~~2018 Retina Articles You Should Know~~

A few retina articles from 2018 that I liked and you might find interesting

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1

Disclosures

- None

2

Objectives

- To review a selection of retina journal publications from 2018 that have broad clinical relevance
  - Hopefully of interest beyond retina specialists
  - Not comprehensive by any means
  - Hopefully practical

3

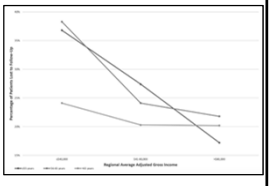
Loss to Follow-Up in Patients with Proliferative Diabetic Retinopathy after Panretinal Photocoagulation or Intravitreal Anti-VEGF Injections

Anthony Obeid, MD, MPH,[1,] Xinxiao Gao, MD, PhD,[1,2,*] Ferhina S. Ali, MD, MPH,[1] Katherine E. Talcott, MD,[1] Christopher M. Ademan, MD,[1] Leslie Hyman, PhD,[3] Allen C. Ho, MD,[1] Jason Hsu, MD[3]*

- Retrospective single-center cohort
- Rate of loss to follow-up (LTFU) in patients with PDR after receiving PRP or anti-VEGF injections
- LTFU qualified as more than 12 months visit interval immediately following treatment
- (RCTs usually have 5-10% LTFU)

4

- Of 1718 patients, 25.4% were LTFU at some point in the 4-yr study
  - 28% after PRP
  - 22% after injection
- Risk factors for LTFU:
  - Young age
  - African American and Hispanic
  - Lower income (by regional-average AGI)



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- Strengths & weaknesses:
  - 1 practice in 1 geographic location
  - Selection bias in choice of PRP vs injections
  - Long time interval (one year)
- <u>Summary</u>:
  - High real-world rate of LTFU with PDR patients, especially

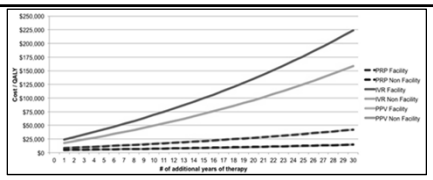
6

Cost Evaluation of Early Vitrectomy versus Panretinal Photocoagulation and Intravitreal Ranibizumab for Proliferative Diabetic Retinopathy

James Lin, MD,[1] Jonathan S. Chang, MD,[2] Nicolas A. Yannuzzi, MD,[1] William E. Smiddy, MD[1]

- Cost-utility model using decision analysis
  - Preserved visual utility, estimated life years remaining, lifetime costs
- Cost and cost-utility of early PPV vs PRP and IVR for PDR without DME
  - DRCR Protocol S and CMMS data used to model hospital and facility-based costs and outcomes
  - "Second eye" utility values
  - Retreatment rates (PRP after IVR, IVR after PRP, etc.)
    - PRP: 5% retreatment per year until year 4; 5% need PPV
    - IVR: 2 per year lifetime; 2.5% need PPV
    - PPV: 5% reoperation in first 2 years

7



- PRP: 2yr cost $7379, cost/QALY $163,988; lifetime cost $42,182, cost/QALY $61,695
- IVR: 2yr cost $19655, cost/QALY $436,992; lifetime cost $244,192, cost/QALY $338,348
- PPV: 2yr cost $8151, cost/QALY $181,144; lifetime cost $42,369, cost/QALY 63,942

8

- Strengths & weaknesses:
  - Modeling does not account for cost of complications
  - Projections based on Protocol S and CMMS data
  - This did not look at VH or DME
  - No good comparisons of early PPV vs PRP or injections over long term
- Summary:
  - Early PPV for PDR without DME has comparable cost-utility to IVR over first 2 years

9

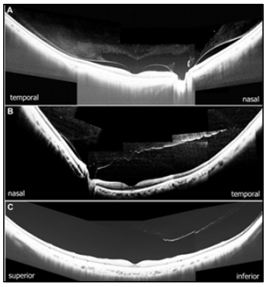
Posterior Vitreous Detachment as Observed by Wide-Angle OCT Imaging

Mayuka Tsukahara, OD,[1,*] Keiko Mori, MD,[1] Peter L. Gehlbach, MD, PhD,[2] Keisuke Mori, MD, PhD[1,3,4,*]

- Wide-angle OCT in 144 healthy subject eyes
- Classification:
  - Stage 0 – no PVD
  - Stage 1 – peripheral PVD
  - Stage 2 – perifoveal to periphery
  - Stage 3 – peripapillary to periphery (still ONH attachment
  - Stage 4 – complete PVD

10

- 100% of PVDs noted first in paramacular/peripheral areas
- Granular hyperreflections noted in cortical vitreous near retina with Stages 1a-1b (syneresis), rarely with Stage 2
- Vitreous schisis most commonly observed in Stage 1a (lacunae)



11

- Strengths & weaknesses:
  - Healthy volunteer population, predominantly female
  - Subjective interpretation of images
- Summary:
  - PVD is a chronic process
  - PVD progression starts paramacular/peripheral
  - Fovea and ONH are last areas involved
  - Peripheral PVD evident in 20s and 30s

12

JAMA Ophthalmol. 2018 Feb 1;136(2):148-154. doi: 10.1001/jamaophthalmol.2017.5849.

Cataract Surgery Outcomes in Eyes With Primary Epiretinal Membrane.

Hardin JS[1], Gauldin DW[1], Soliman MK[2,3], Chu C.J[4], Yang YC[5,6], Sallam AB[1,7].

- Retrospective database study of visual acuity and CME rate after cataract surgery
- 812 eyes with ERM vs 159,184 reference group eyes
- Uncomplicated cataract surgery
- Outcomes: VA, CME, need for PPV

13

- ERM present:
  - Avg VA gain 0.27 logMAR (3 lines)
  - 7.1% worsened 3 lines
  - PPV/MP required in 6.5%
  - Mean time to PPV: 28 weeks
  - CME in 8.6%
- Non-ERM reference group
  - CME in 1.38% (p<0.001)

Table 5.
Incidence of Postoperative Cystoid Macular Edema (CME)[a]

Characteristic	Reference Group			ERM Group			P Value[b]
	Total Eyes, No.	Eyes With CME, No. (%)	95% CI	Total Eyes, No.	Eyes With CME, No. (%)	95% CI	
All eyes	125 455	1731 (1.38)	1.32-1.45	663	57 (8.6)	6.69-10.98	<.001
No diabetes or unknown	100 105	951 (0.95)	0.89-1.01	487	37 (7.6)	5.56-10.30	<.001
Diabetic eyes	22 970	758 (3.3)	3.08-3.54	177	20 (11.3)	7.43-16.81	<.001
Non-PDR	2745	303 (11.04)	9.92-12.27	57	10 (17.5)	9.82-29.37	.21
PDR	576	92 (16.0)	13.23-19.22	29	6 (20.1)	9.51-37.31	.45
Prior DME	352	155 (44.0)	39.94-49.26	8	2 (25)	4.44-59.07	.47
PGA	7176	122 (1.7)	1.43-2.03	67	7 (10.4)	5.15-20.03	<.001
PGA + no diabetes	5896	79 (1.34)	1.08-1.67	52	6 (11.5)	5.40-22.97	<.001
No PGA, no diabetes	93 146	829 (0.89)	0.83-0.95	420	30 (7.14)	5.05-10.01	<.001

Abbreviations: DME, diabetic macular edema; ERM, epiretinal membrane; PDR, proliferative diabetic retinopathy; PGA, prostaglandin analogue.
[a]Percentages of eyes that developed CME are represented in total and as associated with risk factors.
[b]P values were calculated using Fisher exact test.

14

- Strengths & weaknesses:
  - Selection bias (worse ERM may have lead to combined surgery outside of this series)
  - Severity of ERM and CME on imaging not standardized
- Summary:
  - Higher rate of post-operative CME if ERM present preoperatively (8.6%)
  - Even higher rate of CME if DM present (11.3%)

15

Stroke Risk and Risk Factors in Patients With Central Retinal Artery Occlusion

PATRICK LAVIN, MORGAN PATRYLO, MATTHEW HOLLAR, KIERSTEN B. ESPAILLAT, HOWARD KIRSHNER, AND MATTHEW SCHRAG

- Retrospective cohort at single academic site
- Diagnostic yield of inpatient workup after CRAO
- New diagnoses and interventions (change in medications, surgery), rate of symptomatic stroke, MI, death in next two years

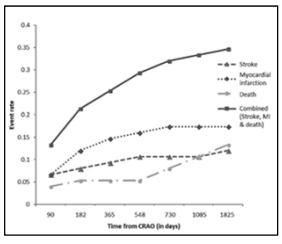
16

- CTA or MRA, MRI (66%), echocardiography, cholesterol, a1c, ESR, CRP, CBC, telemetry
- Rates of stroke, MI, death comparable to those with high risk TIA
- 79% of subjects were found to have a condition meriting hospitalization (besides CRAO)

TABLE 2. Yield of Diagnostic Studies and Outcomes in Patients With Acute Central Retinal Artery Occlusion

Diagnostic Study or Outcome	Frequency of Positive Result
Stroke on magnetic resonance imaging of the brain	25/67 (37.3%)
Critical carotid disease (>70% stenosis, dissection, or intra-arterial thrombus)	36/98 (36.7%)
Critical finding on echocardiography	17/86 (20.0%)
Patent foramen ovale	7/86 (8.1%)
Atrial fibrillation by history or diagnosed on presentation	11/103 (10.6%)
Atrial fibrillation discovered on subsequent 30-day cardiac event monitor	3/34 (8.8%)
Any new significant diagnosis from inpatient evaluation	81/103 (78.6%)
Any change in medication from inpatient evaluation	95/103 (92.2%)
Required an acute surgical procedure as a result of inpatient evaluation	26/103 (25.2%)
Death prior to 2-year follow-up	6/75 (8.0%)
Incident symptomatic stroke, myocardial infarction, or death at 2-year follow-up	24/75 (32.0%)

- Highest stroke risk is in first 1-2 weeks
- Most common surgical procedures: carotid revascularization, coronary artery bypass, valve replacement



18

- Strengths & weaknesses:
  - One academic setting in "stroke belt"
  - Workup varied, long time span for study
- Summary:
  - High prevalence of comorbid disease and high risk for major cardiovascular event in the months after a CRAO

19

Outcomes and Predictive Factors After Cataract Surgery in Patients With Neovascular Age-related Macular Degeneration. The Fight Retinal Blindness! Project

VINCENT DAIEN, VUONG NGUYEN, NIGEL MORLET, JENNIFER J. ARNOLD, ROHAN W. ESSEX, STEPHANIE YOUNG, ALEX HUNYOR, MARK C. GILLIES, AND DANIEL BARTHELMES; THE FIGHT RETINAL BLINDNESS! STUDY GROUP

- Retrospective case-matched control series
- 124 patients with nvAMD undergoing cataract surgery, 372 matched controls (nvAMD, no cataract surgery)
- Matched for treatment duration pre-op, VA, age, follow-up length

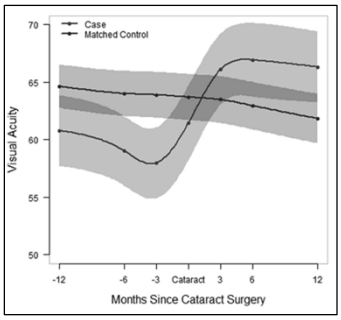
20

- Mean VA gain 10.6 letters at 1 year after CE/IOL
- No change in injection frequency or classification of CNVM as active or inactive in surgery group
- In control group, injection frequency declined and CNVM less active
- Surgery within first 6 months of injection therapy – more likely to lose vision
- Not associated with VA outcome: age, injection >2 weeks before surgery, lesion size

TABLE 2. Visual Acuity Outcomes 12 Months After Cataract Surgery in Patients With Neovascular Age-related Macular Degeneration

	Cataract Surgery Patients, (N = 124)	Matched Phakic Controls, (N = 372)
VA at baseline, mean letters (SD)	60.4 (14.5)	60.8 (13.6)
Time until surgery, median months (Q1, Q3)	34 (22, 56)	-
VA prior to surgery, mean letters (SD)[a]	55.2 (20.1)	63.1 (19.5)
VA 12 months after cataract surgery, endpoint for VA evaluation, mean letters (SD)[b]	65.8 (17.1)	61.3 (20.8)
Proportion of eyes with ΔVA 12 months from preoperative VA, %		
Loss ≥15 letters	1.6%	8.9%
Loss 1-14 letters	11.4%	42.3%
Gain 0-14 letters	61.0%	44.7%
Gain ≥15 letters	26.0%	4.0%

21



22

- Strengths & weaknesses:
  - Retrospective
  - No information on surgical details, cataract grade, etc.
  - Selection bias for surgery
  - No comment on postoperative CME
- Summary:
  - CE/IOL improved vision in nvAMD as compared to matched controls
  - May have greater vision loss if CE/IOL done in first six months of injections

23

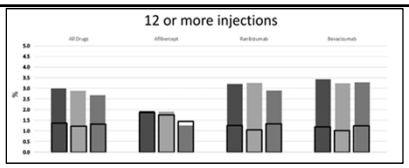
The Real-World Effect of Intravitreous Anti–Vascular Endothelial Growth Factor Drugs on Intraocular Pressure

An Analysis Using the IRIS Registry

Elizabeth A. Atchison, MD,[1] Kevin M. Wood, MS,[2] Cynthia G. Manox, MD,[3] Catherine N. Barry, PhD,[2] Flora Lum, MD,[2] Mathew W. MacCumber, MD, PhD[3]

- Post-hoc registry-based analysis
- Change in IOP from baseline at 1 year and rate of clinically significant IOP rise
- Compared to fellow, untreated eye
- Subsets with at least 12, 18, and 25 injections

24



- Mean change in IOP at 1 year: 0.9mm Hg (0.2mm Hg for control eyes)
- Clinically significant IOP rise: IVA 1.9%, IVR 2.8%, IVB 2.8%
- Higher than the untreated fellow eye for IVR and IVB
- Untreated eye rate was 1.5%

25

- Strengths & weaknesses:
  - Registry limitations (accuracy of data entry, available data points)
  - Variation in IOP measurement methods
  - No visual fields, and glaucoma drop regimens not incorporated
- Summary:
  - Small but statistically significant rate of sustained IOP elevation with anti-VEGF injections
  - Less of an effect with aflibercept

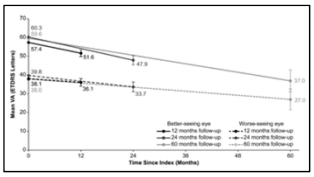
26

Characterizing Disease Burden and Progression of Geographic Atrophy Secondary to Age-Related Macular Degeneration

Usha Chakravarthy, MBBS, PhD,[1] Clare C. Bailey, MD, FRCOphth,[2] Robert L. Johnston, FRCOphth,[3] Martin McKibbin, MBBS, FRCOphth,[4] Rehna S. Khan, MB ChB, FRCOphth,[5] Sajjad Mahmood, FRCOphth,[6] Louise Downey, MB ChB, PhD,[7] Narendra Dhingra, MD, FRCS,[8] Christopher Brand, FRCOphth,[9] Christopher J. Brittain, MBBS,[10] Jeffrey R. Willis, MD, PhD,[10,11] Sarah Rabbi, MPhil,[12] Anushini Muthusamy, PhD,[12] Ronald A. Cantrell, PhD[10]

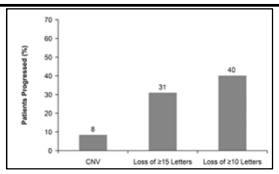
- Retrospective cohort from EMR in the UK
- 1901 patients with GA and no CNVM
- Outcomes: driving ineligibility, progression to CNVM or blindness (<20/400 better eye), loss of >10 letters, mean change in vision

27



- Worse-seeing eye: 2 letters lost by month 12; 6 by month 24, 11 by month 60
- Better-seeing eye: 6, 12, and 23 letters, respectively

28



- CNVM 7.4% occurrence per year
- Progression to driving ineligibility during study (2000-2016): 67%
- Progression to blindness: 16%

29

- Strengths & weaknesses:
  - Retrospective, database-derived analysis from EMR
  - Co-morbidities may have confounded data
- Summary:
  - Significant visual disability over time from GA
  - A large percentage will progress to driving ineligibility
  - Better-seeing eyes lose more vision over time

30

A Database Study of Visual Outcomes and Intraoperative Complications of Postvitrectomy Cataract Surgery

Mohamed Kamel Soliman, MD,[1,2] Joshua S. Hardin, MD,[3] Fayez Jawed, MSc,[4] Sami H. Uwaydat, MD,[3] Mohammed F. Faramawi, MD, PhD,[5] Colin J. Chu, MD, PhD,[6] Yit C. Yang, FRCOphth,[7] Ahmed B. Sallam, MD, PhD[1,2]

- Retrospective study, 2005-2015, in UK
- Excluded: multiple intraocular surgeries, high risk eyes for cataract surgery
- Comparison of eyes with previous vitrectomy vs non-vitrectomized eyes undergoing CE/IOL

31

Table 3. List of Intraoperative Complications in Prior Pars Plana Vitrectomy Group and the Reference (Nonvitrectomized) Group

	Prior PPV, n (%)	Reference (Nonvitrectomized) Eyes, n (%)	*P* Value (Chi-square)
Posterior capsule rupture	33 (1.49%)	2341 (1.72%)	0.4517
Dropped lens fragment	14 (0.63%)	256 (0.19%)	**<0.0001**
Zonular dialysis	28 (1.26%)	764 (0.56%)	**<0.0001**
Iris damage	9 (0.41%)	601 (0.44%)	0.9277
Choroidal hemorrhage	0 (0%)	65 (0.05%)	0.5923
Endothelial damage/Descemet's tear	1 (0.05%)	210 (0.15%)	0.3216
Corneal epithelial abrasion	4 (0.18%)	335 (0.25%)	0.6854
Lens exchange required/other IOL problems	1 (0.05%)	124 (0.09%)	0.7194
Corneal edema	0 (0%)	163 (0.12%)	0.1872
Phacoemulsification burn/wound problems	3 (0.14%)	79 (0.06%)	0.2973
Hyphema	0 (0%)	51 (0.04%)	0.7231
*Overall	93 (4.19%)	4989 (3.67%)	0.2102

- 2221 eyes previously vitrectomized (younger, more myopic, worse preoperative vision)
- 136,533 eyes non-vitrectomized
- No difference: PC rupture
- Higher rate if vitrectomized: zonular dialysis, dropped nuclear fragment
- Worse visual outcome if vitrectomized (logMAR 0.41 vs 0.17)

32

Table 4. Rate of Intraoperative Complication of Phacoemulsification in Vitrectomized Eyes in Previous Studies

	Posterior Capsular Rupture, n (%)	Zonular Dialysis, n (%)	Dropped Lens Fragment, n (%)	Iris Damage, n (%)	Corneal Burn, n (%)	*Overall, n (%)
Misra and Burton[13] (n=117)	2 (1.7%)	–	0	–	–	2 (1.7%)
Pardo-Munoz et al[14] (n=100)	4 (4.0%)	5 (5.0%)	2 (2.0%)	–	–	11 (11%)
Sachdev et al[15] (n=73)	0	0	0	–	–	0
Cole and Charteris[11] (n=72)	2 (2.7%)	3 (4.2%)	0	–	–	9 (12.5%)
Akinci et al[16] (n=60)	7 (11.7%)	4 (6.7%)	1 (1.7%)	–	4 (6.7%)	16 (26.6%)
Chang et al[10] (n=34)	0	0	–	–	0	0
Ahfat et al[14] (n=45)	6 (13.3%)	1 (2.2%)	–	–	–	7 (15.6%)
Current study (n=2261)	33 (1.49%)	28 (1.26%)	14 (0.63%)	9 (0.41%)	3 (0.14%)	93 (4.19%)

33

- Strengths & weaknesses:
  - Multicenter large retrospective study
  - Uncorrected and corrected vision included
- Summary:
  - Higher rate of zonular dialysis (1.3%) and dropped lens fragment (0.6%) in vitrectomized eyes

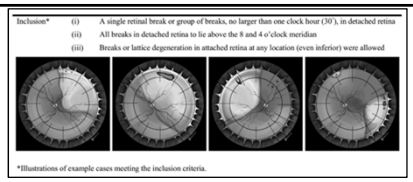
34

The Pneumatic Retinopexy versus Vitrectomy for the Management of Primary Rhegmatogenous Retinal Detachment Outcomes Randomized Trial (PIVOT)

Roxane J. Hillier, MBChB, FRCOphth,[1,2,3,4,*] Tina Felfeli, BSc,[2] Alan R. Berger, MD, FRCSC,[1,2] David T. Wong, MD, FRCSC,[1,2] Filiberto Altomare, MD, FRCSC,[1,2] David Dai, MSc,[2] Louis R. Giavedoni, MD, FRCSC,[1,2] Peter J. Kertes, MD, FRCSC,[1,2,5] Radha P. Kohly, PhD, FRCSC,[2,6,7] Rajeev H. Muni, MD, FRCSC[1,2,5,*]

- Prospective, single-center, randomized trial
- Pneumatic retinopexy vs vitrectomy for certain RDs
- 176 eyes over four years

35



- ETDRS was higher in the PR group (78 vs 68 letters at 3mo; 79 vs 75 letters at 12 mo)
- SSAS higher in PPV group (93% vs 80%)
- NEI VFQ was higher in PR group at 3 and 6 mo but not 12 mo

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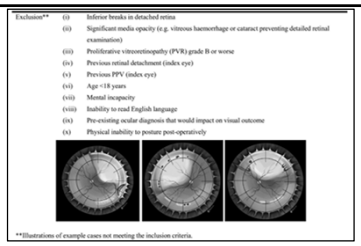

- Mean # visits higher in PR group (11 vs 9)
- Vertical metamorphopsia higher in PPV group

37

- Strengths & weaknesses:
  - Randomized, prospective
- Summary:
  - PR has initially superior acuity and NEI-VFQ scores but by 12 months is equal to PPV
  - PPV has higher primary surgery anatomic success
  - In certain situations (breaks within one clock hour above 4 or 8 o'clock position, clear media, no PVR), PR is a good surgical option

38

Tolerating Subretinal Fluid in Neovascular Age-Related Macular Degeneration Treated with Ranibizumab Using a Treat-and-Extend Regimen

FLUID Study 24-Month Results

Robyn H. Guymer, MBBS, PhD,[1] Caroline M. Markey, PhD,[2] Ian L. McAllister, MBBS, PhD,[3] Mark C. Gillies, MBBS, PhD,[4] Alex P. Hunyor, MBBS,[4,5] Jennifer J. Arnold, MBBS,[6] on behalf of the FLUID Investigators

- Multi-center non-inferiority trial
- "intensive treatment" ranibizumab 0.5mg monthly until ALL fluid resolved vs "relaxed treatment" ranibizumab 0.5mg monthly until all intraretinal fluid resolved and up to 200 microns of subretinal fluid tolerated

39

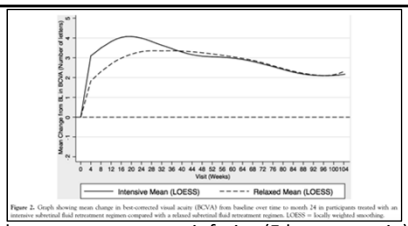

Figure 2. Graph showing mean change in best-corrected visual acuity (BCVA) from baseline over time to month 24 in participants treated with an intensive subretinal fluid retreatment regimen compared with a relaxed subretinal fluid retreatment regimen. LOESS = locally weighted smoothing.

- Relaxed treatment was non-inferior (5 letter margin)
- Proportion gaining 15 lines was not significantly different
- By 24 months, intensive treatment group trended toward greater reduction in CST (153 microns vs 127, p=0.06)

40

- Strengths & weaknesses:
  - Nonmasked investigator
  - Baseline CNV size differed
  - Insufficient duration?
- Summary:
  - Leaving up to 200 microns of subretinal fluid at the fovea may have comparable visual outcome to completely drying the retina in nvAMD

41

Thank you

42

November 2018

Loss to Follow-up Among Patients With Neovascular Age-Related Macular Degeneration Who Received Intravitreal Anti-Vascular Endothelial Growth Factor Injections

Anthony Obeid, MD, MPH[1]; Xinxiao Gao, MD, PhD[1,2]; Ferhina S. Ali, MD, MPH[1]; et al

> Author Affiliations

JAMA Ophthalmol. 2018;136(11):1251-1259. doi:10.1001/jamaophthalmol.2018.3578

43

- Strengths & weaknesses:
- Summary:

44