Viscoexpression technique in manual small incision cataract surgery

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Viscoexpression method of nucleus delivery in manual small incision cataract surgery is described in this article. The practical modifications to the conventional technique in special situations are presented. Intraoperative and postoperative problems likely to be encountered and the steps to avoid them and tackle them effectively are discussed.

Key words: Manual small incision cataract surgery, nucleus, viscoelastic

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Phacoemulsification has become a standard technique for cataract extraction. However, manual small incision cataract surgery (MSICS) is significantly faster, less expensive, and requires less technology.[1-3] Both phacoemulsification and MSICS achieve excellent visual outcomes with low complication rates.[1-3] Therefore, MSICS may be the preferred technique for cataract surgery in the developing world.[1-3] Nucleus management remains the most challenging part of the procedure. Atraumatic nucleus delivery through the sclerocorneal tunnel is important for a good outcome. Viscoexpression technique of nucleus delivery in MSICS is discussed in this article.

Viscoexpression

The nucleus in the anterior chamber can be delivered out of the sclerocorneal pocket incision by a variety of techniques. Viscoexpression is one of the nucleus delivery techniques of MSICS. The basic steps of MSICS[4] such as the incision, capsulorrhexis, hydro procedures, and nuclear prolapse into the anterior chamber are similar irrespective of the nucleus delivery technique used. The nucleus epinuclear complex must be free and in the anterior chamber, before nucleus delivery is attempted.

Technique

Viscoelastic is injected initially through the tunnel in the space between the nucleus and the corneal endothelium. Subsequently, the cannula (23 G) is passed below the nucleus and its tip is positioned 180 degrees away from the tunnel incision, i.e., at 6 o'clock for a 12 o'clock incision. Viscoelastic is injected to fill the anterior chamber and raise the intraocular pressure. This causes the chamber to deepen and pushes the nucleus towards the incision. Simultaneously, posteriorly directed pressure over the scleral incision with the cannula opens the tunnel and causes the nucleus to engage into the tunnel. Continuous injection maintains the chamber under pressure and forces outward nuclear movement. If the tunnel is adequately large, the expression can be done with continued injection, keeping the cannula in the anterior chamber. In hard nuclei or if a smaller incision is made, the cannula has to be withdrawn as the nucleus gets tightly impacted into the tunnel. A wire vectis or the viscoelastic cannula itself can then be used to place pressure over the sclera posterior to the incision without actually going into the tunnel or into the anterior chamber. This pressure helps the nucleus to glide outwards further through the tunnel. Nucleus delivery can be completed this way by applying intermittent pressure. Nucleus delivery is followed by a gush of epinuclear material and viscoelastic. The anterior chamber often shallows following this decompression. A sudden decompression especially when the cannula is in the chamber is not proper, as it may cause a posterior capsular rent or corneal endothelial damage. Residual epinuclear and loose cortical material can then be again viscoexpressed in a similar way, to make the next step of irrigation aspiration easier.

Choice of viscoelastic

Hydroxypropylmethylcellulose (HPMC) 2% is the preferred viscoelastic used for viscoexpression. A small amount of chondroitin–sodium hyaluronate can be used to coat and protect the endothelium before the viscoexpression procedure in cases with compromised endothelium. Wright *et al*.[5] have suggested the use of viscoelastic in small incision surgery to reduce the endothelial cell loss. Although results of surgery (with regards visual outcome and astigmatism) with an anterior chamber maintainer without viscoelastic were comparable to that of other methods, they demonstrated high endothelial cell loss in their series. The mean central and superior endothelial cell losses at 3 months postoperatively were 16% and 22%, and at 12 months postoperatively were 20% and 25%, respectively.

Intraoperative problems with this technique

(a) Failure of the nucleus to engage in the tunnel: Pressurizing the chamber 180 degrees opposite the tunnel is critical so that the flow of the excess viscoelastic towards the incision site pushes the nucleus towards the incision site. Side pockets must be adequate to ensure that a large nucleus can be engaged and then be squeezed out through a smaller external opening. Soft nuclei with an epinuclear shell are easier to engage, as the soft shell helps to seal off the internal

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incision and aids engagement. Hard nuclei (with no soft shell) may not seal the internal opening as well and may cause leakage of viscoelastic through the edges of the tunnel and lead to a failure to build up the intraocular pressure. In hypermature cataracts, there is no epinuclear shell and the nuclear edges are smooth and hard. Viscoexpression may become difficult as the nucleus here often fails to engage into the tunnel. Posterior pressure over the scleral pocket incision is essential to open the tunnel and give the nucleus a chance to be engaged. In case the internal incision is smaller than the nuclear size, an enlargement with a keratome is advisable. Struggling through a small incision may damage the endothelium.

(b) Iris prolapse: A poorly created tunnel, a premature entry, positive pressure or a floppy iris may cause intraoperative iris prolapse and hence a very difficult nucleus delivery. The nucleus edge near the incision site is often trapped below the iris and forcible viscoexpression can cause iridodialysis and bleeding from the angle. We must ensure that the nucleus is completely in the anterior chamber and is free from all the surrounding structures. A proper mydriasis before surgery is essential.

(c) Failure to deliver: Sometimes because the internal incision is adequate but the external incision is too small the engaged nucleus may be difficult to deliver out. In these situations, either the external incision is enlarged or alternatively the nucleus can be removed piecemeal. The nucleus part visible outside is sliced off with a cystitome. The nucleus is pushed back into the anterior chamber and rotated 90 degrees and the viscoexpression is repeated. The nucleus usually delivers out because of a reduction in its dimensions; however, the same step could be repeated if needed.

(d) Fish mouthing: In black cataracts, the nuclear thickness may be more than what the tunnel can open up and accommodate. Excessive stretching to accommodate causes fish mouthing at the edges of the tunnel causing a loss of viscoelastic and shallowing of the anterior chamber. Viscoexpression may fail in such situations.

(e) Two percent HPMC from different manufacturers may have different viscosities. Low viscosity HPMC may make viscoexpression difficult. The viscosity may also go down if the viscoelastic has not cooled down after autoclaving. Use of a thinner cannula may slow the flow of viscoelastic and make viscoexpression difficult.

(f) Corneal endothelial damage: During nucleus removal, instruments should be kept away from the cornea and should not push the nucleus against the cornea. Posterior pressure will help to open the incision for easier nucleus delivery. In addition, gently pulling the bridle suture makes nucleus delivery through the tunnel easier.[6] There should always be a layer of viscoelastic between the cornea and the nucleus.

References

1. Tabin G, Chen M, Espandar L. Cataract surgery for the developing world. Curr Opin Ophthalmol 2008;19:55-9.
2. Gogate P, Deshpande M, Nirmalan PK. Why do phacoemulsification? Manual small-incision cataract surgery is almost as effective, but less expensive. Ophthalmology 2007;114:965-8.
3. Ruit S, Tabin G, Chang D, Bajracharya L, Kline DC, Richheimer W, *et al*. A prospective randomized clinical trial of phacoemulsification vs manual sutureless small-incision extracapsular cataract surgery in Nepal. Am J Ophthalmol 2007;143:32-8.
4. Thomas R, Kuriakose T, George R. Towards achieving small-incision cataract surgery 99.8% of the time. Indian J Ophthalmol 2000;48:145-51.
5. Wright M, Chawla H, Adams A. Results of small incision extracapsular cataract surgery using the anterior chamber maintainer without viscoelastic. Br J Ophthalmol 1999;83:71-5.
6. Gurung R, Hennig A. Small incision cataract surgery: Tips for avoiding surgical complications. Community Eye Health 2008;21:4-5.

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