Case Series: Anatomical and Functional outcomes after Lamellar Hole Surgery

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1. Introduction

- A lamellar macular hole (LMH) is a partial-thickness loss of foveal tissue (Fig. 1) caused by cystoid macular oedema, contraction of the perifoveal epiretinal membrane and vitreous traction
- LMH can cause reduced visual acuity and vision distortion, but in some patients vision is stable
- In most LMH, ocular coherence tomography (OCT) reveals trapped vitreous or posterior hyaloid – called epiretinal membranes (ERM)
- Tractional (A) and degenerative (B) are the two widely accepted subtypes of LMH
  - Tractional: schitic separation of neurosensory retina between outer plexiform and outer nuclear layers
  - Degenerative: intraretinal cavitation, possibly affecting all retinal layers
- The decision to operate on LMH patients remains controversial and evidence for long term outcomes is limited
- Pars plana vitrectomy (PPV) with internal limiting membrane (ILM) peel is the most common technique
  - Evidence for long-term anatomical (resolution of LMH) and functional (best corrected visual acuity (BCVA)) outcomes is scarce
  - Some clinicians report that patients remain stable without intervention

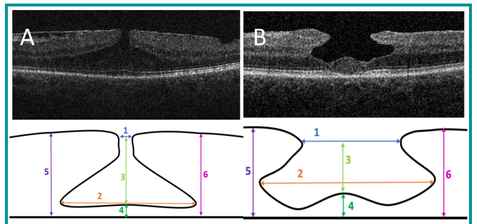


Figure 1: A: Tractional Lamellar Hole, B: Degenerative Lamellar Hole

1	Outer width
2	Inner width
3	Depth
4	Foveal thickness
5/6	Perifoveal thickness

2. Objective

To evaluate anatomical and functional outcomes after lamellar hole surgery with pars plans vitrectomy (PPV) in a local cohort of patients

3. Methods

- Retrospective review of the medical records of 52 eyes of 50 patients who underwent PPV for LMH between February 2015 and February 2022
- Baseline demographics included ocular and systemic co-morbidities, operation details and LMH characteristics.
- Primary outcomes were foveal thickness and best corrected visual acuity (BCVA) assessed using a logarithm of the minimal angle of resolution (LogMAR) chart
- All analyses were carried out using SPSS and GraphPad Prism

4. Results

- Study period: 16th February 2015 – 20th February 2022.
  - 50 participants
- All underwent 23G/25G PPV, 98% (n=40) underwent internal limiting membrane (ILM) peel, 73% (n=38) underwent ERM peel (Table 1)

Baseline characteristics (Table 1)

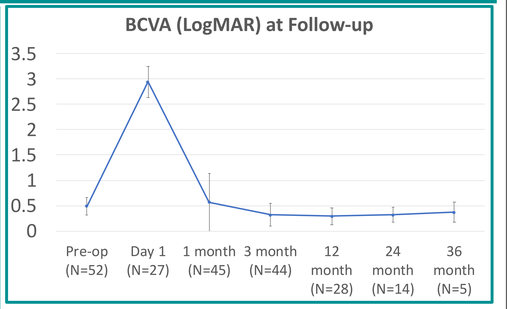
- 58% (n=30) tractional LMH, 42% (n=22) degenerative LMH
- Mean LMH volume and surface area were 0.13±0.118mm^3 and 2.3±1.9mm^2 respectively

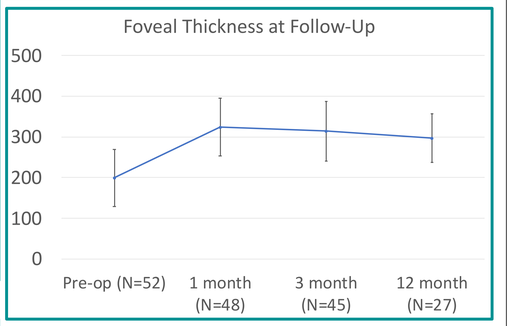
Results

- In operated eyes, BCVA improved significantly from 0.49 (SD=0.17) pre-operatively to 0.32 (SD=0.22) at 3 months (p=<0.0005) and 0.29 (SD=0.17) at 12 months (p<0.0005) (Fig. 2)
- Anatomical resolution of the lamellar hole was achieved in 81% (n=42) of patients
  - In 1 patient the LMH was still present and in one patient their LMH progressed to a macular hole (MH).
  - Two patients experienced complications post-operatively: one developed glaucoma and one required re-operation with PPV
  - Mean BCVA was 0.29 ± 0.17 (N=28) and 0.32 ± 0.15 (N=14) at 12 and 24 months respectively. The change in mean BCVA from pre-operative to 12 and 24 month follow up was not statistically significant (P>0.05).

Table 1: Patient, LMH and surgery characteristics

Age (years)	71.69 ± 7.29
Female (%)	35 (67.3%)
LMH Morphology	
Degenerative LMH (%)	22 (42.31)
Tractional LMH (%)	30 (57.69)
Laterality	
Right (%)	18 (43.9%)
Left (%)	17 (41.5%)
Bilateral (%)	6 (14.6%)
Surgical Steps	
PPV (%)	52 (100)
ERM peel (%)	38(73.08)
ILM peel (%)	51 (98.08)
Cataract removal (%)	42 (80.77)
Pexy	
Cryopexy (%)	6 (11.54)
Endolaser (%)	1 (1.92)
Gas tamponade	
C3F8 (%)	1 (1.92)
C2F6 (%)	25 (48.98)
SF6 (%)	24 (46.15)
Air (%)	1 1.92)





5. Discussion

- Evidence for anatomical and functional outcomes for the surgical management of LMH to date is conflicting and practice differs globally
- This case series adds to the body of literature supporting the safety and efficacy PPV for LMH

6. Conclusion

- PPV is a safe treatment for LH and is effective in terms of anatomical outcomes with a low risk of complication. Measurement of anatomical variables at baseline can accurately predict the final outcome.

References:
(1) Xu H, Qin L, Zhang Y, Xiao Y, Zhang M. Surgery outcomes of lamellar macular eyes with or without lamellar hole-associated epiretinal proliferation: a meta-analysis. *BMC Ophthalmol.* 2020;20(1):345 (2) Witkin AJ, Ko TH, Fujimoto JG, et al. Redefining lamellar holes and the vitreomacular interface: an ultrahigh-resolution optical coherence tomography study. *Ophthalmology.* 2006;113(3):388-397. doi:10.1016/j.ophtha.2005.10.047 (3) Michalewska Z, Michalewski J, Odrobina D, Pikulski Z, Cisiecki S, Dziegielewski K, Nawrocki J. Surgical treatment of lamellar macular holes. Graefes Arch Clin Exp Ophthalmol. 2010 Oct;248(10):1395-400.