Outcomes of Pars Plana Vitrectomy Alone Versus Combined Scleral Buckling-Pars Plana Vitrectomy for Primary Retinal Detachment

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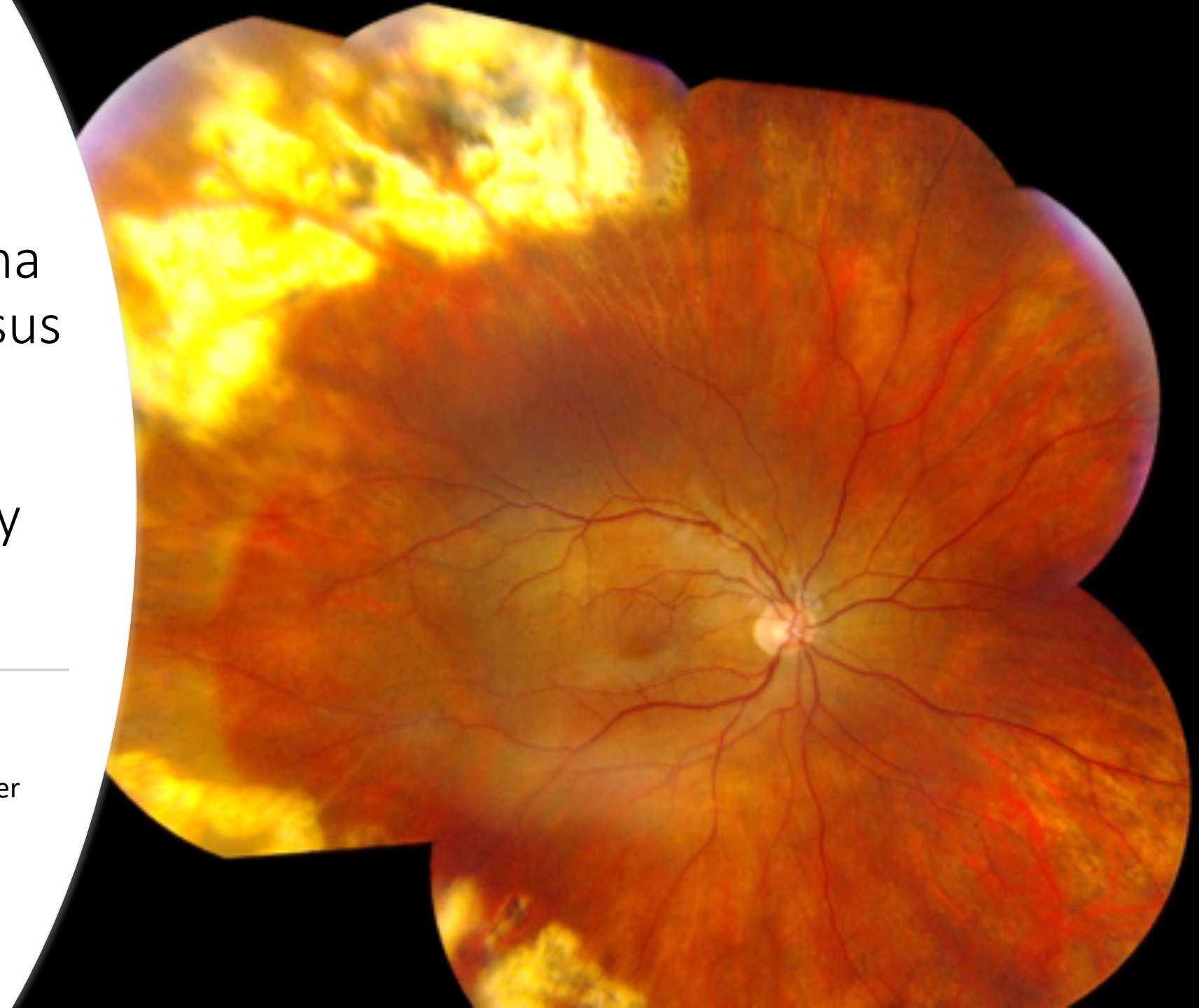

Disclosures

- No relevant financial disclosures

Summary

- Single-institution (Bascom Palmer Eye Institute), retrospective, observational study of 488 consecutive cases with primary RRD repaired via PPV-alone or SB-PPV and gas tamponade.
  - Primary outcome measure: single operation anatomic success (SOAS)
  - Secondary outcome measure: best corrected visual acuity (BCVA)
- SOAS and final anatomic success were achieved in 425 (87.1%) and 487 (99.8%) cases, respectively.
- SOAS was achieved in 90/111 (81.1%) cases with PPV-alone compared to 345/374 (92.2%) cases with SB-PPV ($p=0.0010$).
- SB-PPV had greater SOAS than PPV-alone in phakic eyes ($p<0.0001$), but not in eyes with a posterior chamber intraocular lens (PCIOL).
- Retinal re-detachments occurred on average at 1.5 and 9 months postoperatively.
- Significant BCVA improvement was associated with SOAS ($p<0.0001$).

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Outcomes in RRD Repair

Single Operation Success

Most common primary outcome measure

Final anatomic success

Visual Outcomes

Preoperative VA predictive of final VA

Macula ON vs. Macula OFF

RD Chronicity

Reoperations

Old debate in Retina

SB vs. PPV vs. SB-PPV

No consensus

RD approaches by decade

1970's
- 100% SB

1980's
- 80% SB
- PPV/SB for complex cases

1990's
- Pneumatic retinopexy introduced
- PPV alone for RRD introduced
- SB still predominant choice, esp. if phakic

2000's
- PPV/SB most common surgery overall
- SB preferred 2:1 for phakic RD (PAT Survey)

2010's
- Small-gauge vit use growing rapidly
- SB and PPV/SB use declining – now 2:1 PPV alone

Vail, JAMA Ophth, Jan 2020

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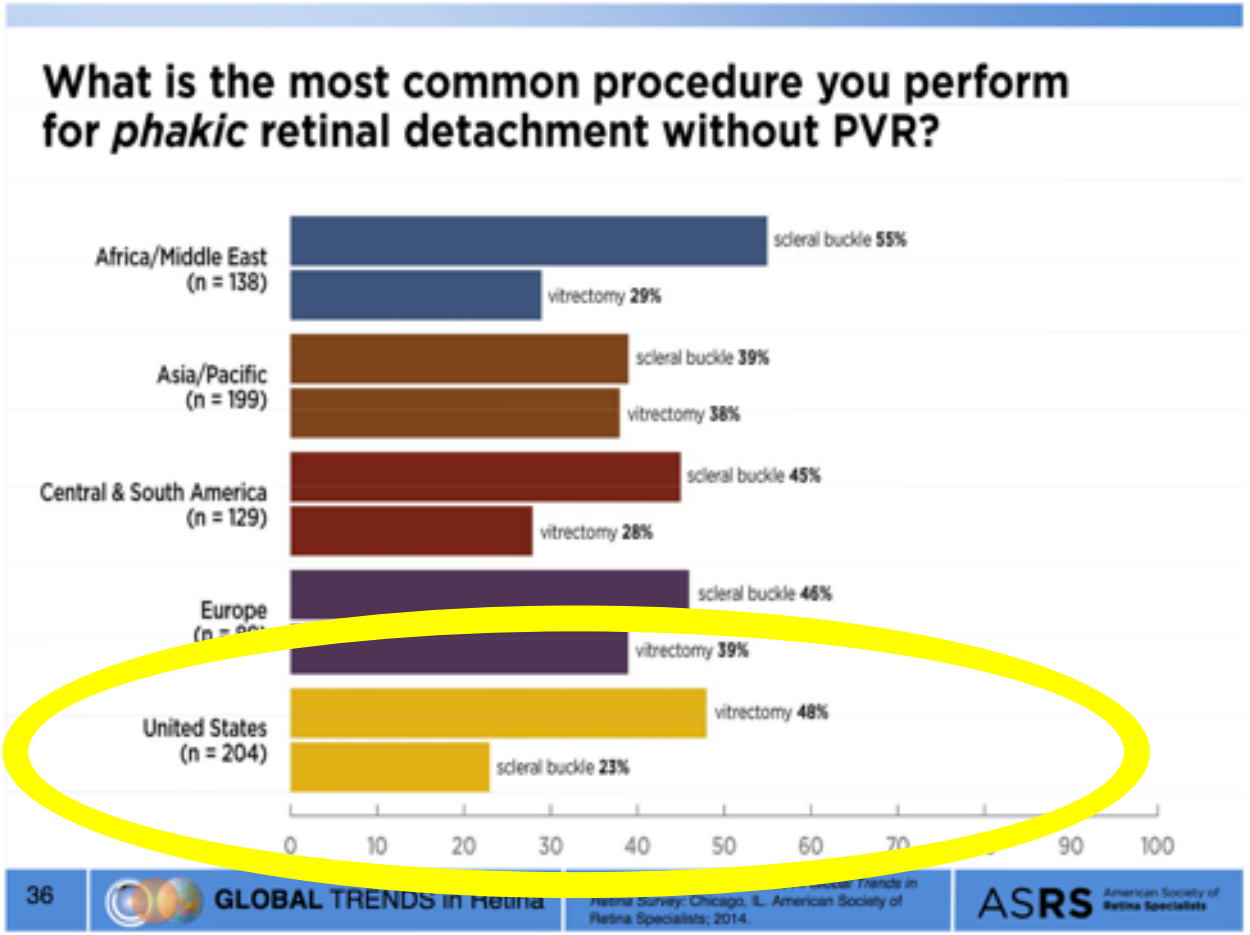
Current Usage of SB



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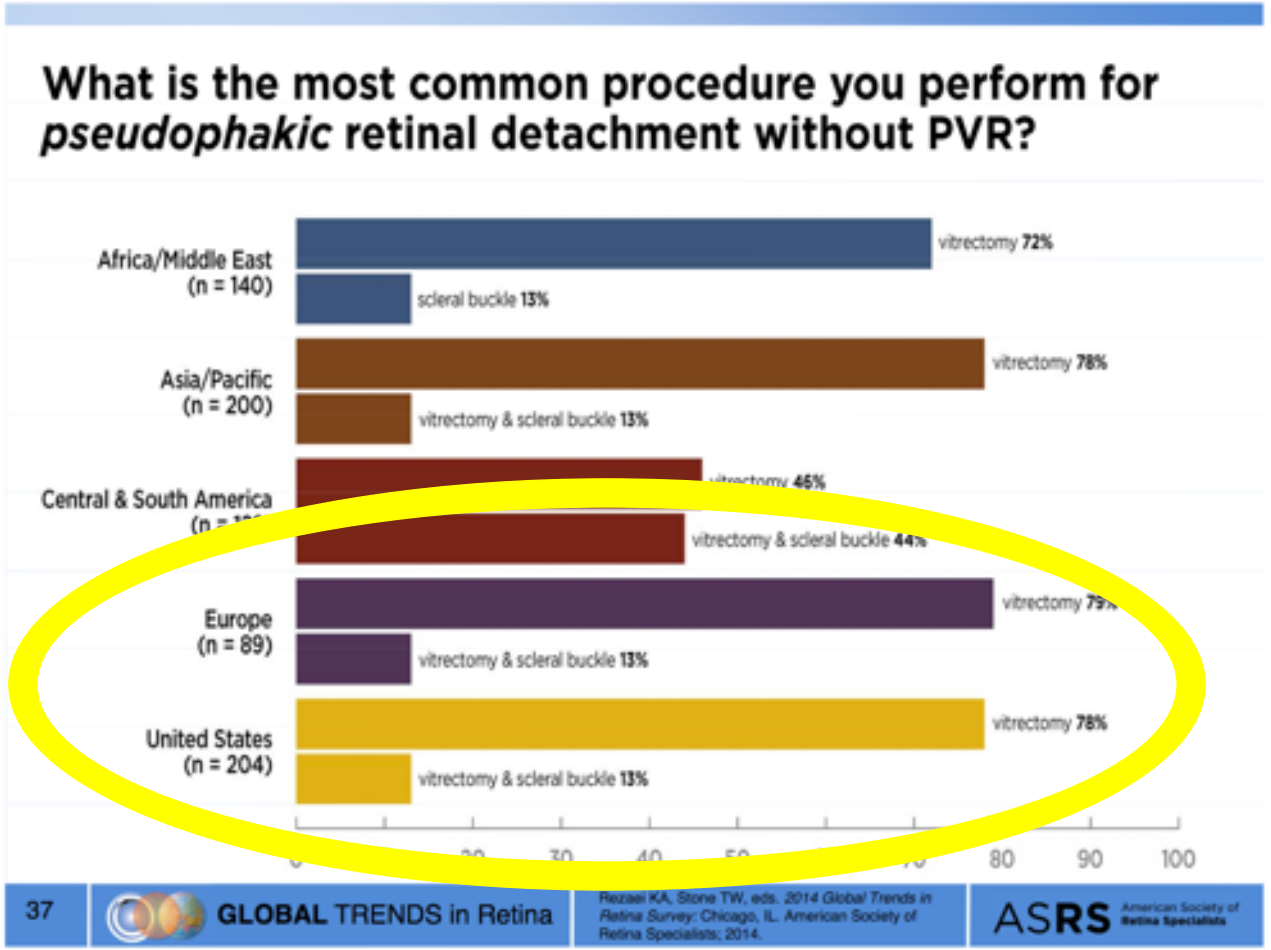
Current Usage of SB



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BPEI Study 2020

Primary RRD Repair

n = 488

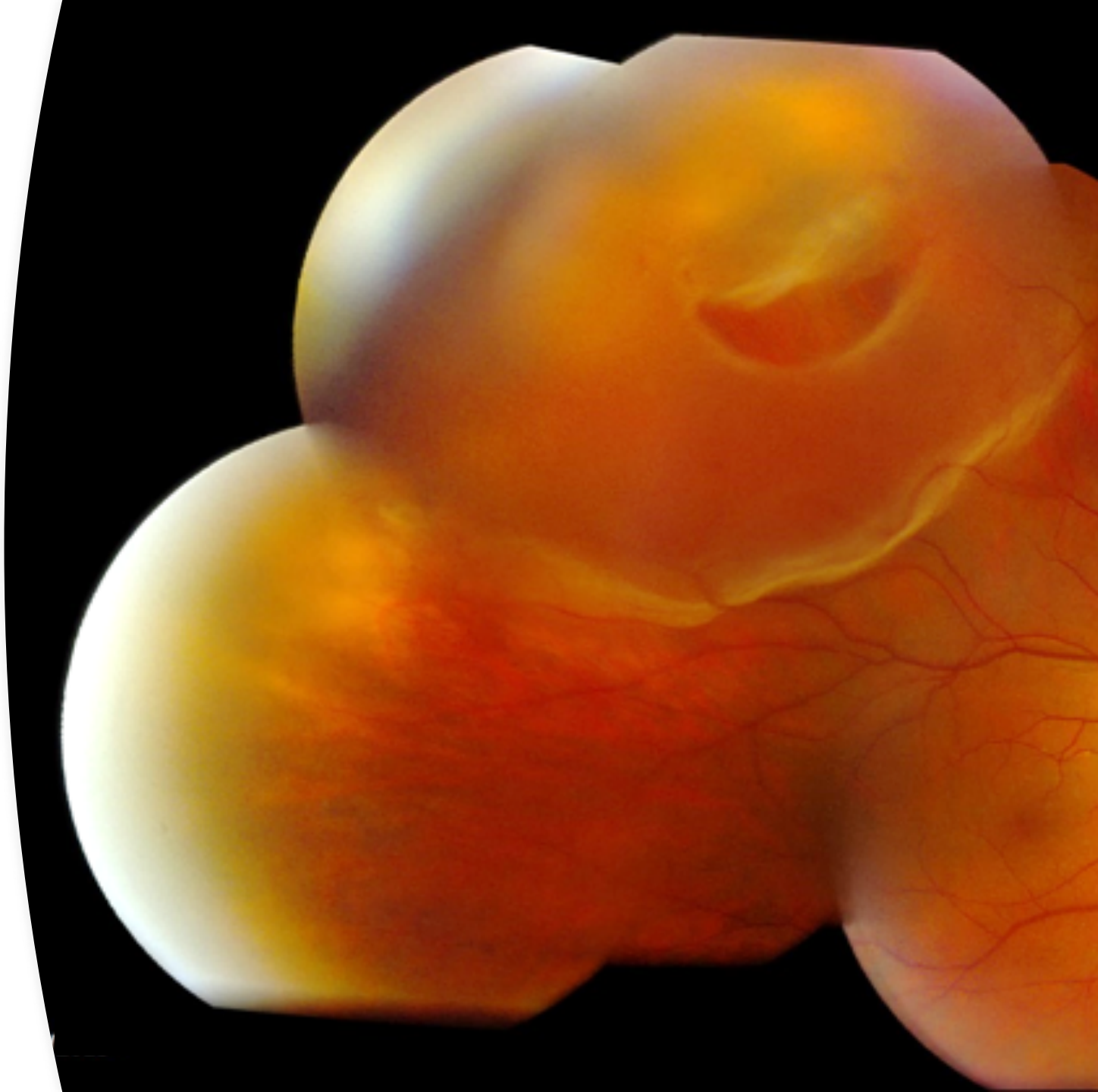
SB-PPV vs. PPV-alone

Exclusion criteria:

- <18 yrs age
- Advanced PVR
- Diabetic TRD
- Trauma
- GRT
- Secondary forms of RD

Primary outcome: Single Operation Success (SOAS)

Secondary outcome: BCVA



	Number (%) or Mean (Std Dev)
Age	59.2 (11.2)
Follow up time (months)	14.3 (9.4)
Gender	
Female	166 (34)
Male	322 (66)
Eye Laterality	
OD	247 (50.6)
OS	241 (49.4)
Ocular Comorbidities	106 (21.7)
Presence of Lattice Degeneration	160 (32.8)
Prior Laser Retinopexy	53 (10.9)
Duration of Symptoms	
<1 week	334 (68.9)
1 week - 1 month	106 (21.9)
1 month - 3 months	32 (6.6)
> 3 months	13 (2.7)
Lens Status	
Phakic	288 (59)
PCIOL	188 (38.5)
ACIOL	4 (0.8)
Aphakia	8 (1.6)
Macular Involvement	
Yes (Macula Off)	361 (74)
No (Macula ON)	127 (26)
RRD Extension	
≥ 3 clock hours	447 (91.6)
< 3 clock hours	41 (8.4)
Inferior RRD Location	265 (54.3)
Total RRD	31 (6.4)
Number of RT	2 (1.7)
Inferior RT Location	158 (32.4)
Presence of PVR Grade A/B	63 (12.9)

Preoperative Features

Follow up	14 months
Sx < 1 week	69%
Phakic	60%
Pseudophakic	40%
Mac OFF	75%
Mac ON	25%
RD > 3 clock hrs	92%
Sup. vs. Inf	50:50
Inferior tear	32%
Number of tears	2
Early PVR	13%

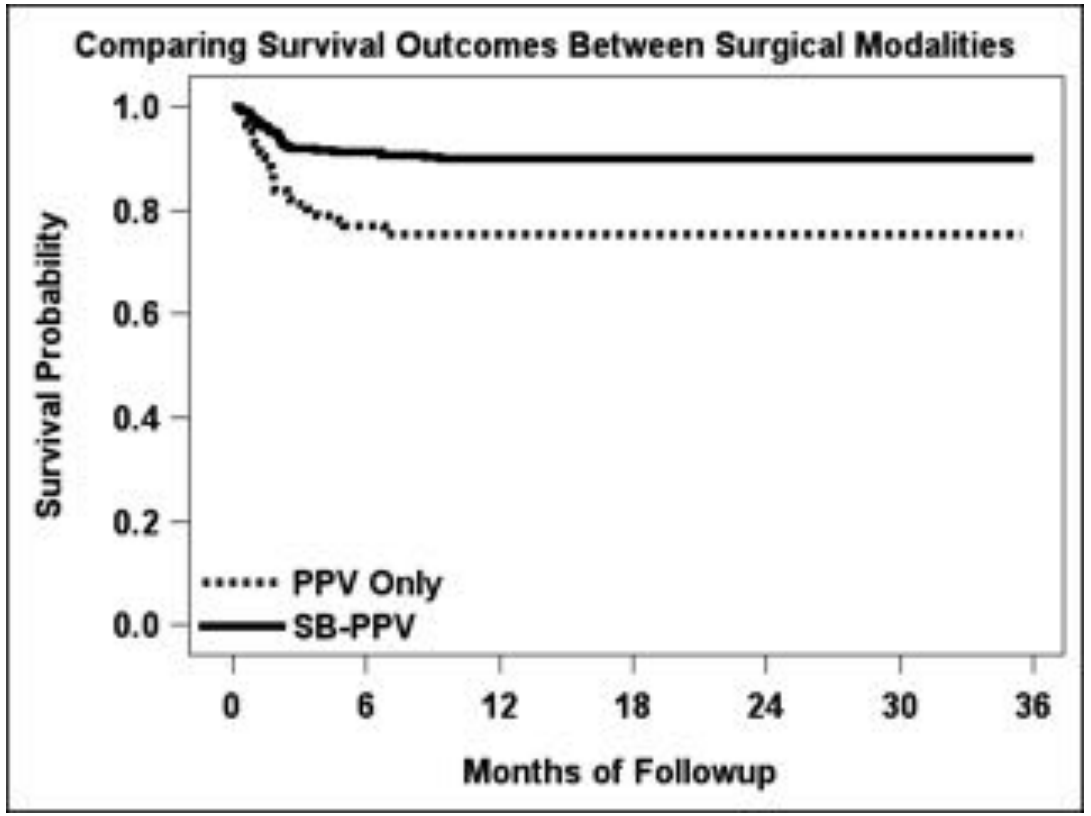
	Number (%)
PPV Gauge Size	
23 gauge	370 (75.8)
25 gauge	116 (23.8)
27 gauge	2 (0.4)
Surgical Modality	
PPV-alone	112 (23)
SB-PPV	376 (77.1)
Subretinal Fluid Drainage Location	
At Peripheral RT	191 (39.1)
Posterior Retinotomy	278 (57)
With PFO	19 (3.9)
Extent of Laser Retinopexy	
RT only	149 (30.7)
Extent of RRD	63 (13)
Circumferential 360°	273 (56.3)
Gas Tamponade	
C3F8	406 (83.2)
SF6	81 (16.6)
Air	1 (0.2)

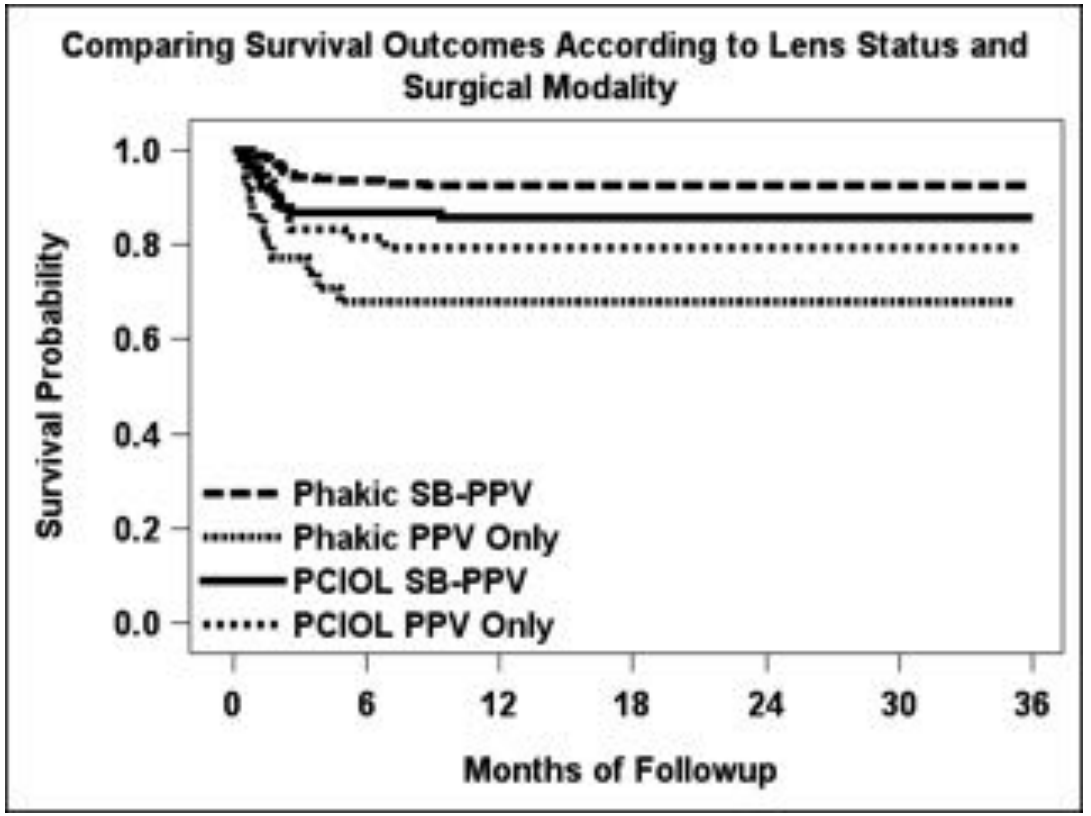
Intraoperative Features

23g	75%
25 g	25%
PPV	23%
SB-PPV	77%
Posterior ret.	57%
360 laser	56%
C3F8	83%

Single Operation Success

	PPV-alone [n (%)]	SB-PPV [n (%)]	Odds Ratio† (95% CI)	p-value
All Eyes	86 (76.8)	339 (91.2)	0.36 (0.20 – 0.60)	0.0010 *
Phakic	24 (68.6)	235 (92.9)	0.19 (0.09 – 1.39)	<0.0001*
PCIOL	59 (80.8)	98 (85.2)	0.72 (0.35 – 1.47)	0.3683
C3F8	69 (79.3)	290 (90.9)	0.40 (0.22 – 0.72)	0.0024*
SF6	16 (66.7)	49 (86.0)	0.34 (0.13 – 0.90)	0.0308*


Comparing Survival Outcomes Between Surgical Modalities
Survival Probability
1.0
0.8
0.6
0.4
0.2
0.0
PPV Only
SB-PPV
0
6
12
18
24
30
36
Months of Followup


Comparing Survival Outcomes According to Lens Status and Surgical Modality
Survival Probability
1.0
0.8
0.6
0.4
0.2
0.0
Phakic SB-PPV
Phakic PPV Only
PCIOL SB-PPV
PCIOL PPV Only
0
6
12
18
24
30
36
Months of Followup

Timing of Surgical Failure

Recurrent RD Distribution

50/63 within first 3 months: 1.5 months

13/63 after first 3 months: 9 months

What is the most important factor for visual improvement in RRD Repair?

VIEWPOINT

What Is the Optimal Timing for Rhegmatogenous Retinal Detachment Repair?

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Rhegmatogenous retinal detachment (RRD) is a common ocular disorder that occurs in approximately 1 of 170 eyes over a lifetime, often indicating urgent surgical intervention. Rhegmatogenous retinal detachments can be divided into fovea-sparing and fovea-involving detachments. In some cases, this distinction can be challenging and in these instances, central visual function, symptoms, and ocular coherence tomography (OCT) are helpful indicators of foveal status.

Preoperative visual acuity (VA) is the strongest prognostic indicator of postoperative visual outcome. When central visual function is preserved and subretinal fluid has not extended through the fovea, prognosis for visual recovery is often quite good, with approximately 80% of eyes ultimately achieving a VA of 20/40 or better. In comparison, when central vision is affected, indicating involvement of the foveal photoreceptors, prognosis is less optimistic and more variable with approximately 30% of patients ultimately achieving a VA of 20/40 or better.[1]

within minutes of experimental retinal detachment.[2] Mueller and microglial cells seem to have a significant role in these proinflammatory changes, which evolve over hours to days, and eventually spread to involve areas of nondetached surrounding retina. Additionally, hypoxia of not only the outer retina but also the inner retina due to reduced retinal blood flow in areas of both detached and nondetached retina may have a role in retinal degeneration and glial cell activation. These observations open avenues for pharmacologic intervention but have yet to translate to clinical treatments.

Despite these observations, clinical evidence suggests that VA outcomes depend less on time to surgery than might be anticipated. In short, multiple retrospective analyses, including hundreds of patients from different clinical sites, have drawn the same conclusion[1,3,4]: there is no difference in VA outcomes among patients who underwent repair within the first week of onset. All of these studies suffer from their retrospective design and the imprecision of ascertaining DMD from the pa-

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VIEWPOINT

What Is the Optimal Timing for Rhegmatogenous Retinal Detachment Repair?

In summary, while animal models and simple logic may lead one to believe that earlier repair of fovea-involving RRDs should translate into better visual outcomes, clinical evidence suggests that the duration of macular detachment has a minor, if any, effect on visual outcome when repair is performed within about 1 week. Similarly, many fovea-sparing RRDs can likely be deferred for a short period without affecting visual outcomes.

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Is there a direct association between SOAS and VA improvement for RRD Repair?

EVRS Study

- “Considering that visual acuity data are not available, it is difficult to know if either successful primary repair or successful final repair is most important to functional outcome.

- It is entirely possible to have a case of a successfully attached retina after initial failure that sustained a loss of function.”

United Kingdom National Ophthalmology Database Study of Vitreoretinal Surgery

Report 3, Retinal Detachment

Timothy L. Jackson, PhD, FRCOphth,[1] Paul H.J. Donachie, MSc,[2,3] Ahmed Sallam, PhD, FRCOphth,[3] John M. Sparrow, DPhil, FRCOphth,[2,4] Robert L. Johnston, FRCOphth[2,3]

Purpose: To describe rhegmatogenous retinal detachment (RD) surgery.

Design: National Ophthalmology Database study.

Participants: A total of 3403 eyes from 3321 patients undergoing primary RD surgery.

Methods: Participating centers prospectively collected clinical data using a single electronic medical record system, with automatic extraction of anonymized data to a national database, from 2002 to 2010.

Main Outcome Measures: Description of the primary procedures performed, intraoperative complication rate, and proportion of eyes undergoing subsequent RD or cataract surgery. We undertook an exploratory analysis of change in visual acuity (VA) using the data available.

Results: Of 3403 operations, 2693 (79.1%) were pars plana vitrectomy (PPV), 413 (12.1%) were retinopexy with a scleral buckle (SB), and 297 (8.7%) were PPV with an SB (PPV-SB). For PPV and PPV-SB, 18.8% were with hexafluoroethane, 12.1% were with perfluoropropane, 43.1% were with sulfahexafluoride, 1.8% were with air, 17.9% were with silicone oil, and 10.7% were with cataract surgery. Within 1 year of vitrectomy, 52.1% of phakic eyes had undergone cataract surgery. For all RD operations combined (and excluding cataract surgery complications), 5.1% had 1 or more intraoperative complication, 13.0% underwent further RD surgery, and 8.3% had silicone oil in situ at last review. The RD reoperation rate was 13.3%, 12.3%, and 14.5% for PPV, SB, and PPV-SB, respectively. For 961 eyes with a baseline and final VA measurement, the median presenting logarithm of the minimum angle of resolution VA improved from 1.0 to 0.5 (20/200–20/63) after a median follow-up of 0.6 years.

Conclusions: These results may help vitreoretinal surgeons to benchmark their intraoperative complication rate and reoperation rate and to compare their surgical techniques with their peers'. They suggest that the benefits of RD surgery greatly outweigh the risks. *Ophthalmology 2014;121:643-648* © *2014 by the American Academy of Ophthalmology.*

N = 3043

<u>SOAS</u>

PPV	87%
SB	86%
SB-PPV	85%

"A lower proportion of eyes undergoing repeat RD surgery achieved visual success compared with eyes undergoing only 1 RD surgery (42.9% vs. 75.3%; P<0.001)."

BPEI Study Visual Outcomes

	Preoperative LogMAR BCVA	Final LogMAR BCVA	p-value
All Eyes	1.06 (0.89)	0.52 (0.60)	<0.0001*
Eyes with SOAS	1.04 (0.89)	0.44 (0.52)	<0.0001*
Eyes with Retinal Redetachment	1.19 (0.85)	1.06 (0.78)	0.3233

The ultimate goal of RRD repair should be single operation anatomic success.

Study	Year	Number of Cases	SOAS PPV	SOAS SBPPV	Anatomic	Visual
SPR Phakic	2007	416	79	70	Equal	SB > PPV; preoperative number RT
SPR Pseudophakic	2007	265	59	89	SB-PPV	PPV = SB; preoperative number RT
UK NODS	2014	2093	87	85	Equal	**SOAS**
PRO Phakic Study	2020	715	83	91	SB-PPV	SB better BCVA
PRO Pseudophakic Study	2020	893	84	92	SB-PPV	Macula On
Mehta Phakic	2011	105	83	97	SB-PPV	PPV = SBPPV
Mehta Pseudophakic	2011	114	87	93	Equal	PPV = SBPPV
Kinori	2011	181	81	87	Equal	PPV = SBPPV
Weichel	2006	152	93	94	Equal	Preoperative VA; Macula ON/OFF
Stangos	2004	71	98	92	Equal	Preoperative VA
Orlin	2014	74	83	86	Equal	PPV = SBPPV
BPEI Phakic	2020	288	69	93	SB-PPV	**SOAS**
BPEI Pseudophakic	2020	188	81	85	Equal	**SOAS**

BPEI Study Summary

Overall SOAS	SB-PPV > PPV-alone
Phakic eyes	SB-PPV > PPV-alone
Pseudophakic	SB-PPV = PPV-alone
Distribution of recurrent RD:	1.5 months, 9 months

Significant visual improvement with SOAS, but not in redetachments.

Take Home Points

- Additional data showing possible advantage of SB-PPV.
- SOAS may be most important factor for visual improvement.
- Bimodal distribution of retinal redetachments may influence follow up regimens.
- Individualized approach is best.