Preliminary results of a clinical study on efficacy of selective laser trabeculoplasty (SLT) in patients with insufficient control of intraocular pressure (IOP) under maximum tolerated drug therapy

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Purpose / Material and Methods

- **Study aim**: to measure the IOP lowering effect of SLT in patients with insufficient IOP control under maximum tolerated therapy
- **Open-label, non-controlled, prospective single center study**
- **Inclusion criteria**
  - 30 patients planned, one eye per patient
  - primary open angle glaucoma (POAG) including normal tension glaucoma (NTG)
  - pseudoexfoliation glaucoma (PEX)
  - pigment dispersion glaucoma (PDG)
  - former argon laser trabeculoplasty (ALT) allowed
- **Exclusion criteria**
  - previous intraocular surgery
  - narrow angle glaucoma and other than above mentioned glaucoma
  - unclear view of trabecular meshwork, any malformation blocking the trabecular meshwork (TM)
- **Control of IOP, visual acuity, possible side effects**
  - Control after 2 hours, and 1, 30, 90, 180, 360 days
  - Preoperative medication continued until 90 days visit

*all possible side effects are listed in Zarbin, M. and Chu, D., Surv Ophthalmol 52: 634-654, 2007*
SLT technology

- Frequency doubled, Q-switched Nd:YAG laser, wavelength 532 nm
- Beam diameter 400 microns, pulse duration 3 nanoseconds
- Non-thermal laser effect in contrast to ALT
- Selective absorption of laser energy by pigmented cells
- Mechanism of action yet not fully understood; probably based on stimulation of endothelial cells of TM

Fig. 1: scanning electron microscopy of TM *
1a: after Argon-Laser trabeculoplasty (ALT)
1b: after SLT

*Courtesy of Kramer TR, Noeker RJ, Ophthalmology 2001, 108; 773-779

SLT procedure

- Preoperative administration of brimonidine eye drops
- Latina SLT lens (Ocular Instruments Bellevue, WA, USA)
- 360° laser treatment of TM □ 100 non-overlapping laser spots
- Energy 0.3 – 1.6 mJ, depending on grade of pigmentation of TM
- No administration of anti-inflammatory drugs postoperative
Patients:
- 26 patients yet included
  - 8 male, 18 female, 14 OD, 12 OS
  - 18 POAG, 3 NTG, 5 PEX
- Mean follow up: 60.6 days ± 35.3 (1 – 98)
  - 22 patients 30 (±3) days
  - 14 patients 90 (±3) days
  - Medication continued unchanged until 90 days visit

Baseline:
- Mean pre-op IOP 19.8 mmHg ± 4.6 (14.0 – 33.0 mmHg)
- Mean number of IOP lowering substances 2.3 ± 1.2 SD (0 – 4)
- Mean visual acuity 0.26 logMAR ± 0.54 (-0.1 – 2.52) (0.6 Snellen charts)

SLT:
- Mean SLT total energy 88.08 mJ ± 21.87 (49 – 126 mJ)
- No complications occurred during SLT procedure
• Results
  • IOP: mean IOP was 15.5 mmHg (-20.3 %, p= 0.001) at 30 days and 15.5 mmHg (-24.3%, p= 0.005) at 90 days
  • Visual acuity: no significant change at 30 and 90 days
• Side effects
  • In 11 cases mild anterior chamber inflammation, resolved without additional therapy
• Complications
  • 3 patients developed paradox rise of IOP (IOP>26mmHg) 2 hours after SLT and were treated additionally with azetazolamide 250 mg per os
  • No severe complications occurred
  • No synechia formation in anterior chamber angle observed
• SLT is a non-thermal laser treatment without coagulative tissue damage in contrast to standard ALT
• SLT can reduce IOP in patients on maximum tolerated medical therapy between 20 - 25% without severe side effects or complications
• Repeated laser treatments are possible, if required future filtrating surgeries are probably not impaired
• SLT is a good option in patients with compliance problems
• It might be that the use of SLT can lower the treatment costs, because it becomes possible to reduce or even withdraw topical therapy
• Future SLT indications at the USZ:
  • patients, who need only a slight additional IOP-reduction to reach the target IOP
  • patients unable to tolerate medication therapy