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 Episcleral 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**

Glaucoma Surgery
- Enhance Outflow
- Atrophic Collector System
- Reduce Inflow

GATT
- Trabeculectomy
- Tube Shunt
- Suprachoroidal Cypass

KDB
- Trabectome

Istent
- Hydrus

** Atrophic Collector System
- Trabeculectomy
- Tube Shunt
- Suprachoroidal Cypass

** Not FDA Approved
*** FDA approval withdrawn

Grover Feltman 2019
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.
Is there a way to clinically assess a patient's inherent collector system?
Episceral Venous Fluid Wave (EVFW)

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

Ronald L. Fellman, MD and Darinder S. Grover, MD, MPH
J Glaucoma Volume 00, Number 00, ■■ 2012

- EVFW is seen during I/A
- Transient blanching of episcleral vessels caused by flow of BSS through collector channels near canal-based surgical sites
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
Does presence or quality of EVFW correlate with surgical outcomes?
Trabectome

- Preoperative view of angle with pigmented TM
- Intraoperative view of angle during trabectome surgery
- Trabectome is high frequency pulsed electro-surgery that selectively disrupts, ablates and aspirates a circumferential strip of TM and inner wall of SC.
- Ultrasound preop
- Ultrasound postop

Goal: Study Patients with Diffuse vs Limited Wave after Trabectome

- Diffuse wave
- Limited Wave

Episceral Venous Fluid Wave Correlates with Trabectome Outcomes

Intraoperative Evaluation of the Trabecular Outflow Pathway

Kendall L. Feltman, MD,1 William J. Feer, MD,1 Darrick S. Grover, MD, MPH1
Ophthalmology Volume 122, Number 12, December 2015
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.

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.

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%.

Conioscopy-assisted Transluminal Trabeculotomy: An Ab Interno Circumferential Trabeculotomy: 24 Months Follow-up

- 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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