Corneal Graft Rejection After Posterior Capsulotomy

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This report reviews 3 patients with pseudophakia who developed corneal graft rejection after undergoing Q-switched neodymium:yttrium-aluminum-garnet laser posterior capsulotomy for posterior capsular opacification. All patients had previously undergone a combined procedure of extracapsular cataract extraction with posterior chamber intraocular lens implantation in the capsular bag. Both the beneficial optical effects and the potential adverse effects should be carefully considered prior to performing neodymium:yttrium-aluminum-garnet laser posterior capsulotomy in patients with corneal graft. It is suggested that all efforts should be made for meticulous control and early intensive treatment of the inflammation and the intraocular pressure increment in patients with pseudophakia with corneal graft who require neodymium:yttrium-aluminum-garnet laser capsulotomies to improve the outcome of corneal grafts.

Key words: Cataract extraction, Intraocular pressure, Lasers, Lenses, intraocular, Pseudophakia

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Case Report

Three patients with pseudophakia who developed corneal graft rejection after undergoing Q-switched neodymium:yttrium-aluminum-garnet (Nd: YAG) laser posterior capsulotomy for posterior capsular opacification were retrospectively reviewed. All patients had previously undergone a combined procedure of extra-capsular cataract extraction with posterior chamber intraocular lens (IOL) implantation in the capsular bag.

The mean age of the patients was 62.00 ± 4.95 years (range, 55.00 to 69.00 years).The mean rejection-free graft survival time was 18.00 ± 4.24 months. The mean number of laser bursts was 19.66 ± 1.41. The mean power used for capsulotomy was 2.5 milijoule per pulse The visual results were encouraging for all of the eyes. The mean pre- and post-capsulotomy visual acuities were 0.23 ± 0.07 and 0.43 ± 0.07 using the Snellen chart, respectively. The mean refractive level of the eyes were -3.67 ± 0.35 D, which did not significantly change after capsulotomy.

All patients received 1 drop of apraclonidine hydrochloride 0.5% (lopidine) 30 to 60 minutes before and then after Nd:YAG capsulotomy. Intraocular pressure (IOP) was measured preoperatively before administration of lopidine and at 1, 3 and 24 hours, 1 week, and 1 month postoperatively. No significant IOP elevations occurred within 24 hours of the Nd:YAG capsulotomy. The maximum IOP was detectable within 3 hours of treatment in all the eyes, which were all found to be less than 25 mm Hg. The average maximum induced IOP rise was 1.4 mm Hg and this occurred within 1 hour of the capsulotomy. Inflammation was successfully treated with a combination of dexamethasone acetate 0.1% drops and diclofenac sodium 0.1%. A β-blocker and an oral carbonic anhydrase inhibitor were used for 1 week to prevent a secondary increase in IOP.

Acute corneal graft rejection was noted in these patients from 4 weeks to 4 months after posterior capsulotomy, with a mean time of 3 months.

Discussion

The success rate for corneal transplants, for which a history goes back for more than 150 years, is in excess of 90% for uncomplicated cases.[1] Large graft wound size and human leukocyte antigen (HLA)-A, -B incompatibility are associated with failures following an immune reaction.[2] In addition, a history of prior glaucoma or uveitis, vitreous surgery with the graft, and a repeat graft in the treated eye increases the risk of failure.[2] This report discusses the complications of Nd:YAG laser capsulotomy and addresses the possible role of Nd: YAG laser posterior capsulotomy in corneal graft rejection.

Posterior capsule opacification, caused by fibrosis or pearl formation, commonly occurs following cataract surgery. The Nd:YAG laser is commonly used in ophthalmology, mainly for posterior capsulotomy in patients with secondary cataract after extracapsular cataract extraction. Cystoid macular oedema and glaucoma,[3] lens pitting and bleeding, damage to the intraocular lens, rupture of the anterior hyaloid face with forward displacement of vitreous into the anterior chamber, rhegmatogenous retinal detachment, and transient laser-induced haemorrhage[4] have been previously reported. Several studies have claimed that

Nd:YAG laser capsulotomy does not appear to increase the risk of corneal graft rejection.[5,6] Neither the inflammatory process itself nor the round white keratic precipitates had a deleterious effect on the central corneal endothelial cell densities.[7] There is no significant correlation between central corneal endothelial cell loss and the laser energy used, pseudophakic status (posterior chamber IOL versus no IOL), size of capsulotomy, vitreocorneal touch, or preoperative corneal endothelial cell density.[8]

Some other studies showed that the Nd:YAG laser treatments for both iridotomy and capsulotomy may act as a stimulus for an accelerated loss of endothelial cells.[9] Corneal graft rejection was observed in 3 patients after the procedure of Q-switched Nd-YAG laser posterior capsulotomy. Inflammation might be explained by chronic irritation of the ciliary body by a displaced haptic or by an immune reaction triggered by damage to the ciliary body at the time of excessive posterior capsulotomy.[10] It has been demonstrated that the release of calcitonin gene-related peptide into the aqueous humour following Nd:YAG laser capsulotomy partly causes the increase in IOP and disruption of the blood-aqueous barrier in this irritative response.[11] Corneal endothelial cell loss may result from endogenic causes such as acute angle closure glaucoma or exogenic causes such as corneal contusion, corneal perforation, or surgery involving the anterior chamber.[12] The degree of tissue damage was inversely proportional to the distance from the site of the optical breakdown, and the damage pattern at a given distance was the same whether the optical breakdown was anterior or posterior to the corneal endothelium.[13] Results indicate that, especially on a high setting, the laser energy can cause injury and destruction of endothelial cells and alterations in Descemet's membrane.[14]

Despite wide clinical use of the Nd:YAG laser, little is known about its damaging effects on the ocular tissues, particularly on the corneal endothelium. Advances in IOL designs, intracapsular rings, and elimination of lens epithelial cells by pharmacological means such as an immunotoxin specific for human lens epithelial cells at the time of surgery may prevent the formation of posterior capsular opacification.[15] Both the beneficial optical effects and the potential adverse effects should be carefully considered prior to performing Nd:YAG laser posterior capsulotomy in patients with corneal graft. It is suggested that all efforts should be made for meticulous control and early intensive treatment of the inflammation and the IOP increment in patients with pseudophakia with corneal graft who require Nd:YAG laser capsulotomies to improve the outcome of corneal grafts.

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