Case Series: Anatomical and Functional outcomes after Lamellar Hole Surgery

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1. Introduction

- A lamellar hole (LH) is a partial-thickness loss of foveal tissue (Fig. 1) caused by cystoid macular oedema, contraction of the perifoveal epiretinal membrane and vitreous traction
- LH can cause reduced visual acuity and vision distortion, but in some patients vision is stable
- In most LH, 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 LH
  - 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 LH 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 LH) and functional (best corrected visual acuity (BCVA)) outcomes is scarce
  - Some clinicians report that patients remain stable without intervention

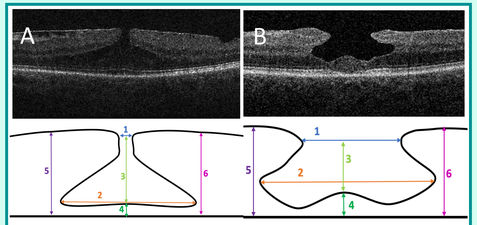


Figure 1: A: Tractional Lamellar Hole, B: Degenerative Lamellar Hole

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 over a 12 month follow up period

3. Methods

- Retrospective review of the medical records of 41 patients who underwent PPV for LH between February 2015 and February 2020
- Baseline demographics included ocular and systemic co-morbidities, operation details and LH 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 – 18th February 2020.
  - 41 participants
- All underwent 23G PPV, 98% (n=40) underwent internal limiting membrane (ILM) peel, 71% (n=29) underwent ERM peel (Table 1)

Baseline characteristics (Table 1)

- 73% (n=30) tractional LH, 27% (n=11) degenerative LH
- Mean LH volume and surface area were 0.126±0.118mm^3 and 2.32±1.9mm^2 respectively

Results

- In operated eyes, BCVA improved significantly from 0.491 (SD=0.168) pre-operatively to 0.330 (SD=0.225) at 3 months (p=<0.0005) and 0.258 (SD=0.126) at 12 months (p<0.0005) (Fig. 2)
- Anatomical resolution of the lamellar hole was achieved in 93% (n=38) of patients
  - In 1 patient the LH was still present and in one patient their LH progressed to a macular hole (MH).
  - Two patients experienced complications post-operatively: one developed glaucoma and one required re-operation with PPV
- Mean foveal thickness increased from 198±54µm pre-operatively to 324±77µm at 1 month post-operatively (P<0.0005) and then decreased to 312±81µm at 3 months (P<0.0005) and 296±62µm at 12 months (P<0.0005) (Fig. 3)

Table 1: Patient, LH and surgery characteristics

Age (years)	71.78 ± 7.78
Female (%)	27 (65.9)
LH Morphology	
Degenerative LH (%)	26.83
Tractional LH (%)	73.17
Laterality	
Right (%)	18 (43.9%)
Left (%)	17 (41.5%)
Bilateral (%)	6 (14.6%)
Surgical Steps	
PPV (%)	41 (100)
ERM peel (%)	29 (70.73)
ILM peel (%)	40 (97.56)
Cataract removal (%)	32 (82.93)
Pexy	
Cryopexy (%)	6 (14.63)
Endolaser (%)	1 (2.44)
Gas tamponade	
C3F8 (%)	1 (2.44)
C2F6 (%)	15 (36.59)
SF6 (%)	23 (56.1)
Air (%)	1 (2.44)

Figure 2: Mean Best Corrected Visual Acuity over time (LogMAR)

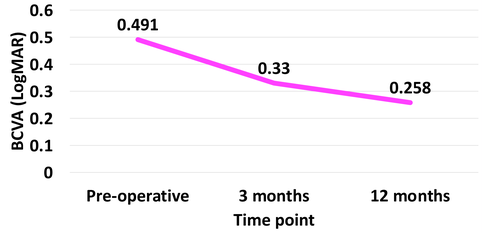
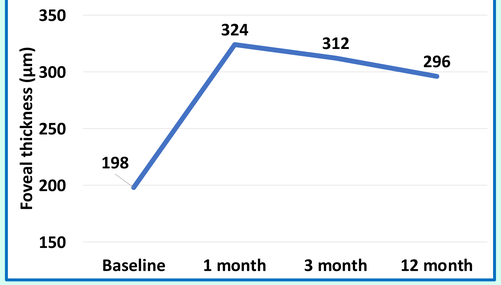


Figure 3 Mean foveal thickness over time



5. Discussion

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

6. Conclusion

- PPV is a safe treatment for LH and is effective in terms of both anatomical and visual outcomes with a low risk of complication

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