Cataract surgery practices in the United States Veterans Health Administration

**Annika G. Havnaer**, 1, 2 **Paul B. Greenberg**, 1, 2 **Glenn C. Cockerham**, 1, 4 **Melissa A. Clark**, 1, Amy Chomsky 1, 2

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**Purpose:** Cataract extraction is among the most frequently performed surgical procedures in the United States (US). However, few cataract surgery practice guidelines are backed by high-quality evidence, which may contribute to considerable variation in practice patterns. We surveyed chiefs of ophthalmology to create a comprehensive picture of current cataract surgery practices in the Veterans Health Administration (VHA), the largest provider of integrated health care and health professions training in the US.

**Methods:** An anonymous thirty-two-question survey of cataract surgery practices was formulated using an online survey program. The inclusion criterion was a chief of ophthalmology at a Veterans Affairs (VA) facility where cataract surgery was performed. An initial email containing a link to the survey was sent to participants in May 2016. Two reminder emails were sent to non-responders at one and two weeks after the initial survey was sent out; the remaining non-responders were called twice over a two-week period. The data was analyzed using descriptive statistics.

**Results:** The response rate was 75% (67/89). In 39% (26/66) and 45% (29/65) of ophthalmology sections, respectively, cataract surgeons routinely performed preoperative consultations and preoperative testing. In 33% (22/66) of sections, cataract surgeons administered intracameral antibiotics. The primary cited reasons for not using intracameral antibiotics were pharmacy or institutional difficulties (30%; 13/44), risk of dilution error (16%; 7/44), and lack of evidence (16%; 7/44). In 92% (61/66) and 30% (20/66) of sections, respectively, cataract surgeons used toric intraocular lenses (IOLs) and multifocal IOLs. In 9% (6/66) of sections, cataract surgeons performed femtosecond laser-assisted cataract surgery (FLACS). In 9% (6/66) of sections, cataract surgeons performed immediate sequential bilateral cataract surgery (ISBCS). Residents were trained in cataract surgery in 86% (57/66) of sections. Seventy-four percent (49/66) of chiefs reported a high level of satisfaction with VA ophthalmology.

**Conclusions:** In the VHA, routine preoperative testing is commonly performed and emerging practices such as FLACS and ISBCS have limited roles. The results of this survey can benchmark future trends in US cataract surgery practices, particularly in teaching hospital settings.

**Commercial Relationships:** Annika G. Havnaer, None; Paul B. Greenberg, None; Glenn C. Cockerham, None; Melissa A. Clark, None; Amy Chomsky, None.

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is a potentially valuable but underused dataset for ophthalmology health services researchers given that participants report on vision and history of cataract surgery and survey data is linked to Medicare claims. We conducted this study to evaluate the rates of cataract surgery in this population and to compare the characteristics of study participants who received cataract surgery to those who did not in order to assess for feasibility of future analyses that could use this data to explore the effects of cataract surgery on mood, quality of life, and functional status in the elderly.

**Methods:** We identified all patients who reported cataract surgery during the NHATS study. All patients who reported cataract surgery prior to the start of the study were excluded. We compared health and demographic characteristics of those who reported having had cataract surgery within the past year to those who never reported having had cataract surgery. Chi-squared tests were used for statistical comparisons.

**Results:** Of the 8,245 participants included in the initial cohort, 3,273 (39.7%) were excluded for having cataract surgery prior to the start of the study. 667 participants reported having cataract surgery during the course of the study, and the remaining 4,305 did not. Participants who had cataract surgery during the study tended to be older (p<0.001), female sex (60% vs. 51%, p=0.04), and have poorer self-reported health (p=0.04) than those who did not have cataract surgery. We did not find a difference in education level (p=0.27) or depression (p=0.99) between the two groups. (Table 1)

**Conclusions:** We demonstrate that NHATS may be used to construct a demographic profile of older patients undergoing cataract surgery. Ophthalmology researchers can further use NHATS to explore the impact of cataract surgery and other ophthalmologic procedures in older populations.

<table>
<thead>
<tr>
<th></th>
<th>Those who had cataract surgery</th>
<th>Those who did not have cataract surgery</th>
<th>P Value</th>
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</thead>
<tbody>
<tr>
<td>Total</td>
<td>N (%)</td>
<td>N (%)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>667 (39.7%)</td>
<td>4,305 (51.1%)</td>
<td></td>
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<tr>
<td>65-69</td>
<td>3 (0.5%)</td>
<td>27 (1.4%)</td>
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<tr>
<td>70-74</td>
<td>121 (19.8%)</td>
<td>638 (33.3%)</td>
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<tr>
<td>75-79</td>
<td>154 (27.8%)</td>
<td>409 (21.4%)</td>
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<td>80-84</td>
<td>150 (27.1%)</td>
<td>307 (16.0%)</td>
<td></td>
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<tr>
<td>85-89</td>
<td>80 (14.4%)</td>
<td>210 (11.0%)</td>
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<td>90+</td>
<td>30 (5.4%)</td>
<td>186 (9.7%)</td>
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<tr>
<td>Sex</td>
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<tr>
<td>Female</td>
<td>402 (60.3%)</td>
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<td>Male</td>
<td>265 (39.7%)</td>
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<tr>
<td>Education</td>
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<td>7 (1.1%)</td>
<td>46 (1.3%)</td>
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<tr>
<td>1-8th Grade</td>
<td>56 (8.4%)</td>
<td>421 (11.7%)</td>
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<tr>
<td>9th-12th Grade</td>
<td>92 (13.3%)</td>
<td>489 (13.6%)</td>
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<td>987 (27.3%)</td>
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<td>46 (6.9%)</td>
<td>259 (7.2%)</td>
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<tr>
<td>Some College</td>
<td>86 (12.9%)</td>
<td>454 (12.6%)</td>
<td></td>
</tr>
<tr>
<td>Associates</td>
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<td>180 (5.0%)</td>
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</tr>
<tr>
<td>Bachelors</td>
<td>83 (12.4%)</td>
<td>432 (12.0%)</td>
<td></td>
</tr>
</tbody>
</table>

Characteristics of NHATS study participants who had cataract surgery and those who did not.

**Commercial Relationships:** Brian C. Stagg, None; Clair Ankuda, None; Ben Otte, None; Maria A. Woodward, None

**Support:** Maria A. Woodward receives a grant (K23 Mentored Clinical Scientist Award K23EY023596) from National Institutes of Health, Bethesda, MD.

**Program Number:** 766 Poster Board Number: B0605

**Presentation Time:** 1:30 PM–3:15 PM

**Effect of a structured surgical curriculum on complication rates in resident cataract surgery**

*Thomas McCurry, Teresa Martz, Sandra M. Johnson.* Ophthalmology, University of Virginia, Charlottesville, VA.

**Purpose:** The purpose of this study is to determine if the implementation of a more structured surgical curriculum for ophthalmology residents decreased the rate of cataract surgical complications.

**Methods:** A retrospective chart review was performed on all first trimester (July – October) resident phacoemulsification cataract cases from 2004 to 2014 at a residency program in Virginia. Complications rates were compared prior to and after the implementation of the Introduction to Phacoemulsification Course, started in 2009. The year 2009 was excluded to allow for transition to the new curriculum. The study population was divided into 2 groups. Group 1 consisted of surgical cases prior to the new surgical curriculum, from 2004 to 2008. Group 2 consisted of surgical cases after the enhanced curriculum, from 2010 to 2014. Complications were defined as any capsular tear and/or vitreous loss.
As expected, resident complication rates were highest in the middle of an academic year that we hypothesize may be due to attending physicians giving residents more autonomy. Overestimation of resident’s own abilities or weakening vigilance could also account for the observed pattern. As residents become more proficient later in their ophthalmological training, but it can be difficult to objectively track their surgical competence. We created a new operative note to facilitate data collection for a retrospective observational study of ophthalmology resident skills.

Results: New resident cataract surgeons started at about 20% rate of cataract surgery complication in July. Complication rates decreased to about 10% in the two subsequent months. The rate of complications rose in November-December and then subsequently fell to just under 10% in April and May (Fig 1).

Conclusions: As expected, resident complication rates were highest at the beginning of an academic year. Interestingly, the rate increased in the middle of an academic year that we hypothesize may be due to attending physicians giving residents more autonomy. Overestimation of residents' own abilities or weakening vigilance could also account for the observed pattern. As residents become more proficient later in their ophthalmological training, complication rates steadily declined, although not as much as we expected. This can likely be attributed to residents taking on more challenging cases in the latter portion of their training.
Crowdsourcing has been shown to efficiently yield accurate skill assessments in simulation and proctomyctomy but its application to eye surgery has yet to be established. Our objective was to determine reliability and validity of intraoperative technical skill assessment by a collective of surgically untrained individuals (“crowd”) for capsulorhexis.

Methods: Faculty ophthalmologists served as experts and surgically untrained personnel served as the crowd. Experts and crowd, comprising six individuals each, viewed videos of capsulorhexis and responded to a survey that included questions from the capsulorhexis component within OSCAR and OSACSS, in addition to overall questions on circularity, overall performance, competence, and operating surgeon’s appointment status (faculty vs. trainee). We assessed reliability within groups using an intraclass correlation (ICC; 2,1) and limits of agreement (LA) between groups through a Bland-Altman analysis. We assessed validity of crowd ratings using correlation coefficients and accuracy.

Results: The ICC was fair to moderate for all questions. ICC for commencement of flap & follow-through in OSCAR was lower for the crowd than for experts but differences between groups did not appear to be statistically significant. LA were approximately one unit on a scale of 1-5 for all questions except for those from OSCAR (scale of 2-5). Crowd ratings were highly correlated with expert ratings for all questions (P <0.01). Accuracy of crowd assessment of competency was 0.75 and surgeon’s appointment status was 0.85.

Conclusions: Assessments of intraoperative skill during capsulorhexis by a crowd appeared to be interchangeable and highly correlated with expert ratings.

Commercial Relationships: Shameema Sikder, None; Lauren Fang, None; Avigyan Sinha, None; Apurv Shekhar, None; Austin Reiter, None; Greg Hager, None; Satyanarayana Vedula, None

A preliminary study on crowdsourcing for intraoperative surgical skill assessment in capsulorhexis

Shameema Sikder,1 Lauren Fang,2 Avigyan Sinha,2 Apurv Shekhar,2 Austin Reiter,2 Greg Hager,2 Satyanarayana Vedula.2
1Ophthalmology, Wilmer Eye Institute, BETHESDA, MD; 2Computer Science, Johns Hopkins University, Baltimore, MD.

Purpose: Crowdsourcing has been shown to efficiently yield accurate skill assessments in simulation and proctomyctomy but its application to eye surgery has yet to be established. Our objective was to determine reliability and validity of intraoperative technical skill assessment by a collective of surgically untrained individuals (“crowd”) for capsulorhexis.

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Conclusions: Assessments of intraoperative skill during capsulorhexis by a crowd appeared to be interchangeable and highly correlated with expert ratings.

Commercial Relationships: Shameema Sikder, None; Lauren Fang, None; Avigyan Sinha, None; Apurv Shekhar, None; Austin Reiter, None; Greg Hager, None; Satyanarayana Vedula, None

Endothelial parameters based on specular microscopy and pachymetry results before surgery and on the 60th postoperative day.

Results: There were 80 surgeries in the R2 group, 142 surgeries in the R3 group, and 202 surgeries in the R4 group. Mean age of R2 patients was 70.3 ±7.5 years old (range of 50 – 85 years), mean age of R3 patients was 66.9 ±9.2 years old (26 – 85 years); and mean age of R4 patients was 67.0 ±12.0 years old (26 – 91 years). Average BCVA before surgery was 0.26 ±0.18. A total of 50 intraoperative complications occurred (11.79% of all surgeries); there were 17(21.25%) in the R2 group, 22(15.49%) in the R3 group, and 11(5.45%) in the R4 group. Complications included 31 cases of posterior capsule tears, 19 cases of vitreous loss, 2 cases of nuclear loss into the vitreous cavity, 6 cases of aphakia, 2 wound burns, 4 cases of zonular dialysis, 4 cases of Descemet’s membrane detachment, and 9 iris lesions. Long-term monitoring revealed no endophthalmitis and 2 cases of bullous keratopathy (1 in the R2 group and 1 in the R3 group). Final BCVA exhibited statistically significant improvement (p=0.001). When preoperative specular microscopy results were compared to those of the 60th postoperative day, no statistical differences were found in most of parameters tested (p=0.28 in the case of endothelium density and p=0.30 for the percentage of hexagonal cells), with the exception of the coefficient of variation (p=0.03). Likewise, pachymetry results did not differ significantly(p=0.08).

Conclusions: Despite the learning curve, surgical phacoemulsification performed by surgeons in training resulted in low rates of complication and good visual outcomes.

Commercial Relationships: Bruna G. Ferreira, None; Hermano Lucio G. Filho, None; Iuri C. Silva, None; Alexandre Ricardo A. Martini, None; Matheus I. Vieira, None; Mathias V. Méleaga, None; Monica Alves, None; Rodrigo P. Lira, None; Carlos Eduardo L. Arieta, None

Program Number: 771 Poster Board Number: B0610
Presentation Time: 1:30 PM–3:15 PM

Risk Factors for Complications in Cataract Surgeries Performed by Residents


Purpose: Cataract surgery is a fundamental skill learned during ophthalmology residency however few studies have evaluated the outcomes of trainees’ surgeries. We performed a retrospective, observational, clinical study to identify risk factors associated with complications (posterior capsular tear (PCT) with and without vitreous loss) and poor postoperative visual outcomes (best corrected visual acuity (BCVA) < 20/40) occurring in resident performed cataract surgeries.

Methods: 845 cataract surgeries performed by ophthalmology residents as primary surgeons between January 1, 2011 and April 30, 2014 were retrospectively reviewed from a large teaching hospital’s electronic medical records. Surgeries resulting in PCT with or without vitreous loss as well as those resulting in a BCVA <20/40 were compared with respect to patient demographic variables, clinical characteristics, surgical procedures, ocular examination results including comorbidities, and resident surgical experience.

Results: PCT occurred in 8.6% of cases and 16.7% of surgeries resulted in a postoperative BCVA <20/40. PCT was positively and independently associated with first quartile of residency training (p=0.011). Residents experienced significantly more complications in their first quartile of cases when a topical block was employed (p<0.001), when operating on patients with diabetic retinopathy (p=0.032) or glaucoma (p=0.016), on patients using an alpha

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blocker (p<.014), and when operating on a cataract of moderate or dense grade (p<.001). Postoperative BCVA < 20/40 was found to be independently related to dense cataract grade (p<.035) and the presence of several pre-existing ocular conditions including diabetic retinopathy (p<.001) and macular degeneration (p<.001). Interestingly, patients with a history of cataract surgery in the fellow eye were less likely to experience PCT (p<.014) and were more likely to experience a favorable visual outcome (p<.020).

**Conclusions:** This study found a strong association between resident surgical experience and surgical complications involving PCT after controlling for a number of risk factors and clinical variables. These findings suggest the possibility that some intraoperative complications may be prevented by assigning novice ophthalmology residents to operative cases with fewer known risk factors.

**Commercial Relationships:** Rebecca B. Bausell, None; Bryan J. Winn, None

**Program Number:** 772 **Poster Board Number:** B0611
**Presentation Time:** 1:30 PM–3:15 PM

**Specular Microscopy Changes After Phacoemulsification Surgery Performed by Ophthalmology Residents**

*Ricardo Moreno*, Alejandro Zermeno*, Flor D. Guzman*, Marisol Garzon1, Mara Barba2. 1Instituto de Oftalmología Conde de Valenciana, México, Mexico; 2Universidad Autonoma de Guadalajara, Mexico, Mexico.

**Purpose:** To describe the corneal endothelial cell characteristics and the risk factors for endothelial cell loss after phacoemulsification performed by residents in an ophthalmology Center in Mexico City.

**Methods:** We reviewed the clinical records of 112 eyes of 84 patients who underwent cataract surgery by an ophthalmology resident under the supervision of an experienced surgeon from March 2016 through August 2016. The endothelial cell density (ECD), percentage of hexagonal cells, endothelial cell area (ECA), coefficient of variation (CV), and central corneal thickness (CCT) were measured preoperatively and 3 months after surgery with a noncontact specular microscope Nike CEM-530. The variables examined to assess the risk for corneal endothelial cell loss postoperatively were patient age, cataract grade (LOCS classification), phacoemulsification technique, anterior chamber depth (ACD), axial length, cumulative dissipated energy (CDE) and presence of diabetes mellitus. Patients with complications during the surgical procedure were excluded.

**Results:** The mean age was 65 years and the average endothelial cell loss was 18.6%. Preoperative and postoperative specular microscopy showed changes in endothelial cell density 2300.1 cells/mm² versus 1872.2 cells/mm²; coefficient of variation, 29.5% versus 35.7%; percentage of hexagonality, 67.1% versus 64.6%; and central corneal thickness, 535 μm versus 540 μm. CDE > 25 and nuclear LOCS > 3.5 (either opalescence or color) were independent risk factors for endothelial cell loss. No statistically significant difference was found in the other variables.

**Conclusions:** The corneal endothelial cell loss is one of the main concerns of cataract surgery in the hands of an ophthalmologist in training. Choosing the appropriate patient can lead to good results and quick learning curve. Phacoemulsification cataract surgery was a safe technique in the hands of a supervised resident.

**Commercial Relationships:** Ricardo Moreno, None; Alejandro Zermeno, None; Flor D. Guzman, None; Marisol Garzon, None; Mara Barba, None

**Program Number:** 773 **Poster Board Number:** B0612
**Presentation Time:** 1:30 PM–3:15 PM

**Trends in surgical experience in cornea, glaucoma and retina subspecialty fellowship training from 2009 to 2016**

Andrew Pouw, Alexander Nguyen, Ji Liu. Ophthalmology, Yale, NEW HAVEN, CT.

**Purpose:** To determine the trends of surgical experience in cornea, glaucoma, and retina subspecialty fellowship training from 2009 to 2016.

**Methods:** Data from AUPO FCC Fellow Exit Survey Surgical Reports (2009 – 2016) and San Francisco Ophthalmology fellowship match statistics reports (2010-2015) were reviewed. The average number of cases performed by fellows in each subspecialty from 2009 to 2016 were analyzed for trends.

**Results:** Fellowship programs and positions increased in all three subspecialties from 2009 to 2015, especially in the field of retina (+30%). In retina fellowship, the average number of cases of posterior vitrectomy increased by 21.8% (442.3 to 538.8). Scleral buckles decreased by 24.9% (88 to 66.1). Laser photoagulations decreased by 12.1% (335 to 295). In cornea fellowship, penetrating keratoplasties decreased by 15.2% (49.9 to 42.3). Endothelial keratoplasties increased by 18.6% (46.3 to 54.9). Deep anterior lamellar keratoplasties increased by 37% (3 to 4.1). Keratectomies increased by 53% (8.7 to 13.3). Phakic intraocular lens implants increased by 118% (1.1 to 2.4). LASIK procedures decreased by 7.7% (61.3 to 56.6). In glaucoma fellowship, aqueous shunt placements increased by 58.8% (45.9 to 72.9). Anterior chamber to Schlemm’s canal shunts increased from 0 to 17.1. Trabeculectomies and Express shunts decreased by 11.1% (69.1 to 61.4). Trabecuoplasties increased by 40.1% (15.2 to 21.3). Uncomplicated cataract cases increased by 74.6% (66.1 to 115). Combined cataract cases increased by 17.8% (25.8 to 30.4). Combined cataract and glaucoma procedures increased by 126% (17.1 to 38.7). Endocyclophotocoagulations increased by 53.1% (6.4 to 9.8).

**Conclusions:** Fellowships provide important additional surgical training after residency. With recent advances and the development of new techniques in each field, fellowship surgical case surveys in all three areas reflected changing practice patterns and the gradual incorporation of new treatments into training curriculums. For certain surgeries, long-term trends in fellowship training may also reflect the acceptance or rejection of some treatment options.

**Commercial Relationships:** Andrew Pouw, None; Alexander Nguyen, None; Ji Liu, None

**Program Number:** 774 **Poster Board Number:** B0613
**Presentation Time:** 1:30 PM–3:15 PM

**Development of a Concise Patient-Reported Outcome Measure for Cataract Surgery in South India**

Charles Frank1, Josiah Smiley1, Hong-Gam Le1, Sanil Joseph1, Stephen Schilling1, Brian Stagg1, RD Ravindran2, Jonathan Trobe1, Joshua D. Stein3,4, Haripriya Aravind1, Joshua R. Ehrlich1,5.

1Department of Ophthalmology and Visual Sciences, University of Michigan, Ann Arbor, MI; 2Lions Aravind Institute of Community Ophthalmology, Aravind Eye Care System, Madurai, India; 3Institute for Social Research, University of Michigan, Ann Arbor, MI; 4Department of Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, MI; 5Center for Eye Policy and Innovation, University of Michigan, Ann Arbor, MI.

**Purpose:** Existing patient-reported outcome measures (PROMs) for cataract surgery are too long to be employed in a busy clinical setting or are not culturally relevant to patients in South India. Consequently, we prospectively surveyed patients in order to develop and test the
psychometric properties of a shortened version of the Indian Visual Functioning Questionnaire (IND-VFQ-SF) for patients undergoing cataract surgery in Tamil Nadu, India.

**Methods:** In Phase 1, using the full Rasch-modified IND-VFQ we prospectively surveyed patients undergoing cataract surgery preoperatively and 1 month postoperatively. We calculated the effect size of each of the 28 survey items (Cohen’s d) and correlations between item scores and preoperative visual acuity. An expert panel (AH, JDS, JRE) selected items from each subscale that were deemed relevant to patients with cataracts and that had: Cohen’s d >0.5; >35% of respondents affected; and correlation with vision in the better-seeing eye <0.15. Selected items formed the IND-VFQ-SF. In Phase 2, the resulting IND-VFQ-SF was prospectively administered to a separate group of patients undergoing cataract surgery. Cronbach’s α and item-total correlations were calculated to evaluate the reliability of the IND-VFQ-SF. For both study phases patients were recruited in even proportions from Aravind’s private and charity hospitals.

**Results:** In Phase 1, 212 patients completed the full IND-VFQ questionnaire. Using predefined criteria and expert consensus, 12 survey items were selected to comprise the IND-VFQ-SF; these items were related to mobility, activity limitation, psychosocial impact, and visual symptoms. In Phase 2, the 12-item survey was completed by an additional 225 patients before and after cataract surgery. The mean age of patients in Phase 2 was 60.4 ± 8.6 years; they were 66.2% female; 36.4% had no formal schooling; 58.5% had a monthly income ≤ 5000 Rupees (US$73); and 53.9% underwent manual small-incision cataract surgery. Mean LogMAR visual acuity was 0.48 preoperatively and 0.06 post-operatively. Cronbach’s α was 0.85 and item-total correlations ranged from 0.47 to 0.74.

**Conclusions:** The IND-VFQ-SF we developed was found to have high internal consistency and its items had very good discriminating power. Thus, this instrument was found to be a reliable PROM to assess the success of cataract surgery in South India.

**Commercial Relationships:** Charles Frank, Josiah Smiley, None; Hong-Gam Le, None; Sanil Joseph, None; Stephen Schilling, None; Brian Stage, None; RD Ravindran, None; Jonathan Trobe, None; Joshua D. Stein, None; Haripriya Aravind, None; Joshua R. Ehrlich, None

**Support:** Heed Ophthalmic Foundation, Kellogg Eye Center for International Ophthalmology, Research to Prevent Blindness “Physician Scientist” Award (JDS), W.K. Kellogg Foundation (JDS), University of Michigan Medical School Summer Biomedical Research Program (CRF)

**Program Number:** 775 **Poster Board Number:** B0614

**Presentation Time:** 1:30 PM–3:15 PM

**Distribution of Posterior Corneal Astigmatism and Aberration before Cataract Surgery in Chinese Patients**

Yating Tang, Yongxiang Jiang, Qinghe Jing, Dongjin Qian, Yi Lu. Ophthalmology, Eye and ENT Hospital of Fudan University, Shanghai, China.

**Purpose:** To study the prevalence of posterior corneal astigmatism (PCA) and aberration in Chinese eyes before cataract surgery.

**Methods:** We conducted a cross-sectional study in Eye and ENT Hospital of Fudan University, Shanghai. In all, we enrolled 1976 eligible eyes of 1976 cataract patients. The astigmatism and aberrations of anterior and posterior cornea were measured by the rotating Scheimpflug System (Pentacam HR, Oculus). Cataract was diagnosed using slit-lamp examination.

**Results:** We conducted a cross-sectional study in Eye and ENT Hospital of Fudan University, Shanghai. In all, we enrolled 1976 eligible eyes of 1976 cataract patients. The astigmatism and aberrations of anterior and posterior cornea were measured by the rotating Scheimpflug System (Pentacam HR, Oculus). Cataract was diagnosed using slit-lamp examination.

**Results:** The mean age of patients were 61.82±13.67 years old. Mean PCA was 0.28±0.16 (range 0-1.0) D and 87.04% eyes had PCA values <0.5D. WTR astigmatism predominated the anterior cornea astigmatism (43.1%); while ATR astigmatism predominated posterior (85.4%) and total corneal astigmatism (47.2%). We found a shift tendency of WTR to ATR with aging in anterior corneal astigmatism, while PCA remains ATR. A significant positive correlation between the magnitude of anterior and posterior corneal astigmatism ($r^2$=0.089, P<0.001), especially in WTR anterior cornea astigmatism eyes ($r^2$=0.298, P<0.001). Compared with total corneal astigmatism, anterior corneal measurements overestimated WTR astigmatism by a mean of 0.24±0.13 (D), underestimated ATR astigmatism and oblique astigmatism in most eyes. Furthermore, anterior corneal aberrations measurements overestimated the total corneal aberration in most eyes.

**Conclusions:** 12.96% of eyes had PCA ≥0.5D. The posterior surface remained ATR astigmatism in most cases with aging. Neglecting the posterior cornea would result in overestimation in WTR anterior corneal eyes and underestimation in ATR and oblique anterior corneal eyes. Also, the posterior corneal aberration was also essential in clinics.

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To investigate cataract surgical complications and its contribution to visual outcomes in older adults from rural and urban areas of Parintins City, Brazilian Amazon Region.

**Methods:** BARES is a population-based study using cluster random sampling to identify individuals ≥ 45 years of age. Eligible individuals were invited to an ophthalmic exam and those who had previous cataract surgery were queried about year and place of surgery. The surgical technique and complications were noted. The contribution of surgical complications on visual impairment (best-corrected visual acuity - BCVA <20/32 to ≥20/200) or blindness (BCVA <20/200) was studied. The association of surgical complications with surgical technique and socio-demographic variables was assessed by multiple logistic regression.

**Results:** A total of 2384 eligible persons were enumerated, 2041 (85.6%) were examined. Previous cataract surgery was found in 173 (8.5%) participants (270 eyes), 97 subjects with bilateral and 76 with unilateral surgery. The mean age at cataract surgery was 67.8±9.3 years. The most frequent surgical technique was phacoemulsification (63.3%), followed by extra-capsular extraction (32.2%), intra-capsular extraction (2.6%), and others (1.9%). Surgical complications were detected in 142 (52.6%) eyes including posterior capsule opacification (29.6%), posterior capsule rupture (16.3%), intraocular lens (IOL) dislocation (6.7%) and corneal decompensation (6.3%). Surgical complications contributed to visual impairment in 19 (13.4%) eyes and blindness in 17 eyes (12.0%). Posterior capsule rupture (12/19 eyes – 63.2%) and corneal decompensation (10/17 eyes – 58.8%) were the most frequent complication leading, respectively, to visual impairment and blindness. Phacoemulsification technique was found to be significantly less associated to surgical complications [OR=0.35; 95% CI: 0.16-0.76; p=0.011].

**Conclusions:** Cataract surgical complications were detected in more than half of previously operated eyes in this population. The most common complications contributing to post-operative visual impairment and blindness were posterior capsule rupture and corneal decompensation. These findings reinforce the need to monitor cataract surgery quality in areas with limited access to healthcare to improve visual outcomes.

**Commercial Relationships:** Yating Tang; Yongxiang Jiang. None; Qinghe Jing. None; Dongjin Qian. None; Yi Lu. None

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questionnaire screening for frailty was applied; it included five components: weakness, slowness, fatigue, low physical activity, and weight loss. Pre-frailty was defined as presence of 1 to 2 components; frailty as presence of ≥3 components. The Hospital Anxiety and Depression Scale (HADS) questionnaire was also used, which identifies anxiety and depression symptoms. All analyses were performed with Stata 14.

**Results:** Of 185 patients (120 women and 65 men; mean age 71.7 years [s.d. 10]; visual acuity worse than 20/200, 110 were pre-frail and 16 were frail. Overall prevalence of frailty and pre-frailty was 8.65% (95%CI 5.3-13.7) and 59.5% (95%CI 52.2-66.4), respectively. Prevalence of frailty was higher in women than in men (13% and 0%, respectively); in patients with anxiety than in those without (30% and 6.1%, respectively); and in patients with depression than in those without (23.8% and 6.7%, respectively). Prevalence of pre-frailty was higher in patients with anxiety than in those without (65.0% and 58.8%, respectively). One month after cataract surgery, 68.8% of those with frailty before surgery reversed to a status of pre-frailty and 6.4% remained frail; 20.9% of those with pre-frailty before surgery reversed to a non-frail status, 72.2% remained with pre-frailty, and 6.4% progressed to frailty. Finally, the likelihood of reversal of pre-frailty (38%) and frailty (31%) was higher in those without signs of anxiety/depression compared with patients who had these conditions.

**Conclusions:** Cataract surgery had a high impact on reversal of prefrailty and frailty in a short follow-up of older patients. Psychological conditions, such as anxiety and depression, were associated with lower reversal of pre-frailty and frailty. A multidisciplinary management of these patients should thus be implemented.

**Commercial Relationships:** Gabor Laszlo Sandor; Dorottya Szabo; Gabor Toth; Iren Szalai; Regina Lukacs; Anita Pek; Georgina Toth; Andras Papp; Zoltan Zsolt Nagy; Hans Limburg; Janos Nemeth

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**Program Number:** 779 Poster Board Number: B0618

**Presentation Time:** 1:30 PM–3:15 PM

**Outcome of cataract surgery in children after bone marrow transplantation**

**Ariel Chen**, Kimberly G. Yen† 1, 2. Baylor College of Medicine, Houston, TX; 2Texas Children’s Hospital, Houston, TX.

**Purpose:** Pediatric cataracts are known to develop in patients who have received bone marrow transplantation (BMT) and pre-treatment conditioning such as total body irradiation (TBI). We present the outcome of cataract surgery in children who have undergone BMT.

**Methods:** Retrospective chart study involving 15 patients (28 eyes) with a history of BMT who had cataract extraction between 2002 and 2012. Outcome measures include change in visual acuity and complications.

**Results:** Of the 15 patients, 7 (47%) had acute lymphoid leukemia, 3 (20%) had acute myeloid leukemia, 2 (13%) had myelodysplastic syndrome, 1 (7%) had Fanconi anemia, 1 (7%) had juvenile myelomonocytic leukemia, and 1 (7%) had adrenoleukodystrophy.

All patients received BMT and conditioning chemotherapy at a mean age of 47.2 ± 19.2 months. Six patients (40%) were female and 9 (60%) were male. Twelve (43%) patients received TBI and 3 (14%) received cranial irradiation in addition to TBI; one (4%) received only cranial irradiation. Eight (53%) patients developed graft versus host disease treated with prednisone and immunomodulators. Mean age of cataract surgery was 109.3 ± 27.1 months; mean follow-up was 55.9 ± 45.1 months. All cataracts were posterior subcapsular subtype. Mean visual acuity improved from 0.7 ± 0.4 logMAR pre-op to 0.3 ± 0.5 logMAR at last visit, p < 0.001. 23/28 eyes (80%) had cataract extraction with intraocular lens placement; 5/28 (20%) of the eyes had cataract extraction with primary posterior capsulotomy and anterior vitrectomy (PC/A Vx). 23/23 of the eyes that did not have primary PC/A Vx developed PCO; 21 of the 23 eyes (91%) were noted to have a posterior capsular opacification (PCO) intraoperatively with inability to completely polish the capsule. 19 (80%) of these were visually significant and 16 of these eyes received YAG laser treatment a mean of 13.4 ± 31.4 months after cataract surgery. Of the remaining visually significant PCO, one belonged to a deceased patient and the other two were lost to follow-up. None of the primary PC/A Vx eyes developed PCO.

**Conclusions:** Children with history of BMT have a predisposition of developing posterior subcapsular cataracts. Need for YAG laser or treatment for PCO is high in this population due to the type of cataracts they develop. The incidence of postoperative PCO treatment

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is significantly reduced in patients who have primary posterior capsulotomy and anterior vitrectomy.

Commercial Relationships: Ariel Chen, None; Kimberly G. Yen, None

Support: Supported in part by an unrestricted grant from Research to Prevent Blindness

Program Number: 781 Poster Board Number: B0620
Presentation Time: 1:30 PM–3:15 PM

Epidemiology of pseudoexfoliation syndrome in a Guatemalan population – 2-year follow-up

Purpose: Pseudoexfoliation (PXF) syndrome is known to be associated with glaucoma, zonular weakness, reduced pupil dilation, and cataract progression. This retrospective study presents two-year follow-up of a Guatemalan population undergoing cataract surgery.

Methods: 279 eyes of 259 patients who underwent cataract surgery at Hospital de la Familia in Guatemala in 2014 and 2015 were reviewed retrospectively. Eyes necessitating combined glaucoma filtration procedures and traumatic subluxed lenses were excluded. Records were reviewed for presence of PXF material, preoperative visual acuity, cataract density, intraocular pressure (IOP), cataract extraction technique, intraocular lens (IOL) placement site, and surgical complications. Fisher exact test and chi-square test were used for categorical variables, and two-tailed T test was used for continuous variables. Statistical significance was defined as p ≤ 0.05.

Results: 233 eyes (83%) had vision worse than 20/200 preoperatively. Phacoemulsification and extracapsular extraction were performed in 60 eyes (22%) and 219 eyes (78%), respectively. The most common complications were elevated IOP (>30 mmHg) on post-operative day 1 (19%), poor intraoperative pupil dilation (13%), zonular abnormalities (10%), vitreous loss (10%), posterior capsular tear (8%), incomplete cortex removal (8%), and iris trauma (5%). Other complications included post-operative hyphema (3%), dropped nucleus (3%), suprachoroidal hemorrhage (0.3%), and retrobulbar hemorrhage (0.3%).

41 eyes (15%) had documented PXF preoperatively. Eyes with PXF were more likely to result in poor dilation (p = 0.004), zonular abnormalities (p < 0.001), and vitreous loss (p = 0.04). The location of IOL placement in eyes with PXF was significantly different (p = 0.003), specifically that more anterior chamber intraocular lenses were placed in eyes with PXF (p < 0.001). Eyes with PXF also were more likely to have elevated post-operative IOP (p = 0.09), however this did not reach statistical significance.

Conclusions: This study confirms our previously reported incidence of PXF in this Central American population of 15%. PXF is associated with increased likelihood of intraoperative and postoperative complications from cataract surgery. Detailed preoperative exam and preparation are warranted to anticipate such complications.

Commercial Relationships: Jennifer L. Barger; Edmund Tsui, None; Kevin C. Chen, None; Ilyse Haberman, None; Jordan Lee, None; Lisa Park, None

Program Number: 782 Poster Board Number: B0621
Presentation Time: 1:30 PM–3:15 PM

Factors influencing anterior chamber depth in pseudophakic eyes youngju An, Eun-Kyoung Kang, Choun-Ki Joo. Department of Ophthalmology and Visual Science, The Catholic University of Korea School of Medicine, Seoul, Korea (the Republic of).

Purpose: Postoperative anterior chamber depth (ACD) is an important factor for predicting refractive outcome. There is controversy regarding the factors that affect postoperative ACD. This study aimed to determine the relationship between postoperative ACD and preoperative factors.

Methods: Seventy-three eyes undergoing cataract surgery were retrospectively evaluated. Axial length (AL), central corneal thickness (CCT), ACD, lens thickness (LT), white-to-white (WTW) distance, and mean keratometry readings (Km) were measured preoperatively and at least 2 months postoperatively by swept-source optical coherence tomography (Argus; Mova, Inc.). Anterior cortical (ACT), nuclear (NT), and posterior cortical (PCT) thicknesses were measured using the embedded software. Postoperative changes were evaluated for significance by a t-test. Simple and multiple regression analyses of postoperative ACD as a function of AL, CCT, ACD, LT, WTW, and Km were performed. We also evaluated the relationship of postoperative ACD with ACD + ACT, ACD + ACT + NT, and ACD + LT (corneal epithelium to anterior and posterior nuclear surfaces and posterior cortical surface, respectively).

Results: Pre and postoperative AL, ACD, LT, WTW, and Km differed significantly. Simple regression analysis revealed significant correlations between postoperative ACD and AL, preoperative ACD, LT, and WTW (β = 0.098, 0.613, 0.266, and 0.280, respectively; p < 0.001, all). Multiple regression analysis revealed significant correlations between postoperative ACD and preoperative ACD (β = 0.739; p < 0.001) and LT (β = 0.400; p = 0.003). Pearson’s correlation analysis revealed significant correlations between postoperative ACD and ACT, ACD + ACT + NT, and ACD + LT (R = 0.711, 0.641, and 0.618, respectively; p < 0.001).

Conclusions: Postoperative ACD is associated with preoperative ACD and LT. Evaluation of these two parameters will help predict postoperative ACD more accurately.

Commercial Relationships: youngju An, None; Eun-Kyoung Kang, None; Choun-Ki Joo, None

Program Number: 783 Poster Board Number: B0622
Presentation Time: 1:30 PM–3:15 PM

Changes in refractive error between one week and one month after cataract surgery
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Purpose: An accurate postoperative refraction is the main goal of cataract surgery. We performed a chart review to identify factors associated with changes in refraction in the first month after surgery.

Methods: A retrospective chart review identified 205 patients (249 eyes) who underwent surgery at the Moran Eye Center in Salt Lake City, UT by two surgeons from 3/1/15-6/30/16. 44 underwent sequential bilateral surgery. Age, sex, presence of dry eye, biometry data, intended target refraction (iTR), intraocular lens (IOL) model, use of limbal relaxing incisions (LRIs) and manifest refraction (MRx) at one week (W1) and one month (M1) were recorded. One-piece acrylic monofocal IOLs by Alcon and Abbott Medical Optics were included. Eyes with other visually significant pathology, surgical complications, visual acuity of 20/40 or worse and lost to follow-up outside the specified date ranges were excluded.

For statistical analysis two groups were formed: eyes that achieved within 0.25D spherical equivalent (SE) from the iTR vs. eyes >0.25D from the iTR. Two comparisons were considered: M1 SE to iTR and W1 to M1 SE. Univariate tests for differences between the two groups were performed using a chi-square test. Multivariable logistic regression were performed on the outcome of >0.25D absolute deviation (AD) for each of the three comparisons. Covariates in the multivariable models were age, sex, anterior chamber depth, axial length, dry eyes, LRIs and the mean of corneal curvature K1 and K2 (Kmean).

Results: Based on the chi-square test, there were significantly more eyes with a M1 MRx >0.25D SE from the iTR that had a toric IOL (14%) than in the <0.25D group (4.8%) p=0.023. In the multivariable logistic regression analysis for each of the comparisons to predict AD >0.25D from the iTR, Kmean was a marginally significant predictor (Odds ratio [OR]:1.19, 95% CI:1.1-4.1, p=0.055) for M1 SE to the iTR. LRIs were a significant predictor (OR:2.04, 95% CI:1.01-4.12, p=0.047) for W1 to M1 SE.

Conclusions: Patients who received toric IOLs were more likely to have a MRx at M1 that was >0.25D SE from the iTR. Patients who received LRIs or had steeper corneal curvature were more likely to have a MRx >0.25D SE from the iTR from W1 to M1 and from the iTR to M1, respectively. Analysis predicting the accuracy of the 2nd eye based on the accuracy of the 1st eye are forthcoming.

Commercial Relationships: Theresa M. Long, None; Molly McFadden, None; Crystal Checketts, None; Mark Mifflin, None; Amy Lin, Eyegate Pharmaceuticals (C)

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Program Number: 784 Poster Board Number: B0623
Presentation Time: 1:30 PM–3:15 PM

Visual outcomes of femtosecond laser-assisted cataract surgery(FLACS) treating high myopia cataract

kaikai qiu1 2
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Purpose: Femtosecond laser-assisted cataract surgery (FLACS) is precise and safe but seldom reported with the high myopia cataract. We performed a retrospective, observational clinical study to identify the changes in the visual acuity (uncorrected distance visual acuity, UDVA), corrected distance visual acuity (CDVA), potential visual acuity (PVA), refractive errors, eye axis length, cornea curvature and astigmatism of those high myopia cataract before and after the FLACS.

Methods: We compared the UDVA of 1 month post-surgery and the CDVA within 1 month pre-surgery; And PVA (only before the surgery) was compared to the UDVA post-surgery and CDVA pre-surgery, respectively. Visual acuity records were all transferred into logMAR visual acuity records for comparison. Spherical equivalence (SE) and total astigmatism of the refractive error, axial length (AL), average central cornea power and cornea astigmatism of total 31 eyes (total 24 patients, 14 female) with cataract and high myopia(axis length ≥ 25.98mm) were all analyzed 1 month post-surgery and those pre-surgery using LenSx (Alcon, U.S.A) completing all FLACS of laser capsulotomy, lens fragmentation, clear cornea incision; Only 2 cases accepted and completed the peripheral cornea relaxation incision(PCRI) for the cornea astigmatism correction. Using statistics software SPSS 17.0 to do all the data student paired t-test, P < 0.05 was considered significant difference.

Results: UDVA of post-FLACS was significantly better compared to CDVA of pre-FLACS(n=31, t=3.553, P<0.0001); UDVA of post-FLACS was also much better than the PVA pre-FLACS(n=20, t=5.987, P <0.0001); PVA was comparable better than the CDVA pre-FLACS (n=20, t=3.553, P=0.002); Refractive error(SE2) post-FLACS was significantly reduced compared to those (SE1) pre-FLACS (n=9, t<10.649, P<0.0001); Axis length was found a little bit shorten post-surgery compared to the pre-surgery but was not significant difference (n=24, t=1.544, P=0.136); Total astigmatism, cornea astigmatism, and average cornea curvature had neither significant difference (P>0.05). And none big complication happened of all cases.

Conclusions: High myopia cataract is eligible to encourage to do the FLACS, which will improve the UCVA, reduce refractive error with safer and better outcomes without much eye axis and cornea changes.

Commercial Relationships: kaikai qiu

Program Number: 785 Poster Board Number: B0624
Presentation Time: 1:30 PM–3:15 PM

Refractive changes after capsulotomy with YAG laser

MAYRA NEVES DE MELO CARNEIRO, Glenda G. Pacheco, Pedro Henrique D. Abreu, Joao J. Nassaralli, RESIDENCIA, INSTITUTO DE OLHOS DE GOIANIA, GOIANIA, Brazil; Retina and Vitreous, Instituto de Olhos de Goiania, Goiania, Brazil.

Purpose: Study of refractive changes after capsulotomy with YAG laser in facectomized patients.

Methods: A retrospective, quantitative study was carried out by analyzing the medical records of a reference ophthalmologic hospital in Goiás. Data from the pre and post YAG laser refractive index data were collected from 67 eyes of 66 patients analyzed in the period from May to November 2016.

Results: We studied 67 eyes of 66 patients, both 29 (43.9 %) men and 37 (56%) women, and 32 (47.7%) underwent myopia after the capsulotomy procedure with YAG laser and 25 (37.3%) hypermetropization and 10 (14.9%) maintained the refraction. The difference in refraction was found by the arithmetic mean of the spherical equivalent for the precapsulotomy procedure of -28.85D and post-capsulotomy of -31.75 D, giving a difference of -2.9 D.

Conclusions: It was concluded with this study that the use of posterior capsulotomy with YAG laser post facettomy caused changes in the refraction of the patients studied, presenting myopia with greater frequency in the results. With these data, we observed the need for other future studies with a large number of eyes to prove what happened in this study.

Toxic Anterior Segment Syndrome in a tertiary Australian Healthcare Institution

Chris H. Lim,1 Nathan Wong,2,3 Ching H. Ng,1,4 Andrew Symons1,4

1Ophthalmology, Royal Melbourne Hospital, Melbourne, VIC, Australia; 2Royal Victorian Eye and Ear Hospital, Melbourne, TAS, Australia.

Purpose: To report the clinical course and outcome of eyes affected by toxic anterior segment syndrome (TASS) in an Australian tertiary hospital, and discuss measures undertaken to minimise risk of further occurrences.

Methods: This was a retrospective case series with records of all eyes matching TASS case definition following cataract surgery from November 2011 to October 2012 included. Clinical features of presentation, treatment measures, and visual outcomes were recorded. The course of investigations and changes to cataract surgery flow at the hospital were described.

Results: 11 cases of TASS following cataract surgery were identified within a 12-month period. All eyes demonstrated features of TASS within 24 hours of surgery; specifically, diffuse corneal oedema and significant anterior chamber fibrin or hypopyon. Anterior chamber and vitreous tap was performed in 6 eyes, with no organism identified or grown from any sample. Visual acuity in all eyes improved post-operatively compared with pre-operative acuity. Changes to cataract surgery practices included replacement of instruments with disposable equivalents, modified sterilization methods with no lag time to re-sterilisation, and staff education. Following one isolated case after implemented changes, no further cases were seen.

Conclusions: This is the first published case series of TASS in an Australian tertiary care setting. Outbreaks of TASS require a multifaceted, multidisciplinary approach to identifying potential causative factors and implementing protocols to address these factors appropriately.

Commercial Relationships: Chris H. Lim, None; Nathan Wong, None; Ching H. Ng, None; Andrew Symons, None

PEDIG Lensectomy Registry: Rates of Amblyopia Treatment, Glaucoma and Other Complications One Year after Surgery

Michael A. Gross1,2, Durga S. Borkar1,2, Nicole Koulisis1, Tave van Zyl1,2, Sherleen Chen1,2, Matthew Gardiner1,2, Sheila Borboli-Gerogiani1,2, Stacey Brauner1,2, Ann-Marie Lobo1,2, Zhonghui Luo1,2, Carolyn Kloek1,2,3, Ophthalmology, Harvard Medical School, Brookline, MA; 4Massachusetts Eye and Ear Infirmary, Boston, MA.

Purpose: To assess whether similar intra and postoperative complications of cataract surgery in glaucoma suspects were associated with cataract surgery. We performed a retrospective, observational clinical study to assess whether similar intra and postoperative complications are observed in glaucoma suspects.

Methods: Cases of cataract extraction by phacoemulsification performed by surgeons on the Comprehensive Ophthalmology Service at an academic practice in Boston, MA between 1/1/14-12/31/14 were reviewed. Perioperative information was collected. Glaucoma suspects were identified and monitored for intraoperative complications and postoperative complications at day 1 (POD1), week 1 (POW1), and month 1 (POM1) exams. Relative risks of complications were calculated in glaucoma suspects versus non-glaucoma and non-glaucoma suspect control cases.

Results: 950 cataract cases were reviewed. 9 patients with planned combined cataract extraction and pars plana vitrectomy were excluded. Of 941 remaining cases, 166 were glaucoma suspects in the operative eye, with 732 controls. Patients ranged from 44-97 years old with 109 (65.7%) women. The most common reason for inclusion as a glaucoma suspect was increased cup to disc ratio or asymmetry in 94 patients (56.6%). 34 (20.5%) had ocular hypertension (OHTN) without C/D changes, 12 (35.3%) of whom were on drops to control intraocular pressure (IOP). 19 (11.4%) had narrow angles, and 15 (9.0%) had other pathology (e.g. pigment dispersion, visual field defects). Glaucoma suspects had no increased relative risk of anterior or posterior capsular rents, anterior vitrectomy, or sulcus lens placement during surgery, compared to controls. At POD1, 52 glaucoma suspect patients (31.3%) had elevated IOP, including 35 with no history of OHTN. At this visit, glaucoma suspects trended toward increased risk of change in steroid drop regimen or addition of IOP drops, however these did not
reach statistical significance (RR=1.37, p=0.38; RR=1.32, p=0.31, respectively). There was no increased risk of change in steroid or NSAID drops regimen at POW1, or retinal detachment or macular edema at POM1.

Conclusions: These results suggest that unlike glaucoma patients, glaucoma suspects undergoing routine cataract surgery do not have increased risk of intraoperative complications. Our results do suggest a propensity for postoperative IOP elevation among glaucoma suspects, with a timeline that cannot be explained by corticosteroid responsiveness.

Commercial Relationships: Emily A. Gross, None; Durga S. Borkar, None; Nicole Koulis, None; Tavé van Zyl, None; Sherleen Chen, None; Matthew Gardiner, None; Sheila Borboli-Gerogiannis, None; Stacey Brauner, None; Ann-Marie Lobo, None; Zhonghui Luo, None; Carolyn Klock, None

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Program Number: 789 Poster Board Number: B0628
Presentation Time: 1:30 PM–3:15 PM
Glycated hemoglobin levels and risk of clinically significant macular edema after cataract surgery in veterans: results from the Veterans Affairs (VA) Ophthalmic Surgery Outcomes Data (OSOD) Project
Michael M. Lin1, Abhishek R. Payal1, Donna Siracuse-Lee1, Tulay Cakiner-Egilmez, Amy Chomskey1, David Vollman1, Elizabeth Baze, Mary G. Lawrence1, Mary K. Daly2,3
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Purpose: Risk of clinically significant macular edema (CSME), thickening of macular area) at various glycated hemoglobin (HgbA1c) levels is an important yet underreported aspect of cataract surgery and its management. We explored the association of elevated HgbA1c levels and risk of diabetic CSME after cataract surgery in veterans.

Methods: Retrospective analysis of a de-identified database of 4923 cataract surgery cases in the VA OSOD Project. We included cases which had data on HgbA1c and occurrence of postoperative diabetic CSME. Logistic regression modeling was used to calculate odds ratios (OR) for risk of CSME at increasing intervals in diabetic range. Odds ratio for CSME in those with HgbA1c ≥ 6.5% compared to <6.5% were calculated after adjusting for age, operating time, history of diabetes, hypertension, history of smoking, and perioperative complications.

Results: Of 4923 cases, 2003 had HgbA1c data available. Mean HgbA1c level was 7.34% (range 4.4%-17.5%, SD 1.6, median 7%). HgbA1c levels ≥ 7.0 were all statistically significantly associated with increased OR for development of CSME, and magnitude of OR for development of CSME increased with increasing HgbA1c levels: for HgbA1c 6.5-6.9 (n=364) [OR 0.6, 95%CI 0.03-5.2, p=0.66]; HgbA1c 7-7.9 (n=543) [OR 5.5, 95%CI 1.73-24.53, p=0.003]; HgbA1c 8-8.9 (n=239) [OR 6.8, 95%CI 1.78-33.94, p=0.005]; HgbA1c 9-9.9 (n=126) [OR 6.8, 95%CI 1.21-44.67, p=0.03]; and HgbA1c ≥ 10 (n=127) [OR 21.3, 95% CI 5.29-126.12, p<0.0001]. Adjusted OR for CSME in those with HgbA1c ≥ 6.5% compared to <6.5% was 4.75 (95% CI 1.57-21.06, p=0.04), adjusted for age, operating time, history of diabetes, hypertension, history of smoking, and perioperative complications.

Of 47 CSME cases in our cohort, 2 (4.3%) cases of CSME were seen at normal HgbA1c levels (4.4%-5.7%), 1 (2.1%) was seen at prediabetes level (5.7%-6.4%), and 44 (93.6%) had HgbA1c levels in diabetic range (≥6.5%). Of the 47 cases of CSME, 3 (6.4%) had posterior capsular rupture during the procedure. There was no significant difference in occurrence of CSME among veterans who suffered a posterior capsular tear and those who did not (p=0.47).

Conclusions: Risk of diagnosis of CSME after cataract surgery increases significantly with increase in preoperative HgbA1c levels.

Commercial Relationships: Michael M. Lin, None; Abhishek R. Payal, None; Donna Siracuse-Lee, None; Tulay Cakiner-Egilmez, None; Amy Chomskey, None; David Vollman, None; Elizabeth Baze, None; Mary G. Lawrence, None; Mary K. Daly, None

Program Number: 790 Poster Board Number: B0629
Presentation Time: 1:30 PM–3:15 PM
Characterizing posterior capsule rupture during cataract surgery in eyes with prior intravitreal injection
Zaid Shalchi, Robin Hamilton. Medical Retina Service, Moorfields Eye Hospital, London, United Kingdom.

Purpose: Several independent study groups, including our own, have recently shown increased posterior capsule rupture (PCR) rates during cataract surgery in eyes with prior intravitreal injections. The cause for this increased risk has not been established. This study’s aim was to investigate the nature of PCR in these cases.

Methods: We used the Moorfields Patient Administrative System (PAS) and OpenEyes electronic databases to identify all cataract surgery procedure undertaken in the Medical Retina service between 1 April 2013 and 31 August 2016. Procedures complicated by PCR were identified and note was made of prior occurrence of intravitreal injection. The operation note for each case was scrutinized, as well as the post-operative course. Each PCR in an injected eye was linked to 2 PCR cases in non-injected eyes that acted as age- and sex-matched controls. Early PCR was defined as occurring before completion of phacoemulsification nucleus removal, with late PCR after this step.

Results: In total, 63,147 cataract surgery procedures were undertaken over the study period, of which 5,711 (9.07%) were in the Medical Retina service. PCR occurred in 97 (1.70%) of these cases, of which 11 had prior intravitreal injection. The surgery was performed by a consultant (attending) surgeon in 4 (36%) of 11 injected eyes and 9 (41%) of 22 non-injected eyes (Chi-square=0.063, p=0.80). In the injected group, early PCR occurred in 6 (75%) of 8 cases where this information was available. In control cases, early PCR occurred in 11 (61%) of 18 procedures (Chi-square=0.472, p=0.49). Post-operative vitrectomy and nucleus fragmentation was needed in 2 of 11 (18%) injected eyes and 2 of 22 (9%) non-injected eyes (Chi-square=0.266, p=0.61). In both groups, 9% of eyes developed post-operative rhegmatogenous retinal detachment.

Conclusions: PCR occurs both early and late during cataract surgery in injected and non-injected eyes and the timing of this complication is not related to prior intravitreal injection.

Commercial Relationships: Zaid Shalchi, None; Robin Hamilton, Novartis (C), Ellex (R), Bayer (C), Novartis (R), Bayer (R), Novartis (F), Ellex (C), Allergan (R), Bayer (F), Allergan (C)

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POINT-OF-CARE DIAGNOSTIC TESTS

Purpose: Ocular surface disease (OSD) can significantly impact pre-operative measurements for cataract surgery. The purpose of this study is to assess the prevalence of abnormal tear testing in pre-operative cataract surgery patients (pts) using two common point-of-care (POC) diagnostic tests and to assess the correlation between patient symptoms and objective test results.

Methods: A prospective observational study of 34 consecutive pre-operative cataract surgery pts was conducted. Pts with visually significant cataract were included for study at their pre-operative appointment. They were administered 2 questionnaires: the Ocular Surface Disease Index (OSDI) and the Symptom Assessment in Dry Eye (SANDE) questionnaire. All pts then underwent tear osmolality (osm) testing (TearLab®) and matrix metalloproteinase-9 (MMP-9) testing (InflammaDry™) regardless of symptomatology and before the instillation of any drops or other testing. Primary outcome measures included tear film osm, tear MMP-9 level, and questionnaire scores.

Results: Average age was 70.1 ± 7.7 years, and 59% of pts were female. At least 1 abnormal tear test was present in 76% of pts, while 35% of pts were abnormal for both tear tests. 15% of pts had abnormal tear osm (≥308 mOsm/L or inter-eye difference ≥8 mOsm/L) but were negative for MMP-9. An abnormal MMP-9 with normal osm was found in 26% of pts, and in 24% of pts both tests were normal. OSDI and SANDE symptom scores were well correlated (r=0.56, p<0.001). However, there was no significant association between OSDI scores (severe symptoms >33) and abnormal tear osm (p=0.42) or MMP-9 (p=0.63). SANDE scores (severe symptoms >50) also showed no significant association with osm (p=0.22) or MMP-9 levels (p=0.24). Mean OSDI and SANDE scores were similar between the subgroup of pts with 2 abnormal tear tests (37.48 ± 26.51 and 34.35 ± 31.63) and the subgroup that tested normal for both tear tests (34.75 ± 24.92 and 35.65 ± 30.63).

Conclusions: There is a high prevalence of OSD in pts who present for cataract surgery as measured by POC diagnostic tear tests. Signs and symptoms of OSD are often poorly correlated; this study shows a similarly poor correlation, suggesting symptomatology alone may miss affected pts. POC testing may be more useful in identifying early or asymptomatic OSD in pre-operative cataract surgery pts.

Commercial Relationships: Owen J. Drinkwater, None; Ashley R. Brissette, None; Christopher E. Starr, RPS Diagnostics Inc. (C), TearLab Inc. (C)

Long-term outcome of cataract surgery for highly myopic patients with traction maculopathy

Purpose: To evaluate the long-term effect of cataract surgery on highly myopic patients with macular traction maculopathy (MTM) and the risk factors associated with MTM progression.

Methods: Highly myopic eyes with MTM including epiretinal membrane traction and retinoschisis without macular hole or retinal detachment, who underwent phacoemulsification surgery, were included. The optical coherence tomography (OCT) and microperimetry examinations were taken on subjects preoperatively and postoperatively to assess the status of retinopathy. The best corrected visual acuity (BCVA) and macular sensitivity (MS) were recorded at every visit.

Results: Within the 184 subjects, both the BCVA and MS were improved significantly after cataract surgery throughout the follow-up period. The OCT examination showed no progression of retinopathy in all subjects at 6 months postoperatively. At 3 years postoperatively, only 7.1% of subjects experienced progression in MTM. Moreover, the long axial length, negative posterior vitreous detachment and positive schisis in fovea may serve as risk factors for MTM progression.

Conclusions: In general, the cataract surgery significantly improves the visual acuity and macular sensitivity of patients with MTM. Cataract surgery per se is not a risk factor for MTM progression, especially in eyes with complete posterior vitreous detachment. However, longer axial length and more extensive macular retinoschisis predispose the patients to MTM progression.

Figure 1. Cai et al, 2016
Optical coherence tomography (OCT) was conducted of the anterior segment, optic nerve and macula with the Zeiss Cirrus 5000 spectral domain OCT device.

**Results:** To date, three-month follow-up data is available for three surgeries among two survivors. The first, a 26-year-old male with known zonular dehiscence, underwent cataract surgery followed by YAG vitreolysis. Intraocular inflammation reduced from 2+ anterior chamber cell at one week to quiet at 3 months with taper of topical dexamethasone 1%. There was no macular thickening on OCT. The second, a 23-year-old male, underwent laser peripheral iridotomy for iris bombe in the setting of inflammatory pupillary membrane and posterior synechiae. Following a one-month taper of topical prednisolone acetate 1%, at 3 months he had a quiet eye, intraocular pressure of 8mmHg, and patent peripheral iridotomy by OCT.

**Conclusions:** In these two cases of intraocular surgery in Ebola survivors in Liberia, inflammation resolved with topical steroids, and without worsening of the disease course. Public health ramifications and further surgical outcomes will be discussed.

**Commercial Relationships:** Rachel Bishop, Kirsten Tawse, None; Robert Dolo, None; Allen O. Eghrari, None

**Program Number:** 794 **Poster Board Number:** B0633 **Presentation Time:** 1:30 PM–3:15 PM **Assessing the impact of adjuvant methods in cataract surgery based on 3x3 crossover experiment**

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**Purpose:** The aim was to examine the impact of music effect compared to other type of adjuvant methods by performing cold-pressor task (CPT) using 3x3 crossover design on naïve normal subjects. This is a follow-up study for validating music effect of reducing pain in cataract surgery.

**Methods:** 50 subjects of sample size was calculated with 5% significance level and 80% power. In order to control the variability, subjects were randomly assigned to Group 1 (control (C), news (N), music (M)), Group 2 (M, C, N), and Group 3 (N, M, C) in 3x3 crossover design and measured pain intensity (PI), and pain tolerance (PT) as responses. The subjects were also surveyed anxiety sensitivity inventory (ASI), pain anxiety symptom scale (PASS) and CPT for analyzing the causal relationship of pain responses and anxiety levels.

**Results:** Statistical analysis was performed with SAS v 9.4. Subjects average age was 25.7 (SD=±2.9, Range= 20–34) of which 48% were male and 52% female. Average PT for C, N, M were 14.87, 16.33, 20.45 secs and PI were 6.7, 6.64, 5.89 respectively. Result of F-test showing the difference in average PT and PI among 3 groups was significant (p=0.0001, p=0.012 respectively). Bonferroni post hoc confirmed that M-treatment was most effective compared to C or N on PT, PI (p<0.0001, p=0.0023 respectively). The hypothesis that PT would be longer under M-treatment on groups with higher ASI and PASS was partially confirmed (p=0.38 and p=0.027, respectively). However, the hypothesis that PI would be lower under M on group with higher ASI or PASS was not supported (p=0.45 and p=0.245, respectively).

**Conclusions:** It was confirmed that music has the most positive impact on PT and PI compared to other adjuvant methods in 3-treatment, 3-period, 3-sequence crossover design. In addition, the importance of taking into account anxiety sensitivity and symptoms was shown as individuals’ pain coping ability affects responses to
pain. This result can be used in cataract surgery procedures which are accompanied by pain.

**Commercial Relationships:** Suvin Choi, None; Sung-Kun Chung, None; Sang-Gue Park, None; Hyung-Hwan Lee, None; Lorne Bellan, None

**Clinical Trial:** https://cmcercc.catholic.ac.kr/IRB/about/certify.jsp, PC16OISI0067