชสีมา

วิธีการวิจัย: เป็นการวิจัยแบบ prospective observational study

วิธีการ: จักษุแพทย์ โรงพยาบาลมหาราชนครราชสีมา จัดการอบรมแพทย์และพยาบาลโรงพยาบาลชุมชนเรื่ององค์ความรู้และการเตรียมดูแลผู้ป่วยต้อกระจกก่อนและหลังผ่าตัด ทีมโรงพยาบาลชุมชนได้คัดกรองผู้ป่วยต้อกระจกเบื้องต้น จากนั้นทีมจักษุโรงพยาบาลมหาราชนครราชสีมาได้ตรวจคัดกรองผู้ป่วยอย่างละเอียดอีกครั้งก่อนการผ่าตัด ทีมผ่าตัดประกอบด้วยจักษุแพทย์จากภาควิชาจักษุวิทยา ศิริราชพยาบาลและจักษุแพทย์โรงพยาบาลมหาราชนครราชสีมา ผู้ป่วยต้อกระจกทุกรายได้ตรวจระดับสายตาหลังผ่าตัดวันแรก สัปดาห์ที่สองและเดือนที่สอง

ผลการวิจัย: ผู้ป่วยจำนวน 204 รายได้รับการผ่าตัดต้อกระจก ผู้ป่วยร้อยละ 67.2 มีระดับสายตาแย่กว่า 6/60 จักษุแพทย์ผ่าตัดด้วยวิธีสลายต้อกระจกร่วมกับใส่เลนส์แก้วตาเทียม ร้อยละ 65.7 และวิธี extracapsular cataract extraction (ECCE) ร่วมกับใส่เลนส์แก้วตาเทียม ร้อยละ 30.4 ผู้ป่วยร้อยละ 3.9 ไม่ได้ใส่เลนส์แก้วตาเทียม ผู้ป่วยร้อยละ 61 มีระดับสายตาดีมากหลังผ่าตัด (VA ≥6/18) ผู้ป่วย 3 ราย (ร้อยละ 1.4) มี vitreous loss และพบกระจกตาบวมในวันรุ่งขึ้นหลังการผ่าตัด 46 ราย (ร้อยละ 22.5) ไม่มีรายงานผู้ป่วยติดเชื้อหลังผ่าตัด

สรุปการวิจัย: การผ่าตัดต้อกระจกในโรงพยาบาลชุมชนของจังหวัดนครราชสีมา ทำให้สายตาของผู้ป่วยหลังผ่าตัดดีขึ้น และไม่มีภาวะติดเชื้อหลังผ่าตัด **จักษุเวชสาร 2550; กรกฎาคม-ธันวาคม 21(2): 111-9.**

* **กลุ่มงานจักษุ โรงพยาบาลมหาราชนครราชสีมา**
** **ภาควิชาจักษุวิทยา คณะแพทยศาตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล**

Original Article/นิพนธ์ต้นฉบับ

Process and Outcome of Cataract Surgery in Rural Area of Nakhon Ratchasima Province

Achara Nitiapinyasakul, M.D.*

Jirapas Anantachai, M.D.**

Khun Dhaivadee Dulayajinda, M.D.**

La-ongsri Atchaneeyasakul, M.D.**

Abstract

Purpose: To develop the process and to assess the outcome of cataract surgery in rural area.

Study design: A prospective observational study.

Methods: Local ophthalmologists provided a training program for community team. After the community team screened the patients at rural primary care units, complete ophthalmic examination was performed by the local ophthalmologists. Cataract surgery was conducted at the community hospitals by university and local ophthalmologists. All patients were examined and recorded uncorrected visual acuity (VA) on the first day, 2 weeks and 2 months after surgery.

Results: Two hundred and four cataract patients were enrolled in this study. Two-thirds of the patients had presenting VA <6/60. Phacoemulsification with intraocular lens (IOL), extracapsular cataract extraction (ECCE) with IOL and without IOL were performed in 65.7%, 30.4% and 3.9% of patients respectively. Sixty-one percent of patients had a good visual outcome. Three patients (1.4%) had vitreous loss and forty-six (22.5%) had corneal edema on the first day post-operation. No post-operative endophthalmitis was found.

Conclusion: Most patients had visual improvement and no report of postoperative endophthalmitis after cataract surgery in this rural setting. **Thai J Ophthalmol 2007; July-December 21(2): 111-9.**

Keywords: *cataract surgery, visual outcome.*

* **Maharat Nakhon Ratchasima Regional Hospital, Nakhon Ratchasima, Thailand;**

** **Department of Ophthalmology, Siriraj Hospital Mahidol University, Bangkok, Thailand**

Introduction

Nakhon Ratchasima is the second largest province in Thailand, consisting of 20,496 km^2. In the 2004 census, there were a population about 2.5 millions and 209,667 (8.25%) were over 60 year-old.

From the 3rd National Survey on Blindness of Thailand in 1994, cataract was the most common cause of blindness, with a prevalence of 1.69-5.77 per 1,000 population.[1] Even the significant improvements of the health-care system in Nakhon Ratchasima, there were 10 ophthalmologists, based at: Maharat Nakhon Ratchasima Regional hospital (6), military hospital (1), metropolitan health care unit (1), and private hospitals (2); all of them work in the city. In 2005, 11,417 patients were registered as cataract at the Department of Ophthalmology, Maharat Nakhon Ratchasima Regional hospital, however, only 2000 cases were operated.

Due to lots of the cataract backlog in Nakhon Ratchasima province, especially in rural areas and in order to address this problem, a rural cataract surgery project was established in 2005 in two ampurs or districts of Nakhon Ratchasima Province, Banleaum and Prathai, which are located 85 and 97 km from the city, respectively with the collaboration of ophthalmologists from university hospital and provincial hospital together with the general practitioners and nurses in rural hospitals. This project was performed in order to ensure that the high quality of cataract surgery outcome was obtained.

Methods

Two hundred and four patients were selected to undergo cataract surgery at two community hospitals in Nakhon Ratchasima province: 74 patients at Banleaum hospital and 130 patients at Prathai hospital. Informed consent was obtained from all cataract patients.

Procedures

The criteria for cataract surgery included an uncorrected visual acuity (VA) of <6/60 or dense posterior subcapsular cataract that would have better VA. The exclusion criteria were any patient manifesting any other ocular diseases (e.g. corneal, glaucomatous, retinal, or vascular diseases).

The process of the cataract surgery is shown in figure 1. The ophthalmologists from the regional hospital provided a training program for doctors and nurses at the community hospitals. The training program consisted of providing basic knowledge about cataracts; basic screening method such as VA measurement using the Snellen's chart, intraocular pressure (IOP) measurement using the Schiotz's tonometer, penlight examination, data recording, pre and post-operative management and preparation of the operating theater.

After the community team visited and screened patients at rural primary care units, all patients were sent to the community hospital for complete ophthalmic examination by the local ophthalmologists. The ophthalmologists reviewed VA, measured IOP by using a pneumatic tonometer, and performed slit lamp and fundus examinations using an indirect ophthalmoscope. Intraocular lens (IOL) power was calculated by the aim at -0.5 diopters for all patients who met the criteria for cataract surgery. Patients with mature or dark brown cataracts were scheduled for extracapsular cataract extraction with posterior chamber IOL implantation (ECCE with IOL), and the remaining patients with immature cataracts were selected for phacoemulsification with posterior chamber IOL implantation (phaco with IOL).

Cataract surgery was conducted at the two community hospitals with the collaboration of three ophthalmologists from Maharat Nakhon Ratchasima hospital, four staff members and four residents from

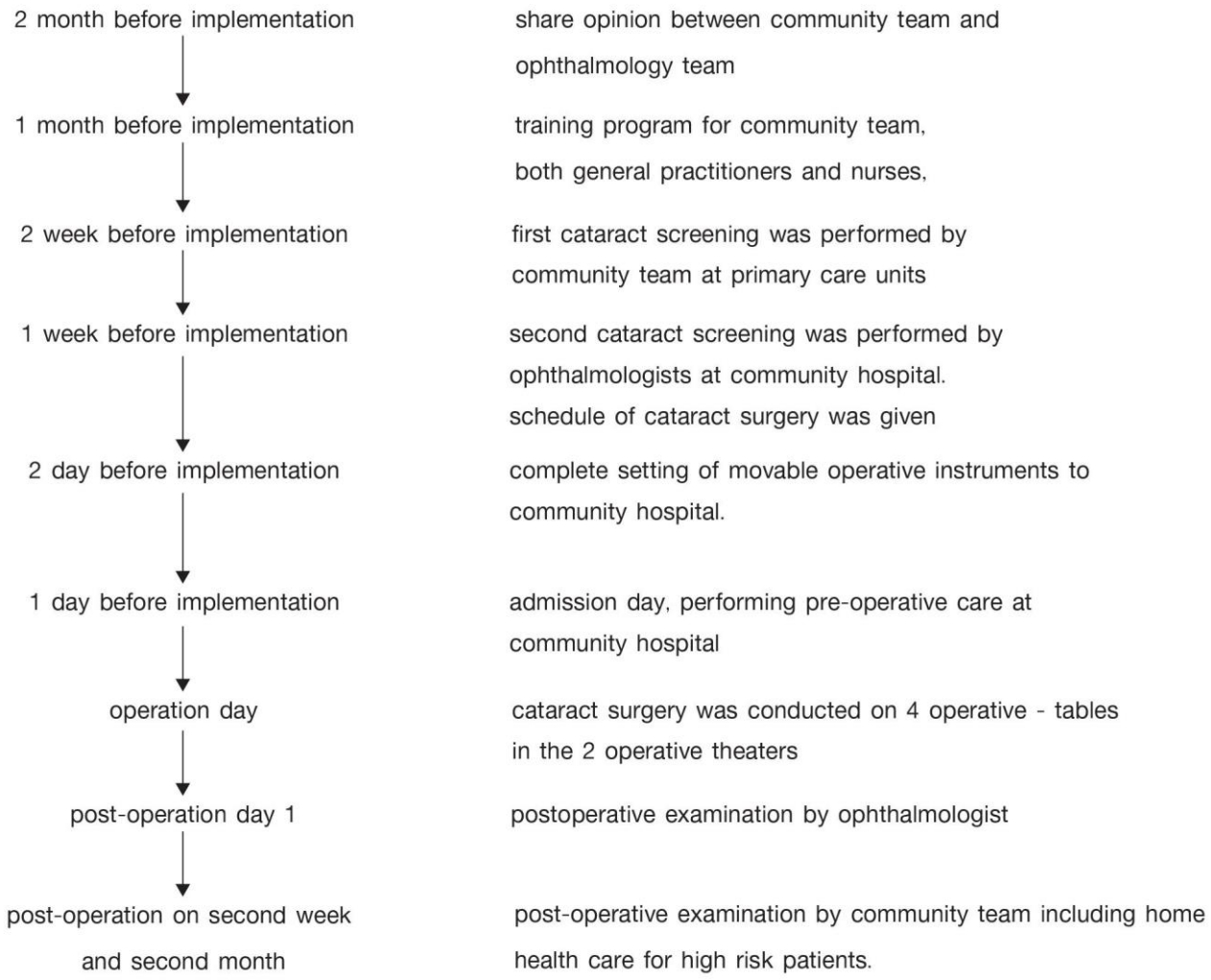

Figure 1. *Flow chart of the process of cataract surgery of rural hospital in Nakhon Ratchasima Province.*

the department of Ophthalmology, faculty of medicine; Siriraj hospital, Mahidol university. The surgeons were divided into two groups, performing the operation in Banleaum hospital and Prathai hospital, respectively. All 204 cataract patients were operated on November 24-25, 2005 at Banleaum hospital and December 8-9, 2005 at Prathai hospital. The surgical instruments for cataract surgery were provided from the department of Ophthalmology, Siriraj hospital and Maharat Nakhon Ratchasima hospital. Uncorrected visual acuity was recorded on the first day, on the second week and on the second month after surgery. The patients who had no relatives or poor hygiene were referred to home health care units of the community hospital for receiving care after surgery.

Definitions

Pre-operative VA was defined as VA without glasses, recorded on the date of screening. Visual acuity was defined as VA without glasses recorded on day 1, day 14 and 2 months after surgery.

For pre-operative VA, near normal vision was defined as VA of 6/6 to 6/18; visual impairment was defined as VA from 6/24 to 6/60; and severe visual impairment was defined as VA of <6/60[2]. The VA level after cataract surgery were categorized by

using WHO guidelines, that is, a good outcome is VA of 6/6 to 6/18; borderline outcome was defined as VA from 6/24 to 6/60; and a poor visual outcome was defined as VA of <6/60.

Data handling and statistical analysis

All data were entered and verified using an excel spreadsheet, then converted into STATA-7 for further analysis. Descriptive statistics were presented as mean, standard deviation and percentage as appropriate. Multiple logistic regression analysis was used to compare visual outcomes of surgery at the two sites and to identify categories of patients and factors related to surgery, associated with obtaining a poor visual outcome. Results were displayed as adjusted odds ratio and 95% confidence interval. A 5% significance level was applied throughout these analyses.

Results

After the community team screened 438 patients at rural primary care units. Two hundred and four patients (46%) were met the criteria and enrolled in this study. Demographic data are shown in table 1. There were 75 males (36.8%) and 129 females (63.2%). The average age was 68.8 years (range 38-89 years, SD = 8.3). Eighty-nine percent

Table 1 Demographic data

	Banleaum Hospital N (%)	Prathai Hospital N (%)	Total N (%)
cataract patients	74 (36.3)	130 (63.7)	204
sex			
male	28 (37.8)	47 (36.1)	75 (36.3)
female	46 (62.2)	83 (63.7)	129 (63.2)
age (years)			
<40	1 (1.4)	0	1 (0.5)
40-49	1 (1.4)	3 (2.3)	4 (2.0)
50-59	8 (10.8)	9 (6.9)	17 (8.3)
60-69	23 (31.1)	64 (49.2)	87 (42.6)
70-79	33 (44.6)	47 (36.1)	80 (39.2)
80-89	8 (10.8)	7 (5.4)	15 (7.4)
underlying disease			
none	45 (60.8)	73 (56.2)	118 (57.8)
diabetes mellitus (DM)	6 (8.1)	11 (8.5)	17 (8.3)
hypertension (HT)	12 (16.2)	16 (11.9)	28 (13.7)
DM and HT	1 (1.4)	14 (10.4)	15 (7.4)
DM, HT and CRF	0	3 (2.2)	3 (1.5)
others	10 (13.5)	13 (10)	23 (11.2)
underlying ocular disease			
none	74 (100)	123 (94.6)	197 (96.5)
high myopia	0	5 (3.8)	5 (2.5)
dry eye	0	1 (0.8)	1 (0.8)
corneal scar	0	1 (0.8)	1 (0.5)

CRF = chronic renal failure

were older than 59 years. Hypertension and diabetes mellitus were the most common underlying diseases in this study.

There were 137 patients (67.2%) with a pre-operative VA of <6/60 or severe visual impairment and 67 patients (32.8%) had VA from 6/24 to 6/60 or visual impairment (Table 2). Phaco with IOL implantation was conducted in 134 cases (65.7%), ECCE with IOL implantation in 62 cases (30.4%); and surgery without IOL in 8 cases (2.9%) (Table 2). Of those eight patients without IOL implantation, three had intra-operative complications (posterior capsule rupture and vitreous loss) and five had high myopia. Corneal edema was the most common complication observed on the first postoperative day (Table 2). Two patients died before final VA assessment from cardiovascular disease and chronic renal failure. Both had performed ECCE with IOL. Two months after cataract surgery, 123 cases (60.9%) had good outcome, 73 cases (36.1%) had borderline outcome, and six cases (2.9%) had a poor outcome (Table 2). In those with a poor outcome, two had posterior capsulse rupture, one had posterior capsulse rupture with IOL dislocation, one had optic atrophy, and two had highly myopic fundus. In those with a good outcome, 2.5% had VA of 6/6, 21.4% had VA of 6/9, 16.2% had VA of 6/12 and 20.1% had VA of 6/18. There was no report of post-operative endophthalmitis.

The relationship of patient's characteristics of the two hospitals and the risks of having a poor outcome are shown (Table 3). The patients from Prathai hospital had clinically significant greater improvement of final VA than those from Banleaum hospital. Phacoemulsification with IOL resulted in clinically significant better final VA than ECCE with IOL. Patients under the age of 60 from Banleaum hospital had clinically significant better final VA than those at the age of 60 years or over.

Corneal edema on post-operative day 1 was clinically significant found in ECCE procedures (OR = 0.03 95%CI = 1.05-4.35). Diabetic and non-diabetic patients demonstrated no difference in corneal

Table 2 Visual acuity, type of surgery, and complications

	Banleaum hospital N (%)	Prathai hospital N (%)	Total N (%)
presenting VA			
VA 6/24 - 6/60	28 (37.8)	39 (30)	67 (32.8)
VA < 6/60	46 (62.2)	91 (70)	137 (67.2)
final VA			
VA 6/6 - 6/18	31 (42.5)	92 (71.3)	123 (61)
VA 6/24 - 6/60	38 (52)	35 (27.1)	73 (36.1)
VA < 6/60	4 (5.5)	2 (1.6)	6 (2.9)
type of surgery			
Phaco with IOL	51 (68.9)	83 (63.8)	134 (65.7)
ECCE with IOL	20 (27.0)	42 (32.3)	62 (30.4)
surgery without IOL	3 (4.1)	5 (3.8)	8 (3.9)
post-operative day 1 complications			
none	62 (83.8)	96 (73.8)	158 (77.5)
corneal edema	12 (16.2)	34 (26.2)	46 (22.5)

Table 3 Relationship of logistic regression illustration associations between multiple patient characteristics of the two hospitals and the risk of having a final postoperative visual acuity worse than 6/18

	Banleaum hospital				Prathai hospital			
	final VA <6/18(N)	final VA 6/6-6/18(N)	OR (95% CI)	p-value	final VA <6/18(N)	final VA 6/6-6/18(N)	OR (95% CI)	p-value
sex								
male	16	12	0.97(0.37-2.55)	0.96	11	36	0.66(0.29-1.50)	0.31
female	26	19	1.0		26	56	1.0	
age								
≥60	39	24	3.79(0.85-16.86)	0.05	34	83	1.23(0.31-4.84)	0.77
<60	3	7	1.0		3	9	1.0	
presenting VA								
<6/60	29	16	2.1(0.78-5.59)	0.13	30	60	2.28(0.89-5.87)	0.07
6/24-6/60	13	15	1.0		7	32	1.0	
underlying disease								
DM	3	39	0.52(0.11-2.56)	0.41	9	19	1.23(0.49-3.07)	0.65
no DM	4	27	1.0		28	78	1.0	
surgical technique (patients who had IOL insertion, N = 196)								
ECCE c IOL	15	4	4.21(1.15-15.4)	0.02	17	24	2.56(1.1-5.9)	0.02
Phaco c IOL	24	27	1.0		18		65	1.0

edema on the first post-operative day (OR = 0.35 95%CI = 0.64-3.37). However, after 2 months, their final VA was not different from those patients whose cornea were clear on the first post-operative day. (OR = 0.9 95%CI = 0.5-2.0, OR = 5.1 95%CI = 0.6-4.1).

Discussion

In 2005, we established a model for prevention of cataract blindness in rural areas by training general practitioners and nurses in rural hospital before implementation of cataract surgery. The collaboration of ophthalmologists and the trained community team for screening, pre-operative and post-operative care of cataract patients provided a good outcome of cataract surgery.

The goal of work, method and outcome of cataract surgery in rural hospital of this study are also similar to the study of Eritrean work of Fred Hollows[3] and Venkatesh R.[4] The goal of work is reduction of avoidable blindness by building the capacity of public health system to treat and to prevent blindness. Cataract screening was performed at an outreach camp or primary care unit and the patients were transported to the base hospital for cataract surgery. Improvement of visual outcome of cataract surgery in rural hospital was also found.

Articles from many countries usually report VA in reference to the best corrected VA using the logarithm of the minimum angle of resolution (Log MAR).[5-10] In this study, we still recorded uncorrected VA using the Snellen's chart because it was more practical for community personnel to use.

Endophthalmitis was not detected within 2

months even though we performed the operation in a rural setting. The incidence of endophthalmitis from the previous articles was 0.04-0.9%.[11-20]

With our innovative surgical technique, we believed that the patients who underwent phaco with IOL achieved a better visual outcome than those with ECCE with IOL. Most of cataract patients (91%) in the study of Siriraj hospital, Mahidol university[20] underwent phaco with IOL. In this study, 65% of patients underwent phaco with IOL. The reason was probably the cataract patients in rural area were found to have more mature or dark brown cataracts than the urban patients.

Most patients in rural areas of Nakhon Ratchasima province had visual improvement after cataract surgery. The difference of the final VA between patients at Banleaum and Prathai hospitals might be caused by the age of the patients. However, differing teams of surgeons probably caused the variation in final visual outcome.

Conclusion

This report was a pilot project that had the potential to reduce the waiting time and backlog of cataract patients in Nakhon Ratchasima province. Most patients had visual improvement after cataract surgery. There was no report of endophthalmitis in this study. The strengths of this project were a well-planned training of the community team before implementation of cataract surgery in rural hospital. Besides providing a good healthcare system to a large number of patients, the issues of insufficient surgical instruments and manpower must be addressed.

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