

Cyclophotocoagulation

Introduction

The glaucomas are a group of diseases that cause damage to the optic nerve that carries vision from the eye to the brain, and eventually leads to vision loss and blindness. High eye pressure (IOP) is the main risk factor, and the only one that can be treated. The two ways to lower IOP are to increase the drainage of fluid out of the eye, or to reduce the amount of fluid produced in the eye. Glaucoma medications, lasers, and surgeries all work in one of these ways. CPC is a surgical treatment that lowers the production of fluid inside the eye. This is done by applying laser energy to the ciliary processes, the part of the eye that produces fluid. (see figure 1)

Transscleral Cyclophotocoagulation

Transscleral cyclophotocoagulation (TCP) involves treating the ciliary processes with laser energy from the outside of the eye (see figure 2). This is done by placing a laser probe on the outside surface of the eye on the white part next to the clear front surface of the eye (cornea). This corresponds to the usual position of the ciliary process glands on the inside of the eye.

Advantages of this approach include the ability to perform the procedure without making an incision into the eye itself. The procedure is performed with a nerve block to prevent pain during the laser, and is often performed with sedative medications given through a vein (IV or intravenous).

The disadvantages of this approach include the inability to see the target ciliary process glands during treatment. Because of this, there is often a need to repeat the treatment at a later time.

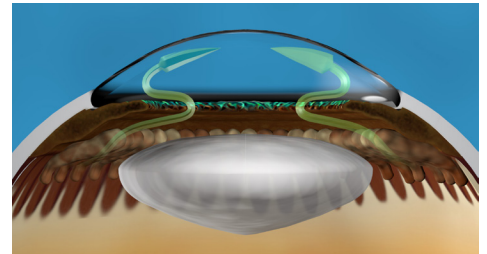


FIGURE 1

Fluid production in the eye: Fluid is produced in the glands behind the iris where the arrows start. It then carries forward through the pupil into the front chamber of the eye and drains out through the drainage system.

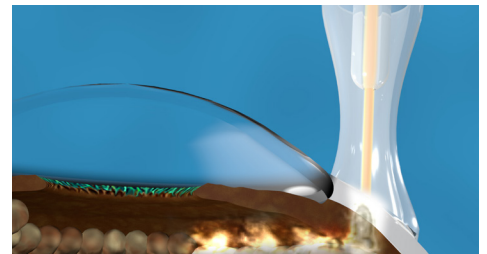


FIGURE 2

Transscleral Cyclophotocoagulation (TCP): an external probe is used to apply laser energy through the wall and middle tissues of the eye to reach the fluid-producing glands.

ABBREVIATIONS

CPC = cyclophotocoagulation

ECP = endoscopic cyclophotocoagulation

TCP = transscleral cyclophotocoagulation

IOP = intraocular pressure



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Endoscopic Cyclophotocoagulation

Endoscopic cyclophotocoagulation (ECP) involves treating the ciliary process glands from the inside of the eye using an endoscope. The endoscope is a probe that contains a camera, light source, and treating laser. When inserted into the eye, the camera can visualize the glands as they are being treated, helping to guide where the laser is used and how much power to use depending on the response of the tissue.

The approach can be anterior (from the front) or posterior (from the back) of the eye. (see figures 3 and 4) The anterior approach is done by making one or two small incisions in the cornea just before it turns into the white tissue of the eye. The probe is then advanced forward until it is facing the ciliary processes under the iris. This approach is commonly performed with cataract surgery.

The posterior approach (also called pars plana) is done by making one or two incisions in the sclera (white part of the eye) about 3 mm behind where the cornea turns into the sclera. The probe is then advanced forward towards the ciliary process glands. This technique usually requires an additional procedure called a vitrectomy, in which the gel in the back of the eye is removed with special instruments. This approach is used when the anterior approach is blocked such as with scar tissue. It may also sometimes be used for more aggressive treatment, as it allows a more extensive coverage of the target tissue.

Clinical Settings for use of Cyclophotocoagulation

- ECP can be used in the treatment of mild to moderate glaucoma (often at the same time as cataract extraction)
- ECP can be used to surgically lower IOP in cases where the drainage system is blocked
- ECP can also be used for moderate to advanced disease such as when another glaucoma surgery has failed to control IOP

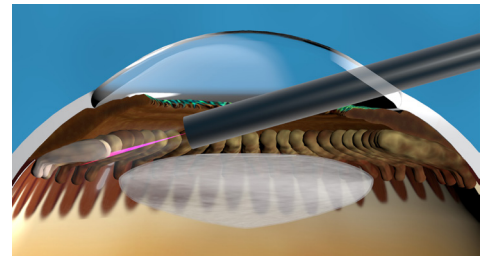


FIGURE 3

Endoscopic Cyclophotocoagulation (ECP) from an anterior approach: the laser probe is inserted into the eye from the front chamber of the eye, through the pupil to gain access to the fluid-producing glands.

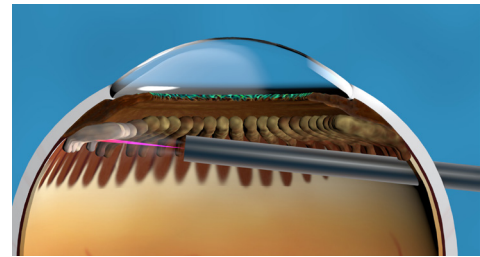


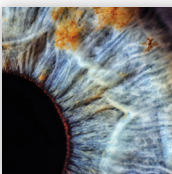
FIGURE 4

Endoscopic Cyclophotocoagulation (ECP) from a posterior approach: the laser probe is inserted into the eye from the back chamber of the eye, with direct access to the fluid-producing glands.

- ECP can also be used for advanced disease that has failed multiple surgeries
- TCP can be used for moderate to advanced glaucoma that has failed another glaucoma surgery

Risks of Surgery

All forms of CPC have the risk of inflammation after surgery, which is treated with intensive anti-inflammatory medication (usually steroids). These can be given at the time of surgery via intravenous route, or an injection in the eye, or by drops or pills after surgery. There is a small risk of infection with ECP as it involves entering the eye, but not with TCP, which is done from the outside of the eye. There is a risk of IOP going too low, which may be higher with the external TCP approach than the internal ECP approach.



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