Visual Outcomes Following Small Incision Cataract Surgery (SICS) in Wangaya Hospital, Bali, Indonesia

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Abstract—Cataract is considered as one of the causes of visual impairment and blindness globally and specifically in Indonesia. Manual small incision cataract surgery (SICS) is a surgical technique that is commonly performed to improve the visual outcomes among cataract patients. This study is aimed to determine the visual outcomes of cataract patients who had done the SICS and to evaluate its effectiveness. An observational study was carried out among cataract patients in Wangaya Hospital, Bali, Indonesia. Patient who underwent SICS procedures were followed-up to obtain their postoperative visual acuity and complications. A total number of 23 patients with 34 operated eyes were included in the study. Cataract was found as an important cause of visual impairment and blindness among the study group, with the number of preoperative blindness and visual impairment was 52.2% and 43.5%, respectively. On the other hand, the SICS procedure showed the results of good visual outcomes in 41.2% of operated eyes and reduced the number of blindness to 0.0% among the study group. There was only 1 (2.9%) complication found postoperatively, which was IOL decentration. In conclusion, the result from SICS surgery in Wangaya Hospital, Bali, Indonesia showed better improvement in visual outcomes and reducing the rate of blindness among cataract patients. The SICS also showed a low postoperative complication rate. Hence, SICS should be continually sustained as the surgical technique to be performed among cataract surgery patients.

Index Terms—Cataract, small incision cataract surgery, visual acuity, ophthalmology.

I. INTRODUCTION

Globally, approximately 1 billion people have a vision impairment that could have been prevented. About 65.2 million of them are due to cataracts.¹ In Indonesia, it is estimated that at least 1.5 million visual impairment and 1.5% of blindness were caused by cataracts.² Due to its tropical climate, the incidence of cataract is found to be affecting Indonesian people 15 years earlier compared to any other subtropical countries.² The manual small incision cataract surgery (SICS) has become popular and one of the most common cataract surgical techniques performed in developing countries, including Indonesia. Manual SICS is a surgical technique that is possible to be done in suboptimal conditions and serves to avoid the high maintenance cost of phacoemulsification surgery, which is also another popular and more modern surgical technique for cataract.³ Compared

to phacoemulsification, SICS offers similar advantages but more frequently performed because of its wider applicability, less time consuming, and lower cost.^{3,4} Several studies in Nepal have shown similar visual outcomes from both SICS and phacoemulsification.^{4,5,6} The aim of this study was to determine the visual outcome of cataract patients who had done manual SICS and to evaluate whether this surgical technique is still suitable or need to be improved in order to gain a better operating results among cataract patients in Wangaya Hospital, Bali, Indonesia.

II. METHODS

This study was carried out at Wangaya Public Hospital, Denpasar, Bali, Indonesia, over 7-months period between September 2019 to March 2020. The study was conducted among adults aged 40-year-old and above who had diagnosed with visually impairing senile cataracts based on the history taking and ophthalmology examination done by the ophthalmologists at the hospital. Patients with pre-existing ocular co-morbidities (traumatic cataracts, congenital cataracts, glaucoma, diabetic retinopathy), history of previous ocular surgeries, and loss-at-follow-ups patients were excluded. Patients also had a preoperative biometry examination before determined to undergo surgery.

All patients had manual small incision cataract surgery (SICS) performed by two different surgeons, but using the same surgical technique. The surgeries were performed under local anesthesia. The SICS is a technique of extracapsular extraction in which includes the following stages: a) 5.5 to 7.5 millimeters sclerocorneal incision and tunnel formation, b) trypan blue-assisted capsulorhexis, c) hydro procedures under the anterior capsule rim to extract the cataract nucleus from the capsular bag, d) irrigation and aspiration, e) implantation of intraocular lens (IOL).³ Patients presenting with operable senile cataract were followed-up at the first-day, seventh-day, and one-month postoperatively to record the unaided best-corrected visual acuity (BCVA) and postoperative complications. All patients received the same drug regimens during the follow-up treatments.

The data were collected and analyzed by using Microsoft® Excel 2019. Visual outcome was categorized using the World Health Organization's standard category for visual impairment and blindness, where normal to mild visual

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impairment is equal to 6/6 and equal to or better than 6/18, moderate visually impaired vision is less than 6/18 and equal to or better than 6/60, severe visually impaired vision is less than 6/60 and equal to or better than 3/60, and blind if the visual acuity is less than 3/60.⁷ Measurement of visual outcomes was done monocularly in the eye diagnosed with cataract. If a patient had bilateral cataracts, the determination of visual impairment would be based on the better eye. A better eye is defined as the eye with better vision.

III. RESULT

A total of 23 patients met the inclusion criteria and were enrolled for the study, involving a total of 34 operated eyes previously diagnosed by senile cataracts. The ages of the patients ranged from 43 to 84-year-old, with a mean of 63 ± 10-year-old. There were 10 male (43.5%) and 13 female (56.5%) patients. Most of the cataract patients were found to be in the age range of 60-69 years, only attended primary school, and unemployed. Table I presents the demographic characteristics of the patients.

TABLE I: DEMOGRAPHIC CHARACTERISTIC OF THE CATARACT PATIENTS IN WANGAYA HOSPITAL

Characteristic	Total (N=23)	Percentage (%)
Gender		
Male	10	43.5
Female	13	56.5
Age (year)		
40-49	3	13.1
50-59	4	17.4
60-69	10	43.5
70-79	5	21.7
> 80	1	4.3
Educational Status		
Uneducated	4	17.4
Primary	10	43.5
Junior High	2	8.7
Senior High	5	21.7
Bachelor	2	8.7
Occupation		
Unemployed	14	60.9
Employed	9	39.1

As for the cataract, most of them were still in an immature stage (64.7%) rather than the mature ones (35.3%). Among the cataract patients, 18 (52.9%) were found in the right eye, and 16 (47.1%) in the left eye. Table II presents the characteristics of cataracts among the patients who underwent SICS procedure.

TABLE II: CHARACTERISTICS OF CATARACT

Characteristic	Total (N=34)	Percentage (%)
Staging		
Immature	22	64.7
Mature	12	35.3
Involved Eyes		
Right Oculi	18	52.9
Left Oculi	16	47.1

Preoperative ocular examination revealed the visual acuity of the patients before undergoing SICS and was classified based on WHO's standard category for visual impairment. Based on the examination, as much as 12 (52.2%) patients were classified as blind and had to present visual acuity of less than 3/60. Among them, 5 (21.7%) patients had binocular

blindness and 7 (30.5%) had monocular blindness. A total of 10 (43.5%) patients were visually impaired with visual acuity ranging from 6/18 to 3/60. Among them, 6 (26.1%) patients had monocular visual impairment and 4 (17.4%) patients had binocular visual impairment. There was only 1 (4.3%) patient that still had a normal vision with visual acuity of better than 6/18. Following the SICS performed, the visual acuities of the patients were mostly improved. No patient was reported to be categorized as blind. A total of 12 (52.2%) patients were still visually impaired. Among them, 6 (26.1%) patients had monocular visual impairment, and 6 (26.1%) patients had binocular visual impairment. A total of 11(47.8%) patients were found to had good vision. Among them, 7 (30.5%) patients had a good monocular vision and 4 (17.4%) patients had good binocular vision. Table III shows the comparison of preoperative and postoperative visual acuity among the study group. This table shows that the SICS procedure reduced the number of patients who were previously categorized as blind from 52.2% to 0.0%. On the other hand, the SICS procedure also improved the number of patients who had a good vision from 4.3% to 47.9%.

TABLE III: PREOPERATIVE AND POSTOPERATIVE VISUAL ACUITY AMONG THE STUDY GROUP

Visual Impairment Category	Before SICS		After SICS	
	Total (N=23)	Percentage (%)	Total (N=23)	Percentage (%)
Blind (< 3/60)				
Monocular	7	30.5	0	0.0
Binocular	5	21.7	0	0.0
Visual Impairment (< 6/18 – 3/60)				
Monocular	6	26.1	6	26.1
Binocular	4	17.4	6	26.1
Good Vision (> 6/18)				
Monocular	1	4.3	7	30.5
Binocular	0	0.0	4	17.4

Among 34 surgically operated eyes, the visual outcome at the first-day postoperatively showed that only 8 (23.5%) eyes had a good vision or visual acuity of 6/6 to 6/18, followed by 20 (58.8%) eyes had a moderate visual impairment (< 6/18-6/60), 2 (5.9%) eyes had severe visual impairment (< 6/60-3/60), and there were 4 (11.8%) eyes still categorized as blind (> 3/60). At the seventh-day or one-week postoperatively, the number of eyes with good vision was increased to 11 (32.4%), followed by 20 (58.8%) eyes still had a moderate visual impairment, 2 (5.9%) eyes still had severe visual impairment, but there were only 1 (2.9%) eye which was categorized as blind. At the thirtieth-day or one-month postoperatively, the number of eyes with good vision was increased to 14 (41.2%), followed by 19 (58.8%) eyes still had a moderate visual impairment, 1 (2.9%) eye still had severe visual impairment, and there was no eye which was categorized as blind. Figure I shows the linear progressivity of the visual outcomes improvement at the first, seventh, and thirtieth-day after SICS procedures. This figure shows that the SICS procedure reduced the number of eyes which was visually impaired or blind. On the other hand, the SICS procedure also improved the number of eyes to be having a good vision up to 41.2% after the surgery.

Fig. 1. Visual outcome of the eyes following the SICS procedure at the first, seventh, and thirtieth-day follow-up

Patient was also followed-up for the postoperative complications after the SICS procedure, and there were found that only 1 (2.9%) eye had IOL decentration. Meanwhile, the rest 33 (97.1%) had no other complications. Table IV presents the postoperative complications after the SICS procedure in the study group.

TABLE IV: POSTOPERATIVE COMPLICATIONS

Complications	Total (N=34)	Percentage (%)
No Complication	33	97.1
IOL Decentration	1	2.9

IV. DISCUSSION

This study is a hospital-based observational prospective study regarding the visual outcomes following the SICS procedure at the Department of Ophthalmology, Wangaya Hospital, Bali, Indonesia. Among the study group, the number of women was found to be more dominant in comparison to men, and the most prevalent age was ranging from 60-69 years. This result is comparable to what was found in cataract patients in many prior studies. Olawoye et al. found that the majority (41.8%) of cataract patients in South-western Nigeria were at 60 to 69-year-old with the mean age of 66.5-year-old.⁸ Semanyenzi also found that the most affected age group belonged to 60-69 (27.7%) age group.⁹ Another study conducted at 4 provinces in China also found that there were more female cataract patients in the study in compare to males.¹⁰ A study in India also showed that the majority of patients were females within the age group of 61-70 years (41.6%).¹¹

Based on the result, this study has shown that cataract is an important cause of blindness among Balinese in Indonesia, with the prevalence of 52.2% in the study group. On the other hand, cataract surgery, such as SICS procedure, results in good visual outcomes in 41.2% of operated eyes. In previous studies carried out in Nigeria⁸, Ghana¹², and India^{11,13}, the total percentages of blindness before cataract surgery were 22.6%, 99.7%, 81.8%, and 70%, respectively. In those studies, the number of eyes that were previously cataract blind showed improvement in visual outcomes after the SICS procedure. The result of good visual outcomes after the SICS procedure in our study shows a fewer number of good visual outcomes than the study in Nigeria (54.1%)⁸, and Central India (46%)¹¹. However, in compare to the study in Ghana¹² and another study in Western India¹³, the number of good visual outcomes in our study were found to be higher, with the percentage of 39.8% and 16.7%, respectively. Meanwhile, the number of patients who were still classified

as blind after SICS procedures in our study are zero. This result shows a great number in compare to any other comparative studies.^{8,11-13}

The difference in our results could be explained by the differences in the methodology of follow-up in each study, where the study in Nigeria⁸ and India¹¹ was carried out in a longer period of time (6-8 weeks), so that the visual acuity recovery and rehabilitation time is shown by the patients would be longer and tend to be better. The studies that had done in Ghana¹² and Western India¹³ shares more similarities to our study, where the duration of the follow-up was done in the period of one month. In compare to the two similar studies, the results found in our study showed a higher number of good visual outcomes among the study group.

Our study showed that the postoperative complications in our study was lower than any other comparative studies.^{8,11-13} There were only one complication after the surgery, which was the IOL decentration. A study done by Mahayana also found IOL decentration as one of cataract post-surgical complication.²

The limitation of our study was that the SICS procedures were done under two different surgeons. Although the same surgical technique was applied, both surgeons had varying skill and expertise, which may result differently on the outcomes of surgery. Our study also used only a small sample size and limited duration of postoperative outcomes. Thus a large scale and longer observation is recommended to be done in order to obtain more optimal cataract postoperative results.

V. CONCLUSION

The visual outcomes results SICS surgery in Wangaya Hospital, Bali, Indonesia showed better improvement of visual acuity and reducing the rate of blindness among cataract patients. The SICS also showed a low postoperative complication rate. Hence, SICS should be continually sustained as the surgical technique to be performed among cataract surgery patients.

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