Community Eye Health

Volume 16 Issue No. 48 2003

AN INTERNATIONAL JOURNAL TO PROMOTE EYE HEALTH WORLDWIDE

SUPPORTING VISION 2020: THE RIGHT TO SIGHT

Sutureless Non-phaco Cataract Surgery:
A Solution to Reduce Worldwide Cataract Blindness?

Albrecht Hennig MD
Programme Director
Sagarmatha Choudhary Eye Hospital
Lahan, PO Box 126 Kathmandu,
Nepal

The Search for Appropriate Sutureless Cataract Surgery

During the last decade, in industrialised countries phacoemulsification has largely replaced ab-externo extracapsular cataract extraction with posterior chamber intraocular lenses (ECCE/PC IOL) with sutures. The small self-sealing phaco incision provides rapid visual rehabilitation, and the surgery is increasingly done on an outpatient basis. However, in developing countries phacoemulsification is performed only on selected patients, usually those able to pay high treatment charges. The reasons for this include the cost of a phaco machine and consumables such as foldable IOLs. Until now, phacoemulsification has played a very limited role in the reduction of cataract blindness in low income countries. Therefore, eye surgeons in developing countries are searching for alternatives to phacoemulsification. We need a surgical technique which is easy to learn, provides an immediate good uncorrected visual outcome, and is affordable to most cataract patients. Such a technique would advance cataract surgery in low income countries and contribute to reaching the goal of VISION 2020: The Right to Sight.

The Techniques

During the early 1980s, when a self-sealing tunnel incision was introduced in the USA, surgeons developed instruments and techniques to cut the nucleus into parts, for easy removal through a smaller self-sealing sclero-corneal tunnel.[1,2,3] These techniques are now partly revitalised in developing countries. There are different names given to the technique where the whole nucleus, or the nucleus divided in parts, is removed through a self-sealing tunnel requiring no sutures, e.g., 'Small Incision Cataract Surgery (SICS)', 'Manual SICS', 'Manual Phaco', 'Sutureless ECCE/PC IOL'. Sutureless surgical techniques are described by

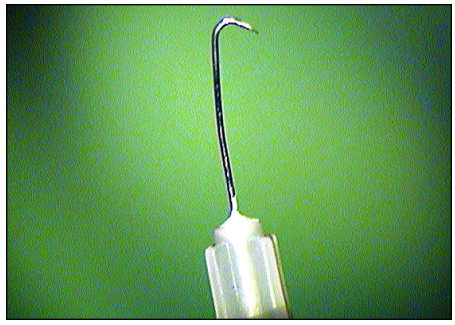

Fig.1: 30G needle bent to a 'fishhook'
Photo: Albrecht Hennig

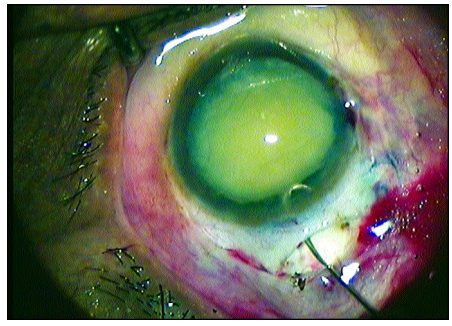

Fig.2: Inserted 'fishhook' before nucleus extraction
Photo: Albrecht Hennig

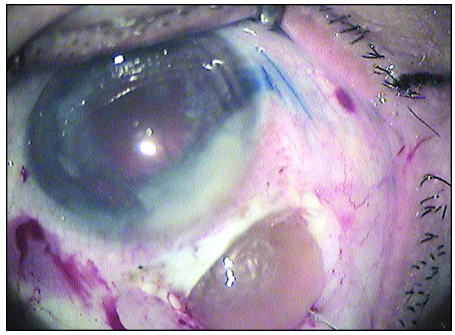

Fig.3: 'Fishhook' extracting the nucleus
Photo: Albrecht Hennig

***Community Eye Health* 2003; 16: 49–64** **Issue No. 48**

In This Issue…

Community Eye Health

Volume 16 Issue No. 48 2003

Supporting VISION 2020:
The Right to Sight

International Resource Centre
International Centre for Eye Health
Department of Infectious and Tropical Diseases
London School of Hygiene and Tropical Medicine
Keppel Street,LondonWC1E 7HT
Tel: 00 44 (0)20 76127964
email: Anita.Shah@lshtm.ac.uk

Typeset by
Regent Typesetting, London

Printed by
The Heyford Press Ltd.

On-line edition **(www.jceh.co.uk)**
OASIS/Xalt
Ms Sally Parsley

ISSN 0953–6833

John Sandford-Smith on pages 51–53. Another approach is to remove the whole nucleus using hydroexpression with the help of an anterior chamber (AC) maintainer,[4,5] or a Simcoe cannula,[6] or with a combination of irrigation/extraction using an irrigating vectis[7] described in detail by John Sandford-Smith.

A different technique, the 'fishhook' extraction, was developed in Lahan, Nepal in 1997.[8] After performing a linear capsulotomy or a continuous curvilinear capsulorhexis, the nucleus is extracted from the capsular bag through the tunnel with a small hook made of a 30G ½ inch needle (Figure 1). This minimises the risk of nucleus-endothelial touch. More than 160,000 sutureless cataract surgeries have been performed in Lahan by this technique and many more in other eye centres around the world.

What Post-operative Outcomes can be Achieved?

The World Health Organization (WHO) categorises the outcome of cataract surgery in three groups: good, borderline and poor (Table 1) and recommends aiming for a 'good', uncorrected visual acuity (VA) in at least 80% of surgeries, and 'poor' outcome in less than 5%. Gogate [9,10] compared manual SICS with conventional ECCE in a randomised controlled trial in Western India and reports, in this issue on page 54, how the two techniques compare in terms of safety, effectiveness, costs and quality of life. More outcome studies on sutureless cataract surgical techniques with long-term follow-up are needed.

Interestingly, since sutureless cataract surgery became the routine procedure at Lahan in 1998, the number of cataract operations increased more than three times in the following five years. This suggests we must be doing something which patients like!

Making the Transition from Sutured to Sutureless Surgery: The Learning Curve

There is no doubt that sutureless cataract surgery is more difficult to learn than ab-externo sutured ECCE/PC IOL. A self-sealing wound with minimum induced astigmatism requires a very accurate tunnel construction as well as good surgical skills and experience to work inside the eye through a narrow tunnel. In his article on pages 58–60, Bernd Schroeder describes the main surgical steps and complications of sutureless cataract extraction and their management. He also reports on the learning curves of different surgeons with different starting experience.

Today many surgeons are keen to convert from sutured to sutureless cataract surgery, but may not be sure whether their surgical ability and skills meet the criteria to master the more difficult sutureless technique. There is a way to find out: self-evaluation of at least 100 consecutive operations using the sutured ECCE/PC IOL technique. A surgeon may be suitable if the surgical complications, especially posterior capsule rupture, are less than 5% and the number of patients with a post-operative uncorrected VA of less than 6/60 (poor outcome) remains below 5%. Unfortunately, at present the number of ophthalmologists wishing to learn sutureless cataract surgery far exceeds the capacity of the existing teaching centres. A list of available training centres and learning resources is included on page 61.

Conclusion

The sutureless technique provides a rapid visual recovery and a return to normal life the day after surgery. However, the long-term visual outcome might not be different to sutured cataract surgery.[11] Other major advantages are a stable, watertight wound without suture-related problems. The surgical time is short and the cost of consumables reduced. It has proved a very suitable technique for high volume, low cost and good result cataract surgery.[12]

The sutureless technique is more difficult to learn than ab-externo ECCE/PC IOL with sutures and needs additional training. However, once mastered, the sutureless non-phaco cataract surgeon can play an important role in the reduction of world-wide cataract blindness.

References

1 Keener GT. The nucleus division technique for small incision cataract extraction. In: Rozakis GW, Anis AY, et al, editors. Cataract Surgery: Alternative Small Incision Techniques. Thorofare (N.J): Slack Inc; 1990. p.163–195.

Table 1: WHO Guidelines and Recommendations for the Post-operative Outcome of Cataract Surgery with IOL

		Uncorrected post-op VA	Corrected post-op VA
Good	(6/6 – 6/18)	80% +	90% +
Borderline	(<6/18 – 6/60)	15%	<5%
Poor	(<6/60)	<5%	<5%

2 Fry LL. The Phacosandwich Technique. In: Rozakis GW, Anis AY, et al, editors. Cataract Surgery: Alternative Small Incision Techniques. Thorofare (N.J): Slack Inc; 1990. p.71–110.
3 Kansas P. Phacofracture. In: Rozakis GW, Anis AY, et al, editors. Cataract Surgery: Alternative Small Incision Techniques. Thorofare (N.J): Slack Inc; 1990. p. 45–70.
4 Blumenthal M. Manual ECCE, the present state of the art. *Klin Monat Augenheilkd* 1994; **205**: 266–270.
5 Thomas R, Kuriakose T, George R. Towards achieving small-incision cataract surgery 99.8% of the time. *Indian J Ophthalmol* 2000; **48**: 145–151.
6 Ruit S, Poudyal G, Gurung R, Tabin G, Moran D, Brian G. An innovation in developing world cataract surgery: sutureless extracapsular cataract extraction with intraocular lens implantation. *Clin Experiment Ophthalmol* 2000; **28**: 274–279.
7 Natchiar G. Manual Small Incision Cataract Surgery. Madurai, India: Aravind Publications, 2000.
8 Hennig A, Kumar J, Yorston D, Foster A. Sutureless cataract surgery with nucleus extraction: Outcome of a prospective study in Nepal. *Br J Ophthalmol* 2003; **87(3)**: 266–270.
9 Gogate P M, Deshpande M, Wormald R P. Is manual small incision cataract surgery affordable in the developing countries? A cost comparison with extracapsular cataract extraction. *Br J Ophthalmol* 2003; **87**: 843–846.
10 Gogate P M, Deshpande M, Wormald R P, Deshpande R D, Kulkarni S R. Extracapsular cataract surgery compared with manual small incision cataract surgery in community eye care setting in Western India: a randomized controlled trial. *Br J Ophthalmol* 2003; **87**: 667–672.
11 Prajna NV, Chandrakanth KS, Kim R, Narendran V, Selvakumar S, Rohini G, et al. The Madurai intraocular lens study II: clinical outcomes. *Am J Ophthalmol* 1998; **125**: 14–25.
12 Hennig A, Kumar J, Singh AK, Singh S, Gurung R, Foster A. World Sight Day and cataract blindness. *Br J Ophthalmol* 2002; **86**: 830–831.

❑

Sutureless Cataract Surgery: Principles and Steps

John Sandford-Smith
FRCS FRCOphth
14 Morland Avenue
Leicester LE2 2pe
Uk

Introduction

Cataracts cause about 50% of world blindness. There is little likelihood of effective prevention becoming available in the next few years and so the only treatment will remain surgical. For many of the other major causes of world blindness, like trachoma, xerophthalmia and onchocerciasis, the remedy is community-based, not hospital-based, and requires prevention rather than treatment. The prevalence of blinding cataract will only increase as people live longer, so cataract will continue to be, by far, the most important treatable cause of blindness.

Cataract Surgical Techniques and Cataract Surgeons

Cataract surgical techniques have changed enormously in the last ten years, both in the developed world and the developing world, and will undoubtedly continue to change at an ever-increasing rate. Phacoemulsification is now the standard, and almost the only procedure in the developed world. For various reasons, most experts in the developing world do not see phacoemulsification as the answer to world cataract blindness, although there are a few 'phaco enthusiasts' who do.

An effective cataract surgeon in the developing world is one who is doing high volume, low cost and low complication surgery. For many of these effective cataract surgeons, the operation of choice is now sutureless non-phaco cataract extraction, and others are changing to this technique.

The purpose of this article is to try to describe the principles of this technique (there are several different ways of doing it), its advantages and disadvantages and how to avoid mistakes and complications.

Sutureless Non-phaco Cataract Surgery

Sutureless non-phaco cataract surgery requires three separate and different steps:

- **The incision** is made so as to be self-sealing and as free from resulting astigmatism as possible. At the same time, it needs to be large enough to allow the entire lens nucleus to be removed in one piece.
- **The nucleus is then mobilised** inside the eye, and inside the lens, to enable it to be removed.
- **The nucleus is then removed** without damaging either the cornea or the posterior lens capsule.

1. The Incision

There are three parts to this. The opening into the sclera, the tunnel and the opening into the cornea.

(a) The opening into the sclera (figure 1)

A superior rectus suture is inserted and a fornix-based conjunctival flap dissected. The incision into the sclera is about 8 mm long and usually shaped like a 'frown'. It can be slightly smaller (6–7 mm), especially if the nucleus is small or the surgeon is very skilled. It can be even bigger and still remain self-sealing. The incision goes halfway through the sclera and can be made with any sharp knife or razor blade fragment. Because it is a little way from the limbus, it is quite vascularised and the blood vessels will need gentle cautery or diathermy first. At its closest point, it should be 2mm from the limbus. The incision can be made straight across rather than frown-shaped but the frown incision is said to produce less astigmatism.

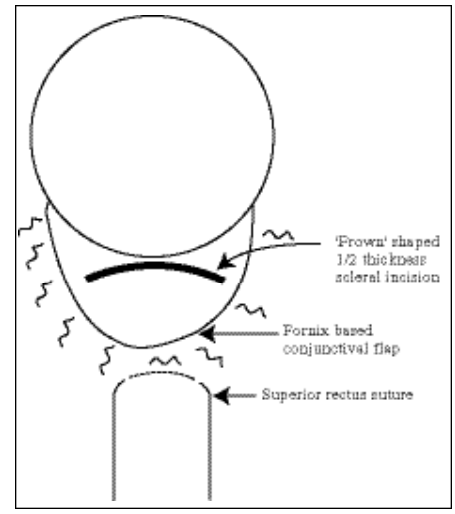

Fig.1: The incision

The incision does not need suturing because the large distance between the internal and external opening (at least 4 mm) makes the wound self-sealing as the intraocular pressure rises. Therefore, the length of the incision does not really matter.

(b) Making the tunnel

This is the most critical part of the incision and for this a standard crescent knife is used. Since the coming of phacoemulsification, these knives are readily available and usually 'disposable'. However, with care between cases and disinfecting the blade in spirit-based povidone-iodine 10% solution or autoclaving at a lower temperature (115°C.), one knife and handle should remain sharp for several cases, or even a whole operating list.

First establish a plane of cleavage about half the thickness of the sclera and then enlarge by making sweeping movements