Original Research Article

A journey of postgraduate in acquiring skills of manual SICS

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Abstract

Introduction: Cataract surgery is the most common surgery in ophthalmology. It is the stepping milestone of every budding ophthalmologist during postgraduate tenure. The learning pattern of surgical steps can provide better understanding about division of postgraduate's curriculum. **Material and Method:** 60 cases underwent manual small incision cataract surgery, 20 each by first, second and third year postgraduates respectively. Surgeries were recorded for complications faced intra-operatively and its management by a single consultant surgeon. The ratios of difficulties were noted with the help of OCTET (Oxford cataract treatment and evaluation team) score. The pre and post-operative visual acuity and slit lamp examination of cases on 1st postoperative day was also noted with OCTET score table. **Results:** Significant decrease in duration, complication rate and postoperative OCTET score was achieved by third year post graduates in comparison with first and second year postgraduates in surgeries. Maximum difficulty observed of around 28% in sclera-corneal tunnel followed by 31.6% in acquiring continuous curvilinear capsulorhexis and 23% in delivery of nucleus. **Conclusion:** Surgical steps till anterior capsulorhexis can be acquired by a first year and upto nucleus delivery by second year post graduate. A third year postgraduate performs full MSICS (Manual small incision cataract surgery) effortlessly.

Keywords: Manual small incision cataract surgery, Post graduate student, learning curve.

Introduction

Cataract is one of the major surgeries performed in ophthalmology. Manual small incision cataract surgery (MSICS) is a cataract surgical intervention with merits of being economical and universally applicable to all grades of cataract[1]. The economical viability and speed of surgery are twin factors that have made MSICS, the surgery of choice in most developing countries. It is useful in ophthalmology camps and high volume cataract surgery centers. Many post graduate (PG) medical training centers are mentoring ophthalmic residents in MSICS [2]. It is the ideal stepping stone for young ophthalmic surgeons everywhere in the world. Although many surgical manuals and videos are available on MSICS, much remains to be gained about the learning milestones of trainee MSICS surgeons [3].

Aim-To document the resident learning curve for manual small incision cataract surgery and to identify implication for the design of ophthalmology residency programme aimed to train surgeons.

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Objectives

1. To assess the learning steps acquired by postgraduates in training of Manual Small incision cataract surgery (SICS).
2. To notify the intra-operative complication faced by PG trainee
3. To evaluate complication faced by postgraduates in Small incision cataract surgery.

Material and Method

Study Design- Prospective interventional study

Sample size and Duration- This study was undertaken according to Helsinki Declaration and it included 60 eyes of 60 patients with different grades of nuclear sclerosis cataract operated by postgraduate trainees over a period of 12 months from March 2017 to March 2018.

Methodology- An informed and written consent was obtained from all the patients explaining the visual prognosis, risks and possible complications of the

procedure according to the declaration of Helsenki. The patients and close relatives were counselled about the procedure, associated complications, guarded prognosis, the requirement for subsequent procedures and the necessity of an excellent compliance and a regular follow up post-operatively.

Inclusion criteria-All grades of nuclear sclerosis cataract with clear cornea without posterior segment involvement with accurate perception and projection of light.

Exclusion criteria

1. Inaccurate perception and projection of light
2. Pathology involving posterior segment
3. Other ocular pathology i.e., glaucoma, corneal degeneration and dystrophy.
4. Corneal opacity

History- A detailed history will be recorded to know the course of the disease. This will include both ocular as well systemic diseases, treatment received (medical or surgical).

The patients will be segregated into 3 groups i.e. Group A: cases operated by first year PG resident; Group B: cases operated by second year PG resident; Group C: cases operated by third year PG resident. Total of 60 patients 20 cases in each group, they will be underwent series of routine ocular examination and special ocular investigations and systemic examination.

Ocular examination- Thorough ocular examination will be carried out including visual acuity in both eyes, perception and projection of light, lid, adnexa, conjunctival and corneal pathology, anterior segment details by slit-lamp microscope. B scan will be ordered in patients of all three groups, wherever fundus could not be visualised due to dense cataract.

Systemic examination- Patients suggestive of systemic involvement will be subjected to physicians reference will be subjected to fitness for cataract surgery.

Pre-operative and post-operative clinical photographs/ intra-operative surgical video will be taken for documentation.

Surgical procedure- Surgical procedure involved a fornix based conjunctival peritomy with Westcott's scissors. This was followed by cauterizing bleeding vessels using wet cautery. Linear scleral incision 2mm posterior to surgical limbus and about 6.5 mm long was made with blade. Tunneling by angled crescent was fashioned about 1mm into clear cornea and extended laterally to produce pockets on both sides. Side port was created in clear cornea at 9 o'clock. Trypan blue was used to stain the anterior capsule for easier capsulorrhexis. Continuous curvilinear capsulorrhexis was done with capsulotome through the side port.

Anterior chamber was entered with angled 45 degree 3.0 mm sterilizeable microkeratome at the anterior most part of the inner tunnel already 1mm into clear cornea. With anterior and lateral movements, wound was extended into the side pockets earlier created by tunneling, giving an inverted trapezoid opening. Viscoelastic (2% methyl cellulose) was used whenever anterior chamber collapsed at every step of the surgery. Hydro dissection was done with 27G cannula and ringer's lactate solution.

Viscoelastic was injected to fill AC for easy nucleus prolapse and rotation. Nucleus delivered with the help of vectis and sins key hook. Left over cortical wash was done with simcoe cannula. There after AC was reformed with viscoelastic and a 6mm diameter poly methyl-methacrylate (PMMA) intraocular lens implanted and dialed in place with Sins key.

Conjunctiva was reposited by wet cautery. Surgical wounds were unsutured in most cases. Following completion of surgery, subconjunctival Gentamycin (0.5%) mixed with (0.5%) dexamethasone were administered. The operated eye was then firmly padded with single layer eye patch.

Post-operative regime- First day post operative assessments included visual acuity and slit lamp examination. Patients with satisfactory first day post operative conditions were discharged on topical treatment with eyedrop prednisolone acetate (1%) 6 times/day, eye drop moxicip (0.5%) 4times/day, eye drop tropicamide (0.5%) once night time/day. Those with corneal edema were given 5% hyperso l5 times/day. Patients found unfit for discharge were kept for a couple of days until they were considered fit for discharge.

Follow-up-Patients will be kept in the IPD for close observation for one or two days, then follow ups will be done weekly for a month, then monthly for next 3 months. All patients will be scrutinised carefully on slit-lamp and visual acuity is recorded on Snellen's drum in every visit. According to associated problems further in change of management is planned.

Results

Table-1: Cataract grading and distribution of patients.

Type of Cataract	Cataract Grading	Number of Patients (%)
Nuclear sclerosis	I	1 (1.6%)
	II	22 (36.6%)
	III	28 (46.6%)
	IV	6 (10%)
Mature	-	2 (3.3%)
Hypermature	-	1 (1.6%)
Total	-	60

We noted that majority 57 (95%) patients were having Immature cataract with maximum 28 (46.5%) patients were having grade III nuclear sclerosis followed by 22 (36.6%) belonging to grade II nuclear sclerosis. Only 3 (5%) patients were having mature cataract in the present study.

Table-2: Intraoperative complication grading by octet score.

S. No	Intra-operative Complication	Grade	Score
1	Button hole in the conjunctivalflap	1	0
2	Scleral tunnel premature entry	1	0
3	Descements stripping	1	0
4	Positive pressure wound	1	0
5	Rhexis tear	3	6
6	Difficult nucleus delivery	1	0
7	Zonular dialysis	2	6
8	Iridodialysis	2	4
9	Posterior Capsule rent	2	6
10	Vitreous disturbance	3	6
11	Failure to implant lens	3	10
12	Nucleus drop	3	10
13	IOL drop	3	10

Maximum complication noted is in capsulorhexis 31.69% followed by 28% in sclerocorneal tunnel followed by 23% in delivery of nucleus.

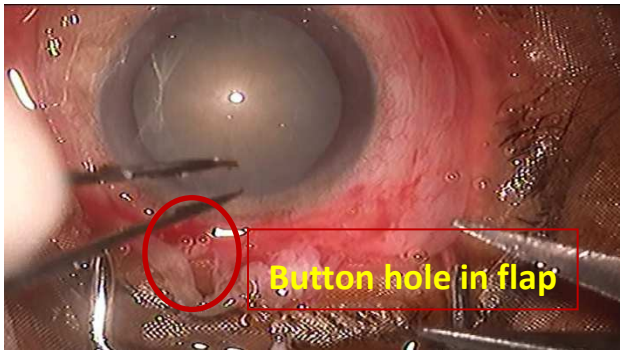

Figure 1– Button hole in conjunctival flap done by first year PG.

Figure 2- No valvular effect in sclerocorneal tunnel done by first year PG.

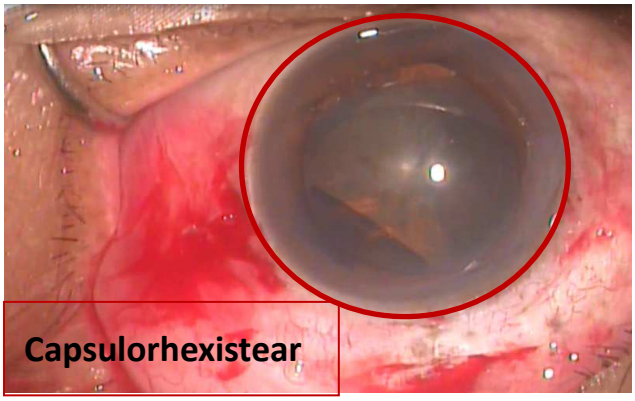

Figure 3- Non curvilinear capsulorhexis with extended margins.

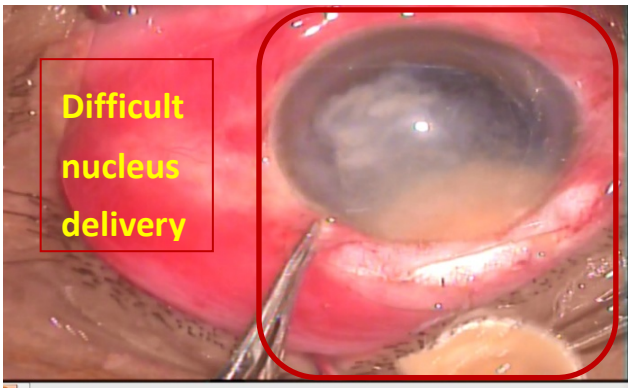

Figure 4- Multiple attempts for nucleus delivery leading to descments stripping by second year PG.

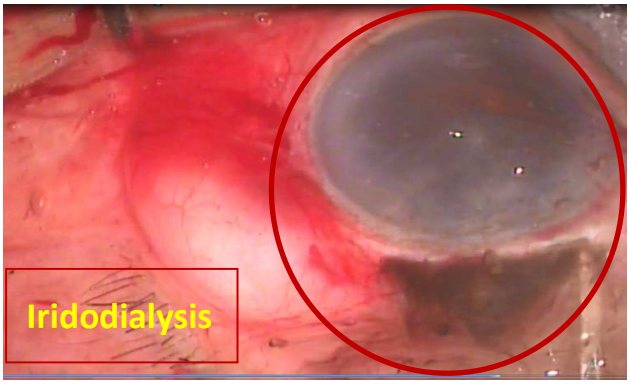

Figure 5- while doing nucleus delivery by wire vectis, iridodialysis occurred by second year PG.

Table-3: Scoring of trainees as per surgical steps performed.

S.NO.	Steps performed by trainee	Grades	Score
1	None	0	0
2	Conjunctivalperitomy	2	5
3	Haemostatic control (cautery)	2	5
4	Reposition of conjunctiva after surgery	2	5
5	Sclerocorneal tunnel construction	4	15
6	Anterior chamber entry	3	10
7	Anterior capsulorrhexis	4	15
8	Hydroprocedure	3	10
9	Nucleus prolapse	3	10
10	Nucleus delivery	3	10
11	IOL placement	4	15
12	IOL dialing	2	5

Maximum surgical steps were performed by third year PG followed by second year PG .

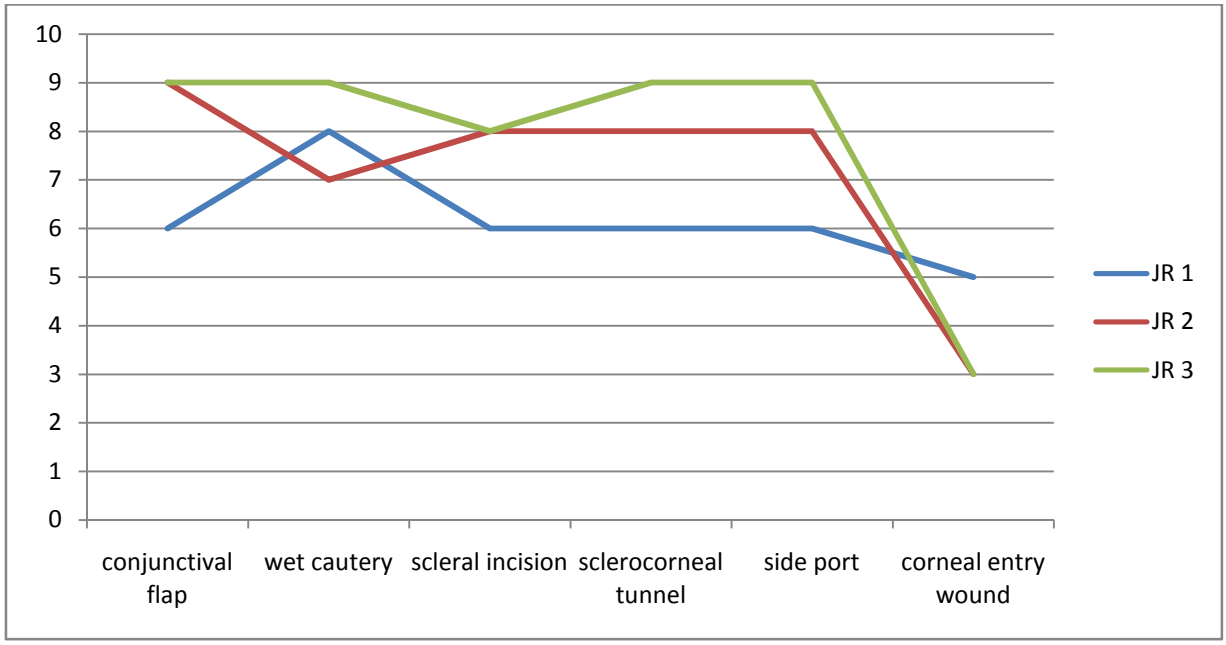

Figure 6- Common surgical steps performed by each group.

Table-4: Distribution of patients according to BCVA

Best corrected visual acuity (BCVA)	Snellen's visual acuity	Number of patients	Percentage (%)
Good	6/6-6/18	21	35
Borderline	6/18-6/60	24	40
Poor	<6/60	15	25

Maximum 40% patients have borderline postoperative best corrected visual acuity.

Discussion

As with all surgeries, MSICS needs experience to be mastered, especially construction of leak-proof valvular tunnel, competent capsulorrhexis, nucleus prolapse and delivery, IOL implantation[1].

In the study, the measured parameters (post-op BCVA, complications, and supervision levels) were poor in the cases operated by first year postgraduates.

In cases operated by second year postgraduates, there was a remarkable improvement in these parameters. Cases operated by third year postgraduates shows only marginal improvement with regards to post-op BCVA and intraoperative complication, although the need for supervisors to intervene diminished significantly [2].

The grade of lenticular opacity was found to be statistically significant as per complications. Higher nuclear densities are associated with bigger nuclei that often pose challenges during prolapse and delivery from the anterior chamber. This could be associated with iris prolapse or even iridodialysis.

Hypermature cataracts have thin fragile capsules that are susceptible to rents especially when a large nucleus is forced through a residual anterior capsular tear or poorly constructed capsulorrhexis margins[3].

It is noted that trainee experienced most complications on operating the initial 12 consecutive patients. Thereafter, post-operative BCVA became averagely better. Today many surgeons are keen to convert from sutured to sutureless cataract surgery.

Complication is inversely proportional to experience as discussed in various studies [3,4] similar facts were observed in our study as third year postgraduates are more familier with MSICS surgical steps had less complication rates especially in steps which were difficult to first year PGs as they were new to these steps of conjunctival flap formation and sclerocorneal tunnel formation.

Good patient selection is key to training MSICS surgeons. The ideal case should be immature cortical or LOC grade II-III nuclear sclerosis that can be molded through the scleral tunnel[4,5].

There should be intact zonular integrity, adequate intraoperative mydriasis and healthy cornea (in terms of clarity, thickness and number of endothelial cells)[6].

The need to perform capsulorrhexis margin with vannasto avoid extension of a capsular marginal tear to posterior capsule during nucleus prolapse and rotation cannot be overemphasized [7,8,9].

Some degree of competence in conventional ECCE appears to ease conversion to suture less tunneled MSICS [10]. The practice that allows for modest mastery of ECCE as currently ensured in our training center have been associated with reduced duration of training, reduced adverse intraoperative complications. [11,12]

Conclusion

Duration and exposure are key criterias in postgraduate training session. Clinicians with more the experiences have better the surgical skills. The practice that allows for modest mastery of Manual SICS as currently ensured in our training centers have been associated with least adverse intraoperative complication under supervision of consultant, while improved results in MSICS performed by postgraduates.

What does this study add to existing knowledge?

Problems faced by postgraduates at different surgical steps of MSICS could be easily understood and could be employed to improve the training schedule of postgraduates.

More emphasis was given on particular steps could be given on which postgraduates were facing difficulties so that perfection could be attained in that particular step.

With increase in years and better understanding of theory, the surgical skills improved and complication rates decreased. Through a well organised training schedule better surgical approach is achieved in postgraduates in learning MSICS. Same schedules can be helpful for mastering surgical steps of MSICS.

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