Treatmen of Malignant
Glaucoma With Contact
Trans scleral
Cyclophotocoagulation

Five cases of pseudophakic malignant
 glaucoma were successfully treated with a single session of contact trans-
 scleral cyclophotocoagulation (CTCP) with diode laser (twenty 4-J spots over
 360°, 1.5 mm posterior to the limbus) after failure of Nd:YAG laser hyalo-
 idotomy and vitreolysis. All patients except for case 2 had a preoperative
diagnosis of chronic angle-closure glaucoma. At the end of the follow-
 up, all the eyes had a well-controlled intraocular pressure (IOP), with no
 medications required in 3 cases and topical β-blocker prescribed in 2. No
 major side effects of laser treatment were observed.

Malignant glaucoma is a severe complica-
tion of anterior segment sur-
gery mainly associated with eyes with
angle-closure glaucoma. The term
“malignant glaucoma” refers to a con-
dition characterized by ocular hyper-
tension with shallow or flat anterior
chamber despite a patent iridotomy and a normal posterior segment
anatomy. The condition is typically un-
responsible to treatment with miotics, but it can be relieved by cycloplegics.
Different pathogenic mechanisms may
be involved, such as ciliovitreal or cilio-
 lenticular block, but there is general
agreement about the presence of post-
erior diversion of aqueous flow, lead-
ing to anterior displacement of the hya-
loid and secondary angle closure.1,2

The treatment of choice for ma-
lignant glaucoma is Nd:YAG laser an-
terior hyaloidotomy (through the pu-
pil, in aphakic or pseudophakic eyes, after posterior capsulotomy, or through a
peripheral iridectomy), possibly fol-
lowed by Nd:YAG laser vitreolysis.3,4
When laser treatment is not possible
or is ineffective, anterior parsplana vit-
rectomy is usually required.5,6

We report 5 cases of pseudopha-
kic malignant glaucoma, defined as
ocular hypertension with a shallow
central anterior chamber, patent pe-
ripheral iridotomy, and no evidence
of choroidal effusion or other uveal
abnormalities on B-scan echographic ex-
amination.7,8 All patients were suc-
cessfully treated with CTCP and diode
laser after failure of Nd:YAG laser hyal-
oidotomy and vitreolysis.

Report of Cases. Case 1. A 79-year-
old woman with nuclear cataract and
chronic angle-closure glaucoma sec-
ondary to plateau iris, already treated
with peripheral laser iridotomy, under-
went extracapsular cataract extraction
plus trabeculectomy with placement of
a posterior chamber 7-mm intraocular
lens (IOL) in the left eye. Preopera-
tive axial length was 21.60 mm.

The first day after surgery her
IOP was 37 mm Hg and the anterior
chamber was shallow, with periph-
eral iridolenticular contact. Therapy
with 1% atropine sulfate and 0.2%
dexamethasone sodium phosphate 6
times a day, 0.5% timolol maleate
daily, 0.5% apraclonidine hydrochloride
and 125 mg of acet-
azolamide 3 times a day was started,
but her IOP was 40 mm Hg on the
next day and the anterior chamber
was more shallow. The Nd:YAG la-
sar iridotomy was repeated and a pos-
terior capsulotomy was done. On day
4 (after cataract surgery), the IOP was
40 mm Hg and the iridoendothelial
contact was complete, with a thin pre-
lenticular aqueous layer and corneal
edema. After unsuccessful Nd:YAG
hyaloidotomy, the patient refused
consent to vitrectomy. Contact trans-
scleral cyclophotocoagulation was
performed on day 7 (after the initial
surgery), sparing the upper quad-
rant to allow restoration of filtra-
tion, although no bleb was visible. We
used a diode laser (Optikon EOS
3000, Rome, Italy) with 2.6-W maxi-
imum nominal output power coupled
with a 400-µm diameter optic fiber
ending with a 3-mm focusing tip. Af-
ter retrobulbar anesthesia, twenty 4-J
spots (exposure time was set accord-
ing to the fiber transmission mea-
sured with the built-in laser meter) were
delivered holding the probe perpen-
dicular to the scleral surface and
placing its center 1.5 mm posterior to
the limbus with firm indentation.9

On day 8 after the initial sur-
gery, the IOP was 8 mm Hg, the an-
terior chamber was shallow, but the
iridocorneal touch had disappeared,
and a filtering bleb had formed. Her
medications were gradually tapered.
One month postoperatively after the
initial surgery, the IOP was 12 mm
Hg, the anterior chamber was deep,
and the filtering bleb was evident.
When last examined, 22 months af-
fter CTCP, the IOP was 12 mm Hg
with no medications.

Case 2. A 67-year-old woman under-
went bilateral extracapsular cataract
extraction with peripheral iri-
dectomy and placement of a 7-mm
posterior chamber IOL at another hos-
pital. Two weeks after surgery she de-
veloped a bilateral flat anterior cham-
ber that was diagnosed as malignant
glaucoma. Nd:YAG laser hyaloidotomy
was unsuccessful and 6 weeks later she
was referred to our center.

Best-corrected visual acuity was
4/200 OU. The IOP was 36 mm Hg
in the right eye and 33 mm Hg in the left
eye while receiving 0.5% timolol ma-
leate twice daily, 0.5% apraclonidine
hydrochloride 3 times a day, 250 mg
of acetazolamide 3 times a day, 1% at-
ropine sulfate three times a day, and
0.2% dexamethasone sodium phos-
phate 4 times a day. The irides were
touching the corneas with a thin pre-
lenticular aqueous layer. Early bullos
keratopathy was present. Bilateral vi-
trectomy was judged hazardous. Be-
cause the left eye previously had bet-
ter vision, we performed vitrectomy in
the left eye and CTCP in the right eye.

Three days later, the anterior
chamber was formed and the IOP
was 10 mm Hg in the right eye and
8 mm Hg in the left. Her medica-
tions were tapered. Three weeks later,
hers IOP was 14 mm Hg in the right
eye and 18 mm Hg in the left while
receiving 0.5% timolol maleate twice
daily, 0.2% dexamethasone sodium

phosphate twice daily, and 1% atropine sulfate 3 times a day. Three months after CTCP, her best-corrected visual acuity was 20/100 OD and 20/150 OS. The IOP was 14 mm Hg in the right eye and 26 mm Hg in the left, while receiving 0.5% timolol maleate twice daily, 1% atropine sulfate twice daily, and 0.1% clobetasone butyrate twice daily. The anterior chamber was shallow in both eyes in the periphery, due to peripher al anterior synechiae, more evident in the left eye, but its central depth was 1.3 mm in the right eye and 1.2 mm in the left according to ultrasound biomicroscopy measurement. Her left eye was treated with CTCP. Her medications were tapered and 1 month later the visual acuity was unchanged and the IOP was 13 mm Hg in both eyes while receiving 0.5% timolol twice daily only.

Case 3. A 74-year-old man with chronic angle-closure glaucoma previously treated with laser iridotomy and compensated with 0.5% betaxolol hydrochloride twice-daily therapy underwent peripheral superior iridectomy and extractcapsular cataract extraction with implantation of a 7-mm posterior chamber IOL in the left eye. Preoperative axial length was 20.74 mm. On day 2, the IOP was 22 mm Hg with peripheral iridocorneal touch had resolved and corneal touch was likely to maintain filtration. By day 14, his IOP was 11 mm Hg with no medications (Figure 3).

Case 4. A 34-year-old woman with bilateral chronic angle-closure glaucoma underwent trabeculectomy for uncontrolled IOP in the right eye. On postoperative day 2, the IOP was 10 mm Hg and the anterior chamber was flat. Since initial posterior subcapsular lens opacity was already present, and corneal touch was likely to precipitate cataract and corneal decompensation, we performed phacoemulsification and 5-mm posterior chamber IOL implant.

Preoperative axial length was 21.48 mm. On postoperative day 2, her best-corrected visual acuity was 20/30 with −0.75 diopters (D) and the IOP was 8 mm Hg. On day 7, the IOP was 12 mm Hg, the anterior chamber was shallow and the refraction had shifted to −3.50 D. Treatment with 1% atropine sulfate 6 times a day was prescribed. Despite a wide patent iridectomy, the iris was bombe´ in the peripheral anterior synechiae, more evident in the left eye, but its central depth was 1.3 mm in the right eye and 1.2 mm in the left according to ultrasound biomicroscopy (Figure 1). On day 8, CTCP was performed and, on the following day, the anterior chamber had deepened and ultrasound biomicroscopy showed restoration of ciliary body position, with several processes directed anteriorly (Figure 2); the IOP was 15 mm Hg. His medications were gradually tapered. Twenty-five months after the initial surgery, his IOP was 11 mm Hg with no medications (Figure 3).

Case 5. A 64-year-old woman with chronic angle-closure glaucoma underwent iridectomy and phacotrabecektomy in the right eye with implantation of a 5-mm posterior chamber IOL. Preoperative axial length was 21.48 mm. On postoperative day 2, her best-corrected visual acuity was 20/30 with −0.75 diopters (D) and the IOP was 8 mm Hg. On day 7, the IOP was 12 mm Hg, the anterior chamber was shallow and the refraction had shifted to −3.50 D. Treatment with 1% atropine sulfate 6 times a day was prescribed. Despite a wide patent iridectomy, the iris was bombe´ in the lateral and inferior sectors. Two additional peripheral Nd:YAG iridotomies were done, following which vitreous oozed from the new openings, forming 2 small collections in the newly deepened anterior chamber. The refraction was −0.25 D, the IOP was 13 mm Hg, and a small filtering bleb was present. The patient continued therapy with 1% atropine sulfate 3 times a day.
Ten months later, the patient developed allergy to atropine and was switched to treatment with 1% cyclopentolate hydrochloride 3 times a day. One week later, the IOP was 38 mm Hg, the bleb was absent, and the best-corrected visual acuity had worsened to 20/200 with −4.00 D. Ultrasound biomicroscopy showed marked flattening of all ciliary structures and a shallow anterior chamber (Figure 5). Posterior Nd:YAG capsulotomy and 2 sessions of hyaloidotomy were unsuccessful. Three days later the patient underwent CTCP in the inferior sectors. One week after CTCP, the IOP was 18 mm Hg, a small bleb was present again and vision was restored. Five months later, the IOP was 20 mm Hg with a deep anterior chamber while receiving 0.5% timolol twice daily (Figure 6).

Comment. We successfully used diode laser CTCP to treat 5 patients with malignant glaucoma in whom anterior hyaloidotomy had failed. In case 1 we used CTCP as a final alternative when the patient refused to consent to vitrectomy. In case 2 we preferred not to attempt bilateral intraocular surgery; this case allowed us to compare the outcome of diode laser CTCP with anterior vitrectomy. Encouraged by these 2 successes we managed 3 more cases of malignant glaucoma refractory to hyaloidotomy, and all were resolved by CTCP.

The pathogenesis of malignant glaucoma is not clear, but posterior aqueous diversion seems involved, either with or without ciliolenticular (or ciliovitreal) block from apposition of the ciliary processes to the lens equator (or anterior hyaloid). Treatment normally includes aqueous suppressants, cycloplegics, and corticosteroids to break ciliary block, hyperosmotics to reduce vitreous volume, anterior Nd:YAG hyaloidotomy and vitreolysis to evacuate vitreous pockets, and anterior vitrectomy.10

Laser photocoagulation of the ciliary processes has been proposed in cases where a wide basal iridectomy is present.11,12 Other suggested treatments include posterior sclerotomy with fluid aspiration from the vitreous and air injection in the anterior chamber,13 lens extraction,14 and pars plana tube insertion following vitrectomy.15 The events leading to resolution of malignant glaucoma appear to involve (1) reduction of aqueous production (via medical therapy), (2) posterior rotation of ciliary processes (as a result of cyclopia), and (3) restoration of normal aqueous flow patterns (by Nd:YAG laser hyaloidotomy or anterior vitrectomy). In understanding how CTCP may help in the resolution of malignant glaucoma, it is unlikely that CTCP may act on the vitreous. The mechanism of action could involve the reduction of aqueous production secondary to ciliary body ablation, but this is unlikely to be the sole reason, since even maximal aqueous suppression was ineffective. The success of CTCP may therefore be attributed to the posterior rotation of ciliary processes secondary to coagulative shrinkage, which also eliminates the abnormal vitreociliary relationship.

Transscleral cyclophotonocoagulation has been reported to cause malignant glaucoma in 1 case16; however, in that case no Nd:YAG hyaloidotomy had been performed beforehand, and the treatment had been performed with a noncontact Nd:YAG technique. The results from our 5 cases raise the possibility that if normal aqueous flow cannot be restored by breaking the anterior hyaloid or presumed vitreous pockets with Nd:YAG laser application(s) in malignant glaucoma, diode laser CTCP could be considered before vitrectomy. Further investigation will help establish the mechanism of this treatment modality and provide more data on its efficacy.

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A Retained Intraocular Surgical Needle 2 Years After Cataract Extraction

Cystoid macular edema (CME) occurs not infrequently after cataract extraction. Various theories exist as to the cause of this phenomenon, including vitreous traction on the macula and uveal inflammation causing a disruption of the blood-retina barrier. Persistent irritation to the iris and anterior uvea may serve to promote or exacerbate this condition, and in part may help explain the observation that CME occurs more frequently in patients with anterior chamber intraocular lenses (IOLs) as compared with patients with posterior chamber IOLs. In this report we describe a patient with a retained intraocular suture needle after cataract extraction, in association with chronic CME unresponsive to medical therapy.

Report of a Case. A 90-year-old patient was seen at our service 2 years after a cataract extraction and IOL placement. He had had poor vision since his surgery. His ocular history was otherwise unremarkable, and his medical history was significant for diet-controlled diabetes mellitus.

His best-corrected visual acuity was 20/400 OD and 20/50 OS. His pupils, extraocular motility, and ocular adnexa were normal. Slitlamp examination of his right eye showed scattered deposits on the corneal endothelium consistent with previous inflammation, a well-placed anterior chamber lens, and a metallic foreign body between the IOL and the iris at the 3-o’clock position (Figure 1). Examination results of his left eye were only remarkable for a moderate nuclear sclerotic cataract.

Extracapsular cataract extraction was performed. The superotemporal sclerotomy was then enlarged slightly with a microvitreoretinal blade. An intraocular forceps was then inserted through the superotemporal sclerotomy and passed anteriorly through the pupil. With upward pressure on the posterior surface of the IOL, the foreign body was grasped and withdrawn. Further inspection of the foreign body showed it to be a needle to a 10-0 suture (Figure 2). Postoperatively, the patient was prescribed topical steroids and antibiotic drops and cycloplegia was maintained. The macular edema improved and he had a visual acuity of 20/160 OD after 4 weeks of follow-up.

Comment. While the patient was at risk for CME given his complicated cataract surgery and anterior chamber IOL, chronic uveal irritation from an intraocular needle may have served as an aggravating factor. Fortunately, retained needles occur uncommonly in surgical practice and, to our knowledge, are unreported after intraocular surgery. Metal fragments, however, have been found in the anterior chamber after phacoemulsification, presumably left behind by the phaco tip. The physiological consequence of these retained particles is not known.

In summary, retained surgical needles may occur after intraocular surgery and may be associated with a poor visual outcome. Removal of retained surgical material may be indicated in selected cases.

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