Cyclodiode laser therapy for painful, blind glaucomatous eyes

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Abstract

Aims—To determine the ability of cyclodiode laser treatment to relieve discomfort in painful blind glaucomatous eyes.

Methods—30 eyes underwent cyclodiode to reduce intraocular pressure (IOP) and relieve pain. Patients graded their pre-cyclodiode and post-cyclodiode pain.

Results—After a minimum follow up of 6 months, a single cyclodiode treatment lowered mean IOP from 51 mm Hg (95% CI plus or minus 3.7 mm Hg) to 26 mm Hg (95% CI plus or minus 5.8 mm Hg) providing pain relief in 73.3% (22/30). After retreatment of six eyes, mean IOP was reduced to 22 (95% CI plus or minus 5.3) mm Hg and pain relief was obtained in 96.7% (29/30). For eyes achieving pain relief after one treatment, IOP was reduced by >30% in only 22.2% (2/9) (p=0.0042, Fisher’s exact test).

Conclusion—Cyclodiode was highly successful in providing pain relief in painful blind hypertensive glaucomatous eyes. The best predictor of successful pain relief was IOP reduction of >30% from baseline. (Br J Ophthalmol 2001;85:474–476)

Cyclodiode laser treatment is being used increasingly to treat refractory glaucoma. In patients with blind and painful eyes, perhaps the most important outcome measure is whether or not treatment renders the affected eye comfortable, yet few published studies have considered symptom relief as an outcome. The aim of this study was to establish the ability of cyclodiode to improve comfort in patients with painful, blind eyes due to glaucoma. Our secondary aim was to establish which treatment related variables correlated with the achievement of a comfortable eye.

Materials and methods

The study design was prospective, longitudinal, and observational. Thirty patients (30 eyes) meeting the inclusion criteria (visual acuity worse than hand movements at 1 metre, significant ocular discomfort, IOP >30 mm Hg, and no previous cyclociseconductive procedures) were recruited between May 1998 and May 1999. Mean age was 73 years (SD 12.2 years). Eighteen patients had neovascular glaucoma, four had aphakic glaucoma, two had raised IOP following vitreoretinal surgery, and six had multiple pathologies. Informed consent was obtained in all cases. The aim of cyclodiode treatment was to achieve adequate IOP reduction and a comfortable eye. Minimum follow up was 6 months (mean 10.8 months, range 6–22 months). All patients were assessed 2–4 weeks after treatment. The frequency of follow up was at the discretion of the clinician with a mean of 2.6 (1.13) visits between 1 month and 1 year.

Patients graded their ocular discomfort before and at each assessment after cyclodiode treatment. Pain was graded as “severe” (grade 3), “moderate” (grade 2), “mild” (grade 1), or “none” (grade 0). Topical and systemic treatment, visual acuity and IOP were recorded at each pretreatment and post-treatment visit.

Cyclodiode treatment was performed under peribulbar anaesthesia with 2% lignocaine using the OcuLight SLX semiconductor diode 810 nm laser (Iris Medical Instruments Inc, Mountain View, CA, USA) and the contact G-probe (Iris Medical Instruments). Treatment was delivered through a 600 µm quartz fibre protruding 0.7 mm from the G-probe contact surface to indent the conjunctiva and sclera, thus improving energy delivery to the ciliary body. Transillumination was used to identify the ciliary body and 40 laser “shots” were applied, 10 in each quadrant of the ciliary body sparing the 3 and 9 o’clock positions. For first treatment sessions, the power of each shot was 1500 mW for 1500 ms (90 J per session). For retreatments, the duration of each shot was increased to 2000 ms (120 J per session). The criteria for retreatment were persistent pain and IOP >30 mm Hg. Topical dexamethasone 0.1% was administered four times daily for 1 month after each cyclodiode treatment.

Results

CHANGE IN INTRAOCULAR PRESSURE (FIG 1)

The mean IOP recorded on the day of cyclodiode treatment was 51 mm Hg (95% CI plus or minus 3.7 mm Hg, range 34–72 mm Hg). After a single cyclodiode treatment, the mean IOP fell to 26 mm Hg (95% CI plus or minus 5.8 mm Hg, range 1–66 mm Hg). At final follow up, after one (n=23), two (n=6), or three (n=1) cyclodiode treatments, the mean IOP was 22 mm Hg (95% CI plus or minus 5.3 mm Hg, range 1–66 mm Hg). Twenty two of 30 eyes (73.3%) had an IOP reduction of greater than 30% with one treatment, and 27 of 30 eyes achieved a 30% reduction when retreatments were included.

PRE-CYCLODIODE AND POST-CYCLODIODE ANTIGLAUCOMATOUS THERAPY

Before cyclodiode treatment, five patients (16.7%) were receiving oral acetazolamide treatment compared with two patients (6.7%)...
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Table 1 Pre-cyclodiode and post-cyclodiode pain assessment

<table>
<thead>
<tr>
<th>Pain Level</th>
<th>Pre-cyclodiode</th>
<th>After single cyclodiode</th>
<th>After repeat cyclodiode (if necessary)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>No pain</td>
<td>0</td>
<td>0.0</td>
<td>21</td>
</tr>
<tr>
<td>Mild pain</td>
<td>0</td>
<td>0.0</td>
<td>1</td>
</tr>
<tr>
<td>Severe pain</td>
<td>6</td>
<td>20.0</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 1 Pretreatment and post-treatment intraocular pressures following single and repeat cyclodiode therapy.

at final follow up. Twenty two eyes (73.3%) were being treated with topical antiglaucoma-
tous drugs before cyclodiode treatment compared with 12 eyes (40.0%) at final follow up.

PRE-CYCLODIODE AND POST-CYCLODIODE PAIN SCORES

After a single cyclodiode, pain was reduced in 22 of 30 eyes (73.3%) and abolished in 21 of
30 eyes (70.0%). After retreatments, pain was reduced in 29 of 30 eyes (96.7%) and
abolished in 26 of 30 eyes (86.7%) (Table 1).

The only factor identified by multiple linear
regression analysis (SPSS 6.1 for Windows,
SPSS Inc, Chicago, IL, USA) to be associated
with pain relief after a single treatment was
IOP reduction > 30% from baseline (p <0.001). Factors unassociated with successful
pain relief included patient age, sex, ocular
diagnosis, previous surgical/medical treatment,
and pre-cyclodiode IOP and pain levels.

COMPlications

Complications occurred in six eyes. Three
patients (10.0%) developed persistent hypotony (IOP <5 mm Hg), one hypotonous eye
remained painful at final follow up but none
developed phthisis. Post-treatment uveitis oc-
curred in two eyes and transient hyphaema
in one eye.

Discussion

We are aware of few studies on symptom con-
tral following cyclodiode treatment, although
Walland et al reported pain control in six of
eight painful, blind glaucomatous eyes using a
treatment protocol similar to ours.7 We have
demonstrated that cyclodiode treatment is very
effective at relieving pain in patients with blind,
painful, glaucomatous eyes. The treatment was
well tolerated and only one of 30 eyes (3.3%) remained painful at final follow up. Multiple

linear regression analysis identified IOP reduc-
tion from baseline as the only variable correlat-
significantly with reduction in pain (p<0.001). The single most important factor
in achieving complete pain relief with one treat-
ment was a reduction in IOP of >30% from
baseline. For eyes achieving complete pain
relief after one treatment, IOP was reduced by
>30% in 81.0% (17/21). For eyes not achiev-
ing pain relief after one treatment, IOP was
reduced by >30% in only 22.2% (2/9) (p=0.0042, Fisher’s exact test).

We used a very simple pain grading system,
similar to the system used by Harmon,7 with
patients classifying their pain as “severe”
(grade 3), “moderate” (grade 2), “mild” (grade
1), or “none” (grade 0) at each assessment.

This system was preferred to a “Visual
analogue scale” system10,11 because we felt it
was easier for patients to understand and was
likely to be more repeatable.

We used a treatment protocol similar to that
described by Bloom et al,1 delivering 90 J to
the ciliary body in the first treatment session
and 120 J on retreatment. Spencer and
Vernon1 have recently reported good results
using 14 applications of 2 W for 2 seconds (56
J per session) over 270 degrees; two of 58 eyes
(3.4%) developed hypotony (final IOP <5 mm
Hg) compared with three of 30 eyes (10.0%) in
our study and three of 210 (1.4%) in the
study of Bloom.1 Our protocol involved a re-
latively high energy delivery to the ciliary body,
which may explain the higher hypotony rate.
However, only seven of our 30 (23.3%)
patients required retreatment compared with
45%,49%,1 and 65%12 in other published
series. Our study included only patients with
already “blind” eyes; the glaucoma in these
eyes might therefore be expected to be more
severe than other study populations. The pre-
treatment mean IOP of 51 mm Hg in our
series was also markedly higher than in the
series of Bloom (34.1 mm Hg),1 Hawkins
(32.5%),13 and Spencer (33.0 mm Hg),14
consistent with more severe disease in patients
with painful, blind eyes.

Other potential complications of cyclodiode
treatment include malignant glaucoma,16 neu-
rotrophic corneal defects,11 scleral perfora-
tion,16 and a theoretical risk of sympathetic
ophthalmia. No such complications occurred
in the present series.

Conclusions

Cyclodiode laser treatment very effectively
eliminated discomfort in previously painful,
blind, glaucomatous eyes. The best predictor
of successful pain relief was reduction in IOP
of > 30% from baseline. “Ideal” treatment
parameters remain uncertain and protocols
using slightly less total energy delivery to the
ciliary body might have a lower risk of
hypotony, although a corresponding increase in
the need for retreatments might be expected.

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