Wednesday, July 25

8:00 AM

Vision-Related Functioning in Patients Undergoing Pneumatic Retinopexy Versus Vitrectomy for Primary Retinal Detachment: Subanalysis of the PIVOT Trial

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OBJECTIVE To compare vision-related functioning, through NEI-VFQ25, between patients that underwent Pneumatic Retinopexy vs. Vitrectomy for primary rhegmatogenous retinal detachment (RRD) in the PIVOT trial.

PURPOSE The PIVOT trial compared long-term outcomes of RRD repair in patients undergoing pneumatic retinopexy(PnR) vs. pars plana vitrectomy(PPV).The PnR group had superior visual acuity at 1 year and higher overall vision-related functioning (NEI-VFQ25) at 3 and 6 months,with no difference at 1 year.The purpose of this study was to determine which subscales within the VFQ25 were different between groups.

METHODS Prospective RCT conducted between 2012 and 2017. RRDs presenting with a single retinal break, or group of breaks no larger than one clock hour, above the 8 and 4

o'clock meridians were included. Macula-on and -off RRDs were assigned to each group by stratified randomization and treated within 24 and 72 hours respectively. Patient reported visual-related functioning was assessed at 3, 6 and 12 months using the NEI-VFQ25 questionnaire. The NEI-VFQ25 is composed by 12 subscales: General Health, General Vision, Ocular Pain, Near Activities, Distance Activities, Vision Specific: Social Functioning, Mental Health, Role Difficulties, Dependency, Driving, Color Vision and Peripheral Vision

RESULTS 157 patients were included in this sub-analysis. PnR was associated with superior vision-related functioning; specifically, significant differences ($p<0.05$) were noted in the Distance Activities (PnR 88±14,PPV 81±19), Mental Health (PnR 82±18,PPV 74±24), Role Difficulties (PnR 85±20,PPV 77±23), Dependency (PnR 94±13,PPV 88±20) and Peripheral Vision (PnR 88±19,PPV 79±24) at 3 months and Distance Activities (PnR 89±13,PPV 83±17), Mental Health (PnR 84±17,PPV 79±21) and Peripheral Vision (PnR 91±16,PPV 81±24) at 6 months. There was no significant difference between the two groups at 1 year.

CONCLUSION This is the first RCT comparing PnR vs PPV using the NEI-VFQ25.PnR group had superior vision-related functioning during the first 6 months post RRD repair with a faster recovery of functioning related to distance vision,peripheral vision, dependence and daily activities.The results are likely explained by PnR being less invasive, with superior visual acuity and less morbidity when compared to PPV.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Approved by institutional review board

8:05 AM

How Scleral Buckling Alters Vitreous Fluidics: Computer Modeling

- Tommaso Rossi, MD, EBOD
- Giorgio Querzoli, PhD

OBJECTIVE The study shows how the presence of buckling alters saccade-induced vitreous fluidics and specifically fluid velocities in proximity to the retinal break, explaining the rationale for re-attachment.

PURPOSE To study the velocity, wall shear stress and pressure of vitreous

METHODS A 3D mesh of retinal surface and vitreous was created based on MRI and ultrasoung imaging of real eye. Mechanical properties of retinal vitreous and slcera were taken fro the literature and tuned according to reverse engineering techniques based upon ultrasound and OCT video imaging. The model simulated the presence of a retinal detachment and underwent saccadic movements of 50° with typical angular velocity up to 500 deg/s. Wall Shear Stress, Velocity and Pressure were calculated in the subretinal space and vitreous chamber in the absence and presence of buckling.

RESULTS Wall Shear Stress during saddadic motion was significantly lower with bukling ($p<0.001$), as well as Vitreous Velocity ($p<0.01$) and Pressure ($p<0.05$). No significant diffrence was found when the eye is still.

CONCLUSION Wall Shear Stress, Pressure and Vitreous velocity are significanlty altered by the presence of slceral indentation and their change most likely represents the

rationale for retinal reattachment in scleral buckling surgery. The eye saccadic movement is necessary to create vitreous dynamics conditions capable of re-attaching the retina.

8:10 AM

Efficacy of Preoperative Intravitreal Injection of Gas as an Adjunct to Pars Plana Vitrectomy for Rhegmatogenous Retinal Detachment Repair

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- Efrem D. Mandelcorn, MD

OBJECTIVE Does preoperative intravitreal injection of gas as an adjunct to pars plana vitrectomy for rhegmatogenous retinal detachment repair result in better patient outcomes than current standard of care?

PURPOSE To evaluate the success rate and complications of preoperative intravitreal injection of gas (PIG) with or without laser retinopexy (LR) combined with pars plana vitrectomy (PPV) for rhegmatogenous retinal detachment (RRD) repair.

METHODS In this prospective nonrandomized interventional case series, consecutive cases of RRD requiring surgical repair using PPV who were eligible to receive PIG from April to September 2017 at Toronto Western Hospital were included. All patients were followed for a minimum of 3 months postoperatively. They were excluded in cases of proliferative vitreoretinopathy grade C or D, contraindication to intraocular gas due to travel plans and inability to maintain the required postoperative head position. The primary outcome measure was anatomical retinal reattachment. Secondary outcome

measures included postoperative visual acuity (VA), ease of surgical repair and postoperative complications.

RESULTS A total of 21 eyes were included. 52% were macula off and 29% had at least one inferior retinal break. 62% of cases had multiple retinal breaks with 69% not clustered in the same quadrant. All eyes (100%) achieved retinal reattachment. The mean VA improved significantly from 0.77±0.69 LogMAR preoperatively to 0.39±0.31 (p=0.01) at the final follow-up postoperatively. 38% of cases required pneumatic retinopexy only. 62% of eyes underwent a PIG with or without LR followed by single PPV and gas tamponade to successfully reattach the retina. Of the PPV patients, none required perfluorocarbon (PFC) heavy liquid or unnecessary posterior retinotomy. In the macula-on group, no patients were observed to develop intraoperative macular detachment. Postoperative complications included transient increased intraocular pressure (14%), cataract formation in 18% of the eleven phakic patients, cystoid macular edema (5%), epiretinal membrane (5%) and persistent subretinal fluid (10%).

CONCLUSION PIG is valuable whether eyes reattach with pneumatic retinopexy alone or if PPV is required. This adjunctive intervention to PPV not only showed a high success rate (100%) but also may simplify PPV without the need for PFC or posterior retinotomy, which may ultimately improve final visual outcomes.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Approved by institutional review board

8:20 AM

Outcomes of Repair of Moderately Complex Phakic Rhegmatogenous Retinal Detachment (RRD): The **PRO** Study (**P**rimary **R**etinal Detachment **O**utcomes)

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- Daniel P. Joseph, MD, PhD
- Antonio Capone, MD
- Yoshihiro Yonekawa, MD
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- Claire Ryan, BA
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OBJECTIVE To evaluate and compare outcomes of comparable phakic primary RRD treated surgically with scleral buckle (SB), pars plana vitrectomy (PPV), or combined PPV-SB.

PURPOSE Moderately complex RRDs can be repaired with SB, PPV, or PPV-SB, with advocates for each method. This study compares moderately complex phakic primary RRD treated surgically with SB, PPV, or PPV-SB to compare anatomic and visual outcomes.

METHODS Retrospective interventional cohort study of all patients in 2015 treated in multiple private and academic retina practices. Inclusion criteria included phakic RRD, with minimum 90 day follow up who presented with moderately complex anatomy and who were treated with SB, PPV, or PPV-SB. Eyes with findings that would bias towards PPV (vitreous hemorrhage, dense cataract, proliferative vitreoretinopathy, giant retinal

tear, etc.) were excluded. Age < 40 (bias towards SB) was excluded. Single surgery anatomic success (SSAS) was defined as retinal attachment with no other RRD surgery within 90 days. Pearson's X^2 and ANOVA were used to test treatment effect of surgery type on SSAS and vision.

RESULTS Of 2190 total patients, 1206 were phakic, and 731 were eligible. 655 were >40 years old, and of these 385 (58%) were male, with a mean age of 59 (±8) years. 160 (24%) had SB, 227 (34%) PPV and 268 (41%) PPV-SB, with a mean follow-up of 376 (±161) days. SSAS was noted in 149 (93%) SB, 191 (84%) PPV and 242 (90%) PPV-SB cases. SB and PPV/SB had SSAS rates superior to PPV ($p<0.03$). Final attachment rate was 99%. Mean final visual acuity for SB, PPV and PPV-SB cases was 20/31, 20/51, and 20/59; favoring SB ($p<0.05$). Mean final visual acuity correcting for mild cataract or post-cataract surgery was 20/31, 20/49, and 20/58, still significant favoring SB ($p<0.05$).

CONCLUSION In comparable phakic RRDs, single-surgery and final anatomic results were similar for SB and PPV-SB, while patients treated with PPV had inferior outcomes. Visual outcomes favored SB even after correction for lens status.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Approved by institutional review board

8:25 AM

Differences in Metamorphopsia and OCT Changes After Retinal Detachment Repair: RCT Comparing Pneumatic Retinopexy to Vitrectomy at 1 Year (PIVOT Trial)

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OBJECTIVE To compare metamorphopsia measurements and OCT morphological changes in patients randomized to primary pneumatic retinopexy (PnR) vs vitrectomy (PPV) for rhegmatogenous retinal detachment repair.

PURPOSE The Pneumatic Retinopexy versus Vitrectomy Outcomes Trial (PIVOT), demonstrated superior 1-year ETDRS vision results with less morbidity for PnR compared to PPV. This study compares the two groups to determine which treatment offers superior objective metamorphopsia measurements. The differences in visual function between groups will be further explored by comparing OCT morphology at 1 year.

METHODS Patients with 1-year follow-up from the PIVOT trial conducted between August 2012 to May 2017 were included in the study. The trial included patients with a single retinal break, or group of breaks within 1 clock hour in detached retina, above the 8 and

4 o'clock meridians. Stratified randomization by macular status was performed. Severity of metamorphopsia at 1 year was quantified using M-Charts, a diagnostic tool for quantification of vertical (MV) and horizontal (MH) metamorphopsia with scores of 0.2-2.0 degrees of visual angle. Morphological changes on OCT at 1 year were assessed by two masked independent graders with disagreements adjudicated by an external retina image reading center.

RESULTS 176 patients were randomly assigned to PnR vs PPV. 1-year ETDRS vision was 79.9±11.5 vs 75.0±14.7 letters in the PnR and PPV groups, respectively (p=0.024). Mean MV scores (n=126) were 0.14±0.29 in the PnR group and 0.28±0.42 in the PPV group (p=0.026). Mean MH scores (n=126) were 0.15±0.33 in the PnR group and 0.24±0.46 in the PPV group (p=0.247). OCT at 1 year (n=149) revealed that the proportion of patients with interdigitation zone (IDZ) disruption was lower in PnR group (60% PnR vs 77% PPV, p=0.021). The proportion of patients with ellipsoid zone disruption was lower in the PnR group (8% PnR vs 22% PPV, p=0.013) as was the proportion of patients with external limiting membrane disruption (3% PnR vs 15% PPV, p=0.006). CME was also less frequent in the PnR group (12% PnR vs 25% PPV, p=0.035). There was no significant difference in the proportion of patients with ERM and several other OCT parameters. IDZ disruption was associated with presence of vertical metamorphopsia (p=0.042).

CONCLUSION Primary PnR for RRD repair results in superior visual acuity and reduced vertical metamorphopsia compared to PPV at 1 year. Abnormalities of the interdigitation zone, ellipsoid zone and the external limiting membrane were significantly lower in the PnR group as was the presence of CME. The reduced postoperative vertical metamorphopsia with PnR is associated with reduced disruption of the IDZ.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Approved by institutional review board

8:35 AM

Endoscopy-Assisted Vitrectomy in Complex Rhegmatogenous Retinal Detachment: Is It an Advantage?

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OBJECTIVE To study potential advantages of endoscopic-assisted vitrectomy (E-PPV) in complex retinal detachments compared with pars plana vitrectomy (PPV) alone.

PURPOSE The use of endoscopy provides a different visualization access of the anterior retina, vitreous base and ciliary body that allows a meticulous vitreous base and anterior proliferative vitreoretinopathy (PVR) dissection that could potentially contribute to decrease surgical failures. This study aims to detect potential advantages of E-PPV compared with PPV alone in retinal detachment (RD) with PVR.

METHODS Single-centre retrospective study. Medical records and surgical reports of 293 patients were reviewed. Patients who underwent PPV for complex rhegmatogenous RD and associated PVR (RD+PVR, recurrent RD + PVR, recurrent RD under silicone oil, recurrent RD post-silicone oil extraction) between July 2009 and January 2017 were included. After 2013, endoscopic visualization system (E2 MicroProbe ™; EndoOptiks, Little Silver,USA) was used in a non-randomized fashion. Data collection included reattachment rate, number of surgeries, lens status, PVR stage, intraocular pressure (IOP) and phthisis rate. E-PPV group and PPV only group were compared using *Chi*-square or Fisher's exact test.

RESULTS One hundred one eyes form 101 patients met the inclusion criteria. The mean participant age was 63.4±13.9 year old and 66.3% (n=67) were males. The mean follow up was 25.45±19.1 months. E-PPV was performed in 33.7% (n=34) of the patients and 66.3% (n=67) underwent PPV only. The mean number of surgeries in the PPV only group was 2.8 ±1.4 and 4.2±1.9 in the E-PPV group ($p<0.05$). The retina remained attached in 75.9% (n=54) in the PPV-only group at last follow up visit, and in 93.9% (n=31) in the E-PPV group (p=0.04). Final IOP did not show differences between groups (PPV= 14.6 ±6.5 mmHg; E-PPV= 13.4 ±7.4 mmHg; p=0.4). At the final follow up 85.14% (n=86) of the patients were pseudophakic or aphakic (PPV group= 79.1%; E-PPV= 97.1%). Retinectomy was performed in 44.5% (n=45) of the patients (PPV group= 22.8%; E-PPV group= 21.8%; $p>0.05$). Evolution to phthisis in the PPV only group was 7.4% (n=4) and 3% (n=1) in the E-PPV group, $p>0.05$.

CONCLUSION Endoscopy-assisted vitrectomy seems to be advantageous in achieving better reattachment rates in complex RD with PVR when compared to PPV alone. Endoscopic visualization allowed a thorough examination and extensive anterior PVR and vitreous base dissection. Only one patient evolved to phthisis in the endoscopy group, despite a mean of 4.2 surgeries needed to achieve anatomical success.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Exempt from approval

8:40 AM

Structural Outcomes and Imaging Observations Following Scleral Window to Treat Exudative Detachment in Uveal Effusion Syndrome

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- Glenn J. Jaffe, MD

OBJECTIVE Does scleral window surgery to treat uveal effusion syndrome improve resolution of exudative retinal detachment but also demonstrate characteristic OCT features?

PURPOSE To demonstrate the anatomic outcomes and identify optical coherence tomography (OCT) findings in eyes undergoing scleral window (SW) surgery to treat exudative retinal detachment (RD) in uveal effusion syndrome (UES).

METHODS Retrospective review of consecutive cases of patients undergoing SW surgery for UES by 2 surgeons at the Duke Eye Center from 2000-2016. Surgical techniques, visual and structural outcomes, and surgical complications were recorded. Prevalence of structural changes on SD-OCT was determined in 9 eyes with available imaging. Pre and post-operative visual acuity were compared.

RESULTS 11 eyes of 10 patients were identified; median age was 63 years and time to diagnosis was 6.5 months (range 2-60 months). Median visual acuity (VA) was logMAR

0.93 (Snellen range 20/20 to LP). SW surgery in all 4 quadrants in was performed on 10 eyes and was combined with external drainage of subretinal fluid in 2 eyes. Resolution of exudative RD was noted in 10 (91%) eyes by a mean of 60 +/-34 days, but with a non-significant change (p=0.13) in final VA of logMAR 0.62 (Snellen range 20/20 to NLP). Choroidal thickness decreased from 534.7 μm to 304.6 μm(p=0.001). Pre SW OCT findings which completely resolved after surgery included: macular srf (67%), CME (33%), and undulation of RPE-choroid junction (78%). OCT hyperreflective foci were reduced after surgery in multiple locations including choroid (89% to 56%), outer retina (100% to 56%), and subretinal (56% to 22%). Only 2 eyes had restoration of outer retinal bands, while 78% had persistent ellipsoid zone disruption.

CONCLUSION UES with exudative RD can be managed successfully with SW surgery but final acuity may be limited by RD chronicity and OCT evidence of structural retinal changes. Earlier identification and intervention in UES may help improve visual and structural outcomes.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Approved by institutional review board