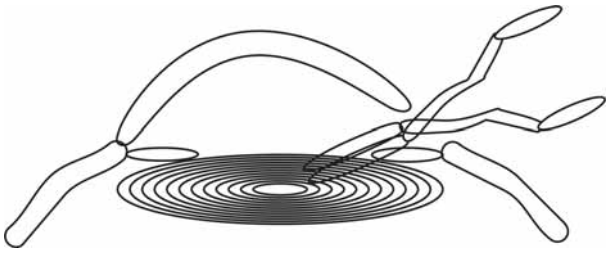
Nucleus Prechopping As An Aid To Small Incision Cataract Surgery

Dr. S S Bhatti

Many cataract surgery techniques are characterized as “phako techniques” while others are characterized as “small-incision techniques”. Described here is a technique that marries the mechanical nucleus reduction techniques of phakoemulsification with the nucleus removal technique of small incision cataract surgery. This technique can be described as this author’s modification of the Akahoshi prechop applied to small incision cataract surgery.

Akahoshi has described a technique of prechopping the nucleus into 4 quadrants with a single handed technique using a cross action forceps with pointed tips and flat blades. After a 3 mm corneal tunnel incision, the Akahoshi chopper forceps is inserted, in the closed position, into the nucleus while it rests in the bag (after loosening by hydrodissection). The forceps is then opened cleaving the nucleus. The cleavage can then be extended till the entire nucleus is “prechopped” by repeated insertion and opening of the forceps blades. The nucleus is then rotated and the process repeated at 90 degrees to the original prechop to split the nucleus into 4 pieces.

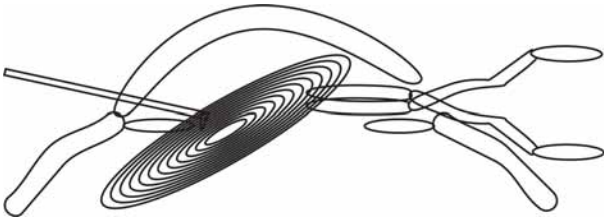


Akahoshi Prechop: Schematic

This technique works well in the hands of Dr Akahoshi but the pressing of the prechopper into the nucleus runs the risk of tearing the posterior capsule or dialyzing the zonules unless the surgeon has a very fine judgement of the amount of pressure that can be safely exerted. Dr. Akahoshi himself has appreciated this fact and has a modification of the technique called the “counter prechop” where a lens manipulator like instrument is used to stabilize the nucleus before prechopping in cases where the nucleus is hard and where the zonules may be weak. Nevertheless, this part of the technique has a certain element of risk, unless the surgeon has exquisite judgement as to the amount of downward pressure that be exerted at the time of inserting the prechopper into the nucleus.

In this author’s modification of the technique, the nucleus is first dislocated into the anterior chamber, after a 5 mm corneal tunnel has been fashioned and a capsulorrhexis done. Methylcellulose is then injected into the anterior chamber to cushion the nucleus from the capsule and the endothelium, as well as to tilt it so that the part close to the incision is tilted towards the cornea.The prechopper is then inserted through the corneal tunnel into the posterior aspect of the nucleus while the anterior aspect of the nucleus is stabilized through a sideport by a dialler, so that it is not pushed towards the endothelium by the prechopper.The blades of the prechopper are then opened to cleanly chop the nucleus into two bits. In very hard cataracts it may be necessary to rotate the nucleus and then repeat the maneuvre from the diagonally opposite side to get a complete cleavage.

The 2 pieces of the nucleus lying in the anterior chamber are then expressed out by first inflating the anterior chamber with methylcellulose and then using a vectis to guide the nucleus fragment out of the eye; a sort of a vectis assisted viscoexpression, so to say. It is important that the vectis not be pressed up against the cornea, or severe keratitis may occur.The role of the vectis is mainly to depress the posterior lip of the incision and to guide the nuclear fragment out of the eye.



The Bhatti Prechop: Schematic

Aligning the nucleus fragment with it's long axis pointing towards the incision before attempting to remove it with the vectis is a small but important point of technique, which prevents the fragment from getting stuck in the incision.

What is the role of this technique in contemporary cataract surgery?

To define the role of this technique one must first try to analyze the possible motivations of the surgeon who uses or wishes to use this technique.

These motivations could be broadly divided into three groups:

1. Cost

2. Ease

3. Quality

1. Cost of surgery: Here this technique is obviously superior to most techniques used today. The only (and non recurring) cost specific to this technique is the cost of the prechopper itself.

2. Ease of surgery: The skills that have to be acquired before this surgery can be easily and speedily done are those of dislocating the nucleus into the Anterior chamber, the prechopping itself, and removing the split pieces from the anterior chamber. Contrary to what most surgeons may think, the hardest part of the technique is developing the vectis handling skills to slide the split pieces through a 5.5 mm incision without creating endothelial damage. The actual prechopping is easy to learn and the step of dislocating the nucleus into the anterior chamber, though harder, is one that most surgeons have already learned to apply to other phako and non phako techniques.

3. Quality of result:This is where the technique really comes into it's own. The technique is ideally suited for lateral incisions: both nasal and temporal. As most patients are old and already have some degree of against-the-rule astigmatism, the wound relaxation that invariably occurs with any incision in any technique, here has the advantage of neutralizing the against-the-rule astigmatism or in some cases actually inducing a with-the-rule astigmatism. Please note that this is a small incision technique (meaning that the incision size is about 5.5 to 6 mm). It is not ideally a sutureless technique and the best results are obtained by taking one 10-0 suture to prevent wound slippage. The wound may be secure enough from the anatomical point of view even without a suture, but best astigmatic results mandate a suture. The average surgically induced astigmatism in this technique is about 0.75D to 1 D.

In those cases with significant preexisting against-the-rule astigmatism, the technique may therefore give results superior to phakoemulsification with a foldable lens due to the possibility of neutralizing the preexisting astigmatism, by appropriately siting the incision. In cases with no preexisting astigmatism, phakoemulsification with a foldable IOL would be superior, because of its lesser surgically induced astigmatism.

As compared to phakoemulsifcation with a PMMA lens, this technique is superior all round, because like the former it allows incision sizes of 5.5 mm or so, but with lesser trauma, quicker execution and no limitation on incision position.In fact a right handed surgeon can sit at the head end and make superior incisions, or nasal incisions(for the left eye), and temporal incisions(for the right eye), with equal facility.

In conclusion, this technique is a safe and effective way for quick, atraumatic and cost effective cataract surgery, with low postoperative astigmatism.

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A copy of the video on the Bhatti prechop technique can be downloaded from the site www.bhattieye.com

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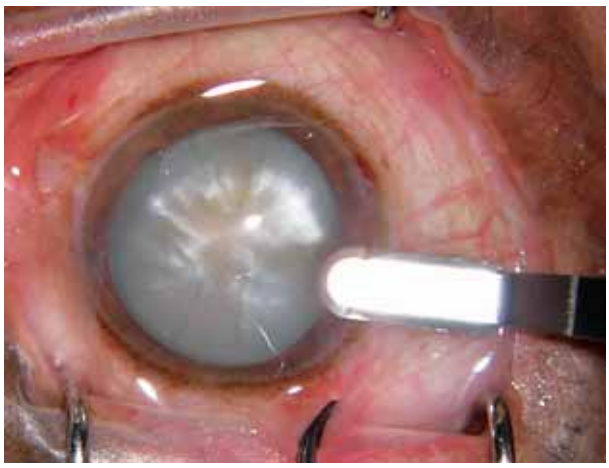
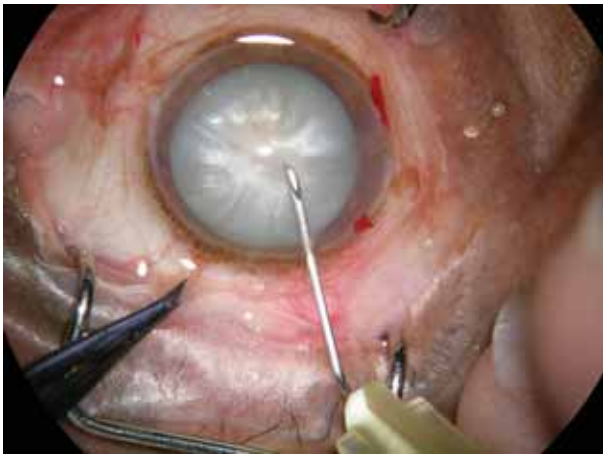
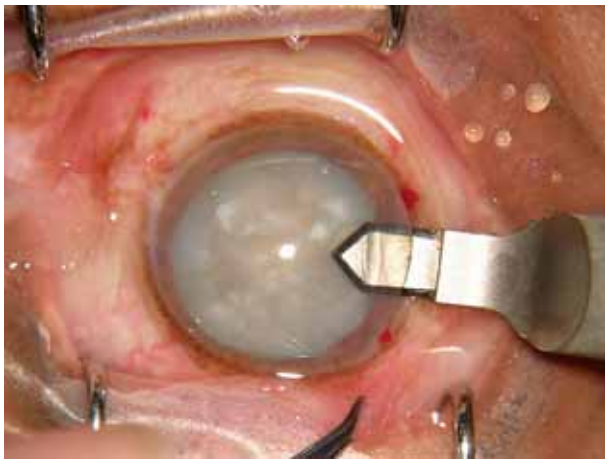


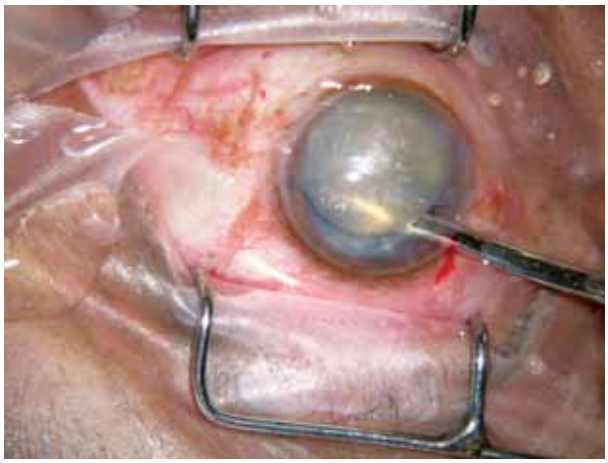
The corneal tunnel



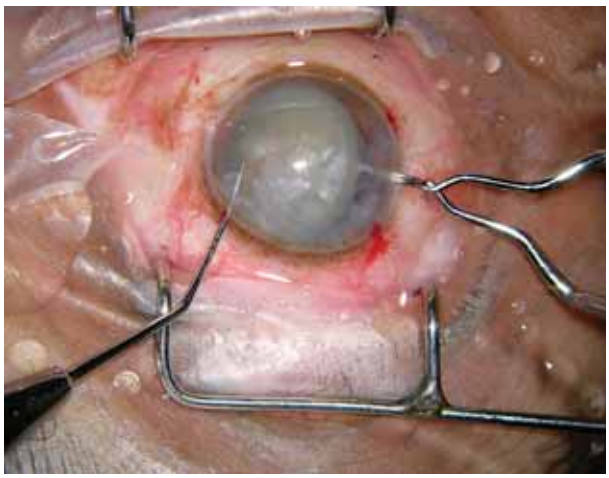
The capsulotomy



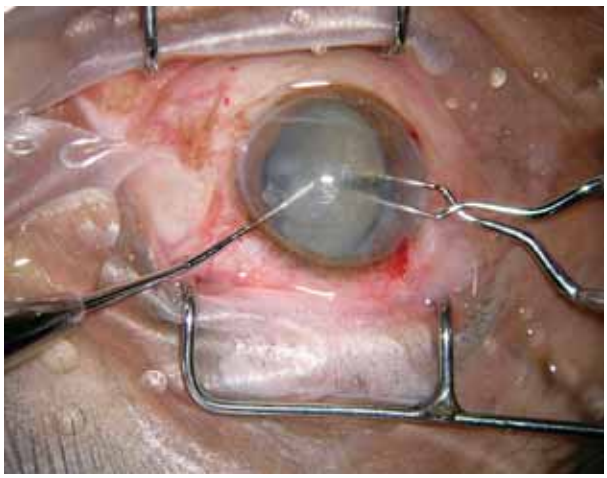
A 5.5 mm incision through the corneal tunnel



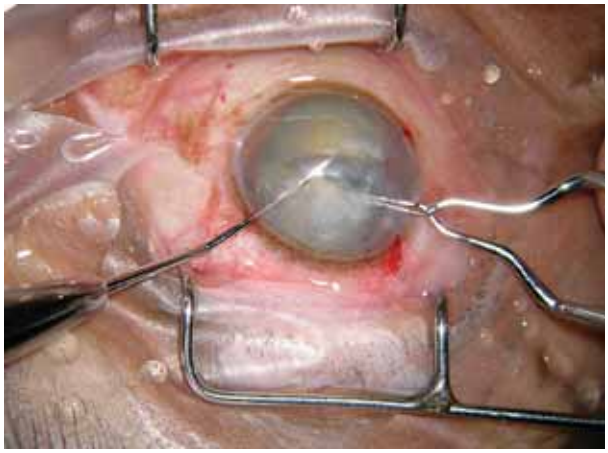
Nucleus subluxation in to the anterior chamber



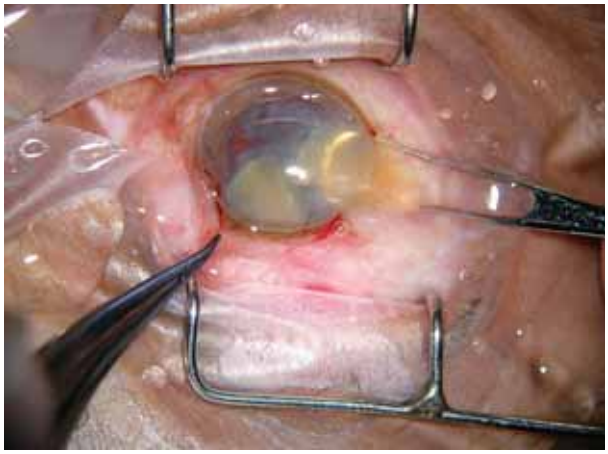
Prechopper inserted into the back of the nucleus, with a dialler pushing back the nucleus from the front



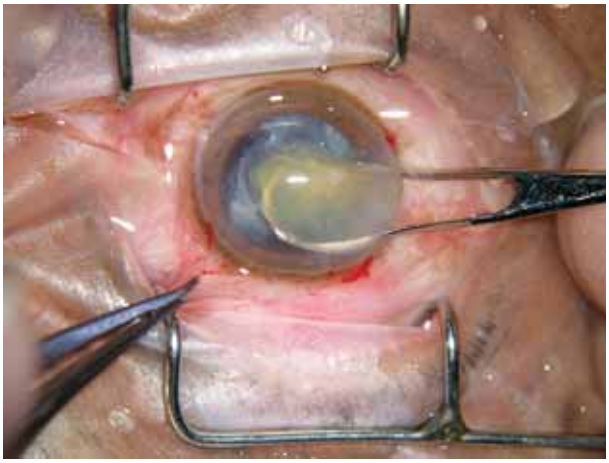
Prechopper blades separated to chop the nucleus



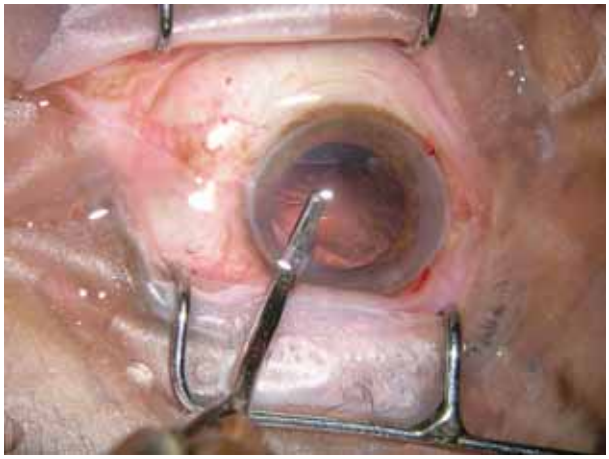
Prechopper and dialler used to further separate the chopped pieces and ensure complete separation



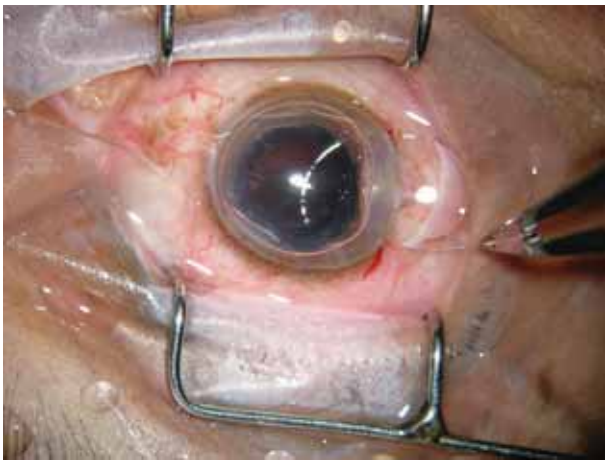
1st nuclear fragment removed with a vectis under copious viscoelastic



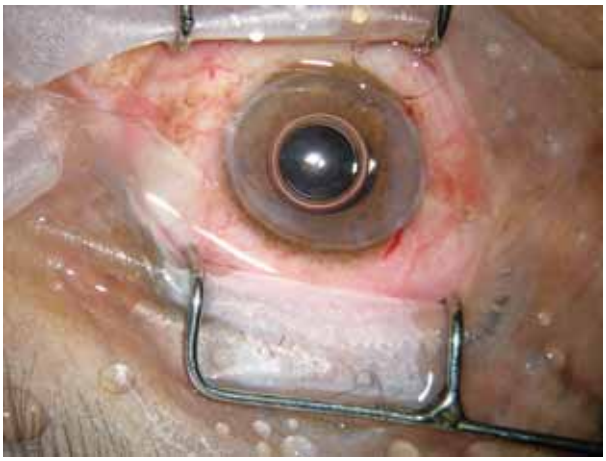
2nd nuclear fragment removed with a vectis



Irrigation-aspiration with a simcoe double barelled cannula



Lens insertion under air



Pupil constricted at the end of surgery