Effectiveness of Selective Laser Trabeculoplasty (SLT) on Pigmentary Glaucoma (PG)
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Purpose:
To evaluate the short (1 month) and middle term (6 months) effect of selective laser trabeculoplasty (SLT) pigmentary glaucoma (PG).

Methods:
We analysed results of SLT in 32 eyes of 32 patients: included 15 in the PG group versus 17 in the Primitve open angle glaucoma (POAG) group. SLT was performed on 32 eyes of 32 patients between November 2010 and May 2011 during a consultation at the Glaucoma Center of the CHNO des Quinze-Vingts. Diagnostic criteria for primitive open angle glaucoma (POAG) included an IOP greater than 22mmHg, a glaucomatosus disc appearance, and visual field loss; diagnostic criteria for PG included all the above anomalies combined with pigment dispersion syndrome (midperipheral, radial iris transillumination defects; increased, homogeneous trabecular meshwork pigmentation; and Krukenberg spindle). Treatment was applied to the anterior trabecular meshwork for 220°. Laser technique consisted of a 400µm spot size with sufficient power to achieve transient bubble formation on the trabecular meshwork (average energy between 0.6 mJ and 1 mJ). Baseline medications were maintained before, during and after SLT. If both eyes of a patient receive SLT, only the first eye that has received laser treatment was counted for statistical analysis. The IOP was measured 1 hour after treatment, 1 month and 6 months after laser treatment. We then compared the results of the two groups.

Results:
We analysed the results of SLT in 32 eyes of 32 patients: 15 in the PG group and 17 in the POAG group. In the PG group there were 12 men (73,3%) and 3 women; Mean age was 43.6 years +/- 11.4 years; mean baseline IOP was 18.2 mmHg +/- 4.5 mmHg; 1 month and 6 months after SLT, mean IOP was respectively 16.1 mmHg +/- 4.7 mmHg and 17.9 mmHg +/- 4.8mmHg; 3 patients (36.6%) had a second SLT; one patient (6.6%) had filtering surgery (nonpenetrating deep sclerectomy : NPDS) six month later. In the POAG group there were 13 women (76.47%) and 4 men; Mean age was 66.3 years +/- 12.9 years; mean baseline IOP was 17.7 mmHg +/- 3.9 mmHg; 1 month and 6 months after SLT, mean IOP was respectively 15 mmHg +/- 4.2 mmHg and 15 mmHg +/- 4mmHg; one patient (5.8%) had a second SLT; 2 patients (11.7%) had filtering surgery (nonpenetrating deep sclerectomy : NPDS) six month later.

A significant statistical difference was found between the two groups in relation with age (patients in PG group significantly younger), gender : PG patients were principally men while there was a majority of women in POAG group, and the decrease of IOP at a 6 month period after treatment : 0.7 +/- 3.5 (3.8%) in the PG group versus 2.75 +/- 2.1 (15.5%) in the POAG group.

Discussion:
Pigmentary Glaucoma (PG) is a secondary chronic open-angle glaucoma (1-1.5% of glaucoma), mainly affecting young (30-50 years), myopic men (78-93% of cases).

Argon Laser Trabeculoplasty (ALT) has already shown efficacy in Pigmentary Glaucoma with even better results in some studies than in POAG or ocular hypertension. The possible mechanism may be the higher level of absorption of energy by pigmented trabecular meshwork cells.

Selective Laser Trabeculoplasty (SLT) is a more recent technique developed by Latina in USA from 1995. SLT delivers laser energy to the trabecular meshwork using parameters to obtain selective absorption of energy by pigmented cells, sparing adjacent cells and tissues from thermal damage. The SLT device in clinical use is a 532nm frequency-doubled, Q-switched Nd: YAG laser with a 3 ns pulse and 400µm beam diameter. Although the mechanism of its action is even less well understood than that of ALT, it provides IOP reduction that is similar in magnitude and duration with ALT, and is associated with very few complications.

In our study we observed a greater decrease in pressure after 6 months in POAG group (15.5%) in comparison with the PG group (3.8%) with a significant statistical difference between the 2 groups. In POAG group 70% of patients had a decrease in IOP of 20% or more at 6 months versus only 27% of patients in PG group.

Main hypothesis to explain this difference:
Degree of trabecular meshwork pigmentation:
In one study (Chen et al), the degree of trabecular meshwork pigmentation wasn’t found to affect the success rate of SLT, or to have any effect on IOP reduction after 1 or 4 months after the procedure. However after 7 months, the success rate was significantly related to the pressure-lowering effect of SLT. In another study (Hodge et al), trabecular meshwork pigmentation was also found not to be a predictor of success. The study by Melamed et al included three eyes with pigmentary glaucoma, with a mean IOP reduction of 24% after SLT. In the study by Damji et al, in those patients with pigmentary glaucoma, an average baseline IOP of 21.8 mmHg decreased by 5.6 mmHg in five eyes that had SLT after 12 months. On the other hand, our observations are supported by Harasymowycz et al who reported four cases of eyes with heavily pigmented trabecular meshwork, three of them with pigmentary glaucoma, in whom SLT was followed by marked and sustained IOP rise. Three of the four required trabeculectomy due to uncontrolled IOP after SLT. Moreover, according to our conclusions, in one recent prospective study including 91 POAG, 22 pseudoexfoliative glaucoma (PEX) and 23 PG, Koucheki et al showed that the level of IOP reduction did not vary in POAG, PEX, and PG groups at 16 months but a significant increase in IOP was observed in PG group after 6 months.

In our study no complications were noted, however, these studies suggest that the degree of trabecular meshwork pigmentation could affect the effectiveness of SLT and could even be a risk factor of failure.

CONCLUSION

We carried out a retrospective study comparing 32 eyes in 32 patients treated with SLT, we found that SLT seemed less effective in PG than in POAG at 6 month after laser treatment.

These result suggest a role in degree of trabecular meshwork pigmentation in the effectiveness of SLT. However to confirm our conclusions, it will be necessary to carry out a prospective study with more patients and longer follow-up.