Advances in Macular Hole Surgery

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Outline

- Classification of Macular Holes
- Importance of the ILM
- Does Positioning matter?
  - OCT guided positioning
Etiology

- Disease of cortical vitreous
  - Abnormal vitreous separation
    - MHs result from abnormal perifoveal posterior vitreous detachment
  - Anterior/posterior traction
  - Tangential traction
Macular Hole Stages

- **Gass Classification**
  - 1a – Yellow dot, no hole
  - Foveal detachment
  - 1b – Yellow circle, no hole
  - 2 – Small hole
    - ≤ 400 μm
  - 3 – Larger hole
    - ≥ 400 μm
  - 4 – Hole, complete PVD

- **Biomicroscopic classification**
<table>
<thead>
<tr>
<th>OCT Stages</th>
<th>OCT - gold standard</th>
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<tbody>
<tr>
<td>Stage 0</td>
<td>VMA</td>
</tr>
<tr>
<td>Stage 1</td>
<td></td>
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<tr>
<td>Stage 2</td>
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<td>Stage 3</td>
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<td>Stage 4</td>
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Surgical Repair

- Described in 1991
- Steps
  - Debulk vitreous
  - Create PVD (if not present)
  - ILM removal?
  - Inject gas

Ongoing Controversies

- ILM removal
  - When is it necessary?
  - Stain or no Stain?
- Face Down positioning
  - Is it necessary?
  - How long?
ILM removal

- **Rational**
  - ILM = scaffold for proliferation of cellular components
  - ILM thickens with age
  - Leads to tangential traction
  - ILM peeling
    - Removes tangential traction
    - Guarantees complete separation of the posterior hyaloid
      - Vitreoschisis
ILM Peel using BBG
ILM Peel using Kenalog
ILM Removal: Risk/Benefit

- **Risk**
  - More Traumatic
  - Staining Toxicity
  - Light Toxicity

- **Benefit**
  - Increase rate of closure
  - Improved vision?
ILM Removal: Anatomic Success

- 30+ studies reviewing ILM removal
  - ILM removal → higher closure rate
    - Closure rates: 80-100% with ILM peel
    - Closure rates: 40-70% without peel

- Meta-Analysis Cochrane 2013 (4 RCT’s)
  - ILM removal → higher closure rates, less likely to need additional surgery
  - No increase in complications with ILM removal
  - Cost effective
ILM Removal

- Decreased rates of MH reopening\(^1\)
  - Review of 877 MH closures
    - 0.4% reopening in ILM peel
    - 7% reopening without

Visual Success

- ILM peeling
  - Vision improvement in many studies
  - Other studies have equivalent results
  - No studies show negative impact on vision in ILM peeled group

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Positioning?

- **Gas tamponade: Rational**
  - Facilitate re-apposition of edges
  - Provide a scaffold for the migration of glial cells
    - Promote and maintain hole closure

- **Face-Down Position: Rational**
  - May optimize the effect of gas
  - Unproven
  - Current practice varies
Macular Hole - Positioning

- **Non-compliance**
  - Compliance with face-down positioning averages only 38% of the prescribed time

- **RCT’s (Cochrane 2011) suggests:**
  - Benefit in holes > 400 μ
  - No benefit in smaller holes

OCT driven decision making

- FD-OCT can image MH through gas
- If hole is closed:
  - stop face down positioning

<table>
<thead>
<tr>
<th>Study</th>
<th>Image Obtained</th>
<th>Hole Closed</th>
</tr>
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<tbody>
<tr>
<td>Masuyama 09</td>
<td>81% (13/16)</td>
<td>77% (10/13)</td>
</tr>
<tr>
<td>Sano 11</td>
<td>92% (24/26)</td>
<td>95% (23/24)</td>
</tr>
<tr>
<td>Yamakiri 12</td>
<td>76% (31/40)</td>
<td>94% (29/30)</td>
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<tr>
<td>Goto 12</td>
<td>88% (22/25)</td>
<td>82% (18/22)</td>
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Conclusions

- ILM peeling increasing success
- OCT-Driven Decision making
  - Limits Face Down Positioning