VISUAL OUTCOME OF CATARACT SURGERY IN A FIELD HOSPITAL OF SUB-SAHARAN AFRICA

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ABSTRACT

Objective: The aim of the study was to document the visual outcome of cataract surgery in the difficult setting of the field hospital and compare it with international standards.

Study Design: A quasi-experimental study.

Place and Duration of Study: Level II hospital United Nation mission, Sudan. Feb 2006 to Nov 2006

Materials and Methods: All the patients undergoing cataract surgery in our hospital were included in the study. The patients had complete general physical, systemic and ophthalmic examination before surgery. Most of the patients underwent phacoemulsification, or extra-capsular cataract extraction (ECCE) with posterior capsular intraocular lens (IOL) implantation. The patients were followed up after 1 day, 7 days, 6 weeks, and 3 months of surgery. The preoperative and postoperative visual acuity was compared.

Results: A total of 163 eyes in 145 patients were operated by one experienced Phaco surgeon and only those who completed 6 weeks follow up were included in the study (141 eyes in 136 patients). The average age of the patients at operation was 57 years (age ranged from 10-78 years). There were 88 (64.71%) females and 48 (35.29%) males. Most of the patients had senile cataracts. The majority of the patients had marked improvement in the vision at six weeks follow up. Preoperatively 112 of eyes (79.43%) had poor vision (best corrected acuity <3/60) compared to only 2 (1.41%) eyes postoperatively. A corrected vision of 6/18 or better was achieved in 124 (87.94%) eyes. An uncorrected vision of 6/18 or better was obtained in 102 eyes (72.34%) at their last follow up visit. Six patients (4.2%) had a poor visual outcome (best corrected vision less than 6/60).

Conclusion: Cataract extraction with IOL implantation gives good visual results even in the field hospital settings provided it is performed by experienced surgeon with good team support.

Keywords: Cataract surgery, field Surgery, Phacoemulsification.

INTRODUCTION

Despite global initiative for the elimination of cataracts, it is still the leading cause of blindness. The average prevalence of blindness is about 0.7% in the world, ranging from 0.3% in Western Europe and North America, to more than 1% in parts of sub-Saharan Africa; approximately half of all blindness is caused by cataract[1]. The cataract surgery rate in most African countries is 100-500 per million per year[2]. Most of the cataract surgery done in Africa is ICCE without IOL implantation and the resultant uncorrected aphakia is adding to the visually disabled patients[3]; this is also true for parts of India[4,5]. The IOL implantation has improved the visual outcome not only in the industrialized countries but also in some developing countries[6-8]. We did phacoemulsification or ECCE with IOL implantation in most of our cases and aim of the study was to see if we could achieve postoperative visual acuity as good as achieved in the industrialized countries.

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PATIENTS AND METHODS

The patients with cataract were selected from 11 medical/ eye camps arranged by the Pakistan Armed Forces Contingent in collaboration with the Blue Nile State Blind Association, Sudan between Feb 2006 to Nov 2006. The patients were further examined in level II hospital of Pakistan Armed Forces Contingent. A detailed ophthalmic examination (including visual acuity, pupillary examination, slit lamp biomicroscopy, and applanation tonometery) was carried out. The hardness of cataract was documented. Biometry was carried out for the estimation of lens power using the SRK-T formula. The aim was to make the patients emetropic after IOL implantation. A

detailed medical examination by the medical specialist was also done to rule out serious systemic diseases. Routine laboratory test included urine Routine Examination, blood Complete Picture, and screening for HIV, Hepatitis B, and C viruses.

All the operations were carried out under peribulbar anaesthesia except in children where general anaesthesia was given. The skin was cleaned with 10% povidone iodine solution and the eye was irrigated with 5% povidone iodine solution immediately before surgery.

Phacoemulsification was done in grade 1-4 and extracapsular cataract extraction in grade 5-6 nuclear sclerosis cataracts. Phacoemulsification was done through a 3.2mm clear corneal incision placed at 10 o'clock just inside the limbus. A paracentesis was made at 2 o' clock for the second instrument. The continuous curvilinear capsulorhexis (CCC) was done after filling the anterior chamber with viscoelastic (Hydroxpropyl methylcellulose/ HPMC). Hydrodissection was done to ensure free rotation of the nucleus. Phacoemulsification surgery proceeded in the usual way, using a 'divide and conquer' technique. The phaco parameters used were 30 to 70% phaco power (depending on the hardness of the nucleus), 60-80mmHg vacuum during trenching and 150-250mmHg during emulsification. The aspiration rate was 20 ml/min and the bottle height at 90 cm throughout the procedure. The cortical matter was removed by manual irrigation and aspiration using Simcoe cannula.

The patients with hard nuclei had extracapsular cataract extraction, where a one-stepped clear corneal incision was made just inside the limbus from 2 o' clock to 10 o'clock. The nucleus was expressed after can opener capsulotomy. The cortical matter was removed by manual irrigation and aspiration with Simcoe cannula. The incision was closed with 5 interrupted 10/0 nylon sutures after IOL implantation. The intraocular lens was placed in the bag or sulcus depending on the amount of capsular support available intraoperatively. In cases, where there was small tear in the posterior capsule without vitreous loss, anterior vitrectomy was not done. Bimanual automated anterior vitrectomy was performed in cases with posterior capsule rupture and vitreous loss. In cases where there was no capsular support, primary A.C. IOL was not implanted because of non-availability of the A.C. IOL. The eye was padded after instillation of antibiotic-steroid eye ointment at the end of procedure.

The patients were seen next morning. Postoperatively, steroid–antibiotic combination eye drops were used for first two weeks, only steroids were given in tapering doses for the next 1-3 weeks depending on the anterior chamber activity. Follow-up was done after 1 week, 6 weeks and 3 months. The patients were refracted 6 weeks after surgery and corrected visual acuity recorded.

Statistical analysis was done using SPSS version 14 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to describe the data. The McNemar test was used for comparison of preoperative and postoperative vision. P-value <0.05 was considered statistically significant.

RESULTS

A total of 141 eyes in 136 patients who completed at least six weeks follow-up were included in the study. The average age of the patients at operation was 57 years (SD 9.1). There were 88 (64.7%) females and 48 (35.3%) males. Most of the patients had senile cataracts (Table 1). The postoperative follow up was attended for 6 weeks in 141 eyes (100%), 3 months in 38 (27%) eyes and 6 months in only 13 eyes (9.2%). None were followed for more than six months because of the end of our one year tenure in Sudan. Only 22 surgeries were performed in the first 4 months compared to 119 in the last 4 months (60 in the last month only). This was due to build-up of confidence in the local population about the success of cataract surgery in our hospital.

Surgery

Phacoemulsification was performed in 61 (43.26%), eyes ECCE in 77 (54.61%) eyes, ICCE in 3 (2.12%) eyes with sublaxated lens or hypermature cataract with gross zonular dehiscence. The single piece PMMA IOLs were inserted in 136 (96.45%) eyes (in the bag in 131

eyes and in the sulcus in 5 eyes). The posterior capsule rupture occurred in 5 eyes (3.55%). Vitreous prolapse was managed by anterior vitrectomy followed by in the sulcus IOL implantation in 3 (2.12%) of these cases. The patients who had ICCE (3 eyes) or if the capsular support was inadequate (2 eyes), did not have any IOL implant because of non availability of the Anterior Chamber (AC) IOL which resulted in aphakia (5 eyes).

Visual Results

The majority of the patients had marked improvement in the vision as shown in the table 2, which shows the preoperative and postoperative vision (uncorrected and corrected) in 141 eyes who completed 6 weeks' follow up. Preoperatively 112 (79.43%) eyes had poor vision (best corrected acuity <3/60) compared to only 2 (1.42%) of eyes postoperatively and a corrected vision of 6/18 or better was achieved in 124 (87.94%) eyes (p-value <0.001). An uncorrected vision of 6/18 or better was obtained in 102 (72.34%) eyes at their last follow up visit. Six (4.26%) patients had a poor visual outcome (best corrected vision less than 6/60). The causes of poor vision are given in Table 3. The mean postoperative spherical error in these patients was 1.18D. The postoperative astigmatism of> 2D was more common in ECCE (33%) than in Phacoemulsification eyes (11%). Two eyes in the ECCE eyes had >4D with the rule astigmatism which improved after selective stitch removal.

Intraoperative and Postoperative Complications

The posterior capsular tear was the most common intraoperative and striate keratopathy was most common postoperative complication (Table 4). One patient had iris prolapse on first postoperative day which was reposed and additional corneal stitch was placed. There was no case of cystoid macular oedema or endophthalmitis or visually significant posterior capsule opacity.

Table 1: Types of cataract (n=141)

Aetiology	No. of eyes	Percentage of total
Senile Cataract	133	94.33%
Congenital cataract	4	2.84%
Traumatic cataract	1	0.71%
Complicated Cataract	3	2.13%

Table 2: Preoperative and Postoperative corrected visual acuity (n=141)

Visual acuity	Pre-operative No. of eyes (%)	Post-operative visual acuity (at sixth week), No. of eyes (%)
<3/60	112 (79.43%)	2 (1.42%)
3/60-6/60	24 (17.02%)	4 (2.84%)
6/60-6/18	5 (3.55%)	11 (7.80%)
6/18-6/6	0	124 (87.94%)

Table 3: Causes of poor visual outcome (n=141)

Cause of poor vision	No. of eyes
Age related macular degenerations	2 (1.42%)
Corneal opacities	1 (0.71%)
Diabetic retinopathy	2 (1.42%)
Hypermetropic amblyopia	1 (0.71%)
Total	6 (4.26%)

Table 4: Description of complications

Complications	No. of eyes (% of total eyes)
Intraoperative complications	
Posterior capsule rupture	**4(2.84%)**
Capsular aspiration	1 (0.71%)
Corneal burn (Phaco burn)	2 (1.42%)
Postoperative Complications	
Striate Keratopathy	8 (5.67%)
Iritis	5 (3.55%)
Hyphema	1 (0.71%)
Iris prolapse	1 (0.71%)
Transient Glaucoma	4 (2.84%)

DISCUSSION

In 1994, the World Health Organisation estimated that there were 38 million blind people in the world increasing by a million every year[1]. Precise figures for the incidence of cataract blindness in Africa are not available, but it is estimated that at least 600,000 Africans become blind from cataract each year[2]. The cataract surgery rate (CSR) is unfortunately low at 100-500 per million population per year in most of African countries compared to 2500-3500 in the industrialised countries[2]. To tackle cataract blindness, the World Health Organization, the International Agency for Prevention of Blindness, and various governmental and non-governmental

organisations, have launched "Vision 2020—the right to sight." This aims to increase the number of cataract operations from about 10 million per year currently to over 30 million per year by 2020 (in Africa to about 2000 per million per year)[2,3].

To achieve this ambitious goal, we must have a comprehensive strategy. First of all, we should know the reasons for the low CSR in Africa, and then address those limiting factors. The two known barriers are patient related like poverty, ignorance and patients' isolation and provider related like limited trained ophthalmologist, essential drugs and equipment[9-11]. The poverty is no doubt the main reason but ignorance also plays a big role. Most of the patients with bilateral cataracts we treated were blind for years believing that it is their fate and nothing can be done. Some of them were reluctant to undergo surgery fearing that this might add to their miseries rather than restoring their sight. This is due t the fact that most of the cataract surgeries in Africa are in free eye camps where the visual outcome is not very promising And the uncorrected aphakia after ICCE adds to the visually handicapped list[4-6]. The use of IOL although associated with increased cost, results not only in good visual outcome but also earlier intervention and increase in number of cataract operations[7,8]. The patient come for surgery in greater number and with greater confidence. This is evident in our study: only 20 patients came for surgery in first 4 months compared to 121 in the last 4 months. This is due to the fact that every satisfied patient adds to the good reputation of the surgeon and brings more patients for surgery. In industrialised countries, a population based survey of people aged over 40 in Australia showed that 89% of eyes operated for cataract achieved a corrected vision of 6/18 or better,[12] and in the UK National Cataract Survey 87% of operated eyes achieved 6/12 or better at final refraction[13]. In only one study from Kenya, 94.3% of the patients achieved corrected vision of 6/18 or better after ECCE and PC-IOL.[14] This study demonstrate that good outcomes can be obtained in the settings of developing countries if done by experienced surgeon with IOL were implanted. This is also evident from our study where 88% patients achieved corrected visual acuity of 6/18 or better in a field hospital setting.

The unaided vision of 6/18 or better was achieved in 75% of phacoemulsification patients and only 39% of ECCE patients due to less amount of surgery related astigmatism (2.0D with the rule astigmatism at 6 weeks). This is comparable to study in the United Kingdom.[15] The follow up was more than three quarter of the patients after 6 weeks and one third after 3 months which is higher than that reported in Africa.[16] The aim of Pakistan medical team was to alleviate the sufferings of the war-torn people of Sudan, and the eye surgery was one of the tools to achieve that goal. The Blue Nile state has population of half a million and we could perform 141 cataract operations in less than ten months which is higher cataract surgery rate than in most African countries.

CONCLUSION

The visual out come is good even in the setting of a field hospital if you have trained and experienced team and IOL is used in all the patients. The only way to bring the CSR to desired 2000 surgeries per million in Africa (as envisaged in Vision 2020) is to establish permanent eye hospital with trained staff, necessary equipment like operating microscope, phacoemulsification machine and biometer and provision of IOL for all patients.

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