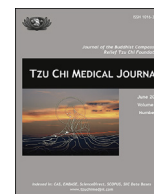




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Case Report

Neovascular glaucoma following Nd:YAG laser capsulotomy in a patient with diabetes and syphilitic uveitis

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ABSTRACT

A diabetic woman had been suffering from progressively blurry vision in the right eye for 1 year after cataract surgery. Slit lamp examination revealed bilateral band keratopathy with quiescent anterior-chamber reaction, an intumescent cataract in the left eye, and dense posterior capsular opacity in the right eye. Capsulotomy was performed, but this led to neovascular glaucoma. Because of a refractory elevation in intraocular pressure, trabeculectomy with mitomycin C treatment, vitrectomy with pan-retinal photocoagulation, and intravitreal injection of bevacizumab were performed. A positive rapid plasma reagin test and a positive *Treponema pallidum* hemagglutination assay led to the impression of syphilitic uveitis, and the patient was treated with intravenous penicillin for 2 weeks. The visual acuity of the right eye was 0.1 at the 12th-month follow up. This case shows that neovascular glaucoma may present as a complication of capsulotomy in uveitic/diabetic eyes.

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1. Introduction

Opacification of the posterior capsule (PCO) is the most common complication of cataract surgery in uveitis patients [1,2]. In such patients, the incidence of PCO is 14.2% to 58% with extracapsular cataract extraction [3,4] and 23.7% to 62% with phacoemulsification [1,2,5–7]. Visual function is highly adversely affected by PCO [8,9]. Capsulotomy by Nd:YAG laser is the gold standard for restoring better visual acuity in patients with PCO. Capsulotomy is considered a relatively safe procedure, but it still has several complications. These include a sudden increase in intraocular pressure (IOP), long-term IOP elevation [10–13], iris hemorrhage [14], cystoid macular edema [12,15,16], posterior vitreous detachment [17], retinal breaks/detachment [18–20], and aqueous misdirection syndrome [21,22]. Neovascular glaucoma (NVG) rarely occurs as a complication of capsulotomy [23]. Here, we present a case of NVG following Nd:YAG capsulotomy involving a patient with diabetes and syphilitic uveitis.

2. Case Report

A 68-year-old woman with diabetes, who had sight in one eye, visited our clinic due to progressively blurry vision in her right eye for 1 year. She had lost the vision in her left eye at the age of 17 due to an unknown cause. She had undergone cataract surgery of the right eye 1 year previously at another hospital. On examination, the corrected visual acuity was 0.05, and hand motion was at 10 cm for the left eye. Right- and left-eye IOP was 17 mmHg and 16 mmHg, respectively. Biomicroscopy showed mild band keratopathy with quiescent anterior-chamber reaction in both eyes and an intumescent cataract in the left eye. In addition, there was a superior sclerocorneal incision scar and partial iris defect with a large and up-drawn pupil in the right eye. Careful examination did not reveal even the slightest rubeosis. The intraocular lens was surrounded by a fibrotic capsule with dense PCO behind; this PCO hindered a clear and detailed fundus examination. Therefore, Nd:YAG laser capsulotomy was performed. However, blood gushed from the small capsulotomy right after the second laser shot. When the hyphema resolved 5 days later, prominent neovascularization of the iris and an elevated IOP of up to 31 mmHg were noted (Fig. 1). Gonioscopy revealed hyperpigmentation of the trabecular meshwork and some peripheral anterior synechiae. Fluorescein angiography failed to provide clear images due to the PCO with a small opening and the

Conflict of interest: none.

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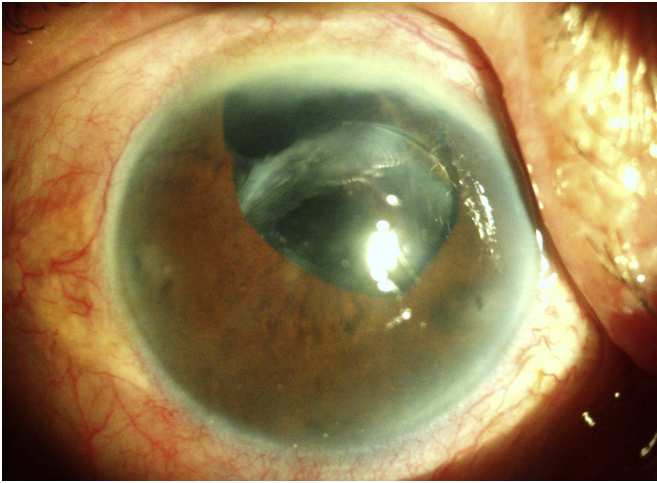


Fig. 1. Five days after Nd:YAG laser capsulotomy, when the hyphema resolved, prominent neovascularization of the iris can be seen.

presence of faint vitreous hemorrhage. Topical timolol, dorzolamide, and brimonidine were prescribed, and intravitreal injection of bevacizumab was performed. Because of persistently high IOP, combined surgery, including trabeculectomy with mitomycin C, pars plana vitrectomy with panretinal photocoagulation, and intravitreal injection of bevacizumab, was performed 2 weeks after the capsulotomy. IOP returned to within normal limits post-operatively. Repeated fluorescein angiography revealed leakage of sclerotic vessels and patches of macular ischemia. A rapid plasma reagin test and a *Treponema pallidum* hemagglutination assay showed positive responses. Under the impression of syphilitic uveitis, the patient was treated with intravenous penicillin for 2 weeks. The visual acuity of the right eye was 0.1 at the 12th-month follow up.

3. Discussion

Neovascular glaucoma, which usually results from diabetic retinopathy, ischemic central retinal vein occlusion, or ocular ischemic syndrome, rarely occurs following capsulotomy [23]. Capsulotomy increases the risk of NVG in diabetic eyes [24–26]. A retrospective review has shown that NVG develops more often in diabetic eyes that have undergone extracapsular cataract extraction with capsulotomy than in those without capsulotomy [24]. Weinreb et al [25] reported that NVG occurred after capsulotomy in three diabetic patients who had undergone panretinal photocoagulation before uncomplicated extracapsular cataract extraction.

Most of the vascular endothelial growth factors (VEGFs) in the eyes are released from the ischemic retina, and the concentration of VEGFs in the vitreous fluid is much higher than that in the aqueous humor during ocular neovascularization [27]. An intact posterior capsule acts as an anatomical barrier that confines VEGFs to the posterior segment; this confinement prevents the spread of VEGFs into the anterior segment and hence the neovascularization of the iris and angle [28]. Nd:YAG laser capsulotomy breaks this anatomical barrier and carries the risk of NVG in patients with ischemia or inflammation of the posterior segment.

NVG following capsulotomy in a uveitis patient has been reported [4]. Infection with *T. pallidum* increases angiogenesis, which is mediated in part by an increased production of various angiogenic factors [29]. Our patient had diabetes and syphilis uveitis and thus carried a high risk of NVG. However, capsulotomy is nearly inevitable when patients develop PCO with significantly decreased

visual acuity. Prevention of PCO formation might be a better way to avoid NVG following capsulotomy. Phacoemulsification instead of extracapsular cataract extraction [30]; the use of acrylic intraocular lenses [31]; the removal of any retained lens fragment [32]; posterior capsule polishing to remove any residual debris, leaving the eye as clean as possible; complete removal of viscoelastics [31]; and aggressive control of intraocular inflammation are key steps to avoiding PCO formation.

From this case we have learned that capsulotomy may result in NVG in uveitis/diabetes patients, even in seemingly quiescent eyes. Ophthalmologists should keep this possible complication in mind. A careful ocular examination and thorough patient counseling may be essential before Nd:YAG laser capsulotomy in the treatment of uveitis/diabetes patients.

References

- [1] Elgohary MA, McCluskey PJ, Towler HM, Okhravi N, Singh RP, Obikpo R, et al. Outcome of phacoemulsification in patients with uveitis. *Br J Ophthalmol* 2007;91:916–21.
- [2] Ram J, Gupta A, Kumar S, Kaushik S, Gupta N, Severia S. Phacoemulsification with intraocular lens implantation in patients with uveitis. *J Cataract Refract Surg* 2010;36:1283–8.
- [3] Chung YM, Yeh TS. Intraocular lens implantation following extracapsular cataract extraction in uveitis. *Ophthalmic Surg* 1990;21:272–6.
- [4] Krishna R, Meisler DM, Lowder CY, Estafanous M, Foster RE. Long-term follow-up of extracapsular cataract extraction and posterior chamber intraocular lens implantation in patients with uveitis. *Ophthalmology* 1998;105:1765–9.
- [5] Suresh PS, Jones NP. Phacoemulsification with intraocular lens implantation in patients with uveitis. *Eye* 2001;15:621–8.
- [6] Estafanous MF, Lowder CY, Meisler DM, Chauhan R. Phacoemulsification cataract extraction and posterior chamber lens implantation in patients with uveitis. *Am J Ophthalmol* 2001;131:620–5.
- [7] Kawaguchi T, Mochizuki M, Miyata K, Miyata N. Phacoemulsification cataract extraction and intraocular lens implantation in patients with uveitis. *J Cataract Refract Surg* 2007;33:305–9.
- [8] Hayashi K, Hayashi H, Nakao F, Hayashi F. Correlation between posterior capsule opacification and visual function before and after neodymium:YAG laser posterior capsulotomy. *Am J Ophthalmol* 2003;136:720–6.
- [9] Buehl W, Sacu S, Findl O. Association between intensity of posterior capsule opacification and visual acuity. *J Cataract Refract Surg* 2005;31:543–7.
- [10] Richter CU, Arzeno G, Pappas HR, Steinert RF, Puliafito C, Epstein DL. Intraocular pressure elevation following Nd:YAG laser posterior capsulotomy. *Ophthalmology* 1985;92:636–40.
- [11] Shani L, David R, Tessler Z, Rosen S, Schneck M, Yassur Y. Intraocular pressure after neodymium:YAG laser treatments in the anterior segment. *J Cataract Refract Surg* 1994;20:455–8.
- [12] Ari S, Cingu AK, Sahin A, Cinar Y, Caca I. The effects of Nd:YAG laser posterior capsulotomy on macular thickness, intraocular pressure, and visual acuity. *Ophthalmic Surg Lasers Imaging* 2012;43:395–400.
- [13] Jahn CE, Emke M. Long-term elevation of intraocular pressure after neodymium:YAG laser posterior capsulotomy. *Ophthalmologica* 1996;210:85–9.
- [14] Gardner KM, Straatsma BR, Pettit TH. Neodymium:YAG laser posterior capsulotomy: the first 100 cases at UCLA. *Ophthalmic Surg* 1985;16:24–8.
- [15] Kraff MC, Sanders DR, Jampol LM, Lieberman HL. Effect of primary capsulotomy with extracapsular surgery on the incidence of pseudophakic cystoid macular edema. *Am J Ophthalmol* 1984;98:166–70.
- [16] Karahan E, Tuncer I, Zengin MO. The effect of Nd: YAG laser posterior capsulotomy size on refraction, intraocular pressure, and macular thickness. *J Ophthalmol* 2014;2014:846385.
- [17] Sheard RM, Goodburn SF, Comer MB, Scott JD, Snead MP. Posterior vitreous detachment after neodymium:YAG laser posterior capsulotomy. *J Cataract Refract Surg* 2003;29:930–4.
- [18] Dardenne MU, Gerten GJ, Kokkas K, Kermani O. Retrospective study of retinal detachment following neodymium:YAG laser posterior capsulotomy. *J Cataract Refract Surg* 1989;15:676–80.
- [19] Javitt JC, Tielsch JM, Canner JK, Kolb MM, Sommer A, Steinberg EP. National outcomes of cataract extraction. Increased risk of retinal complications associated with Nd:YAG laser capsulotomy. The Cataract Patient Outcomes Research Team. *Ophthalmology* 1992;99:1487–97.
- [20] Ranta P, Tommila P, Kivela T. Retinal breaks and detachment after neodymium:YAG laser posterior capsulotomy: five-year incidence in a prospective cohort. *J Cataract Refract Surg* 2004;30:58–66.
- [21] Mastropasqua L, Ciancaglini M, Carpineto P, Lobefalo L, Gallenga PE. Aqueous misdirection syndrome: a complication of neodymium:YAG posterior capsulotomy. *J Cataract Refract Surg* 1994;20:563–5.
- [22] Arya SK, Sonika, Kochhar S, Kumar S, Kang M, Sood S. Malignant glaucoma as a complication of Nd:YAG laser posterior capsulotomy. *Ophthalmic Surg Lasers Imaging* 2004;35:248–50.

- [23] Hayreh SS. Neovascular glaucoma. *Prog Retin Eye Res* 2007;26:470–85.
- [24] Poliner LS, Christianson DJ, Escoffery RF, Kolker AE, Gordon ME. Neovascular glaucoma after intracapsular and extracapsular cataract extraction in diabetic patients. *Am J Ophthalmol* 1985;100:637–43.
- [25] Weinreb RN, Wasserstrom JP, Parker W. Neovascular glaucoma following neodymium-YAG laser posterior capsulotomy. *Arch Ophthalmol* 1986;104:730–1.
- [26] Tsopelas N, Kokolakis N, Droutsas D, Theodossiadis G. Extracapsular cataract extraction in diabetic eyes. The role of YAG laser capsulotomy. *Doc Ophthalmol* 1995;91:17–24.
- [27] Aiello LP, Avery RL, Arrigg PG, Keyt BA, Jampel HD, Shah ST, et al. Vascular endothelial growth factor in ocular fluid of patients with diabetic retinopathy and other retinal disorders. *N Engl J Med* 1994;331:1480–7.
- [28] Prasad P, Setna PH, Dunne JA. Accelerated ocular neovascularisation in diabetics following posterior chamber lens implantation. *Br J Ophthalmol* 1990;74:313–4.
- [29] Macaron NC, Cohen C, Chen SC, Arbiser JL. Cutaneous lesions of secondary syphilis are highly angiogenic. *J Am Acad Dermatol* 2003;48:878–81.
- [30] Pande MV, Spalton DJ, Kerr-Muir MG, Marshall J. Postoperative inflammatory response to phacoemulsification and extracapsular cataract surgery: aqueous flare and cells. *J Cataract Refract Surg* 1996;22:770–4.
- [31] Alio JL, Chipont E, BenEzra D, Fakhry MA. International Ocular Inflammation Society, Study Group of Uveitic Cataract Surgery. Comparative performance of intraocular lenses in eyes with cataract and uveitis. *J Cataract Refract Surg* 2002;28:2096–108.
- [32] Teo L, Chee SP. Retained lens fragment in the anterior segment as a cause of recurrent anterioruveitis. *Int Ophthalmol* 2010;30:89–91.