Visit by Dr Geoffrey Woodruff Consultant Paediatric Ophthalmologist Emeritus Leicester Royal Infirmary UK to Ethiopia 25thMarch to 3rd April 2018

This visit had three purposes:

1) To support paediatric cataract surgery in Gondar as Visiting Professor & Mentor in Paediatric Ophthalmology at Gondar University Hospital Eye Department 25th March to 30th March.

2) To Support the Himalayan Cataract Project Exam Preparation Course Addis Ababa 31st March to 2nd April as Representative of the International Council of Ophthalmology

3) To further develop the CHICOE (Children's Improvement in Cataract Outcome Ethiopia) Study in collaboration with Ethiopian colleagues

This report describes the first part of my visit:

Visiting Professor & Mentor in Paediatric Ophthalmology, Gondar University Hospital 25th March-30th March 2018

Supported by the International Council of Ophthalmology
Rayner, MISS and Altomed

Visit to Gondar University Hospital Eye Department as Visiting Professor & Mentor in Paediatric Ophthalmology 25th March-30th March 2018

I was invited to spend a week as visiting professor at Gondar University Hospital by Dr Fisseha, formerly Head of Department of Ophthalmology and now Medical Director, and Dr Teshager Consultant Paediatric Ophthalmologist. Since my previous visit in December 2017, Dr Teshager had returned from one year's fellowship subspecialty training in Paediatric Ophthalmology at KCMC Hospital in Tanzania and we were keen to share experience particularly of Paediatric cataract surgery. In the immediate week before my visit, Dr Teshager had undertaken an outreach program with one of the senior residents (Dr Abera) in Sanja, northwest of Gondar. Since this was the first time that a team from Gondar had run an outreach program at the clinic they used, this had been a challenging experience. Dr Teshager told me it had been hot. Given that Google indicates that Sanja has an average annual temperature between 25 and 42 degrees C, I think this was probably an understatement. Impressively, all of the children Dr Teshager had identified as needing surgery during the outreach in Sanja attended for surgery in Gondar during the week of my visit.

OBJECTIVES OF THE VISIT:

- To support Dr Teshager in undertaking cataract surgery on children in Gondar: to provide mentorship and training and to share experience of paediatric cataract surgery, particularly in the light of Dr Teshager's successful completion of his Fellowship in Tanzania.
- To review the re-establishment of paediatric cataract surgery in Gondar after Dr Teshager's absence for one year.
- To provide teaching in paediatric ophthalmology to the Ophthalmology Residents (trainee ophthalmologists) in Gondar.
- To discuss The CHICOE (Children's Improvement in Cataract Outcome in Ethiopia) study.

OUTPATIENT ACTIVITIES

On the Monday, we saw a total of 45 patients, more than half of whom had been seen by Dr Teshager in the Sanja outreach program the previous week. Of the total of 48 children we saw in the week, 5 had severe visual impairment or blindness from bilateral cataract, and two had visual impairment as a consequence of bilateral uncorrected aphakia (ie they had had cataract extraction for bilateral cataract but had not had an intra-ocular lens placed at the time of surgery and were not wearing the necessary high powered glasses to correct for this). Of the remaining 41 children, 20 children had had severe eye trauma causing poor vision in one eye. Of these, 5 had had previous surgery with modest benefit, 6 had damage to the eye such that there was no prospect of benefit from any further surgery other than removal of the eye (2 cases), but 9 cases had the prospect of some improvement of vision with cataract surgery.

One child sadly had terminal retinoblastoma eye cancer that probably would have been curable (as is normal in western countries) if the parents had accessed treatment for their child as soon as they had observed a white glint in the eye more than a year previously. Some parents described travelling 3 hours on foot and then 2 hours in a minibus in order to come to the hospital in Gondar. We therefore gave priority for surgery to children coming from Sanja. We also saw two young adults with disfiguring squint for which surgery was indicated, albeit with a lower priority than the children with cataract.

CATARACT SURGERY:

Surgery Performed by Dr Teshager

3 cataract operations on children with severe visual impairment from bilateral cataract (under general anaesthesia)
2 Intraocular lens implantation procedures on a child with bilateral aphakia (under general anaesthesia)
5 cataract operations on children with unilateral cataract (under general anaesthesia)
2 operations for squint (misalignment of the eyes) on young adult patients (under local anaesthesia)
5 cataract operations were deferred because of lack of theatre time and operated by Dr Teshager the next week; one patient had to wait a further week for surgery

Cataract surgery learning Points

1) Unable to adjust height of the infusion bag
2) Non-functioning microscope foot pedals as well as other basic equipment.
3) Positioning of patient on the operating table and correct use of trypan blue
4) Thick fibrous capsular plaques
5) Capsulorhexis as a realistically attainable technique

1) In the centres I have visited in Africa there has been a practice of covering the infusion drip stand for intra-ocular surgery in a sterile drape. This makes it very difficult to adjust the height of the infusion bag. It soon becomes completely impossible to adjust the height of the infusion bag as the mechanism becomes seized up from disuse. While it was common enough for a seized up drip stand to be used when I started as a consultant in Leicester, in current western practice all machines for phaco cataract surgery have a powered mechanism for raising or lowering the infusion bag and there is no attempt to cover the stand in a sterile drape. With the advent of phaco surgery, surgeons have become very aware that in all intra-ocular surgery there is a profound difference between adjusting the infusion pressure (by raising or lowering the bag) and adjusting the infusion flow (by turning the standard IV line slide adjuster). When aspirating cataractous material from the eye, the key to success is normally to maintain a constant pressure in the eye. This prevents collapse of the anterior chamber of the eye and damage to the cornea and/or the posterior capsule of the lens, common complications limiting the outcome of cataract surgery.

There is usually a reason why apparently outdated practices continue: in this case, there is the fear that not covering the drip stand may lead to infection (this could be mitigated by ensuring that the stands are clean and do not shed particles of rust or paint). Moreover, surgeons have correctly observed that if the posterior capsule is inadvertently damaged (usually because of collapse of the anterior chamber), lowering the infusion flow rate is indeed the correct response because this reduces the tendency for the infusion to swirl vitreous and other ocular contents out of the eye.

2) There continues to be a problem of maintenance of both technical and basic equipment in Gondar. Some of the operating stools for the surgeons and scrub nurses are missing a castor wheel, posing a risk to staff and patients. The operating microscope foot pedals did not function correctly, making it hard for the surgeon to move around the operating field or adjust the focus or zoom. We could not make the sophisticated Accuris vitrectomy/phaco machine work, but we had reliable service from the much simpler Vitron3030 Gueder manual aspiration vitrectomy unit we used on my last visit to Gondar.

Not all wonky looking equipment is non-functional (left), but if it is, it needs to be mended (right). Unfortunately spare parts are often very difficult to obtain

Right: We enjoyed a far more spacious theatre environment than on my previous visit (left). Picture on left shows impenetrable barrier to adjustment of the height of the drip stand by a green sterile drape.

3) As on my visit to Gondar in December, we found that attention to detail in positioning the patient as well as manipulating the position of the eye to achieve optimum coaxial viewing achieved a much better view for the surgeon. The Trypan blue dye available in both Gondar and at KCMC in Tanzania has a poor reputation for providing staining of the anterior capsule. By injecting the dye under a bubble of air or under a layer of cohesive viscoelastic without first coating the anterior capsule with methylcellulose, we were able to achieve good staining of the capsule on every occasion, greatly enhancing the surgeon's view of the anterior capsule and the ease of performing cataract surgery.

4) An unusual but challenging problem the surgeon may encounter in operating on children's cataracts in the UK, is the phenomenon of a thickened fibrous anterior capsule of the lens that resists strenuous efforts at penetration to gain access to the cataractous contents of the lens bag. This is a much more common problem in Gondar, occurring in 3 out of the eight children we operated on.
Dr Teshager honed his technique of seeking a peripheral portion of the capsule which is invariably less fibrous and dividing this with the vitrector or intraocular scissors and using a bimanual technique to control movement of the fibrous fragment and prevent it being lost into the back of the eye.

This 13 year old girl had previously suffered a penetrating injury to the left eye. The lens became cataractous and then spontaneously resorbed leaving an irregularly shaped white fibrous plaque in the centre of the pupil. This plaque could not be incised but Dr Teshager removed it by cutting around and delivering it using a bimanual technique.

5) In western cataract surgery the standard method of opening the anterior lens capsule to gain access for removal of the cataractous lens is to perform a continuous curvilinear capsulorhexis. This procedure is akin to making a small nick in the cellophane wrapping of a compact music disc and then tearing the cellophane in a circular fashion to make a strong edged circular opening of the capsule on the front (anterior) surface of the cd box wrapping. This opening is strong and will not tear out. In contrast, the traditional opening of the lens capsule with multiple radial incisions (or similar) is inherently unstable and liable to tear outwards unexpectedly and also does not allow precise location of any intra-ocular lens. If there is good visualisation of the capsule with appropriate adjustment of the microscope and use of trypan blue staining to visualise the edge of the capsule, the capsulorhexis technique is much easier and safer, but it can be hard to learn the technique. We carried out some simulated capsulorhexis before the operating day and during surgery I observed Dr Teshager's technique offering advice & guidance as required. In my absence the subsequent week, Dr Teshager was able to complete one capsulorhexis unsupervised and had learnt enough about the issues for no patient to be disadvantage by his attempting to use this far superior, but unfamiliar, technique. While some techniques used in the developing world (such as manual small incision cataract surgery in adults) offer cheaper alternatives to the latest techniques with only small disadvantages) the technique of capsulorhexis offers a substantial benefit that is applicable in even the most resource poor environments and will ultimately offer greatly improved outcome results for children's' cataract surgery.

SQUINT SURGERY

We operated on 2 young adults for strabismus under local anaesthesia on the day when we had an operating theatre available but no anaesthetist.

A Target Outcome was determined before surgery; post operatively an assessment was made as to what extent the target had been achieved. In addition, I asked one of the residents to record whether they would have undertaken the same or more surgery, or the same or less as the consultants planned to do. I have asked the 5 resident staff most involved in helping us for this visit and my visit in December, to collect follow up data on all the patients we operated on and I have undertaken to co-author a paper with them about the visit if they can collect the post-operative data. Collecting the post- operative data will present a challenge.

Acknowledgements
I am humbled by the huge experience and manual dexterity of African colleagues working in difficult circumstances. An important role as surgical mentor and visiting professor is to alert colleagues as to how, with equipment and consumables that are within the reach of their funding bodies, much better results are possible for children blind from treatable cataract. I am very grateful to Rayner who provided cohesive viscoelastic (used in every lens implantation for paediatric cataract patients in the UK, but normally never used in Ethiopia) and injectable intra-ocular lenses when the required lens power was not available in Gondar. Many thanks also to Zeiss who also provided viscoelastic, to MISS who provided vitreous cutters (in place of many times used and now blunt cutters) and to Altomed who kindly donated vitreous cutters and a wide variety of useful consumables such as aspiration cannulas, and tubing adaptors for connecting up unlikely combinations of vitrectomy machine and

cutter. Thanks also to HALE (Health Action Leicester for Ethiopia) and Vision 2020 for long term support of the Leicester Gondar Eye Link. All patients and their parents consented to photography.

Geoffrey Woodruff FRCOphth
Consultant Ophthalmologist Emeritus
Leicester Royal Infirmary

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