Short communication

Peripapillary and Macular Microvascular Density after Selective Laser Trabeculoplasty in Exfoliative Glaucoma: OCT-Angiography stady on 30 cases

Abstract:

Exfoliative glaucoma is a particularly aggressive type of open-angle glaucoma, characterized with a faster rate of progression and poorer response to medical therapy. (1)

We present a prospective study on 30 eyes with exfoliative glaucoma with high intraocular pressure (IOP) treated by Selective Laser Trabeculoplasty (SLT). Fifteen (15) patients were involved in the study and were followed up over a period of 6 months.

The aim of this study is to evaluate the changes in the microvascular density (VD) of the periparipillary and the macular area by using OCT angiography before and after the treatment by Selective Laser Trabeculoplasty.

Keywords: Exfoliative glaucoma, microvascular density, OCT angiography, Selective Laser Trabeculoplasty.

Introduction:

Pseudoexfoliation syndrome is a systemic disease with primarily ocular manifestations characterized by deposition of whitish-gray protein on the lens, iris, ciliary epithelium, corneal endothelium and trabecular meshwork. It is the most common cause of secondary glaucoma worldwide, and the most frequent cause of unilateral glaucoma. (2)

Pseudoexfoliation glaucoma responds poorly to medical therapy compared with other types of glaucoma and can lead to rapid progression of optic nerve damage. (1)

Selective laser trabeculoplasty is a safe and noteworthy treatment option to reduce IOP in exfoliative glaucoma eyes [3-5].

Methods:

This is a prospective study realized in department of ophthalmology Ibn Sina in Morocco between January and June of 2021, on 30 eyes of 15 patients with exfoliative glaucoma treated by SLT.

The data for each patient was collected: age, sex, complete examination with measure of visual acuity, intraocular pressure measured by applanation tonometer, biomicroscopic examination, gonioscopy, pachymetry and angio-OCT, before and after treatment with SLT.

The microvascular density in peripapillary and macular area were analyzed by the OMAG algorithm (OpticalMicroAngiography)

The follow-up of patients over a period of 6 months.

Results:

A total of fifteen patients were included in the study, the median age was 58.1 (35 to 84 years old), ninewere males and six were females giving a male to female ratio of 1.5.

All patients had exfoliative glaucoma at different stage: early: 4 (27%), moderate: 8 (53%), advanced: 3 (20%) rebellious to medical treatment.

The average IOP before the SLT was 24.26 mmHg and the central corneal thickness was 530.04± 38.83 µm

The SLT was realized on 180° of trabecular surface in 26 eyes, and on 360° in 4 eyes.The energy delivered during the SLT laser was 0.77 mJ and varied between 0.4 and 0.9 mJ.

Mean IOP decreased from 24.26 to 17.11 mmHg after 6 months post-SLT, we observe a decrease in intraocular pressure over six months post SLT (table 1).

After one month post SLT microvascular density was increase of 4.4% (ranging from 29.8% to 31.11%) at the peripapillary area, and of 5% at the macular area (ranging from 45% to 47.25%). (graphic 1 and 2)

After 6 months of SLT, this microvascular density was decrease of 0.3% at the peripapillary area and of 0.6% at the macular area, without correlation with IOP. (graphic 1 and 2)

Discussion:

During this study, we were able to evaluate the changes in the microvascular density in peripallary and macular area before and after SLT, in patients with exfoliative glaucoma.

In our study, the efficacy of SLT is assessed by a statistically significant reduction in IOP from the first month, the decrease in mean IOP continued at three and six months. After 1 month we have noticed an increase in microvascular densityof peripapillary radial capillary plexus andmacular regions (foveal, para and perifoveal) after SLT, related to a negative correlation with IOP. This increase was noticed in all stages of glaucoma but it was more important in patients with early glaucoma.However, after 6 months post SLT all mean vascular densities returned to their initial levels.

This study had several limitations: first; the sample size was relatively small, second; the follow-up period was six months post SLT, which may be relatively short considering that exfoliative glaucoma is a progressive degenerative disease. A study with a longer duration and larger population may confirm our findings.

Conclusion:

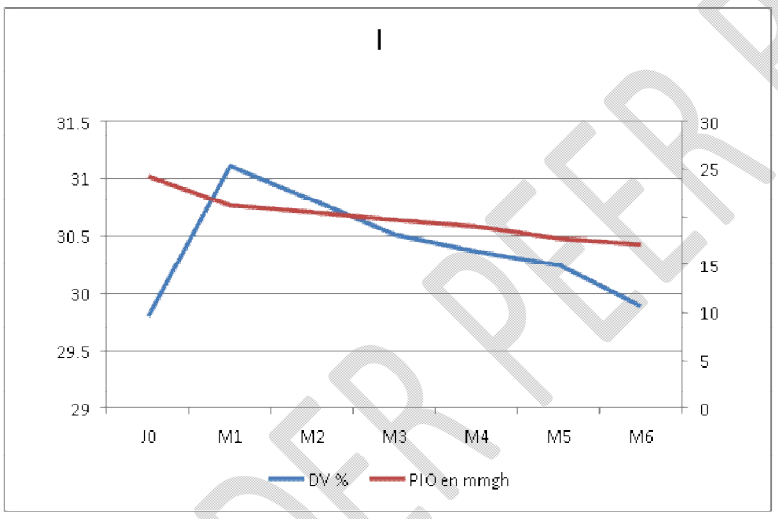
The variation in retinal blood flow is a risk factor for glaucoma progression, in this study we determine the effect of reducing the intraocular pressure on peripapillary and macular vascularization in exfoliative glaucoma treated by SLT as a second line of therapy, by using OCT Angiography, and we clarified the importance of early management of exfoliative glaucoma and reduce of IOP in regeneration of retinal microvascularization.

Table and graphic

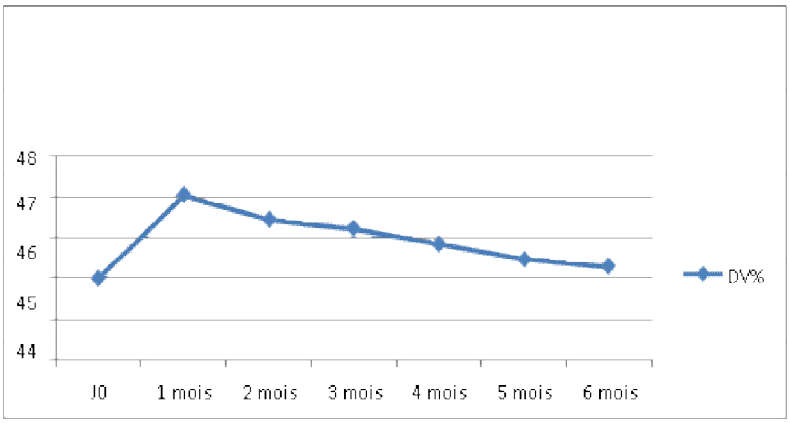
Table 1: Evolution of IOP in mmHg

	J0	1month	2months	3months	4months	5months	6months
IOP inmmgh	24,26	21,19	20,47	19,68	18,97	17,72	17,11

Graphic 1: Variation in peripapillary microvascular density and the IOP



Graphic 2: Variation in macular microvascular density



CONSENT (WHERE EVER APPLICABLE)

the patient has given their informed consent for the case report to be published

Abreviations:

OMAG: optical MicroAngiography

SLT:Selective Laser Trabeculoplasty

OCT:Optical coherencetomography

IOP: intraocular pressure

VD: microvascular density

References:

(1) Miglior S,Bertuzzi F. Exfoliative glaucoma: new evidence in the pathogenesis and treatment. https://doi.org/10.1016/bs.pbr.2015.06.007. ElsevierVolume 221, 2015, Pages 233-241

(2) Alpa S. Patel, M.D., Jordan Scott Masters, MD, Derek W DelMonte, MD, JoobinKhadamy, MD, Kourtney Houser, MD, Sadiqa K Stelzner, MD, FACS. American academy of ophthalmology

3. Mansouri K, Rao HL, Hoskens K, D'Alessandro E, Flores-Reyes EM, Mermoud A, Weinreb RN. Diurnal variations of peripapillary and macular vessel density in glaucomatous eyes using optical coherence tomography angiography. Journal of glaucoma. 2018 Apr 1;27(4):336-41.

4. Gillmann K, Rao HL, Mansouri K. Changes in peripapillary and macular vascular density after laser selective trabeculoplasty: an optical coherence tomography angiography study. Acta Ophthalmologica. 2022 Mar;100(2):203-11.

5. Hu X, Wan5. g X, Dai Y, Qiu C, Shang K, Sun X. Effect of Nimodipine on Macular and Peripapillary Capillary Vessel Density in Patients with Normal-tension Glaucoma Using Optical Coherence Tomography Angiography. Current Eye Research. 2021 Dec 2;46(12):1861-6.