TO COMPARE THE EFFICACY OF TWO CURRENT TECHNIQUES OF CATARACT SURGERY PERFORMED AT A RURAL PRIMARY EYE CARE CENTRE IN NORTHERN INDIA: SIX WEEK TRIAL

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Abstract

**Background:** Cataract till today remains the most common yet treatable cause of blindness accounting for more than 50% of blindness and visual impairment in the developing world. The cataract surgery paradigm today comprises mainly of the premium & elegant Phacoemulsification technique and its poor yet comparable cousin Manual Small Incision Cataract Surgery (MSICS), the more traditional intra capsular cataract extraction (ICCE) & extra capsular cataract extraction (ECCE) well on their way out except in certain situations. The goals for cataract surgery today regardless of type are rapid patient mobilization and comfort, early visual rehabilitation, minimal induced astigmatism and risk benefit ratio shift in patients favor counterbalancing the surgeon’s ego and faith in one particular technique only. The aim of cataract surgeon in rural primary eye care centre in the developing world is not only to achieve the above mentioned goals but also to aim at maximizing result with least possible complication leading to uneventful and early post operative recovery taking in account disease severity and patient’s economic status.

**Aim:** To compare the efficacy (visual acuity and complication rate) of the two current state of art techniques MSICS and phacoemulsification in routine cataract extraction surgery at a rural primary eye care centre in Northern India at six weeks.

**Design:** Randomized, prospective clinical trial.

**Setting:** Sant Sarwan Dass Charitable Hospital, Vill. BAL, Distt. Jalandhar, A Charitable Eye Hospital in rural area surrounded by industrial zones/clusters and its peripheral eye OPD services at Kathar, a midsized agricultural town.

**Method:** A randomized clinical trial of 128 patients (age group 20-80 years, 72 female / 56 male) with various grades and types of cataract who underwent single eye cataract surgery by either Phacoemulsification or MSICS procedure between 1st Oct, 2010 and 30th Nov, 2010 were included. Patients were informed regarding nature and outcomes of the procedures (MSICS versus Phacoemulsification), IOL types (rigid PMMA & Foldable), nature of anesthesia (Peribulbar for all surgeries), and duration of visual rehabilitation and full informed consent was obtained. All patients underwent routine pre-operative examination with particular emphasis on lenticular slitlamp examination after full mydriasis. Eyes with previous ocular surgery; ocular pathology; corneal, uveal, retinal or glaucomatous eye disease, zonular dehiscence > 20° and also those with congenital, traumatic and brunescent cataracts were excluded. The patients were randomly assigned (standard random table) for
either phacoemulsification or MSICS and all surgeries, pre and post operative documentation was done by the author (JSS). The patients were divided into two groups randomly by draw of lots. Group P consisted of 63 patients who underwent phacoemulsification and group M consisted of 65 patients who underwent manual small incision cataract surgery. The surgical procedures used, intra operative observations, post operative complications and post operative visual acuity was recorded at 1 week and 6 weeks. Out of 128 patients, 3 patients 2 from group P and 1 from group M were lost to follow up after 2nd post operative visit. The analysis of remaining 125 eyes is published. Out of these 61 eyes (48.8%) underwent Phacoemulsification, 29 eyes (23.2%) with single incision single instrument Phacoemulsification method & 30 eyes (24.0%) with double incision chopper assisted Phacoemulsification, all 59 eyes receiving foldable IOL in bag. 2 eyes (1.6%) were converted from Phacoemulsification to MSICS, 1 after capsulorrhexis extension inferiorly and 1 after posterior capsule rupture. 6 eyes (4.8%) underwent MSICS with nucleus delivery and foldable IOL implantation through 3.2 mm scleral pocket incision. The remaining 58 eyes (46.4%) underwent MSICS with rigid IOL implantation. All patients received Intra Ocular Lens implant and no sutures were used to close the scleral tunnel in any patient. The patients from both groups had good and similar visual outcome after correction at 1 week and 6 weeks. The two groups were compared with student-t test.

**Result:** The visual outcome at one week showed 87 eyes (69.6%) recording best corrected visual acuity (BCVA) ≥6/12, 42 eyes from group P (68%) and 45 eyes from group M (70.0%); 23 eyes (18.4%) recording BCVA between 6/12 and 6/24, 11 eyes from group P (18%) and 12 eyes from group M (18.7%). The post operative (BCVA) at 6 weeks was ≥ 6/12 in 95 eyes (76%), 47 eyes (77.04%) from group P and 48 eyes (75%) from group M; 18 eyes (14.4%) recording (BCVA) between 6/12 and 6/24, 8 eyes (13.11%) from group P and 10 eyes (15.6%) from group M. There was 1 case (0.8%) of total patients with posterior capsule rent in the group P. On 1st day post operative 3 eyes (2.4%) presented with corneal edema, 2 (3.2%) from the P group and 1 (1.5%) from the M group. At 6 weeks clinically significant macular edema was observed in 2 eyes (1.6%), 1 (1.5%) from each group. 2 Eyes from each groups displayed mild uveitis in the immediate post operative period. Complications like endophthalmitis or retinal detachment were not seen in any group. There was no significant difference in intra operative and post operative complication in both groups. However due to small group size and short term follow up of patients potential complications may be missed.

**Summary:** MSICS and phacoemulsification are both safe and effective techniques yielding high cure rates, low complication rates and excellent postoperative visual rehabilitation after cataract surgery at primary eye care centers in rural India. MSICS is less expensive, less
technology dependent and is soon emerging as surgery for masses in primary eye care centers in developing countries with large cataract backlog.

Financial disclosure: The operating surgeon JSS has no financial interest in any of the products or methodology mentioned in the study.

Scope of the Problem

Cataract is defined as partial or complete loss of transparency of the crystalline lens substance or its capsule. Cataract may occur as a result of age, trauma, systemic or ocular diseases, high myopia, long-term steroid therapy, and excessive exposure to infrared and ultraviolet light, heredity, maternal infections, Down’s syndrome etc. The incidence of cataract also increases with age amounting to more than 50% in population over 82 years
[1]. With increasing life span and better healthcare facilities in the developing nations the population along with age related problems will burgeon. Also the increase in ultraviolet radiation resulting from depletion of ozone layer is expected to increase the incidence of cataracts [2]

Cataract till today remains the most common yet treatable cause of blindness. Upto 75% of blindness (visual acuity below 3/60) is due to cataract [3]. The WHO/NPCM (National Program for Control of Blindness) survey has shown that there is a backlog of 22 million blind eyes (12 million blind people) in India and 80.1% are blind due to cataract [4]. Compared with other developed countries cataract occurs at a much earlier age in India [5]. Also various social, economic and environmental factors contribute to cataract blindness in populations at a much younger age [4].

Cataract surgeons in India performed an estimated 0.5 million cataract surgeries in 1981-1982, 1.2 million surgeries in 1992 and this increased to 4.8 million in 2006 with 90% intraocular lens acceptance [6]. The current NPCB guidelines state that implantation of an IOL will be mandatory unless medically not advisable, as proposed by Vision 2020, which has been implemented in the eleventh 5-year plan for India (2007-2012) [7]. There are around 11,000 eye surgeons in India with an average ratio of 1 surgeon for about 1,00,000 population including a wide disparity between rural and urban areas and many of them have non surgical practices [8]. To eliminate cataract eye blindness in India over 14 million surgeries will be needed every year during 2016-2020 on persons most likely to go blind from cataract [9]. In terms of disability-adjusted life years, cataract extraction is one of the most cost effective of all surgical interventions [10]. The modern cataract surgery is also highly cost effective compared with procedures across multiple medical specialties [11]. A vast majority of Indian Population lives below the poverty line and is not able to afford the cost many of the premium intraocular lenses available in western settings which are sometimes more than several times the annual and sometimes lifetime income of most of the poor [12]. Also scaling and training of surgeons and making available phacoemulsification or the more recent phacoemulsification with femtosecond laser assisted procedure for are highly improbable.

Cataract Surgery is the most commonly performed procedure and the surgery today has constantly evolved through various techniques. The modern cataract surgery has come a long way since the days of Sushruta (6th century B.C) who described Couching as a method to cure the disease. In 1748 Jacques Daviel (1696-1762) was the first physician to successfully extract cataract from the eye by both intra and extra capsular methods. Von Graffe (1828-1870) also described Intra capsular cataract extraction later modified by Henry Smith as the Smith Indian Tumbling Technique and held sway for a century. Kelman designed a cryoprobe using liquid Nitrogen, which became standard for Intra capsular cryosurgery until it was phased out in mid seventies by reintroduction of extra capsular
surgery along with IOL fixation. The modern era of refined extra capsular surgery was further popularized by Gills method of manual cortical aspiration and Kelman’s development of Phacoemulsification in 1967 with its nuclear fragmentation and automated irrigation/ aspiration. The manual small incision cataract surgery (MSICS) which was pioneered in the U.S. by Kansas and in Israel under Michael Blumenthal actually bloomed in Nepal and India due to its wide applicability and flexibility in community eye health care.

In developing nations like India with large cataract surgical backlog, the community outreach programs both Government and Non Government Organizations (NGO’s) have adopted both the phacoemulsification and MSICS as flag bearers in the crusade. Many of the surgical steps like sutureless shelved incision, continuous curvilinear capsulorrhexis, 360 degree capsular overlap, use of better lens technologies and design, intraocular lens power calculation by newer formula, are not only common to both but are actually complementary to each other and help in easy surgical conversion like upgrading to newer techniques and also in bailing out of complications thus avoiding unnecessary surgeon –patient embarrassment.

Both the techniques despite being closer than cousins of the same blood have different advocates. The subject text books and medical suppliers fraternity are firm supporters of the opinion that phacoemulsification is the gold standard of treatment known today but we all know that 100% phacoemulsification is not possible[13] particularly in the hard, black nucleus, zonular dehiscence >30deg, machine failure, adequate manpower training and economic constraints particular to the developing world. On the other hand as the MSICS developed later than phacoemulsification its age and complication rate particularly in reference to increased posterior capsular opacification and also its seemingly crude steps compared to a machine extraction raises a question whether the two techniques can deliver equable results from same or different surgical platforms ALLTIME particularly in primary eye care centres across the developing world.
Materials and Methods

A randomized clinical trial was performed which comprised of 128 patients (age group from 20yrs -80yrs, 72 female/56 male) presenting with various grades of cataract and attending Eye O.P.D. services at Sant Sarwan Dass Charitable Eye Hospital, vill. Bal, Distt. JALANDHAR and at its peripheral centre at Kathar, between 1st October 2010 and 30th November 2010, and registering for cataract surgery. All the patients were informed and a written consent explaining the clinical trial was obtained from them regarding willingness to participate in the clinical trial.

All the patients were consecutive except those which were excluded from ambit of the trial. Patients with previous ocular surgery; present or previous ocular pathology; corneal, uveal, retinal or glaucomatous disease; zonular dehiscence > 20 deg and also those with congenital, traumatic and brunescent cataracts were excluded. The patients who dropped during follow up were also excluded from the analysis. The patients in whom conversion of surgery was done intraoperatively were included for statistical study under the initially planned surgery group. Full informed consent regarding nature and outcomes of the procedures (MSICS versus Phacoemulsification), IOL types (rigid PMMA versus Foldable), nature of anesthesia (peribulbar for all case) and expected duration of visual rehabilitation was discussed and taken. All patients were undertaken for strict pre operative evaluation and examination. This included measurement of uncorrected and best corrected visual
acuity (Snellen), Intraocular pressure measurement by both indentation (Schiotz) and
applanation (Goldmann), detailed examination of the anterior segment under Slit Lamp
Biomicroscope observing for any ocular surface disorder, corneal eye disease, pupillary size
and reaction for any abnormalities, good iris tone, signs of iritis, keratic precipitates,
presence of posterior synechiae, pigment on lens, intact zonular apparatus,
pseudoexfoliation and also after maximal dilatation status of a satisfactorily dilating pupil,
grading of cataract, zonular status, nuclear study on a combination of opalescence and
colour grading protocol and also for posterior capsular and anterior vitreous study. Fundus
examination was done during the same period with +20 D Volk lens and binocular indirect
ophthalmoscope.

Keratometry was performed on Righton Speedy –K autokeratometer and axial length was
measured with Optikon BIOLINE A-Scan. The lens power was calculated using modified SRK
formula (Sanders, Retzlaff, Kraff). The patients were asked for any history of systemic
disease, drug allergies or any other previous surgery undertaken. The patient’s blood
pressure was measured and laboratory investigations including random blood sugar and
screening for HIV and HbsAg were done. Randomization of patients was done pre
operatively by standard random table on different surgery days on a consecutive basis. All
the surgeries were performed by single operating surgeon JSS.

All patients were operated under peribulbar anesthesia using a mixture of 30 ml of
lignocaine 2% with adrenaline1:200000, 20 ml of bupivacaine 0.5% and hyaluronidase 1500
I. units. Anesthesia was adequate in all patients and no massage or superpinky was used.
Pupillary dilatation was achieved with a combination of 0.8% tropicamide and 5%
phenylephrine. Povidone iodine solution 5% was instilled in conjunctival sac immediate pre
operatively to induce complete asepsis and then patients were walked into the operation
theatre. On table the patients eyes, forehead and face upto tragus was painted with
povidone iodine 5% and draped with sterile double cloth sheet. The eyelids were separated
with Kratz Barraquer open bladed speculum and no bridle suture was used. The eyes were
stabilized with a Pierse Hoskin atraumatic forceps and a three step shelved, scleral pocket
incision one mm from limbus was made with entry 2 mm in clear cornea at 10-o clock using
an angled 2.8 mm keratome. The anterior chamber was deepened with hydroxypropyl
methylcellulose with a 22 gauge canula and capsulorrhexis was initiated and completed
with a utrata capsulorrhexis forceps using the graded mm scale on the shanks to achieve
centration and a 4.5mm - 5.5 mm round capsulotomy most of the time. Hydrodissection and
hydrodelineation were performed using tapered Blumenthal canula to free the cortex and
achieve free rotation of the nucleus.
Till this step the procedure was same for both groups. The patients who were in the MSICS group a superior sclero corneal tunnel was made 1.5 mm from limbus at 12-o clock using angled crescent blade, 2.8 & 5.2 mm keratomes and nucleus was delivered after debulking using viscoexpression and Bidaye’s nucleus delivery punch in all cases except those with a very soft cataract in which the nucleus was delivered after viscofracture[14] through the initial sclera tunnel enlarged to 3.2mm using the appropriate keratome. The anterior chamber was deepened with more viscoelastic and cortical aspiration was done manually by Gills method. The IOL was then implanted, 6 eyes with 3.2 mm incision receiving a Foldable IOL and 58 eyes with 5.2-6mm incision receiving a rigid PMMA IOL with 6 mm optic/12.5 mm.

In the phacoemulsification group using Storz Protégé machine, 29 eyes underwent single incision single instrument phacoemulsification as described by Robert M Kershner[15] and bowl and snail technique by Gomma A[16] and 30 eyes underwent phacoemulsification by chopper assisted crater and chop method using two incisions, the choice of technique depending upon surgeon comfort. Automated removal of residual cortex was done with a unimanual handpiece. All 59 eyes received neutral yellow 360 deg square edge foldable IOL in bag. A small group of 2 eyes were converted to MSICS due to zonular dehiscence and inferior extension of capsulorhexis but were included in phacoemulsification group for statistical interpretation. All the intraoperative methods and parameters were recorded and all patients were discharged on similar systemic and topical medication. All complications, visual acuity and intra ocular pressure was recorded at 1 week and 6 weeks using same instruments.
Observations and Outcomes

Group P was assigned for patients who had undergone phacoemulsification and group M for patients who had undergone MSICS. The patients from both groups had good and similar visual outcome after correction at 1 week and 6 weeks. The visual outcome at one week showed 87 eyes (69.6%) recording best corrected visual acuity (BCVA) ≥6/12, 42 eyes from group P (68%) and 45 eyes from group M (70.0%); 23 eyes (18.4%) recording BCVA between 6/12 and 6/24, 11 eyes from group P (18%) and 12 eyes from group M (18.7%). The post operative (BCVA) at 6 weeks was ≥ 6/12 in 95 eyes (76%), 47 eyes (77.04%) from group P and 48 eyes (75%) from group M; 18 eyes (14.4%) recording (BCVA) between 6/12 and 6/24, 8 eyes (13.11%) from group P and 10 eyes (15.6%) from group M. There was 1 case (0.8%) of total patients with posterior capsule rent in the group P. On 1\(^{st}\) day post operative 3 eyes (2.4%) presented with corneal edema, 2 (3.2%) from the P group and 1 (1.5%) from the M group. At 6 weeks clinically significant macular edema was observed in 2 eyes (1.6%), 1 (1.5%) from each group. 2 Eyes each from both groups displayed mild uveitis in the immediate post operative period. No eye displayed any serious complication like endophthalmitis or retinal detachment. There was no significant difference in intraoperative and post operative complication in both groups.

<table>
<thead>
<tr>
<th>Intra operative Complications</th>
<th>P group</th>
<th>M group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Descement’s detachment</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Radial tear of anterior capsule</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Posterior capsule rupture</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Repeated iris prolapse</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>IOL insertion in ciliary sulcus</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Anterior segment hemorrhage</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>IOL placed upside down</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Complications noted on 1(^{st}) post operative day</th>
<th>P group</th>
<th>M group</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>P group</th>
<th>M group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal edema</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Uveitis</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Retained cortical matter</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Posterior capsular striae</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### Complications noted at 1 week post operative

<table>
<thead>
<tr>
<th>Condition</th>
<th>P group</th>
<th>M group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated Intraocular pressure</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Uveitis</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Retained cortical matter</td>
<td>1</td>
<td>1</td>
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### Complications noted at 6 week post operative

<table>
<thead>
<tr>
<th>Condition</th>
<th>P group</th>
<th>M group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupillary capture</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Cystoid macular edema</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Chronic uveitis</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Visual Outcomes (Best Corrected Visual Acuity)</td>
<td>P group</td>
<td>M group</td>
</tr>
<tr>
<td>---------------------------------------------</td>
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<tr>
<td><strong>1 week post operative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥6 /12</td>
<td>42 (68%)</td>
<td>45 (70.0%)</td>
</tr>
<tr>
<td>6/12 -6/24</td>
<td>11 (18.0%)</td>
<td>12 (18.7%)</td>
</tr>
<tr>
<td>6/24-6/36</td>
<td>5 (8.19%)</td>
<td>6 (11.11%)</td>
</tr>
<tr>
<td><strong>6 week post operative</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥6/12</td>
<td>47 (77.04%)</td>
<td>48 (75%)</td>
</tr>
<tr>
<td>6/12 -6/24</td>
<td>8 (13.11%)</td>
<td>10 (15.6%)</td>
</tr>
<tr>
<td>6/24-6/36</td>
<td>5 (8.19%)</td>
<td>4 (6.25%)</td>
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</table>

**Statistical analysis**
The designed study was undertaken to compare the efficacy of two current techniques of cataract surgery at a rural primary eye care centre. A randomized clinical trial of 128 patients (age group 20-80 years, 72 female/56 male) who registered for cataract surgery at the hospital, Sant Sarwan Dass Charitable Eye Hospital, vill. Bal Distt Jalandhar and consented to be a part of the study.

The patients were randomly assigned (standard random table) and all trial was conducted using standard examination and surgical techniques. The intra operative complications including surgical conversion, post operative complications and postoperative best corrected visual acuity taken on Snellen chart at 6 metres and converted into decimal notation. The patients who did not come for check up after 1 week post operative (n=3) were excluded from the ambit of the study. The patients in whom the nature of surgery was changed intraoperatively (n=2) were included in the parent group.

All the data was recorded on a pre designed Performa and managed on excel spread sheet. Preoperative values of all the parameters were statistically compared among the two groups, group P including (those who underwent phacoemulsification) and group M including (those who underwent manual small incision cataract extraction). For the quantitative variables, approximate normal distribution was assessed and subsequently mean was calculated. Repeatedly measures of variance were used to determine changes from the preoperative value. The categorical variables between the two groups were compared on student-t test. P value of <0.05 was considered significant.

The 125 patients were divided into Group P (n=61) and group M (n=64). Out of these 125 patients there were 70 female/55 male with age (mean ± SD) 55.3±11.6 for group P and 56.8±12.3 for group M.

The mean post operative BCVA at six weeks improved to 0.53±0.18 in the P group and 0.51±0.22 in the M group. The difference was not found to be statistically significant (p>0.25).

The complication rates were also similar to both methods during intra operative, immediate post operative and delayed postoperative period as documented on the complication charts.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Group P (n=61)</th>
<th>Group M (n=64)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean ± SD)</td>
<td>57.3 ± 11.6</td>
<td>62.4 ± 12.3</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>50.8%</td>
<td>37.5%</td>
<td>.13</td>
</tr>
<tr>
<td>Visual acuity ≤ Finger counting 1 ft</td>
<td>9.3%</td>
<td>10.4%</td>
<td>P&gt;0.10</td>
</tr>
<tr>
<td>Mean visual acuity of remaining patient</td>
<td>0.13 ± 0.05</td>
<td>0.12 ± 0.09</td>
<td></td>
</tr>
<tr>
<td>Mean IOL power</td>
<td>21.01 ± 1.1 D</td>
<td>21.7 ± 1.3 D</td>
<td></td>
</tr>
<tr>
<td>Mean visual Outcome at 6 weeks With best correction</td>
<td>0.53 ± 0.18</td>
<td>0.51 ± 0.22</td>
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</table>

**Analysis and Discussions**

Over the last two decades the cataract surgery platform has seen a major upheaval with almost total abandonment of intracapsular cataract extraction from hospital and camp scenario not only in the west but also in the developing world. The final epitaph has also been laid on the unscientific principle of couching which was also practiced till very recent in sub Saharan Africa and Yemen.
The advent is continuous with standardization of Intra Ocular Lens (IOL) implantation and the minor modifications in the technique of extracapsular cataract extraction the major difference only remaining in the manual versus automated extraction. The automated technique phacoemulsification is used by most surgeons of the developing world and enables a very high degree of precision in the surgical process. The technique of manual small incision cataract surgery was born after incorporating a few principles each from the earlier extracapsular technique and phacoemulsification.

Cataract is one of the most common causes of treatable blindness worldwide and is considered as the commonest, relatively safer and cost effective as compared with other surgical interventions in term quality of life restored. The goal of modern cataract surgery are rapid patient mobilization, minimal induced astigmatism and early visual rehabilitation. But more than that cataract surgery today is a need based surgery and should be amenable in various geographical, social and economic settings keeping the patient expectation parameters like postoperative comfort, early rehabilitation, fewer postoperative visit, lesser systemic and topical medicine and a carefully weighted visual outcome in mind. The current cataract surgery paradigm involves a small incision surgery with continuous curvilinear capsulorhexis, hydroprocedures, sutureless shelved corneal or scleral incision and a 360° capsular overlap as some of the incorporates to a efficient visual recovery post cataract extraction.

Phacoemulsification is one of the most elegant procedures performed on human body and its impact on quality of life is needless and the British Medical Research Council states that despite the additional costs associated with the technology, phacoemulsification resulted in longer term savings as a result of more rapid rehabilitation and fewer postoperative visits. The major advantage of phacoemulsification over manual techniques is that it allows for implantation of a folding IOL many of them from the premium segment through small and even micro incision. But still the most important factor is that despite its elegance is 100% phaco possible especially in hard cataracts and those without adequate zonular support. Phacoemulsification also has a long learning curve, is expensive to both procure and run, upgradation from extracapsular cataract extraction comes at cost of time in learning curve and increased infrastructural cost, the issues of sterilization during mass cataract surgery in developing countries as raised by Thomas raise hackles of many surgeons that is it absolute or is there a way out to meet patient demands from some other surgical platform.

Manual small incision cataract surgery (MSICS) on the other hand is a manual, multistep, multitool, manoeuvrable surgical procedure which offers the similar advantages with merits of wider applicability, better safety and lower costs.
The reason why this study was conducted was because in most Primary Eye Care Centers across the the developing world most are not only outdated in infrastructural requirements but also lack manpower resources usually having one surgeon per establishment to cater to a vast community needs. The corneal or vitreo retinal services are either absent or of a referral nature beyond the financial ambit of the patients visiting the primary eye care hospital. This study was designed to compare the efficiency of the two techniques comparing visual outcome and complications in the immediate post operative period. A study over a longer period of time would hold more weight but usually due to financial crunch the patients at primary eye care centre are notorious in getting lost during follow up over a longer period of time.

All surgeries and documentation was done by the author JSS well experienced in both techniques for past ten years and in other surgical procedures for cataract the past 19 years. Both the statistical data and the complication charts show that both MSICS and phacoemulsification are excellent procedure and both are capable of good visual delivery with low complication rate. MSICS is very much amenable and now most patients with soft cataracts especially those in the younger age group are now receiving foldable IOL’s in bag. It is also a procedure of choice in bailing out of difficult phacoemulision situations especially those encountered by newer surgeons. It also is a valuable armamentum in the learning curve to efficient phacoemulsification. Also while surgeons and patients living in countries with high literary rates are more obsessed by the technique of automated cataract extraction and its paraphernalia of multifocal and accommodative lenses the usually lesser financially and education deprived patients in the developing world are concerned about the outcome. The advantages of MSICS as a low cost, Indian Rs 720.99 for MSICS versus Indian Rs 1978.89 for phacoemulsification[20], equally effective technique makes it an alternative,especially in an unequally developed[19] or developing country.

MSICS provides similar and early postoperative rehabilitation as phacoemulsification, can be used in any surgical setting where extracapsular surgery is currently carried out, gives the same small incision sutureless benefit, has very low and comparable intra and postoperative complications, is more economical, significantly faster, interchangeable and less technology dependant it is a comparable technique non being absolute. It is thus a chosen surgery for cataract extraction in any primary eye care centre across the developing world.
Conclusions

Until recently, manual small incision cataract surgery (MSICS) was considered as a low tech, unproven poor cousin to the gold standard phacoemulsification[19]. Its innate humbleness has been instrumental in its wide popularity and acceptance the world over. Several recent articles have been published comparing the two techniques in which the both techniques stand out in their respective realms complementing each other in the fight to cure the seemingly cataract epidemic. Even in this technology driven time 100% phacoemulsification is not possible partly due to cataractous condition and partly due to machine failure and in India it may be as high as 3.7% [21]. Thus there is perfect logistics for a trained phaco surgeon to get working knowledge of MSICS and use each technique as the situation demands to maximize patient benefit. Manual extracapsular cataract extraction (especially small incision versions) occupy an important place in modern cataract surgery, and while not a replacement for phacoemulsification in western countries, should be a part of a cataract surgeons overall skill set[22]. Its use in large national or community blindness prevention and control programs that tackle cataract blindness and visual impairment and make best use of available resources [20] needs no overemphasis. We can thus safely conclude that both MSICS and phacoemulsification are two equal armaments in a cataract surgeons hands against the cataract backlog and its eradication.

What the study adds: That MSICS is capable of great maneuverability and a number of minor modifications of the technique can further it.

Conflict of interest: The author declares no conflict of interest. The jam packed halls at any major ophthalmic conference during a MSICS session are a mute testimony to MSICS procedures acceptability and popularity.
Master Chart /Illustrations/Diagrams

Sant Sarwan Dass Charitable Eye Hospital, Vill. Bal, Distt. Jalandhar (Pb.) India

The anatomy of the eye in relation to areas of interest during MSICS and Phacoemulsification
Storz Protégé phacoemulsification machine

Scleral tunnel construction using angled crescent blade [17]
IOL Insertion through sclero-corneal incision

[17]

Hydrodelineation procedure

Hydrodelineation of nucleus and epinucleus—cross section view. A larger cannula is advanced beneath the cortex (C) and infusion is started to separate the nucleus (N) from the epinucleus (E). Arrows show the flow of fluid. The demarcation of the nuclear core and epinucleus is seen clinically as the “golden ring” (GR). Technique as modified by Drews. (Courtesy Allergan India)
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I would at this juncture also add that this work is original and no copyright has been infringed upon. I dedicate this work to the poor of the developing world.