

## A novel approach to glaucoma surgery: electro-surgical corneoscleral trepanation improves the outcome of lasercyclophotocoagulation

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### Purpose:

Treatment of glaucoma with lasercyclophotocoagulation (LSP) yields good results with regards to lowering intraocular pressure, with regards to maintaining vision however the prognosis remains poor. One of the most important complications, which lead to postoperative loss of vision, is a short-term increase in intraocular pressure immediately after laser therapy. To prevent this post-operative increase in intraocular pressure, laser therapy can be combined with fistulation techniques. The purpose of this study was to develop and evaluate the use of an electro-surgical technique for corneoscleral trepanation in combination with laser therapeutic treatment of glaucoma in cats and dogs.

### Method:

From 1999 to 2005 we performed LSP on 152 eyes in 128 dogs using a diode laser (Visulas II® Carl Zeiss Meditec AG, Jena, Germany). Power (400-1000 mW) and number of laser points (70-100) varied according to the individual requirements of the patient, exposition time however remained constant at 5000 ms. After analyzing the outcome of the cases that have undergone LSP to date in 2003, we started to combine laser therapy with fistulating techniques in selected cases. From 2003 to 2005 we used corneoscleral trepanation in conjunction with LSP in 28 eyes on 23 dogs and one cat.

Corneoscleral trepanation was performed with the Diacapsutom® (Erbe Elektromedizin GmbH, Tübingen, Germany), a high frequency electro-surgical device designed for capsulotomy. This tool is equipped with a bipolar coagulation tip, which utilizes the light arch spanning from the cathode to the anode at the tip of the bipolar needle for cutting. The first step of the surgical procedure comprises the separation of the conjunctiva, episclera and the Tenon'sche capsule from the sclera at the 12 o'clock position. A full thickness scleral flap (3x3mm) is created by fenestrating the sclera. The sclera is then carefully detached from the ciliary body and the iris root, cutting it within the cornea 1-2mm from the limbus completes separation. Closure of the fistula is achieved by suturing the conjunctiva and the Tenon'sche capsule to the cornea using interrupted sutures (9-0 Vicryl®, Ethicon GmbH, Norderstedt, Germany).

### Results:

Electro-surgical preparation of the sclera using the Diacapsutom® proved to be technically easy and save to perform in all cases. The use of the Diacapsutom® minimized bleeding and allowed for high-precision cutting of the sclera. One of the complications associated with this method was ectasia caused by subotimal closure of the fistula. Including the Tenon'sche capsule as part of the closing layers, thus rendering the closure more rigid, prevented this. A further complication was caused by the displacement of the iris into the fistula by the flow of the aqueous humor into the fistular space. This resulted in an aspheric appearance of the pupil. Preoperative miosis was found to improve this situation.

Long-term follow-up (>one year) showed that the surgical approach evaluated in this study resulted in a permanent reduction of intraocular pressure (below 20 mmHg) in 24 out of the 28 eyes. Vision was saved in five eyes (18%) using the combined approach, compared to 10% (15 eyes out of 152) undergoing LSP without corneoscleral trepanation.

### Conclusion:

The results of the presented studies suggest that the combination of LSP with corneoscleral trepanation improves the prognosis in animals suffering from glaucoma with regard to maintaining vision compared to LSP alone. The aetiopathogenesis of the increase in intraocular pressure observed after surgery remains unclear, however further statistical analysis of the study data might highlight contributing factors.