Abstract
In India, the problem of blindness secondary to cataracts remains a formidable one; a problem that is unlikely to be resolved in the foreseeable future despite the increase in number of cataract surgeries being performed. In December of 2012 I undertook a placement at the Ruby Nelson Memorial Hospital in Jalandhar, India. The hospital coordinates eye camps with great efficiency and skill, restoring the sight of tens of thousands every year. During my stay I observed two camps where over 200 surgeries were performed using the Manual Small- Incision Cataract Surgery (MSICS) technique. The MSICS technique has been shown to be advantageous for high-volume caseloads whilst maintaining excellent visual outcomes. By employing this safe and cost-effective method, eye surgeons can combat cataract blindness not only in India but also across the developing world.

Keywords: manual small incision cataract surgery, eye camp

Introduction
India has one of the largest populations of blind people in the world, affecting an estimated 18.7 million, in a total population of 1.2 billion. Cataracts is the largest cause of blindness, both in India (62.6%) and worldwide (47.8%). However, with great efforts to combat cataract blindness in India, its prevalence has been reducing in recent decades. In 2012, over 6.3 million cataract surgeries were completed in India, as opposed to 1.9 million in 1999. However, due to increasing age, elimination of cataract blindness in India may not be achieved by 2020.

My attachment
Whilst researching for an elective placement I came to know of Dr Jacob Prabhakar, an ophthalmologist based at the Ruby Nelson Memorial Hospital (RNMH) in Jalandhar, who conducts eye camps in India. He had the reputation of ‘completing a cataract surgery in 1.5 minutes’.

Jalandhar district is one of the 22 districts in the Indian state of Punjab, Northwest India. It has a population of over 2 million, 47% of whom live in rural areas. The RNMH of Seventh-Day Adventists is a 120-bed hospital set up in 1966 in Jalandhar. It is a major provider of eye care in the region, performing more than 8,000 cataract surgeries a year. It is also the Adventist Institute of Optometry, offering diplomas and a BSc in Optometry.
Daily Routine
Typical days involve morning worship, followed by outpatient clinics run by two ophthalmologists. Patient turnover rates are high in these clinics, with the help of optometry students doubling up as ophthalmic assistants. Patients are seen by an ophthalmologist, have their history taken and a slit lamp examination, then sent to neighbouring rooms to have further tests done by optometrists - such as refraction and keratometry. Afternoons were mostly occupied with surgery. However, routine days were few and far in between - they were interrupted by numerous eye camps and community clinics.

The Eye Camps
Free eye camps have been conducted by RNMH for decades, and every year 8000-10000 cataract surgeries are done at these camps.10 Eye camps are conducted up to 1-2 times a week by RNMH, in various parts of India, and the same places are revisited annually. Most camps are held in Hindu or Sikh temples, and organised with the help of the relevant religious leaders. Publicity for the camps is done a few days or weeks prior, and most villagers have already been awaiting them due to its annual nature.

Sponsorship is obtained from various sources including temples, religious leaders, donors and Christian organisations.

The 2 camps I observed at Loht Baddi and Rajpura were considered small and had 200-300 patients where approximately 100 individuals from each camp underwent cataract surgery. However, I was informed by the team that some camps (e.g. those in Andhra Pradesh) can involve over 2000 surgeries performed over several days.

Screening
A team consisting of 7 people (1 ophthalmologist, 3 optometrists, 1 nurse, 1 OT technician, 1 driver) from RNMH travels to the host destination. Patients are initially examined by optometrists and only patients with mature cataracts are shortlisted for surgery. Depending on availability of time and sponsorship, pterygiums are sometimes treated at the camps. Patients requiring other services e.g. spectacles, squint surgery are referred to RNMH. Patients with corneal opacities, however, are not referred, as RNMH does not have the resources for corneal transplantation.

Figure 1 | Eye Camps. (A) Pre-operative assessment: A-scan biometer to measure axial length to calculate IOL power needed. (B) Optometrist examining a patient in the weekly community clinic at a Hindu temple. (C) Dr Jacob Prabhakar using manual instruments for surgery.
The Surgery

Patients short-listed for cataract surgery then undergo pre-operative assessments (Figure 1A: intraocular pressure measurement, A-scan biometry). Patients are given prophylactic antibiotics and those with IOP of 21-24mmHg are given acetazolamide.

Patients are excluded from surgery if they have any of the following: IOP>24mmHg, high urine glucose, infection or inflammation of the eye, corneal opacification, mental illness or if consent is not attained.

Patients who are shortlisted for surgery are then transported via a bus to a local hospital or RNMH (if in close proximity) where the theatre is set up. All cataract surgeries at the eye camps are performed using the Manual Small- Incision Cataract Surgery (MSICS) as (Figure 1C, 2 and 3)

With the help of an experienced team and volunteers, case turnover time is rapid. Efficiency is a result of numerous factors including using multiple sterile instrument sets which are autoclaved between patients, and a no-touch technique where the gloves do not come into contact with the patient. To expedite turnover, consecutive patients are placed simultaneously on the table. As soon as one surgery is complete, the surgeon swivels to the adjacent patient.

Complications were few but some that arose were: failed dilation of pupil, high IOP, prolapsing iris, lens subluxation, lens dislocation.

Following surgery, patients are transported back to the temple, where they will stay for another 3 days and have their progress monitored by an optometrist from RNMH who stays in the temple with them.

Advantages of eye camps

Hospitals in developing countries are mainly located in urban areas, thus the majority of patients with cataracts, who live in rural areas, have limited access to their facilities.

A study in Punjab showed that a higher prevalence of cataracts was associated with being widowed, low education, low weight, short stature, and limited protein intake. In comparison with Framingham’s eye study, which studied the population in Framingham, Massachusetts, USA, it was also found that the prevalence of senile cataract in Punjab corresponded with the prevalence in Framingham’s residents 14 years later in age.11,12 Another study suggested that the prevalence of cataract in women in North Indian villages aged 55 to 59 years was 7.4 times that of women of the same age in high-income countries.13 

Hospitals in rural villages often lack the necessary surgical equipment and medications, and are poorly
This issue can be circumvented by the practice of eye camps, which many hospitals in India and around the world conduct to reach those who are unable to access them. By returning to the same villages every year, eye camps also provide patients a long-term access point to eye care.

Eye camps are also able to improve relations between religious communities. Healthcare is able to cross religious boundaries and make them work hand-in-hand for the benefit of the communities they serve. It was refreshing to see Christians tapping their feet to Hindu songs, and Sikh leaders joining in during a Christian prayer, all within the walls of the operating theatre. Doors that are normally closed are so warmly opened in the name of medicine.

Manual Small-Incision Cataract Surgery (MSICS)

In North America and Europe, cataracts are mostly extracted using phacoemulsification technology, while in developing countries, only those who can afford it receive such surgery. Millions of others in developing nations with reversible blindness from cataracts go untreated and there is a huge backlog of patients with bilateral mature cataracts. Thus, the MSICS technique was developed to provide a sutureless, cost-effective and efficient technique that gives rapid visual rehabilitation. Although relatively recent, the MSICS is gaining popularity in many countries by virtue of its ability to manage difficult cataracts very safely. It is the technique of choice in eye camps where cataract surgery can be performed on hundreds of patients in a few hours without high-technology equipment.

Advantages of MSICS

MSICS is less expensive to perform than phacoemulsification. As the name suggests, manual tools are used. The only expensive equipment needed in MSICS is an operating microscope, which can function on batteries or a diesel generator. Phacoemulsification requires capital investment and recurring expenditure of a phacoemulsification machine which costs GBP £9000-60000 as well as costs of surgical consumables (phacoemulsification tips, sleeves, tubing). The non-foldable poly
(methylnethacrylate) (PMMA) lens are produced locally in contrast to foldable IOLs that are imported from the United States, reducing cost of the lens. In a study done in a hospital in India, the cost of a MSICS surgery was USD $15.34 compared to phacoemulsification surgery which costs USD $42.10.¹⁸

MSICS can be performed rapidly in a high-volume setting, maximising surgical efficiency and productivity. The MSICS technique is also sutureless as a result of a self-sealing corneal valve. This further reduces time taken for the operation, and also avoids suture-related complications (e.g. iris prolapse, suture infiltrate, bleeding).

Patients undergoing MSICS have early visual rehabilitation. At 40 days follow-up, the MSICS group demonstrated better near vision compared to the phacoemulsification group. Additionally, patients were satisfied with their quality of vision without spectacles. In the phacoemulsification group, however, the first complaint was that their near vision was grossly hampered.¹⁶ This is particularly important in remote settings where patients find it difficult to obtain refractions or spectacles after surgery.

Furthermore, MSICS can be performed in cases where phacoemulsification can be challenging, for example, hard nucleus, for which phacoemulsification is limited.¹⁹ Less post-operative visits are required, thus suitable in conditions where follow up is difficult.²⁰

**Disadvantages of MSICS**

However, studies have shown that phacoemulsification gives a better uncorrected visual acuity than MSICS.²¹,²² Ruit and colleagues postulated that this may be due to a higher rate of posterior capsule opacification in MSICS, as well as greater inflammation and macular oedema from iris manipulation in MSICS. Cortical clean-up may also be more thorough in the phacoemulsification technique.²¹

**Conclusion**

My placement observing eye camps in India was incredibly informative. I experienced first-hand how eye care is delivered to underprivileged people and witnessed eye pathology less commonly encountered in the developed world.

Cataract surgery in the eye camps was performed using the MSICS technique, which is rarely used or taught in the UK as it has been superseded by phacoemulsification. The MSICS is a safe, fast, and cost-effective technique that has been shown to achieve excellent visual outcomes, making it a superior means for addressing the huge backlog of blinding cataracts not only in India but also in the rest of the developing world.
PUNJAB, INDIA AT A GLANCE

Placement locations
Ruby Nelson Memorial Hospital of Seventh-Day Adventists (RNMH) is located in Jalandhar, Punjab, North-west India. Jalandhar is the oldest city in Punjab and is a highly developed hub for commercial activity. Sikhism is the predominant faith in Punjab, followed by Hinduism. RNMH is a Christian hospital, but regularly partners with local Sikh and Hindu leaders to provide free eye care to underprivileged communities in the region. RNMH is also an optometry school, providing BSc and diplomas in Optometry. Thus there were many friendly local students to befriend and learn the Indian culture from.

Visa and Travel Costs
A visa has to be applied for beforehand in order to enter India. Main bulk of the cost of the trip is the airfare. A direct flight from London costs about £700. Accommodation and food in the hospital will cost less than £10 a day. The currency in India is Indian Rupees with approximately 100 rupees to the pound.

Vaccinations
A travel nurse appointment will be required for India. Hepatitis A, Hepatitis B, Typhoid, diphtheria, Cholera, BCG. Malaria: low risk. Minimal risk for body fluids exposure thus HIV PEP not indicated. The hospital also has a general medical and surgical department thus any medications needed can be prescribed by the general medical doctor and bought from the pharmacy.

Climate
Temperatures in Punjab range from 1 to 46 degrees Celsius. Summers (April – June) can get very hot and Winters (Dec-Feb) are very chilly. Students are advised to bring clothes appropriate for the season. The accommodation provides an air-conditioner, fans, as well as a portable heater.

Cuisine
All food is provided by the hospital canteen, which serves healthy, delicious and hygienic food. The hospital advocates health-promoting lifestyles thus all food is vegetarian, fresh, and cooked with minimal spices. You are not advised to purchase street food or drink any water served (even those served in restaurants). Also avoid ice and cut fruits. Always drink sealed bottled water bought from reputable shops. The hospital provides potable filtered water from a dispenser.

Languages spoken
All staff and students speak English, but patients only spoke Punjabi. Hindi is also spoken as it is the ‘national’ language.

Equipment
You will need an ophthalmoscope and a torch. Gloves, alcohol gel and masks will also come in handy. And last but not least, an adventurous spirit.

Tourism
Jalandhar - There are shopping centres and markets in which you can reach via an auto (automobile). A trip to the local market is definitely worthwhile to experience the sights and sounds of Jalandhar. In Amritsar, 2 hours drive from Jalandhar, you can visit the Golden Temple, a world-renown pilgrimage point for Sikhs, and the India-Pakistani Wagah border, where an energy-filled ‘lowering of the flags’ ceremony is held daily. A pre-booked taxi which brings you there and back will cost about £30 for the whole day.

Contact
Dr Jacob Prabhakar, Consultant Ophthalmologist and Medical Director
Email: jacobbeaulah@yahoo.com
References


