

## CANALOPLASTY AFTER LASER TRABECULOPLASTY

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### **Abstract:**

The paper presents a case of a pseudoexfoliative glaucoma previously treated with argon laser trabeculoplasty in a tertiary center, who was scheduled for canaloplasty in the Ophthalmology Department of the County Hospital Piatra Neamt, Romania. Although the status post laser trabeculoplasty is not among the best indications for canaloplasty, the article confirms the fact that this procedure can also be successfully performed in these cases.

**Keywords:** trabecular meshwork, intraocular pressure, Schlemm's canal, aqueous outflow

### **Introduction**

Open angle glaucoma is a potentially blinding disease, characterized by painless visual loss due to retinal ganglionar cells death. The only risk factor amenable to treatment is elevated intraocular pressure (IOP). The outflow of the aqueous humor occurs through 2 pathways: conventional and uveoscleral. Conventional route comprises trabecular meshwork, Schlemm's canal, collector channels and episcleral veins and is responsible for about 85% of the aqueous outflow. The key source of outflow resistance is the juxtacanalicular connective tissue region of trabecular meshwork and the inner wall of Schlemm's canal [1]. The gold standard of antiglaucomatous surgery is trabeculectomy, a standard perforating filtering procedure introduced by Cairns in 1968. It is associated with very good long-term intraocular pressure (IOP) control but also with many

complications including flat or shallow anterior chamber, suprachoroidal hemorrhage, wound leak, cataract formation, bleb-related problems such as fibrosis or encapsulation of the bleb, decreased vision from hypotony maculopathy and endophthalmitis [2].

Nonfiltering techniques avoid intraocular penetration reducing overdrainage or the risk of endophthalmitis. Peripheral iridectomy is not required, reducing the breakdown of the blood-aqueous barrier, resulting in less anterior chamber inflammation with fewer cataracts, synechia and bleb failure. These techniques became an increasingly popular alternative to the conventional glaucoma surgery because of the lower postoperative complication rates and quick visual rehabilitation.

Canaloplasty is closer to the "ideal" procedure than any other surgical technique because it uses the natural outflow system to reduce IOP. Canaloplasty targets the main source of outflow resistance and treats the entire length

of Schlemm's canal [3]. Its best indications are open-angle glaucoma, primitive or secondary and cases previously treated with laser trabeculoplasty are not a straightforward indication. The surgical results after canaloplasty seem to be comparable with trabeculectomy but with minimal complications [4,5]. The absence of a filtration bleb means that success or failure of this procedure is independent of subconjunctival fibrosis. The article presents a case of pseudoexfoliative glaucoma previously treated with argon laser trabeculoplasty in which IOP was successfully lowered with canaloplasty.

Argon laser trabeculoplasty (ALT) has become one of the standard treatments for glaucoma. Argon laser increases the aqueous outflow by photocoagulation of trabecular meshwork. The accepted theories to explain this effect in the mechanical and the cellular theories: the mechanical theory postulates that ALT causes coagulative damage to the trabecular meshwork, which results in collagen shrinkage and subsequent scarring of the trabecular meshwork in the area of each burn. Thus, the adjacent untreated intertrabecular spaces are reopened and aqueous outflow is increased. The cellular theory says there is a migration of macrophages that clear the trabecular meshwork through phagocytic activity in response to coagulative necrosis induced by the laser [6].

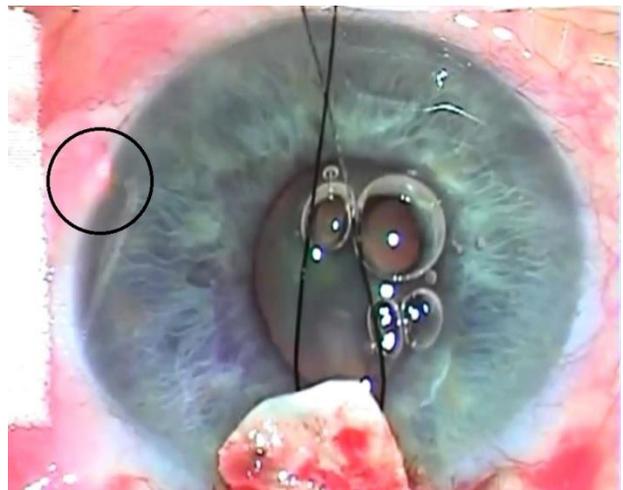
## Material and methods

The paper presents the case of a 72-year-old man diagnosed with OD pseudoexfoliative glaucoma, who underwent argon laser trabeculoplasty in a tertiary center. In December 2013, he was evaluated in the Ophthalmology Department of the County Hospital Piatra Neamt. Ophthalmologic examination at that moment revealed:

- Visual acuity in right eye: 0.2
- IOP in right eye 20 mm Hg with quadruple medication (Lumigan, Cosopt, Brimonal)
- C/D in right eye: 0.9
- Gonioscopy: anterior chamber angle grade III (modified Shaffer system) with trabecular pigmentation

- Slit-lamp biomicroscopy: cortical lens opacities, pseudoexfoliative material at pupillary margin.

After the patient gave an informed consent, he was scheduled for canaloplasty of his right eye, in December 2013. The operation was done according to the technique described by Scharioth in 2010 [7]. After superior peritomy, a superficial scleral flap 1/3 of scleral thickness was fashioned. No bipolar cautery was used, in order to maintain the integrity of collector channels. A deep scleral flap, 0.5 mm inside the margins of the first scleral incisions was prepared and dissected anteriorly, with adequate depth in order to deroof the Schlemm's canal. At that moment, a paracentesis was performed to reduce IOP. The dissection of the deep flap was continued anteriorly fashioning the trabeculo-descemet window. After the excision of the deep scleral flap, a microcatheter was introduced in the Schlemm's canal, the entire 360° circumference (Fig. 1, 2). A 9:0 polypropylene suture was tied to the exteriorized end of the catheter and introduced in the canal, and then the catheter was withdrawn. The suture was tied under tension in the canal, high viscosity viscoelastic was placed in the scleral lake and superficial flap was secured with 5 resorbable vicryl sutures. At the end of the procedure, the patient received a subconjunctival injection with antibiotic and dexamethasone. Postoperatively, the patient received antibiotic and steroid drops during the day and a combination of antibiotic and steroid (ointment) at night. The antiglaucomatous medication was discontinued after the procedure. The patient was then examined on day 1 and on month 1 postoperatively.





**Fig. 1, 2** Illuminated beacon tip of the microcatheter in the Schlemm's canal

## Results

Immediately postoperatively on day 1, the IOP was of 7 mm Hg and on the 1 month follow-up visit, IOP was of 13 mm Hg, with no medication. There were no intra- or postoperative complications in this case.

## Discussions

Argon laser trabeculoplasty has become one of the standard treatments for glaucoma. However, in recent years, a failure rate of 15-25% in the first year and annual failure rates of 5-10% thereafter had been noticed [8]. Most patients fail within 10 years and require further treatment. Membrane formation in the chamber angle is a frequent cause of the failure. The major risk factor for the membrane to form is the number of argon laser trabeculoplasties performed. The rise in IOP after argon laser trabeculoplasty is a frequent complication. Posterior placement of laser burns and pigmentation of the trabeculum are associated with an increase of IOP. The inflammatory response triggered in the trabecular meshwork can also lead to peripheral anterior synechia formation.

Although status post laser trabeculoplasty is not the best indication for canaloplasty, the paper shows that the procedure can also be performed in these cases. The IOP response after canaloplasty was very good (complete success, IOP<21 mm Hg, without medication).

## Conclusions

The status post laser trabeculoplasty is not an absolute contraindication for canaloplasty. The paper confirms the fact that canaloplasty can also be performed in these patients, but further studies with more patients recruited and a longer follow up are needed to ascertain the maintenance of low IOPs in time after canaloplasty in these cases.

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