INTRA OCULAR PRESSURE DROP
AFTER Q SWITCHED NEODYMIUM YAG
LASER POSTERIOR CAPSULOTOMY

M. LEYS *, P.T.V.M. DE JONG ** and J.H. PAMEIJER **

SAMENVATTING

Het is bekend dat na een Nd-YAG laser nastaardiscissie de oogdruk kan oplopen. Bij 80 ogen die een capsulotomie ondergingen, was de oogdruk gemiddeld 6.4 mm Hg of 41% gestegen. Twee maanden na de behandeling daarentegen was deze oogdruk gemiddeld 1.8 mm Hg of 12% gedaald ten opzichte van de beginwaarde. \((p<0.001)\). De achterste oogkamerlensimplanten hadden de kleinste drukveranderingen.

RÉSUMÉ

L'élévation de la tension oculaire est une complication redoutée de la discision au neodymium YAG laser. La capsulotomie postérieure de 80 yeux donne une élévation moyenne de 6.4 mm Hg, soit 41%. Deux mois après le traitement de 67 yeux il y avait, au contraire, une diminution de 1.8 mm Hg, soit 12% par rapport à la valeur de départ \((p<0.001)\). Ce furent les yeux à implants postérieurs qui ont présenté le moins de modifications tensionnelles.

SUMMARY

Elevated intraocular pressure has been reported as a common complication of a YAG laser posterior capsulotomy. In a group of 80 eyes the pressure rise was 6.4 mm Hg or 41% two hours after the capsulotomy. However when the pressure was measured two months after the treatment there was a mean pressure drop of 1.8 mm Hg or 12% compared with the pretreatment value \((p<0.001)\). The posterior chamber implants had the smallest pressure changes.


* Department of Ophthalmology, University Hospital, De Pintelaan 135, 9000 Gent.
** Department of Ophthalmology, Erasmus University Rotterdam, Eye Hospital, Schiedamsevest 180, 3011 BH Rotterdam, The Netherlands.
Introduction

Knife discission of after cataract is more and more ousted by Neodymium-YAG laser capsulotony because of the lack of risk of infection and the relative simplicity of the procedure for the patient. On the other hand complications of laser capsulotomy, e.g. ocular hypertension, have been described not encountered with a surgical discission. Pending the availability of a Nd-YAG laser a waiting-list of patients with after cataract had been created. Thus quite a number of patients was treated in just a few days. The purpose of this report is to describe the short and intermediate term side effects of Nd-YAG capsulotomy. Possible risk factors will be described together with a hitherto unknown drop in intraocular pressure after two months.

Patients and methods

Three surgeons performed posterior capsulotomies with a Zeiss Visulas Q-switched Neodymium-YAG laser in 80 eyes of 77 patients (table).

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An extracapsular lens extraction was performed up tiel to 4 years (mean 2.5 years) prior to the capsulotomy.

Prior to the capsulotomy the visual acuity and the applanated tension of the eyes were noted by a single investigator. Aftercataracts were
divided in those with many Elschnig pearls and in fibrotic ones. We graded capsule opacities in one to three plus. It also was noted if the posterior lens capsule was taut or slack. No contact lens was used while

Fig. 1. — Intraocular pressure before treatment versus intraocular pressure 2 hours after treatment.
Fig. 2. — Intraocular pressure changes after YAG laser capsulotomy in eyes with a posterior chamber lens implant.

doing a capsulotomy. The energy of every shot delivered was summated, whether it resulted in optical breakdown or not.

Two hours after the Nd-YAG capsulotomy visual acuity and eye pressure were measured again by only one investigator and the same happened two months later. In all measurements the same Goldmann applanation tonometer was used on the same Haag Streit 900 slit lamp. After two months patients came back at the same time of the day as when the post treatment values were obtained.
Results

On the average we needed 53 pulses (range 5-248) with a mean energy setting of 1.43 mJ (range 0.5-3.3) to perform the capsulotomies. The mean summated energy was 76 mJ. Visual acuity after two months improved at least one Snellen line in 88% of the eyes.

Two hours after capsulotomy the mean eye pressure rose from 15.4 (± 3.8) to 21.8 (± 10.2) mm Hg, which is a statistically significant rise of 6.4 (± 9.3) mm Hg or 41% with a p value of less than 0.001 (Student’s t-test) (fig. 1). We found no relation between the pressure rise and the total amount of the delivered energy.

In eyes with a posterior chamber lens there was a mean pressure rise of 2.1 (± 5.7) mm Hg (fig. 2) while in the non glaucomatous eyes with an iridocapsular lens or without an intraocular lens the pressure rise amounted to 7.4 (± 9.7) mm Hg. This difference was significant for the logarithmic values with the Student’s t-test (p<0.01). Of the four glaucomatous eyes, one aphakic and one pseudophakic eye, both with primary open angle glaucoma, had an impressive pressure rise of respectively 16 and 30 mm Hg two hours after treatment.

Fig. 3. — Intraocular pressure before treatment versus intraocular pressure 2 months after treatment.
Two months after the capsulotomy 66 patients returned to the same examiner at the same time of the day as the capsulotomy was performed.

The mean intraocular pressure (±SD) in the 68 treated eyes was 15.5 (±3.8) mm Hg prior to treatment, and 13.7 (±3.6) two months after it.

This drop of 1.8 (±3.5) mm Hg or 12% was also statistically significant with the Student’s t-test (p<0.001) (fig. 3). The four glaucoma eyes were under control with their pretreatment medication.

Discussion

A 50% pressure rise two hours after a Nd-YAG laser capsulotomy has been described before by many authors (Terry et al., 1983; Blackwell et al., 1984; Keates et al., 1984; Stamm, 1984; Vine, 1984).

It is considered to be due to the accumulation of debris in the trabecular meshwork (Parker et al., 1984; Parker & Clorfeine, 1984). Also prostaglandin mediated changes in the blood-aqueous barrier might influence the intraocular pressure (Schems et al., 1984; Terry et al., 1984). This pressure rise after two hours is reduced when prostaglandin inhibitors are given prior to the capsulotomy (Alpar, 1984). A tonographic examination before and two hour following capsulotomy showed that a pressure increase of 50% matches with a decrease of 50% of the facility of outflow (Terry et al., 1984).

The intraocular lens was found to have a protective effect on the pressure rise; this effect is best seen in the posterior chamber lenses but it might also exist for the iridocapsular and the anterior chamber ones (Pappas et al., 1984). The maximum pressure rise in the pseudophakic eye probably comes later than in the aphakic eye (Pappas et al., 1984).

Some authors postulate that the shock effect of the laser wave is disturbing the trabecular function (Channell and Beckman, 1984). Electron microscopic examination of the trabeculum failed however, to show any structural changes by indirect contusion.

The normalisation of the IOP two months after the discission, could be the result of a normalisation of the facility of outflow. A tonographic study might be useful to prove it. In addition it might be due to a recovery of the trabecular meshwork from the functional disturbance by the shock wave, to restitution of the blood-aqueous barrier, or to disappearance of prostaglandin (precursors) and fibrin from the anterior chamber. We can only speculate why the pressure became lower
than the precapsulotomy values. It might be due to a rebound mechanism after the pressure rise or due to a destructive effect of the shock wave on the ciliary body epithelium. Unfortunately the pressure of the fellow eye had not been taken before and after capsulotomy in all cases, so we could not compare the treated with the untreated eyes. Similar unexplained lowering of the intraocular pressure has been described after cataract extraction with and without lens implantation (Bigger and Becker, 1971; Smith and Anderson, 1976; Radus et al., 1984), and after photocoagulation of diabetic eyes (Schiodte et al., 1980; Schiodte, 1982).

Conclusion

Acute self limiting intraocular pressure rise after Nd-YAG laser capsulotomy has been documented.

The pressure rise was the smallest in eyes with a posterior chamber implant lens. A new finding was a statistically significant drop in intraocular pressure two months after the capsulotomy.

The mechanism of this drop in intraocular pressure is unknown.

BIBLIOGRAPHY


