BEACON
Full title: Management of **larg**e recalcitrant macular h**o**les
Acronym: LARGO study

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What are you studying?
Management of recalcitrant primary and secondary large macular holes.

What is your primary research question:

What is the management of recalcitrant large macular holes, larger than 400um?
To include both recalcitrant

- Primary idiopathic macular holes
- Secondary macular holes –
    - High myopia (axial length of ≥ 26mm or ≤ -6.00D)
    - post rhegmatogenous retinal detachment (RRD)
    - post-trauma
    - syndromic

What are the clinical features of these holes?

What are the risk factors for non-closure of these recalcitrant holes?

What are the functional and anatomical outcomes on these eyes following final closure of the hole?

Background and importance:

While the closure rate for small and medium size macular holes is excellent (95%+) following surgery with vitrectomy, internal limiting membrane (ILM) peel and injection of tamponade (most often gas), the results for large macula holes can be disappointing.[1]

In particular, a small subset of macula holes imposes challenges to surgeons and frustrations on patients. These include large and extra-large holes, myopic macula holes, post-traumatic macular holes and recalcitrant macula holes.

The anatomical and visual outcomes of revision surgery for failed primary macular hole surgery are poorly understood, and the benefits of adjunctive procedures remains unclear.

Several techniques have been developed to close recalcitrant large macula holes including inverted ILM flaps, human amniotic membrane, retinal grafts, radial nerve fibre layer (NFL) incisions, blood clot patches, lens capsule and the retina expansion technique. [2-6]

While there is some literature in favour of such approaches, there is still no consensus as to the best approach. Opinion among the vitreoretinal community on the benefits of revision surgery has been divided, and a better understanding of success rates may help guide clinical management.

Change in macula hole size after primary surgery may be a helpful indicator of success in revision surgery. There is also a suggestion that ILM flaps and NFL incisions may be more effective at closing holes with failed primary surgery than the other techniques reviewed in this study. [2]

The basis for many of these approaches is to provide a scaffold for cells to migrate into the space in these large holes which cannot be closed with gas alone. Larger case series and longer follow up are required to determine if one approach is superior to others.
At this time, surgical success is likely attributable to surgeon comfort or preference for a particular technique.

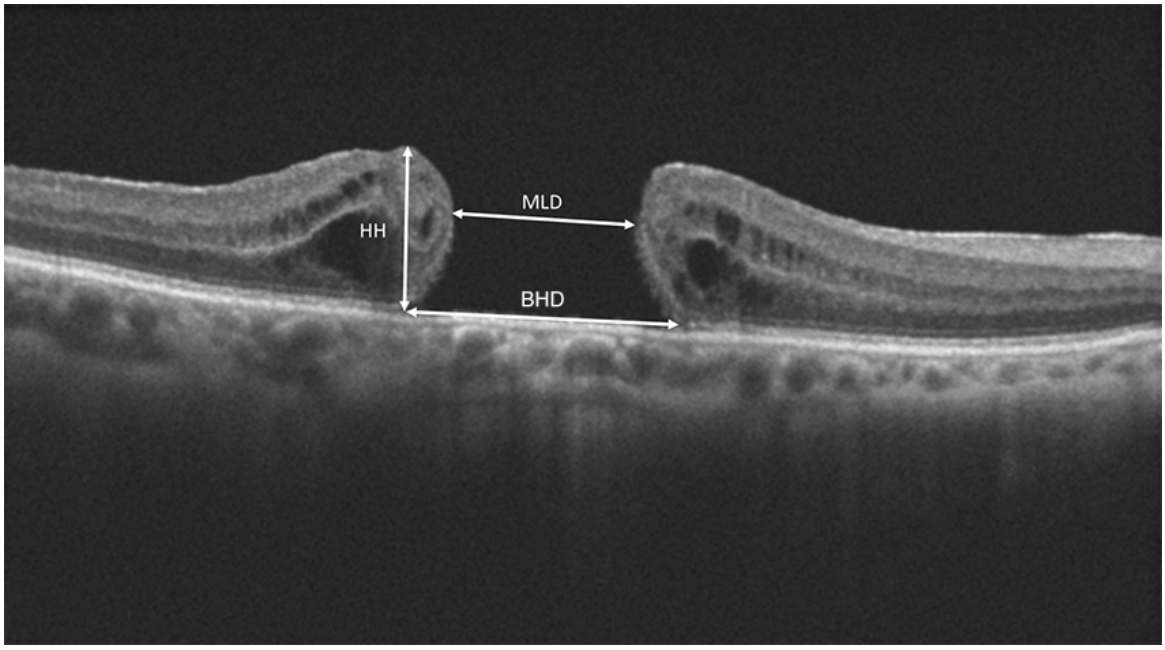
This study will add to the literature by characterisation of these challenging macular holes and will provide better understanding of the techniques used for these cases to determine if one carries better visual outcomes over the others.

Case Definition:

A large recalcitrant full thickness macular hole (FTMH)

A large full thickness macular hole is defined as a full thickness defect in the fovea area with a minimum linear diameter (MLD) of ≥ 400um.

The macula hole should be recalcitrant (after one initial vitrectomy surgery) and could have been either primary or secondary (myopia, post RRD, trauma, syndromic). There should have been any degree of complete 360 degree peri-hole peeling.



Inclusion Criteria:

- FTMHs that did not close after initial vitrectomy
- Full thickness defect in the fovea larger than 400um
- Any age
- Initially either primary or secondary macular holes to myopia, post RRD, trauma and syndromic
- Minimum of 3 months follow up
- OCT documentation pre and post-operatively

Exclusion Criteria:

- Full thickness defect in the fovea ≤ 400um
- Full thickness defect in the fovea with a detached retina
- Less than 3 months follow up
- Incomplete 360 ILM peeling around fovea

Likely Incidence:

Based on the BEAVRS database, there are about 4000 primary macular hole surgeries performed in the UK per year. With a 4% of non-closure rate overall – we estimate the incidence of primary recalcitrant macula holes to be 160 per annum in UK. There is however no data available for the incidence on secondary recalcitrant macula holes.

Combined Prospective/Retrospective data collection:

- **For Retrospective:**
  - Eligible study period: Jan 2018 - Dec 2023 (5 years)
  - Target completion for end of data collection: 1st July 2023 (12 months)

- **For Prospective:**
  - Case collection period: November 2022 – November 2023
  - Follow up duration: 3 months minimum

Primary outcome measure: Closure of macula hole

Secondary Outcome measures:

Best corrected visual acuity **(**BCVA) at final follow-up; BCVA improvement; surgical intervention; adverse events; macula hole OCT features

Data collection form(s): Formatted excel chart available from study leads via email. Remember all data must be anonymised

Images required: OCT images. Must be anonymised and coded with local study number only. Horizontal line scan through centre of macular hole with labelling for pre and post revision surgery. Scan image to include scale bars.

References

1. Steel DH, Donachie PHJ, Aylward GW, et al. Factors affecting anatomical and visual outcomes after macular hole surgery; findings from a large prospective UK cohort. *Eye* 2021;35:316-325.

2. Maguire MJ, Steel DH, Yorston D, et al. Outcome of revision procedures for failed primary macular hole surgery. *Retina* 2021; 41(7): 1389-1395.

3. Robles-Holmes HK, Staropoli PC, Yannuzzi N, Sridhar J. Management of large or recurrent macular holes. *Curr Ophthalmol Rep*. 2020 June ; 8(2): 62–68.

4. Wong Roger, Howard C, Orobona GD. Retina expansion technique for macular hole apposition report 2.Efficacy, closure rate, and risks of a macular detachment to close large full-thickness macular holes. *Retina*. 2018 April; 38(4): 660-663.

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6. Zhang L, Li X, Yang X, Shen Y, Wu M. Internal limiting membrane insertion technique combined with nerve growth factor injection for large macular hole. *BMC ophthalmology*. 2019 12 1;19(1):247