

Selective Laser Trabeculoplasty in the Treatment of Pseudoexfoliation Glaucoma in Patients Allergic to all Anti-Glaucoma Drops

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ABSTRACT

Secondary chronic open-angle glaucoma associated with pseudoexfoliation (PEX) syndrome accounts for approximately 25% of all glaucomas and represents the most common identifiable cause of glaucoma overall. Selective laser trabeculoplasty (SLT) is effective in reducing intraocular pressure (IOP) in glaucomatous patients and has the advantage of preserving surrounding structures. We report here SLT treatment of a 82 year old female with a secondary developed open-angle pseudoexfoliation glaucoma allergic to all anti glaucoma eye drops especially those which contain bethadone hydrochloride as preservative. Since patient was allergic also to methyl-cellulose, we performed SLT with water as a mediator. Patient had PEX syndrome for 10 years, immature cataracts on both eyes, and best corrected visual acuity (BCVA) 0.7 on the right and 0.2 on the left eye. We have monitored intraocular pressure (IOP), the changes in the visual field and optic nerve. Preoperative IOP was 28 mmHg on the right and 30 mmHg on the left eye. The follow up period was 24 months with time points for measured parameters every 3 months. After 18 months IOP remained in the normal values (average 17 mmHg) on the right eye, but on the left eye it increased up to 28 mmHg. SLT re-treatment was carried out on the left eye and the IOP stabilized again on the values between 16-18 mmHg. There were no significant change in the visual field and optic nerve configuration before and after SLT (C/D value for right eye: 0.3–0.4; C/D left eye: 0.5). Based on this case report, SLT seems to be very effective treatment for maintaining regular IOP in patient with PEX who is allergic to all types of medications.

Key words: selective laser trabeculoplasty, pseudoexfoliation syndrome, open angle glaucoma

Introduction

PEX syndrome is a generalized process of the extracellular matrix characterized by production and progressive accumulation of an abnormal extracellular material in many intra- and extraocular tissues. Pathogenetic concept of PEX syndrome is a type of elastosis affecting particularly elastic microfibrils. Active involvement of the trabecular meshwork (TM) in this characteristic matrix process may lead to glaucoma development in 40–60% of the patients¹. PEX-associated open-angle glaucoma represents a relatively severe and progressive type of glaucoma with a generally poor prognosis due to high intraocular pressure levels and fluctuations in the diurnal pressure curve. The primary cause of chronic pressure elevation appears to be local production of PEX material by TM cells and Schlemm's canal cells with subsequent

degenerative changes of Schlemm's canal and juxtacanalicular tissues. Additional pathogenetic factors contributing to pressure increase include pronounced melanin dispersion, increased protein concentrations of the aqueous humor, vascular factors, and connective tissue alterations of the lamina cribrosa¹. Intraocular pressure (IOP) decreasing is shown to diminish the progression of the disease, and could be achieved by the chronic use of hypotensive eyedrops, incisional surgery or laser trabeculoplasty². Selective laser trabeculoplasty (SLT) is effective in reducing intraocular pressure (IOP) in such patients and has the advantage of preserving surrounding structures³. This treatment consists of application of laser spots in the TM, leading to an increase in the outflow facility through it and in consequence, decreasing IOP.

Selective photothermolysis takes place when thermal damage is confined to the target, melanin, by using a specific laser wavelength with a laser exposure time (3 ns) equal to or shorter than the thermal reaction time of melanin. Thus, pulsed lasers with low threshold radiant exposures can selectively target pigmented TM cells and avoid collateral thermal damage to adjacent nonpigmented cells⁴. SLT does not depend on chronic instillation of eyedrops, as does medical treatment, and also does not have too many complications, as does incisional surgery². Since our patient was allergic to any glaucomatous drops we performed SLT, estimated as the best therapy modality.

Materials and Methods

Case report. A 82 year old female, allergic to all antiglaucoma eye drops especially those which contain bensalconium chloridum as preservative, presented to us with a secondary developed open-angle pseudoexfoliation glaucoma. Patient had PEX syndrome for 10 years, immature cataracts on both eyes, and BCVA 0.7 on the right and 0.2 on the left eye. Patient was also allergic to methyl-cellulose, so we performed SLT with water as a mediator. Preoperatively IOP was 28 mmHg on the right and 30 mmHg on the left eye. SLT was performed using a frequency doubled (532 nm) q switched Nd:YAG (Ellex Solo) laser which creates a spot size of 400 μm⁴. We monitored intraocular pressure (IOP), the changes in the visual field and optic nerve for 24 months with check points every 3 months. The used apparatus were, computerized visual field-OCTOPUS and optical coherence tomography (OCT-Zeiss).

Results

On the first day after SLT, IOP of the right eye decreased from 28 mmHg to 18mmHg and on the left eye from 30 mmHg to 20 mmHg. While IOP on the right eye

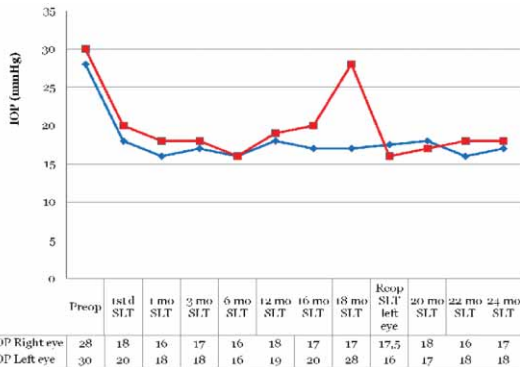


Fig. 1. Intraocular pressure in both eyes for follow up period of 24 months. IOP – intraocular pressure, SLT – selective laser trabeculoplasty, Preop-preoperative, D – day, Mo – month, Reop-re-operation

remained in the normal values (average 17mmHg) for whole follow up period of 24 months, on the left eye it increased up to 28 mmHg 18 months after treatment. SLT re-treatment was carried out on the left eye and the IOP stabilized again on the values between 16–18mmHg (Figure 1). There were no significant changes in the visual field and optic nerve configuration before and after SLT (C/D value for right eye:0.3–0.4; C/D left eye:0.5) (Figure 2). Patient had cataract on both eyes, left predominating, and BCVA also did not significantly change after the SLT treatment, remaining 0.7 on the right eye and 0.2 on the left eye.

Discussion

The current pathogenetic concept describes PEX as an elastic microfibrilopathy involving TGF-beta1, oxidative stress and impaired cellular protection mechanisms as a key pathogenetic factors. The pathogenetic factors TGF-β1 and TIMP-1/2 appear to be causally involved in this fibrotic process and thus may represent potential

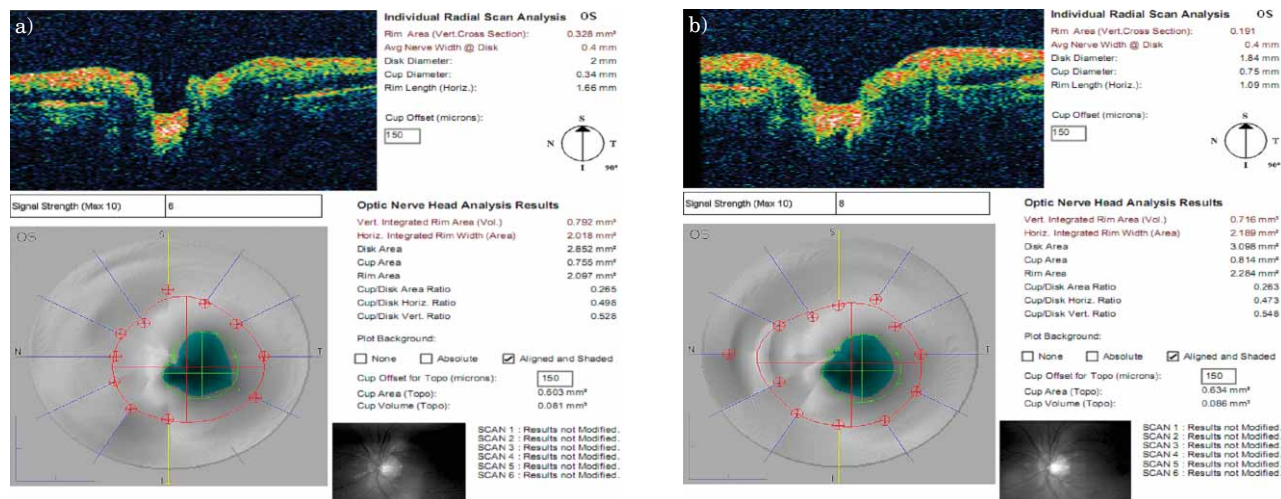


Fig. 2. OCT measurement of left eye optic disc before (A) and one year after SLT treatment (B). OCT – optical coherence tomography, SLT – selective laser trabeculoplasty.

targets for specific, rational therapeutic approaches². Although there is no evidence to determine the effectiveness of laser trabeculoplasty compared to contemporary medication (prostaglandin analogues, topical anhydrase inhibitors and alpha2-agonists) and also with contemporary surgical techniques, evidence suggests that, in people with newly diagnosed secondary open angle glaucoma, the risk of uncontrolled IOP is higher in people treated with medication when compared to laser trabeculoplasty at two years follow up¹. Although, it is also well known that trabeculoplasty is less effective than trabeculectomy in controlling IOP at six months and two years follow up. The literature has shown variable rates of the short and long term efficacy of SLT, with mean reductions in IOP ranging from 2–14 mmHg at 1 month, 3–6 mmHg at 3 months, and 5–7 mmHg at 6 months^{5–8}. A recent study has shown that SLT is a safe and effective procedure with continued average IOP lowering over 3 months⁹. Coagulative damage to the TM has not been

reported^{10,11}. Recent studies showed that patients who had a baseline IOP >21 mmHg were more likely to have a greater absolute value of IOP reduction and IOP reduction correlated with number of shots and average energy delivered^{12,13}. Results in our reported case confirm the results of the previous studies. Since our patient was allergic to drops with preservatives, including anesthetic drops, and methyl cellulose, we performed SLT without anaesthesia and with water mediator and achieved adequate laser shot energy. The IOP was successfully decreased for the follow up of two years, with repeated treatment on the left eye after 18 months. We conclude that SLT seems to be very effective method for maintaining regular IOP in the patient with PEX syndrome who is allergic to all types of medications.

Abbreviations: PEX – Pseudoexfoliation (PEX) syndrome, SLT – Selective laser trabeculoplasty, IOP – intraocular pressure, BCVA – best corrected visual acuity, C/D – cup/ disc

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SELEKTIVNA LASERSKA TRABEKULOPLASTIKA U LIJEČENJU PSEUDOEKSFOLIJATIVNOG GLAUKOMA KOD PACIJENTA ALERGIČNOG NA KONZERVATIVNU ANTIGLAUKOMSKU TERAPIJU

SAŽETAK

Sekundarni glaukom otvorenog kuta kao posljedica pseudoeksfolijativnog sindroma (PEX-a) najčešći je oblik glaukoma poznatog uzroka i predstavlja 25% svih glaukoma uopće. Selektivna laserska trabekuloplastika (SLT) učinkovita je metoda u snižavanju očnog tlaka u pacijenata s glaukomom te ima prednost očuvanja okolnih mikrostruktura tkiva. Prikazani su rezultati 82-godišnje pacijentice s PEX glaukomom, alergičnom na sve anti glaukomske kapi za oči, pogotovo one koje sadrže bensalkonij-klorid kao konzervans. Kako je pacijentica bila alergična i na metil-celulozu, kao medijator za SLT korištena je voda. Pacijentica boluje od PEX sindroma 10 godina, ima imaturne mrežne na oba oka te korigiranu vidnu oštrinu 0.7 na desnom te 0.2 na lijevom oku. Parametri koje smo pratili u liječenju pacijentice su očni tlak, promjene vidnog živca i vidnog polja. Preoperativni očni tlak bio je 28 mmHg na desnom te 30 mmHg na lijevom oku. Vrijeme praćenja pacijentice bilo je 24 mjeseca s vremenskim točkama mjerenja ispitivanih parametara svakih 3 mjeseca. Nakon 18 mjeseci očni tlak bio je u normalnim vrijednostima u prosjeku 17 mmHg na desnom oku, dok je na lijevom oku narastao na 28 mmHg. SLT je ponovljen na lijevom oku te se vrijednost očnog tlaka normalizirao između 16 i 18 mmHg. Na vidnom polju i oćnom živcu nije bilo nikakvih očekivanih promjena prije i poslije terapije (C/D desno: 0.3–0.4; C/D lijevo: 0.5). Na temelju ovog prikazanog slućaja možemo zaključiti da je SLT učinkovit u održavanju normalnog očnog tlaka u pacijenta alergičnog na ostale tipove antiglaukomske lijećenja.