MIGS: Update on Canal-based MicroInvasive Glaucoma Surgery

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Outline

- Overview of my Glaucoma Surgical Algorithm
- Review Angle and Collector System Anatomy
- Demonstration of the Episceral Venous Fluid Wave
- Correlation of Fluid Wave to IOP Lowering Post Ab Interno Trabeculotomy
- Conclusion and Future Implications
What’s wrong with the Current Standard of Care?
Bad Blebs
Bad Tubes
Controversy with Angle Based Surgery

Question:
- When is Minimally Invasive Glaucoma Surgery (MIGS) actually Minimally Effective Glaucoma Surgery (MEGS)

Answer:
- When the patient’s inherent drainage system is not functional
**Problem:** There is no preop test for aqueous venous channel capacity

**Figure 17-6.** Schlemm’s canal, collector channels (1) and scleral vessels (2) in a normal human eye, perfused with Indian ink solution. × 50. No signs of the intrascleral block can be detected (From Nesterov et al., 1978, reproduced with permission)
Is there a way to clinically assess a patient’s inherent collector system?
Episcleral Venous Fluid Wave (EVFW)

Episcleral Venous Fluid Wave: Intraoperative Evidence for Patency of the Conventional Outflow System

Ronald L. Fellman, MD and Davinder S. Grover, MD, MPH

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- EVFW is seen during I/A
- Transient blanching of episcleral vessels caused by flow of BSS through collector channels near canal-based surgical sites
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A

B

DS Grover - 2019
Wave

- Provides insight into outflow
- Varies based on how much of the angle one opens
- Segmental vs 360 circumferential
  - For example w GATT
5-0 Prolene Suture GATT

A B C
D E F
G H I

DS Grover - 2019
GATT wave
Question

Does presence or quality of EVFW correlate with surgical outcomes?
Trabectome
Trabectome is high frequency pulsed electro-surgery that selectively disrupts, ablates and aspirates a circumferential strip of TM and inner wall of SC.
Goal: Study Patients with Diffuse vs Limited Wave after Trabectome

- Diffuse wave
- Limited Wave
Episcleral Venous Fluid Wave Correlates with Trabectome Outcomes

Intraoperative Evaluation of the Trabecular Outflow Pathway

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Correlation of EVFW and Trabectome Outcomes

• Purpose: To determine whether the characteristics of an intraoperative EVFW correlates with Trabectome outcomes.

• Methods: Retrospective Review of 68 eyes of 49 patients with glaucoma underwent phaco-Trabectome (63 eyes) or Trabectome alone (5 eyes).

• Main Outcome Measures: Degree and extent of EVFW, IOP and glaucoma medications.
Correlation of EVFW and Trabectome Outcomes

**Methods:**
- The EVFW was evaluated in a masked fashion for wave degree (0-4) and number of clock hours (0-6).
- A diffuse EVFW (4, 5, 6 clock hours) was a near complete blanching of the episcleral vasculature and a poorly defined wave was minimal to no change in the episcleral vasculature.
- Patients were grouped into wave categories of diffuse verses poorly defined EVFW to determine if there was a correlation with postoperative IOP.
- Patients requiring further glaucoma surgery were considered failures.
Correlation between IOP, meds and outcomes for extensive vs minimal wave

- Baseline IOP: 19.3 mmHg ± 5.1 on 2.7 meds ± 0.9

- At 12 months:
  - Extensive EVFW (4,5,6 clock hours):
    - Mean IOP 13.3 mmHg ± 2.7 on 1.4 ± 1.2 medications
  - Poorly Defined EVFW:
    - Mean IOP 18.4 ± 3.1 mmHg on 2.9 ±0.9 medications (both p=0.001).
Failures

- Overall, 5/68 eyes (7%), required further glaucoma surgery.
- Eyes with a poorly defined EVFW had a much higher likelihood of further glaucoma surgery, 4 of 11 or 36%.
• GATT participants 198 eyes of 198 patients with preoperative IOP ≥ 18mmHg
• No prior IOP lowering surgery.
• Focusing on 18 - 24 month follow up
Conclusions

• EVFW is a reasonable intraoperative snapshot of the overall health of the conventional outflow system
  • correlated with an improved surgical outcome for Trabectome

• Absence of the EVFW implies obstruction in the intrascleral trabecular pathway, preventing flow to the visible episcleral veins.
  • Poor prognosis
  • the patient is more likely to require a new drainage system for the eye

• The characteristics of an EVFW may be able to prognosticate surgical outcomes following Trabectome and other angle based surgeries.
Implications

- At this time, there is no universal outcome marker for canal-based surgery, because it is difficult to visualize/measure enhanced aqueous flow into the venous collector channels
  - Perhaps the EVFW can play a role?

- Until we have the ability to reliably determine which patient would be best treated with canal-based glaucoma surgeries, glaucoma surgeons will likely continue to experience mixed results with MIGS.
  - Perhaps stage of disease can play a role?
Thank you for your time

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