# Phacovitrectomy versus lens-sparing vitrectomy for rhegmatogenous retinal detachment repair according to the surgical experience

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- Min Seok Kim: None

C: Consultant, L: Lecture fee, S: Stock

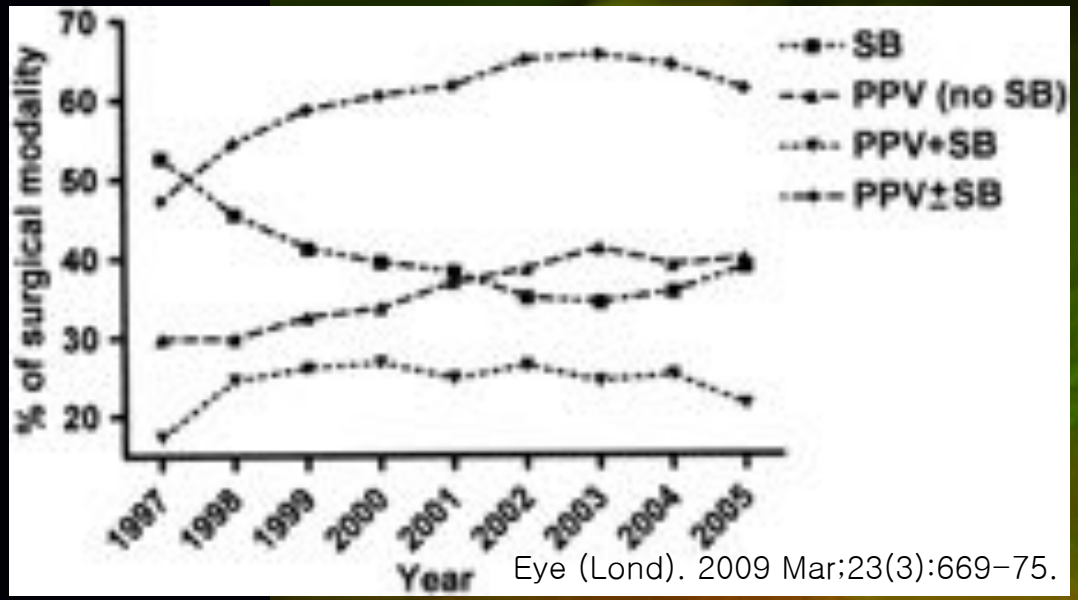
# Summary


- **Purpose:** To compare the efficacy and safety between phacovitrectomy and lens-sparing vitrectomy for primary rhegmatogenous retinal detachment (RRD) treatment according to surgical experience.

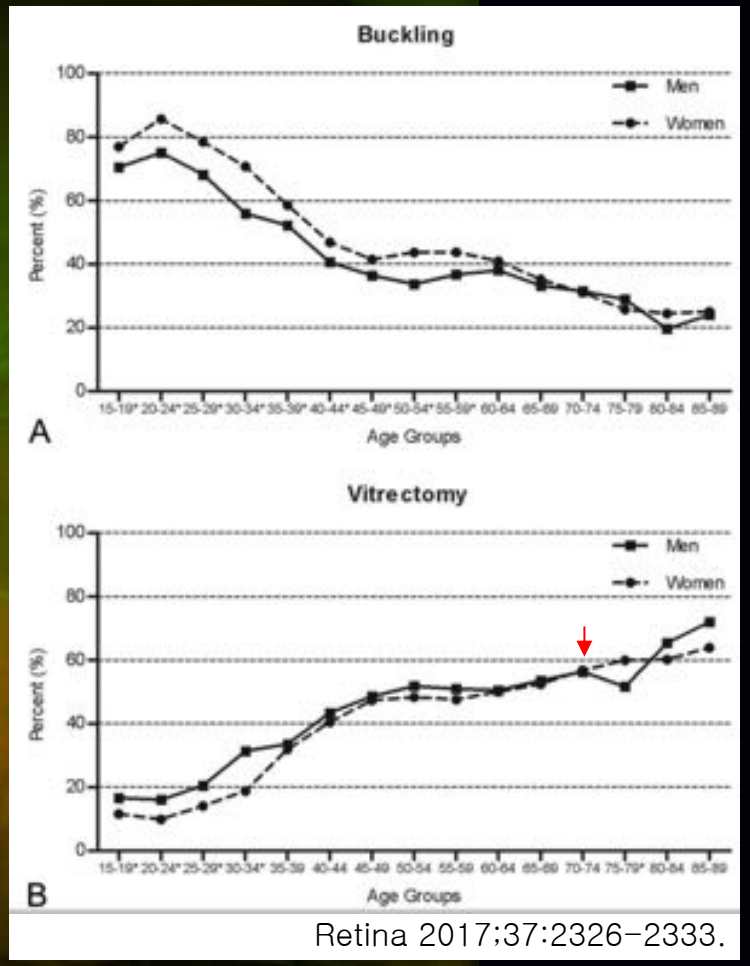
- **Methods:** We retrospectively reviewed the charts of 193 patients with primary RRD who underwent either phacovitrectomy or lens-sparing vitrectomy. Patients were operated by two experienced surgeons or eight vitreoretinal fellows and had a minimum follow-up of 6 months. Anatomical success rate, postoperative complications, and best-corrected visual acuity were compared.

- **Results:** Primary anatomical success rate was 91.7% for lens-sparing vitrectomy and 97.6% for phacovitrectomy in the experienced surgeon group (P=0.396). The fellow surgeon group had lower primary success rate for phacovitrectomy than for lens-sparing vitrectomy (85% vs. 94.1%, P=0.148). During phacovitrectomy, one zonulysis case in the experienced surgeon group and four posterior capsular rupture cases in the fellow surgeon group were noted. Cystoid macular edema was found only after phacovitrectomy (10 of 82 [12.2%]), and epiretinal membrane incidence was higher after phacovitrectomy (23 of 82 [28%]) than after lens-sparing vitrectomy (9 of 111 [8.1%]).

- **Conclusions:** Combined phacoemulsification and vitrectomy by experienced and inexperienced surgeons has no additional benefit in improving the surgical outcome of primary RRD management, and phacovitrectomy may not be a desirable option in inexperienced surgeons.




Eye (Lond). 2009 Mar;23(3):669-75.




Retina 2017;37:2326-2333.

(Male, 71-years old, phakic lens)

What's your plan?

## Phacovitrectomy for Rhegmatogenous RD

- Advantages to the patients
  - Avoids need for later cataract surgery
  - Faster visual rehabilitation
  - Reduced cost
- Advantages to the surgeon
  - Avoid difficulties of postvitrectomy cataract surgery
  - Excellent visualization of peripheral retina
  - Reduced risk of missed breaks
  - More complete vitrectomy possible
  - Large gas fill
- Disadvantageous
  - Longer surgical time
  - Increased postoperative inflammation
  - Increase in proliferative vitreoretinopathy rate
  - Risk of iris/intraocular lens capture
  - Inaccurate IOL power calculation

RETINA 27:462–467, 2007

# Phacovitrectomy for Rhegmatogenous RD

- Q1: What about the anatomical success rate of phacovitrectomy?
  - lack of consensus
  - surgeons consider both medical and nonmedical factors during decision making*
- Q2: What if a surgeon is inexperienced in cataract surgery?
  - prolonged surgical time
  - more complications during phacovitrectomy
- Purpose

To compare the efficacy and safety between phacovitrectomy and lens-sparing vitrectomy for primary rhegmatogenous retinal detachment (RRD) treatment according to surgical experience.

*Current opinion in ophthalmology 2016;27:196-200.

# Methods

- Inclusion criteria
  - primary RRD patients at SNUBH between Jan 1, 2014 and Dec 31, 2018
  - patients underwent either lens-sparing vitrectomy or phacovitrectomy
  - followed up for more than 6 months
  - surgeons: 2 experienced professors or 8 intraining vitreoretinal fellows*

*The fellows were at similar levels for both cataract surgery and vitrectomy in their second-year training period in the same institution

- Exclusion criteria
  - eyes that developed RD due to other causes such as traction or exudation
  - PVR grade C or worse
  - prior history of ocular surgery including vitrectomy, scleral buckle, and cataract surgery
  - history of ocular trauma
  - concurrent placement of scleral buckle
  - tamponade using silicone oil

SNUBH: Seoul National University Bundang Hospital, Rep. of Korea

# Methods

- 4 groups (Total n = 193)
  - Group 1 (n=60): lens-sparing vitrectomy by experienced vitreoretinal surgeons
  - Group 2 (n=42): phacovitrectomy by experienced vitreoretinal surgeons
  - Group 3 (n=51): lens-sparing vitrectomy by vitreoretinal fellows
  - Group 4 (n=40): phacovitrectomy by vitreoretinal fellows

*One case in Group 2 and two cases in Group 4 were initially planned to undergo lens-sparing vitrectomy, but the procedure was changed to phacovitrectomy due to lens touch during phakic vitrectomy.

- Surgical techniques
  - → general or local anesthesia
  - → 23- or 25-gauge sutureless pars plana vitrectomy with a noncontact wide-angle viewing system
  - → fluid/air exchange
  - → endolaser
  - → gas tamponade

- <u>Outcome measures</u>
  - Primary anatomical success rate (when attached retina lasted 6 months)
  - Final success rate
  - Cause of re-detachment
  - Other complications
  - Visual acuity changes

- The chi-square test, Fisher's exact test and t-test were used for statistical analysis and $P < 0.05$ was considered statistically significant

# Results

- Demographics & clinical characteristics

| | Experienced surgeon | | | Vitreoretinal fellow | | |
|---|---|---|---|---|---|---|
| | Lens-sparing vitrectomy (n = 60) | Phacovitrectomy (n = 42) | P | Lens-sparing vitrectomy (n = 51) | Phacovitrectomy (n = 40) | P |
| Age, years | 49.3 ± 11.8 | 61.8 ± 8.3 | <0.001 | 48.8 ± 10.8 | 60.8 ± 8.1 | <0.001 |
| Sex | | | | | | |
| Male | 39 (65) | 24 (57.1) | 0.422 | 26 (51) | 17 (42.5) | 0.421 |
| Female | 21 (35) | 18 (42.9) | | 25 (49) | 23 (57.5) | |
| Diabetes | 3 (5) | 2 (4.8) | 1.000 | 1 (2) | 6 (15) | 0.041 |
| Hypertension | 9 (15) | 13 (31) | 0.054 | 9 (17.6) | 9 (22.5) | 0.564 |
| Axial length, mm | 25.39 ± 1.79 | 24.39 ± 1.24 | 0.001 | 26.20 ± 2.00 | 24.40 ± 1.22 | <0.001 |
| Spherical equivalent, D | -3.56 ± 4.08 | -0.95 ± 2.37 | <0.001 | -4.07 ± 4.59 | -0.88 ± 2.85 | <0.001 |
| Right eye | 34 (56.7) | 22 (52.4) | 0.669 | 31 (60.8) | 24 (60) | 0.939 |
| Onset, days | 7.9 ± 8.5 | 8.5 ± 10.3 | 0.723 | 5.3 ± 7.6 | 7.5 ± 8.6 | 0.209 |
| Follow-up, months | 27.3 ± 16.3 | 25.8 ± 15.3 | 0.628 | 26.6 ± 15.6 | 24.8 ± 16.1 | 0.573 |
| Macula-off RD | 33 (55) | 21 (50) | 0.619 | 32 (62.7) | 29 (72.5) | 0.326 |
| Extent of RD | | | | | | |
| 1–6 clock hours | 36 (60) | 24 (57.1) | 0.773 | 32 (62.7) | 22 (55) | 0.455 |
| 6–12 clock hours | 24 (40) | 18 (42.9) | | 19 (37.3) | 18 (45) | |
| Number of tears | | | | | | |
| Single | 46 (76.7) | 32 (76.2) | 0.956 | 45 (88.2) | 36 (90) | 0.789 |
| Multiple | 14 (23.3) | 10 (23.8) | | 6 (11.8) | 4 (10) | |
| Location of tears | | | | | | |
| Superior | 50 (83.3) | 34 (81) | 0.869 | 39 (76.5) | 29 (72.5) | 0.786 |
| Inferior | 6 (10.0) | 4 (9.5) | | 10 (19.6) | 10 (25) | |
| Combined | 4 (6.7) | 4 (9.5) | | 2 (3.9) | 1 (2.5) | |
| Operation time, min | 55.8 ± 15.0 | 62.7 ± 12.9 | 0.016 | 103.9 ± 41.3 | 128.0 ± 54.5 | 0.018 |
| Vitrectomy gauge | | | | | | |
| 23-gauge | 29 (48.3) | 20 (47.6) | 0.943 | 13 (25.5) | 11 (27.5) | 0.829 |
| 25-gauge | 31 (51.7) | 22 (52.4) | | 38 (74.5) | 29 (72.5) | |
| Tamponade | | | | | | |
| $SF_6$ | 56 (93.3) | 33 (78.6) | 0.056 | 35 (68.6) | 28 (70) | 0.888 |
| $C_3F_8$ | 3 (5) | 4 (9.5) | | 16 (31.4) | 12 (30) | |
| Air | 1 (1.7) | 5 (11.9) | | 0 (0) | 0 (0) | |

# Results

- Surgical outcomes and postoperative complications of lens-sparing vitrectomy and phacovitrectomy

| | Experienced surgeon | | | Vitreoretinal fellow | | |
|---|---|---|---|---|---|---|
| | Lens-sparing vitrectomy (n = 60) | Phacovitrectomy (n = 42) | P | Lens-sparing vitrectomy (n = 51) | Phacovitrectomy (n = 40) | P |
| **Reattachment with a single operation** | 55 (91.7) | 41(97.6) | 0.396 | 48 (94.1) | 34 (85) | 0.148 |
| **Recurrence of RD** | 5 (8.3) | 1 (2.4) | | 3 (5.9) | 6 (15) | |
| **Missed/new break** | 1 | 0 | | 2 | 2 | |
| **PVR** | 4 | 1 | | 1 | 4 | |
| **Final reattachment** | 60 (100) | 42 (100) | | 51 (100) | 40 (100) | |
| **Epiretinal membrane** | 1 (1.7) | 11 (26.2) | <0.001 | 8 (15.7) | 12 (30) | 0.102 |
| **Macular hole** | 0 (0) | 1 (2.4) | 0.412 | 1 (2) | 1 (2.5) | 1.000 |
| **Cystoid macular edema** | 0 (0) | 4 (9.5) | 0.026 | 0 (0) | 6 (14.3) | 0.007 |
| **Increased IOP** | 7 (11.7) | 3 (7.1) | 0.450 | 8 (15.7) | 3 (7.5) | 0.234 |
| **VH** | 0 (0) | 0 (0) | 1.000 | 1 (2) | 0 | 1.000 |

# Results

- Complications related to combined or subsequent cataract surgery

| | Experienced surgeon | Vitreoretinal fellow | P |
|---|---|---|---|
| Phacovitrectomy complications* | 1/42 (2.4) | 4/40 (10) | 0.196 |
| Subsequent cataract surgery after lens-sparing vitrectomy | | | |
| Number of patients | 32/60 (53.3) | 31/51 (60.8) | 0.430 |
| Surgery interval, days | 346.4 ± 340.7 | 246.2 ± 221.0 | 0.173 |
| Complications | | | |
| PCR | 0/32 (0) | 5/31 (16.1) | 0.024 |
| IOL subluxation | 1/32 (3.1) | 2/31 (6.5) | 0.613 |
| Zonulysis | 0/32 (0) | 1/31 (3.2) | 0.492 |

* One case of zonulysis in experienced surgeon group and 4 cases of PCR in fellow surgeon group

- Functional outcomes before and after surgery according to methods of surgery and surgeon's experience

| | Preoperative BCVA, logMAR | Mean final BCVA, logMAR | P |
|---|---|---|---|
| Group 1 | 0.79 ± 0.86 | 0.11 ± 0.30 | <0.001 |
| Group 2 | 0.96 ± 0.93 | 0.10 ± 0.18 | <0.001 |
| P* | 0.330 | 0.946 | |
| Group 3 | 0.98 ± 0.97 | 0.16 ± 0.25 | <0.001 |
| Group 4 | 1.05 ± 0.92 | 0.22 ± 0.42 | <0.001 |
| P* | 0.704 | 0.375 | |

* Comparisons between lens-sparing vitrectomy and phacovitrectomy within the surgeon group

# Results

- Intraoperative and postoperative data according to the different methods of surgery

| | Lens-sparing vitrectomy (n = 111) | Phacovitrectomy (n = 82) | P |
|---|---|---|---|
| Age, years | 49.1 ± 11.3 | 61.3 ± 8.2 | <0.001 |
| Sex | | | |
| Male | 65 (58.6) | 41 (50) | 0.238 |
| Female | 46 (41.4) | 41 (50) | |
| Diabetes | 4 (3.6) | 8 (9.8) | 0.080 |
| Hypertension | 18 (16.2) | 22 (26.8) | 0.072 |
| Axial length, mm | 25.76 ± 1.93 | 24.39 ± 1.22 | <0.001 |
| Spherical equivalent, D | -3.80 ± 4.31 | -0.91 ± 2.60 | <0.001 |
| Right eye | 65 (58.6) | 46 (56.1) | 0.732 |
| Onset, days | 6.7 ± 8.2 | 8.0 ± 9.5 | 0.301 |
| Follow-up, months | 27.0 ± 15.9 | 25.3 ± 15.6 | 0.450 |
| Macula-off RD | 65 (58.6) | 50 (61) | 0.735 |
| Extent of RD | | | |
| 1–6 clock hours | 68 (61.3) | 46 (56.1) | 0.471 |
| 6–12 clock hours | 43 (38.7) | 36 (43.9) | |
| Number of tears | | | |
| Single | 91 (82) | 68 (82.9) | 0.865 |
| Multiple | 20 (18) | 14 (17.1) | |
| Location of tears | | | |
| Superior | 89 (80.2) | 63 (76.8) | 0.852 |
| Inferior | 16 (14.4) | 14 (17.1) | |
| Combined | 6 (5.4) | 5 (6.1) | |
| Increased IOP | 15 (13.5) | 6 (7.3) | 0.172 |
| VH | 1 (0.9) | 0 (0) | 1.000 |

| | Lens-sparing vitrectomy (n = 111) | Phacovitrectomy (n = 82) | P |
|---|---|---|---|
| Operation time, min | 77.9 ± 38.4 | 94.6 ± 50.9 | 0.010 |
| Vitrectomy gauge | | | |
| 23-gauge | 42 (37.8) | 31 (37.8) | 0.996 |
| 25-gauge | 69 (62.2) | 51 (62.2) | |
| Tamponade | | | |
| $SF_6$ | 91 (82) | 61 (74.4) | 0.101 |
| $C_3F_8$ | 19 (17.1) | 16 (19.5) | |
| Air | 1 (0.9) | 5 (6.1) | |
| IOL problem | NA | 5 (6) | NA |
| Reattachment with a single operation | 103 (92.8) | 75 (91.5) | 0.733 |
| Recurrence of RD | 8 (7.2) | 7 (8.5) | |
| Missed/new break | 3 | 2 | |
| PVR | 5 | 5 | |
| Final reattachment | 111 (100) | 82 (100) | |
| Epiretinal membrane | 9 (8.1) | 23 (28) | <0.001 |
| Macular hole | 1 (0.9) | 2 (2.4) | 0.576 |
| Cystoid macular edema | 0 (0) | 10 (12.2) | <0.001 |

# Results

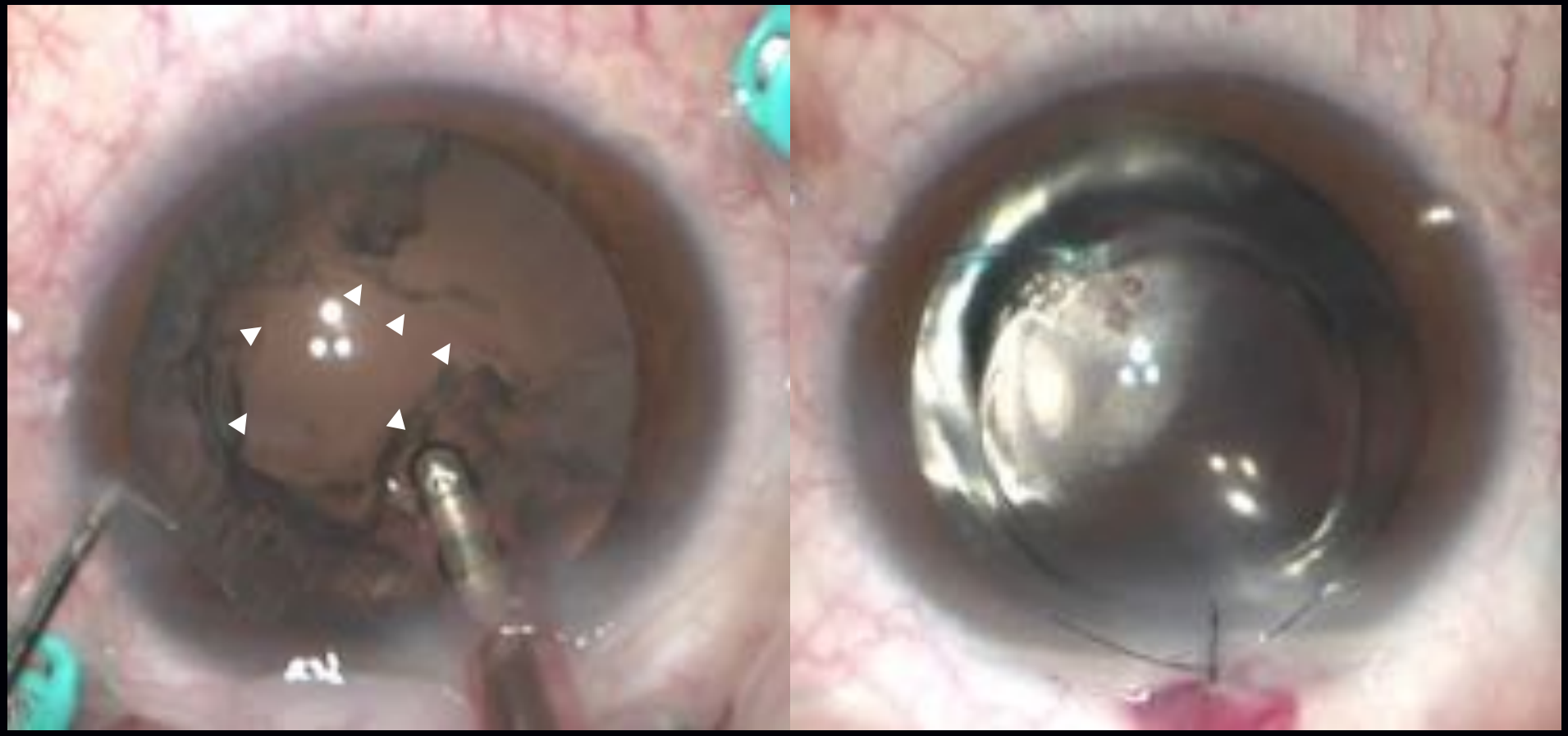


Figure: Posterior capsule rupture (arrow heard) during pachovitrectomy (left). Subsequent corneal edema due to complicated cataract surgery (right)

# Discussion

- Combined phacoemulsification and vitrectomy has no additional benefit in improving the surgical outcome of primary RRD management especially in beginners.

- Inexperienced surgeon
  - Tends to induce more complications related to cataract surgery
  - Prolonged phacoemulsification → Corneal edema, pupil constriction
    → Poor visualization during vitrectomy
  - Longer surgical time, more anterior segment manipulation
    → More PVR formation

# Discussion

- In this study, 56.8% of lens-sparing vitrectomy patients underwent subsequent cataract surgery
  - In other studies: 22.0 ~ 59.3%*
  - → considerable portion of patients did not require subsequent cataract surgery
- Experienced surgeons had have no difficulties performing the subsequent cataract surgery
- Less predictable refractive outcome (e.g., myopic shift) after phacovitrectomy always remains

∴ the decision to perform phacovitrectomy due to ensuing cataract problem is the lack of concrete evidence

- Limitations
  - Possibility of a selection bias (due to all participants in a single center)
  - Accompany cataract surgery was determined by surgeon's judgment, not randomization
  - Insufficient number of patients, which may not have produced statistically significant results
  - Different learning curves and decision making before and during the surgery among fellows
  - Functional outcomes were not analyzed in this study because of several confounding factors

* BMC ophthalmology 2016;16:216, Jpn J Ophthalmol 2016;60:395-400, Clinical ophthalmology 2014;8:1957-65, Ophthalmology 2014;121:643-48.

## CONCLUSION

- Because the experienced retinal surgeon who is familiar with cataract surgery showed high success rate of RRD vitrectomy regardless of whether the cataract surgery was combined or not, the surgical procedure could be selected based upon the surgeon's preference or the patient's need.

- In contrast, surgeon in training should be careful when interpreting previous reports that phacovitrectomy is advantageous, because accompanying cataract surgery could be an extra burden to them and consequently may affect the surgical outcome of vitrectomy for primary RRD.

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## Thank you for the attention !