



Manual Small Incision Cataract Surgery (MSICS) in Mature Cataract Using Lerprat Technique: Visual Outcome and Complication

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Abstract:

Background: Mature cataract remains a problem in developing countries included Thailand. The World health organization (WHO) data shows that 60% of blindness in developing countries is caused by cataract. For surgical management, Lerprat Technique has been developed by using conventional extracapsular cataract extraction (ECCE) equipment (Sinskey hook, Iris spatula, Simcoe cannula) without the need for costly or invent new instruments. It can be used in cataract hardness, mature cataract that is common in developing countries. Moreover, it does not interfere with the upper conjunctivae which is used in glaucoma surgical treatments if needed in the future. “Lerprat technique” is a new technique by integrating the “Ruit technique” with the “Modified Blumenthal technique”.

Objective: To report visual outcome and complication of manual small incision cataract surgery (MSICS) in mature cataract using Lerprat technique.

Methods: This is a retrospective descriptive study, between January to September 2016. Approval to conduct this study was obtained from the Institutional Review Board Royal Thai Army Medical Department No. IRBRTA 437/2559 and Thai Clinical Trials Registry No. TCTR 20171208003. Data were collected on 60 eyes of 60 patients who performed manual small incision cataract surgery (MSICS) in mature cataract using Lerprat technique. The postoperative visual acuity at first day, 1 week, 6 weeks and 3 months was collected. The intraoperative and postoperative complications were evaluated.

Results: All patients had poor preoperative visual acuity (below 20/200) and achieved improved visual acuity after surgery. On the first postoperative day, the best corrected visual acuity (BCVA) were excellent (20/20-20/30) in 30 cases (50%), good (20/40-20/70) in 28 cases (46.7%) and borderline in 2 cases (3.3%) respectively. On the first postoperative week, visual acuity was excellent (20/20-20/30) in 52 cases (86.7%) and good (20/40-20/70) in 8 cases (13.3%). At 6 weeks and 3 months after operation, visual acuity was excellent (20/20-20/30) in 60 cases (100%). Complications were hyphema in 3 cases (5%) and increased intraocular pressure in one case (1.7%).

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Conclusion: Manual small incision cataract surgery (MSICS) in mature cataract using Lerprat technique is safe and effective procedure.

Keywords: Cataract, Surgery, Lerprat technique, MSICS

Introduction

Mature cataract remains a problem in developing countries included Thailand. The “Thailand Population Data” estimates that in 12 years times there will be 14.4 million elderly people in the country. This group of population will stand the highest chance of having cataracts as the eye lens deteriorates with age. The World Health Organization (WHO) data shows that 60% of blindness in developing countries is caused by cataract. It is estimated that in 2030 there will be 34.865 million people around the world will become blind as a result of untreated cataract.

At present, there are 3 common cataract surgery methods. Firstly, Phacoemulsification, this method uses a small machine to break up the lens into small pieces before sucking the broken pieces out. The advantage of this method is the small incision size of around 3 mm. However, this method is costly. Also, the use of forces to break “mature cataracts” into smaller pieces creates a lot of unwanted heat in the process which can then lead to endothelial cell of cornea loss and decompensation. Second method, Extracapsular Cataract Extraction (ECCE). With this method, the surgical incision size is larger than 10 mm as the whole lens is brought out to remove the cataract. So, the patients will take longer time to recover since the ECCE requires multiple corneal sutures due to the larger incision size. Moreover, the ECCE method interferes with the upper part of the conjunctivae which is an important surgical area used in treating glaucoma if needed in the future. On the other hand, no unwanted heat is created in this method.

The last method, the ‘Manual Small Incision Cataract Surgery’ (MSICS). There are several techniques in the MSICS method.

These include the “Ruit technique”¹, “Modified Blumenthal technique”², “Kongsap technique”³, “Nylon loop technique”⁴, “Double nylon loop technique”⁵ and etc. Comparing to other methods, the MSICS method causes less bruising on the cornea, requires very little to none suture, less astigmatism and fewer post-operative appointments. Unfortunately, the existing MSICS techniques require the care operators to purchase or invent specific surgical instruments for each technique.

Lt.Col. Lerprat Mangkornkanakpong, M.D., Ph.D., an ophthalmologist with glaucoma expertise has experience in MSICS and understood the existing techniques. He has developed a new technique by integrating the “Ruit technique” with the “Modified Blumenthal technique” to create a new technique, the “Lerprat technique.”⁶ The advantages of using the “Lerprat technique” in MSICS are 1) Reduced cost as it requires no additional surgical instruments as the standard set of surgical ECCE instruments can be used. 2) Requires only a small amount of subconjunctival anesthesia. 3) Easy surgical procedures. and 4) It does not interfere with the upper conjunctivae which is used in glaucoma surgical treatments if needed in the future.

Materials and methods

This study was performed in accordance with the tenets of the Declaration of Helsinki. Approval to conduct this study was obtained from the Institutional Review Board Royal Thai Army Medical Department No. IRBRTA437/2559 and Thai Clinical Trials Registry No. TCTR20171208003

This retrospective case series was made up of 60 patients with mature cataract who underwent Manual Small Incision Cataract Surgery (MSICS) using Lerprat technique performed by two surgeons (LM and PS) between January to September 2016. All patients with mature cataract who were admitted for surgery were potentially eligible. Patients with ocular infection or ocular pathology such as corneal scar, retinal detachment, optic atrophy, glaucoma were excluded.

Patient data included sex, age, ocular examination, preoperative visual acuity, intraocular pressure by computerized non-contact air puff tonometry, postoperative visual acuity and operative complication. Follow-up patients were examined at 1 day, 1 week, 6 weeks, 3 months and 6 months after surgery. Visual acuities were analyzed of excellent (20/20-20/30), good (20/40-20/70), borderline (20/80-20/200), and poor (less than 20/200) outcomes.

Retrobulbar or subconjunctival anesthesia of 2% xylocaine was administered. There are 5 steps in using the Lerprat technique

in MSICS. Step 1: Open anterior capsule of the lens (Capsulorhexis/Capsulotomy) by using a bent needle, together with viscoelastic substance, which makes the operation easier. Step 2: Scleral tunnel incision from temporal side, leaving the upper conjunctivae untouched for glaucoma surgery if needed in the future. The scleral tunnel incision looks like a closed valve. The inside is larger than the outside part so the wound is smaller. Step 3: The lens is removed from the capsule (Nuclear luxation). The lens is tilted and placed on a spatula instrument. Then rotate to remove the entire lens. This looks similar to a car tire changing machine. Step 4: Remove the lens from the eye through scleral tunnel incision (Nuclear delivery). Balance salt solution is used to accelerate the removal by Simcoe cannula via side port incision at 6 or 12 o'clock area. Step 5: Remove the cortex of the lens and intraocular lens (IOL) implantation. Finally remove viscoelastic substance from anterior chamber and check the wound. Generally, this technique does not require any stitches but if so only one suture is sufficient as showed in figure 1-6.

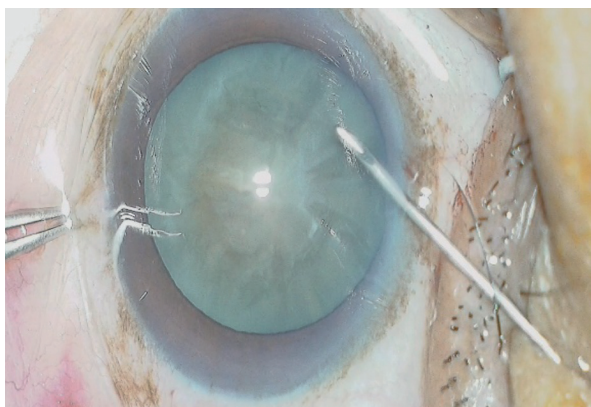


Figure 1 Open anterior capsule of the lens (Capsulorhexis/Capsulotomy) by using a bent needle

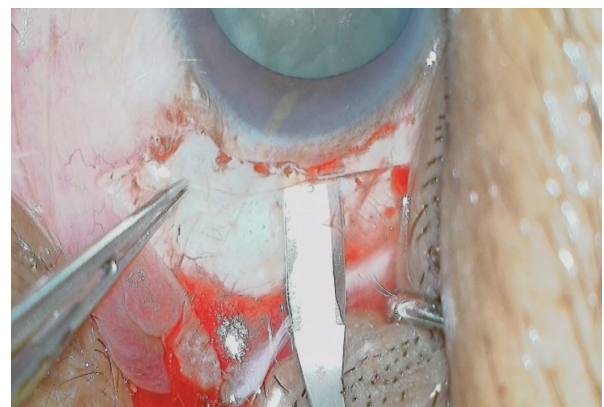


Figure 2 Scleral tunnel incision from temporal side

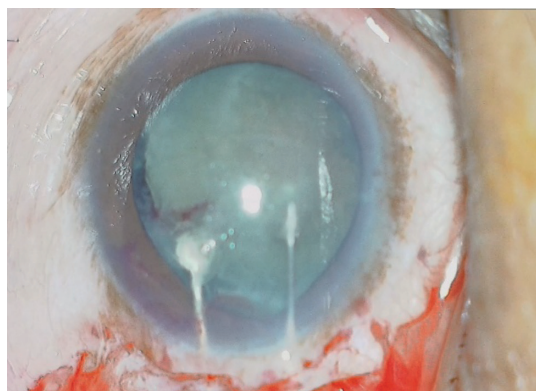


Figure 3 The lens is removed from the capsule (Nuclear luxation)

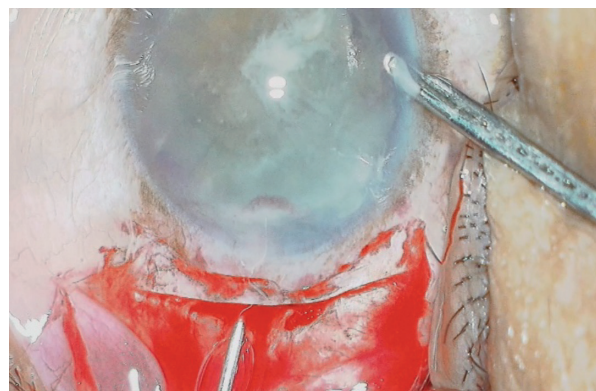


Figure 4 Remove the lens from the eye through scleral tunnel incision (Nuclear delivery)



Figure 5 Remove the cortex of the lens

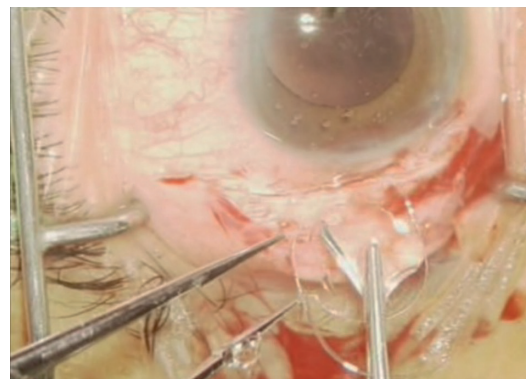


Figure 6 Intraocular lens (IOL) implantation in posterior capsule

Statistical analysis was validated and saved in the form of a file with the STATA/MP 12 program. Then analyzed by statistics: 1) Analyze general data using descriptive statistics such as percentage, mean, standard deviation, minimum and maximum values. 2) Compare preoperative and postoperative visual acuity in 1 day, 1 week, 6 weeks, and 3 months using the McNemar test statistic. Consideration of statistical significance when $p < 0.05$. For exclusion criteria, patients who had any ocular infection, history of allergy to anesthesia, or other underlying ocular conditions (such as corneal scar, retinal detachment, optic atrophy, and glaucoma) were excluded.

Results

Manual small incision cataract surgery (MSICS) using Lerprat technique was

successfully performed in 60 eyes of 60 patients (28 men and 32 women) whose age ranging from 48 to 87 years (mean age, 71.07 years). Suture-less wounds were achieved in 22 patients. The rest was only one scleral tunnel wound suture. The preoperative uncorrected and corrected visual acuity was less than 20/200 (poor) in 60 patients (100.0%). All of the patients in this study had mature cataracts and improved visual acuity following surgery. The uncorrected visual acuity (UCVA), shown in Table 1, the most UCVA was good in 40 eyes (66.7%) at first day postoperatively. After follow up the postoperative visual acuity without correction, there were 34 eyes (56.7%), 46 eyes (76.7%) and 47 eyes (76.7%) in excellent group at 1 week, 6 weeks and 3 months respectively.

As shown in table 2, BCVA (best corrected visual acuity), there were 30 eyes

(50%) and 52 eyes (86.7%) were in excellent group at Day 1 and 1 week postoperatively. We found that all eyes 60 eyes (100%) were in excellent group at postoperative 6 weeks and 3 months respectively.

The most common postoperative complication was hyphema (3 eyes, 5 %) that occurred on the first day after surgery. All of the patients were resolved within one week after treated with frequency topical steroid eye drop, bed rest and head elevation

30-45 degree. The other postoperative complication was elevated intraocular pressure (1 eye, 1.67%) which caused by retained viscoelastic substance. The rising of intraocular pressure was controlled by antiglaucomatic drugs. The pressure was back to normal range after discontinuing the medication. No other significant complications, such as endophthalmitis or corneal decompensation, occurred in any of the eyes.

Table 1 Postoperative uncorrected visual acuity n (%)

Visual acuity	Follow-up visit			
	Day 1	1 week	6 weeks	3 months
20/20-20/30 (excellent)	8 (13.3)	34 (56.7)	46 (76.7)	47 (76.7)
20/40-20/70 (good)	40 (66.7)	24 (40.0)	14 (23.3)	13 (23.3)
20/80-20/200 (borderline)	12 (20.0)	1 (1.7)	0	0
< 20/200 (poor)	0	1 (1.7)	0	0

Table 2 Postoperative corrected visual acuity n (%)

Visual acuity	Follow-up visit			
	Day 1	1 week	6 weeks	3 months
20/20-20/30 (excellent)	30 (50.0)	52 (86.7)	60 (100)	60 (100)
20/40-20/70 (good)	28 (46.7)	8 (13.3)	0	0
20/80-20/200 (borderline)	2 (3.3)	0	0	0
< 20/200 (poor)	0	0	0	0

Discussion

The goal of cataract surgery is to improve patient's vision and their quality of life. Lerprat technique used Simcoe cannula and iris spatula, which is already in the conventional extracapsular cataract extraction set, for lens removal. This technique can also improve patients' vision with less complications. For the surgical wound, this technique

is suture less or using only one suture for wound closure so the patients will have less wound irritation, less corneal astigmatism, better wound healing and don't have to come to follow up very often. The successful outcome is the rate of visual gain postoperatively. We use Snellen chart to compare between preoperative and postoperative visual acuity

of 60 eyes from 60 patients. All eyes have preoperative visual acuity worse than 20/200. For UCVA, after the surgery 40 eyes (66.7%) were in good visual acuity group at postoperative day 1. There were 34 eyes (56.7%), 46 eyes (76.7%) and 47 eyes (76.7%) in postoperative excellent visual acuity group at one week, 6 weeks and 3 months respectively.

As mention previously, mature cataract extraction with Lerprat technique has a satisfactory outcome. Although this technique has less complications, we found that the common postoperative complication from this technique were hyphema (3 eyes, 5 %) and elevated intraocular pressure (1 eye, 1.67%). There were no other significant complications, such as endophthalmitis or corneal decompensation. Compared to conventional technique such as Phacoemulsification which machine cost about 3-4 million baht and have to use with consumable such as cassette (1400-1800 baht/each), this technique can reduce the cost per case. Compared to MSICS which have to use with special equipment cost about 5000-6000 baht, Lerprat technique needs no new equipment (used only Simcoe cannula, which is already in the conventional extracapsular cataract extraction set). Furthermore, Lerprat technique creates wound at temporal area (preserve superior area) in case that the patients also have glaucoma, they can do other surgery such as Trabeculectomy in the future.

Conclusion

Cataract surgery with Lerprat technique had a satisfactory outcome. Further study with more patients and more factors evaluation such as endothelial cell count and surgical induced astigmatism were recommended.

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