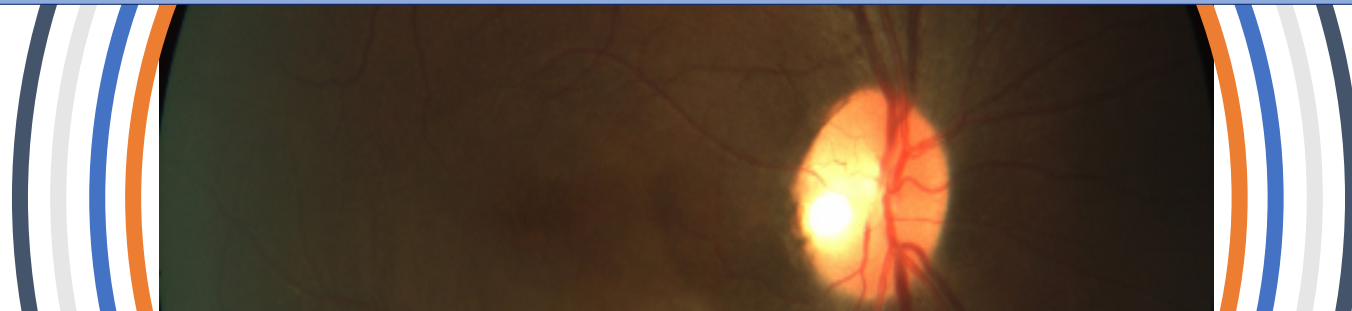




Scleral Patch Graft in Optic Disc Pit Maculopathy



Dr. K. Naresh Babu MS, FNB(VR), MBA(HR), FASRS

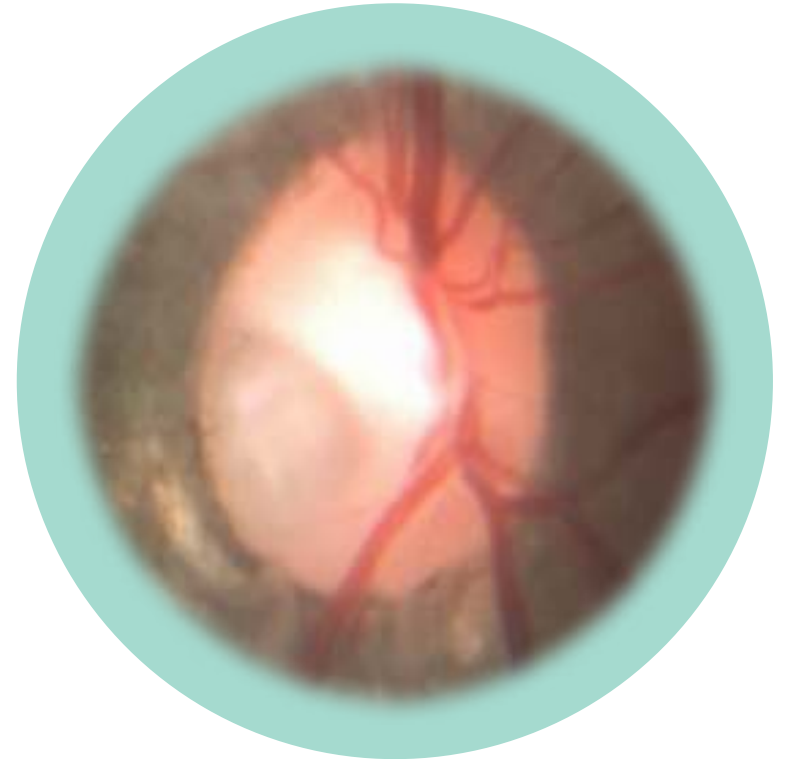
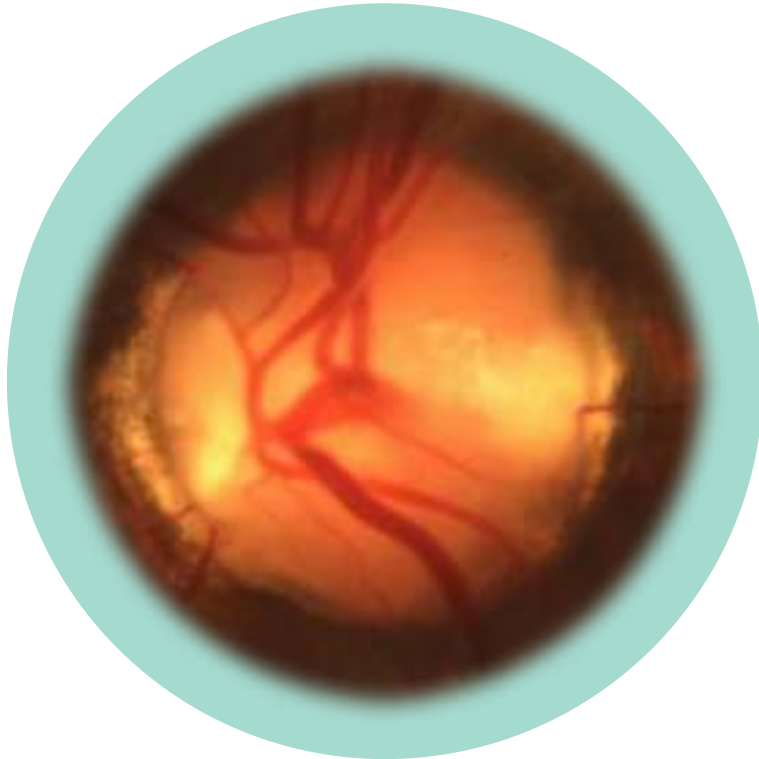
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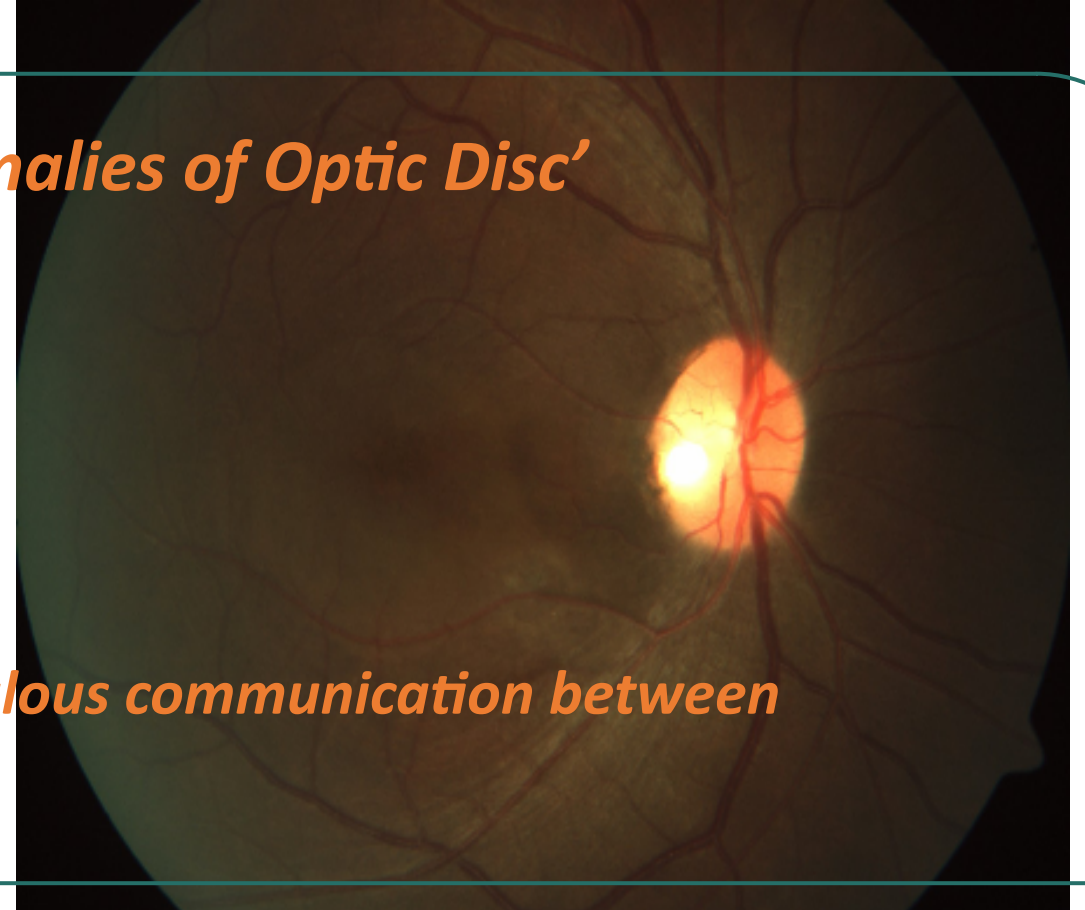
Introduction

- **Optic Disc Pit** - Congenital cavitory anomalies of ONH
 - Imperfect closure of embryonic fissure
- Rare - 1 in 11,000 population



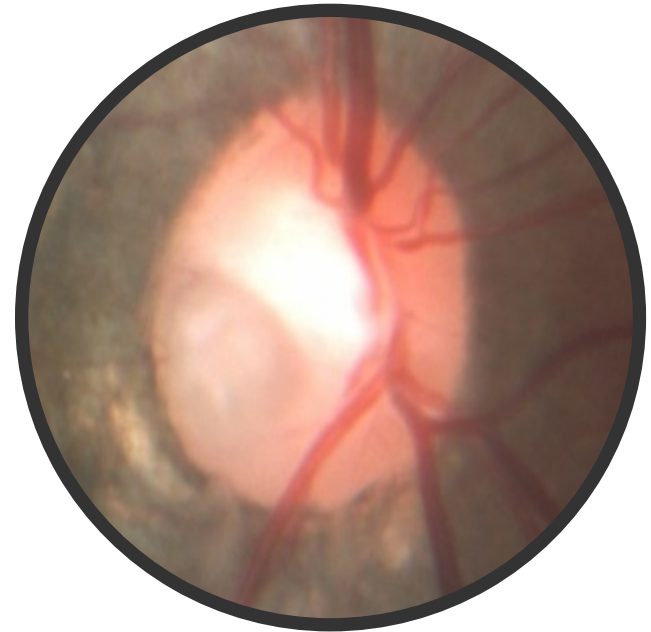
What is Optic Disc Pit..?

- Spectrum of *'Congenital cavitory anomalies of Optic Disc'*
- Includes:
 - ONH Pit
 - ONH Coloboma
 - Morning glory disc
 - Extrapapillary excavation
- Abnormal structure of optic nerve - *Anomalous communication between intraocular and extraocular spaces*



Optic Disc Pit

- Unilateral (85%), small, oval, hypo-pigmented gray–white excavation at OD
- SITE: Temporal or infero-temporal
- Congenital – Mostly
- Acquired - Secondary to Glaucoma and Myopia
- Most are sporadic, AD inheritance reported



❖ Theodossiadis GP, Panopoulos M, Kollia AK, Georgopoulos G. Long-term study of patients with congenital pit of the optic nerve and persistent macular detachment. *Acta Ophthalmol.* 1992;**70**(4):495–505

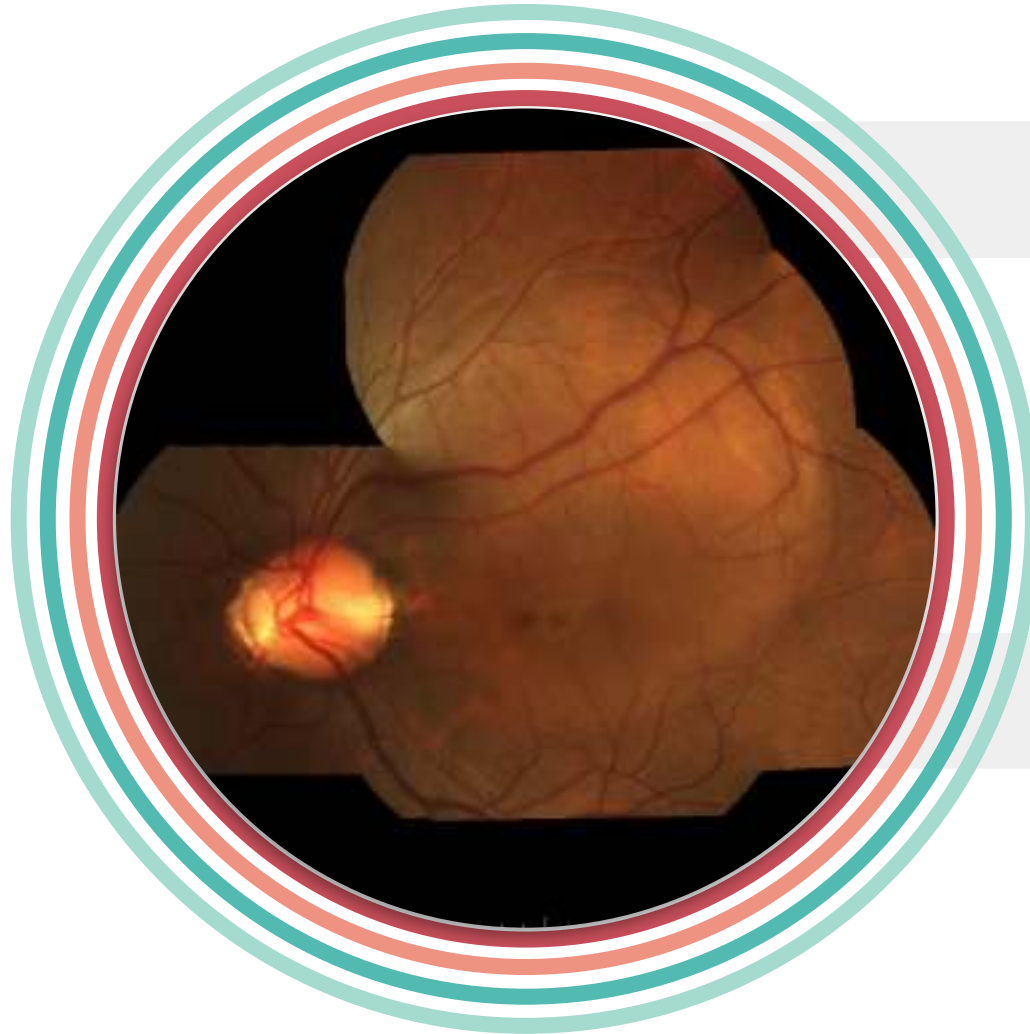
ODPM

Serous detachment

Cystic degeneration

Schisis

Degenerative pigmentary changes



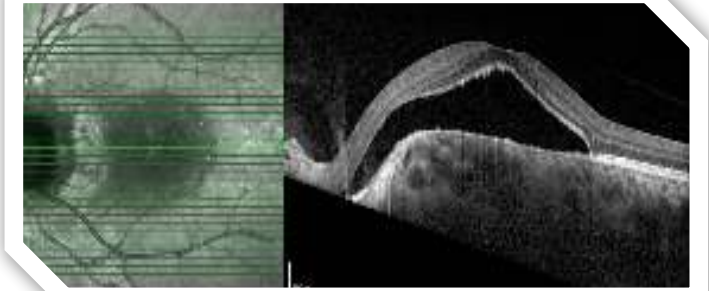
- 25-75% visual deterioration – ODPM
- Third or fourth decade

- Untreated - Poor prognosis
- 80% < 20/200

❖ Bloch E, Georgiadis O, Lukic M, et al. Optic disc pit maculopathy: new perspectives on the natural history. *Am J Ophthalmol* 2019; 207: 159–169.

Theories - Source of SRF ?

- Passage of *vitreous fluid* from the pit to sub-retinal space
- Abnormal *blood vessels* at base of the pit
- *CSF* from Subarachnoid space
- Both **PVD** and **macular traction** play a vital role in pathogenesis
- **Lincoff** - Fluid from ODP creates a schisis-like inner layer separation and detachment at outer layer of macula is a secondary phenomenon



- ❖ Brown GC, Shields JA, Patty BE, Goldberg RE. Congenital pits of the optic nerve head. Experimental studies in collie dogs. *Arch Ophthalmol*. 1979;97:1341–4.
- ❖ Georgalas I, Kouri A, Ladas I, Gotzaridis E. Optic disc pit maculopathy treated with vitrectomy, internal limiting membrane peeling, and air in a 5-year-old boy. *Can J Ophthalmol*. 2010;45:189–91.

Treatment

- Advances in retinal imaging offer newer insights into various therapeutic options
- **Purpose:** To produce a permanent barrier for fluid migration out of ODP
- **Vitrectomy & ILM peeling:**
Relieves AP & tangential traction
- **Juxta-papillary Laser:**
Produces scar - prevents intra-retinal & sub-retinal fluid migration



- ❖ Hirakata A, Inoue M, Hiraoka T, et al. Vitrectomy without laser treatment or gas tamponade for macular detachment associated with an optic disc pit. Ophthalmology 2012;119:810–8.

Treatment

- Speculation: Sealing the pit may permanently obscure the source of fluid
(i.e. The OD pit itself)
- ***Adjuncts to seal OD Pit:***
 - ❖ Fibrin glue
 - ❖ ILM flap
 - ❖ Autologous scleral graft
 - ❖ Platelet Rich Plasma

❖ Travassos AS, Regadas I, Alfaiate M, et al. Optic pit: novel surgical management of complicated cases. Retina 2013;33:1708–14.

Comparison of various surgical techniques for optic disc pit maculopathy: vitrectomy with internal limiting membrane (ILM) peeling alone versus inverted ILM flap 'plug' versus autologous scleral 'plug'

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ABSTRACT

Aim To compare the anatomical and visual outcomes of vitrectomy with internal limiting membrane (ILM) peeling alone versus inverted ILM flap to plug the pit versus autologous scleral plug for the treatment of optic disc pit maculopathy (ODP-M).

Methods This retrospective study included 23 patients (23 eyes) who underwent 25G pars plana vitrectomy, ILM peeling and gas tamponade. While the pit was not plugged in group 1 (n=8), inverted ILM flap and autologous scleral flap were used to plug the pit in group 2 (n=7) and group 3 (n=8), respectively. Complete anatomical success was defined as total resolution of subretinal fluid (SRF) and macular schisis on optical coherence tomography while visual success was defined as a gain of at least 2 Snellen lines 1 year after surgery.

Results Baseline characteristics were similar in all three groups. Mean central foveal thickness and SRF decreased in all three groups ($p < 0.05$). Complete anatomical success was achieved in 25.0%, 85.7% and 87.5% eyes while visual success was achieved in 12.5%, 28.6% and 12.5% eyes in groups 1, 2 and 3, respectively. One eye (4.3%) in group 2 developed full-thickness macular hole at 1 month post-surgery. After complete resolution, there was no recurrence of fluid.

Conclusion ODP-M has a better surgical outcome if the pit is plugged. Both inverted ILM flap and autologous scleral plug are equally efficacious adjuncts to plug the pit.

plugging the ODP have been shown to improve the surgical outcome.¹⁻⁴ The adjuncts available to seal the pit include autologous platelets, fibrin glue, inverted or transplanted ILM flap, and autologous scleral flap.^{1-4 6-14} However, most of the previous studies are single-arm, non-comparative studies. Literature lacks studies comparing outcomes of vitrectomy alone with vitrectomy and plugging of pit. Also, comparison between various adjuncts to plug the pit has never been done.

This study was done to compare the anatomical and visual outcome of ODP-M after vitrectomy with ILM peeling alone versus vitrectomy with inverted ILM flap to plug the pit versus vitrectomy with autologous scleral plug (SP) to plug the pit.

MATERIALS AND METHODS

This retrospective study was done at Aravind Eye Hospital, Madurai, India. Records of all the patients who underwent vitrectomy for ODP-M from 2012 to 2018 were reviewed. All the surgeries were performed by a single surgeon (NB).

The patients who underwent vitrectomy for ODP-M were included in the study. Those with axial length < 22 mm or > 24 mm, any coexisting ocular pathologies affecting vision and those lost to follow-up before 1 year were excluded from the study.

All the patients underwent complete ophthalmological

Management of double optic disc pit complicated by maculopathy

*Naresh Babu, Girish Baliga, Piyush Kohli,
Kim Ramasamy*

Optic disc pit (ODP) is a rare, congenital, cavitary anomaly of the optic disc. Usually, single ODP occurs in an eye and only eleven cases of double ODP have been reported so far in the literature. In the present study, we report a case of unilateral double ODP, with both the pits present in opposite disc segments. They were associated with serous retinal detachment at the macula and retinal pigment epithelium degeneration nasal to disc. The case was managed successfully with vitrectomy, internal limiting membrane peeling, plugging the pits with homologous partial-thickness scleral flaps, and gas tamponade.

Key words: Optic disc pit maculopathy, scleral plug, vitrectomy

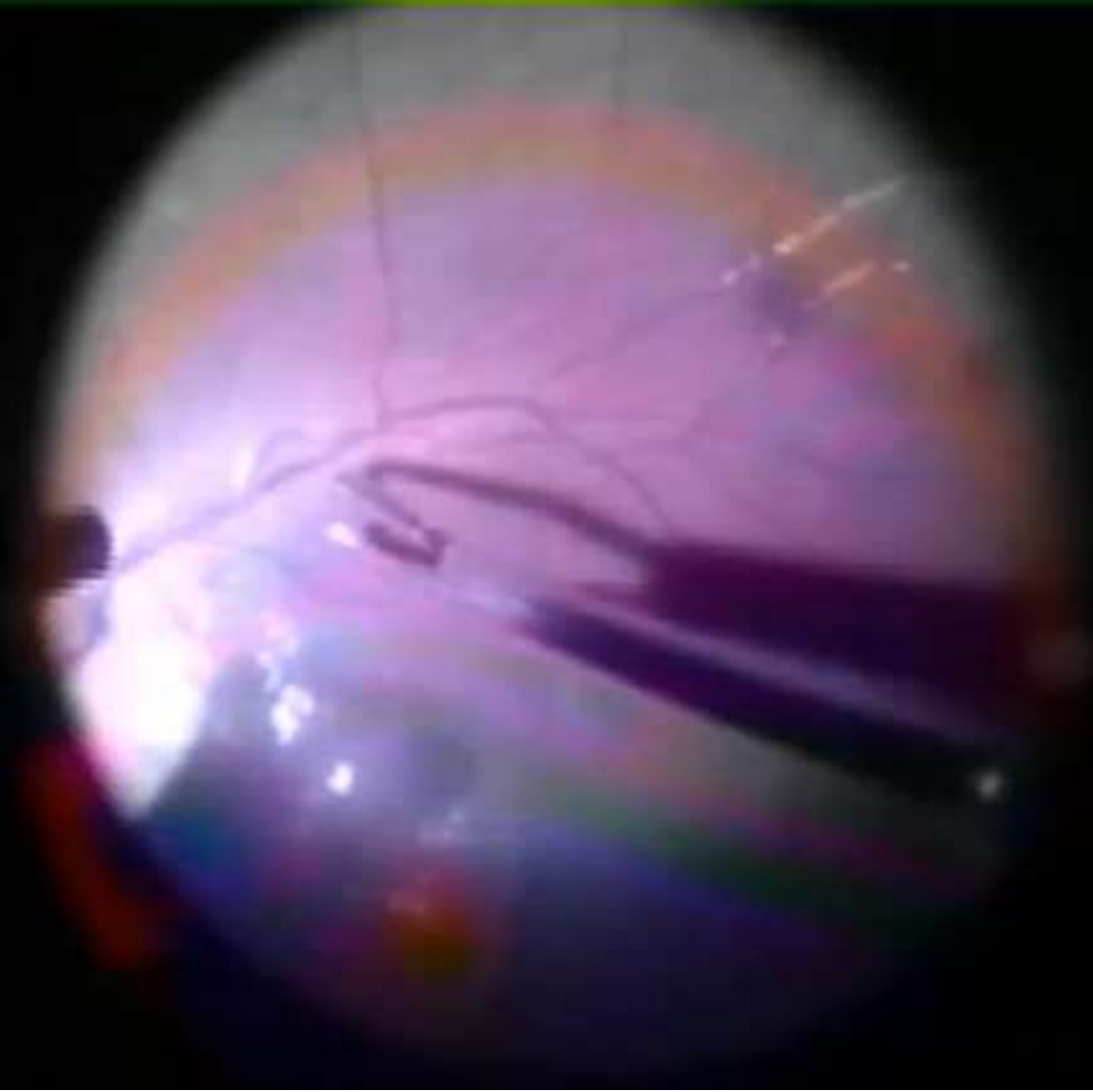
macula; and RPE degeneration nasal to disc [Fig. 1a]. Fundus autofluorescence showed hypo-autofluorescence in the region corresponding to SRD at macula; and hypo-autofluorescence nasally in the region corresponding to RPE degeneration, which was bordered by a hyper-autofluorescence ring [Fig. 2].

Optical coherence tomography (OCT) through the disc showed two distinct hyporeflective areas, one each in inferotemporal and inferonasal segments, suggestive of two ODPs. Communication between the optic disc and retinal layers was seen in the region of the inferotemporal pit [Fig. 3a and b]. OCT through the macula showed serous retinal detachment (SRD, 1353 μ) and intraretinal fluid but no outer retinal dehiscence (ORD) [Fig. 4a].

After taking informed consent from the patient, he underwent 25/23-gauge (G) pars plana vitrectomy (PPV). Posterior vitreous detachment induction was followed by internal limiting membrane (ILM) peeling 2-disc-diameter around the fovea, fluid-air exchange (FAE), and active internal subretinal fluid (SRF) drainage through the pit. Although

ILM PLUG

SURGEON: DR. NARESH BABU

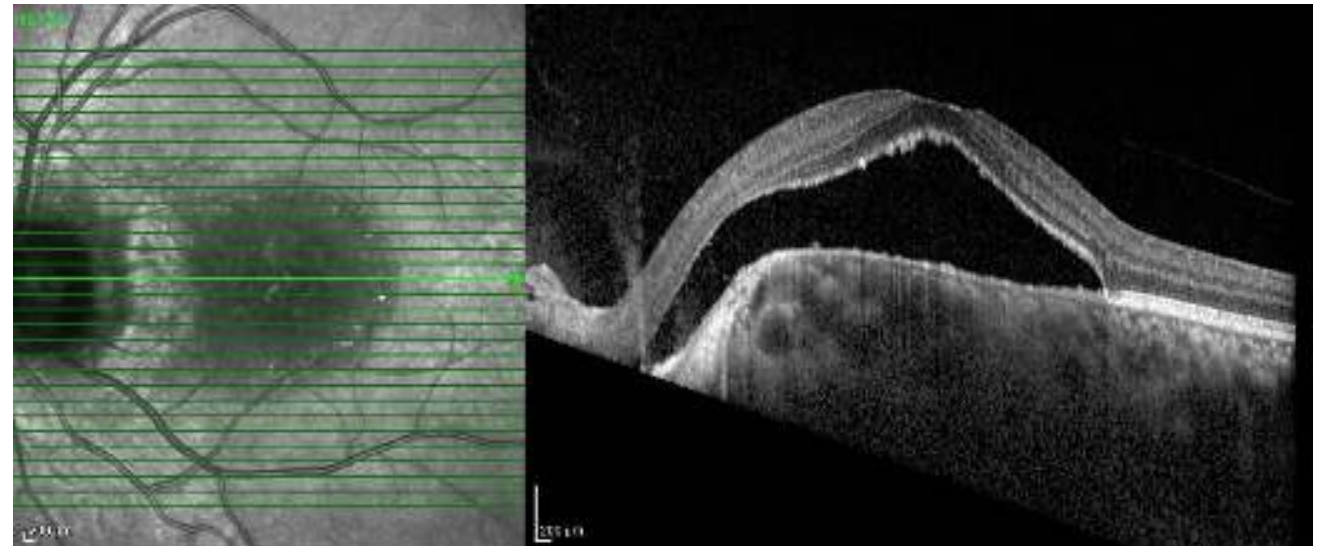
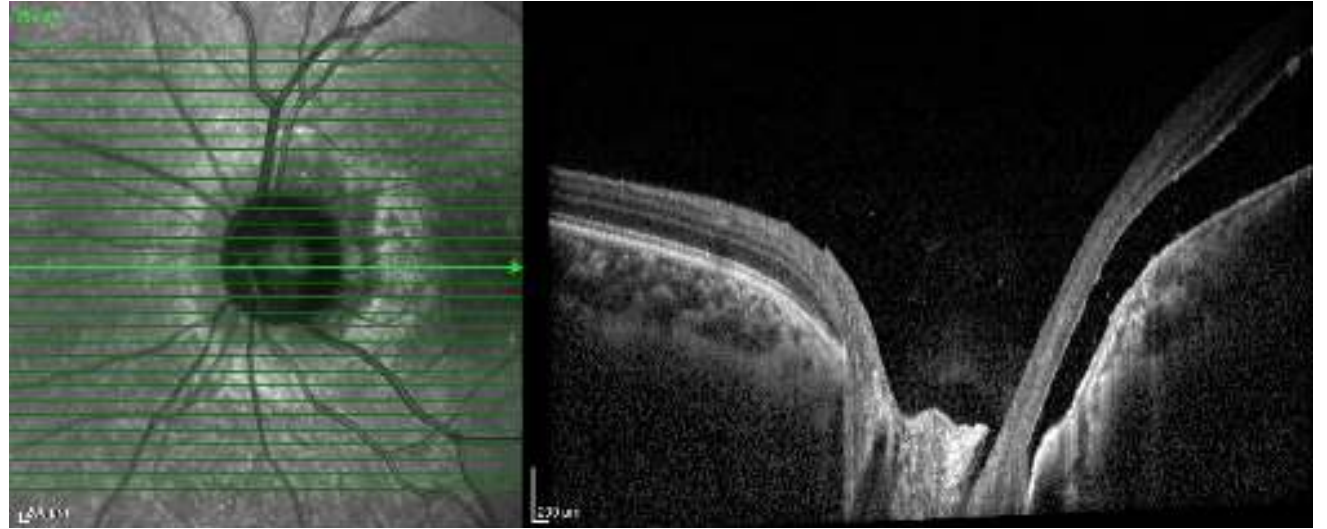


SCLERAL PLUG

CASE SCENARIOS

CASE 1

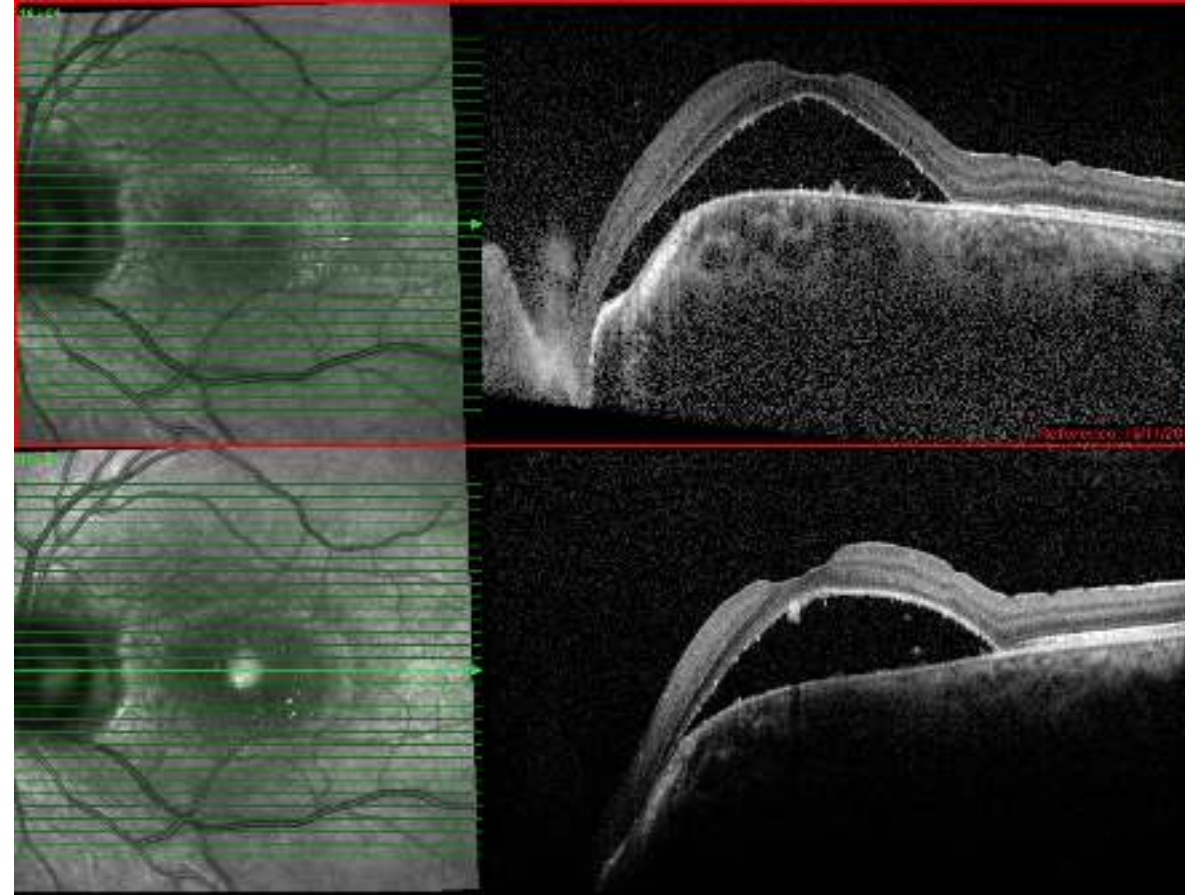
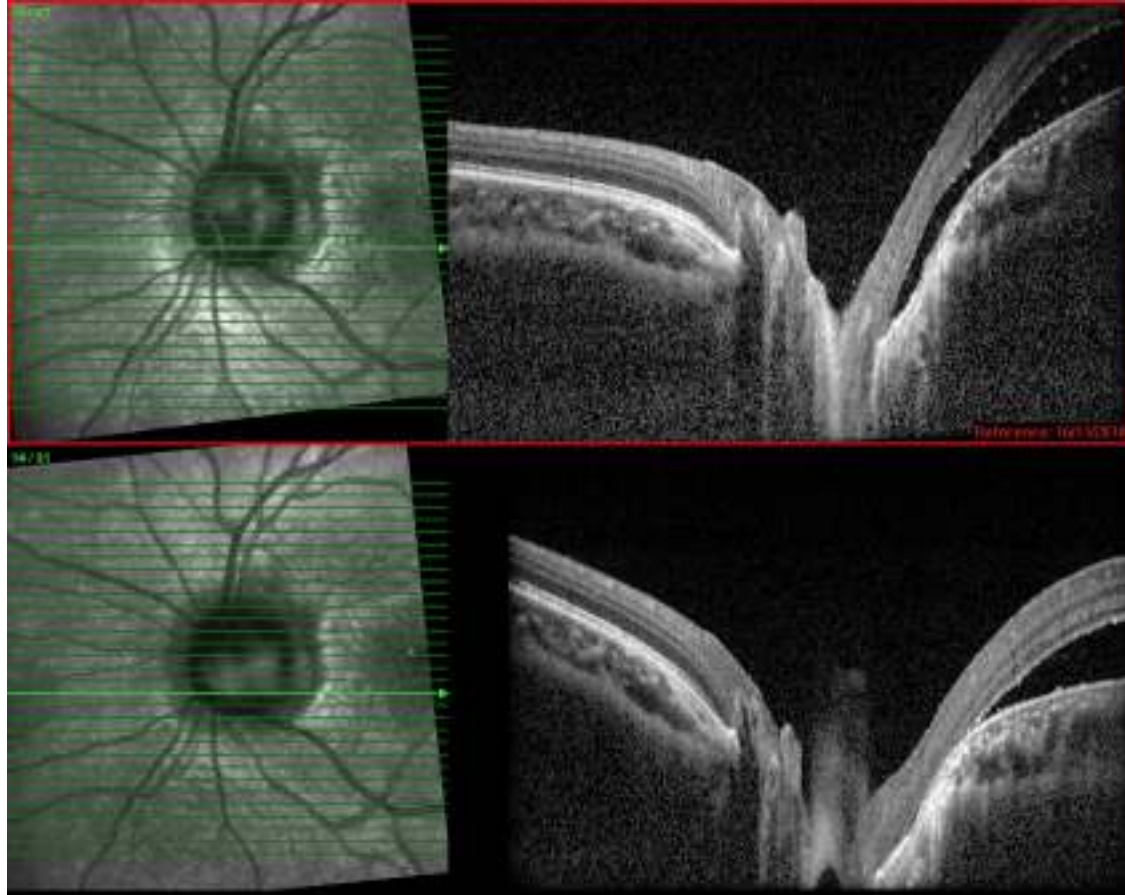
- 22 years old female
- Blurring LE 4-5 months
- BCVA LE 20/20p
- Sx: LE PPV + Scleral plugging of OD + ILMP + SF6



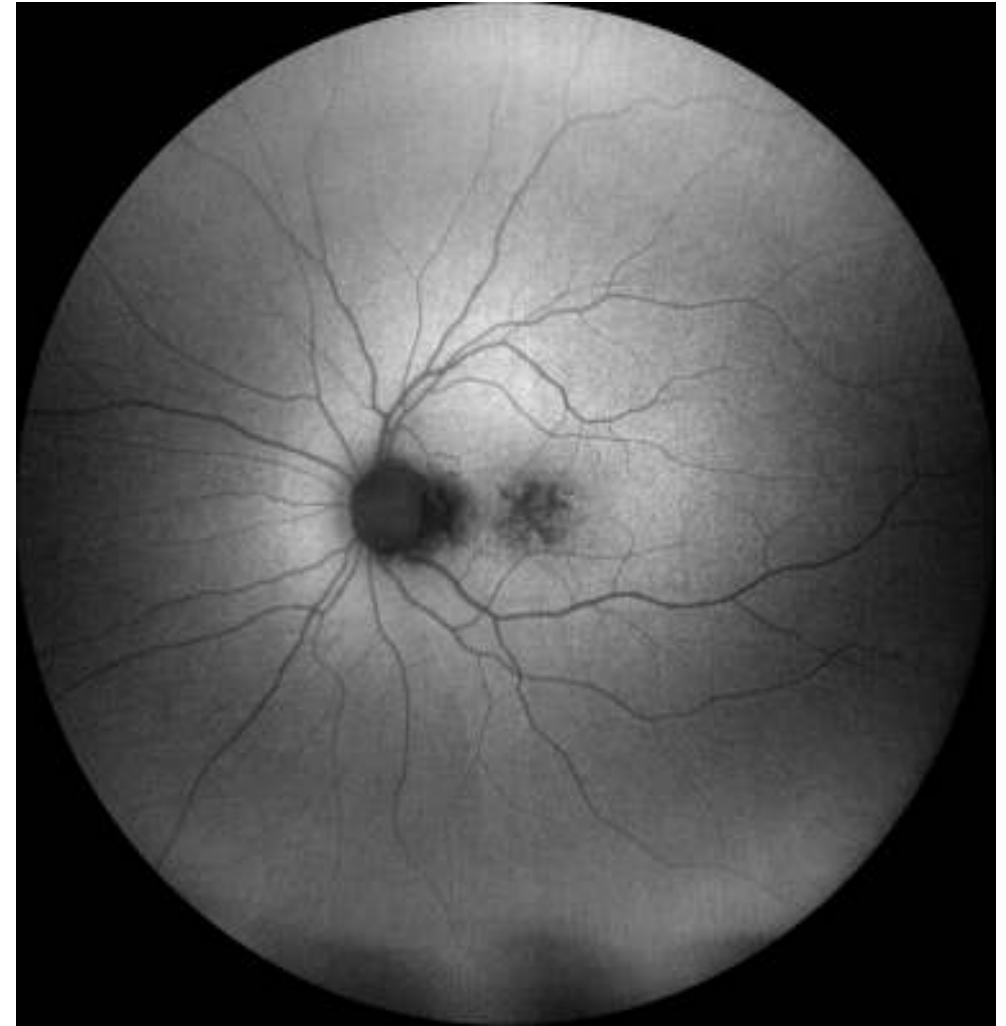
POD 30 - BCVA *20/20*, Partial resolution of metamorphopsia



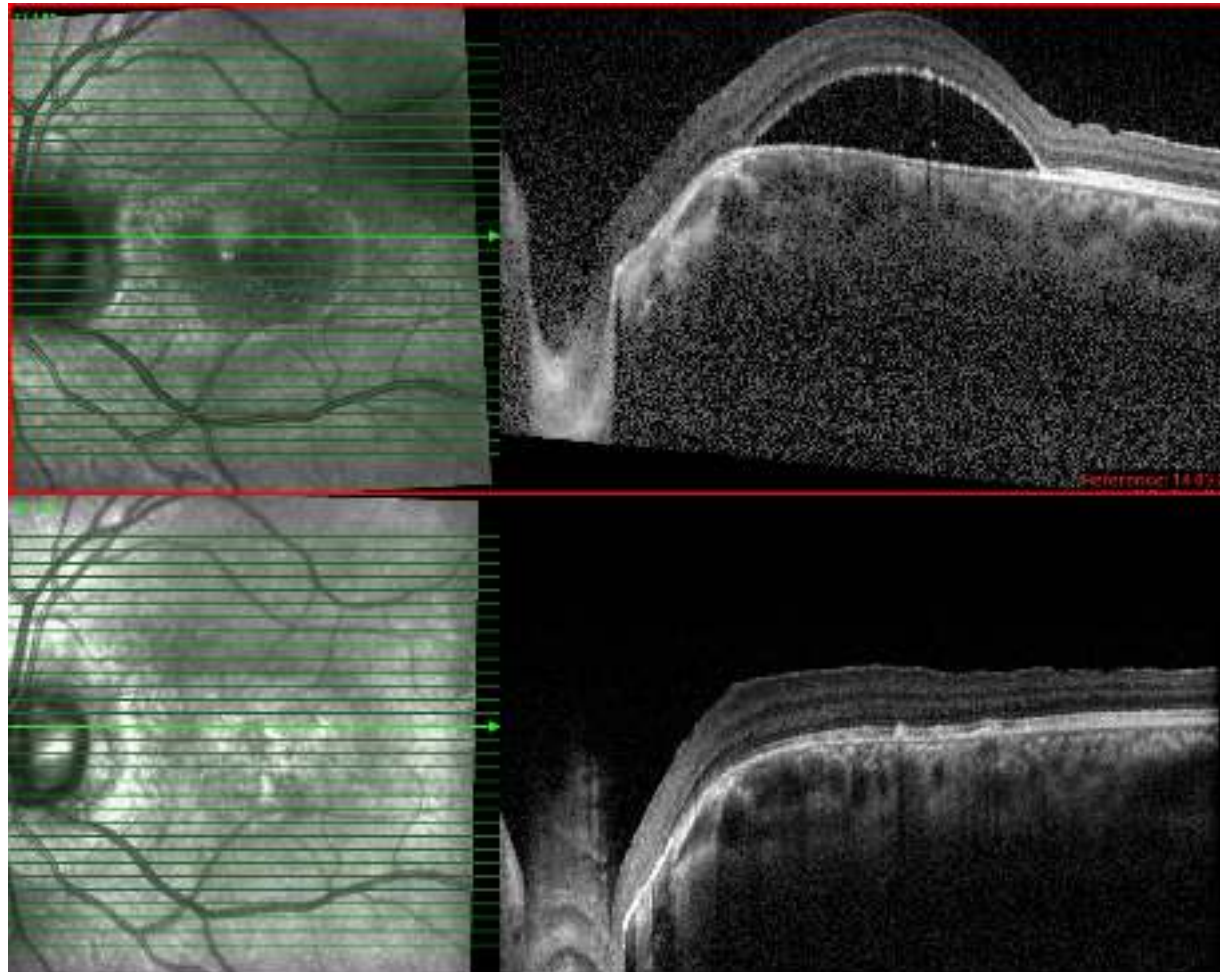
POD 30 - OCT : Scleral graft plugging OD pit & Partial resolution of SRF



*POD 90 - **BCVA 20/20**, Complete resolution of metamorphopsia*



POD 90 - OCT : Scleral graft plugging OD pit & Complete resolution of SRF

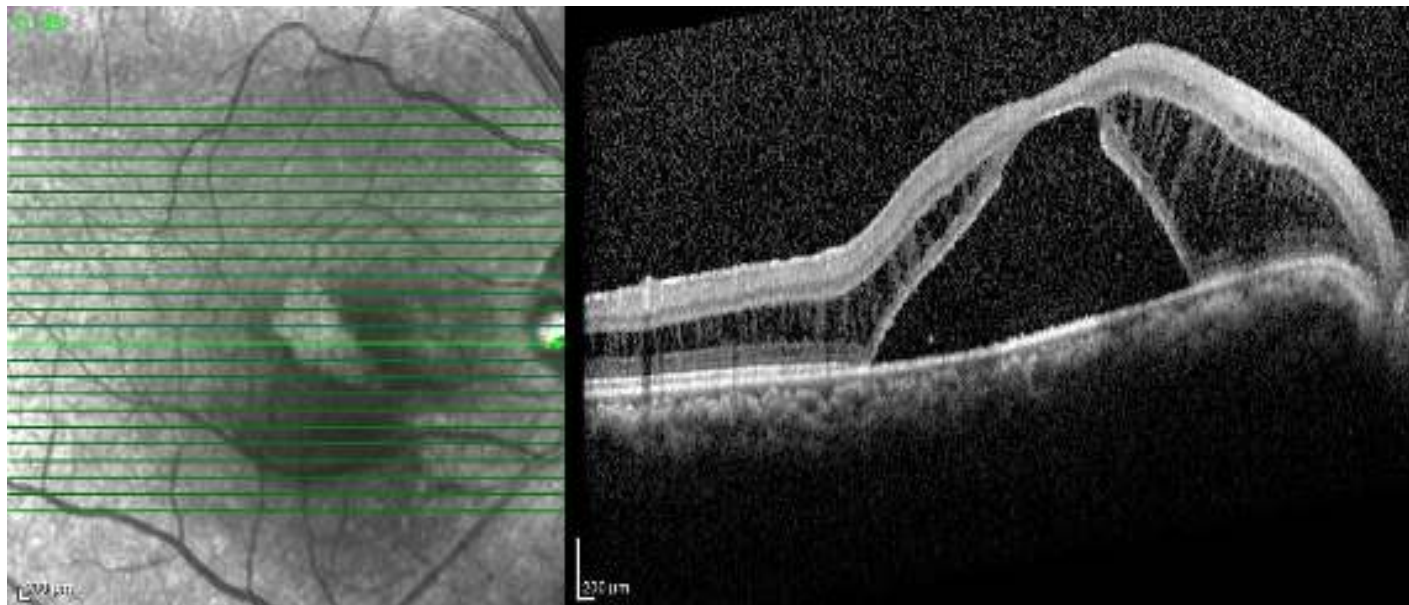
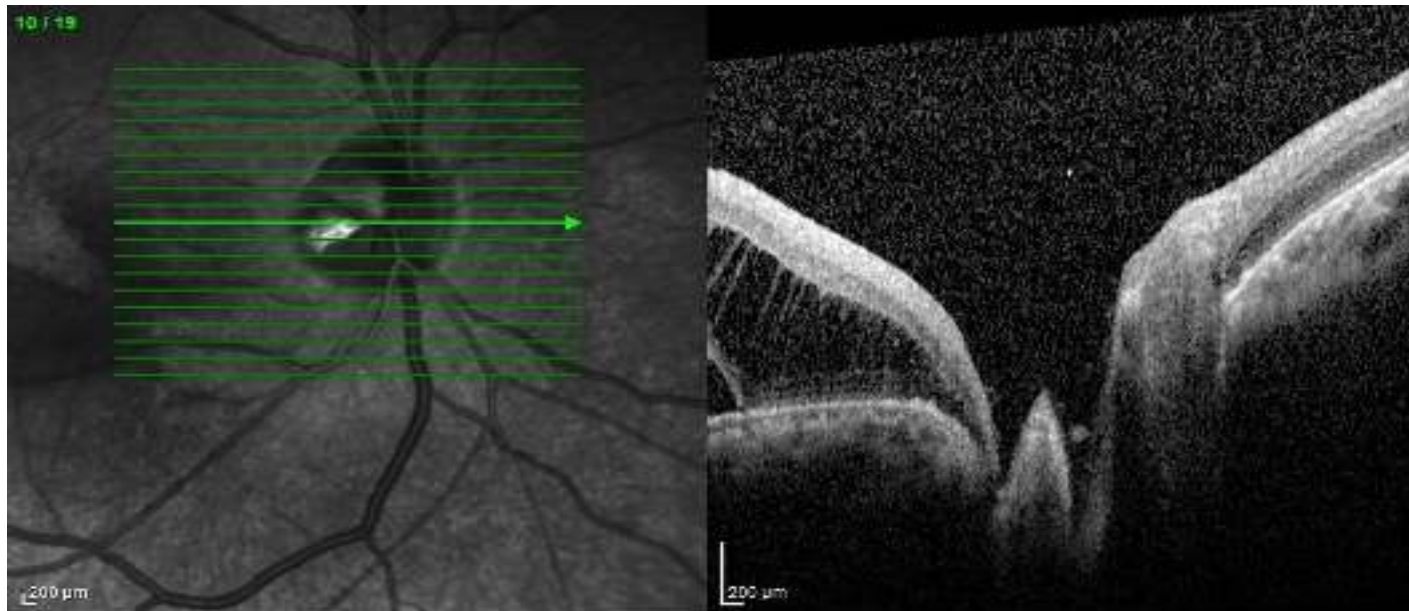


CASE 2

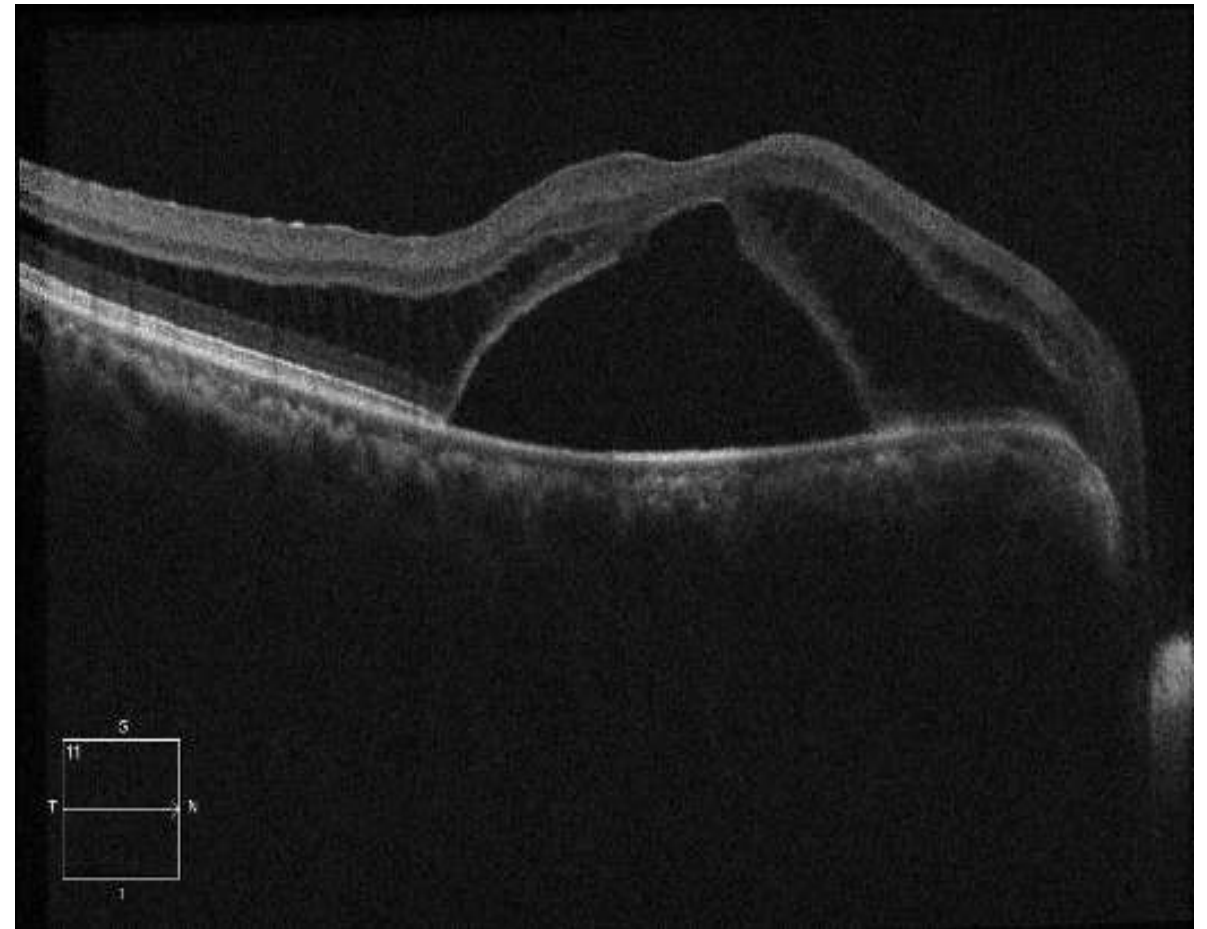
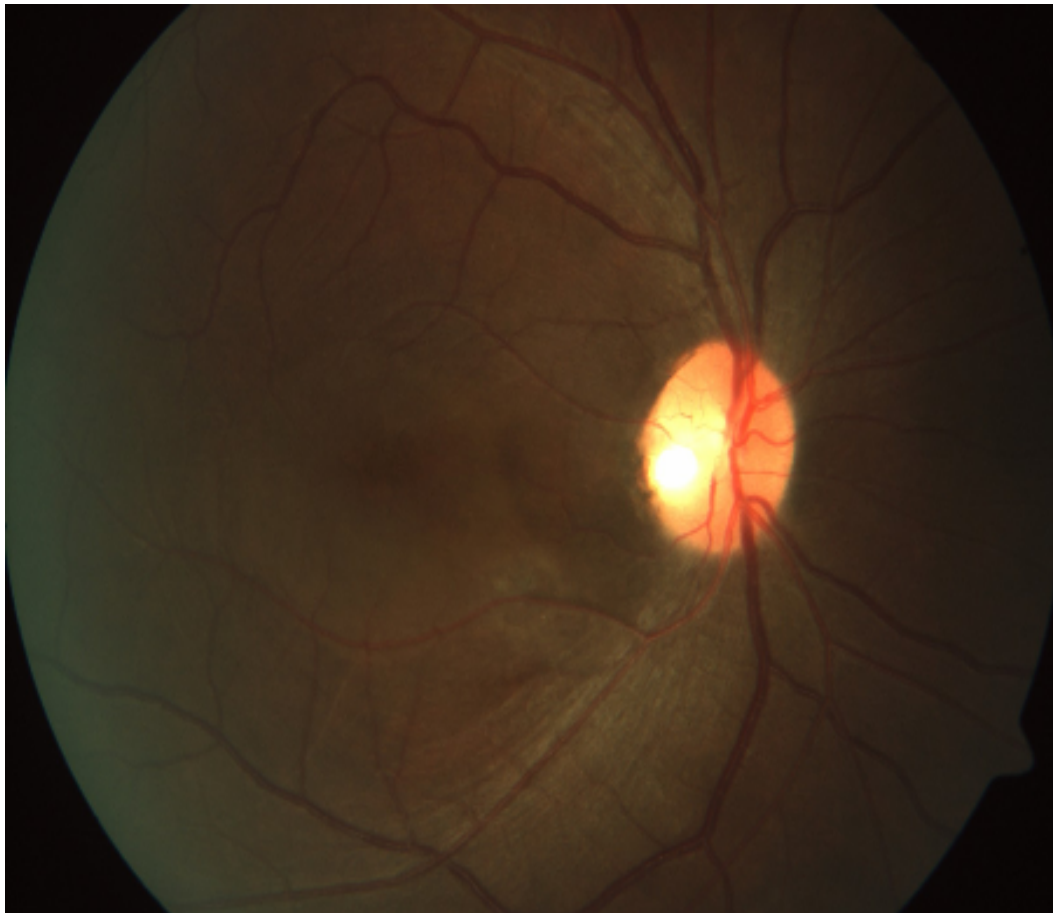
- 34 year old female
- Blurring RE 1 year
- BCVA 6/60
- Sx: PPV + Scleral plugging of OD + ILMP + SF6



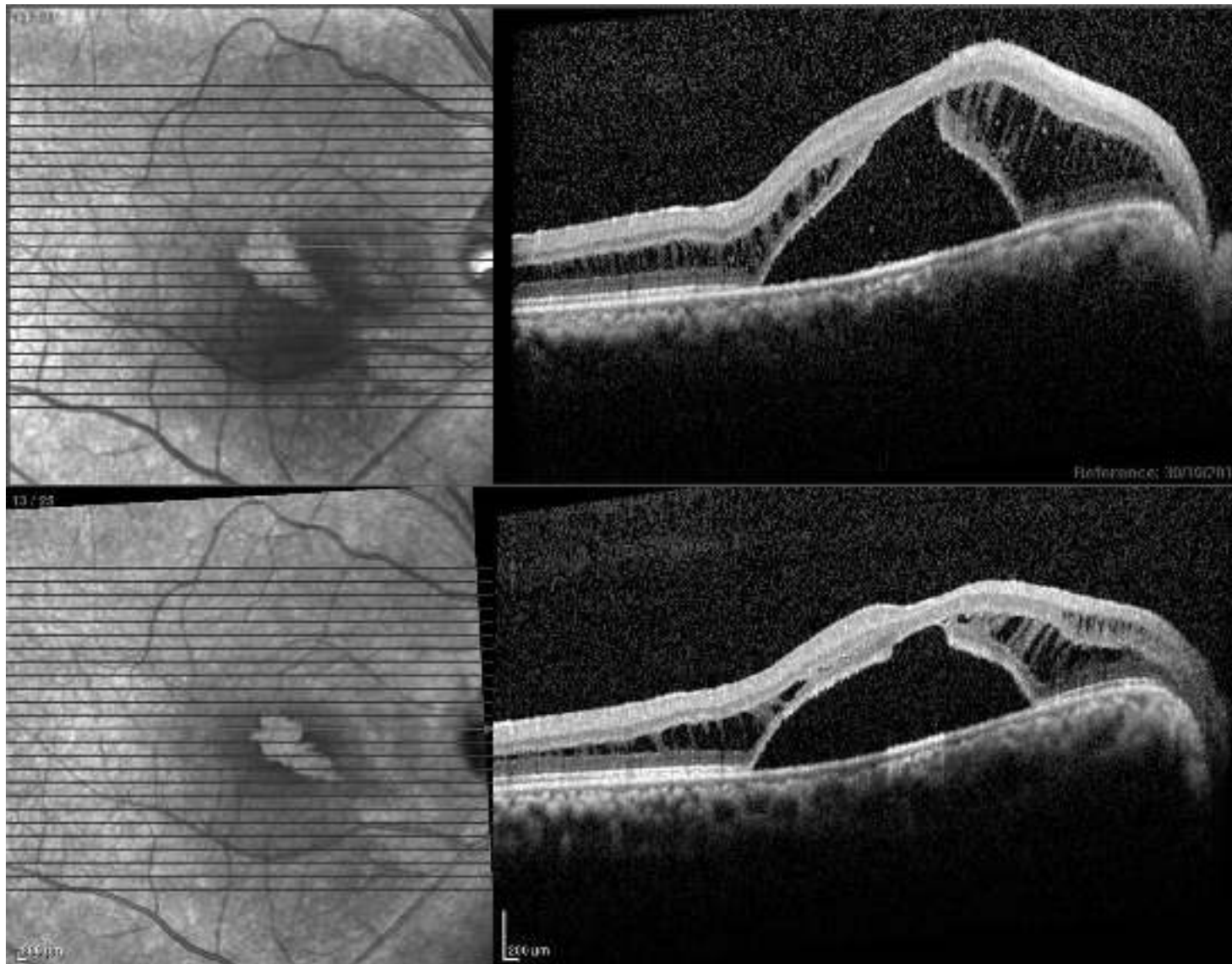
***PRE-OPERATIVE
OCT***



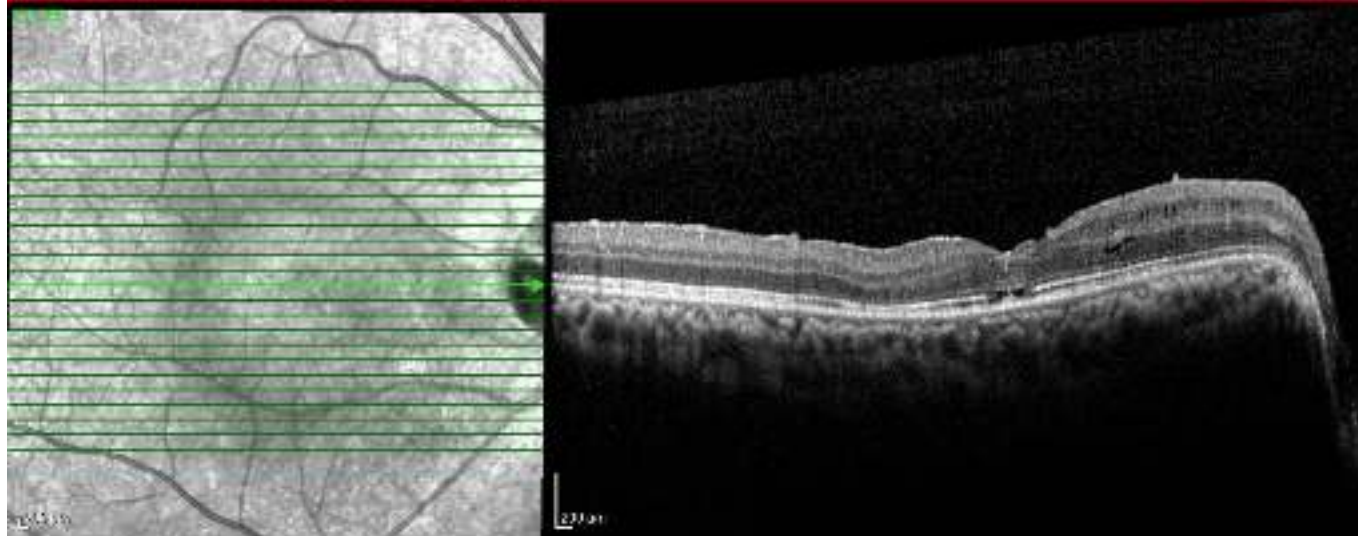
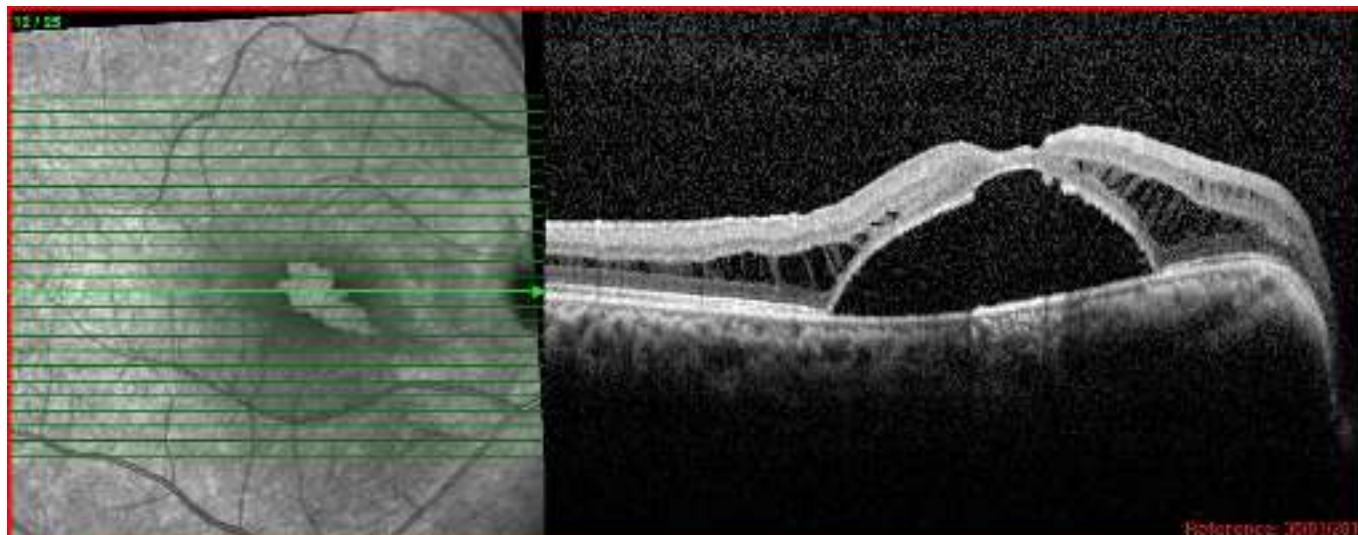
POD 30: BCVA RE 6/36 OCT : Partial resolution of SRF



POD 90: BCVA RE 6/24 OCT : Partial resolution of SRF



POD 180 : BCVA RE 6/18 OCT: Complete resolution of SRF



➤ [BMC Ophthalmol. 2024 Dec 2;24\(1\):519. doi: 10.1186/s12886-024-03777-z.](#)

Anatomical and functional outcome of surgical correction of optic disc pit maculopathy using autologous scleral patch graft: a long-term retrospective analysis

Naresh Babu Kannan ¹, Avik Dey Sarkar ², MuthuKrishnan Vallinayagam ², Swikruti Jena ²,
Shraddha Shah ², Kim Ramasamy ²

Kannan NB, Sarkar AD, Vallinayagam M, Jena S, Shah S, Ramasamy K. Anatomical and functional outcome of surgical correction of optic disc pit maculopathy using autologous scleral patch graft: a long-term retrospective analysis. BMC Ophthalmol. 2024 Dec 2;24(1):519

AUTOLOGOUS SCLERAL PLUG

- **DESIGN:** Retrospective observational study
- **PURPOSE:** Efficacy of Scleral Patch Graft (SPG) in improving anatomical and functional outcome in ODPM

Materials & Methods

Retrospective Study

Aravind Eye Hospital, Madurai, India

Inclusion criteria

- **54** Patients who underwent PPV + ILMP + SPG for ODPM 2016-2022
- Performed by single surgeon (Dr NB)

Exclusion criteria

- Coexisting ocular pathology
- Loss to follow-up before 6 months

Parameters assessed

- Best-corrected visual acuity (BCVA)
- Intraocular pressure (IOP)
- Slit-lamp Biomicroscopy
- Dilated fundus examination
- Optical Coherence Tomography (OCT)

Outcome measures

- **Anatomical success:**
 - **Complete:** Total resolution of SRF, IRF and macular schisis; Closure of ODP
 - **Partial:** Reduction in CFT < 300 microns with residual SRF, IRF or schisis; Closure of ODP
- **Visual success:**

Gain of ≥ 2 Snellen lines



RESULTS

- 54 patients
- 28 (51.85%) were female
- Mean Age: 36.36 ± 15.69 years
- Laterality: 53.7% OS and 46.3% OD
- Mean IOP: 16.17 ± 2.59 mmHg
- ***Visual improvement - 45 (83.33%)***
- ***Complete anatomical success (OCT) – 16 (29.63%)***
- ***Partial anatomical success – 24 (44.44%)***

Anatomical & Functional outcome

	Pre-Operative Baseline	Post-Operative 1 month	Post-Operative 3 months	Post-Operative 6 months
BCVA (LogMAR Scale)	0.66±0.37	0.74±0.34	0.58±0.33	0.49±0.32
CMT(μ)	677.46 ± 251.57	461.26±238.3	362.68±125	287.36±121.9

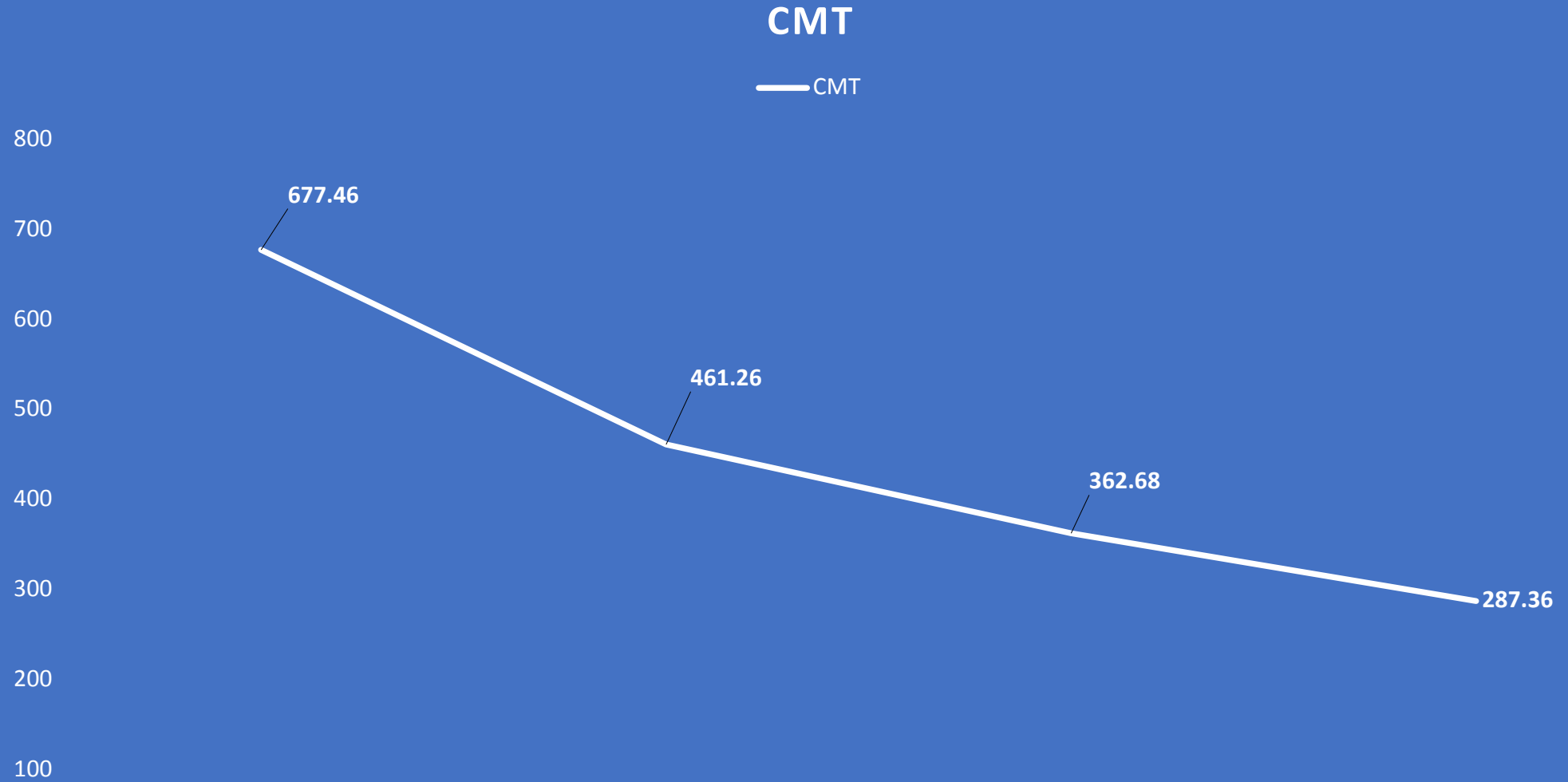
Functional outcome

BCVA

— BCVA

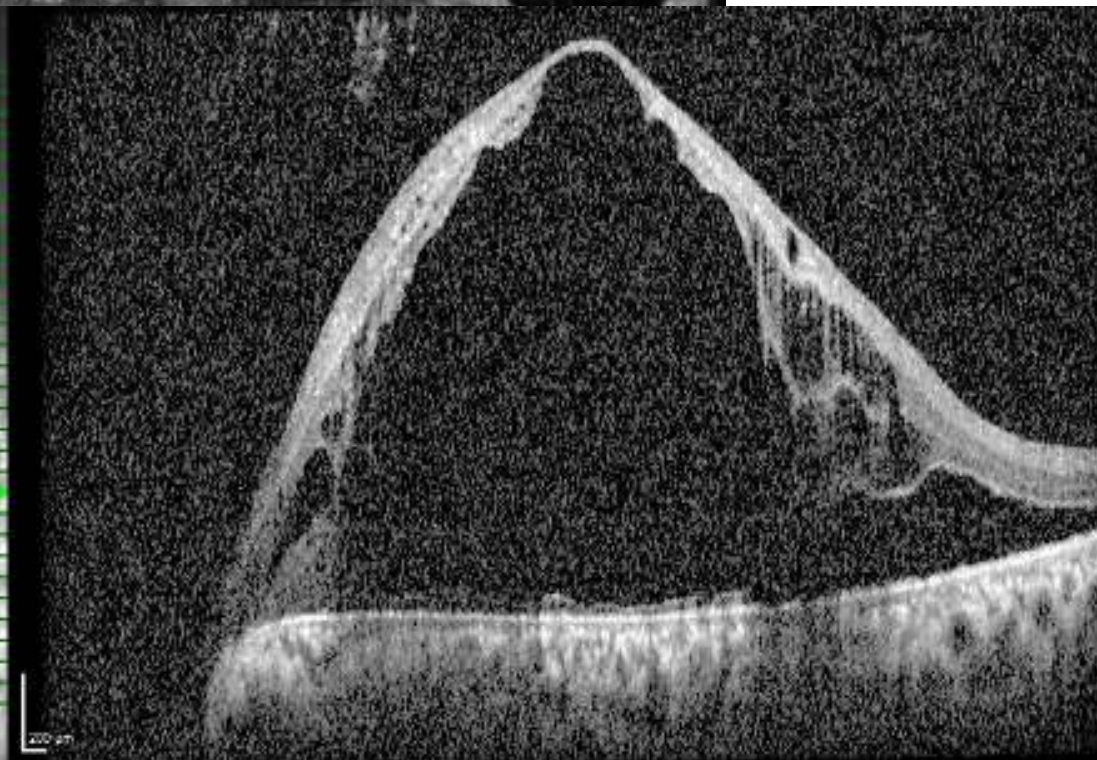
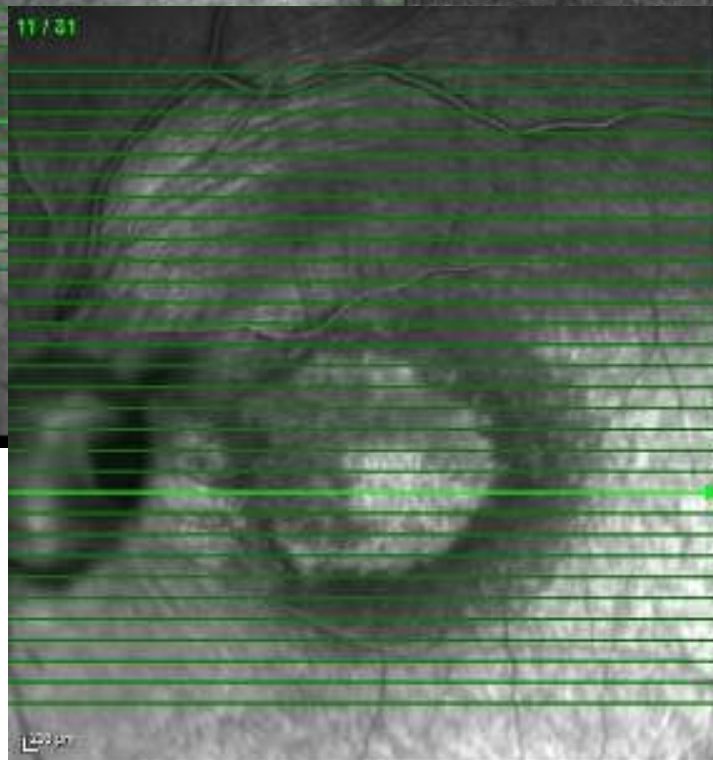
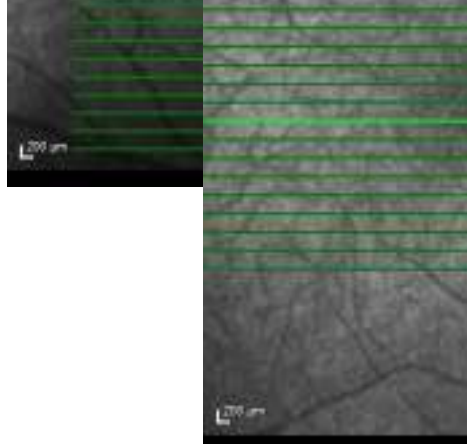
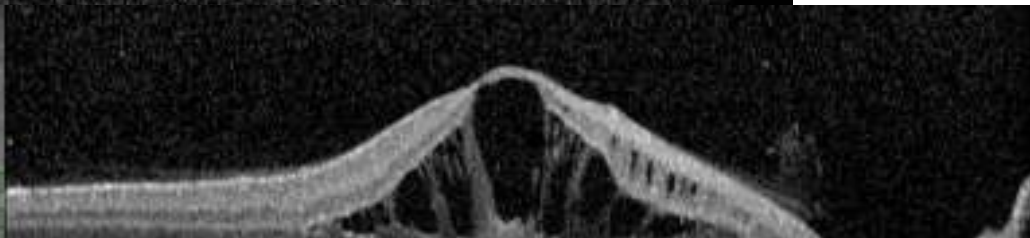
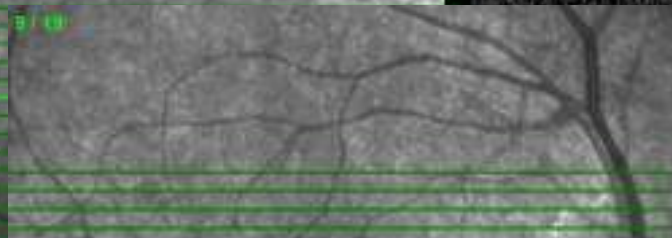
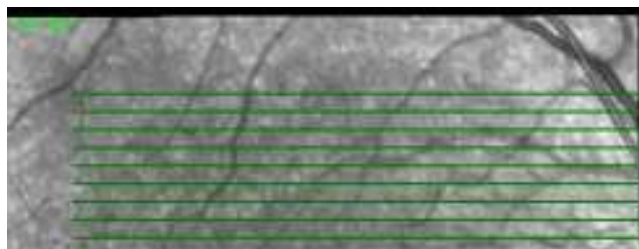


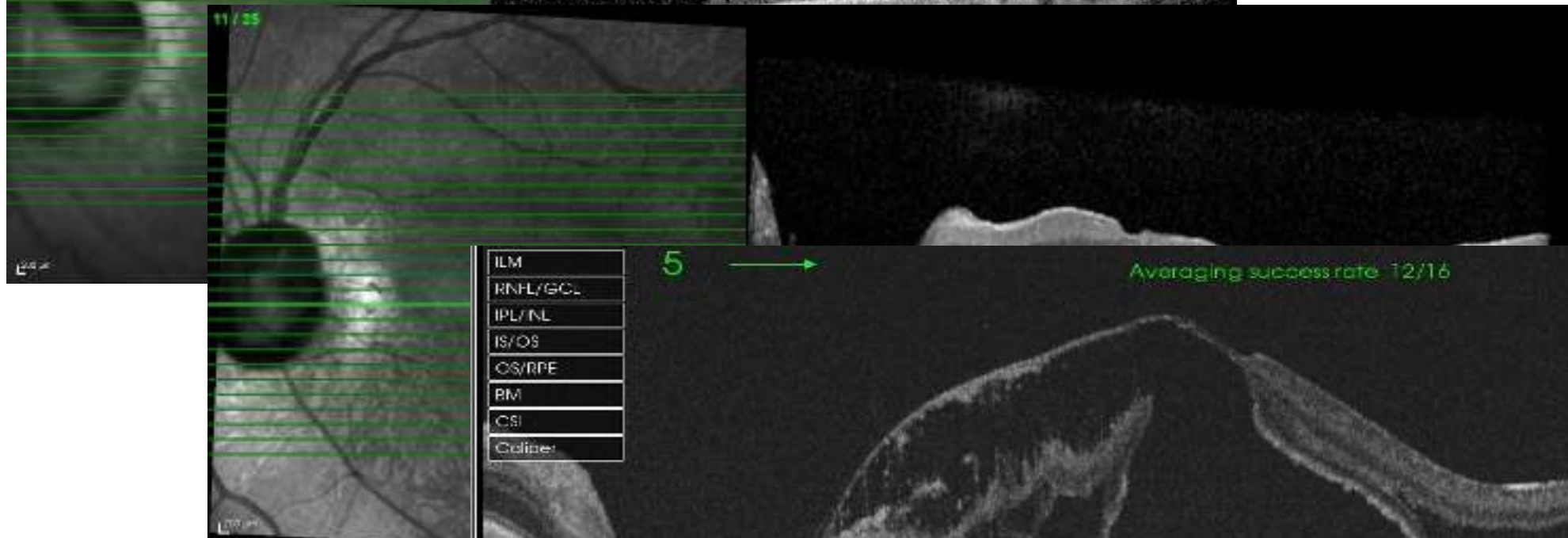
Anatomical outcome



OCT - Parameters

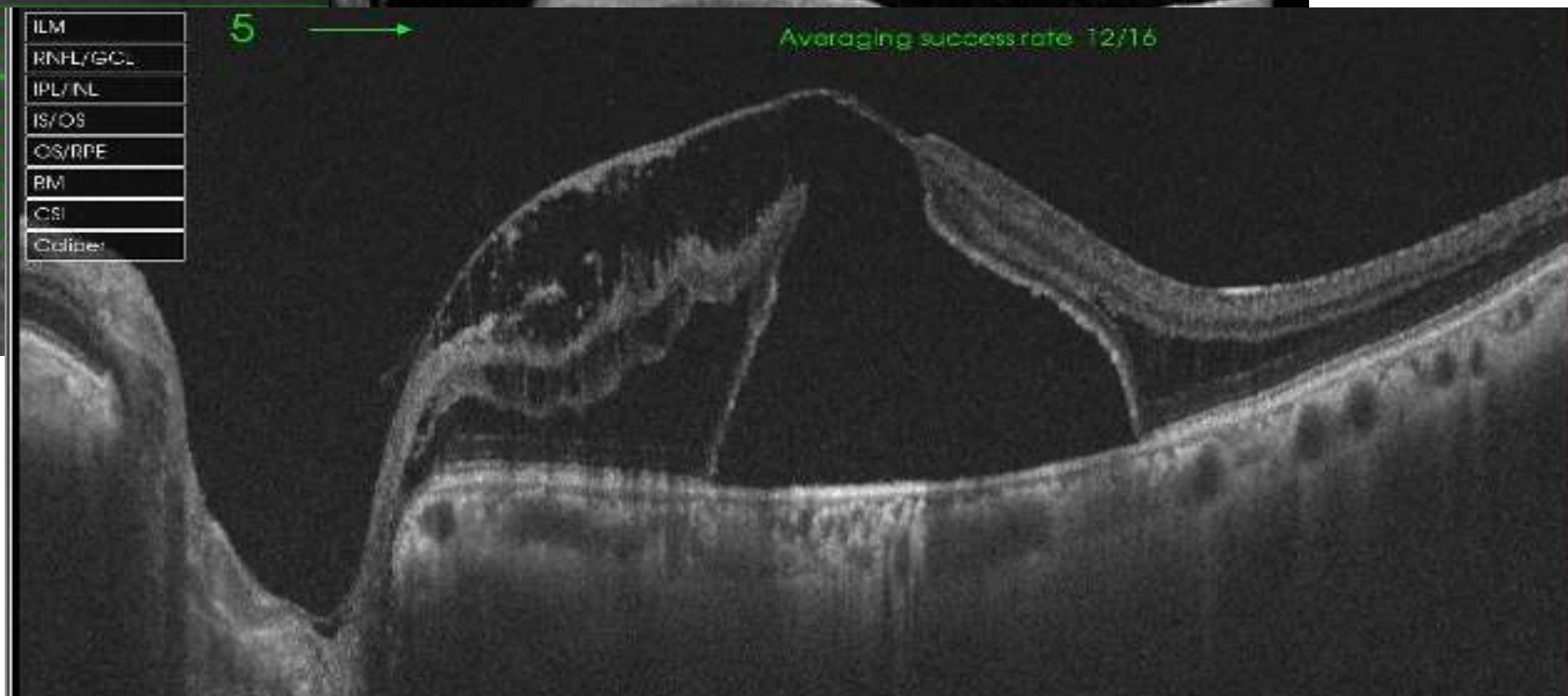
OCT Biomarkers	Pre-operative Baseline (n=54)	Post-operative 6 Months (n=54)	Percentage Reduction (%)
Intraretinal Fluid	31	15	51.61%
Schitic Fluid	43	05	88.37%
Subretinal Fluid	31	10	67.74%
Outer Lamellar Macular Hole	17	04	76.47%
Full Thickness Macular Hole	02	00	100%
ELM/ EZ Disruption	41	19	53.66%
Pachychoroid	19	08	57.89%





ILM
RNFL/GCL
IPL/NL
IS/OS
OS/RPE
BM
CSI
Caliper:

Averaging success rate 12/16



Follow up at 6 months

Response Analysis At 6-Months	Complete Anatomical Success n=24	Partial Anatomical Success N=16	Some Anatomical Success N=09	No Anatomical Success N=05
Any EDEMA (SRF/ IRF/ Schisis)	Completely resolved	Isolated SRF - 02 Isolated IRF - 05 Isolated SF - 01 Combined - 08	Isolated SRF - 02 Isolated IRF - 04 Isolated SF - 01 Combined - 02	Isolated SRF - 01 Isolated IRF - 01 Isolated SF - 01 Combined - 02
Macular Hole (Lamellar/ Full Thickness)	Completely resolved	Completely resolved	LMH in 2 patients But decreased CFT	Persistent LMH in 2 patients
ELM/ EZ Disruption	Completely resolved	Persistent Disruption in 03 patients	Persistent Disruption in 07 patients	Persistent Disruption in 09 patients

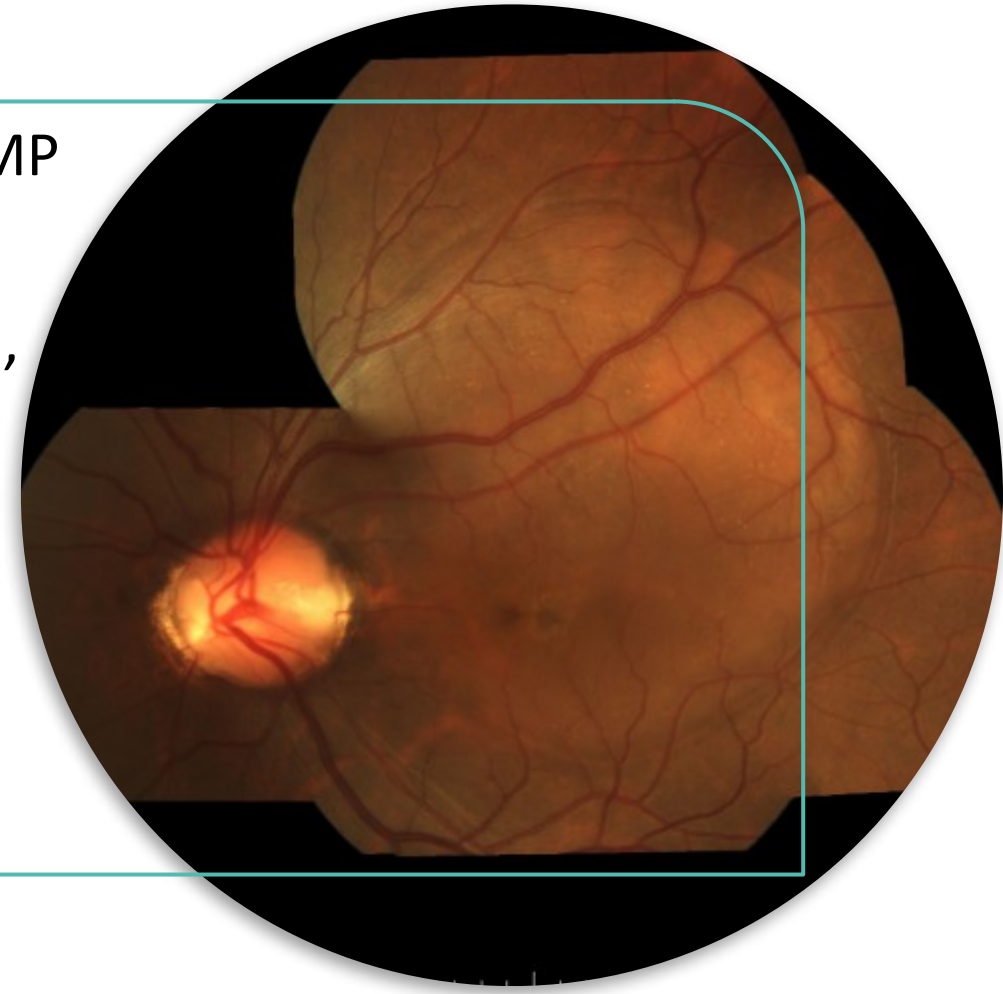
Discussion

- ❖ Autologous SP to seal ODP first proposed by Travassos et al
 - Reported 3 cases with fluid resolution and visual gain in 12 months
- ❖ Shah et al - 2 cases successfully treated with SP and gas tamponade
- ❖ Babu et al - Both ILM plugging and autologous scleral plugging of OD pit revealed similar results - 85.7% and 87.5% anatomical correction at 1 year
- ❖ ***Visual improvement - 45 (83.33%)***
- ❖ ***Complete anatomical success (OCT) – 16 (29.63%)***

- ❖ Babu N, Kohli P, Ramasamy K. Br J Ophthalmol Epub ahead of print: doi:10.1136/ bjophthalmol-2019-315075
- ❖ Shah PK, Karandikar SS, Narendran V. Scleral autograft for optic nerve head pit associated chronic maculopathy. Ophthalmic Surg Lasers Imaging Retina 2017;48:251–4.

Discussion

- Shukla et al reported post-surgical MH in > 50% after ILMP in the presence of Outer lamellar macular hole
- In this series, Out of 17 patients with Outer lamellar MH, only one developed FTMH
- 3 patients – Failure of anatomical and visual recovery
- Outer lamellar macular hole – Good anatomical and visual rehabilitation
- Pachychoroid at 6 months - Poor resolution of fluid



❖ Shukla D, Kalliath J, Tandon M, et al. Vitrectomy for optic disk pit with macular schisis and outer retinal dehiscence. Retina 2012;32:1337–42.

HIGHLIGHTS

- *Largest case series of ODPM surgery using Autologous scleral plug*
- *Long term success in improving BCVA and CMT*
- *Evaluated microstructural changes in OCT*
- *Outer lamellar macular hole - Excellent outcome*
- *Pachychoroid - Poor resolution*
- *SPG enhances functional and OCT-based microstructural outcome*



Thank You