Pars plana vitrectomy versus combined pars plana vitrectomy-scleral buckle versus scleral buckle for repair of primary rhegmatogenous retinal detachment

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Summary

- Retrospective, interventional case series from a multi-surgeon, single academic setting between 2011-2019
- Evaluate the anatomical and functional outcomes of PPV vs PPV/SB vs SB in the treatment of primary, noncomplex RRD
- No significant differences in single surgery success rates between PPV, PPV-SB, or SB
- PPV provides excellent results irrespective of lens status, macular involvement, or location of pathology with no added benefit from SB

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Introduction

- Rhegmatogenous retinal detachment (RRD) is an important cause of vision loss and its incidence is increasing

- Fundamentals for RRD repair using any method:
  - Find the breaks
  - Seal the breaks
  - Plug the breaks

- Recent studies suggest that SB alone or the addition of SB improves outcomes in RRD over PPV alone

Purpose

- To compare anatomic and visual outcomes in eyes undergoing PPV with eyes undergoing PPV/SB or SB alone performed by a single group of experienced vitreoretinal surgeons at an academic institution

Methods

- Retrospective review of primary, non-complex, RRD cases that underwent PPV, SB, or PPV/SB
  - 12 vitreoretinal surgeons operating between 2011 and 2019
- Inclusion:
  - Minimum follow up of 3 months
- Exclusion:
  - Trauma, PDR, ROP, sickle cell retinopathy, exudative retinal detachment, myopic traction maculopathy, dialysis, dense cataract, PVR (any grade), endophthalmitis, GRT, posterior staphyloma, choroidal detachment, Stickler syndrome, intraocular malignancy, any history of intraocular surgery except cataract surgery.
  - RRD managed with pneumatic retinopexy, laser barricade, or observation
- Outcomes:
  - Single surgery anatomic success (SSAS)
  - Visual acuity (VA)

Results: demographics

Table 1. Demographics of overall patient cohort and compared by surgical group.

	Total (N=751)	PPV (N=668)	PPV/SB (N=51)	SB (N=32)
	N (%) or Mean (±SD)	N (%) or Mean (±SD)	N (%) or Mean (±SD)	N (%) or Mean (±SD)
Age (years)	55 (±12)	56 (±11)	50 (±14)	33 (±15)
Male	506 (67%)	452 (68%)	32 (63%)	22 (69%)
Right Eye	405 (54%)	362 (54%)	22 (43%)	21 (66%)
Follow up (months)	30 (±24)	32 (±25)	18 (±10)	12 (±6)

PPV-pars plan vitrectomy; PPV/SB-pars plana vitrectomy in combination with scleral buckle; SB-scleral buckle

Table 2. Retinal detachment size, location, macular status, number of retinal breaks, & lens status

	Total	PPV	PPV/SB	SB
	N (%) or Mean (±SD)	N (%) or Mean (±SD)	N (%) or Mean (±SD)	N (%) or Mean (±SD)
Size (clock hours)	4.8 (±2.0)	4.8 (±2.0)	5.6 (±2.0)	4.2 (±1.1)
Hemisphere				
Superior	385 (56%)	348 (57%)	19 (41%)	18 (56%)
Inferior	222 (32%)	192 (32%)	19 (41%)	11 (34%)
Equatorial	78 (11%)	67 (11%)	8 (18%)	3 (10%)
Macula status				
On	335 (45%)	303 (45%)	15 (29%)	17 (53%)
Off	416 (55%)	365 (55%)	36 (71%)	15 (47%)
No. of retinal breaks				
1	293 (41%)	263 (41%)	19 (38%)	11 (37%)
2-4	208 (29%)	189 (30%)	15 (30%)	4 (13%)
>4	215 (30%)	184 (29%)	16 (32%)	15 (50%)
Lens status				
Phakic	441 (60%)	378 (58%)	35 (69%)	28 (90%)
Pseudophakic	295 (40%)	276 (42%)	16 (31%)	3 (10%)

- 751 eyes included
  - PPV - 89%
  - PPV/SB - 7%
  - SB - 4%
- Mean age was 55 years
  - SB: 33 ± 15 years ($p<0.001$)
- Mean length of post-op follow up was 30 months
- No significant difference in macular status, location, number of breaks, or lens status between PPV and PPV/SB
  - Size of RD was greater in PPV/SB ($p=0.009$)

Results: anatomic success

- SSAS:
  - PPV – 91.2%
  - PPV/SB – 84.3%
  - SB – 93.8%
  - Macula status, inferior retinal breaks, total number of retinal breaks, or lens status had no effect on SSAS within each surgical group
- PPV vs PPV/SB vs SB:
  - No differences in overall SSAS (p=0.27)
  - No difference in SSAS when controlling for presence of inferior breaks (p=0.73)
- PPV SSAS superior to PPV/SB
    - Phakic (92% vs 80%, p=0.02)

Table 3. Anatomic outcomes by surgery.

	PPV N (%)	PPV/SB N (%)	SB N (%)	*P*-value
SSAS				
Overall	609/668 (91%)	43/51 (84%)	30/32 (94%)	0.267
Macula On	281/303 (93%)	11/15 (73%)	15/17 (88%)	0.026
Macula Off	328/365 (90%)	32/36 (89%)	15/15 (100%)	0.201
Inferior breaks	233/262 (89%)	17/20 (85%)	14/15 (93%)	0.732
Non-inferior breaks	376/406 (93%)	26/31 (84%)	16/17 (94%)	0.283
Phakic	349/378 (92%)	28/35 (80%)	26/28 (93%)	0.044
Pseudophakic	248/276 (90%)	15/16 (94%)	3/3 (100%)	0.633

Results: visual outcomes

- Overall Cohort
  - No difference in final VA between PPV and SB (P = 0.598)
  - PPV/SB VA was inferior to PPV (p=0.001) and SB (p=0.014)
- Macular Status
  - Mac-on: PPV/SB < PPV (p=0.013) or SB (p=0.019)
- Retinal break location
  - Lack of inferior pathology: PPV/SB < PPV (p<0.001) or SB (p=0.009)
  - Inferior breaks: no difference among groups
- Lens Status
  - Pseudophakic at time of RD: PPV>PPV/SB (p=0.002)

Table 4. Visual outcomes by surgery.

	PPV Mean (±SD)	PPV/SB Mean (±SD)	SB Mean (±SD)	*P*-value
Visual Acuity (logMAR)				
Overall	0.17 (±0.33)	0.29 (±0.34)	0.14 (±0.30)	p<0.001
Macula On	0.12 (±0.31)	0.28 (±0.35)	0.09 (±0.29)	p=0.014
Macula Off	0.22 (±0.32)	0.29 (±0.35)	0.23 (±0.26)	p=0.351
Inferior breaks	0.18 (±0.35)	0.16 (±0.31)	0.12 (±0.31)	p=0.589
Non-inferior breaks	0.17 (±0.31)	0.39 (±0.33)	0.17 (±0.29)	p<0.001
Phakic	0.18 (±0.33)	0.25 (±0.34)	0.13 (±0.29)	p=0.084
Pseudophakic	0.16 (±0.32)	0.36 (±0.35)	0.18 (±0.33)	p=0.002 (PPV > PPV/SB)

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Strengths and Limitations

- Strengths:
  - Largest single institution, primary RRD case series
  - Longest documented follow-up on surgical management of primary RRD

- Limitations:
  - Retrospective nature of study
  - No randomization or standardization of surgical technique
  - Cases dominated by PPV

Conclusions

- No significant differences were noted in single surgery success between PPV, PPV/SB, or SB for primary, non-complex RRD
  - PPV alone SSAS was comparable to recently reported PPV/SB SSAS from other groups

- PPV can provide excellent anatomical and functional results irrespective of lens status, macular involvement, or location of pathology with no added benefit from the addition of a SB

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