Original Article

Sutureless ECCE with Foldable IOL Using the Kongsap Technique

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Abstract **Sutureless ECCE with Foldable IOL Using the Kongsap Technique**
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Purpose : **To evaluate the outcomes of the small incision cataract surgery with foldable intraocular lens implantation using the Kongsap technique.**

Method : **In a retrospective study, 40 eyes of 40 patients had undergone cataract surgery using the Kongsap technique. After capsulorhexis and hydrodissection were performed, the endonucleus was prolapsed into anterior chamber and trisected using a nuclear supporter and a Sinskey hook. Pieces were extracted with the same instruments through a small incision. After the cortical debris was aspirated, the foldable IOL was placed into the capsular bag and the wound was closed with no suture. The visual acuity, intraoperative and postoperative complications were recorded.**

Results : **This technique was successfully performed in 40 eyes. There was no intra-operative complication, including capsule break, zonular dialysis, vitreuos loss,suprachoroidal hemorrhage. The significant postoperative complication was transient corneal edema located at the corneal wound, which developed in 7 eyes (17.5 percent). No other significant complications were noted during the 3 – months follow up period. Postoperatively, best corrected visual acuity of 20/40 or better was achieved in 34 eyes (85 percent), 35 eyes (87.5 percent), and 35 eyes (87.5 percent) at the end of the first postoperative week, 4 weeks, and 3 months, respectively.**

Conclusion : **Cataract surgery using the Kongsap technique provides self-sealing incision, rapid visual recovery and low complication. It can be use as alternative to phacoemulsification in the developing countries.**

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Introduction

Several techniques have been devised to perform ECCE without phacoemulsification. These include the modified pocket incision, the quarters extraction, phacotrisection, the nylon loop technique, manual phacocracking and prechop manual phacofragmentation.[1-8,10] The Kongsap technique is a small incision cataract surgery in which the lens nucleus is divided into three fragments prior to manual removal through a relatively small incision, using inexpensive instrumentation.[9] The foldable intraocular lens(IOL) is placed in the capsular bag and the wound is closed with no suture. The purpose of the present pilot study was to determine the visual acuity and complications in eyes undergoing cataract surgery using the Kongsap technique.

Patients and Methods

Forty eyes of 40 consective patients with cataract (21 women, 19 men; age range 48 to 81 years) undergoing cataract surgery using the Kongsap technique at the department of Ophthalmology, Prapokklao hospital, Chanthaburi, Thailand from October 2005 to April 2006 were included in the study. Exclusion criteria were corneal disease, amblyopia, previous retinal detachment surgery, glaucoma and maculopathy.

All patients had complete ophthalmologic examination before and after surgery that included a slitlamp examination without and with pupil dilatation, tonometry, and ophthalmoscopy. Written informed consent was obtained from all patients enrolled in the study.

Instrumentation

Essentially the instruments for the Kongsap technique are similar to the standard ECCE. Additional instruments are :

- The nuclear supporter, made form a 3-mm keratome or cresent knife and minimized its sharpening with a grindstone(Fig 1).
- 3.0 mm angled keratome
- 15 degree stab knife
- Two Sinskey hooks

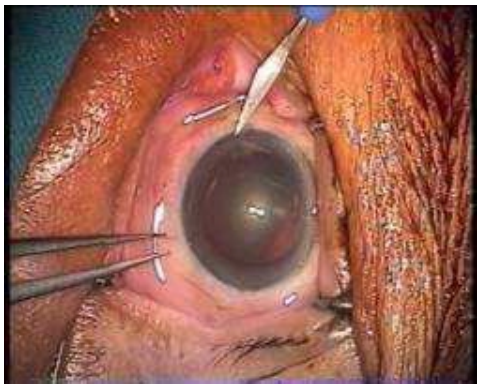
Fig 1. The nuclear supporter.

Surgical technique

Side ports and ACM port

Two side port, at the 3 and 7 o'clock position in the right eye is performed with a 15 degree stab knife(Fig 2). The ACM port should be

Fig 2. Side port incision at 3 and 7 o'clock position in the right eye.



at 3 o'clock (Fig 3)and the intrastromal length is 1-2 mm, to accommodate the ACM and keep it stable during the surgery. The ACM is introduced without flow with bevel up and the bevel is rotated down after it has entered the anterior chamber.

Capsulotomy

A 6-6.5 mm continuous curvilinear capsulorhexis (CCC) is performed with a 27G bent needle when the anterior chamber is filled with balanced salt solution. The cystotome is introduced through the 7 o'clock side port and created the first puncture on the center of the anterior capsule and then created the anterior capsular flap(Fig 4). The anterior capsule is torn in a curve manner by either pushing or pulling the flap. Optionally, this step may be undertaken with ACM closed and AC filled with a viscoelastic material.

Hydrodissection / Hydrodelineation

A 26G blunt tipped canula mounted on a 2 cc syringe filled with BSS is guided behind the rhexis margin in the subcapsular plane(Fig 5). Lift up the canula slightly and injected the BSS slowly and smoothly until a fluid wave is seen. The canula may be inserted through the temporal corneal incision and inject the fluid to the right and left of 9 o'clock meridian. Hydrodelineation is performed to separate the nucleus from epinucleus.The fluid is injected between the nucleus and epinucleus until the golden ring is seen under the microscope.

Fig 3. The ACM insertion at 3 o'clock incision.

Fig 4. The capsulorhexis

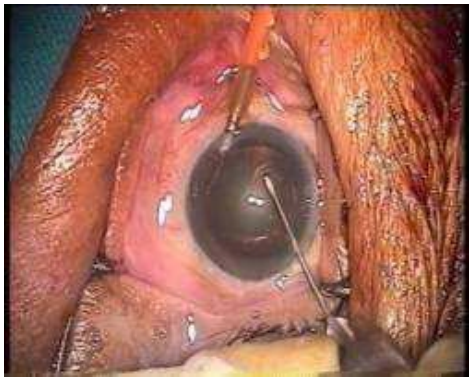
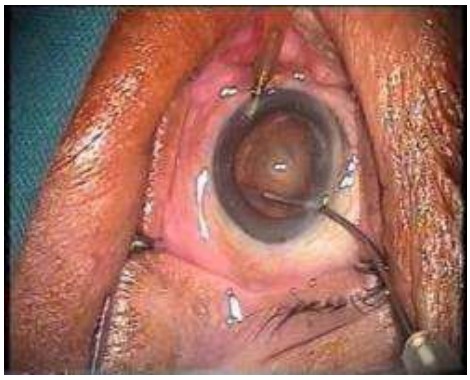


Fig 5. Hydrodissection and hydrodelineation.

Fig 6. Anterior cortical debris removal.



Anterior cortical debris removal

Anterior cortical debris should be removed as much as possible in order to manipulate the hard core nuclear easily(Fig 6). Aspiration is better controlled using a 10 cc syringe and canula and the canula should be introduced through the paracentesis at 7 o'clock

Fig 7. Temporal clear corneal incision.

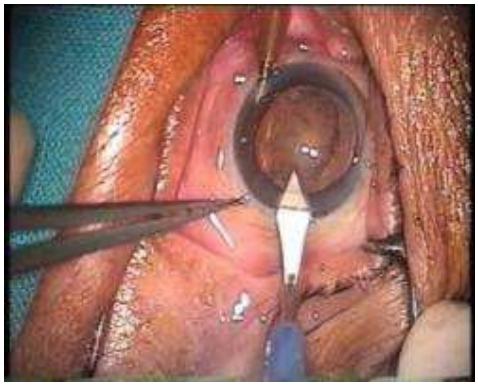
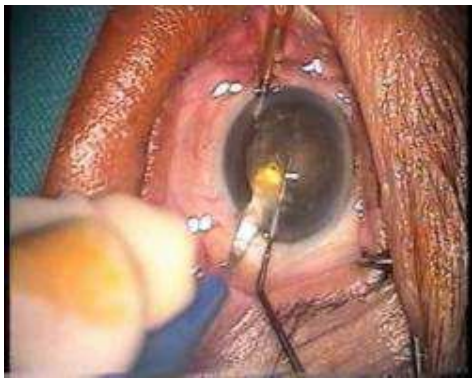


Fig 8. lens prolapse into anterior chamber

Fig 9. lens is devided into three fragments.



Nuclear fragmentation

A 4 - mm temporal clear corneal wound is made using a 3- mm keratome(Fig 7). The infusion is then either closed or anterior chamber maintainer removed in order to make space for the nucleus manipulation and the viscoelastic is injected into anterior chamber. The nucleus is dislocated out of the bag to anterior chamber using a spatula and a Sinskey hook(Fig 8). Viscoelastic is injected below and above the nucleus facilitating this maneuver. The nuclear supporter made from a 3 -mm keratome is hold with the left hand and the Sinskey hook is on the right hand. The plateform of nuclear supportter is passed under the nucleus and the Sinskey is placed over the nucleus. The nucleus is slightly manipulated and a trisection is made by gently pushing the nuclear supporter and the Sinskey hook against each other(Fig 9). The nucleus is now devided into three fragment and the final size of each fragment is about 3.0-3.5 mm.

Nuclear removal

Viscoelastic is injected below and above the nucleus. The nuclear supportter is passed under the first fragment and the Sinskey is placed over it and then pull it out(Fig 10). The second and third fragment are extracted using the same technique. Keep in mind that high density viscoelastic should be injected into anterior chamber once it's shallow in order to protect the corneal endothelium and manipulate safely during the process.

Cortical clean up

Once the nuclear fragments have been

already extracted, the BSS from the anterior chamber maintainer (ACM) is now opened. The epinucleus and lens cortex are flushed out by gentle pressure on the sclera posterior to the incision. The residual cortex is removed through the side port incision by a cortex extractor which is attached to an extension tube and a 10 – ml syringe(Fig 11).

Fig 10. Each fragment is removed through clear corneal incision.

Fig 11. Epinucleus and lens cortex are removed using a 23 G canula.

Fig 12. Foldable intraocular lens implantation.

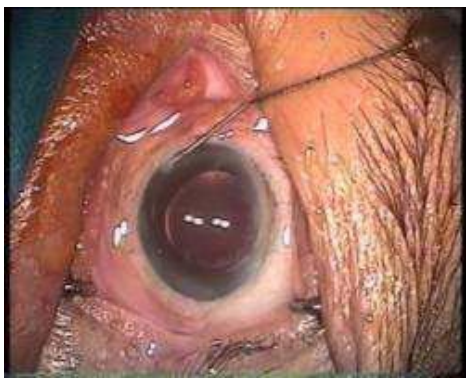
IOL implantation

The viscoelastic is injected into anterior chamber and a foldable intraocular lens is implanted in the capsular bag using the forceps or the injector(Fig 12). Sideport and anterior chamber maintainer port will be hydrated by injection of a few drops of BSS into the stroma (Fig 13). For the ophthalmologists who are new to this technique, a 5–mm temporal clear corneal incision should be done and a 5.0 mm. polymethyl methacrylate posterior chamber intraocular lens (IOL) instead of a foldable IOL can be implanted in the capsular bag.

Results

Forty patients were successfully performed cataract surgery and intraocular lens implantation using this technique. There were 34 eyes with self–sealing incisions with widths of 3.5 or 4.0 mm. and 6 eyes with 5.5 mm. At the end of surgery, 35 eyes(87.5 percent) were unsutured and 5 eyes(12.5 percent) had 1

Fig 13. The wound closure with no suture.



interrupted sutures. Mean surgical time was 13.88 minutes(range 11 to 17 minutes).

Intraoperatively, iris prolapse occurred in 2 eyes(5 percent) with early perforation of the wound. The stripping of descemet's membrane limited to the area closed to the wound was seen in 2 eyes(5 percent). Neither posterior capsule rupture nor zonular dialysis was seen in any eye.

All patients were examined 1 day, 1 week, 4 weeks and 3 months postoperatively. A clear cornea was observed at 1 day postoperatively in 33 of 40 eyes(82.5 percent). Minimal early postoperative corneal edema located at the corneal wound was seen in 7 eyes(17.5 percent). Six of 7 patients with corneal edema occurred in the first 20 cases. In all cases, the corneal edema resolved by 1 week after surgery. The postoperative IOP spikes of over 21 mm Hg that were observed in 2 eyes(5 percent) returned to normal limits within a few days without antiglaucoma therapy. Iritis was observed in 1 eyes(2.5 percent). No corneal decompensation was detected in any patients.

A best corrected visual acuity(BCVA) of 20/40 or better was achieved in 34 eyes(85 percent), 35 eyes(87.5 percent), and 35 eyes(87.5 percent) at the end of the first postoperative week, 4 weeks, and 3 months, respectively (Table 1). The mean central corneal endothelial cell loss at 1 month postoperatively was 8.15 percent (range 1.5 percent to 14.12 percent).

Discussion

The aim of all manual phacofragmentation is to reduce the size of a cataractous lens intraocularly so it can be manipulated and repositioned to permit sectioning and be extracted through a relatively small incision - all using inexpensive instruments. Usually, the nucleus is divided into 2 or 3 fragments and extracted through a 4.5 to 6.5 mm.

In the current study, the lens nucleus was divided into three fragments prior to manual removal through a 3.5 - 4.5 mm clear corneal incision and the foldable IOL was implanted in the capsular bag . The incision was usually closed with no suture. The size of the wound for the Kongsap technique is smaller than other method of bisecting the nucleus such as prechop manual phacofragmentation, the nylon loop technique, manual phacocracking.[5,6,7,10]

Compare with manual multiphacofrag-

Table 1. Postoperative visual acuity (n=40)

Visual acuity	Follow-up visit		
	1 week	4 weeks	12 week
	Number of eyes(%)	Number of eyes(%)	Number of eyes(%)
20/20 - 20/40	34(85.0)	35(87.5)	35(87.5)
20/50 - 20/70	5(12.5)	4(10.0)	4(10.0)
20/100- 20/200	1(2.5)	1(2.5)	1(2.5)

mentation(10 percent)[3], the Quarters extraction technique(10 percent)[4], prechop manual phacofragmentation(12.4 percent)[5], the nylon loop technique(13.3 percent)[7],and manual phacocracking(10.19 percent)[10], the Kongsap technique had higher incidence of postoperative corneal edema(17.5 percent). The author think that the postoperative corneal edema was caused by the learning curve and after the learning period, there was a lower incidence of coneal damage. For the first- 8 cases, the endothelial cell loss was as high as 14.2 percent but it decreased to 1.5 percent in the 40th case

Thus, the maneuver performed mostly in the anterior chamber, the corneal endothelial damage may occur during nuclear luxation, nuclear fragmentation and during nuclear removal through the clear corneal incision ; this can be avoided if a good viscoelastic protection of endothelium is frequently injected into the anterior chamber and the surgeon hold the nuclear supporter and the Sinskey still. I also note that use of a viscoelastic agent and progression in the learning curve can lower the incidence of endothelial-related complications.

The patient selection is important for the success of the surgery. The guidelines are similar to the ones used for phacoemulsification. The nuclear hardness of 2^+ to 3^+ according to Lens Opacities Classification System II[11], is easier to perform nuclear fragmentation using this technique. The Kongsap technique enables cataract surgery in the hard cataract having a large nucleus but there is narrow space for manipulation in anterior chamber; thus, the nucleus is hard for nuclear fragmentation and the central fragment is too thick. The surgeon should enlarge the incision to make the nuclear removal easier and implant a 5.5 mm. PMMA intraocular lens.

Conclusion

Cataract surgery using the Kongsap technique provides self-sealing incision, rapid visual recovery and low complication. It can be use as alternative to phacoemulsification in the developing countries.

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