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MANUAL PHACOEMULSIFICATION IN BASRAH; THE FIRST SERIES FROM IRAQ

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Abstract
This prospective study includes 80 eyes of 78 patients with cataract, who had manual phacoemulsification operated upon by the same surgeon at Basrah Hospitals between Feb, 2006 and Jul, 2007. They were 35 males and 43 females, 2 of them (females) have cataract in both eyes. The age of patients range from 35-70 years, 23 eyes of 21 patients (28.7%) at age of between 35-45 years, 20 eyes (25%) at age of between 46-55 years, 27 eyes (33.7%) at age of between 56-65 years, 10 eyes (12.5%) at age ≤ 66 years. The pre-operative visions for those patients were ranged from 6/24 to projection of light (PL), depend on the type and extent of cataract. There was selected with no significant corneal astigmatism in all of these patients. Surgery was done on 21 eyes (26%) with posterior subcapsular cataract, 20 eyes (25%) with nuclear cataract, 30 eyes (38%) with mature cataract and 9 eyes (11%) with hypermature cataract. On the first postoperative day, according to Oxford Cataract Treatment and Evaluation Team Grade (OCTET) classification the observation was: Grade 0 was reported in 46 eyes (58%), Grade I developed in 25 eyes (31%), Grade II developed in 8 eyes (10%), and Grade III developed in 1 eye (1%). On the 7th postoperative day, 54 eyes (67.5%) had Uncorrected Visual Acuity (UCVA) of good outcome, 23 eyes (28.7%) had of borderline. On day 40 postoperative, 75 eyes (93.7%) achieved a best corrected visual acuity (BCVA) of good outcome. The final refractive states in 73 eyes (91.2%) was emmetropic or within (-1) diopteric sphere of the desired refractive target without a significant astigmatism.

Introduction
Phacoemulsification has become the procedure of choice for cataract extraction in most parts of the world which need an expensive machine and instruments. In order to obtain the advantages of a self-sealing sutureless incision at a low cost, eye surgeons in the developing world performing manual phacoemulsification with small sutureless incision cataract extraction as an alternative method [1, 2].

In our country this manual phachoemulsification procedure was done in Baghdad in ninetieth by a foreign visitor ophthalmologist's team but was not done as a routine and was not reported by Iraqi ophthalmologists until Feb, 2006. The first experience was done in Basrah hospitals. It is thought that small wound in manual phaco-emulsification heals faster than conventional incision, leading to less astigmatism (high astigmatism is an important cause of poor uncorrected visual acuity after conventional extra capsular cataract extraction surgery ECCE), better uncorrected visual acuity, rapid rehabilitation, sutureless surgery and without using an expensive phaco machine with accessories which are the advantages of this surgery. This is important as many patients do not wear or cannot afford spectacles after surgery, which means that their uncorrected visual acuity is what they rely on to carry out their every day functions. A post-operative vision of 6/18 or better without spectacles is a goal which appears to be

within the reach of small incision techniques for cataract surgery. Irritation and infection from sutures necessitates their removal and it seems likely that patients without sutures would be more comfortable, less likely to rub their eyes and more satisfied with surgery. However, there are concerns that the method used to remove the nucleus in manual phacoemulsification may be more traumatic to the corneal endothelium than conventional extracapsular cataract extraction and intraocular lens (ECCE/IOL) surgery. The majority of ophthalmologists in developing countries are being well trained in conventional ECCE surgery. The change to manual phaco-emulsification is easier than learning real phacoemulsification, as anterior chamber dynamics in manual phacoemulsification are similar to conventional ECCE. More trials are needed to compare the different techniques and their variations, to provide better evidence of the costs and benefits.

Patients and methods

This study included 80 eyes of 78 patients with cataract, who had manual phacoemulsification operated upon by the same surgeon at Basrah Hospitals between Feb, 2006 and Jul, 2007. 43 had surgery in the right eye and 37 had surgery in the left eye. They were 35 males and 43 females, 2 of them are females have cataract in both eyes (Table I). The age of patients range from 35-70 years, 23 eyes of 21 patients (28.7%) age of between 35-45 years, 20 eyes (25%) age of between 46-55 years, 27 eyes (33.7%) age of between 56-65 years, 10 eyes (12.5%) age $\leq$ 66 years (Table II). The pre-operative visions for all patients were ranged from $\geq$ 6/24 to projection of light (PL). Surgery was done on 21 eyes (26%) with posterior subcapsular cataract, 20 eyes (25%) with nuclear cataract, 30 eyes (38%) with mature cataract and 9 eyes (11%) with hypermature cataract (Table III).

Preoperative examination like detailed slit lamp examination, applanation tonometry, keratometry, A-scan biometry to calculate the intraocular lens with the use of SRK I or SRK II formula. The inclusion criteria for selection of cases, included cataracts with healthy endothelium (examined under high magnification using slit lamp), without coexisting ocular pathology and no significant corneal astigmatism depending on keratometer reading preoperatively.

After an adequate mydriasis with tropicamide 1% and phenylephrine 10%, a local akinesia of facial nerve was performed by injection of 2% lidocaine (Van Lint's method) and a local anesthesia by injection of 0.5 cc Lidocaine subconjunctivaly near superior rectus muscle insertion. Superior rectus muscle was fixed by bridle suture, a fornix based conjunctival flap was created superiorly and minimum haemostasis achieved with bipolar diathermy. A partial thickness 5.5 mm perpendicular external scleral incision was made 2 mm behind and parallel to the limbus by using squint caliber. Scleral tunnel was constructed using a disposable angel round crescent knife and extended through sclera up to 1.0 mm into clear cornea. Additional corneal paracentesis was made on 9 o'clock site for right eyes and 3 o'clock for left eyes using a disposable paracentesis stab knife 45 side port. Through the paracentesis, hydroxy propyl methyl cellulose 2% (visco) was injected to deepen the anterior chamber (AC), and then 0.1 ml of 0.06% trypan blue was injected between the visco and anterior capsule by using a 24g needle for deep dens cataracts only to attain a uniform staining of the anterior capsule. A 3.2mm keratome was used to access the AC from the scleral tunnel and the visco with

trypan was aspirated by simcoe irrigation aspiration cannula (I/A) then the AC was deepened again using a new visco. A curvilinear continuous capsulorrhexis (CCC) of 6 mm diameter was initiated using a bent 26-gauge needle then completed using an utrata capsulorrhexis forceps. If the CCC margin extended to the periphery, the capsulotomy was converted to fine can opener type. The internal corneal incision was extended for about 0.5mm more than the external scleral tunnel incision in each side by keratome. Hydroprocedures were done with a 24-gauge hydrodissection cannula, the nucleus was made to rotate freely by hydroprocedures, a sinskey hook was used to prolapse one pole of the nucleus outside the capsular bag and the rest of the nucleus was wheeled out into the AC. After good cover of visco, the prolapsed nucleus was fractured (emulsified) in to two large pieces using special dissector manual fragmentation instruments through the scleral tunnel, then extracted from the eye using an irrigating vectis pressing the posterior lip of tunnel to open the valve for the exit of the fragments. The cortex was washed using a simcoe cannula and capsular bag inflated by visco again. PMMA posterior chamber intra ocular lens (PCIOL) of 5.5 mm optic was implanted in the capsular bag. The visco material was aspirated and replaced by BBS fluid, stromal hydration was performer. The integrity of the self-sealing scleral incision was ensured and the cut conjunctival flap was apposed using a forceps fitted to bipolar diathermy. Finally 20 mg gentamicin and 2 mg dexamethasone was injected Subcunjunctivaly and the eye was closed for 24 hours.

Results

On the first postoperative day, according to OCTET classification the observation was: Grade 0 was reported in 46 eyes (58%), Grade I developed in 25 eyes (31%), Grade II developed in 8 eyes (10%), and Grade III developed in one eye (1%) (Table V).

The visual acuity on the 7th postoperative day, 54 eyes (67.5%) had an UCVA of good outcome, 23 eyes (28.7%) of borderline and 3 eyes (3.7%) of poor outcome (Table VI).

The visual acuity on day 40 postoperative, 75 eyes (93.7%) achieved a BCVA of good outcome, 3 eyes (3.7%) of borderline and 2 eyes (2.5%) had poor BCVA (Table VII).

The final refractive state on day 40 postoperative, 73 eyes (91.2%) was emmetropic or within (–1) diopteric Sphere (DS) of a desired target of refraction without a significant astigmatism, 3 eyes (3.7%) had (1) – (3) DS of ametropia, 2 eyes (2.5%) had (1) diopteric cylinder (DC) (1 myopic and 1 compound myopic) and only 2 eyes (2.5%) had (2) DC (1 simple myopic and 1 mixed) (Table VIII).

Discussion

Intraoperative findings or complications were recorded both in the case records as well as in a standard pro forma. Capsulorrhexis tear was converted to fine can-opener type of capsulotomy in 4 cases (5%) (Table IV) so that, the success rate of complete capsulorrhexis is (95%) in 76 eyes. This is in agreement to studies done by Galand A[3] and Duch Mesters [4], while in another study of Jacob *et al* reports a failure of CCC with adjunct use of trypan blue in 3.85% of eyes with white cataract [5]. Meantime all these 4 cases of capsulorrhexis tear were mature cataracts and all of them completed successfully. One of the patients (1.2%) had zonular dialysis during delivery of a large nucleus (Table IV) and this was consistent with other studies by authors Parikshit Gogate [6], and Rao SK, Lam DS [7]. None of these eyes had posterior capsular rupture or and no eyes were converted to conventional extracapsular cataract extraction.

Postoperatively, patients were examined on the 1st day, 7th day and 40th post-operative days. A high follow-up rate on Day 40 was achieved with a strong post-operative counseling process in the hospital. The first day postoperative complications were graded according to Oxford Cataract Treatment and Evaluation Team Grade classification (OCTET).

According to OCTET, Grade 0 quit eyes with clear cornea. Grade I was trivial complications that may have needed medical therapy like mild corneal edema, but were not likely to result in a marked drop in visual acuity. Grade II were intermediate complications that needed medical therapy and would have resulted in a marked drop in visual acuity if left untreated like anterior chamber (AC) +2 reaction and striated keratopathy. Grade III were serious complications that would have needed immediate medical or surgical intervention to prevent gross visual loss like sever AC reaction and marked corneal edema or iris prolapsed.

Uncorrected Visual Acuity (UCVA) and Best Correct Visual Acuity (BCVA) using a Snellen's chart were also recorded on the 7th and 40th postoperative days respectively, Categorizing postoperative visual acuity as per the WHO Guidelines - good outcomes (6/6 - 6/18), borderline outcomes (< 6/18 - 6/60) and poor outcomes (< 6/60),. On the 40th postoperative day, the complete ophthalmic examination included slit lamp examination, fundus examination and refraction.

On the first postoperative day, according to OCTET classification was observed, Grade 0 developed in 46 eyes (58%), Grade I developed in 25 eyes (31%), Grade II developed in 8 eyes (10%) and Grade III developed in one eyes (1.2%) due to zonular dialysis intraoperative in this eye (Table V). All these complications were resolved on 7th day postoperative, 78 eyes (98%) had central PCIOL in the capsular bag and 2 eyes had central PCIOL in the sulcus. Summation of Grade 0 and I (89%) with good outcome in a first postoperative day. This agreed by almost all of the other authors [8, 9]. All patients were discharged one day postoperative day.

On the 7th postoperative day, 54 eyes (67.5%) had a UCVA of good outcome, 23 eyes (28.7%) had a UCVA of borderline, and 3 eyes (3.7%) had poor outcome especially in those elderly patients and in those who had Grade II and III in first day postoperative (Table VI) and this goes with the results reported by most of the authors [10, 11].

On day 40 postoperative 75 eyes (93.7%) achieved a BCVA of good outcome, while 3 eyes (3.7%) achieved BCVA of borderline and only 2 eyes (2.5%) achieved BCVA of poor outcome category (Table VII), these are due to one eye had cystoid macular edema (CME) and one patients had age related macular degeneration (AMD) during fundus examination specially in those had mature cataract and elderly patients and this goes with the results reported by author [8, 10, 12]. Considering UCVA on day 7, 54 eyes (67.5%) presented themselves under good outcomes against the 75 eyes (93.7%) on day 40 of BCVA.

The final refractive state of a BCVA group (Table VIII), 73 eyes (91.2%) was emmetropic or within (-1) diopteric sphere (DS), 3 eyes (3.7%) had (1) to (3) DS of ametropia, 2 eyes (2.5%) had (1) diopteric cylinder (DC) (1 myopic, and 1 compound myopic) and only 2 eyes (2.5%) had (2) DC (1 simple myopic and 1 mixed). I think because of diathermic cauterization of sclera and depend on the amount of cauterization, this was consistent with other studies [10, 11].

Cataracts constitute a significant volume of cataract surgical load in our country. Currently, satisfactory results have been published with respect to phacoemulsification in cataracts. In Iraq, where cataract backlog is still a socioeconomic problem, procedures like

phacoemulsification remain an expensive modality of management, and majority of the population find it difficult to afford it. Manual phacoemulsification promises to be a viable cost effective alternative in this regard. The safety of this procedure especially in white cataracts is enhanced by the adjunctive use of trypan blue dye as in our study the success rate of CCC was 95%.

Jacob *et al* [5], reports a failure of CCC with adjunct use of trypan blue in 3.85% of eyes with white cataract. This compares favorably with our results in 4 cases (5%). All those cataracts in which the CCC was converted to can-opener capsulotomy type were white mature in nature. The challenge of performing CCC in white cataracts is well documented [1, 3-5]. This is because of lack of red reflex, poor contrast between the anterior capsule and the underlying cortex, high intralenticular pressure in white cataracts, leaking of lens matter from the anterior capsule puncture sites and the occasional presence of capsular fibrosis. Various methods have been described to tackle such situations effectively. Use of trypan blue is found to be safe and effective in performing a CCC. In manual phaco, it also helps in making the difficult step of nucleus prolapsed through an intact capsulorrhexis safe and effortless, because the dye stained capsular rim is distinctly visible all throughout the surgery, as a result, any compromise to the capsular bag during prolapsed of nucleus can be detected easily and relaxing incisions can be made at any point of the process thereby saving the intracapsular removal of nucleus.

Immediate postoperative complications such as corneal oedema found in 11% of the cases (summation of Grade II, 10% and III, 1%) in our study were higher than the published results of phacoemulsification in white cataracts raising doubts whether phaco-emulsification is more endothelial friendly[2,13,14]. However, all of them were resolved with medical therapy by the time. One of the major reasons for the high incidence of corneal oedema in our situation is that many of the cataracts were hard and were camouflaged in white cortex. In such circumstances, manual phacoemulsification has been found to be effective to tackle these hard cataracts without much intraoperative complication, as demonstrated in our study. Final visual outcome on the 40th postoperative day was satisfactory, with 93.7% of patients having BCVA of 6/9 or better. It compares favorably with other studies on white cataracts. Jacob *et al* reports that 3.85% of cases where a CCC had failed it had to be converted to conventional ECCE[5]. This was not the case with our study, as we could comfortably continue a sutureless procedure manual phacoemulsification with a can-opener capsulotomy.

This study concludes that creating a complete CCC and prolapsing the nucleus from the bag into the anterior chamber are the two difficulties encountered during manual phaco-emulsification in eyes with white cataracts. Trypan blue staining helps the surgeon to visualize the anterior lens capsule while performing CCC. Secondly, it makes the prolapsed of nucleus using sinskey hook a very safe maneuver by delineating the CCC margin and the underlying cortex. Hence, in our country, Iraq, where phacoemulsification may be unaffordable to the majority of population requiring cataract surgery, manual phaco-emulsification could to be a safe and efficacious alternative in white cataract, especially with the adjunctive use of trypan blue dye.

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Table I: Gender and side distribution of the cases.

Eye	Right	Left	Total
Male	20	15	35
Female	23	22	43*
Total	43	37	78 patients 80 eyes

*Two females had bilateral cataract

Table II: Age and Gender distribution of the cases

Age/years	35 – 45	46 – 55	56 – 65	≥ 66
Males	10	12	9	4
Females	11+2eyes	8	18	6
Total **(%)**	23 (28.7%)	20 (25%)	27 (33.7%)	10 (12.5%)

Table III: Types of cataract and Gender distribution

Cataract	PSC	NS	Mature	Hypermature
Males	8	6	16	5
Females	13	14	14	4
Total **(%)**	21 (26%)	20 (25%)	30 (38%)	9 (11%)

Table IV: Intraoperative complication rate

Type of complication	No.	%
CCC Failed	**4**	**5%**
Zonular dialysis	**1**	**1.2%**
Converted to conventional ECCE	**0**	**0**

Table V: First post operative day according to OCTET

Grads	Grad o	Grad I	Grad II	Grad III
Males **(%)**	19 (24%)	11 (13.7%)	5 (6%)	1 (1%)
Females **(%)**	25+2eyes (34%)	14 (17.5%)	3 (4%)	0 0%
Total **(%)**	46 (58%)	25 (31%)	8 (10%)	1 (1%)

Table VI: UCVA of cases in 7th post operative day

Uncorrected Visual acuity	6/6 - 6/18 Good	< 6/18 - 6/60 Borderline	< 6/60 Poor
Males **(%)**	24 (30%)	9 (11%)	2 (2.5%)
Females **(%)**	30 (37.5%)	14 (17.5%)	1 (1.2%)
Total **%**	54 67.5%	23 28.7%	3 3.7%

Table VII: BCVA of cases in 40th post operative day

Corrected Visual acuity	6/6 – 6/18 Good	<6/18 – 6/60 Borderline	< 6/60 Poor
Males (%)	32 (40%)	2 (2.5%)	1 (1.2%)
Females (%)	43 (53.7%)	1 (1.2%)	1 (1.2%)
Total (%)	75 (93.7%)	3 (3.7%)	2 (2.5%)

Table VIII: Refraction of the cases in 40th post operative day

Refraction	Emmetropia or (-1) DS	(1) to (3) DS	1DC	2DC
Males (%)	32 (40%)	2 (2.5%)	1 (1.2%)	0 (0%)
Females (%)	41 (51%)	1 (1%)	1 (1.2%)	2 (2.5%)
Total (%)	73 (91.2%)	3 (3.7%)	2 (2.5%)	2 (2.5%)

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