

Abstract

Introduction: Manual small incision cataract surgery (MSICS) is a cost-effective alternative to phacoemulsification cataract surgery for developing countries. This prospective study was carried out in Combined Military Hospital (CMH), Chittagong from October 2009 to March 2011 on 75 cataract patients who were operated by MSICS technique.

Objectives: Aim of this study was to assess the visual outcome and complications of MSICS in a peripheral CMH.

Methods: Seventy five cataract patients were operated by MSICS technique. All surgical procedures were performed by the principal author. Major per-operative and postoperative complications were documented. Visual outcome was assessed by Snellen's visual acuity test 06 weeks after operation.

Results: Uncorrected visual acuity (UCVA) was 6/6 – 6/18 in 57 (76.0%) patients, < 6/18 – 6/60 in 15 (20%) and < 6/60 in 03 (4.0%) patients. Best corrected visual acuity (BCVA) was 6/6-6/18 in 65 (86.7%) patients, < 6/18-6/60 in 07 (9.3%) and < 6/60 in 03(4.0%) patients. Visual outcome was good in 86.7% of patients according to World Health Organization (WHO) criteria and was not far away from the WHO expected outcome. Posterior capsule rupture was the most significant per-operative complication which was found in 7(9.3%) cases and surgically induced astigmatism was main postoperative complication that affected visual outcome. Mean postoperative astigmatism (against-the rule) was - 1.25DC.

Conclusion: MSICS is a safe and cost-effective technique of extra-capsular cataract extraction where surgical skill and experience of the surgeon plays a significant role in the result.

Key-words: Manual small incision cataract surgery (MSICS), posterior capsule rupture, best corrected visual acuity (BCVA), surgically induced astigmatism.

Introduction

Cataract is the leading cause of reversible blindness in the world causing more than 18 million bilateral blindness¹. Most of these blind people reside in developing countries². Age-related cataract is a natural aging process. Large number of retired armed forces personnel, civilian entitled patients and parents of the soldiers undergo cataract surgery in different CMHs every year. WHO reports that there is a backlog of cataract of approximately 15.8 million people with an annual increase of over 2 million newly cataract-blind patients³. Bangladesh is one of those countries with backlog of cataract patients.

Modern cataract surgery aims to achieve a better unaided visual acuity with rapid post-surgical recovery and minimal surgery related complications. These qualities can be achieved by reducing the incision size. Incision size depends on the mode of delivery of the nucleus of the cataractous lens and the type of intraocular lens implanted. It is about 10-12 mm in conventional extra-capsular cataract surgery, about 5.5-7.0 mm in manual small incision surgery (MSICS) and 2.2- 3.0 mm in phacoemulsification technique.

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The advantage associated with the smaller incision has made phacoemulsification the technique of choice for cataract surgery where the resources are available. But phacoemulsification requires expensive instrumentation which may not be available at all centres.

Due to expense of equipments and consumables, phacoemulsification has a limited role in developing countries like Bangladesh. In order to obtain the advantages of a self-sealing sutureless incision with least surgically induced astigmatism at a low cost, ophthalmologists of developing world have adopted as an alternative to phacoemulsification.

Until recently MSICS was considered as a low-tech to the gold standard phacoemulsification. Several recent articles have compared MSICS to phacoemulsification and demonstrated almost equal outcome. Different studies from local and international article had reported that manual sutureless small incision cataract surgery is an encouraging technique and that good visual results can be obtained in over 85% of cases with some associated complications like post-operative astigmatism, per-operative hyphema, irido-dialysis etc^{4,5}.

WHO⁶ categorizes the outcome of cataract surgery in three groups: good, borderline and poor and recommends aiming for a good, uncorrected visual acuity (VA) in at least 80% of surgeries and poor outcome in less than 5%. WHO Guidelines and Recommendations for the Post-operative Outcome of Cataract Surgery with Intra Ocular Lens Implantation (IOL):

		Uncorrected post-op VA	Corrected post-op VA
Good	(6/6 – 6/18)	80%+	90%+
Borderline	(<6/18 – 6/60)	15%	<5%
Poor	(<6/60)	<5%	<5%

Other than CMH Dhaka, CMH Chittagong and BNS Patenga, recently cataract surgery is performed by MSICS technique in other CMHs. In this study, outcome of MSICS was assessed in a peripheral CMH like CMH, Chittagong.

Materials and Methods

This prospective study was conducted in the Department of Ophthalmology, Combined Military Hospital, Chittagong from October 2009 to March 2011. Seventy five cataract patients were included in this study. All surgical procedures were performed by the principal author. Detailed history was taken from all patients and was documented. Pre-operative examination like visual acuity assessment, detailed slit lamp examination, IOP measurement, indirect biomicroscopy with +90.0D lens, keratometry and biometry was carried out for all patients. Type of cataract was recorded on the basis of morphology as cortical, nuclear, mixed type and posterior subcapsular cataract. Traumatic cataract, developmental cataract and cataract with other co-existing ocular disease were excluded from the study.

Surgical technique: The eye to be operated was first properly dilated by putting mydriatic drop. Peri-bulbar anaesthesia was given in all cases by injecting mixture of lignocaine 2% and bupivacaine 0.5% at two different sites superiorly and inferiorly. Peri-ocular skin was properly disinfected by painting with 10% povidone-iodine solution. Then one drop of 5% povidone-iodine was put in the conjunctival sac. After proper draping, a 6.0-6.5mm long, straight scleral incision was made in superior location at a distance of about 2mm from the limbus with a number 15 blade. Sclero-corneal tunnel was made with a crescent knife and entry into the anterior chamber with a 3.2 mm keratome. The internal opening of the incision was wider, so as to facilitate the nucleus delivery. Before entering into the anterior chamber, a side port was made at the limbus at right angle to the incision. Anterior chamber was filled with visco-elastic substance (methyl cellulose).

Trypan blue was used in all cases to stain the anterior capsule. Anterior capsulotomy was done by continuous curvilinear capsulorhexis (CCC) technique or capsulotomy method (when CCC was not possible) with the help of a self-made cystitome and a capsulorhexis forcep. Hydro-dissection was done in all cases without hydro-delineation. Nucleus was delivered by irrigating vectis. Cortical matter was then washed out with Simcoe's cannula and rigid, single piece

poly methyl methacrylate (PMMA) IOL was implanted in the bag or in the ciliary sulcus. Anterior chamber intraocular lens (ACIOL) was implanted in one case. Visco-elastic material was washed out. Sclerocorneal wound was then checked for its self sealing character. The wound was self – sealing in most cases and no stitch was applied except in a few. Conjunctiva was approximated by closing with gentle cautery.

Sub-conjunctival injection of antibiotic (gentamicin) and steroid (dexamethasone) was given. Eye pad and bandage was applied for 24 hours. Cases were examined at the first post-operative day, 1-week post-op, and 6-weeks post-operatively with a slit-lamp and direct ophthalmoscope and +90D lenses for any significant sign. Patient's postoperative visual outcome was assessed by Snellen's chart. All major per-operative and postoperative complications were documented. All patients were followed-up for at least 06 weeks.

Results

The age of the patients studied ranged from 45 to 78 years. The highest numbers of patient were in the age group of 61-70 years, 33 (44.0%). Patients in age group 41-50 were 09 (12.0%), in group 51-60 were 27 (36.0%) and in group 71-80 were 06 (8.0%). Out of all 75 patients, 63 (84.0%) were male and 12 (16.0%) were female. Majority of the patients were retired soldiers 42 (56.0%). Civilian entitled patient were 18 (24.0%) and parents of the soldiers were 15 (20.0%).

Morphologically most common type of cataract in the study group was mixed cortical and nuclear type 35 (46.67%) followed by posterior sub-capsular variety 16 (21.33%). Nuclear cataract was in 15 (20%) cases and cortical cataract in 09 (12%) cases. Among the noteworthy per-operative complications, premature entry was in 05 (6.67%) eyes, too long tunnel in 03 (4.0%), small capsulorhexis in 05 (6.67%), per-operative small pupil in 03 (4.0%), partial iridodialysis in 02 (2.66%) and posterior capsule tear in 07 (9.33 %) eyes (Table-I).

Table-I: Per-operative complications (n=75).

Complications	Number	Percentage
Premature entry	05	6.7
Too long tunnel	03	4.0
Small capsulorhexis	05	6.7
Small pupil	04	5.3
Partial iridodialysis	02	2.7
Posterior capsule tear	07	9.3

Regarding post-operative complications (shown in Table-II) significant corneal oedema was in 21 (28.0%) eyes, vitreous in anterior chamber in 06 (8.0%), retained cortical matter in 04 (5.33 %), endophthalmitis in 01 (1.33%) and secondary angle closure glaucoma in 01 (1.33%) eye. Minor complications like mild iritis, mild corneal oedema which are almost universal postoperatively for a few days, have not been shown in the table.

Table-II: Post-operative complications (n=75).

Complications	Number	Percentage
Significant cortical matter	21	24.0
Retained cortical matter	04	5.3
Vitreous in anterior chamber	06	8.0
Endophthalmitis	01	1.3
Secondary angle closure glaucoma	01	1.3

Visual outcome after 06 weeks of operation is shown in Table-III. Uncorrected visual acuity (UCVA) was 6/6 – 6/18 in 57 (76.0%) eyes, < 6/18 – 6/60 in 15 (20%) and < 6/60 in 03 (4.0%) eyes. Best corrected visual acuity (BCVA) was 6/6-6/18 in 65 (86.7%) patients, < 6/18-6/60 in 07 (9.3%) and < 6/60 in 03(4.0%) patients.

Table-III: Post-operative visual outcome after 06 weeks (n=75).

Visual Acuity	Range	Number	Percentage
United Visual Acuity	6/6 – 6/18	57	76.0
	<6/18 – 6/60	15	20.0
	<6/60	03	4.0
	Total	75	100
Best corrected Visual acuity	6/6 – 6/18	65	86.7
	<6/18 – 6/60	07	9.3
	<6/60	03	4.0
	Total	75	100

Discussion

In the evolution of cataract surgery, manual small incision cataract surgery (MSICS) was a later addition much after phacoemulsification became a popular technique. It is neither a hi-tech procedure nor it is practiced in Western countries.

MSCIS was developed mainly as a cost-effective alternative to phacoemulsification cataract surgery^{7,8}. The western world switched over from extra-capsular cataract extraction (ECCE) to phacoemulsification. In the developing countries where cost is a major issue, MSICS was developed after the advent of phacoemulsification, and hence it is a relatively younger technique than the latter. In this study, we tried to assess the safety and efficacy of MSICS in terms of visual outcome and complications in eyes undergoing cataract surgery in a peripheral CMH. Many studies have been published on various aspects of the MSICS in different countries by now^{9,10,11}. Hennig and co-authors operated 500 cataract patients by MSICS technique. The uncorrected visual acuity (UCVA) was 6/18 or better in 70.5% of the patients. Best-corrected visual acuity (BCVA) was 6/18 or better in 96.2% of eyes at 6-weeks¹².

Khan Muhammad Tariq & co-authors, UCVA was 6/18 or better in 66.3% eyes at 6 weeks post-operatively. BCVA was 6/18 or better in 80.6% of eyes at 6-weeks in this study¹³. R. Venkatesh & co-authors study result shows, at 6 weeks postoperatively, 78.4% patients achieved UCVA of 6/18 or better, and 97.1% had BCVA of 6/18 or better¹⁴. In this study, at 6-weeks post-operatively un-corrected visual acuity (UCVA) was 6/18 or better in 76% eyes and best-corrected visual acuity (BCVA) was 6/18 or better in 86.7% eyes. The present study result has similarity with above mentioned studies to some extent and UCVA (6/18 or better in 76%) shows similarity with R. Venkatesh study (78.4%) result, while BCVA (6/18 or better in 86.7%) is better than Tariq Khan's study (80.6%) but worse than Hennig (96.2%) and R. Venkatesh's study (97.1%). The main reason for the decreased UCVA in our study is thought to be the surgically-induced astigmatism.

Regarding per-operative complications, Hennig and co-authors¹² noticed posterior capsule (PC) rupture in 0.2% cases, R. Venkatesh and co-authors¹⁴ experienced it in 2% cases. In Khan Tariq's study¹³, some degree of irido-dialysis occurred in 4.0% cases, and in 3.33% cases posterior capsule tear was noted. In this study, we noted posterior capsule rupture in 7 (9.3%) cases and partial irido-dialysis in 2 (2.7%) cases.

We assume that surgeon's inadequate experience of the technique may be the cause for the increased incidence of intra-operative complications. Initially we used to perform both hydro-dissection and hydrodelineation for easy delivery of nucleus and most PC rupture occurred in initial cases. Afterwards hydrodelineation was avoided and there was hardly any PC rupture. Because most PC rupture occurred during cortical matter wash out and delivery of nucleus as a whole by hydro-dissection left only small amount of cortical matter. Among the post-operative complications, R. Venkatesh and co-authors¹⁴ found significant corneal oedema in 19.6% cases, Khan Tariq and co-authors¹³ found it in 12.7% cases while in our study it was present in 21 (24.0%) cases. Post-operative endophthalmitis occurred in 2% cases in Khan Tareq's study and it was in 01 (1.33%) case in this study, which responded well to the therapy that was instituted from the 1st post-operative day. One patient, in whom anterior-chamber intraocular lens (ACIOL) was implanted, developed secondary angle closure glaucoma which was managed initially by medication and then it needed YAG-laser iridotomy. Visual outcome was poor in this patient. In this study, the incidence of posterior capsule opacification was absent because it takes at least 6 months to develop, but the studied patients were followed up for 6-wks only. Like most authors, we also predominantly found against-the-rule (ATR) astigmatism (minus cylinder in 90 ±20 degrees) in our study, because we adopted superior approach in all cases¹⁵. Mean astigmatism at 6-weeks post-operatively was 1.25 D (0.50-2.0 D).

Conclusion

Phacoemulsification is the universally accepted and most widely practiced technique of cataract surgery in the developed countries. MSICS technique is a safe and cost effective alternative for the developing world. In MSICS, the surgical skill and experience of the surgeon plays a significant role in the result of the surgery. Almost all grades of nuclear sclerosis and all sizes of cataractous lenses can be dealt with this technique. Early diagnosis and early institution of treatment decreases the risk of loss of eye because of postoperative endophthalmitis.

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