Laser Canalostomy (LC) using the TM:YAG

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**Introduction**

Viceocanalostomy [1], a modified nonpenetrating deep sclerectomy [2], NPDS, is a procedure for POAG surgery with a low postoperative risk profile. Using Stogman’s microsurgical approach, the outer wall of the canal of Schlemm can be removed (unroofing of Schlemm’s canal) during the preparation of the deep scleral flap towards the clear Descemet’s membrane in a controlled way. By this surgical preparation, the naso and temporal orifices of Schlemm’s canal adjacent to the site of the deep sclerectomy are exposed, thus allowing for probing of the surgical ostia (Fig. 1). However, the level of intraocular pressure (IOP) which can be achieved by this procedure is not as low as compared to a successful standard trabeculectomy, especially in cases where the preservative IOP is only moderately elevated. This may be due to the fact that the major component of the outflow resistance [3-5], the anterior juxta-canalicular trabecular meshwork (TM), remains intact by this surgical procedure.

**Materials and Methods**

Photoablation:

To perform micro ablations of the inner wall of Schlemm’s canal and the adjacent juxta-canalicular trabecular meshwork, we used a Tm:YAG laser and an Er:YAG laser (InPro Hamburg, Germany; Type CUT) in the normal spiking mode. The Tm:YAG emits radiation of 2.01 µm with a tuneable pulse lengths <1000 µs and a repetition rate <10 Hz up to a maximal averaged power of 10 W. The Er:YAG emits a radiation of 2.94 µm with a tunable pulse length <100 µs and a repetition rate <10 Hz up to a maximal averaged power of 10 W. The laser was operated multimode with a uniform beam profile. At the tip, the laser beam was coupled into a quartz fibre of 100 micrometers core diameter. The energy per pulse delivered through the fibre was measured with a joule meter (PEM 10) at its high sensitivity of 81.5V/J. The fluence was regulated by changing of the bank voltage.

**Surgical procedure**

A triangular flap of approximately one-third schlemm’s width with a 5 mm base at the limbus was prepared using the microsurgical viceocanalostomy set (Grieshaber AG, Switzerland). Inside the area of the initial flap a second triangular flap was dissected down to the level of the canal of Schlemm. The orifices of the canal of Schlemm were dilated using high viscous hyaluronic acid (Hyaluron G). Then the laser probe was gently introduced into the canal and photoablation was started.

**Discussion**

First attempts to lower the IOP using laser application to structures of the trabecular meshwork were performed by Krasnov [7]. Different methods with various lasers have been investigated for trabecular ablation [8-9]. Berlin et al. (UV-laser) [10] and Hill et al. (IR-laser) [11] started working with photo ablation laser, they have shown that trabecular meshwork could be ablated with minimal collateral thermal damages. All authors, except for the group of Kampmeier [14], used the technique of all internal laser trabecular ablation with tips sizes up to 500 microns in diameter.

This study shows that the special design of the tip allows for probing of Schlemm’s canal. The following selective retrograde TM photoablation can be performed without damaging the posterior wall of Schlemm’s canal.

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**Literature:**