AN AUDIT OF THE CATARACT SURGICAL OUTREACH PROGRAMME IN LITEIN IN 2008

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE DEGREE OF MASTER OF MEDICINE IN OPHTHALMOLOGY, UNIVERSITY OF NAIROBI.

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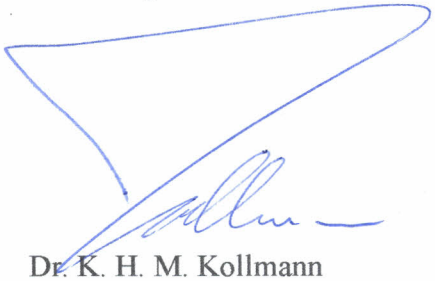

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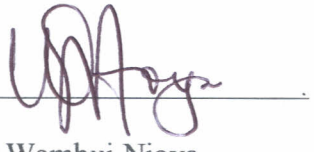
THIS DISSERTATION IS MY ORIGINAL WORK AND HAS NOT BEEN PRESENTED FOR A DEGREE AT ANY OTHER UNIVERSITY

Signed: 

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AKNOWLEDGEMENT

This study has been made possible with the assistance of a number of people to whom I would like to express my sincere gratitude.

I am indebted to my supervisors, Dr. M. M. Kariuki and Dr. K. H. M. Kollmann, for their continued guidance, suggestions and encouragement throughout the study period.

I would also like to express my gratitude to Dr. Yusufali for his assistance during data collection and reviewing the results.

I also wish to appreciate the contribution of AIC Litein Hospital eye unit staff members for the assistance they afforded me.

Finally, I owe special thanks to my family for their morale support and prayers.

May God bless you all.

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ABBREVIATIONS

AC	Anterior Chamber
BCVA	Best corrected visual acuity
BJO	British Journal of Ophthalmology
CSR	Cataract Surgery Rate
ECCE	Extra capsular Cataract Extraction
ICCE	Intra capsular Cataract Extraction
IOL	Intraocular Lens
KNH	Kenyatta National Hospital
MSICS	Manual Small Incision Cataract Surgery
PC	Posterior Chamber
Phaco	Phacoemulsification
Post Op	Post Operative
Pre Op	Pre Operative
SICS	Small Incision Cataract Surgery
UCVA	Uncorrected visual acuity
UON	University Of Nairobi
VA	Visual Acuity
WHO	World Health Organization

ABSTRACT

Objective: To evaluate the outcome of cataract surgical services offered by the University of Nairobi outreach programme in AIC Litein Hospital.

Methodology: Retrospective hospital-based survey of the records of all patients who underwent cataract surgery in AIC Litein Hospital in 2008. Questionnaires were filled from patients' records and the data was analysed using SPSS 17.0.

Results: There were seven outreach visits in 2008 with an average of 33 surgeries carried out during each visit. There was a high rate of loss of patients to follow up which limited the analysis. Post operative visual acuity did not meet WHO standards as more than 5% of the cases had visual acuity worse than 6/60. The commonest intra-operative complication was posterior capsule tear with vitreous loss (14%). The commonest early post-operative complication was corneal oedema and the commonest late complication was posterior capsular opacity. The leading cause of poor outcome was refractive error.

Conclusions: Poor patient follow up may have contributed to the apparent poor outcome as it is likely that only the patients with problems came back for review. Patient follow up could be improved by visiting the patients in their homes and accurately recording their post-operative examination. The surgeries were associated with a high rate of intra-operative complications and the post-operative visual outcome did not meet WHO standards. The outcome could be improved by availability of accurate biometry and a wide range of intraocular lenses.

INTRODUCTION

A cataract is defined by the WHO as a clouding of the lens of the eye, which impedes the passage of light. A cataract may develop after an injury, inflammation, disease or may be age related. Although many advances have been made in the identification of risk factors for cataract, there is as yet no proven primary or medical treatment for cataract. Surgical removal of the cataract remains the only effective treatment available to restore or maintain vision.

Globally, the estimated number of people with visual impairment is in excess of 161 million with 37 million being categorized as blind and 124 million having low vision. The leading cause of blindness is cataract being responsible for at least 17.6 of the 37 million cases of blindness in the world. Surveys from Central African Republic, Congo, Ethiopia, Kenya, South Africa and Tanzania revealed that the prevalence of blindness is about 1% and low vision is 3% with cataracts accounting for 55%[1]. The global target is to ultimately reduce blindness prevalence to less than 0.5 % in all countries, or less than 1 % in any country.

The main issues in the treatment of cataract blindness are the availability, accessibility, acceptability and affordability of surgery. The objectives of elimination of cataract blindness are to provide cataract surgical services which have a high success rate in terms of visual outcome and improved quality of life, are affordable for all people, accessible to rural as well as urban populations and cater for more than the number of new cases per year to eliminate the backlog of cataract over a number of years.

WHO guidelines for reasonable quality of visual outcome after cataract surgery state that 80% of patients should have presenting visual acuity of 6/18 or better, and including pre-existing pathology, less than 5% should have presenting visual acuity of < 6/60.

A study on the output and visual outcome of cataract surgery done in 1998 by Rumbogoya et al[2] in AIC Litein Hospital revealed that, using a limbal based ECCE/PC IOL technique, a total of 309 surgeries were performed and at the fourth week post-op, 3.7% of the patients had VA less than 6/60. After this study, the Department of Ophthalmology (UON) revised the outreach setting by changing to SICS technique, having two consultants going for outreach for better supervision of trainees, improving wet lab training, improving availability of consumables and training of local staff for better post op care.

BACKGROUND

Outreach is defined as the provision of a specialized service to a location outside the base unit. Generally, outreach surgical programmes were established to make eye care available to people in need that live far from eye care professionals. Such communities tend to be isolated, have poor infrastructure and a low density population. Primary eye care workers are used to find and assess people in need then organize for a surgical team to come to them. Screening is built into the permanent primary health care delivery systems thus enhancing the comprehensive Community Based Rehabilitation (CBR) programmes[3]. Globally, there has been a decline of surgical outreach camps due to a high proportion of poor visual outcomes, limited follow up and refraction services available to patients.

Coverage of cataract surgery in low-income countries remains low. Among the barriers to cataract surgery is the lack of eye surgeons and distance from medical facilities. Data from India and Africa suggest that the current level of service delivery is well below the incidence of new cases of cataract causing visual impairment and, hence, the backlog of cataract blindness and impairment continues to grow.[4]

The number of cataract operations performed per 100 000 population per year is known as the cataract surgery rate (CSR). It serves as an indicator of the efforts made by any community towards alleviating cataract blindness. Targets for the CSR in order to eliminate avoidable blindness by the year 2020 vary globally from 2000–5000. Currently, the CSR in most sub-Saharan countries remains less than 500. Kenya's CSR is estimated by WHO to range from 500 to 999.

The UON Department of Ophthalmology is a WHO regional training centre that trains students from Eastern, Southern, Central and Western Africa. At undergraduate level, the students are taught basic anatomy, physiology and clinical ophthalmology.

Postgraduate training builds up on the basic sciences and clinical ophthalmology while teaching surgical skills under supervision. Surgical training starts in the wet lab in the Department of Ophthalmology where the trainees get their first exposure to instruments and surgical techniques. Surgical technique is learnt at the base unit in KNH and is enhanced through elective term training in high volume cataract centres and regular outreach programmes at various peripheral centres such as AIC Litein Hospital.

The setting of the outreach programme in Litein involves screening of patients by ophthalmic nurses. The patients are screened in the surrounding villages and are advised to visit the hospital for further evaluation and for cataract surgery during the monthly UON outreach visits.

During the UON outreach visit, visual acuity is measured using a tumbling E chart at 6m. History taking is done to determine the likely cause of the cataract, duration of visual impairment and the presence of ocular co-morbidity and systemic illnesses. Blood pressure readings are taken for all patients and random blood sugar is measured in the known diabetics. Intraocular pressure is determined using a schoitz tonometer. Anterior and posterior segment evaluation of the eye is done using a slit lamp. There is no ocular ultrasound available to evaluate the posterior segment in eyes where the cataract is too dense to see through.

The cataract surgeries are carried out in the eye unit's operating theatre. Para-bulbar local anaesthetic is administered in the waiting room using an aseptic technique. The patients are then guided to the operating room where cataract surgery is done. The surgeries entail the formation of a fornix-based conjunctival flap, 7mm long scleral tunnel, nuclear extraction after anterior capsulotomy cortex aspiration using irrigation-aspiration cannula and placement of a PC IOL. Standard IOL power of 22D is used as biometry is unavailable. Any complications that arise are noted in the operation notes.

Patient evaluation on the first postoperative day includes visual acuity assessment and evaluation the anterior segment. If the visual acuity is noted to be worse than 6/60, the patient's posterior segment is thoroughly examined to determine the cause of the poor outcome. Any early post-operative complications are noted in the patient's records. The patients are discharged home on topical steroid and antibiotic drops and are given appointments to be seen in the eye unit one week later. Patients are seen at 1, 4 and 12 weeks post-operatively and more frequent visits are advised if necessary. During the post-operative visits, the patients' visual acuity is noted and the cause of visual acuity less than 6/60 is sought. Refraction is done after six weeks.

EVOLUTION OF CATARACT SURGERY

Just like any other form of surgery, cataract extraction has undergone many changes over the decades. Cataract surgery began around 800 BC, when couching was the procedure of choice. This was the "surgical" displacement of the cataractous lens into the vitreous cavity using a needle.

In the 19th century, Albrecht von Graefe's linear extraction was the major new development where the incision was made through the sclera in the largest possible circle around the globe. In the 1950s, ophthalmologists were performing ECCE through a 180° corneal section under topical anaesthesia (cocaine drops).In 1949, Sir Harold Ridley introduced the IOL.

From the 1950s to the 1980s, ICCE became the dominant cataract extraction technique. In the 1960s, Dr. Charles Kelman developed and later perfected phacoemulsification where ultrasound energy is used to fragment the nucleus so that it can be removed through small (3mm) incisions. Phaco is the most popular technique for cataract surgery in the Western world. However, phaco in developing countries is only performed on a select few who can afford the high costs. There are disadvantages of phaco including being a relatively difficult technique with a long learning curve, expensive, high maintenance equipment and disposables required, the unavailability of foldable IOLs especially in developing countries, in addition to the harmful effect of the ultrasound waves on the sensitive corneal endothelium especially in old age and hard cataracts in which phaco is not preferred.

During the early 1980s, a self-sealing tunnel incision was introduced in an attempt to provide better healing with less surgically induced astigmatism. In 1990s, this technique was revitalized in developing countries and the sutureless incision was developed. The corneal entry was described as a one-way valve or corneal lip incision, which enabled the incision to self-seal.

Developing countries have adopted alternatives which provide immediate good uncorrected visual acuity and are affordable. Different names have been used for the technique whereby the nucleus is removed whole or in parts through a small self-sealing tunnel that does not always require sutures, for example, Small Incision Cataract Surgery (SICS), Manual SICS, Manual Phaco and Sutureless ECCE/PC IOL.

The main objective in modern cataract surgery is to achieve a better unaided visual acuity with rapid post surgical recovery and minimal surgery-related complications. Early visual rehabilitation and better unaided vision can be achieved by reducing the incision size, using a scleral tunnel and an anterior chamber maintainer. Other aims include improved quality of life and ensuring patient safety and satisfaction.[5] Adapting newer technologies may give higher productivity, reduce costs & improve outcome quality.

LITERATURE REVIEW

Various audits have been done in Kenya looking into the outcome of cataract surgery. One showed that 1.5% of eyes had BCVA of less than 6/60 postoperatively.[6] One done in Kericho, Bureti and Bomet districts revealed 31.5% with poor outcome.[7] A survey in Embu showed 37.3% had poor outcome[8]. An audit done in a private hospital in Nairobi revealed 5.2% poor outcome.[9]

Attempts have also been made in other countries to develop monitoring systems for cataract outcome. In Malawi, country-wide monitoring of cataract surgery outcome revealed 19.5% poor visual outcomes at the time of discharge.[10] A rapid assessment of cataract surgical services done in Pakistan revealed that 43.1% had poor outcome.[11]

A study done looking at the outcomes of high volume cataract surgeries in a developing country showed that high quality surgery can be attained but this is depends on the choice of surgical technique, standardized protocols, standardized training of surgeons and paramedical personnel, and an overall organizational structure that supports high volume patient flow.[12]

Studies looking at the complication rates in various types of incisions have shown that clear corneal incisions are a statistically significant risk factor for acute post-cataract surgery endophthalmitis when compared with scleral tunnel incisions. [13, 14]

Studies comparing the efficacy and efficiency of ECCE and MSICS found that MSICS is more effective and economical than ECCE and almost as effective as and more economical than phaco. It is also easier for a surgeon trained in ECCE surgery to master MSICS than phaco.[15, 16, 17, and 18]

One of the pillars of VISION 2020 is human resource development and it aims to achieve a minimum ratio of at least one ophthalmologist per 250,000 population. The number of ophthalmologists varies greatly from one region of the world to another. In Kenya, it is estimated to be 1 per 650,000 and in Ethiopia, 1 per 2.6 million .The lack of trained manpower in Africa is, therefore, an important reason for low cataract surgical rates, and because of this, some countries have taken the initiative of training medical assistants or ophthalmic nurses to be cataract surgeons.

Surgeons in training have been shown to have a higher rate of complications than experienced surgeons especially vitreous loss.[19, 20, 21] The rate of post-op endophthalmitis in resident-performed surgery has been found to be comparable to the reported rates of more experienced surgeons.[22]

It has been shown that patient co-morbidities may also contribute to poor outcome of surgery [23] so it would be important to identify such risk factors pre-op. Thus selection procedures may be modified but patients should not be denied surgery if their vision has a fair chance of improvement after the surgery.

More recent studies have shown that the prevalence of cataract related blindness may be on the rise due to cataract-surgery-related complications which may convert some of the "curable blind" into "incurable blind". [24, 25] It is therefore important to monitor outcome (quality) as well as numbers (quantity).

RATIONALE

Cataract surgical services need to be monitored to determine both the quality and quantity of work done. The indicators that are used are the number and outcome of surgeries that are done. The objective of performing cataract surgery is to restore visual function at the organ level and also to restore functioning and independence at the personal level.

Monitoring enables programme managers to determine their contribution towards the reduction of blindness. Periodical analysis measures the trend towards achieving successful visual outcomes and indicates the areas that need improvement.

It has also been shown that monitoring of outcomes is associated with a change in surgeons' attitudes, leading to greater emphasis on appropriate case selection, better management of surgical complications, and improved visual outcomes.[26]

Poor outcomes have been recorded in other settings in Kenya[7, 8]. This audit will help evaluate the UON outreach programme as a means of offering services to the community in Litein. It will also help evaluate the effectiveness of the changes that have been implemented over the last 10 years.

AIMS AND OBJECTIVES

Aim: To evaluate the output and outcome of cataract surgical services offered by the UON outreach programme in AIC Litein Hospital

Objectives:

1. To determine the number of cataract surgeries done (monthly, overall) from 1st January 2008 to 31st December 2008

2. To determine the visual outcome of cataract surgeries

3. To determine frequency and types of complications arising from cataract surgery

METHODOLOGY

Study Area

Litein is the capital town of Buret district which is in the Rift Valley Province of Kenya. According to the 1999 census, Litein has a population of 83,441 with 2,628 people living in the urban area. It is estimated that 48% of these people live below the poverty line. The main source of income in the area is tea farming.

Litein Hospital is run by the African Inland Church and it is where the outreach programme is based.

Study Design: Retrospective hospital-based case series

Source Population: All patients who underwent cataract surgery in AIC Litein Hospital between 1st January 2008 and 31st December 2008.

Sample size: 236 case records were obtained in AIC Litein Hospital

Data collection tool: A questionnaire was used to record patient characteristics, pre- and post-op examination findings, surgery details and complications (Appendix 1). Good visual outcome was taken to be visual acuity that was 6/18 and better, poor visual outcome was taken as worse than 6/60 and borderline visual outcome was taken as worse than 6/18 to 6/60.

Data analysis: Collected data was summarized in graphs and tables then conclusions were made.

Study Limitations

This being a retrospective study, it was restricted by the availability and accuracy of the records included in the study.

Ethical considerations

Ethical approval was sought from the KNH/UON Ethics, Research and Standards Committee prior to the commencement of the study.

Permission was also obtained from AIC Litein Hospital to access patient records.

All patient records were handled confidentially.

RESULTS

Figure 1: PATIENT'S FOLLOW-UP

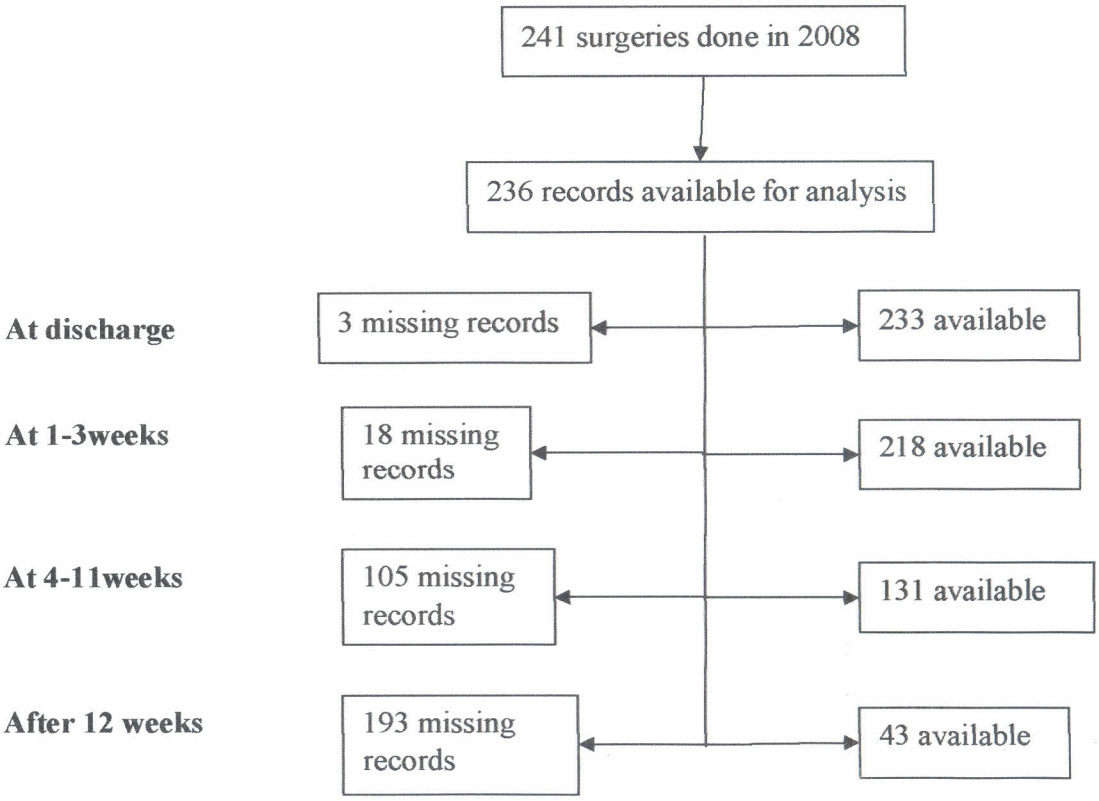


Table 1: Follow-up in weeks

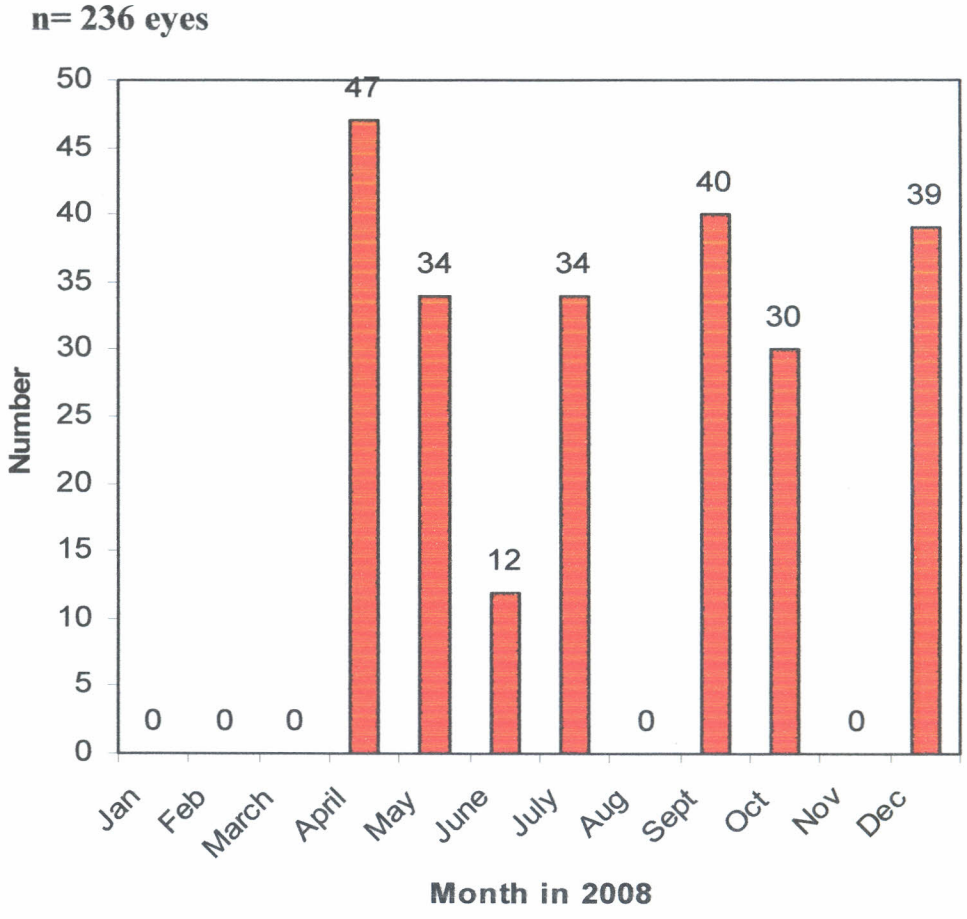
Mean	9.26
Median	3.57
Mode	1.14
Std. Deviation	16.15
Minimum	.00
Maximum	159.57

The range for the duration of follow up for the study population was 0-159 weeks.

The mean follow up duration was 9.26 weeks.

The mode of follow up was 1.14 weeks.

Figure 2: MONTHLY DISTRIBUTION OF CATARACT OPERATIONS IN LITEIN IN 2008

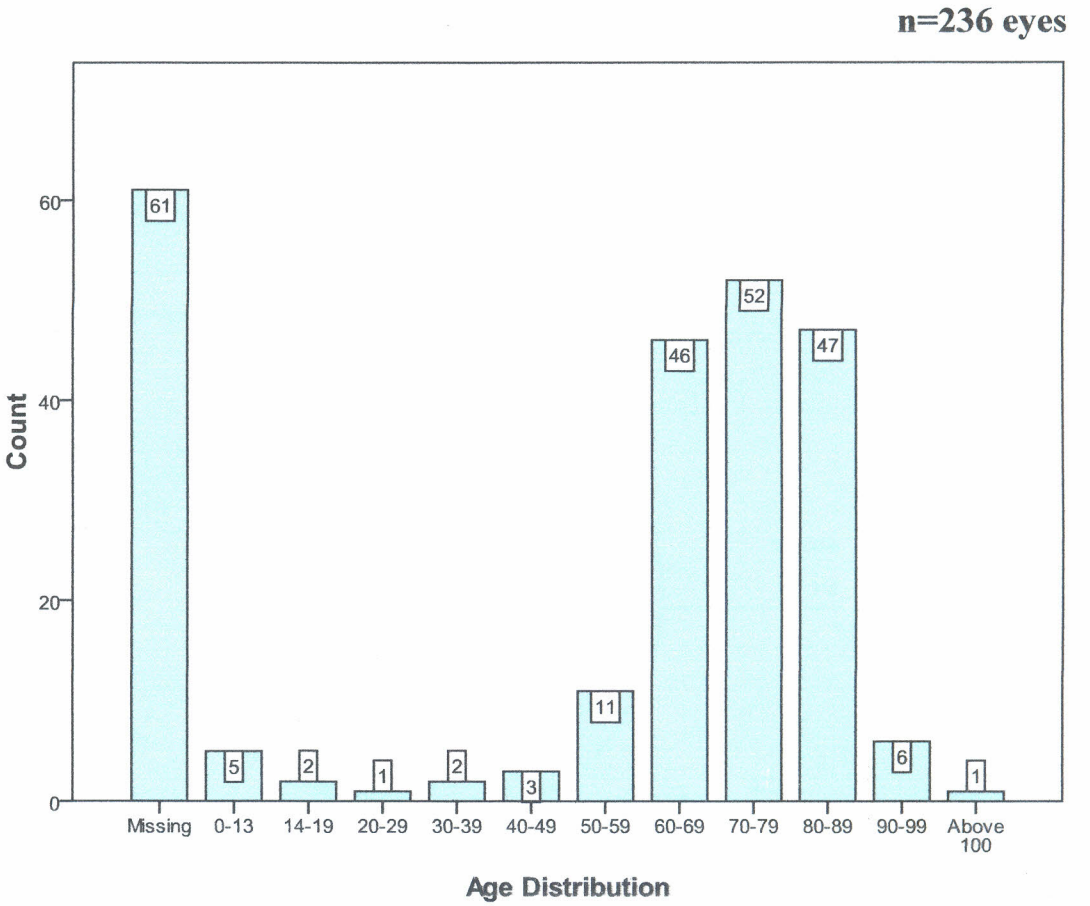


There were seven surgical outreach visits in 2008. There were no visits in January, February, March, August and November.

April had the highest number of surgeries done whereas June had the lowest.

The average number of surgeries per visit was 33.

Figure 3: AGE DISTRIBUTION IN 2008



The actual age was not recorded in 61 (25%) of the cases and was recorded as 'A' (presumably adult).

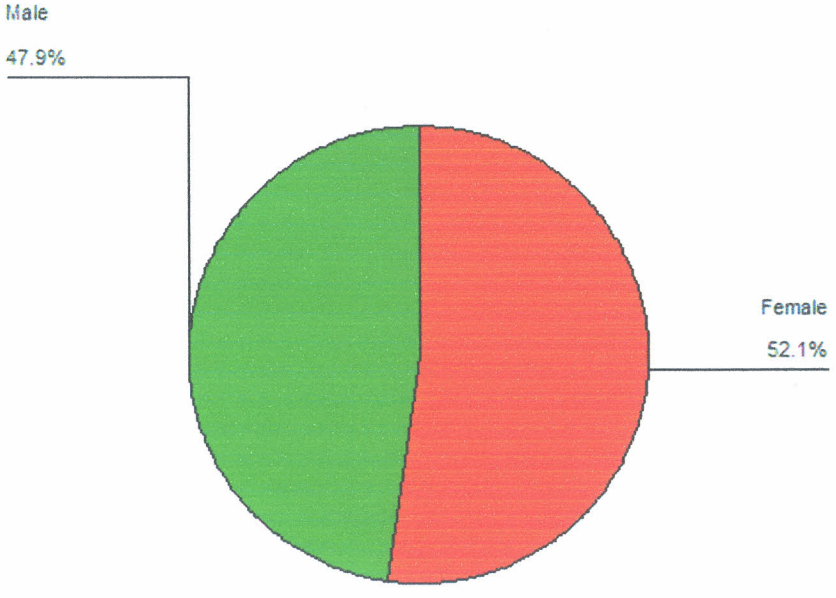
The mean age of the patients was 69.26 years.

The youngest was 7 years and the oldest was 100 years old.

The median age was 72 years and the mode age group was 70-79 years.

Figure 4: SEX DISTRIBUTION

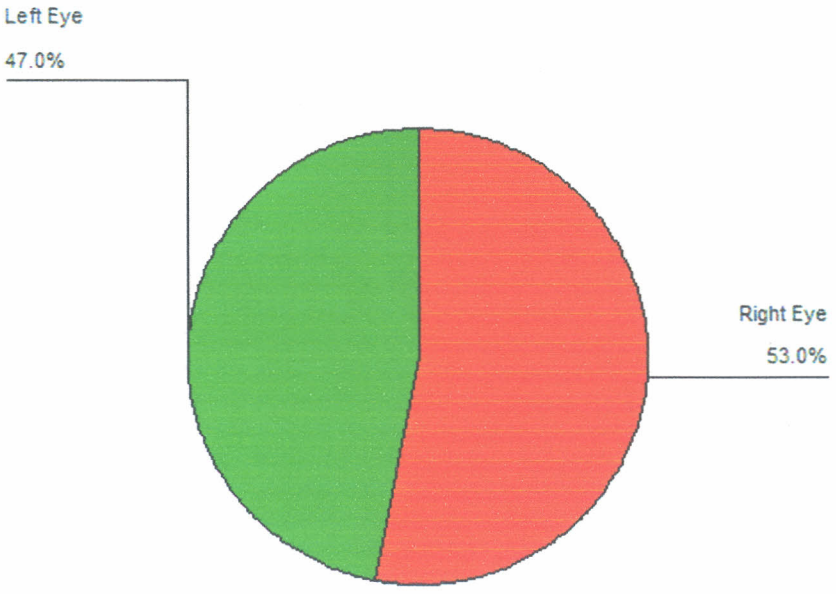
n=236 eyes



One hundred and twenty three (52.1%) of the cases were female and 113 (47.9%) were male.

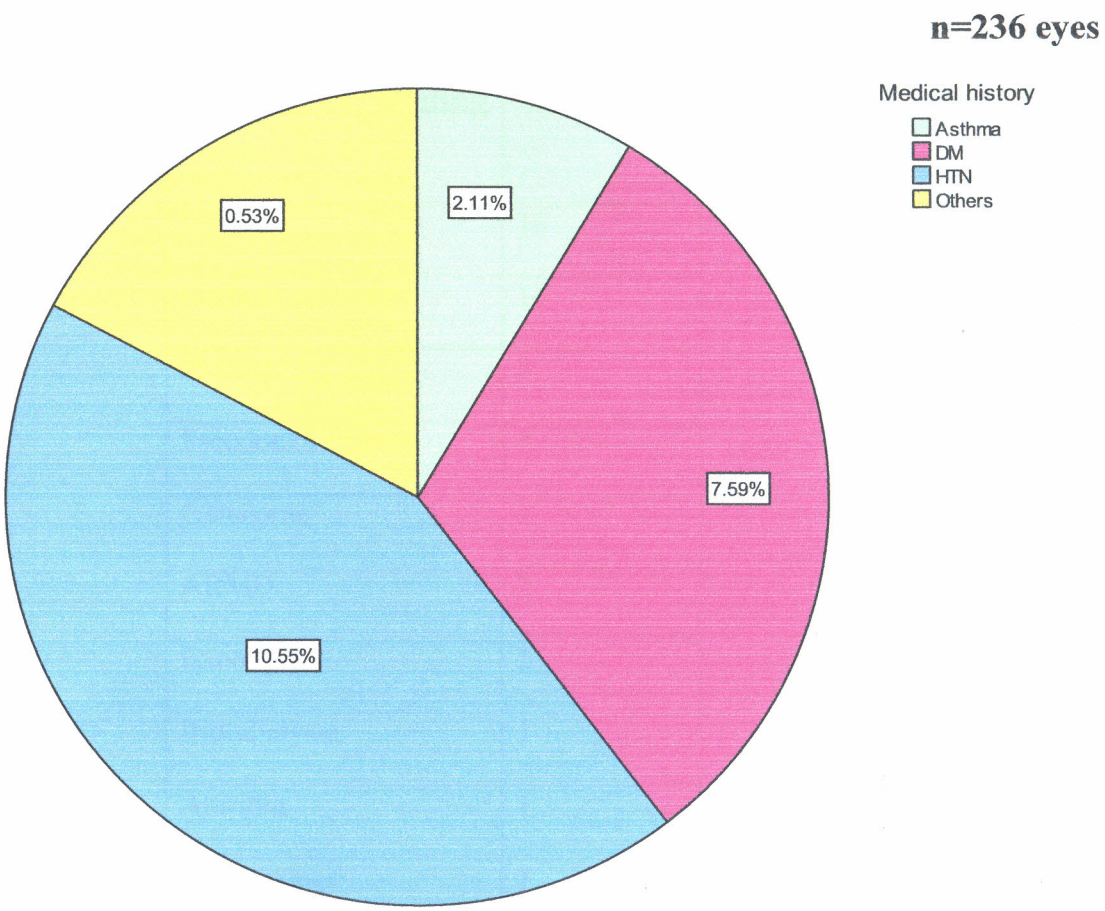
Figure 5: OPERATED EYE

n=236 eyes



One hundred and twenty five (53%) of the operations were carried out on the right eye while 111 (47%) were on the left eye.

Figure 6: MEDICAL CO-MORBIDITY



Seventy five per cent (179) of the cases did not have a medical co-morbidity.

Hypertension and diabetes mellitus were the commonest systemic diseases found in the study population.

Other co-morbidities included peptic ulcer disease, arthritis, goitre, carcinoma of the breast, anaemia and tuberculosis.

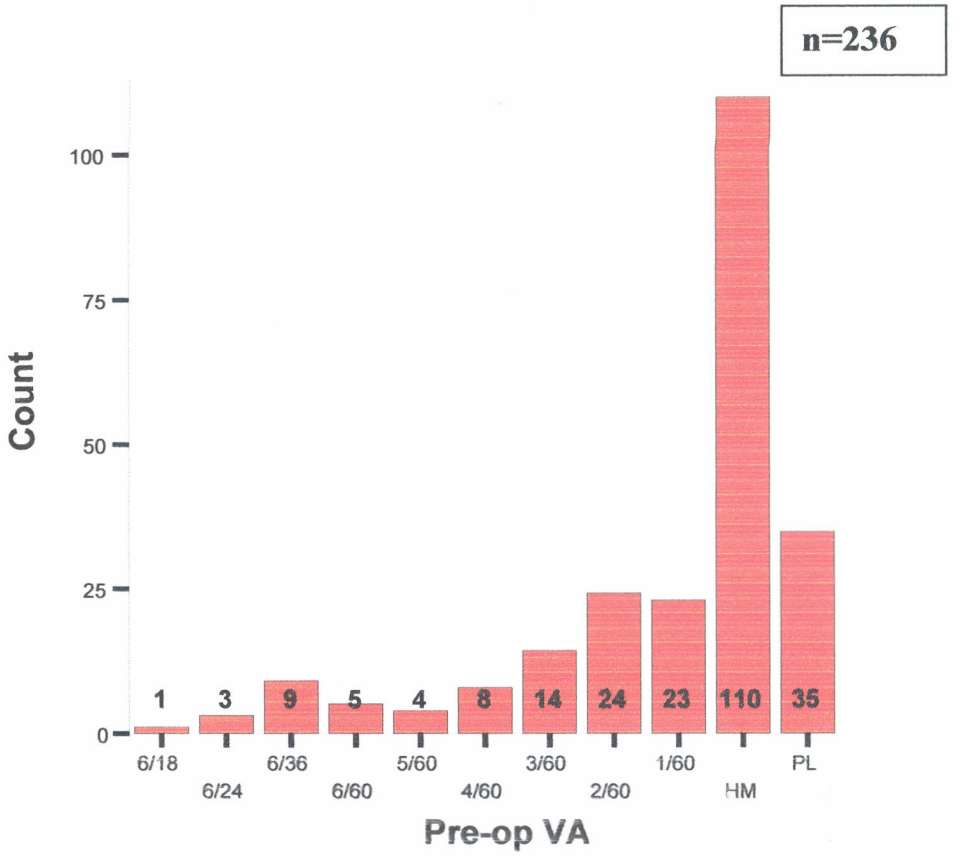
Table 2: OCULAR CO-MORBIDITY

Ocular finding	Number
Uveitis	16
Corncal scarring	14
Shallow AC	3
Pseudoexfoliation	2
Glaucoma	2
ARMD	2
Exotropia	1
Iridodialysis	1
Aniridia	1
Keratoconus	1
Chemical injury	1
Retinal detachment	1
None	191

Only 45 eyes were reported to have pre-existing ocular co-morbidity.

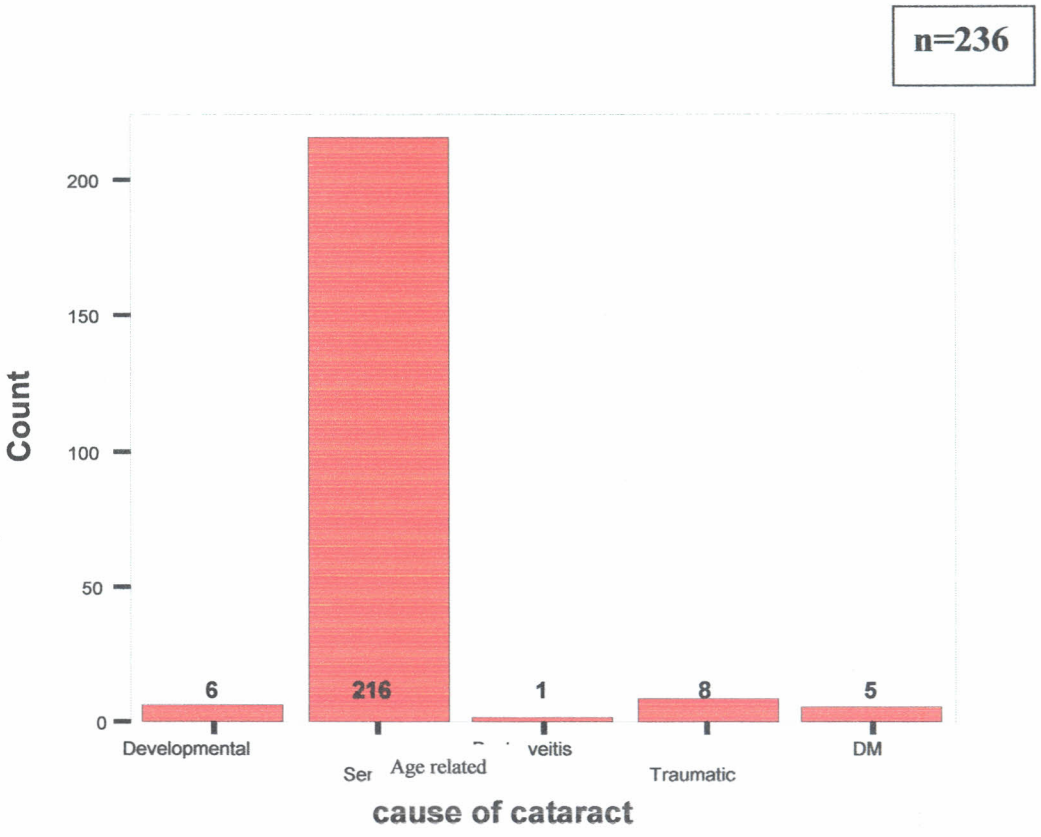
There were 16 (6.7%) eyes reported to have uveitis and 14 (5.9%) eyes had corneal scarring.

Figure 7: PRE-OPERATIVE PRESENTING VISUAL ACUITY



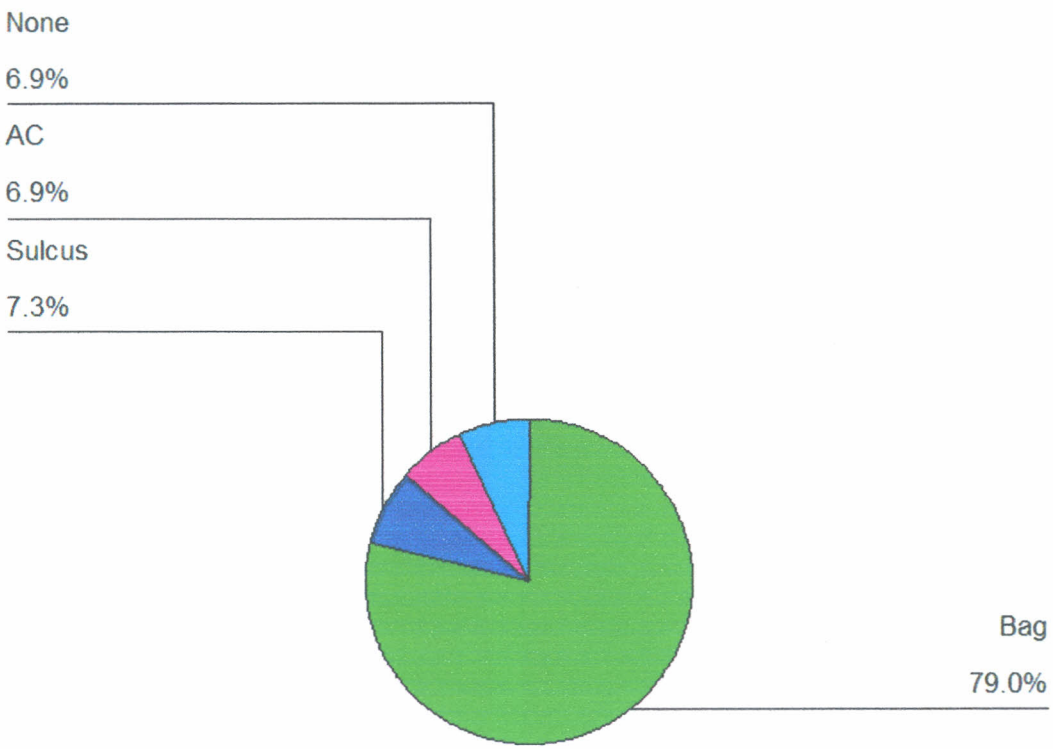
Two hundred and eighteen (92.3%) of the eyes had presenting VA between PL and 5/60 while 17 (7%) had presenting VA between 6/24 and 6/60. Only 1 eye (0.4%) had 6/18.

Figure 8: CATARACT TYPES



Two hundred and sixteen (91.5%) of the cataracts that were operated on were age-related.

Figure 9: IOL PLACEMENT

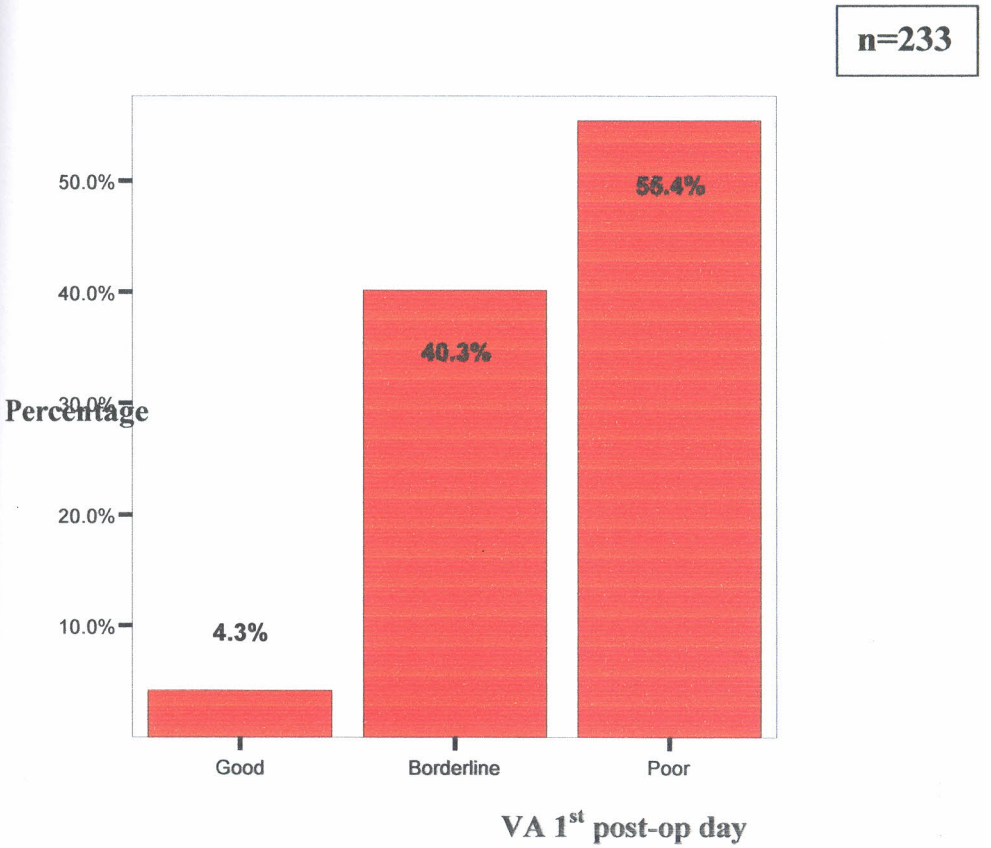


The records of 3 cases were insufficient.

One hundred and eighty four (79%) of the intraocular lenses were placed in the capsular bag.

Two hundred and twenty (93.1%) of the cases had IOLs inserted while 16 (6.9%) of the eyes were left aphakic.

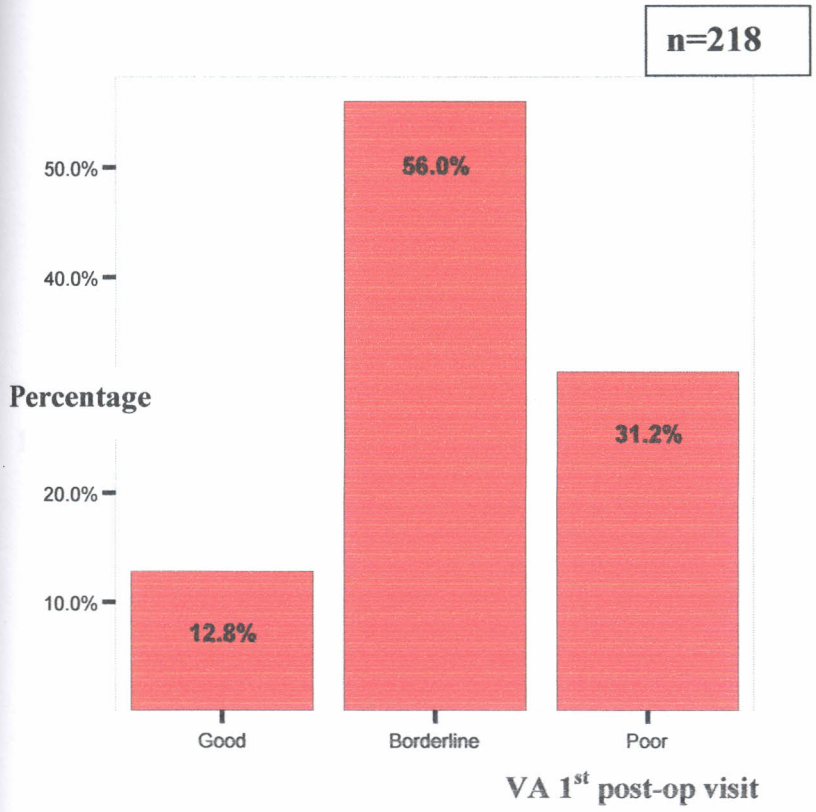
Figure 10: VISUAL ACUITY ON 1ST POST-OPERATIVE DAY



Three of the records did not have the visual acuity recorded.

Good outcome was found in 10 (4.3%) of the cases and poor outcome was found in 129 (55.4%).

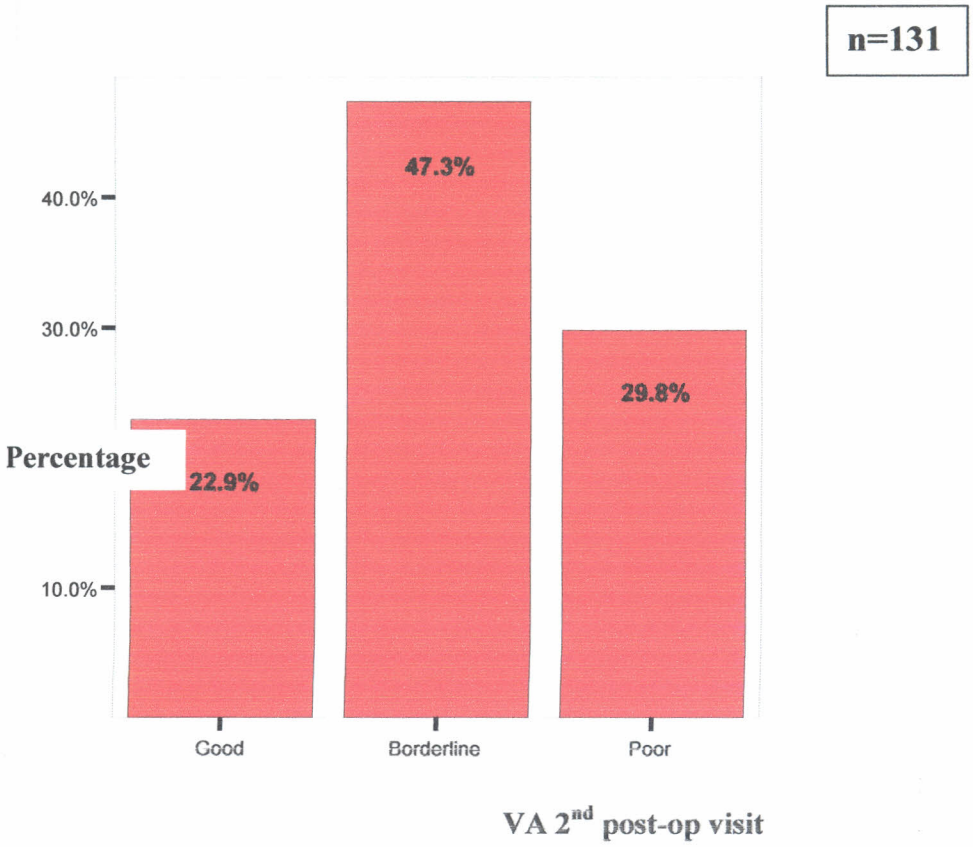
Figure 11: VISUAL ACUITY AT FIRST POSTOPERATIVE VISIT (1-3weeks)



Eighteen (8%) of the cases did not have any visual acuity recorded after being discharged.

Good outcome was recorded in 28 (13%) and poor outcome in 68 (31%) of the cases.

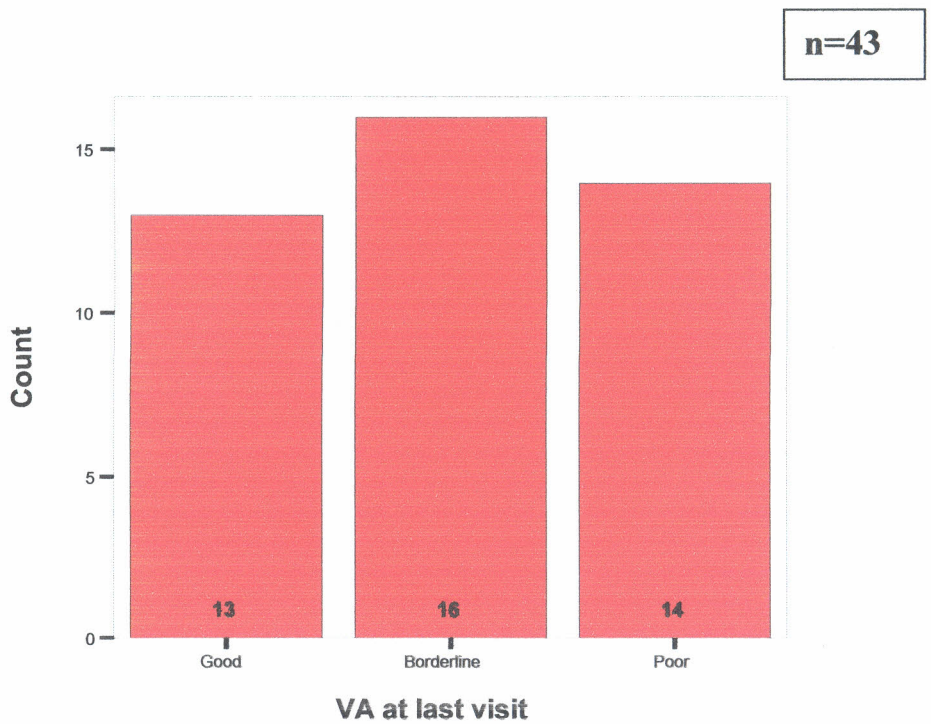
Figure 12: VISUAL ACUITY AT SECOND POSTOPERATIVE VISIT (4-11weeks)



One hundred and five (44%) of the cases did not have any visual acuity recorded at this visit.

Thirty (23%) had good outcome whereas 39 (30%) had poor outcome.

Figure 13: VISUAL ACUITY AT THE LAST VISIT (>12 WEEKS)

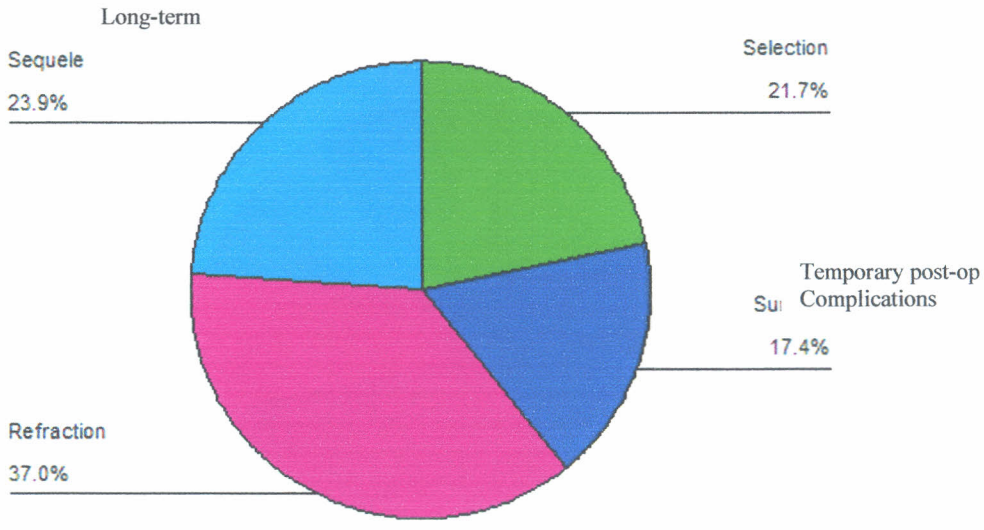


One hundred and ninety three (82%) of the cases did not have any visual acuity recorded at this visit.

Good outcome was recorded in 13 (30.2%) cases and poor outcome in 14 (32.6) cases.

Figure 14: CAUSES OF POOR VISUAL OUTCOME

n=45

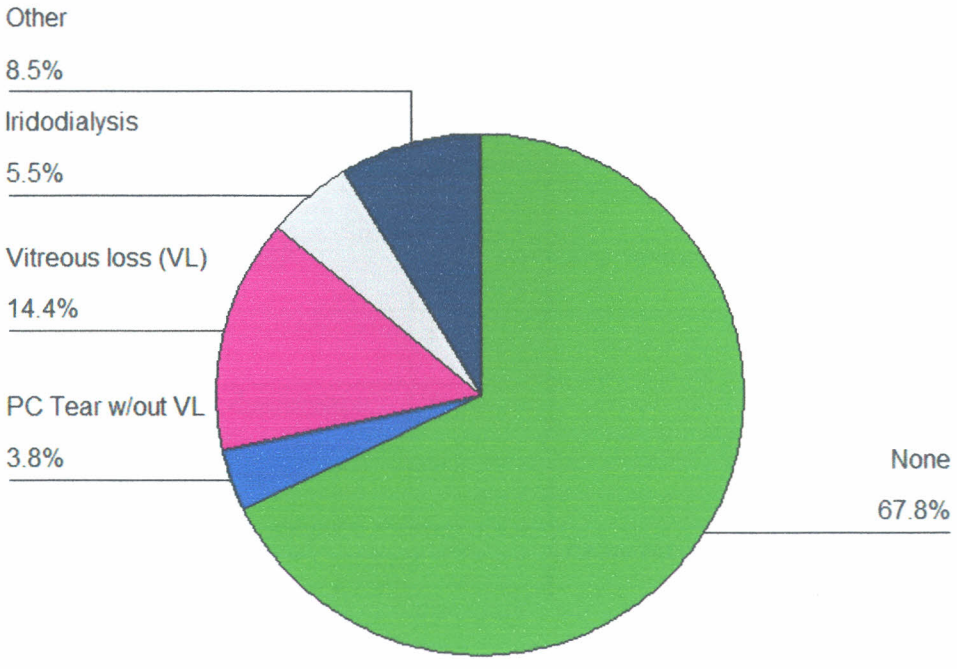


The commonest reported cause of poor outcome was refractive error.

Seven cases were reported to have developed bullous keratopathy and 12 developed posterior capsule opacification.

The commonest surgery-related cause was early post-operative corneal oedema.

Figure 15: INTRA-OPERATIVE COMPLICATIONS



Majority (67.8%) of the cases did not have any intra-operative complications.

Posterior capsule tear with vitreous loss accounted for 14.4% while posterior capsule tear without vitreous loss accounted for 3.8%.

Table 3: POST-OPERATIVE COMPLICATIONS

n=236

Early complications	Number	Late complications	Number
Corneal oedema	97	PCO	12
Shallow AC	1	Pupillary capture	7
Elevated IOP	1	IOL dislocation	3
Uveitis	1		
Wound dehiscence	1		
Hyphaema	1		
None recorded	134	None recorded	214

Corneal oedema was the commonest early post-operative complication.

Posterior capsule opacity was the commonest late post operative complication.

DISCUSSION

There were 241 cataract surgeries done in Litein in 2008. A similar audit was done in the same hospital 10 years ago (1998) and it was found that 324 cataract surgeries were done[2]. This apparent decline in surgical outcome may be due to the fact that fewer outreach trips took place in 2008 than had been scheduled as a result of inaccessibility of the region due to post-election skirmishes. Although there were 241 cataract operations performed in Litein in 2008, only 236 records were available for analysis.

There was poor post-operative follow up of patients as the mean duration of follow up was found to be 9 weeks. Only 233 records had details of the first post-operative day exmination findings, 218 at the first post-operative visit, 131 at second visit and 43 after 12 weeks. It is difficult to determine (from this study) why we have such poor post-operative follow up. The poor follow up might be due to the fact that most of the patients come from villages that are far from the hospital and thus decide or manage come back for follow up only if they have a problem. The patients may also go for follow up at other eye units that are closer to where they live. Some of the patients are also followed up by the ophthalmic nurses from Litein who go for outreach in the villages where some of the patients come from. During these visits, the nurses do not go with the patients' records so they cannot update their findings in the patients' records.

There were seven surgical outreach visits in 2008 with an average of 33 operations per visit. There were no visits in January, February and March due to inaccessibility of the region due to post-election violence. No outreach visits are carried out in August as this is the examination period in the university. In 1998, there were also seven visits but with an average of 44 cataract operations per visit.

The median age of the patients who underwent cataract surgery was 70 years and the mode age group was 70-79 years. This implies that most of the cataracts were age related. Record keeping of the patients' age was insufficient as 61 (25%) were recorded as 'A' (presumably adult) instead of the actual age being recorded. In 1998, the mean age was 62.8 years and the mode age group was 70-79 years[2].

In 2008, 123 (52.1%) of the cases were female and 113 (47.9%) were male. In 1998, there were 139 males and 63 females but 107 cases did not have the sex indicated[2]. The apparent increase in number of female patients may be due to improved knowledge on the services being offered and better record keeping.

In 2008, 125 (53%) of the operations were carried out on the right eye while 111 (47%) were on the left eye. Twenty six of the cases had the other/fellow eye already operated on for cataract.

Hypertension and diabetes mellitus were the commonest systemic diseases found in the study population. In 1998, diabetes mellitus (5.2%) and hypertension (3.2%) were also the commonest co-morbidities[2]. This is similar to the Auckland co-morbidity study where hypertension accounted for 46% of the co-morbidities and diabetes mellitus accounted for 20%[27]. Medical co-morbidities such as diabetes mellitus can be associated with poor visual outcome due to retinopathy and higher rate of complications[23].

Uveitis and corneal scarring were the commonest pre-existing ocular co-morbidities found in the eyes operated on. Such co-morbidities can lead to poor visualisation during cataract surgery and are also associated with higher complication rates (both intra-operative and post-operative).

Over 90% of the eyes that underwent cataract surgery had pre-operative visual acuity of 6/60 and below. This implies that most of the eyes were blind. Most of the cataracts were reported to be age-related which is in keeping with the age distribution of the patients.

Most of the intraocular lenses were placed in the capsular bag (the most desirable location). Half (50%) of the IOLs that were put in the anterior chamber were put in previously aphakic eyes (planned AC IOLs). There were more anterior chamber IOLs put and more eyes left aphakic than in the study performed by Bhagat et al on resident-performed phaco in New Jersey[20] (AC=0.8%, aphakic=3.6%). This may be in keeping with the higher rate of intra-operative complications in Litein.

Post-operative visual outcome was analysed using WHO grading whereby good outcome is visual acuity of 6/6-6/18, borderline outcome is <6/18-6/60 and poor outcome is <6/60. WHO recommends that, using available correction, good outcome should account for >80%, borderline outcome <15% and poor outcome <5%. Based on these recommendations, the outreach services in Litein did not meet the standards. The post-operative visual acuity that was recorded was presenting visual acuity and only a few cases had refraction done.

At the time of discharge, poor outcome was found in 5.2% of the cases reviewed in Litein[2] 10 years ago whereas in 2008, 55.4% had poor outcome. Visual acuity at the time of discharge in the study done by Alhassan et al on a training course in Nigeria[28] was found to be good in 45.2% and poor in 5.2%. A study done by Limburg et al on routine monitoring of visual outcome of cataract surgery in both Asia and Africa[29] found good outcome in 31% and poor outcome in 17% at the time of discharge. A study done by Hennig et al on sutureless cataract surgery in Nepal[30] found good outcome in 76.8% and poor outcome in 0.6% on the day of discharge. Visual acuity at discharge in Litein (4% good and 55% poor) was worse than all these centres.

At the first week post-operative visit in the review done 10 years ago in Litein[2], 7.4% had poor outcome. In the audit done by Alhassan et al in Nigeria[28], 74% of the patients' visual acuity was available for analysis and 36.8% of the patients seen at this visit had good outcome whereas 10.4% had poor outcome. Visual outcome in 2008 in Litein (13% good and 31% poor) was still worse compared to these two other audits.

At the second post-operative visit in the review carried out 10 years ago in Litein[2], 3.7% had poor outcome which was better than in this review of 2008. The outcome in Litein in 2008 (good=23%, poor=30%) was also worse when compared with studies in other centres such as Kikuyu Eye Unit[26] (44% good outcome and 8.7% poor outcome), Nigeria[28] (54.6% good outcome and 12.1% poor outcome), Aravind[12] (43.9% good outcome and 5.3% poor outcome) and Nepal[30] (70.5% good outcome and 1.5% poor outcome).

The poor outcome noted at the various visits may be due to several factors. The conditions under which visual acuity is measured, in the outreach setting, is not optimum as the lighting is poor and sometimes the sunlight falls directly on the patients' faces causing a lot of photophobia. It may also be that only the patients who had poor outcome came back for review while all the others who were satisfied with their visual outcome did not return. Most of the patients are screened at the village level then advised to come to the hospital for cataract surgery. They may not have sufficient funds to come back to the hospital for follow up visits so they only come back when they feel it is really necessary. Despite the apparently poor outcome, there has been a steady flow of patients coming to Litein (for over 20 years) for ophthalmic services which implies that the community is satisfied with the services rendered.

There were very few patients who were followed up beyond 12 weeks after their operation in Litein thus it is difficult to compare the long term outcome with other centres. A rapid assessment of avoidable blindness in Nakuru[31] found that of the patients who had undergone cataract surgery, 49.5% had good outcome whereas 30.6% had poor outcome. A rapid assessment of cataract surgical services in Embu[8] found that 44.5% had

good outcome and 37.3% had poor outcome. A review of cataract surgical services in Kericho, Bureti and Bomet[7] showed that 58.1% had good outcome and 31.5% had poor outcome. The poor results seen in Litein are generally comparable with other centres in Kenya. An audit done in Pakistan[11] showed 5.5% good outcome and 43.1% poor outcome. Visual outcome was slightly better in Aravind[12] (good=43.9%, poor=5.3%) and Nepal[30] (good=64.9%, poor=1.5%).

In view of the poor follow up of operated patients, the analysis of the cause of poor visual outcome may not be accurate. Another difficulty also encountered during data analysis is that the cause of poor outcome was not sought during most of the clinic visits. Refraction was found to be the leading cause of poor visual outcome followed by poor case selection. This is in keeping with the fact that no biometry was done.

The rate of intra-operative complications (14.4% vitreous loss) did not to meet WHO standards which require that posterior capsule tears and vitreous loss to each be less than 5%. Most of the intra-operative complications occurred in age-related cataracts which accounted for 77.8% of the posterior capsule tears and 91.2% of the cases with vitreous loss. This audit's complication rates were comparable with those found in an audit carried out in Litein 10 years ago (13.3% vitreous loss) [2]. However, vitreous loss in Litein was more common compared to studies done by Alhassan et al during a training course in Nigeria[28] (5.7%), Bhagat et al on resident-performed phaco in New Jersey[20] (6.7%) and Kothari et al in a teaching hospital in India[19] (7.63%).

Corneal oedema/ striate keratopathy were the commonest immediate post operative complications noted in Litein. This is probably due to more intra-operative manipulation being carried out by the residents. Corneal oedema was found in 44.6% of cases during a training course studied by Alhassan et al in Nigeria[28]. Corneal oedema is a temporary cause of poor vision and it is expected that if patients had better follow up, their visual outcome would improve once the oedema clears.

CONCLUSION

There were seven surgical outreach visits in 2008 with an average of 33 cataract operations being carried out during each visit. Most the patients who received cataract surgical services in 2008 in Litein were elderly females who were blind in the eyes to be operated on. Poor follow up of patients made it difficult to accurately draw conclusions about the long term outcome of the cataract surgeries. The initial visual outcome did not meet WHO recommendations and was poorer than in previous studies done in other centres. The main cause of poor outcome was refractive error. The surgeries were associated with a high rate of intra-operative complications, especially vitreous loss. The high incidence of post-operative corneal oedema, which in some cases led to corneal decompensation/ bullous keratopathy, was likely due to more intraocular manipulation by residents.

RECOMMENDATIONS

1. I would recommend that proper record keeping is done for each patient who is to undergo cataract surgery. This should include biographical data, pre-operative assessment of both eyes (looking out especially for prognostic indicators), intra-operative notes and post-operative visits. During follow up visits, visual acuity should be accurately assessed and if a patient is noted to have poor vision, the cause should be sought and documented at each visit.
2. Determining a patient's refractive status both pre-and post-operatively should be routinely done. This would best facilitated by having an optometrist or someone well trained in refraction being posted to Litein. Routine biometry and having a wider variety of IOL powers would help to minimise the rate of post-operative refractive errors.
3. Routine monitoring of the cataract surgical outcome should be done. This could be in the form of annual reports and reports on each visit. This would help enhance record keeping and help the surgeons know which areas need improvement.
4. The cause of poor patient attendance of post-operative clinics should be sought. This may be best done in a qualitative study looking at the knowledge, attitudes and practices of the people living in the catchment area of Litein Hospital. If the patients are seen during other outreach camps carried out by Litein staff members, the patient's records should be updated according to the camp findings.

APPENDIX 1

QUESTIONNAIRE

CATARACT SURGERY RECORD

RE ☐ LE ☐

PATIENT DETAILS

Name _____ Hosp. No. _____

Residence _____ Age _____

Sex _____

OCULAR HISTORY

Cause of cataract

Congenital	☐	Senile	☐	Traumatic	☐
Developmental	☐	Post-uveitis	☐	Drug-induced	☐

Visual complaints, affected eye, duration, treatment _____

Previous eye surgery (which, where, when) _____

Other eye diseases _____

Medical History _____

PRE-OP EXAMINATION

VA

Presenting ___

Pinhole/BCVA ___

IOP _____

Eyelids _____

Conjunctiva _____

Cornea _____

AC _____

Iris _____

Pupil _____

Type of cataract

Nuclear cataract	☐	Hypermature	☐
Cortical cataract	☐	Aphakic	☐
PSC	☐	Pseudophakic	☐

Vitreous _____

Fundus _____

SURGERY

Date _____

Surgeon

Consultant	☐
Trainee	☐
Both	☐

Anaesthesia

LA	☐
GA	☐
Complications	☐

Surgical technique

Type		***IOL***		***Suture***		***Incision***	
SICS	☐	Bag	☐	Yes, no.	☐	Scleral	☐
ICCE	☐	Sulcus	☐	None	☐	Corneal	☐
Lensectomy	☐	AC	☐			Limbal	☐
		None	☐			Superior	☐
		Unknown	☐			Temporal	☐

COMPLICATIONS

Pre-op complications

Retrobulbar haemorrhage

Intra-op complications

None	☐	Iris prolapse/damage	☐	Hyphaema	☐
PC tear	☐	Zonular dialysis	☐	Lens matter in vitreous	☐
V-loss	☐	Iridodialysis	☐	Suprachoroidal h'age	☐
Expulsive h'age	☐	Cyclodialysis	☐		

Post-op complications

Shallow/flat AC	☐	Corneal oedema	☐	Aqueous misdirection	☐
Elevated IOP	☐	Cystoid macula oedema	☐	PCO	☐
Retinal detachment	☐	Endophthalmitis	☐	Astigmatism	☐
Uveitis	☐	Pupillary capture	☐	IOL dislocation	☐

POST-OP EXAMINATION

	Date	**Presenting VA**	**Best VA**
Discharge	_____	_____	_____
1-3wk	_____	_____	_____
4-11wk	_____	_____	_____
12+ wk	_____	_____	_____

Cause of poor outcome

Selection _____

Surgery _____

Refraction _____

Sequele _____

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