

Posterior Capsular Tear

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Abstract

Cataract surgery is one of the most performed ocular surgeries. It is normally a safe procedure to have. Cataract surgery needs good training for the junior surgeon to master the technique and avoid the common intraoperative complication. One of the most common and dreadful complications of cataract surgery is posterior capsular tear.

Keywords: Posterior; Capsular; Tear; Vitreous; Loss

Introduction

Posterior capsular tear is the most common significant intraoperative complication during cataract surgery. It is one of the complications that is most likely to change the outcome of surgery and the steps following its occurrence. Not only that it dictates certain intraoperative interferences, it also dictates certain additional postoperative care. It is known that posterior capsular tear can be associated with increased risk of dropped nucleus as well as postoperative endophthalmitis, Cystoid macular edema and even retinal detachment [1]. In a sense the incidence of posterior capsular tear is used as a method of assessing the quality of training and level of control a surgeon has in cataract surgery. Although this is true, capsular tears can sometime occur for reasons outside the control of even the most experienced surgeons. It is ideal to try the best to stop the occurrence of this ominous complication but it is also very wise to be good at preventing what can be caused by the occasional inevitable posterior capsular tear. Although cataract surgery was originally employed to remove an opaque lens, it is now considered a refractive surgery as well where expectations of near perfect eyesight postoperatively are on the rise.

Eyes at More Risk of Posterior Capsular Tear

Identification of the eyes more likely to have capsular rupture is a very important step in prevention of its occurrence. A trainee surgeon should avoid operating on these eyes until confident enough with the equipment as well as the procedure. Pseudo exfoliation [2] is one of the conditions associated with increased risk for posterior capsular rupture. White or dense cataracts are also harder to perform without the risk of inducing a tear in the posterior capsule. The size of the pupil is also a factor that should be considered for assessing the suitability of a case to be performed by a junior surgeon as small pupils can be a risk factor for rupture of the posterior capsule. Subluxated lens such as in Marfan syndrome is another risk factor [3]. Intraoperative Floppy iris syndrome, high Myopia, diabetes mellitus should be avoided by the junior surgeon at the beginning of their training. Also local

inflammation and structural changes of the vitreous also affect the potential for posterior capsule rupture during cataract surgery.

Stages where the Eye is at More Risk of Posterior Capsular Tear

Stages where eye is more likely to get posterior capsular rupture are removal of cortical material as well as removal of the last piece of nucleus. The capsule is most vulnerable when the bulk of the nucleus is aspirated out of the eye allowing the posterior capsule to be withdrawn towards the phacotip. It is advisable at this stage of surgery to reduce the vacuum and fluid setting as well as using a second instrument to avoid getting the posterior capsule drawn into the tip [4].

Capsulorhexis and Risk of Extension

It is wise to consider that there is still risk involved even if high risk factors are not there. Those risks are more related to the technique the surgeon follows as well as the phacodynamics. Irregular capsulorhexis or extension of a radial tear posteriorly can result in a tear of the posterior capsule. To this extent, it is essential for cataract surgeon to control capsulorhexis as it is the single step that controls the rest of the procedure. Capsulorhexis on a small pupil can be challenging as posterior extension can occur without noticing it. In those at-risk eyes, it is essential to try whatever is possible to prevent extension of anterior capsular tear. Certain maneuvers should be utilized to prevent such extension such as; high molecular weight viscoelastic, use of anterior capsule dyes such as Trypan blue, two stage capsulorhexis, frequent aspiration of liquefied cortical matter in cases of white cataract and use of retroillumination and/or Vannus scissors. Also, irregular capsulorhexis can extend posteriorly at the time of hydrodissection or hydrodelineation. Gentle injection of small amount of fluid should help avoid such a complication. Rotation of the nucleus should be avoided in case of irregular capsulorhexis or the presence of posterior extension of an anterior capsular tear.

Preventing a Posterior Capsular Tear

Surgeon should be aware of certain signs especially in at risk eyes in order to early detect capsular rupture. This can prevent vitreous loss or

dislocation of lens fragments. In such cases remedial actions should be taken.

At the first sight of the tear getting directed backward toward the zonules while performing anterior capsulotomy, surgeon should inject high viscosity OVD in order to direct the flap to its intended path. However, if this did not work, surgeon should try and flatten the flap by unfolding it. They then should pull the flap to the opposite direction and while under tension towards the center of the lens [5]. If this fails to bring the flap into its intended path, capsulotomy should be started at a new location and then reunited with the other end of the advancing original tear. In case the whole lens moves when the surgeon pull on the flap this means that the anterior zonular fibers are bridging the tear and surgeon should exert any more traction on the flap. A technique has been described to cut the anterior zonular fibers bridging the anterior capsular tear while the flap is under traction. This should only be performed under direct visualization of the tear and anterior zonules.

What to do when a Tear Develops

As a first step if posterior capsule rupture is suspected, aspiration and ultrasound power should be stopped. The hand piece should be kept inside the anterior chamber with the irrigation on. Cohesive viscoelastic should be injected into the anterior chamber through the side port before withdrawing the hand piece from the eye.

The situation should be assessed whether the nucleus is still intact, a quadrant remains or only some cortex is left. The dynamic of fluids into and out of the eye during phacoemulsification should be kept to a minimum to avoid inadvertent increase anterior chamber pressure. This includes lowering the bottle as well as using minimal aspiration of fluid to maintain anterior chamber depth. A lens glide can be used to maintain the nucleus in the anterior chamber. In case additional phacoemulsification is still needed short burst of ultrasound power as well as low vacuum is essential to avoid any enlargement of the tear.

How to Deal with Last Piece of Nucleus if Posterior Capsular Tear Occurs

Removal of remaining cortical matter after posterior capsular rupture needs certain precautions to avoid making the tear even larger. Dry manual aspiration is the safest way to remove cortical material with the anterior chamber. However, both automated and manual irrigation and aspiration can be utilized. In case automated irrigation and aspiration is chosen as a way to remove remaining cortical matter, the infusion bottle should be low in order to avoid fluid turbulence which in turn would increase the size of the tear. Now the choice between coaxial or bimanual irrigation and aspiration should be in favor of the latter as the aspiration port is always directed upward which can help avoid pulling on the capsule. Cortical material should

be engaged before try aspirating as this will help avoid losing viscoelastic which in turn would promote vitreous prolapse. In all events it is extremely wise to avoid removing difficult cortical remains. The main objective here is to clear as much of the visual axis as possible and to leave behind any difficult pieces.

Vitreous loss is one the most undesired outcomes by most cataract surgeons. Vitreous can be easily visualized when in doubt using Kenalog suspension [6]. When it is seen it is ideal to clear all the vitreous in the anterior chamber to avoid corneal touch, vitreous wick or distortion of the pupil. Those are features that remain in the eye and are normally unsightly for any ophthalmologist or optometrist assessing the eye following surgery. It is also advisable to close the corneal wound with a single removable stitch rather than to leave the cornea to heal on its own. This simple stitch reduces the likelihood of more vitreous being drawn towards the wound with the loss of aqueous fluid through a leaky wound.

Prevention of extension of posterior capsular tear by converting it to posterior capsulorhexis is a wise step normally taken by experienced surgeons. This helps, in addition to keeping the tears the smallest possible, the subsequent insertion of in the bag lens implantation.

Conclusion

When it is about to believe how safe cataract surgery is we get reminded by how things can go wrong just by the simple development of a tear in the lens capsule. These tears can develop sometimes with the junior surgeon and sometimes with the most experienced surgeons. This simple tear can change the course of an operation going really well. It is essential to know which eye to avoid as a junior surgeon and which eye to gift to the more gifted surgeon. The golden rule in posterior capsular tear for any surgeon is not to panic, deal with the current situation and get the best out of it.

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