

Original Article

Sutureless Manual Extracapsular Cataract Extraction with Club

Mahfooz Hussain¹, Homaira Iqbal Khan², Tahir Ali³, Muhammad Aftab⁴, Adnan Alam⁵
¹Euro Eye Clinic, ²Kabir Medical College, ^{3,4,5}Lady Reading Hospital, Peshawar

ABSTRACT

Purpose: To evaluate the efficacy and safety of cataract extraction through small pupil with the help of a specially designed instrument called club.

Study Design: Interventional case series.

Place and Duration of Study: Euro eye clinic from January 2019 to December 2019.

Methods: Seventeen consecutive patients with pupil diameter of <4mm after maximal pharmacological dilatation were recruited for study. Inclusion criteria was patients with less than 4mm pupil size after maximum pharmacological dilation. Patient with previous anterior segment surgery and small pupil with posterior synechia were excluded. The instrument (club) was originally designed for breaking posterior synechiae. Sutureless Manual Extracapsular Cataract Extraction (SMECE), more commonly known as MSICS, was performed in all cases. After tunnel formation and capsulotomy, club was used to bring lens edge out in pupillary margin. Lens was then maneuvered into anterior chamber and expressed out.

Results: All 17 patients had successful SMECE. In one patient pupil was stretched before applying instrument. None of the patients had posterior capsular rupture or hyphaema.

Conclusion: This instrument designed in Center of Ophthalmic Instrument and Equipment Designing (COIED) is very useful, safe and cost effective. In Extra Capsular Cataract Extraction (ECCE) or SMECE, surgeons usually do keyhole iridotomy, mechanical stretching or multiple sphincterotomies for managing small pupil. With this new instrument, cataract extraction can be done without surgical trauma to the pupil, thus preserving pupil shape.

Key Words: Sutureless Manual Extra capsular Cataract Extraction (SMECE), Manual Small Incision Cataract Surgery (MSICS), Miosis.

How to Cite this Article: Hussain M, Khan HI, Ali T, Aftab M, Alam A. Sutureless Manual Extracapsular Cataract Extraction with Club. Pak J Ophthalmol. 2022, **38 (1)**: 16-20.

Doi: 10.36351/pjo.v38i1.1252

INTRODUCTION

In developing countries Sutureless Manual Extracapsular Cataract Extraction (SMECE) is widely

used.^{1,2} It is more commonly known as manual small incision cataract surgery (MSICS) but incision is no way small and SMECE appears to be more appropriate name for this surgery.³ SMECE (new name for MSICS) has been proved to be as effective as phacoemulsification.^{4,5} It has been shown to be better than extra capsular cataract extraction.^{6,7}

Small pupil is a common problem faced by cataract surgeons and increases chances of intra operative complications particularly posterior capsular rupture and iris damage.^{8,9} The causes of small pupil

*Correspondence: Mahfooz Hussain
Department of Ophthalmology, Euro Eye Clinic
Email: mahfoozhussain@hotmail.com*

*Received: April 18, 2021
Accepted: November 26, 2021*

are pseudoexfoliation, posterior synechiae secondary to uveitis or previous surgery, tonic pupil, diabetic iridopathy, iris sphincter sclerosis from ageing, chronic miotic therapy and iridoschisis.¹⁰ Doing phacoemulsification through small pupil is possible but it becomes easier with the help of various mechanical pupil dilating devices.¹¹⁻¹³ On the other hand performing SMECE through small pupil is more traumatic. Normally SMECE surgeons do multiple iris sphincterotomies to enlarge small pupil, to make it big enough to bring lens into anterior chamber, before expressing it out of eye.

The objective of study was to do cataract extraction in small pupil without damaging sphincter. Club was designed in Center of Ophthalmic Instrument and Equipment Designing (COIED). Club has same angles as chopper but end is round like small ball which gives it shape of club (Figure) and hence the name. Club gets lens out of capsular bag and brings lens edge in pupil. This way lens can be brought in anterior chamber without damaging pupil and postoperatively pupil stays round without any damage to pupil sphincter.

METHODS

It was a prospective interventional case series. Patients were recruited from 1st January 2019 to 31 December 2019. Inclusion criteria was patients with less than 4mm pupil size after maximum pharmacological dilation. Patients with previous anterior segment surgery and small pupil with posterior synechia were excluded. Seventeen consecutive patients with pupil diameter < 4 mm after maximal pharmacological dilatation were recruited for study. Causes of small pupil in this study were pseudoexfoliation (n = 9), rigid tonic pupil (n = 3), diabetic iridopathy (n = 2) and sphincter sclerosis from ageing (n = 3). Patients with coexisting anterior segment pathologies like glaucoma or uveitis were not included in study. All patients were operated by SMECE with Club. After tunnel formation and capsulotomy, club was used to bring lens edge in pupillary margin. Lens was then maneuvered into anterior chamber and expressed out of the eye with the help of ocular viscoelastic device (OVD).

Intraoperative complications like difficulty in bringing out lens into anterior chamber, posterior capsular rupture, zonular dehiscence or hyphema were not noted. Postoperative examination was done at day one, one week, one month and three month. Visual

acuity, intraocular pressure (IOP), lens position and anterior chamber inflammation was noted on all visits.

Standard postoperative regimen was topical steroid and antibiotic eye drops one hourly for one day, followed by 6 times a day for a week and then four times a day for another 4 weeks. Frequency of this regimen was changed when needed and topical cyclopentolate and IOP lowering medications were added when needed. At 10th week, all patients had stopped using eye drops.

After superior peritomy, 6-6.5 mm frown shaped incision was given 2 mm behind the limbus. Scleral tunnel was made with crescent blade extending up to 12 mm on internal edge and 2 mm in front of limbus. Side port was made and OVD was injected into anterior chamber. OVD was used to lift iris away from lens to create more space between iris and anterior surface of lens. 24-gauge needle was used to do can-opener anterior capsulotomy. Capsulotomy needle was taken underneath the iris to do as big capsulotomy as possible. 3.2 mm phaco knife was used to enter anterior chamber through tunnel but the incision was not enlarged on both sides as done in routine cases. This keeps anterior chamber formed deep during use of club. Hydrodissection was done using 20 gauge cannula. For softer cataract, hydro-delineation was also done to separate central hard part of lens, which could easily be grabbed by club. OVD was injected back into eye to inflate anterior chamber. Sinski hook was introduced through the side port with left hand. Sinski hook was used not only to stabilize the lens but also to press it down. At this stage of operation club was used. This device has a small ball at its end which swipes underneath lens. This brings superior lens margin into pupillary area (Figure 1).

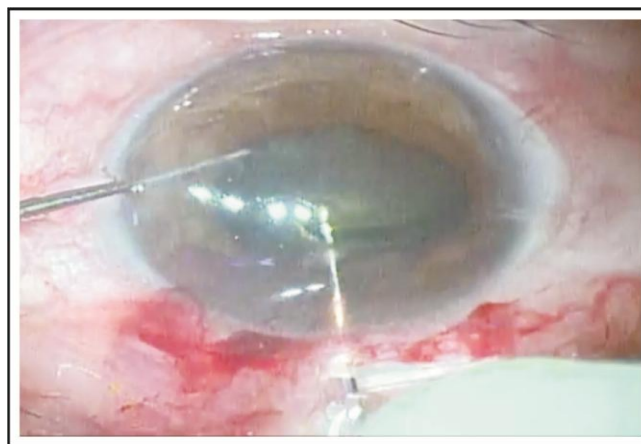


Figure 1: Using Club for nucleus expression.

After the lens edge was popping out of the bag, OVD was injected underneath the lens to push posterior capsule backwards and to push lens forward. Lens was rotated to bring it into anterior chamber. OVD was injected at 5 and 7 O'clock position in anterior chamber and in front of the lens. Eye was held at 6 O'clock position with toothed forceps and pressure was applied at 12° clock to express the lens. Irrigation and aspiration of soft lens matter was done with simcoe cannula. A 6.5 mm single piece PMMA posterior chamber intraocular lens (IOL) was implanted in all patients. After aspirating OVD, conjunctiva was opposed with bipolar cautery.

RESULTS

All the patients had successful surgery with no specific problems regarding use of this new instrument. All the patients had pupil diameter of <4mm at the time of surgery. None of the patients had posterior capsule rupture, iris trauma or hyphaema. Only in one patient pupil margin was damaged. In this patient pupil was sclerosed and we had to stretch pupil.

Postoperative inflammation was usual for a routine cataract extraction. All the patients were off postoperative treatment at 2 months time. Intra ocular pressure (IOP) was high in 3 patients. IOP was controlled with topical beta blockers in 2 patients and only one patient had acetazolamide 250 mg tablets for 3 days. All glaucoma treatment was stopped at 8 weeks and IOP was normal in all patients at 3 months. Average postoperative vision with correction was 6/9, ranging from 6/24 to 6/6.

The instrument is not expensive and reusable and there is no extra cost per surgery. Introduction of club into eye and inserting it under lens is safe because of its round edge. Rest of the operation before and after this step was as per routine.

DISCUSSION

Many patients presenting for cataract surgery have pupils that do not dilate to desired levels with pharmacological mydriatic agents used topically.¹⁴ The causes of small pupil in this study were pseudoexfoliation, rigid tonic pupil, diabetic iridopathy and ageing pupillary sclerosis. Phacoemulsification with the help of iris retraction hooks was my procedure of choice in cases of small pupil. Then I designed a hook and used it for lens extraction in pupil.¹⁵ This new instrument, club, is

even better and more easy to use than previously designed hook. Now with the help of club I performed SMECE with more ease and without any extra cost, which is particularly useful for countries where cost of surgery is big issue.

I classify cataract extraction through small pupil into four possible ways. The first method is mechanically stretching method. The second method is iris cutting method. The third method is iris retractor method and the fourth method is cataract extraction through small pupil without any dilatation. The first three methods are by dilating pupil as described by Kershner¹⁶ and the fourth method is cataract extraction through small pupil without any mechanical dilatation. Phacoemulsification through small pupil has been described but in this study I have described a new method in which pupil is not dilated for extracapsular cataract extraction and pupil is only stretched by lens itself when it comes into anterior chamber.

Commonly used method for extracapsular cataract extraction through small pupil is bimanual stretching of pupil.¹⁷ Though the pupil with this method is dilated but still remains small enough and it remains difficult for lens to pop out into anterior chamber. The other disadvantages of this method are intraoperative hyphaema, iris sphincter damage, pigment dispersion and malfunctioning pupil postoperatively.

The second method commonly used for small pupil is multiple sphincterotomies to enlarge pupil.¹⁸ This makes SMECE easy through small pupil but the scissors used for cutting iris can damage corneal endothelium. This also leaves an irregular and enlarged postoperative pupil which does not give acceptable cosmetic result and postoperatively patient also feels trouble from glare. Another way of managing small pupil in SMECE is doing keyhole iridotomy and then applying iris suture at the end of operation to restore iris shape. All these methods cause irreversible damage to pupil sphincter and leave pupil dilated postoperatively in some cases.

The third method is pupil expanding devices. These small pupil dilating devices are iris retraction hooks, polymethyl methacrylate (PMMA) pupil dilator-ring, perfect pupil expansion device and Greather pupil expander.^{19,20} These devices have only been tried for successfully managing small pupil in phacoemulsification though iris retraction hooks have been used in SMECE. In SMECE these devices are very likely to touch corneal endothelium. Touching of corneal endothelium can particularly happen when

anterior chamber is likely to collapse which is during expressing lens out of the bag and during expressing lens out of the eye.

The device is simple and safe to use. This is a reusable instrument and there is no extra cost per surgery. There were no particular intraoperative or postoperative complications in our study.

CONCLUSION

This instrument designed in COIED is very useful, safe and cost effective. In SMECE surgeons usually do key hole iridotomy, mechanical stretching or multiple sphincterotomies for managing small pupil. With this new instrument cataract extraction can be done without surgical trauma to pupil, thus preserving pupil shape. There were no cases of posterior capsular rupture or papillary sphincter damage and no extra cost to surgery with minimal added time for surgery. Minimal postoperative inflammation was probably because of minimal trauma to iris.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board (OSP-IRB-/2021/007).

Conflict of Interest

Authors declared no conflict of interest.

REFERENCES

- Ruit S, Paudyal G, Gurung R, Tabin G, Moran D, Brian G.** An innovation in developing world cataract surgery: Sutureless extracapsular cataract extraction with intraocular lens implantation. *Clin Exp Ophthalmol.* 2000; **28**: 274-279.
- Gogate P.** Clinical trial of manual small incision cataract surgery and standard ECCE. *Community Eye Health J.* 2003; **48**: 54-55.
- Hussain M.** Cataract extraction through small pupil without mechanical dilatation. *Ophthalmol Update,* 2010; **8** (1): 9-11.
- Ruit S, Tabin G, Chang D, Bajracharya L, Kline DC, Richheimer W, et al.** A prospective randomized trial of phacoemulsification vs. manual sutureless small-incision extracapsular cataract surgery in Nepal. *Am J Ophthalmol.* 2007; **143** (1): 32-38.
- Gogate PM, Kulkarni SR, Krishnaiah S, Deshpande RE, Joshi SA, Palimkar A, et al.** Safety and efficacy of phacoemulsification compared with manual small-incision cataract surgery by a randomized controlled clinical trial: six week results. *Ophthalmology.* 2005; **112** (5): 869-874.
- Huang FC, Tseng SH.** Comparison of surgically induced astigmatism after sutureless temporal clear corneal and scleral frown incisions. *J cataract Refract Surg.* 1998; **24**: 477-481.
- Olsen T, Dam-Johansen M, Bek T, Hjortdal JO.** Corneal versus scleral tunnel incision in cataract surgery: a randomized study. *J Cataract Refract Surg.* 1997; **23** (3): 337-341. Doi:10.1016/s0886-3350(97)80176-9. PMID: 9159676.
- Guzek JP, Holm M, Cotter JB, Cameron JA, Rademaker WJ, Wissinger DH, Tonjum AM, Sleeper LA.** Risk factors for intraoperative complications in 1000 extracapsular cataract cases. *Ophthalmology,* 1987; **94** (5): 461-466. Doi:10.1016/s0161-6420(87)33424-4. PMID: 3601359.
- Fine IH, Hoffman RS.** Phacoemulsification in the presence of pseudoexfoliation. *J cataract Refract Surg.* 1997; **23**: 160-165.
- Halkiadakis I, Chatziralli I, Drakos E, Kartzalkis M, Skouriotis S, Patsea E, et al.** Causes and management of small pupil in patients with cataract. *Oman J Ophthalmol.* Sep-Dec. 2017; **10** (3): 220-24.
- Vasavada A, Singh R.** Phacoemulsification in eyes with small pupil. *J cataract Refract Surg.* 2000; **26** (8): 1210-1218.
- Goldman JM, Karp CL.** Adjunct devices for managing challenging cases in cataract surgery; Pupil expansion and stabilization of the capsular bag. *Curr Opin Ophthalmol.* 2007; **18** (1): 44-51.
- Grzybowski A, Kanclerz P.** Methods for achieving adequate pupil size in cataract surgery. *Curr Opin Ophthalmol.* 2020; **31** (1): 33-42.
- Malyugin BE.** Recent advances in small pupil cataract surgery. *Curr Opin Ophthalmol.* 2018; **(1)**: 40-47.
- Hussain M.** Cataract extraction through small pupil without mechanical dilatation. *Ophthalmol Update,* 2010; **8** (1): 9-11.
- Kershner RM.** Management of small pupil for clear corneal cataract surgery *J cataract Refract Surg.* 2002; **28** (10): 1826-1831.
- Basckulin A, Kundt G, Guthoff R.** Efficiency of pupillary stretching in cataract surgery. *Eur J Ophthalmol.* 1998 Oct-Dec; **8** (4): 230-3.
- Cole MD, Brown R, Ridgeway AE.** Role of sphincterotomy in extracapsular cataract surgery. *Br J Ophthalmol.* 1986 Sep; **70** (9): 692-5.
- Birchall W, Spencer AF.** Misalignment of flexible iris hook retractors for small pupil cataract Surgery: effects on pupil circumference *J cataract Refract Surg.* 2001 Jan; **27** (1): 20-4.
- Graether JM.** Graether pupil expander for managing the small pupil during surgery *J cataract Refract Surg.* 1996 Jun; **22** (5): 530-35.

Authors' Designation and Contribution

Mahfooz Hussain; Consultant Ophthalmologist: *Concept, Design, Manuscript Preparation, Manuscript Editing, Manuscript Review.*

Homaira Iqbal Khan; Associate professor: *Literature Search, Manuscript Preparation.*

Tahir Ali; VR Fellow: *Data Acquisition, Data Analysis, Statistical Analysis.*

Muhammad Aftab; VR Fellow: *Data acquisition, Data Analysis, Statistical Analysis.*

Adnan Alam; VR Fellow: *Literature Search, Manuscript Preparation.*

