

# IMPROVING THE OUTCOME OF LASER PROCEDURES IN GLAUCOMA

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# LASER PROCEDURES

- Laser treatment for internal flow block
- Laser treatment for outflow obstruction
- Miscellaneous laser procedures

# LASER TREATMENT FOR INTERNAL FLOW BLOCK

- Laser peripheral iridotomy
- Laser iridolasty ( Gonioplasty)

# Iridectomy

- Pre-treat -- pilocarpine, selective alpha agonists
- Post-treat -- topical steroids, ocular hypotensives

# Iridectomy

- **Complications**

- Visual disturbance
- IOP spike
- Inflammation
- Bleeding

- **Considerations**

- Location choice
- Ocular hypo.
- Topical steroids
- Laser choice or the use of contact lens

# LASER TREATMENT FOR OUTFLOW OBSTRUCTION

- Argon laser trabeculoplasty
- Selective laser trabeculoplasty

# SLT

- Selective laser trabeculoplasty
- Non-thermal laser
- Q-switched frequency doubled (523) Nd.YAG laser
- Selectively targets and irradiates only the pigmented cells in the trabecular meshwork with no collateral damage to the underlying structures

# Contact Placement



- NO magnification (1X only)
  - Latina SLT
  - Goldmann 3 mirror
  - Ritch
- Changes in magnification will alter beam diameter and energy



# Preoperative Medications?

- Alpha agonists
- Topical anaesthesia

# Postoperative Medications

- Alpha agonists for 48 hours
- Avoid the use of steroids
- Topical NSAID if needed

## How long after treatment is the optimum pressure reduction reached?

- Usually observed after one day
- 8 – 10 % are slow/late responders, response may be seen 4 – 12 weeks

**Laser**

**Cyclophotocoagulation**

# Background

- The first cyclodestructive laser procedure was performed by Beckman and colleagues in 1972, and since then various other cyclodestructive procedures have been implemented

# Background

Year	Author	Type of laser
1989	Brancato et al	Nd :YAG laser (1064 nm)
1992	Gaasterland et al	Semiconductor diode laser (810 nm)
1992	Uram	Endoscopic Cyclophotocoagulation
2010	Tan et al	Micropulse diode laser

# Laser Cyclophotocoagulation

Trans - Scleral

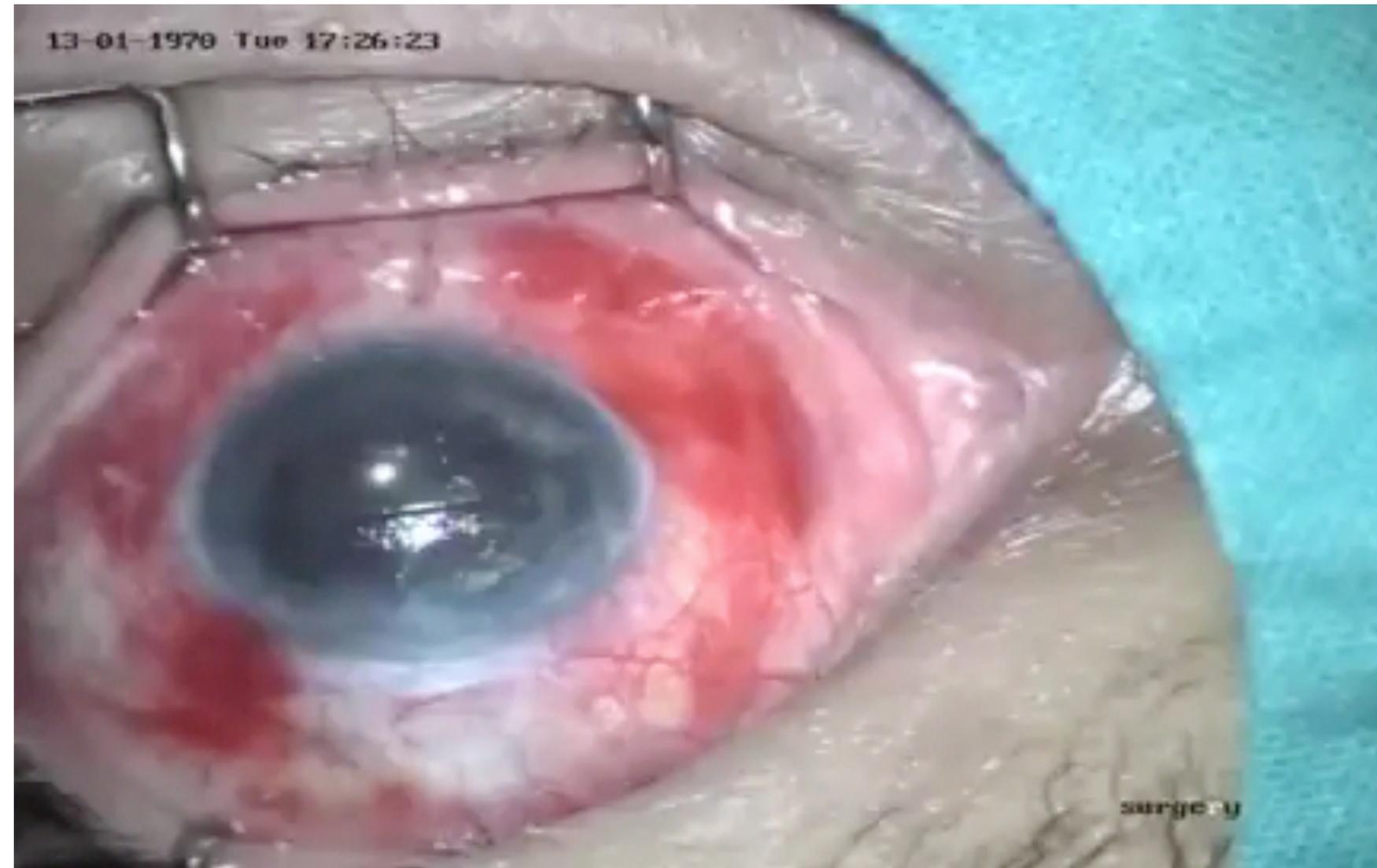
Contact trans-scleral CPC (TSCPC)

Micropulse CPC (MPCPC)

Endocyclophotocoagulation (ECP)

# Contact Trans-scleral CPC

- Using the continuous wave is the common way of delivery
- It is effective for all the forms of glaucoma
- It is often used as a treatment of last resort because of the risk of morbidity and hypotonic, visual disturbance and even phthisis bulbs.

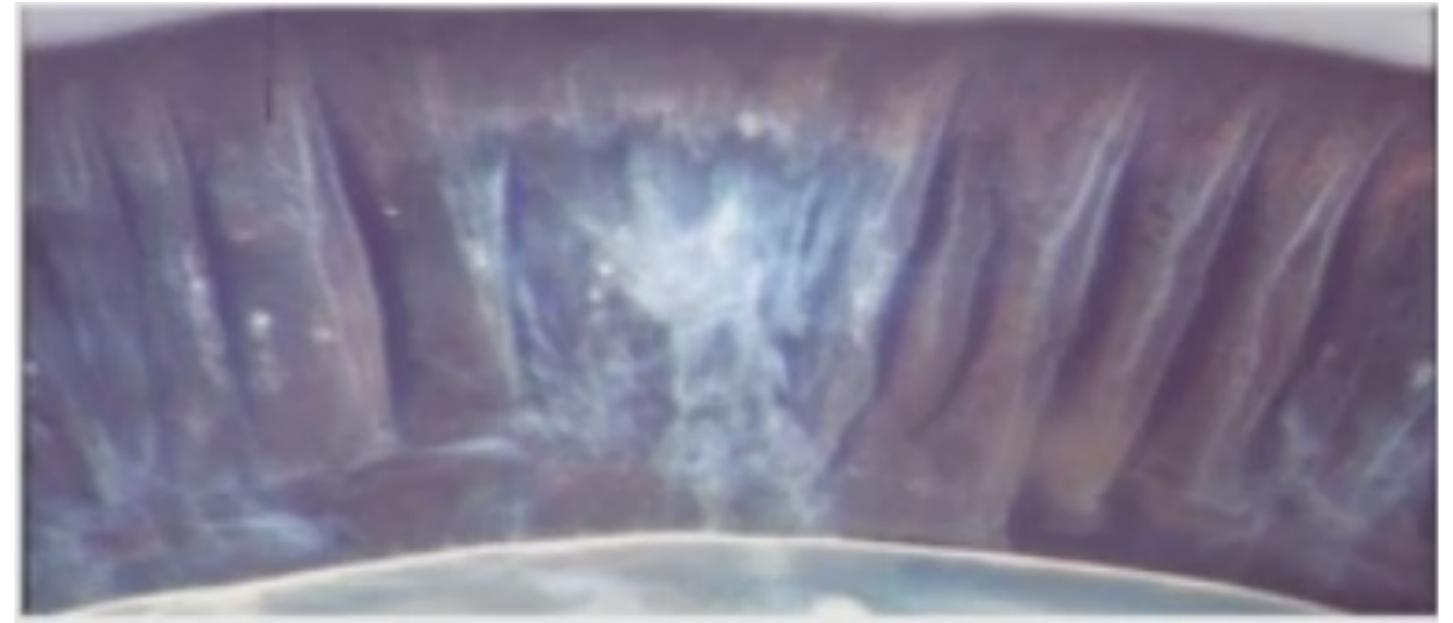


# Parameters

- Duration : 2000 millisecond
- Power: 2000 mW
- Power increased or decreased by 250 mW
- 5 - 6 spots /quadrant. 20 - 24 spots over 360 degrees

# CPC

- Success of TCP in lowering IOP is tempered by significant complication rate rates by 10 years:
  - Visual loss of two or more lines occurred in 75 % of eyes
  - Pthisis occurred in 3 % of eyes
  - 5 eyes with initial visual acuity counting fingers lost light perception (7%)



# Improving Outcome

- Modified parameters of Trans scleral cyclophotocoagulation
- Micropulse ( Subcyclo ) cyclophotocoagulation
- Endocyclophotocoagulation

# Modified Parameters

- Duration : 4000 millisecond
- Power: 1250 mW
- Power increased or decreased by 150 mW
- 6 spots /quadrant. 18 - 24 spot over 360 degrees

# Modified Parameters

- Results :
  - Used as primary surgical treatment in POAG
  - IOP
    - Decreased by 20 % in 47 % of treated eyes
    - 22 mmHg or less in 48% of treated eyes
  - Vision : 77 % same or better
- Cyclodestructive procedures in treatment of Glaucoma . Anjana P et al .June 2019

# New Procedure

**Micropulse cyclophotoagulation**

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**Subcycloprocedure**

# Difference in mechanism of action

TSCPC	MPCPC
Targets pigmented CB epithelium and stroma, including vascular core, to suppress aqueous production	Low grade CB inflammation and thermal insult hypothesized to <ul style="list-style-type: none"><li>. Reduce aq production</li><li>. Enhance uveoscleral outflow</li></ul> Activate cellular biochemical cascade
Results in diffuse coagulative tissue damage	Allows final control of thermal effect on CB epithelium

# MPCPC

- An alternative which administers a series of repetitive short pulses of laser energy separated by rest periods , and it is unlike CWPCPC which delivers continuous high intensity energy to the ciliary body.
- MP is applied using customized probe that is used to apply the laser in a continuous painting fashion, rather than individual burns, and rather to pars plans than pars plicate



# Parameters

- Power : 2000 mW
- Location : 3 mm behind the limbus
- Probe moved in a painting like fashion from 10:30 to 2:30 clock hours superiorly and from 3:30 to 8:30 inferiorly
- Exposure time was 80 seconds per semi-circumference with a duty cycle 31.3 %
- The probe is held perpendicular to the limbus

# Parameters



# MPCPC

- Mechanism of action still unclear
- It is hypothesized that inflammation of the ciliary body reduce aqueous formation and possibly enhance uveoscleral outflow
- UBM after MPC
  - No anatomical damage or visible lesion in ciliary body
  - Thin space between sclera and ciliary body which may correspond to presence of suprachoroidal fluid

# MPCPC

- Indicated for most types of glaucoma:
  - POAG
  - PACG
  - Pseudoexfoliation
  - NVG
  - Steroid induced glaucoma
  - Uveitis
  - After PKP

# Results of the procedure

- Reduction of mean IOP from 27.7 mmHg. To 16.3 mmHg. With 41.2 % reduction
- Reduction of mean medication from 3.3 pre-op to 2.3 post-opM

# Results of the procedure

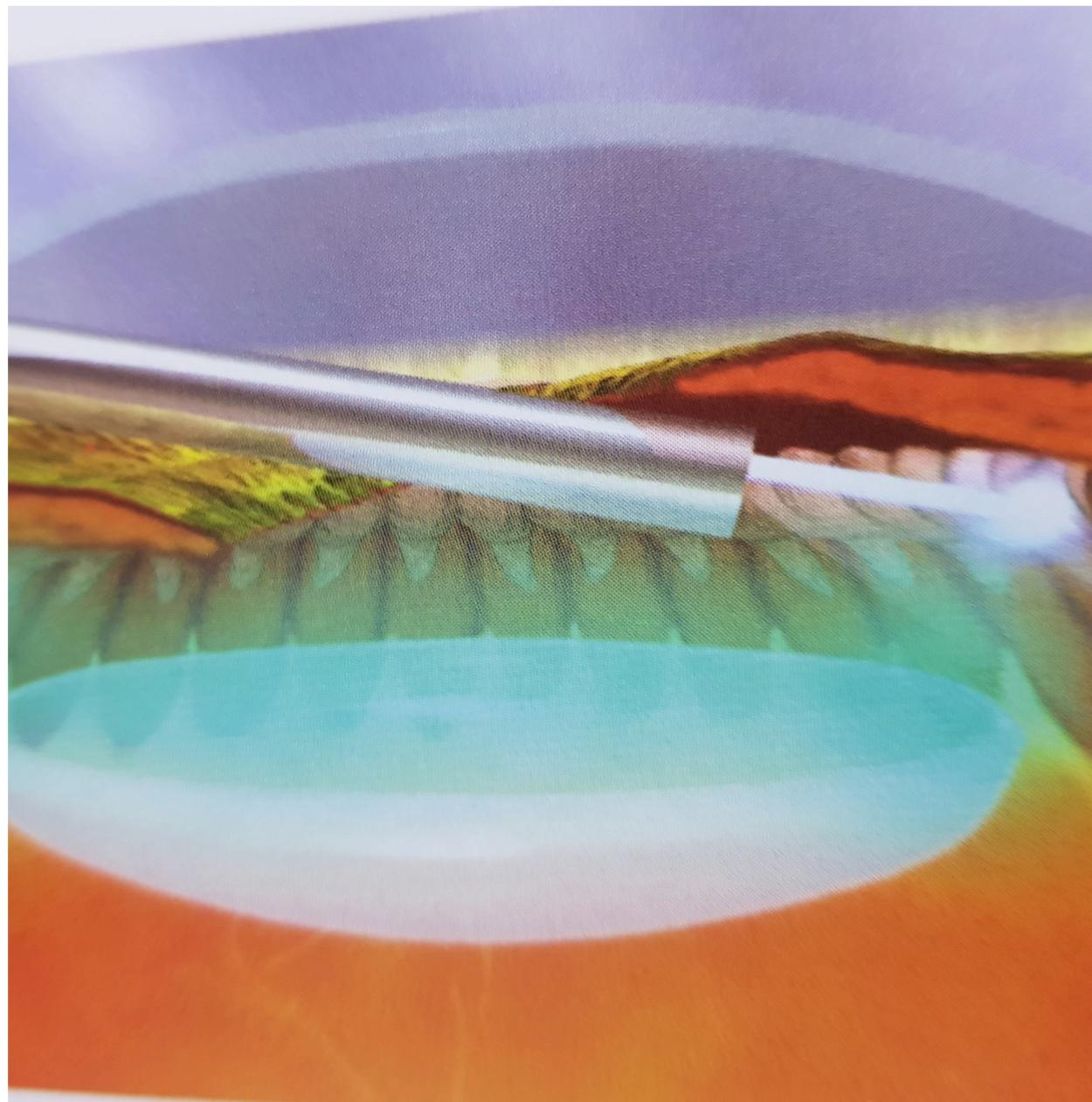
- Reduction of IOP 30 % from baseline and below 21 mmHg.
- Reduction of mean number of medications from 3.4 pre-op to 2.9 post op

Yves Lokhur and Nassuria Bentratch. Glaucoma institute, Saint Joseph Hospital Paris

# Endocyclophotocoagulation

- Can be done in phakic, pseudophakic and aphakic eyes
- Limbal approach is used in phakic eyes while pars-plana approach is preferred in aphasic and pseudophakic eyes since there is better visualization of ciliary processes
- The goal of the laser application is to whiten and shrinks the ciliary process
- The entire ciliary procedure should be treated
- ECP can be combined with phacoemulsification

# Endocyclophotocoagulation



*Thank you for your attention*



# Endocyclophotocoagulation

- In a study of 68 eyes with refractory glaucoma that underwent ECP, the mean IOP reduced from 27.7 mmHg. To 17.0 mmHg. (34% reduction)
- The number of glaucoma medications decreased from 3 to 2
- The mean follow-up period was 12.9 months
- Ninety percent of eyes had IOP less than 22 mmHg. At the last follow up period

- Chen J et al. Endoscopic photocoagulation of the ciliary body for the treatment of refractory glaucomas. Am J Ophthalmol 1997;124(6):787-796

*Thank you  
For your attention*