Endothelial Cell Loss and Visual Outcomes of Nylon Loop Technique by Resident Training at Prapokklao Hospital

Praputsorn Kosakarn, MD.

Department of Ophthalmology, Prapokklao Hospital, Chanthaburi, Thailand

การผ่าตัดต้อกระจกแผลเล็ก ด้วยวิธี nylon loop technique เป็นวิธีการที่มีประสิทธิภาพสูง ประหยัด และให้ผลการผ่าตัดที่ดี จักษุแพทย์หลายท่าน เกรงว่าในช่วงเริ่มฝึกฝนเทคนิคดังกล่าว จะทำให้เกิดผลเสียต่อตาผู้ป่วย จึงจำเป็นต้องทำการศึกษาเพื่อพิสูจน์ข้อกังวลดังกล่าว

Objective : To evaluate endothelial cell loss and visual outcomes of nylon loop technique that had been done by resident at Prapokklao hospital.

Material and method : Nylon loop technique was performed in 136 eyes by resident at Prapokklao hospital between March 2006 to December 2007. Preoperative visual acuity, postoperative visual acuity, intraoperative complication and postoperative complication were recorded. Preoperative endothelial cell count and post-operative endothelial cell count were measured at 1week, and 1month.Follow up was done at 1 month interval until 1 year.

Results : The mean follow up interval was 17.85 weeks (range 4-52 weeks). Preoperative visual acuity 20/80-20/200 was 25 eyes (18.4%) and less than 20/200 was 111 eyes (81.6%). Post operative visual acuity better than 20/40 was 101 eyes (74.3%). Postoperative complication was corneal edema 3 eyes (2.2%). The mean preoperative endothelial cell count was 2,425 $\pm$ 277 cell/mm^2. The mean postoperative endothelial cell count at 1 week, and 1 month were 2,223 $\pm$ 311cell/mm^2, and 2,162 $\pm$ 317 cell/mm^2 respectively. The mean percentage of postoperative endothelial cell loss at 1 week and 1 month were 8.28, and 10.78 respectively.

Conclusions : Nylon loop technique is a procedure that is safe to teach resident and has good resulted and few complicated (corneal edema 2.2%). The mean percentage of postoperative endothelial cell loss at 1 week and 1 month are 8.28, and 10.78 respectively.

Keywords : Manual small incision cataract surgery, Nylon loop technique, Endothelial cell loss, Corneal edema.

Manual small incision cataract surgery (MSICS) has several techniques such as modified Blumenthal[1], nylon loop[2], hydro ECCE[3-4], double nylon loop[5]. The technique that was used to teach resident at Prapokklao hospital was "nylon loop technique"[2]. Resident came from Ramathibodi hospital, Siriraj hospital, Chiangmai hospital and Srinakarink hospital. The author studied to show that nylon loop technique was safe to teach resident and to evaluate endothelial cell loss, visual outcomes and complications of this technique.

Material and method

Nylon loop technique was used to teach resident to do manual small incision cataract surgery at Prapokklao hospital between March 2006 to December 2007. Totally 131 eyes (62 male, 74 female) were enrolled in the present study. Mean age was 67.35 ± 10.19 years (range 35-75 years). Preoperative visual acuity, postoperative visual acuity, intraoperative complication, postoperative complication and preoperative endothelial cell count were recorded. Postoperative endothelial cell count was recorded at 1 week and 1 month after surgery. Follow up was done at 1 month interval until 1 year after surgery. Written informed consent was obtained from all enrolled patients in the present study.

Surgical techniques

Anesthesia was done with retrobulbar block in all cases. Paracenthesis was performed at 11 o'clock and 7 o'clock (for the right eyes of patient). Temporal clear corneal incision was made for 3.2 mm by keratome. Capsulorrhesis was made by forceps about 6-7 mm. Hydrodissection and hydrodelamination was done until the hard core nucleus was loosened. The lens was taken into anterior chamber by sinsky hook. Viscoelastic substances were injected behind and in front of the lens to protect endothelial cells. Nylon loop (figure 1) was inserted behind the lens in horizontal plane and then nylon loop was swung up to cover the lens about half of the lens (figure 2). Nylon loop was pulled to cut the lens into 2 pieces. The sinsky hook and spatula were used to remove each piece of lens (figure 3). The cortex of lens was irrigated by simcoe canula. The intraocular lens was implanted into capsular bag. The incision was sutured using 10-0 nylon for 1 stitch. The anterior chamber was flushed using balanced salt solution.

Statistical analysis

Descriptive statistics were expressed as mean, standard deviation and percent. Comparison of mean was analyzed by using paired t-test. The p-values of less than 0.05 were considered statistical significant.

Results

The mean of the follow up interval was 17.85 weeks (range from 4 to 52 weeks). The preoperative visual acuity is shown in table 1. The visual acuity was less than 20/200 for 111 eyes (81.6%) and between 20/80 and 20/200 for 235 eyes (18.4%). The postoperative visual acuity at 1 month after surgery is shown in table 2. The

best corrected visual acuity better than 20/40 was achieved for 101 eyes (74.3%) and 20/60–20/200 for 35 eyes (25.7%). The mean endothelial cell count and the mean endothelial cell loss and the mean percentage of endothelial cell loss were shown in table 3. The mean preoperative endothelial cell count was 2,424 ± 276 cell/mm^2. The mean postoperative endothelial cell count at 1 week after surgery was 2,223 ± 311 cell/mm^2. The mean postoperative endothelial cell count at 1 month after surgery was 2,162 ± 317 cell/mm^2. The mean postoperative endothelial cell loss at 1 week and 1 month after surgery were 201 ± 188 cell/mm^2 (8.28%) and 262 ± 216 cell/mm^2 (10.78%) respectively. The difference between the mean percentage of postoperative endothelial cell loss at 1 week and 1 month was significant (p-value <0.001). No intraoperative complication occurred in the present study. Postoperative complication was corneal edema 3 eyes (2.2%). No permanent complication such as corneal decompensation occurred in any cases. The percentage of endothelial cell loss of 3 eyes that had corneal edema was 30.41%, 16.10%, and 18.41% respectively.

Discussions

Manual small incision cataract surgery (MSICS) that had been done at Prapokklao hospital had several techniques such as modified Blumenthal, nylon loop, hydroECCE, double nylon loop. Each technique was either easy or hard to learn according to how to manage the lens and remove the lens out. But each technique must be careful to avoid to injury endothelial cell. Nylon loop technique was used to teach residents from Ramathibodi hospital, Siriraj hospital, Chaingmai hospital and Srinakarin hospital. This technique had been done in anterior chamber so that endothelial cell might be injuried more. New MSICS surgeon should have experienced MSICS surgeon to teach during doing nylon loop technique for the best results. The author studied to evaluate the results, complications and endothelial cell loss of this technique. Postoperative visual acuity was better than 20/40 in 74.3 percent of the cases. The improved visual acuity rate is not difference from others reports. Yao' study[6] revealed that visual acuity was better than 20/40 in 76.6 percent of the receiving cases. Jaime[3] reported that visual acuity was better than 20/40 in 83 percent of the cases. Hepsen[7] found that visual acuity was better than 20/40 in 83 percent of receiving cases. Kosakarn (manual phacocracking)[8] also reported that visual acuity was better than 20/40 in 83.34 percent of the cases.

The mean endothelial cell loss of cataract surgery was about 0–40 percent[9] of the preoperative endothelial cell count. The mean endothelial cell loss in phacoemulsification with intraocular lens implantation was 0–20 percent[9] of endothelial cell count. The present study measured endothelial cell count by using fixed frame analysis method[9]. The mean endothelial cell loss at 1 week and 1 month were 8.28% and 10.78% respectively that were within the range of standard cataract surgery. Trnavec[10] found that the endothelial cell loss in ECCE group was 18.53% and in phacoemulsification group was

16.43%. George[11] also reported that endothelial cell loss in ECCE group, MSICS group and phacoemulsification group were 4.7%, 4.2%, and 5.41% respectively. However, the comparison between the mean percentage of endothelial cell loss at 1 week and 1 month was found that the difference was statistical significant (p-value < 0.001). The difference of the mean percentage of endothelial cell loss was about 2.5% so that the effects of MSICS for endothelial cell loss should follow up for a long periods. The loss rate was more than physiologic rates according to ages (0.5% per year). Some reports[12-13] had follow up patients for 2-5 years and found that loss rates were more than physiologic rates. So that the endothelial cell loss of nylon loop technique should be reported again in the future.

The most postoperative complication was corneal edema in 3 eyes (2.2%). This present study found corneal edema less than others reports. Manual multi phaco fragmentation technique[14] had corneal edema in 10 percent of the cases. Quarter extraction technique[15] had corneal edema in 10 percent of the cases. Manual phacocracking technique[8] also reported corneal edema in 10.19% of the cases. Severe permanent complication was not found in any cases. The endothelial cell loss of 3 eyes (corneal edema) were 30.41%, 16.10%, and 18.41% respectively. Xei Lx[16] reported that endothelial cell loss 4.6%, 14.9%, 40.8%, 67%, and 84% were found in eyes that had corneal edema grade 0-4. This suggests that more injury to endothelial cell, more corneal edema postoperatively. The author was careful while doing surgery especially in the surgical step that might injury endothelial cell such as cutting lens, removing lens. The author suggest that new MSICS surgeons and residents should use viscoelastics substances to protect endothelial cell during surgery and try to avoid to injury endothelial cell and should select patient that the lens is soft to medium nuclear sclerosis.

Conclusions

Nylon loop technique is a procedure that is safe to teach residents, has good results and few complications (corneal edema 2.2%). The mean percent endothelial cell loss at 1 week and 1 month are 8.28%, and 10.78% that are not more than the standard cataract surgery.

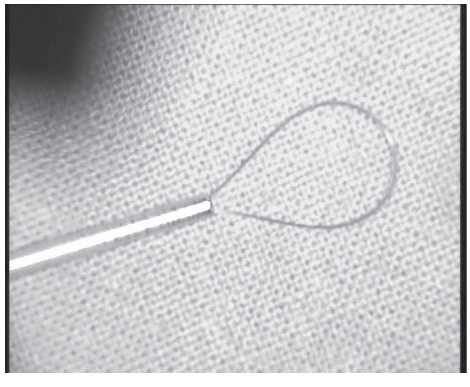

Figure 1 Nylon loop

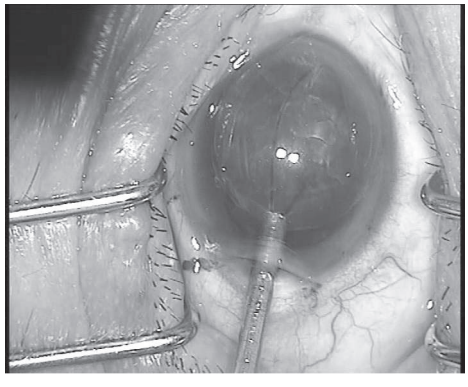

Figure 2 Nylon loop was swung to cover the lens about half of the lens

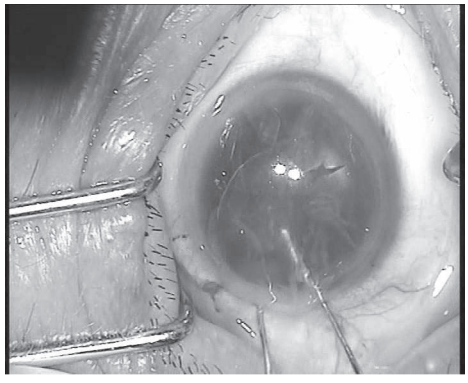

Figure 3 The sinsky hook and spatula was used to remove each piece of lens

Table 1 Preoperative visual acuity (n = 136)

Visual acuity	Number of eyes	Percent of total eyes
20/80-20/200	25	18.4
less than 20/200	111	81.6
Total	**136**	**100**

Table 2 Postoperative visual acuity at 1 month after surgery (n = 136)

Visual acuity	Number of eyes	Percent of total eyes
20/20 - 20/40	101	74.3
20/60 - 20/200	25	25.7
Total	**136**	**100**

Table 3 Mean endothelial cell count, mean endothelial cell loss, and percentage of endothelial cell loss (n = 136)

	Mean endothelial cell		
	Count (cell/mm^2)	loss (cell/mm^2)	percentage (%)
Preoperative	2,424 ± 276	-	-
Postoperative 1 week	2,223 ± 311	201 ± 181	8.28
Postoperative 1 month	2,162 ± 317	262 ± 216	10.78

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ผลของการสูญเสีย Endothelial cell และผลของระดับสายตาหลังผ่าตัดต้อกระจกด้วยวิธี Nylon loop โดยแพทย์ประจำบ้านที่โรงพยาบาลพระปกเกล้า

นายแพทย์ประภัสสร โกษาคาร
กลุ่มงานจักษุวิทยา โรงพยาบาลพระปกเกล้า จันทบุรี

วัตถุประสงค์ : เพื่อศึกษาผลการเกิด endothelial cell loss และผลของระดับสายตาก่อนและหลังผ่าตัดจากการสอนแพทย์ประจำบ้านสาขาจักษุวิทยาจากสถาบันต่างๆ ที่มาฝึกผ่าตัดต้อกระจกแบบแผลเล็กที่โรงพยาบาลพระปกเกล้าด้วยวิธี nylon loop technique

วิธีการศึกษา : สอนแพทย์ประจำบ้านสาขาจักษุวิทยาผ่าตัดต้อกระจกในผู้ป่วยที่โรงพยาบาลพระปกเกล้าด้วยวิธี nylon loop technique จำนวน 136 ตา ระหว่างเดือน มีนาคม 2549 ถึง เดือนธันวาคม 2550 บันทึกข้อมูลระดับสายตาก่อนและหลังผ่าตัด, ภาวะแทรกซ้อนระหว่างผ่าตัดและหลังผ่าตัด, ตรวจวัดจำนวน endothelial cell ก่อนและหลังผ่าตัด 1 สัปดาห์, 1 เดือน และ 1 ปี ตรวจติดตามผลการรักษาทุก 1 เดือนจนถึง 1 ปี

ผลการศึกษา : ระยะเวลาในการติดตามผลการรักษาเฉลี่ย 17.85 สัปดาห์ (4–52 สัปดาห์) ระดับสายตาก่อนผ่าตัด 20/80–20/200 พบ 25 ตา (18.4%) น้อยกว่า 20/200 พบ 111 ตา (81.6%) ระดับสายตาหลังผ่าตัด ดีกว่า 20/40 พบ 101 ตา (74.3%) ไม่พบภาวะแทรกซ้อนระหว่างผ่าตัด ภาวะแทรกซ้อนหลังผ่าตัดที่พบ คือ corneal edema 3 ตา (2.2%) ค่าเฉลี่ยของ endothelial cell ก่อนผ่าตัด 2,425 ± 277 cell/mm^2 ค่าเฉลี่ยของ endothelial cell หลังผ่าตัด 1 สัปดาห์ 2,223 ± 311 cell/mm^2 และหลังผ่าตัด 1 เดือน 2,162 ± 317 cell/mm^2 ค่าเฉลี่ย ของ endothelial cell loss หลังผ่าตัด 1 สัปดาห์เท่ากับ 8.28% และหลังผ่าตัด 1 เดือน 10.78%

สรุป : การผ่าตัดต้อกระจกแบบแผลเล็กด้วยวิธี nylon loop technique สามารถใช้สอนแพทย์ประจำบ้านสาขาจักษุวิทยาได้ผลการรักษาดี ปลอดภัย มีภาวะแทรกซ้อนน้อยมาก (corneal edema 2.2%) และผลของการเกิด endothelial cell loss ที่ 1 สัปดาห์และ 1 เดือนเท่ากับ 8.28% และ10.78% ตามลำดับ