



**SESSION: Update on Retinal Detachment (Risk, PNR, Buckle, Laser)**

**DATE: September 2, 2023**

**HALL: HALL 1**

**TIME: 13:40 – 14:25**

**Moderators: Rajeev Muni, Mariano Iros**

### **Invivo generated autologous plasmin(IVAP) assisted vitrectomy, oral retinotomy, silicone oil injection for the treatment of chronic retinal detachment**

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**Purpose:** To report the results of IVAP assisted vitrectomy, inferior-oral retinotomy and silicone oil injection for surgical treatment of patients with chronic retinal detachment.

**Methods:** A total of 14 consecutive eyes with chronic retinal detachment who had intravitreal injection of 25 µgr of t-PA and 0.1 ml of autologous whole blood, 3 days before surgery, underwent lens extraction with phacoemulsification, vitrectomy, oral retinotomy, and silicone oil injection were compared to a similar group of 16 consecutive eyes with chronic retinal detachment who underwent vitrectomy, with or without lens extraction and silicone oil injection. Primary outcome measure was single operation success.

**Results:** Mean age of 12 patients of whom 6 (Group 1) were female, was 38.66±18.75 years and 15 patients of whom 4 were female (Group 2), was 35.40±11.92 years (p=0.58). Mean follow-up time was 11.69±7.61 months in group 1 and 29.13±18.83 months in group 2 (p=0.04). While the preoperative LogMAR visual acuity was 1.35±0.65, it was 0.61±0.42 at postoperative final exam. While the preoperative LogMAR visual acuity was 1.22±0.33, it was 1.20±0.89 at postoperative final exam (p=0.038). Retinal reattachment was achieved 12 of 13 eyes (%92.30) in group 1 and 7 of 15 eyes (%46.66) in group 2 with one surgical intervention (p=0.010)

**Conclusion:** IVAP assisted vitrectomy, oral retinotomy and silicone oil injection is effective and safe for the surgical treatment of chronic retinal detachment.

**Keywords:** Autologous Plasmin Enzyme, Chronic Retinal Detachment

## Reattachment Rate with Pneumatic Retinopexy for Rhegmatogenous Retinal Detachment with a Single Break in Detached Retina

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**Purpose:** To assess reattachment rate with pneumatic retinopexy (PnR) for primary rhegmatogenous retinal detachment (RRD) in patients meeting PIVOT criteria with a single break in detached retina.

**Methods:** A post hoc analysis of two prospective clinical trials that included primary RRDs referred to St. Michael's Hospital, Toronto, Canada between August 2012–April 2021. Inclusion criteria included patients with a single break in detached retina and any number of breaks or lattice degeneration elsewhere, who also met PIVOT trial criteria (Hillier et al. 2018).

**Results:** 108 patients were included. All had a minimum of 3 months of follow-up and 99% (107/108) had a one-year follow-up. 32.4% (35/108) were females with a mean age of 62 (±10.0) years and 51.8% (56/108) were phakic. 75.9% (82/108) of RRDs were fovea-off at presentation.

Primary anatomic reattachment rates (PARRs) at postoperative months 3 and 12 were 86.1% (93/108) and 85% (91/107) respectively. Mean logMar BCVA was 0.34 (±0.4) at 3-months and 0.2 (±0.3) at the 12-months post-operatively.

The mean extent of RRD was 2.3±1 and 2±1 quadrants in patients who had primary reattachment with PnR versus those who required a subsequent intervention. 40% (6/15) of patients who failed PnR had additional breaks visualized at the time of pars plana vitrectomy. PARR was 89.5% (77/86) in patients with no additional pathology in the attached retina.

**Conclusions:** PARR in patients meeting PIVOT criteria was 80.8% in the randomized trial. In this prospective cohort study, PARR was 86.1% at 3 months and 85% at 12 months when only patients with a single break in the detached retina and any number of breaks or lattice degeneration in the attached retina were included. PARR increased to 89.5% in patients with no additional pathology in the attached retina. Pneumatic retinopexy provides long-term reattachment in a large proportion of patients with a single break in the detached retina who meet PIVOT trial criteria.

**Keywords:** Rhegmatogenous Retinal Detachment (RRD), Pneumatic Retinopexy (PnR), Primary Anatomic Reattachment Rate (PARR)

## The implementation of pneumatic retinopexy in the Japanese population

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**Purpose:** Pneumatic retinopexy (PnR) is currently used infrequently in the Japanese population. The purpose of this study is to assess the implementation of PnR in eyes with rhegmatogenous retinal detachment (RRD) in comparison with scleral buckling (SB) and pars plana vitrectomy (PPV) approaches in the Japanese population.

### Methods:

We retrospectively reviewed 73 consecutive eyes treated for RRD between December, 2020 and October, 2022. All cases were treated by a single surgeon in a tertiary care hospital in Tokyo. The method of treatment was selected at the surgeon's discretion; generally, PnR was adopted primarily when it met clinical trial criteria (PIVOT). Baseline characteristics and treatment outcomes (primary reattachment rate and visual acuity at 3 months and at the last visit) were compared among PnR, SB and PPV groups.

### Results:

Of 73 eyes included, 33 eyes (45.2%) were treated by PnR, while SB and PPV were selected for 13 (17.8%) and 27 eyes (37.0%), respectively. The proportion of eyes meeting PIVOT criteria was significantly higher in PnR group (27 eyes; 81.8%) compared to SB (2 eyes; 15.4%) and PPV (6 eyes; 22.2%) groups ( $p < 0.001$ ), with preponderance of superior breaks detected in 28 eyes (84.8%) of the PnR group. The post-treatment visual acuity was similar between the 3 groups at 3 months ( $p = 0.069$ ) and at the last visit ( $p = 0.310$ ). Primary reattachment was achieved in 29 eyes (87.9%), 12 eyes (92.3%) and 27 eyes (100.0%) after PnR, SB and PPV, respectively ( $p = 0.152$ ).

### Conclusions:

PnR was applied to 45.2% of the cases and contributed to primary reattachment without an operating room setting or hospitalization in 39.7% (27/73) of the total cases, which is a substantial advantage in the Japanese health care system. PnR should be considered as a first-line treatment in appropriate cases of RRD, particularly in eyes meeting clinical trial criteria.

**Keywords:** pneumatic retinopexy, implementation, rhegmatogenous retinal detachment

## Chandelier-Assisted Scleral Buckling with Illuminated Endolaser Retinopexy

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**Purpose:** To report the the results of surgical management of rhegmatogenous retinal detachment(RRD) with chandelier-assisted scleral buckle(CASB) using curved illuminated endolaser retinopexy in a case series.

**Methods:** CASB was performed under noncontact wide-angle microscopic viewing system with 23-gauge chandelier illumination. Retinopexy was performed with a curved illuminated endolaser probe in 5 phakic eyes with RRD with caution to move the probe very slowly. In all eyes circumferential buckle is placed, combined with radial sponges in 2 eyes. Sclerotomy site was cleared of any vitreous and sutured in all eyes.

**Results:** Direct visualization enabled the identification of small peripheral fresh tears that could not be seen preoperatively in 2 eyes. In all eyes CASB was effective in finding the tears, localisation of the buckling element and checking the retinal attachment. The curved illuminated endolaser probe was safe to use in phakic eyes, and effective retinopexy was achieved. No additional retinopexy was required postoperatively. Complete retinal attachment was observed on postoperative day 1. No complications were observed during follow-up of 12 months. Best corrected visual acuity increased in all cases, and remained stable.

**Conclusion:** Retinopexy with curved illuminated endolaser photocoagulation was effective and safe in chandelier illumination-assisted scleral buckle surgery for the management of RRD in phakic eyes. This method may be considered as an option when other modalities of retinopexy is not available at hand. Further studies with longer follow-up is needed.

**Keywords:** rhegmatogenous retinal detachment, chandelier-assisted scleral buckle, illuminated endolaser

## Bacillary Layer Detachment in the Pathophysiology of Secondary Macular Hole in Fovea-off Rhegmatogenous Retinal Detachment

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**Purpose:** To describe the pathophysiology of secondary macular hole (MH) in rhegmatogenous retinal detachment (RRD) by assessing bacillary layer detachment (BALAD) and associated abnormalities using optical coherence tomography (OCT).

**Methods:** Retrospective cohort including 360 consecutive primary fovea-off RRDs referred between January 2012–September 2022. Pre-operative OCTs were assessed for BALAD-related abnormalities, including lamellar and full-thickness MH (FTMH).

**Results:** 22.5% (81/360) of patients had evidence of BALAD-related abnormalities at presentation. 8% (29/360) had MH associated with RRD, of which 79.3% (23/29) were lamellar holes with the posterior border of BALAD intact (BALAD-lamellar hole), and 20.6% (6/29) were FTMH. Immediately following reattachment, 62% (18/29) of MHs persisted, while 38% (11/29) closed with RRD repair. Of those that persisted, 83% (15/18) had BALAD-lamellar holes, all of which progressed to FTMH in a mean of 8.1 ( $\pm 3.2$ SD) days. OCT imaging demonstrated the spectrum of changes from BALAD to FTMH, which included 1) cleavage planes from Henle fiber layer (HFL)–outer plexiform (OPL) at the foveal walls into the BALAD cavity; 2) significant thinning of central outer nuclear layer (ONL); 3) loss of the Müller cell cone (MCC) with tissue remnants at the foveal wall inner edges; 4) retinal operculum attached to vitreous strands in proximity to BALAD-lamellar hole; and 5) progressive thinning/degradation of the posterior border of BALAD-lamellar hole leading to FTMH. Histological sections from normal eyes were assessed to assist with OCT interpretations and to determine possible areas of low mechanical stability.

**Conclusion:** This study provides novel insights into the progression from BALAD to BALAD-lamellar hole and subsequent FTMH in RRD. Hydration, tractional forces, and cystic/cellular degeneration are key processes. OCT interpretations guided by histological sections of normal eyes demonstrating probable areas of low mechanical stability suggest that the pathophysiological process occurs with sequential changes in critical areas: RPE–photoreceptor interface, myoid zone, HFL–OPL at the foveal walls and MCC with surrounding tissue. This process culminates in photoreceptor–MCC disjunction leading to BALAD-lamellar hole, which subsequently degenerates leading to FTMH.

**Keywords:** rhegmatogenous retinal detachment, full-thickness macular hole; bacillary layer detachment

## High-frequency electric current welding with suprachoroidal approach to treat retinal detachment: timing of morphological changes and strength of chorioretinal adhesion

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**Purpose:** Chorioretinal adhesions (CRA) are essential in retinal detachment surgery. To evaluate the morphological changes (MC) and CRA strength (CRAS), a high-frequency electric current welding (HFECW) was applied with suprachoroidal approach on experimental animal model to cause CRA.

**Methods:** For HFECW, a modified generator EK-300M1 with pre-settings (three groups: 10–12 Volts (V), 12–14 V and 14–16 V) was used. Treated eyes were enucleated in 1 hour (h), 3, 7, 14 and 30 days after treatment. A study of the MC of the CRA was performed on 54 (108 eyes) rabbits (32 eyes per group, 12 control eyes); the retina was treated with suprachoroidal approach using 25-gauge tip (treated area diameter/size 0.260 mm/0.053 mm<sup>2</sup>). Study of CRAS was performed on 52 (104 eyes) rabbits: (32 eyes per group, 8 control eyes). CRAS was measured using a biomechanical force elongation tester. The reduction in weight at the time of CRA rupture was registered as a measure for adhesion strength.

**Results:** The MC showed an instant increase in the CRA in the area of HFECW application, which further strengthened with time. The retina responded by apparent destruction of rods, cones, loss of bipolar, amacrine, horizontal and ganglion cells, development of cysts and migration of RPEs, while the choroid showed damage and migration of melanocytes. By day 30, a tissue reaction showed a partial cell regeneration and connective tissue degeneration. The study of CRAS showed that after application of 10–12 V at 1 h from treatment with HFECW a CRAS was 8.75% and 25.74% higher than that of 12–14 V and 14–16 V, respectively, and at 1 week it was 10.18% and 9.54% higher than that of 12–14 V and 14–16 V, respectively.

**Conclusions:** Application of HFECW with suprachoroidal approach can induce an instant CRA, which strengthens within first weeks from surgery. Application of lower electromotive force (10–12 V) showed a higher CRA strength. HFECW with suprachoroidal approach could be an alternative method to treat retinal tears, reducing the need for endotamponade and vitreoretinal surgery.

**Keywords:** suprachoroidal approach, morphological changes, retinal detachment

## **Direct Laser Photocoagulation of the Retinal Pigment Epithelium: A Novel Method to Seal Retinal Breaks during Pars Plana Vitrectomy for Retinal Detachment**

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**Purpose:** To examine the clinical effectiveness of employing direct retinal pigment epithelium (RPE) laser photocoagulation to create chorioretinal adhesion around the retinal breaks.

**Methods:** Twenty eyes of 20 patients were included in the study; all eyes had rhegmatogenous or combined rhegmatogenous-tractional retinal detachment. Direct RPE laser photocoagulation during vitrectomy, using spots of 100–150 mJ for of 120–200 ms duration, was performed in the area where the edges of each retinal break would settle following retinal reattachment. The thickness of the neuroretina over the treated area was compared to that measured after traditional transretinal laser photocoagulation.

**Results:** The mean follow-up time was 24 (11–46) months. Postoperatively, an ophthalmoscopically visible pigmentary reaction developed over the treated area, except for a single eye where the retinal break was located in an area of myelinated nerve fibres. There were no serious complications, and the retinas in all 20 eyes remained reattached. The mean best-corrected visual acuity (BCVA) at the final follow-up was significantly higher than that before surgery ( $p=0.001$ ). The thickness of the neuroretina at 1 month after surgery greatly differed between areas of direct versus transretinal laser photocoagulation: 217  $\mu\text{m}$  in the former and 104  $\mu\text{m}$  in the latter group.

**Conclusions:** The efficacy of direct RPE photocoagulation in retinal break sealing equals the effect of traditional transretinal photocoagulation, but without risking damaging the neurosensory retina, and the laser application is not hindered by retinal opacities.

**Keywords:** Retinal detachment; vitrectomy; direct RPE laser photocoagulation