**NUCLEUS DROP**

Proper management of a posterior capsular rent is vital to avoid complications

_by Soosan Jacob MD_

When a posterior capsule rupture (PCR) is noted prior to nucleus removal, the aim of the surgery should be to try and remove the nucleus in a safe manner without allowing any pieces to drop into the vitreous (Fig 1A). Various techniques have been described to try and prevent a nucleus drop after PCR. This includes innovative techniques such as the HEMA lifeboat proposed by Dr Keiki Mehta, phacoemulsification using a Sheer’s glide etc.

The IOL. Scaffold described by Prof Amar Agarwal is a technique recently introduced for utilising in such a situation. This involves utilising an IOL as a scaffold beneath the nuclear pieces to prevent them from falling into the vitreous cavity. This technique is suitable for retained fragments up to semi-nuclei or soft whole nuclei. In case of large hard nuclei, removal of the fragments via an extended corneal section is still preferred.

When a PCR is noted, it is essential not to reflexively pull out the phaco probe in a panic. The second hand should be used to instil a dispersive viscoelastic into the anterior chamber via the side port before withdrawing the probe. This prevents a sudden shallowing of the anterior chamber, extension of the posterior capsular rent and vitreous loss.

In case of a PCR with an intact anterior hyaloid face, a breach in the hyaloid face may be prevented by this simple step. The dispersive OVD is also instilled over the rent with the dual objective of preventing further vitreous loss as well as to act as a scaffold to prevent nuclear fragments from falling posteriorly into the vitreous cavity. The fragments may be further tackled by IOL scaffolding, depending on the size and density of the nucleus.

In this technique, the nuclear pieces are first brought up into the anterior chamber and placed temporarily over the iris prior to phacoemulsification. Preservative-free triamcinolone acetonide is then used to stain the vitreous, and anterior vitrectomy is performed using low flow settings. Epinucleus and cortex aspiration are carried out using the vitrector probe, switching between cutting and aspiration modes (Fig 1B, C, D). Adequacy of capsular sulcus support is assessed.

The IOL is then pre-placed and utilised as a scaffold after coating the cornea with dispersive viscoelastic. This is done after enlarging the main port minimally to allow the leading haptic of the IOL to be injected gently and in a controlled manner into the anterior chamber over the iris and under the nuclear fragments. While injecting, the injector tip should be placed within the anterior chamber and wound assisted implantation should be avoided to prevent uncontrolled entry and consequent drop of the IOL into the vitreous. A globe stabilisation rod may also be placed through the side port under the IOL optic to stabilise the IOL as it unfolds in the anterior chamber (Fig 2A).

In cases with a good pupillary tone and a pupillary size between 5.0 to 6.0mm, the second haptic may also be placed over the iris under the nucleus fragment (Fig 2B). If not, and in cases of floppy iris syndrome, the second haptic is allowed to trail outside the eye through the main port and the surgeon centres the optic over the pupil by engaging it at the haptic-optic junction using a dialler.

The nuclear fragments are then emulsified over the optic, which acts as a scaffold and prevents fragments from falling down while being emulsified (Fig 2C,D). The optic also compartmentalises the eye and prevents vitreous from further prolapsing into the anterior chamber or getting aspirated into the phaco probe during emulsification. It further acts to divert the irrigation fluid away from the vitreous cavity thus preventing hydration and prolapse of the vitreous. The torn posterior capsule is kept safely away from the phaco probe and chances for the anterior capsular remnants getting accidentally aspirated into the phaco probe are decreased. Once the fragments are emulsified, the IOL is dialled into the sulcus and any further anterior vitrectomy if required is performed.

If capsular support is not adequate for sulcus fixation of the IOL, the IOL scaffold technique can still be performed and the IOL can be secondarily fixated to the sclera via a glued IOL technique. In this case, diometrically opposite lamellar scleral flaps are created at the beginning of surgery and the IOL scaffold technique as described previously is then proceeded with. Once the nuclear fragments have been removed, 20-gauge sclerotomy by the scleral flaps and the haptics of the IOL are exteriorised under the scleral flaps using the handshake technique. They are then tucked using the Scharioth intra-scleral tuck into 26-gauge tunnels made at the edge of the scleral flaps and the flaps are sealed with glue.

Fig 1A: A posterior capsular rent is seen with retained cortex, epinucleus and a retained nuclear fragment. Flaps seen are for later fixation of a glued IOL due to the absence of an adequate capsular support in this case.

Fig 1B: The vitrector probe is used to perform anterior vitrectomy and remove cortex and epinucleus by alternating it between cutting and aspiration modes. The vitrectomy may also be introduced through a corneal incision.

Fig 1C: The nucleus is supported by the vitrector and is brought forwards into the anterior chamber by posterior assisted levitation.

Fig 1D: The nucleus is placed temporarily on the iris surface before proceeding with the IOL scaffold technique.

Fig 2A: The IOL is injected gently over the iris while a globe stabilisation rod stabilises it from below. The leading haptic is placed on the iris and the second haptic is allowed to trail outside the corneal incision.

Fig 2B: In case of pupils with a good tone and a size between 5-6mm, the second haptic may also be placed over the iris underneath the nuclear fragment.

Fig 2C: The IOL acts as a scaffold supporting the pieces during emulsification and preventing drop into the vitreous cavity.

Fig 2D: The IOL scaffold also acts as a barrier and decreases vitreous hydration and prolapse, vitreous aspiration into the phaco probe as well as unintentional damage to the capsular remnants during emulsification. After nucleus emulsification, the haptics are dialled into the sulcus or secondarily fixated depending on the degree of capsular support.

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