Research Article

Nucleus division with McPherson forcep in Small Incision Cataract Surgery: A prospective study

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Abstract

Introduction: Cataract is the major cause of blindness (62.6%) in India. Small incision cataract surgery (SICS) is a popular technique in Indian scenario. There are various techniques of small incision cataract surgery. Various techniques are used to decrease the size of incision in cataract surgery. In our technique McPherson forcep is used to divide the nucleus in two pieces. **Aim and objective:** To study the outcome of nucleus management with McPherson forcep in SICS. **Material and methods:** 250 patients of various grades of cataract operated with McPherson forcep during study period from Jan 2007 to December 2008. Results were documented. In this technique nucleus is made to stand vertical/ oblique in anterior chamber (A/C). Then the forcep is introduced with blades on both the sides of the nucleus and the nucleus is divided in two pieces with horizontal force. Divided pieces are delivered separately with viscoexpression. **Results:** out of 250 patients operated 136 (54.4%) were male and 114(45.6%) were female.211 (84.4%) of patients were from 51-70 yrs of age. 175 (70%) of patients were with Grade II and III nuclear cataract. 179 (71.60%) of patients operated through 5-6mm incision. 43(17.20%) patients required 4-5mm incision. 28(11.20%) patients required >6mm incision. 1 (0.4%) patient had intraoperative zonulodialysis.23 (9.2%) had minimal corneal edema (<10 descemet's folds) and 3(1.2%) patients had grade 1 iritis . **Conclusion:** with this technique incision size can be reduced to less than 6 mm in most of the patients. This is a safe, simple and economical procedure.

Keywords: Small Incision Cataract Surgery, McPherson forcep.

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INTRODUCTION

Cataract is the major cause of blindness (62.6%) in India. Small incision cataract surgery (SICS) is a popular technique in Indian scenario due to early visual rehabilitation, better postoperative BCVA, economical and less time consuming procedure. Size of incision is the major concern in cataract surgery. Various techniques are used to decrease the size of incision in cataract surgery. In SICS nucleus is delivered manually through a sutureless wound. Size of nucleus decides the length of incision required. Nucleus management is an important part of SICS. Delivery of the intact nucleus requires bigger incision. Dividing the nucleus in two or more pieces manually makes it easier to deliver the nucleus thereby decreasing the size of incision. Damage to the corneal endothelium and posterior capsule is the major concern in SICS with all attempts being made to prevent or minimize it**.** There are various techniques of nucleus management in SICS as Nucleus delivery using an irrigating vectis or a curved cystitome–the fish hook , Using two instruments to sandwich the nucleus between them, Bisecting the nucleus into two using two instrument, one as the "cutter" and another, usually a vectis, as the board, By using a snare similar to the tonsillar snare, Dividing the nucleus into three parts (trisection) using a triangular instrument and a vectis, Using an anterior chamber maintainer and a Sheet's glide (the Blumenthal technique), Viscoexpression of nucleus.[1,2,12] In these techniques the

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instruments are in close proximity to the corneal endothelium and posterior capsule, which can cause damage to these vital structures and sometimes special instruments are required.

AIM AND OBJECTIVE

To study the use of Macpherson's forcep for nucleus division with in small incision cataract surgery.

MATERIAL AND METHOD

Observational study of 250 patients of cataract operated with McPherson forcep. Study period was from Jan 2007 to December 2008. Patients were observed for intraoperative ease of nuclear division, length of incision, complications during nucleus management like damage to corneal endothelium, iris, lens capsule and zonules. Postoperatively patients were examined for corneal edema and intraocular inflammation.

Inclusion criteria – All patients with cataract willing to get operated were included in the study.

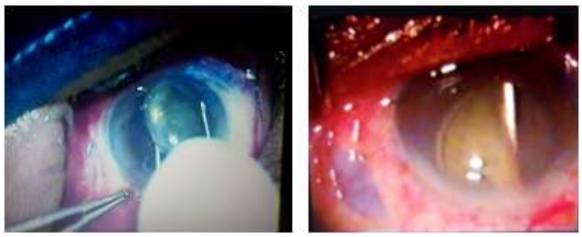
Exclusion criteria- 1) Patients with non dilating pupil.
2) Patients having zonular weakness on examination.

Ethical institutional clearance was obtained for the study.

McPherson Forcep

SURGICAL TECHNIQUE

The surgery is performed under peribulbar anesthesia. Under all aseptic precautions, painting and draping is done. Wire speculum is applied. Superior rectus suture is taken. Fornix based peritomy is done. Haemostasis achieved. Partial thickness scleral groove is made with lancet tip blade 2mm posterior to the limbus. Size of incision depends upon the grade of nucleus from 5mm to 6mm.Sclerocorneal tunnel dissection is done with crescent blade up to 2mm in clear cornea. Anterior chamber (A/C) entered with lancet tip blade through the side port made on right side, 90 degrees away from the main wound. Air is injected in the A/C. Tryphan blue dye is injected over lens capsule directly and kept for 10-20 sec. A/C is washed with saline to remove the dye. A/C is filled with the viscoelastic solution. Continuous curvilinear capsulorhexis is done with the cystitome through the side port. A/C is filled with the viscoelastic solution. A/C is entered through the main wound with the 3.2mm blade and the incision is extended sideways with the keratome. Hydro delineation is done with cannula or simcoe's irrigation aspiration cannula. Author is using simcoe's cannula for hydro delineation and found it safe in his hands. With hydro delineation left pole of the nucleus is prolapsed out of the bag. If this does not happen then the A/C is filled with the viscoelastic and left pole of the nucleus is lifted with the dialer with tyre levering technique and nucleus is made to stand vertical. After the left pole of the nucleus gets prolapsed in the anterior chamber, viscoelastic solution is injected from left side of the nucleus to make it stand oblique or vertical. Soft nucleus can be made to stand vertical whereas hard nucleus is kept little oblique. Blades of the McPherson forcep are inserted from sides of nucleus. Blades should be at the centre or slight below the centre to get a good grip of nucleus so that it will not slip. Nucleus is divided in two pieces superior and inferior by closing and approximating the two blades of McPherson forcep. Direction of force should be horizontal with slightly upward. Force should never be directed inferiorly or superiorly. upper and the lower one. Both pieces will be laying horizontal, upper one in the A/C and lower on in the bag. Superior piece is delivered with the viscoexpression. The A/C is filled with the viscoelastic solution. Lower piece is taken to the A/C with the dialer and then delivered with viscoelastic solution. Cortex is aspirated through the side port with the simcoe's irrigation aspiration cannula. Intraocular lens is inserted after filling the A/C with the viscoelastic solution. Viscoelastic solution is washed with the saline; A/C is formed with the saline. Stability of the chamber is checked. Superior rectus suture is removed. Subconjunctival injection of the gentamycin and dexamethasone is given superiorly so that bulged conjunctiva will cover the external incision. Antibiotic steroid ointment is applied and eye is patched.



Division of nucleus with McPherson Forcep **Delivery of nuclear piece with visco**

RESULTS

Total 250 patients were operated. Out of 250 patients 136 (54.4%) were male and 114(45.6%) were female.

Table 1: Age wise distribution of patients (n=250)

Age (yrs)	No of patients	Percentage
31-40	06	02.40
41-50	25	10.00
51-60	132	52.80
61-70	79	31.60
71-80	08	03.20

Table 2: Grading of nucleus (n=250)

Grade of nucleus	No of patients	Percentage
I	26	10.40
II	78	31.20
III	97	38.80
IV	49	19.60

Table 3: Length of scleral incision (n=250)

Size of incision	No of patients	Percentage
4-5mm	43	17.20
5-6mm	179	71.60
>6mm	28	11.20

Table 4: Complications (N=250)

Complications	No of patients	Percentage
Corneal edema (<10 Descemet's folds)	23	9.2
Moderate corneal edema (>10 Descemet's folds)	0	0
Iritis	3	1.2
Descemet's stripping	0	0
Intraoperative zonular dehiscence	1	1

Patients with grade IV nuclear cataract required larger incision.

Post op day1

Table 4 shows complications - 1 (1.33%) patient had intraoperative zonular dehiscence with vitreous loss while breaking the nucleus. Open sky vitrectomy was done. No intraocular lens was inserted, patient was kept aphakic. 23 (9.2%) patients had mild corneal edema (<10 descemet's folds) on day1.corneal edema was resolved in 2-3 days. Corneal edema was more common in patients with grade IV nuclear cataracts. Corneal edema was paracentral where nucleus touched endothelium. 3 patients had grade I iritis on day1 post op. No patient was required to extend the incision. No patients had iris injury due to McPherson forcep.

DISCUSSION

Nucleus delivery is the main step in SICS. In Blumenthal, viscoexpression, wire vectis and phacosandwich techniques nucleus is delivered intact. Incision required depends upon size of the nucleus and is larger incision [1,5,12] In phacosandwich and wire vectis technique chances of damage to corneal endothelium, iris and capsule are more. Chances of iridodialysis are more in phacosandwich and wire vectis technique.[1, 2, 9, 11] Problems that can occur in viscoexpression with intact nucleus delivery are Failure of the nucleus to engage in the tunnel, iris prolapse, failure to deliver, corneal endothelial damage. [12] Various techniques are used to divide the nucleus in two or more smaller pieces. Small pieces can be delivered through small incision thus decreasing the size of incision. Division of the nucleus needs an instrument to be passed around the nucleus. In various techniques of SICS pressure is applied vertically from above and below the nucleus to break it in two or more pieces.[1,4,6,7] In SICS with snare a special snare is required. It is difficult to pass a snare around nucleus along with chances of damage to endothelium.[1,3] In phacofracture technique, an instrument is passed behind the nucleus and another instrument is passed in front and pressure applied on to the nucleus. Chances of damage to posterior capsule and endothelium are high in this technique[1,12]. In **our technique** the blades of McPherson forcep are passed from sides of nucleus parallel to iris plane at the centre of nucleus under vision away from corneal endothelium, iris and posterior capsule. This minimizes chances of damage to these structures. Pressure is applied is in horizontal direction that protects endothelium and capsular bag. Divided nucleus is easily removed with viscoexpression. In our study of 250 patients, 136 (56.4%) were male and 114(45.6%) were female. 211 (84.4%) patients were between the age group of 51-70 yrs owing to the maximum incidence of cataract in this age group. Grade II and III cataract contribute 70% of study group. 19.60% had Grade IV nuclear cataract and 10.40% had grade I cataract. Incision size was less than 6mm in 88.80% of patients. Incision size of >6mm required in 5 (6.66%) of patients. Most of grade I nuclear cataract required only 4mm incision. Decreasing the size of incision to <6mm is easier with this technique but is difficult to get it to 4 mm in grades II and more as . Reason for this is the space required to separate the blades is same at the tip and at external incision. Sinumol S operated through 3mm incision.[11] Intraoperatively

1(0.4%) patient had zonular dialysis. mild corneal edema (< 10 descemet's folds) was present in 23 patients (9.2%) on day1. Edema resolved in 2-3 days postoperatively. No patient had moderate corneal edema (>10 descemet's folds). 3(1.2%) patients had grade I in day 1. Our findings are correlating with study by Gogate PM 2009 [2] and Sinumol S 2011.[11]

SUMMERY AND CONCLUSION

Most of the patients in our study were between 50-70 yrs of age as cataract is more common at this age. Most of the patients had grade III –IV nuclear cataract. Incision size can be reduced below 6mm safely. This technique can be used in all grades of cataract safely. This is a simple technique to master. No special instruments are required. Chances of complications are less. This is an economical technique. Thus this is a safe, simple and economical procedure. This technique is not useful in patients with small pupil and zonular weakness.

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