RESIDENTS/FELLOWS RESEARCH DAY -- 1993

DEPARTMENT OF OPHTHALMOLOGY

THE UNIVERSITY OF IOWA COLLEGE OF MEDICINE

THE UNIVERSITY OF IOWA HOSPITALS & CLINICS

IOWA CITY, IOWA

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RESIDENTS/FELLOWS RESEARCH DAY

JUNE 18 - 19, 1993

SCHEDULE OF EVENTS

Friday, June 18

1:00 - 3:00	Presentations 1 - 6
3:00 - 3:20	Coffee Break
3:20 - 5:20	Presentations 7 - 12

Saturday, June 19

8:00 - 10:00	Presentations 13 - 18
10:00 - 10:20	Coffee Break
10:20 - 12:00	Presentations 19 - 23
6:30	Dinner Party Holiday Inn Rooms C & D (Staff, Fellows, Residents and Spouses or Friends)

FRIDAY, JUNE 18

3:00 **BREAK**

SATURDAY, JUNE 19

Wednesday, June 16

Residents/Fellows Research Day---1993

The Pupillary Photostress Test

Norman A. Zabriskie and Randy H. Kardon

An objective, pupillographic photostress test of the 30° visual field was developed. Pupillary light reflexes were recorded every 3 seconds after a photostress to derive the light sensitivity loss as a function of time. In ten normal subjects, increasing photostress duration (30,60,120sec) caused more sensitivity loss at time zero (ANOVA), but did not affect the exponential recovery rate. Unilateral optic neuropathy resulted in less initial sensitivity loss and a slower rate of recovery from photostress compared to the normal fellow eye, suggesting a neuronal influence on photostress recovery.

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Surgical Management of the Horizontal Component in Dissociated Vertical Deviation Associated with Congenital Esotropia

David T. Wheeler, MD, Erin Enke, CO, William E. Scott, MD

The surgical management of Dissociated Vertical Deviation (DVD) with a significant dissociated horizontal component and/or simultaneous exodeviation has received recent attention as a distinct entity.

We reviewed over 1100 records of patients who presented to the University of Iowa since 1980 with congenital esotropia that underwent surgical correction. Thirty-four (3%) exhibited DVD and dissociated horizontal deviation (DHD). Twelve (35%) of patients with DHD were excluded due to a limitation of ocular motility or anisometropia that might result in a secondary deviation. Extraocular muscle surgery was performed in 8 of the remaining 22 patients for the vertical and/or horizontal deviation. Superior rectus recession was effective in reducing or eliminating DVD but was not effective in resolving the horizontal component. Three patients were noted to have DHD following surgery for DVD. Lateral rectus recession was effective in reducing or eliminating DHD.

Care was taken to distinguish between DHD and postoperative exotropia. Sixty-nine patients (6%) had DVD and postoperative exotropia without a dissociated horizontal component. Thirty-nine (57%) of these patients underwent surgery for the vertical and/or horizontal deviation. Only one exotropia was noted after surgery for DVD. Control of the horizontal component required recession of one or both lateral recti.

Simultaneous surgery for DVD and DHD or exotropia is effective in treating patients who present with dissociated vertical and horizontal strabismus following surgery for congenital esotropia.

RESIDENTS/FELLOWS RESEARCH DAY -- 1993

TENON'S CYST FORMATION AFTER TRABECULECTOMY WITH MITOMYCIN C.

Campagna JA, Munden PM, Alward WLM

The purpose of this study was to determine the incidence, possible risk factors, and outcome of Tenon's cyst (TC) formation in patients undergoing trabeculectomy with adjunctive intra-operative Mitomycin C, an inhibitor of fibroblast proliferation. The charts of all patients undergoing trabeculectomy with Mitomycin C at the University of Iowa from July, 1991 to September, 1992 were reviewed to identify those patients who developed Tenon's cysts (TCs) in the early post-operative period. 100 eyes of 100 patients qualified for inclusion. The incidence of TC formation was 29% (29/100). Mean time to TC formation was 3.8 ± 1.3 weeks following surgery with a mean intraocular pressure (IOP) of 20.7 ± 8.3 mmHg. Men were more likely to develop TCs than women (39.6% vs. 19.2%, $p<0.03$, chi-square). There were no statistical differences between those patients developing TCs and those who did not with respect to age, race, number or type of pre-operative medications, mean pre-operative IOP, prior argon laser trabeculoplasty(ALT), prior trabeculectomy, or prior TC formation. The 29 patients who developed a TC had a mean follow-up time of 22.0 ± 12.9 weeks, with a mean IOP of 14.2 ± 6.3 mmHg at last exam. One patient required a repeat trabeculectomy with Mitomycin C. Two patients required bleb needling, subsequent TC excision and eventual seton placement. Of the remaining 26 patients; 14 (53.8%) required no glaucoma medication, 11 (42.3%) required one glaucoma medication, and 1 (3.8%) required two glaucoma medications for IOP control. The adjunctive use of intra-operative Mitomycin C during trabeculectomy may be associated with an increased incidence of TC formation.

CLINICOPATHOLOGICAL CORRELATION OF IDIOPATHIC POLYPOIDAL CHOROIDAL VASCULOPATHY

Walker J, Rummelt V, Folk JC, Folberg R

Purpose: This report describes the clinical, histopathological, and ultrastructural findings in a 61-year-old Japanese man with idiopathic polypoidal choroidal vasculopathy. Methods: The patient presented with a moderate subretinal hemorrhage nasal to his right disc with some breakthrough bleeding into the vitreous. After clearing, a network of sub-RPE vessels surrounding the disc and scattered RPE detachments were identified. He had intermittent subretinal and vitreous hemorrhages that resulted in a blind painful eye unresponsive to medical management. The right eye was obtained surgically and immediately fixed in buffered 10% formalin and processed for standard histology. Remaining wet tissue was postfixed in 2.5% gluteraldehyde and processed for transmission electron microscopy. Results: Histopathology demonstrated hemorrhage in the trabecular meshwork, vitreous, and sub-RPE spaces. There were multiple neovascular membranes present between Bruch's membrane and the RPE, especially adjacent to the optic nerve. These membranes presumably arose from vessels extending around the peripapillary end of Bruch's membrane. Bruch's membrane was calcified and revealed many drusen. There were many dilated choroidal blood vessels. Surprisingly, there were multifocal areas of choroidal inflammation consisting of lymphocytes and plasma cells. TEM revealed alterations of the lamina elastica of Bruch's membrane. Conclusion: This entity appears to involve an extensive network of neovascular tissue emanating from the disc. It is not clear to what extent the dilated choroidal blood vessels and focal areas of inflammation are related to disease pathogenesis.

PROGNOSTIC VALUE OF MICROCIRCULATION ARCHITECTURE IN MALIGNANT MELANOMAS AND MELANOCYTIC NEVI OF THE CILIARY BODY AND CHOROID

Rummelt V, Folberg R, Parys van Ginderdeuren R, Pe'er J, Gruman LM, Rummelt C, Naumann GOH, Hwang T, Woolson RF

We studied the relationship between tumor blood vessel morphology and survival in a series of 234 eyes removed for ciliary body or choroidal melanomas. Two independent observers examined the histologic preparations of the tumors for the presence of each of nine tumor vascular patterns. Additionally, we examined the microcirculation architecture of 23 melanocytic nevi of the ciliary body or choroid. Statistical analyses included tests for interobserver reliability, Kaplan Meier survival curves, and the fitting of Cox regression models. The detection of each of nine vascular patterns is highly reproducible. The Cox regression model indicates that the presence of vascular networks, defined as at least 3 back-to-back closed vascular loops, is the variable most strongly associated with death from metastatic melanoma. Nevi contain only normal and straight blood vessels and areas of avascularity, but no loops or networks. 40/47 (85.6%) patients with uveal melanoma displaying the nevus vascular patterns, did not develop metastatic disease (median: 14 years).

These results indicate, that the presence of vascular networks is the most important prognostic factor for survival in primary uveal melanoma. If networks can be imaged clinically using non-invasive imaging techniques, then ophthalmologists may be able to determine the biological aggressivness of a melanoma in vivo.

TEST-RETEST RELIABILITY OF A STANDARD LETTER-CHART VISUAL ACUITY TEST COMPARING MACULAR DISEASE WITH NORMALS

Vanden Bosch ME, Wall M

We tested the visual acuity of 38 normal subjects and 32 subjects with ophthalmoscopic evidence of macular pathology. Subjects were refracted by a single observer and then asked to read a series of ETDRS visual acuity charts for a total of six chart readings. Results were scored by two methods. Preliminary examination of the data shows that using the ETDRS recommended scoring method of counting total number of letters read correctly, there was a lower variability compared with using the Snellen equivilent in both groups. Comparing the two groups, there was no significant difference in variability using Snellen equivilent; however, using ETDRS scoring there was a significantly higher variability in the group with poorer visual acuity, ie macular pathology. It appears that letter-chart visual acuity testing is less reliable for persons with poorer acuity compared with normals, but that this is dependent on the method of scoring the test.

FOLLOWUP OF BILATERAL MEDIAL RECTUS RECESSION IN CONGENITAL AND ACQUIRED ACCOMMODATIVE AND NONACCOMMODATIVE ESOTROPIA

Bautista DV, Scott WE

A retrospective study was performed to determine the effect and stability of bilateral medial rectus recessions in patients with congenital and acquired esotropia. The computerized data base identified 1672 patients who were seen at the Pediatric Ophthalmology and Strabismus clinic and had the diagnosis "esotropia" and/or underwent medial rectus recession surgery. Patients with secondary esotropia, neurologic disorders or who had previous ocular or extraocular muscle surgery were excluded. Four hundred and nine patients who had bilateral medial rectus recession surgery after 1971 were identified and divided into three groups: congenital and acquired accommodative and nonaccommodative esotropia. Deviations were recorded as follows: preoperatively, and postoperatively at 1 week, 6 weeks, 6 months, 1 year, 5 years, 7 years, 10 years, greater than 10 years or to the most recent clinic visit or until the next surgery. Within each group, for each postoperative visit, the amount of correction obtained per millimeter of recession was calculated to demonstrate the trend in alignment over time. Final alignment was also correlated with the presence of amblyopia, dissociated vertical deviation and fusion. Results will be presented.

INTRACTABLE OCULAR HYPERTENSION ASSOCIATED WITH SUB-TENON DEPOT CORTICOSTEROIDS IN YOUNG PATIENTS

Bartos CEP, Munden PM, Carlson DW

In this report we describe three young patients, age eight to eighteen, who developed refractory ocular hypertension following sub-Tenon injections of triamcinolone acetonide for the treatment of inflammatory diseases of the posterior segment . Ocular hypertension associated with sub-Tenon depot corticosteroids is variable in onset, is of long duration, and commonly becomes intractable to medical management.

We suggest the following guidelines when considering use of sub-Tenon depot corticosteroid injections. 1. The absence of a steroid response to topical corticosteroid does not reliably predict development of ocular hypertension following sub-Tenon depot corticosteroid injection. 2. Sub-Tenon depot corticosteroid injections anterior to the equator may carry an increased risk of developing ocular hypertension. 3. Visible corticosteroid in the sub-Tenon space is associated with continuing pharmacologic activity. 4. Water soluble depot corticosteroid preparations should be used initially, leaving the less soluble preparations for chronic, persistent disease. 5. An elevated intraocular pressure response to sub-Tenon depot corticosteroids can be delayed (up to 27 weeks in our series). Continued monitoring of intraocular pressure is necessary as long as the depot corticosteroid remains visible in the eye. 6. Intractable ocular hypertension should be treated by excision of the remaining steroid.

VITH NERVE PALSY AND DIVERGENCE PARALYSIS

Kimberley Beaudet, William E. Scott, M.D.

The disparity in the near/distance measurements in patients with VIth nerve palsy and divergence paralysis has been disputed by neuro-ophthalmologists and strabismologists. A retrospective study of patients with VIth nerve palsy (bilateral or unilateral) and patients with divergence paralysis has been done at the University of Iowa Hospitals & Clinics with particular attention to the primary measurements at distance and near. The purpose of this study is to help differentiate unilateral from bilateral VIth nerve palsy, long-standing VIth nerve palsy from one of recent onset, and VIth nerve palsy from divergence paralysis using the size of their ocular misalignment.

QUANTITATION OF IRIS TRANSILLUMINATION DEFECTS IN EYES OF PATIENTS WITH PIGMENTARY GLAUCOMA

Haynes WL, Alward WLM, McKinney JK, Munden PM, Verdick R

Iris transillumination defects may be important markers of disease severity and/or disease activity in patients with pigmentary glaucoma. We present a simple method for quantitation of iris transillumination defects using infrared iris transillumination videography and computerized image analysis.

Three observers independently made multiple measurements of percent iris transillumination (the percentage of visible iris which transilluminates) from three standard images using the technique. The coefficient of interobserver variance was 2.51%, 3.56% and 8.13% respectively for mild, moderate, and marked iris transillumination. The coefficient of intraobserver variance was much smaller for each image, measuring 0.25%, 0.87%, and 1.26% respectively for mild, moderate, and marked iris transillumination.

To exemplify the utility of the technique, one observer measured percent iris transillumination of both eyes of a group of patients with asymmetric pigmentary glaucoma. There was a significant correlation between the amount of iris transillumination and the severity of glaucoma in the eyes of these patients.

QUANTITATIVE CHANGES IN THE OPERATED AND FELLOW EYE AFTER OPTIC NERVE SHEATH FENESTRATION FOR IDIOPATHIC INTRACRANIAL HYPERTENSION

McKinney JK, Kardon RH

We retrospectively analyzed changes in optic disc swelling, kinetic visual fields and relative afferent pupillary defect (RAPD) in 14 patients with idiopathic intracranial hypertension following unilateral optic nerve sheath fenestration Three time points were analyzed: preoperative, one month postop, and six to twelve months postop. Optic disc swelling was graded from stereo disc photos in a masked fashion by both authors with good interobserver reliability. Visual field loss with and without blindspot enlargement was quantified volumetrically with Thompson's Pupil Grid.

The mean disc grade for both operated and fellow eyes decreased significantly. However, the data for fellow eyes revealed three patterns of response: 4 fellow eyes showed no change in disc grade (group 1), 5 changed by >0.5 to <1.0 disc grades(group 2) and 5 changed by >1.0 disc grades (group 3). In groups 2 and 3, the time course of the change in disc grade in the fellow eye paralleled that in the operated eye.

The mean field grade excluding blind spot enlargment decreased in the operated eyes but showed no significant change in the fellow eyes. There was a trend toward worsening of grade in the fellow eyes at the first postoperative visit. No correlation existed between the disc grade and the field grade. The clinically measured RAPD correlated poorly with the difference between the two eyes of disc grade, field grade and calculated RAPD.

These findings confirm the observation that disc swelling improves in over 50% of fellow eyes following unilateral fenestration but contradicts the impression that this change lags behind that of the operated eye. We were unable to show any significant change with time after surgery in either kinetic field loss in the fellow eye or RAPD.

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A COMPARISON BETWEEN MODIFIED KRIMSKY AND ALTERNATE PRISM COVER TEST MEASUREMENTS

Furr BA, Kutschke PJ, Keech RV

The modern trend toward earlier correction for strabismic conditions in children is a reality. The need for an accurate assessment of the angle of deviation is a must. Some have reported using the Modified Krimsky method rather than the Alternate Prism and Cover Test in measuring young children preoperatively. The question that presents itself is, are measurements taken with these two methods, the Modified Krimsky and Alternate Prism and Cover Test comparable?

A prospective study was designed to compare the measurements obtained with these two methods.

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CORNEAL EPITHELIAL EDEMA AND PACHYMETRY DETERMINATION IN PATIENTS WITH FUCH'S DYSTROPHY AND PSEUDOPHAKIC/APHAKIC BULLOUS KERATOPATHY

WEIL LJ, MATHERS WD

REDDY CV,

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A RETROSPECTIVE STUDY OF THE EFFECTIVENESS OF MITOMYCIN-C AUGMENTED TRABECULECTOMY FOR NORMAL-TENSION GLAUCOMA

Neu KW, Alward WLM

Abstract

Purpose: Patients with normal-tension glaucoma have progressive glaucomatous field loss despite intraocular pressures (IOPs) < 24 mmHg. Our goal was to determine whether augmentation of trabeculectomy with mitomycin-C could safely yield low intraocular pressures in these patients.

Methods: Twenty-three eyes underwent mitomycin-C trabeculectomies for progressive glaucomatous field loss despite preoperative IOPs < 24 mmHg. Five of these eyes never had IOPs ≥ 24 mmHg. The other 18 had primary open angle glaucoma with IOPs ≥ 24 mmHg early in their disease, but had further visual field losses despite three consecutive preoperative IOPs < 24 mmHg after medical therapy and/or laser trabeculoplasty. Retrospective univariate analysis of variance was performed on intraocular pressures and visual field testing at 6 months and 8-14 months postoperatively.

Results: The mean preoperative IOP was 18.78 ± 2.81 mmHg. The mean postoperative IOP was 10.32 ± 2.8 mmHg at six months and 9.69 ± 2.92 mmHg at twelve months. Pairwise comparison of the data revealed a significant drop in IOP with a p-value <.0001. Nineteen of 23 eyes had stable visual fields at 6 months and 8-14 months postoperatively. Four eyes continued to have progressive visual field loss. Comparing patients with worsened fields to those with stable fields, there was no significant difference in the mean percentage change in IOP. Only one of the 23 trabeculectomies failed. No long-term complications occurred as a result of the low intraocular pressures achieved with mitomycin-C trabeculectomies.

Conclusion: When used intraoperatively during trabeculectomies for normal-tension glaucoma, mitomycin-C safely achieves and maintains a desired very low postoperative intraocular pressure of statistical significance.

A SIMPLE MODIFICATION OF DNA/RNA (NORTHERN) SOLID SUPPORT HYBRIDIZATION FOR IMPROVED QUANTITATION OF SPECIFIC mRNA.

Morin, ME.

The development of methods for the transfer and binding of nucleic acids to a variety of solid support media has provided a highly sensitive and specific means of detecting and quantitating specific DNA and RNA sequences. A simple modification of one of these methods, DNA/RNA (Northern) slot blot hybridization, has resulted in improved quantitation of specific mRNA. The major advantages of the modified procedure are that differences in yield during isolation of RNA and differential or incomplete nucleic acid binding to solid support media will not affect the comparative, quantitative assessment of specific mRNA. Hence, much smaller changes in specific mRNA levels can be reliably detected.

"PUPIL FLICKER FOLLOWING FREQUENCY" AND ITS RELATIONSHIP TO PUPIL SIZE AND LIGHT STIMULUS INTENSITY.

Mishra AV, Kardon RH, Thompson HS, Moore PA

We studied the ability of the pupil to respond to repetitive light pulse stimuli. The maximum frequency of light stimulation which the pupil was able to follow was called the flicker following frequency of the pupil. Our preliminary results show that the amplitude of the pupil contraction decreases exponentially with increasing flickering rates. We plotted the natural log function of pupil contraction(Y-axis) against flicker frequency(X-axis) and were able to determine the flicker following frequency by determining where the line intersected the X-axis. Our data also suggest that the flicker following frequency is relatively insensitive to small changes in light intensity.

We would expect mechanical limitation of iris movement to influence the ability of the pupil to follow a flickering light and thus a stiff, damaged iris might be identified. Patients with small pupils who have less amplitude of iris movement may have lower flicker following frequencies for mechanical reasons.

We will present the results of10 normal subjects in whom, we measured the peak pupillary flicker following frequency in relationship to 1) pupil size and 2) light stimulus intensity.

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LINKAGE ANALYSIS OF RIEGER'S ANOMALY

WEISMANN BP, ALWARD WLM

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VISUAL FACTORS AFFECTING PERFORMANCE ON THE IOWA DRIVING SIMULATOR

MAWN LA, ALWARD WLM

AN ANATOMIC STUDY OF THE LACRIMAL GLAND DUCTULES

CONLON MR, CARTER K, NERAD JA

The anatomic course and relationship of the lacrimal gland ductules to surrounding structures in the orbit is not well described in the literature. To further elucidate the anatomic pathway of the ductules, cadaver dissections were performed and the information correlated with histopathological observations. Digitized images of the lacrimal gland and ductules were reconstructed to gain a better understanding the anatomical relationships of the ductules. Fluorescein staining of the conjunctiva was performed to document the point of entery of the ductules in the superior fornix. The results of this study are reviewed in reference to their clinical significance.

The Prevalence of Peripheral Retinal Breaks in Eyes with Surface Wrinkling Retinopathy

Richard M. Feist, M.D.
H. Culver Boldt, M.D.
Chittaranjan V. Reddy, M.D.
Sunil Gupta, M.D.

Peripheral retinal breaks have long been identified as one potential cause of surface wrinkling retinopathy (SWR) but the rate of peripheral retinal breaks in eyes with idiopathic SWR has not previously been described. Using the computerized patient list of the University of Iowa Department of Ophthalmology we identified 606 eyes of 561 patients with surface wrinkling retinopathy (SWR).

SWR followed previous retinal detachment surgery, laser photocoagulation or cryopexy in 129 eyes (21%). SWR occurred in conjunction with retinal vascular occlusion, cystoid macular edema, subretinal fluid, disc edema, uveitis, full thickness macular hole, or retinal vascular or choroidal vascular anomaly in 146 eyes (24%).

SWR was idiopathic in 338 eyes (56%). We will present the prevalence of peripheral retinal breaks in this series of patients, compare this rate to both unaffected fellow eyes and the literature, and make specific reccomendations in the evaluation of the patient with SWR.

SURGICAL MANAGEMENT OF PERFORATING(DOUBLE PENETRATING) BB GUN INJURIES.

Sunil Gupta M.D., James C. Folk M.D., Jose S. Pulido M.D.

Purpose: Perforating(double penetrating) BB gun injuries have been reported to cause poor visual outcome even with modern vitrectomy techniques. The purpose of this study was to determine visual outcome of eyes with perforating BB gun injuries managed at The University of Iowa. Methods: We reviewed the surgical management and final visual outcome of all six patients with BB gun related perforating ocular injuries between 1980 and 1992. Results: Five patients underwent surgery whereas one patient refused intervention and was lost to follow-up. Scleral buckle and lensectomy were performed in all cases. All five patients had visual acuity of 5/200 or better. Four patients had vision of 20/200 or better, 2 of these being 20/70 or better. The patient with less than 20/200 vision had involvement of the temporal macula. Conclusion: Recent advances in vitreoretinal surgery have improved management and visual outcome of eyes with BB gun related perforating injuries.

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FACTORS PREDICTIVE OF VISUAL OUTCOME IN AGE-RELATED MACULAR DEGENERATION AND SUBFOVEAL CHROIDAL NEOVASCULAR MEMBRANES

GODLEY BF, FOLK JC

OBSTACLES TO DONOR EYE PROCUREMENT AND THEIR SOLUTIONS

Mack RJ, Mason P, Mathers WD

PURPOSE: Shortages in transplantable corneas are common, yet little appears in the medical literature about patterns of tissue donation and factors affecting procurement. We have analyzed such figures and taken measures to improve procurement rates based on our data.
METHODS: Fifty consecutive Cardiovascular ICU deaths were reviewed to compare the number of transplant-eligible donors to amount of tissue received. An anonymous survey of 250 housestaff and nurses was undertaken to identify obstacles to donor eye procurement.
RESULTS: While 12/50 potential donors met transplant eligibility criteria, only 1 became a donor. A required request policy notwithstanding, the most common reason for non-procurement was failure to make a request. The most significant impediments to making the request were 1) not thinking to ask 2) unfamiliarity with eligibility criteria 3) unfamiliarity with enucleation procedures 4) the feeling that someone else should make the request and 5) reluctance to impose on a grieving family. Very few cited religious reasons or being too busy. Measures taken to improve tissue procurement based on this data will be presented and discussed.
CONCLUSIONS: Systematic analysis of obstacles to donor eye procurement and their solutions may help to improve our country's performance in this area.