Short Term PFCL Endotamponade in Complex RRD - Staged Surgical Approach

Dr Naresh Babu Kannan

MS FNB (VR) MBA (HR) FASRS

Head, Department of Vitreo-retina

Aravind Eye Hospital, Madurai

History of PFCL – 'A Boon in Complex RRD'

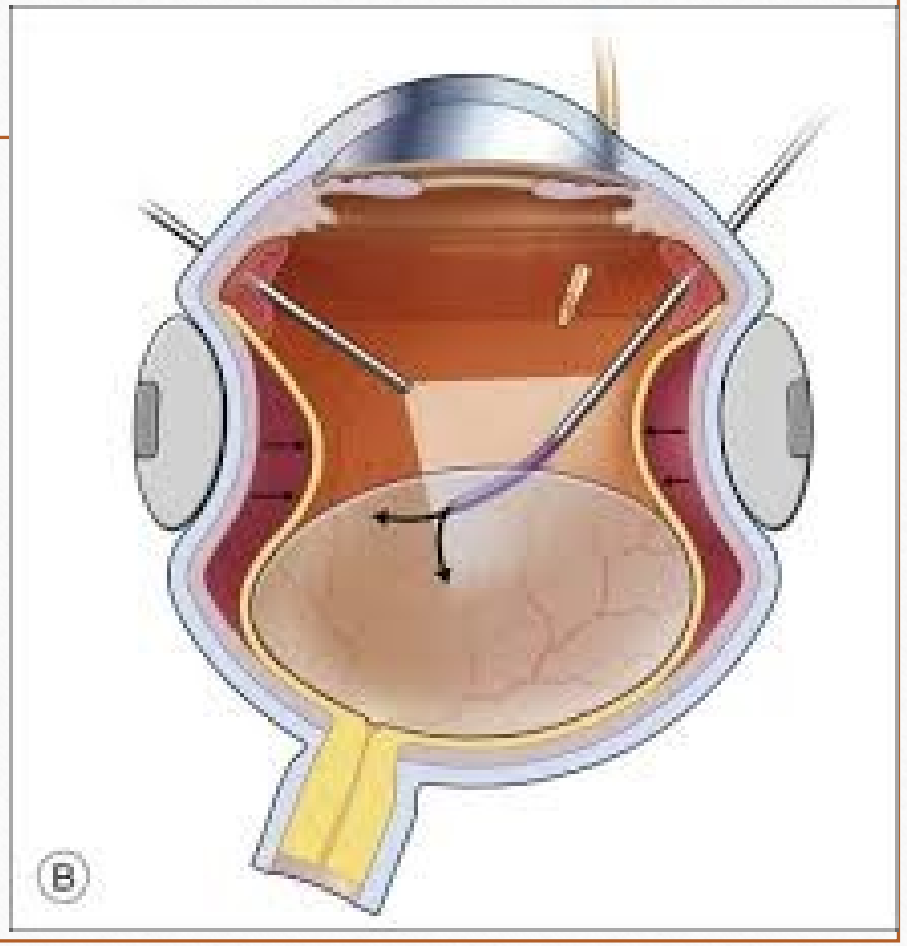
- PFCL in medicine was discovered by Clark Jr. and Gollan in 1966
- Zimmerman and Faris used PFCL in detached retina in 1982
- Stanley Chang et used PFCL in GRT and severe PVR

PFCL - Physical Properties

- Fluorochemicals with hydrogen atoms replaced by fluorine
- High specific gravity
- Moderate surface tension
- Low viscosity
- Optical clarity and transparency
- **Specific gravity 1.76 - 2.30**

PFCL molecules

- **Perfluoro-octane**
- Perfluorophenanthrene
- Perfluorodecalin
- Perfluorotributylamide
- Perfluorooctylbromide



Functions of PFCL - Complex RRD

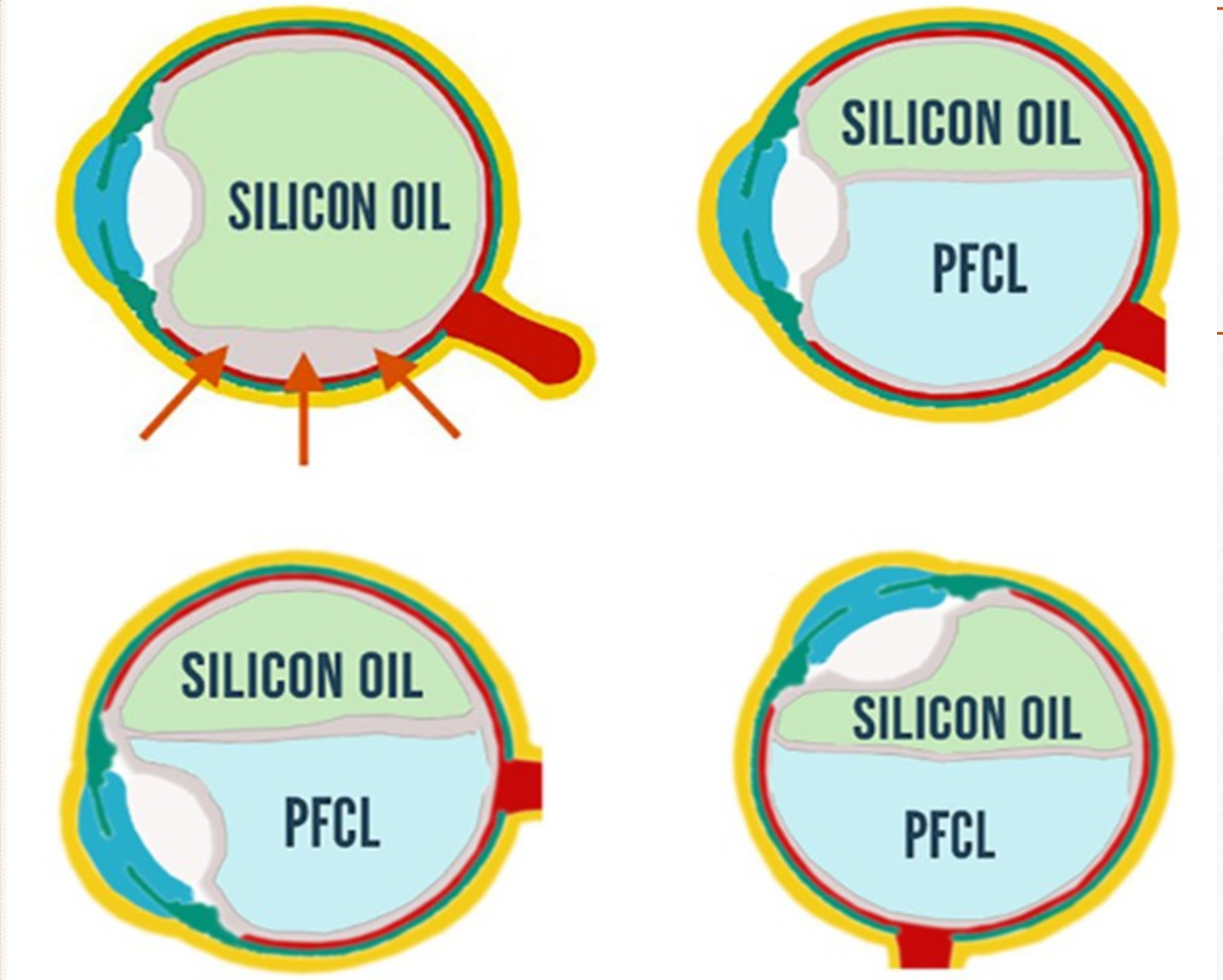
PFCL - Relocates and immobilizes detached posterior retina

SRF pushed anteriorly into the vitreous cavity (stream rolling effect)

Stabilizes macula during membrane dissection – "Third hand"

PFCL reduces dead space in inferior vitreous for migration of RPE cells, growth factors and cytokines

Prevents inferior compartmentalizatio n and reduces PVR



Trabelsi O et al. Short-Term Total Tamponade with Perfluorocarbon Liquid and Silicone Oil in Complex Rhegmatogenous Retinal Detachment with Severe Proliferative Vitreoretinopathy. Clinical Ophthalmology. 2023 Dec 31:515-25.

Two-staged surgery as an alternative to buckle–vitrectomy for rhegmatogenous retinal detachment complicated by choroidal detachment

Naresh Babu · Piyush Kohli · Karthik Kumar · Renu P. Rajan · Girish Baliga · Sagnik Sen · N. O. Ramachandran · S. Bhavani · Kim Ramasamy

- Buckle Vitrectomy (Group 1) vs Two stage surgery (Group 2) – in RRD CD
- 33 eyes -15 Group 1 and 18 Group 2
- Retinal re-attachment: 10 (66.7%) in Group 1 and 14 eyes (77.8%) in Group 2
- Visual improvement in 13 (86.7%) in Group 1 and 17 eyes (94.4%) in Group 2

Babu N, Kohli P, Kumar K, Rajan RP, Baliga G, Sen S, Ramachandran NO, Bhavani S, Ramasamy K. Two-staged surgery as an alternative to buckle-vitrectomy for rhegmatogenous retinal detachment complicated by choroidal detachment. Int Ophthalmol. 2021 Jan;41(1):135-

Table 1 Comparison of pre-operative and post-operative characteristics of both the groups

	Group 1	Group 2	*p* Value
Number of patients	15	18	
Gender			
Male	12 (80.0%)	15 (83.3%)	> 0.99
Female	3 (20.0%)	3 (16.7%)	
Mean age (years)	55.3 ± 19.6	46.1 ± 14.0	0.124
History of trauma	2 (13.3%)	5 (27.8%)	0.413
Lens status			
Phakic	4 (26.7%)	4 (22.2%)	0.825
Pseudophakic	11 (73.3%)	14 (77.8%)	
Intraocular pressure	9.1 ± 4.0 mmHg	8.6 ± 5.2 mmHg	0.755
PVR > C	2 (13.3%)	3 (16.7%)	> 0.999
Presence of MH	0	3 (16.7%)	0.233
Median pre-operative BCVA	logMAR 2.30, i.e. finger counting	logMAR 2.60, i.e. hand movement	0.256
Anatomical success rate after 1 surgery	10 (66.7%)	14 (77.8%)	0.697
Average number of surgeries required for anatomical success	1.40	1.39	0.963
Median post-operative BCVA	logMAR 1.08 i.e. 20/240	logMAR 1.04 i.e. 20/240	0.884
Number of eyes with visual improvement	13 (86.7%)	17 (94.4%)	0.579
Number of eyes with final BCVA ≥ 6/60	7 (46.7%)	9 (50.0%)	> 0.999

Babu N, Kohli P, Kumar K, Rajan RP, Baliga G, Sen S, Ramachandran NO, Bhavani S, Ramasamy K. Two-staged surgery as an alternative to buckle-vitrectomy for rhegmatogenous retinal detachment complicated by choroidal detachment. Int Ophthalmol. 2021 Jan;41(1):135-

> Eur J Ophthalmol. 2020 Jul 22;1120672120945108. doi: 10.1177/1120672120945108. Online ahead of print.

Medium-term tamponade with vitrectomy and perfluorodecalin for the management of complex retinal detachments

Luke K Chehade [1], Brad Guo [1], Weng Chan [1], Jaqjit Gilhotra [1]

- 85 eyes of Complex RD managed with PPV where PFD (C10 F18) as medium-term tamponade
- Mean follow-up:16.0 ± 2.67 months
- The cases included **Inferior detachment** (28 patients), **PVR-C** (19 patients), **Re-detachment (9 patients), Inferior detachment + PVR-C** (6 patients), **GRT** (6 patients), inferior detachment + GRT (4 patients), **TRD** (4 patients), and **traumatic detachment** (4 patients).
- **Anatomical success in 98.8%** along with significant improvement in BCVA
- No reports of retinal toxicity

Perfluorocarbon liquids as postoperative short-term vitreous substitutes in complicated retinal detachment

Ferdinando Bottoni, Maurizio Sborgia, Paolo Arpa, Nino De Casa, Emanuela Bertazzi, Marzio Monticelli, Vito De Molfetta

Institute of Biomedical Sciences, University of Milan, Department of Ophthalmology, San Gerardo Hospital, Monza, Italy

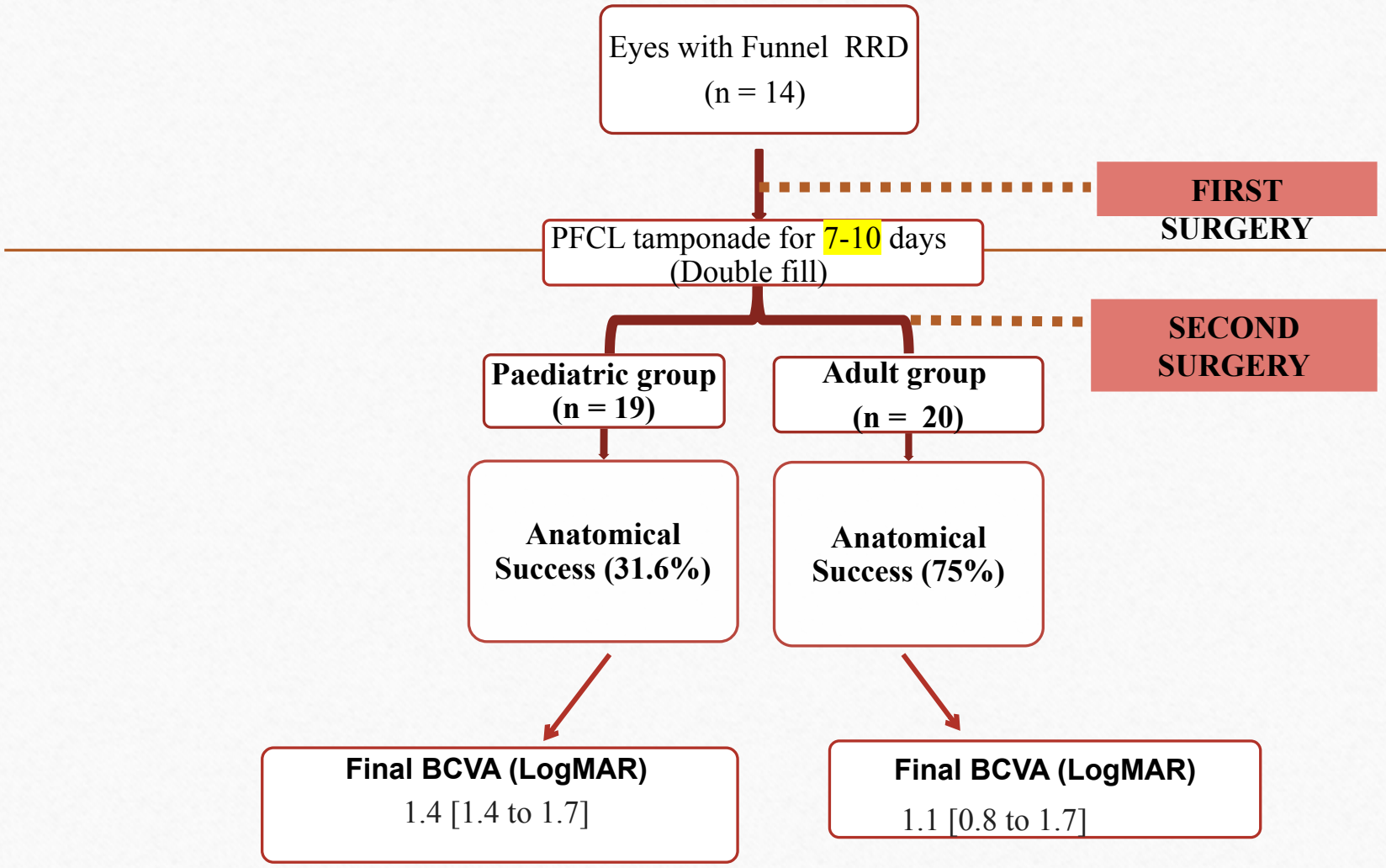
Received: 10 November 1992 / Accepted: 7 May 1993

- 32 eyes of 32 selected patients with complicated RD
- Anatomic attachment of the retina was achieved with one operation in 25 (78%) of the 32 eyes with a median follow-up of 8 months (mean 8.4 months).
- 88% of reattached eyes showing a final VA > 5/200

Severe PVR / Closed Funnel RRD

- PFCL permits initial dissection of posterior PVR
- Opens up the funnel to provide view for better removal of membranes
- In Recurrent inferior RD with PVR - Need for relaxing retinectomy obviated

Short-Term PFCL Tamponade in Closed funnel RD (PVR D2-3)




25
-0.4
Vacuum
Cut Rate
0

Short-Term Total Tamponade with Perfluorocarbon Liquid and Silicone Oil in Complex Rhegmatogenous Retinal Detachment with Severe Proliferative Vitreoretinopathy

Omar Trabelsi,[1] Mejda Bouladi,[2] Amel Ouertani,[1] and Ahmed Trabelsi[1]

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- 52 eyes
- Retina re-attached in 48/52 eyes (92.3%) including 28 eyes (58.3%) without SO and 20 eyes (41.7%) with prolonged SO tamponade.
- VA improved in 45 eyes (86.6%) ($P<0.001$), remained stable in 4 eyes (7.7%) and decreased in 3 eyes (5.7%).

> Retina. 2013 Apr;33(4):791-7. doi: 10.1097/IAE.0b013e31826a6978.

Pars plana vitrectomy with medium-term postoperative perfluoro-N-octane for recurrent inferior retinal detachment complicated by advanced proliferative vitreoretinopathy

Eric J Sigler [1], John C Randolph, Jorge I Calzada, Steve Charles

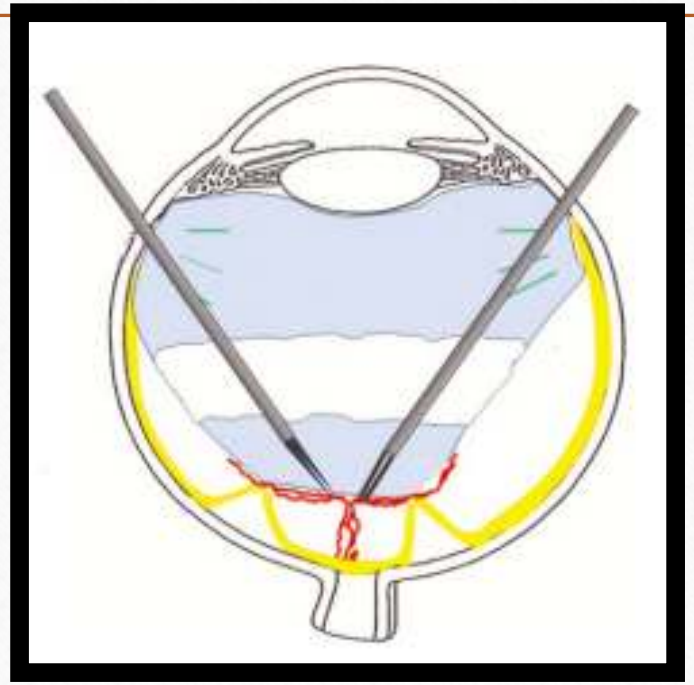
- Recurrent inferior RD and Grade C PVR
- **"Medium-term" PFO for 2- to 3-weeks**
- 44 eyes, Mean follow-up: 30.71 ± 12.92 months
- Successful re-attachment 86%
- *Medium-term PFO offers efficacious tamponade effect*

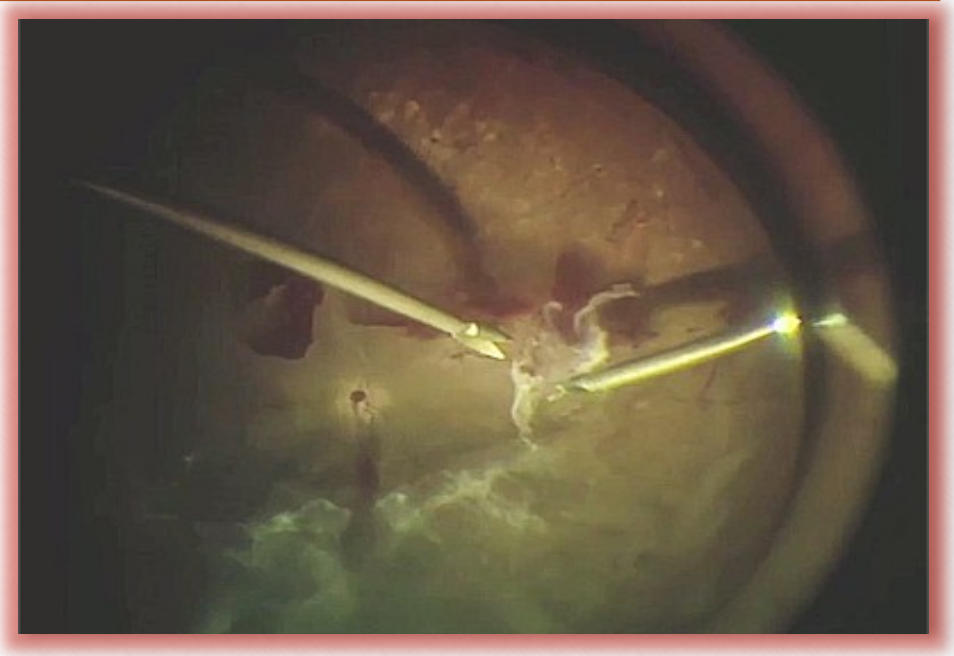
PFCL in PVR Membranes

PVR Membranes

- Delamination and segmentation cannot be done (tight adherence with retinal distortion)
- Peeling or stripping to be done – Difficult in a mobile and thin retina
- Bimanual dissection preferred
- Tools of the Trade - Retinal pick, forceps, membrane spatula or Tano's
- Ideal areas to begin: Center of fixed retinal folds and Areas of stiff retina

Bimanual Dissection





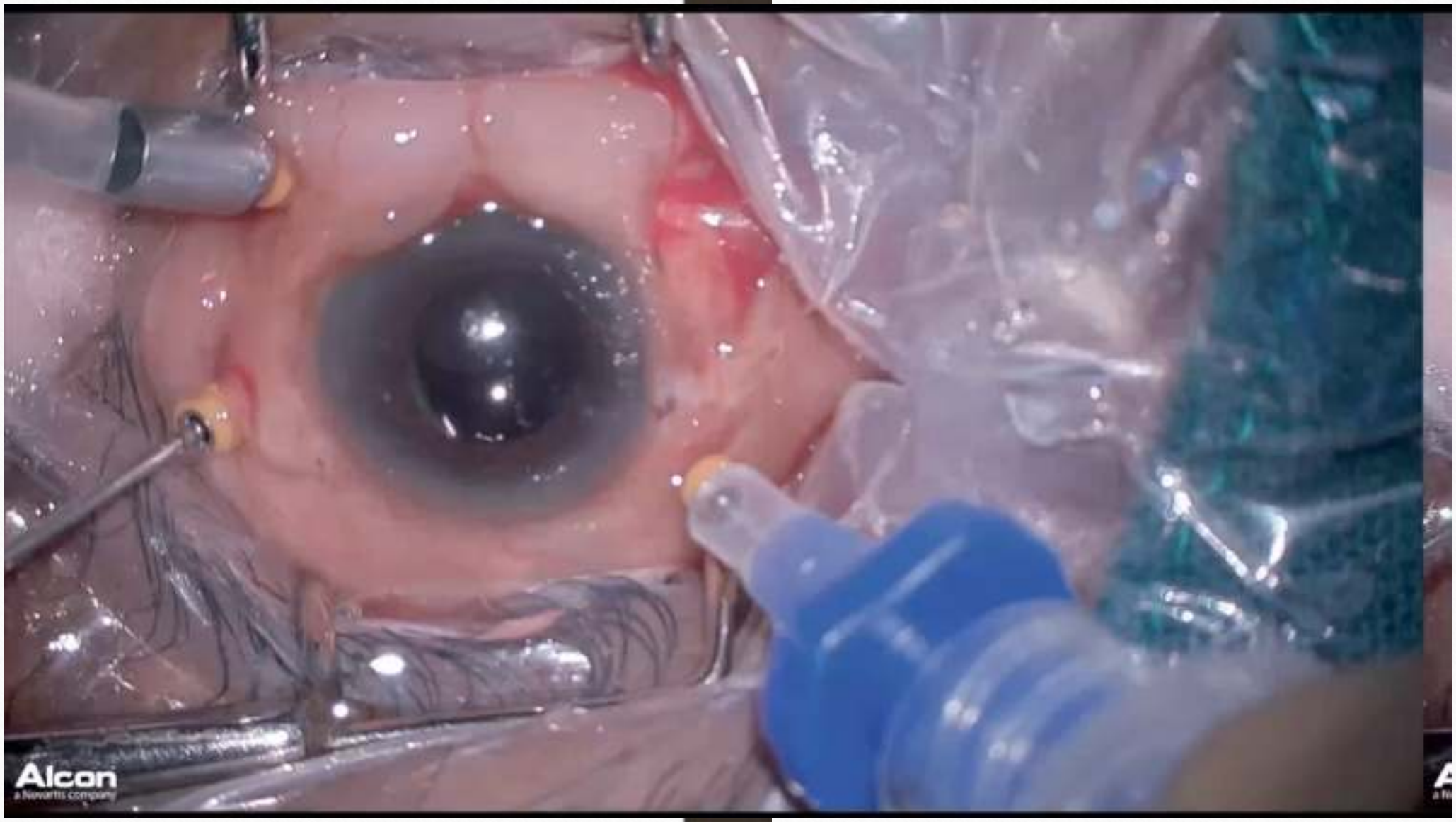
Relaxing Retinectomy

- Diathermy to surrounding retina
- Retina elevated and cut with scissors or cutter
- GOAL : Surgical excision of entire retinal contracture with *adjacent healthy retina*

  - To optimize re-apposition to RPE and avoid residual proliferative tissue
- ***PFCL determines extent of RR:***

PFCL to stabilize posterior retina – After RR, PFCL injected again - *if retina remains elevated or PFCL migrates subretinally* – Membranes removed - Retinectomy enlarged till retina flat under PFCL

Peyman 2nd Ed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PFCL in GRT

Giant Retinal Tear

- PFCL stabilizes the detached retina and displaces the subretinal fluid
- Unfolding of GRT
- Prevents inversion of flap and posterior slippage

Posterior Segment

- **Total GRT**
- Temporal RD with detached macula

J Vitreoretin Dis. 2024 Dec 13;9(2):144-150. doi: 10.1177/24741264241305105.
eCollection 2025 Mar-Apr.

Short-Term Endotamponade With Perfluorocarbon Liquids for Giant Retinal Tear-Associated Retinal Detachment

Naresh Babu Kannan [1], MuthuKrishnan Vallinayagam [1], Tanya Balakrishnan [1], Avik Dey Sarkar [1], Renu P Rajan [1], Kim Ramasamy [1]

Surgical Outcome in GRT RRD – *Conventional versus Two-Staged Surgery with PFCL Tamponade*

Purpose:

- To compare the surgical outcomes of RD associated with Giant Retinal Tear (GRT-RD) in two-staged surgery with PFCL tamponade against conventional single-staged PPV

Kannan NB, Vallinayagam M, Balakrishnan T, Dey Sarkar A, Rajan RP, Ramasamy K. Short-Term Endotamponade With Perfluorocarbon Liquids for Giant Retinal Tear-Associated Retinal Detachment. J Vitreoretin Dis. 2024 Dec 13;9(2):144-150

METHODS

- Retrospective analysis of 74 eyes of 68 patients with GRT-RD, operated over five years
- Patients underwent
  - ❑ Two-stage surgery with a short-term PFCL endotamponade (Cluster A; n=52)
  - ❑ Conventional single stage surgery (Cluster B; n=22)
- Minimum follow up 12 months
- Primary outcome: Anatomic reattachment
- Secondary outcomes: Final visual improvement, re-surgery rate and IOP

Results

- Mean age: 48.19 ± 15.73 years
- Male preponderance (n=67, 90.54%) was noted
- High myopia in 18.92%, trauma in 13.51% and PVR in 13.51%
- Final retinal attachment: 82.69% (Cluster A) and 72.73% (Cluster B)
- Baseline BCVA and final BCVA:

  1.58±0.56 and 0.83±0.52 (cluster A)

  1.13±0.84 and 0.73±0.5 (cluster B)

Conclusion

- Short term PFCL improves anatomical and functional outcomes in GRT-RD
- PFCL ‘steamrolls’ SRF and flattens detached retina
- Enables better uptake of barrage laser
- Reduces risk of slippage of retina

PFCL in Paediatric RD

Paediatric RRD

- Trauma
- GRT
- High myopia
- FEVR related detachment
- Coloboma related RRD

Efficacy of Short-term Postoperative Perfluoro-n-octane Tamponade for Pediatric Complex Retinal Detachment

AYAKO IMAIZUMI, SHUNJI KUSAKA, HIROE NOGUCHI, YOSHIKAZU SHIMOMURA, AND SHOICHI SAWAGUCHI

- 10 eyes of 9 children (6 boys and 3 girls)
- Retinas reattached in 8 eyes (80%)
- No apparent adverse events related to PFO

Surgical Technique

Perfluoro-n-octane-assisted mega Weiss-ring technique for posterior vitreous detachment induction in retinal detachment

Naresh Babu, Jayant Kumar, Piyush Kohli, Kim Ramasamy

- PVD induction by a novel technique to completely and safely remove vitreous in a single sheet
- A ring similar to the natural Weiss ring created - ***"The Mega Weiss Ring technique"***

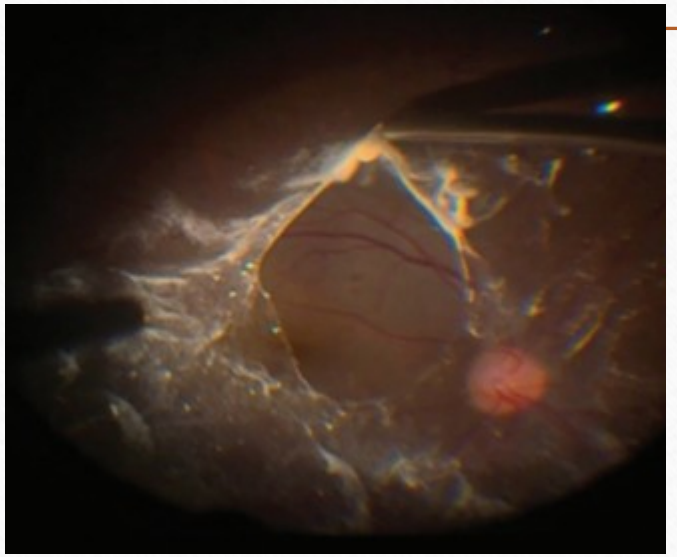
Indications

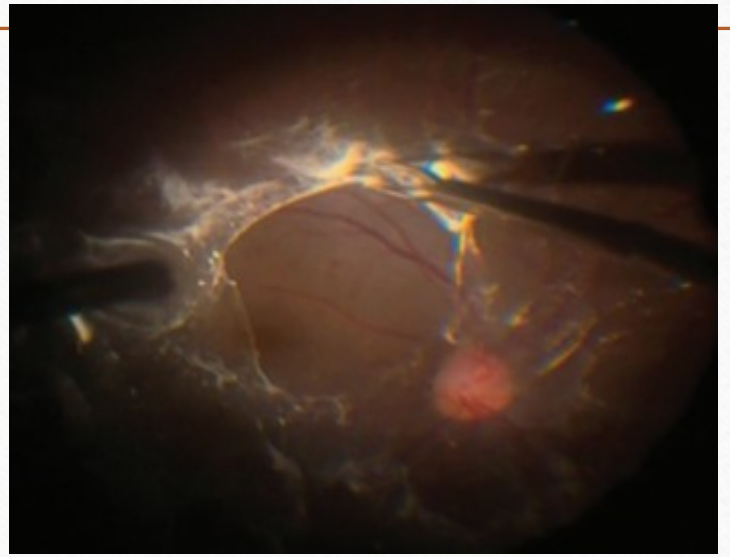
- Pediatric cases with no pre□existing PVD
- Macular hole RD
- Myopic RD
- Peripheral breaks and partial PVD

The Technique

- Core vitrectomy and injection of 0.2 ml TA to stain posterior cortex
- **PFCL injected on the posterior pole**
- Stroking of vitreous sheet in a centrifugal fashion and form a ring of 5 DD size
- The sheet is lifted from edges of the ring using ILM forceps
- Potential space between vitreous sheet and detached retina filled by PFCL
- **PFCL causes a gradual peripheral extension of PVD**

"Mega Weiss Ring" Technique





- Babu N, Kumar J, Kohli P, Ramasamy K. Perfluoro-n-octane-assisted mega Weiss-ring technique for posterior vitreous detachment induction in retinal detachment. Indian J Ophthalmol 2019;67:1463-5

STAGED SURGERY - Summary

- **Good surgical outcome**
- **Clinically no apparent toxicity**
- **Lack of need for strict post operative prone positioning**
- **Enhanced patient comfort**
- **Reduced operating time**

Thank You