

## **Glaucoma**

### **E-00015**

Five-year comparison of selective laser trabeculoplasty versus argon laser trabeculoplasty after previous argon laser trabeculoplasty

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#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To compare the intraocular pressure (IOP) lowering effect of selective laser trabeculoplasty (SLT) vs. argon laser trabeculoplasty (ALT) in open-angle glaucoma (OAG) patients who have had previous ALT (180 or  $\geq 360$  degree treatment).

**Methods:** We conducted a randomized, controlled trial comparing SLT and ALT in 176 OAG patients, including pseudoexfoliation and pigmentary glaucoma patients. As part of this study, there were 66 patients that had undergone previous ALT treatment. They were divided into two groups: those that had received 180 degrees of previous ALT treatment, and those that had received at least 360 degrees of previous ALT treatment. Post-operative IOP, followed up to 5 years, were compared among the groups.

**Results:** For subjects who had received 180 degrees of previous ALT treatment, there was no significant difference in IOP reduction between the SLT and ALT treatment groups over time. The average difference in IOP reduction was 1.1mmHg at 5 years after treatment. As for the subjects who had received 360 degrees of previous ALT treatment, the average difference in IOP reduction between the two treatment groups was 5.9mmHg, with the SLT group displaying a superior IOP-lowering effect. However, the difference was not statistically significant due to small sample size in the subgroups.

**Conclusions:** SLT appears to be equivalent to ALT in terms of IOP lowering in patients that have previously received 180 degrees of ALT treatment. However, SLT could be slightly superior to ALT in patients that have been treated with 360 degrees or more of ALT treatment, but a larger sample size is needed to confirm this.

## **Glaucoma**

### **E-00016**

Heidelberg Edge Perimeter: a new vision specific test of function

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#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To introduce the design principles, scientific rationale and preliminary clinical data for the Heidelberg Edge Perimeter (HEP).

**Methods:** HEP uses flicker defined form (FDF) to generate the stimuli used to evaluate the visual field. FDF was generated by flickering random dots of 0.34 degrees at 15Hz against a mean luminance background (50cdm-2). Dots within the 5 degree stimulus were flickered in counterphase to background dots. The random dot background had a density of 3.5 dots per degree. A preliminary normal database of 100 volunteers was used to establish preliminary confidence intervals to define normality and limits for threshold estimation algorithms. Test-retest characteristics were established using 30 patients with glaucoma, and compared to SITA-SAP and Matrix. Combination Structure-Function Maps were generated using HEP and the HRT. Clinical trials will be presented that establish the effect of optical blur, random dot density and organization, temporal frequency and stimulus size.

**Results:** HEP performance improved with higher contrast, a greater random dot density, greater background element organization and mid-peripheral viewing. It is robust to < 6D of optical blur and is dependent on target area rather than contour. The coefficient of repeatability was 6.86dB for FDF, 7.82dB for SITA-SAP and 10.29dB for the Matrix.

**Conclusions:** The Heidelberg Edge Perimeter used flicker defined form, a magnocellularly driven illusion, to efficiently measure the central visual field. Preliminary clinical trials indicate: i. Good test-retest characteristics, ii. Ability to detect early glaucoma and iii. Deeper and larger defects (frequently) than standard automated perimetry.

## **Glaucoma**

### **E-00017**

Effect of local anesthesia on trabeculectomy success

N. Geffen, M.M. Carrillo, Y. Jin, G.E. Trope, Y.M. Buys

#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** Subconjunctival anesthesia has been reported to be a risk factor of poor success with trabeculectomy surgery. The purpose of this study is to compare the long-term results of trabeculectomy surgery with subconjunctival anesthesia versus topical lidocaine 2% jelly.

**Methods:** A retrospective review of the long-term IOP of 57 trabeculectomies previously enrolled in a prospective study comparing subconjunctival anesthesia to topical lidocaine 2% jelly. Follow-up was conducted by reviewing the medical charts from July 2002 to August 2007. Differences between the two groups were statistically assessed using the Student t test for continuous data, the chi square test or the Fisher s exact test for categorical data and the Kaplan-Meier survival analysis.

**Results:** The median age was 65 years and the median follow-up time was 4.2 years for both groups (range 0.1-4.8 years). There were no statistically significant differences in baseline characteristics and follow-up observations. At 4 years following surgery, 29.5% of the subconjunctival anesthesia patients versus 39.5% of the topical lidocaine 2% jelly patients were complete success (IOP between 6-21 mmHg and 20% reduction without glaucoma therapy or repeat filtration surgery,  $p=0.15$ ) and 82.7% of the subconjunctival anesthesia patients versus 95.8% for the topical lidocaine 2% jelly patients were qualified success (above with glaucoma therapy,  $p=0.39$ ).

**Conclusions:** Comparison of the data collected during similar median follow-up periods of 4.2 years, showed no statistically significant difference between the groups. Subconjunctival anesthesia did not result in a worse prognosis for trabeculectomy in this cohort.

## **Glaucoma**

### **E-00018**

Effect of MRI on the Ex-PRESS glaucoma shunt

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#### ABSTRACT (AS SUBMITTED)

**Purpose:** The Ex-PRESS mini glaucoma shunt is a miniature, stainless steel, non-valved device used for the treatment of glaucoma. The manufacture tested the effect of MRI (2 Tesla) on the device using a dish and a pendulum test. The device apparently did not move during both tests. The purpose of this study was to evaluate the effect of MRI on the Ex-PRESS glaucoma shunt.

**Methods:** I. Dry dish test: the device was placed on a dry dish and was exposed to the magnetic field of 1.5 and 3 Tesla MRI for 30 seconds. II. Wet dish test: the device was placed floating in a dish filled with 10cc of tap water, and was exposed to magnetic fields of 1.5 and 3 Tesla for 30 seconds.

**Results:** The device positioned in the dry dish did not move during exposure to both magnetic fields of 1.5 and 3 Tesla MRI. However when the device was tested floating in water it was pulled towards the magnetic field with both the 1.5 and 3 Tesla MRI, and moved straight from one rim of the dish to the opposite rim in the direction of the magnetic field.

**Conclusions:** The Ex-PRESS glaucoma shunt is influenced by magnetic field forces. These results raise questions regarding the safety of performing MRI in patients implanted with the Ex-PRESS.

## **Glaucoma**

### **E-00019**

Does intereye asymmetry percentage of confocal scanning laser ophthalmoscopy correlate with rim area to disc area asymmetry ratio in a glaucoma screening population?

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#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To determine the relationship between asymmetry of optic disc detected by intereye asymmetry percentage included in HRT III software and intereye asymmetry measured using rim area to disc area asymmetry ratio (RADAAR).

**Methods:** 377 subjects were included in this study and RADAAR values were calculated based on stereometric HRTIII values by dividing the value of rim / disc area of the greater disc area by the value rim / disc area of the smaller disc area.

**Results:** Rim area to disc area asymmetry ratio (RADAAR) significantly correlate with intereye asymmetry percentage include in HRT III software (Pearson correlation  $r = 0.27$   $p=0.000$ ).

**Conclusions:** In this current study, Rim Area to Disc Area Asymmetry Ratio (RADAAR) as well as intereye asymmetry percentage, may be useful when using HRTIII for the purpose of mass screening. Additionally, RADAAR takes into account intereye disparity of disc size.

## **Glaucoma**

### **E-00020**

Multi-centre Canadian study of compliance and drop administration in glaucoma  
R. Kholdebarin, R.J. Campbell, Y. Jin, Y.M. Buys

#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** Poor compliance with medication is a major concern in the management of glaucoma. Improper administration technique can lead to contamination and inaccurate dosing. This study estimates the prevalence and predictors of non-compliance and improper administration technique among Canadian glaucoma patients.

**Methods:** Data was collected using a standardized questionnaire. Non-compliance was defined as missing at least 1 drop of medication per week and/or inability to accurately describe the medication regimen. Drop administration technique was assessed by study personnel with patients applying eye drops. Patients were asked to indicate the most common reason for missing medication. Physicians provided information regarding the patient's glaucoma including measures of disease stability. Predictors were assessed using odds ratio from logistic regression model.

**Results:** 500 patients from 10 centers across Canada participated in the study. 25.6% reported missing at least 1 drop of medication per week. 4.2% were unable to accurately describe their medication regimen. Overall noncompliance was 27.9%. 33.8% demonstrated improper administration technique, 6.8% missed their eye and 28.8% contaminated the bottle tip. The most common reasons given for missing eye drops were "forgetfulness" and "being away from drops". Formal education limited to elementary school and duration of treatment less than 5 years increased patient reported non-compliance. Factors associated with improper administration technique were age 60 years and older, and formal education limited to elementary school.

**Conclusions:** Over 50% of the patients surveyed were either non-compliant or demonstrated improper administration technique. Glaucoma patients should be educated on the importance of compliance and instructed on proper drop administration.

## **Glaucoma**

### **E-00021**

Predictive value of Heidelberg retinal tomography and frequency doubling technology perimetry for detecting glaucoma in a developing country

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#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To determine the diagnostic sensitivity of Heidelberg Retinal Tomography (HRT) in combination with Frequency Doubling Technology Perimetry (FDT) for detecting glaucoma in rural villages of a developing country.

**Methods:** A cross-sectional design was used. Testing included HRT, FDT perimetry (C-20-5 screening protocol), tonometry, anterior segment biomicroscopy, and dilated ophthalmoscopy in 307 rural, non-English speaking residents of Southern India over 35 years old. An abnormal HRT was defined as at least one area of borderline abnormality on the Moorfield's Regression Analysis. An abnormal FDT was defined as one location of reduced sensitivity present on both the initial and repeat examination. Diagnostic precision of HRT and FDT were compared to a cup to disk ratio of 0.7 or greater as determined on the clinical examination.

**Results:** A reliable HRT scan was obtained in one eye in 95% of 248 subjects. 62% of subjects had reliable scans in both eyes. Repeatably reliable FDT's were obtained on 79% of subjects. For HRT, the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy for a C/D > 0.7 on clinical examination was 34%, 88%, 29%, 91% and 82% respectively. For FDT, the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy was 26%, 78%, 14%, 89% and 72% respectively. When HRT and FDT were combined (either test abnormal), the sensitivity, specificity, positive predictive value, negative predictive value, and accuracy was 46%, 72%, 20%, 90% and 69% respectively.

**Conclusions:** Both HRT and FDT can be used to obtain reliable data in a developing country rural village setting. In this setting, both tests perform significantly more poorly than in clinical settings. HRT and FDT appear to detect abnormality in different individuals with minimal overlap. Combined HRT and FDT testing leads to increased sensitivity, but with a substantial decrease in specificity, limiting its application as a screening tool in this population.

## **Glaucoma**

### **E-00022**

Endocyclophotocoagulation in primary open angle glaucoma and primary angle closure glaucoma  
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#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To evaluate outcomes of combined phacoemulsification and 270 degrees endocyclophotocoagulation (ECP) procedures in 104 consecutive eyes with primary open angle glaucoma (POAG) or primary angle closure glaucoma (PACG).

**Methods:** This study was a retrospective chart review of 91 patients who underwent 270 degrees of endocyclophotocoagulation and cataract extraction with intraocular lens implantation (IOL) for a variety of mechanisms of glaucoma. Data with respect to demographics, ocular history, indication for surgery, intraoperative and postoperative complications were collected. Preoperative and postoperative visual acuity (VA), mechanism of glaucoma, intraocular pressure (IOP), gonioscopic examination and number of glaucoma medications were recorded. Snellen visual acuities were converted to logMAR values for statistical analysis.

**Results:** Endocyclophotocoagulation for 270 degrees of arc in combination with phacoemulsification and IOL insertion was performed for POAG (81 eyes) and PACG (23 eyes) patients. The mean best corrected visual acuity (BCVA) for all patients preoperatively was 20/70 and improved to 20/32 three months postoperatively ( $p < 0.01$ ). At three months postoperatively, IOP decreased from 22.3 to 16.1 mmHg ( $p < 0.01$ ) and from 16.5 to 14.6 mmHg ( $p < 0.05$ ) in PACG and POAG patients respectively. The average number of topical glaucoma medications decreased from 2.1 to 1.8 ( $p < 0.1$ ) in the PACG group and 2.3 to 1.8 ( $p < 0.01$ ) in the POAG group three months postoperatively. Using the Shaffer grading system and gonioscopy, 93% of patients with PACG showed marked anterior chamber angle widening. Subgroup analysis of 11 eyes with PACG due to a plateau iris mechanism demonstrated improvement in IOP from 23.3 mmHg to 16.8 mmHg ( $p < 0.01$ ) three months post-operatively with the average number of topical glaucoma medications decreasing from 1.43 to 1.00 ( $p < 0.10$ ). There was marked angle widening on gonioscopy in 100% of patients according to the Shaffer grading system.

**Conclusions:** Endocyclophotocoagulation of 270 degrees of ciliary processes combined with phacoemulsification and intraocular lens implantation is effective in lowering both intraocular pressure as well as the number of topical glaucoma medications in POAG and PACG. A subgroup analysis of patients with the diagnosis of primary angle closure glaucoma due to a plateau iris mechanism revealed that in addition to improvement in intraocular pressure control and need for topical glaucoma therapy, marked anatomical widening of the angle as assessed by gonioscopy postoperatively.

## **Glaucoma**

### **E-00023**

2nd Ahmed valve insertion in the same eye  
M. Smith, Y.M. Buys, G.E. Trope

#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To examine the results of same-eye second glaucoma drainage device (GDD) insertion in eyes with refractory glaucoma despite previous Ahmed GDD insertion.

**Methods:** Non comparative retrospective case series.

**Results:** 21 patients who underwent insertion of two glaucoma drainage devices into the same eye between January 1999 and November 2007 were identified. 19 patients had follow up of at least 1 year and were included in the analysis. All surgeries involved Ahmed GDDs and were performed by a single surgeon (GT). Mean age at time of surgery was 58 years (median 60, range 37-81). Mean number of previous trabeculectomies in the operated eyes was 1.74 (median 2, range 0 to 4). The mean interval between insertion of the first and second Ahmed valves was 24.2 months (median 17, range 4-67). Mean follow up interval was 38.8 months (median 35 months, range 12-80 months). The IOP, number of glaucoma medications and LogMAR visual acuity (VA) at 12 months and at final follow-up was examined. Mean pre-op IOP was 18.8mmHg which was reduced by 43% to 10.8mmHg at 12 months ( $p<0.0001$ ) and by 42% to 10.9mmHg at final follow-up ( $p=0.0001$ ). The mean number of glaucoma medicines being used preoperatively was 4.1 and this was reduced to 2.4 at 12 months ( $p<0.0001$ ) and 2.6 at final follow-up ( $p=0.0002$ ). Although the mean VA was poorer post-operatively this did not reach levels of statistical significance. 16 of the 19 patients (84.2%) achieved IOP of  $\geq 5$ mmHg and  $\leq 21$  mm Hg and  $\geq 20\%$  decrease on IOP prior to second GDD insertion with or without glaucoma drops. One patient required anterior chamber reformation on the first post-operative day and another suffered corneal decompensation which resulted in a decrease in VA from 20/70 pre-operatively to counting fingers post-operatively.

**Conclusions:** In eyes with refractory glaucoma where IOP remains uncontrolled despite an Ahmed GDD insertion of a second GDD is effective in improving IOP control.

## **Glaucoma**

### **E-00024**

Correlation of bleb appearance and intraocular pressure following phacotrabeculectomy  
M. Smith, M.L. Chipman, G.E. Trope, Y.M. Buys

#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To examine the relationship between bleb morphology and intraocular pressure following phacotrabeculectomy.

**Methods:** We recently completed a prospective randomized study comparing one- versus two-site phacotrabeculectomy. Two years post-operatively the blebs were graded by one observer (YMB) according to the The Indiana Bleb Appearance Grading Scale (IBAGS). In addition the presence or absence of microcysts was recorded. The bleb morphologic appearance of one- versus two-site phacotrabeculectomy was compared and a correlation of bleb features with IOP was evaluated.

**Results:** 76 patients were evaluated at 2 years. There was no difference in bleb characteristics of one- versus two-site phacotrabeculectomy. On multivariate analysis increasing bleb height was associated with a decrease in IOP ( $p=0.017$ ). An increase in IBAGS height score by 1 unit resulted in a reduction in IOP of 2.16 mmHg (95% confidence interval 0.40 to 3.92 mmHg). In this study there was no association between vascularity, bleb extent or microcysts and IOP. There were no cases of bleb leak in this series.

**Conclusions:** Increased bleb height as recorded by the IBAGS is related to lower IOP.

## **Glaucoma**

### **E-00025**

Ocular massage following Ahmed valve insertion  
M. Smith, Y.M. Buys, G.E. Trope

#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To investigate the effect of ocular massage on intraocular pressure (IOP) during the hypertensive phase following Ahmed glaucoma drainage device (GDD) insertion.

**Methods:** Non comparative prospective trial of patients with IOP above target 1 to 8 weeks following Ahmed GDD surgery. IOP was measured one hour following massage. If the IOP was below 21mmHg and at least 20% lower than baseline the patient was instructed to massage at home.

**Results:** 8 postoperative Ahmed GDD patients with IOP above target pressure were recruited into this study. The mean time to massage post surgery was 19.5 days (median 16, range 12-44) and the mean IOP prior to massage was 22mmHg (median 22, range 18-28). Immediately following 10 seconds of ocular massage the IOP was lower in all patients, with a mean drop of 10.9 mmHg (median 11, range 5-18), a 49.5% reduction. One hour following massage the IOP was below 21mmHg and at least 20% lower than baseline in 6 of the 8 patients, with a mean drop of 30.7% or 6.8 mmHg (median 7, range 0-14). 2 patients did not maintain a 20% drop in IOP for 1 hour following massage and were commenced on glaucoma drops. A third patient responded well to massage but was unwilling to undertake massage at home and was considered a failure. The remaining 5 patients (62.5%) were advised to undertake ocular massage at home every 2 hours during waking hours. One week later 4 of the 5 patients maintained a drop of 20% versus pre-recruitment IOP, with a mean drop of 34.5% or 7.6mmHg (median 8, range 0-14). In one of these patients massage resulted in a 10mmHg drop in baseline IOP to 16mmHg at 2 weeks post-recruitment but he remained over target pressure and was commenced on glaucoma drops. On final review at 6 weeks post-recruitment 3 of the 8 patients (37.5%) were considered complete successes (20% drop in IOP and within target IOP, no glaucoma drops), whereas one patient (12.5%) was considered a partial success (20% drop in IOP with massage alone, glaucoma drops added to meet target IOP). Massage was unsuccessful in 4 patients (50%), with 3 having an inadequate IOP response, and 1 patient proving unwilling to massage at home. There were no complications associated with ocular massage in this series.

**Conclusions:** During the hypertensive phase following Ahmed GDD surgery ocular massage was totally or partially successfully in reducing IOP in 50% of cases. This technique should be considered in all patients with IOP above target in the early post-operative period.

## **Glaucoma**

### **E-00026**

Anterior segment optical coherence tomography as a method to detect occludable angles and correlation with gonioscopy

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#### **ABSTRACT (AS SUBMITTED)**

**Purpose:** To correlate the objective measurements acquired using anterior segment optical coherence tomography to clinical gonioscopy and determine the ability to detect occludable angles.

**Methods:** Patients were evaluated by gonioscopy performed by one glaucoma specialist. Patients were subsequently imaged using AS-OCT. We obtained low resolution scans of the horizontal and vertical meridians, as well as high resolution scans of all four quadrants. Data measures included angle opening distance at 500 microns (AOD500), trabecular iris angle (TIA) and patient demographics.

**Results:** Sixty-eight angles of 68 patients were included in the study. Clinical gonioscopy found 18 patients to have a Shaffer grade 4 angle, 15 patients with a grade 3 angle, 15 patients with a grade 2 angle, 11 patients with a grade 1 angle, and 9 patients with a grade 0 angle. Mean TIA and AOD500 were 42 +/- 11 (25-59) and 485 +/- 193 (240-880) in patients with a grade 4 angle, 27 +/- 9 (14-46) and 283 +/- 123 (121-552) in grade 3 angles, 14 +/- 4 (8-22) and 126 +/- 45 (74-257) in grade 2 angles, 9 +/- 8 (0-20) and 98 +/- 95 (0-248) in grade 1 angles, and 7 +/- 7 (0-19) and 70 +/- 80 (0-211) in grade 0 angles. Using a TIA of less than 22 degrees, AS-OCT has the ability to detect occludable angles with a sensitivity of 100% and a specificity of 88%. When using an AOD of 214um, AS-OCT detects occludable angles with a sensitivity of 94% and a specificity of 89%.

**Conclusions:** AS-OCT was helpful in determining objective measurements of angle grade. AS-OCT was also useful in detecting occludable angles.