Mastering the Management of MIGS

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Vance Thompson Vision, Sioux Falls, South Dakota

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Financial Disclosure – Justin Schweitzer, OD, FAAO

• Aerie – C/L
• Alcon – C/L
• Allergan – C/L
• Bausch + Lomb – C/L
• Ocular Therapeutix – C
• EyePoint – C
• Sight Sciences – C
• Dompe - C
• Sun – C
• Equinox – I
• Reichert - C
• J&J – C/L
• Alcon – L
• Horizon – C
• Quidel – C

* Chief Medical Editor: Modern Optometry
WHY MIGS

More than 90% of patients are nonadherent to their ocular medication dosing regimens, and nearly 50% discontinue taking their medications before 6 months.

Prospective, multicenter trial evaluating four ocular surface metrics 3 months post-stent implantation.

- n=47 eyes
- Other ocular health metrics improved as well:
  - 49% longer time to tear break-up (FTBUT) (p<0.0001)
  - Significantly reduced corneal/conjunctival staining (Oxford Schema) (p<0.0001)
  - Trend toward less hyperemia (Efron Score)

OSD IMPROVEMENT IN IMPLANTED EYES

- Proportion of eyes with stable or improved OSD improved from 49% to 80% (p<0.001)
- Proportion of eyes with stable or improved OSD improved from 49% to 80% (p<0.001)
Currently I utilize MIGS procedures for glaucoma patients:

Minimally or Micro Invasive Glaucoma Surgery (MIGS)

Procedures that have an ab-interno approach, are minimally traumatic, with at least modest efficacy, extremely high safety and rapid recovery.

Collaborative Care in Glaucoma

Cataract surgery alone may be the most common glaucoma surgery today.

Cataract Surgery and Rate of Visual Field Progression in Primary Open-Angle Glaucoma.

Purpose

To test the hypothesis that cataract surgery slows the apparent rate of visual field (VF) decay in primary open-angle glaucoma patients compared with standard medical glaucoma care.

Design

Retrospective cohort study.

Methods

Consecutive open-angle glaucoma patients who underwent cataract surgery and who had at least 3 years of follow-up before and after surgery were retrospectively reviewed. Mean deviation (MD) was visual field index (VFI) rate, proportionate linear regression (PLR), proportionate rate of change (PRC), and the Glaucoma Rate Index (GRI) were compared before and after cataract surgery.

Results

A total of 134 eyes of 82 patients were included. Median (interquartile range) follow-up was 3.3 (2.1-6.1) years before and after cataract surgery. Among all examined parameters (MD, PRC, VFI, VFI, PLR, and GRI), the VFI rate of change before surgery was 1.79% (MD) and 0.47% (PRC), and after surgery, it was 0.48% (MD) and 0.13% (PRC). The PRC was significantly associated with the postoperative VF decay rate (-0.033 year for every 1% increase in the decay rate after cataract surgery).

Conclusion

Although all OCP parameters improved after cataract surgery, VF continued to progress. Cataract surgery does not slow the apparent rate of glaucomatous VF decay as compared to medical care during the progression of the disease.

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Case 1:
An 86-year-old Caucasian female referred for a contact evaluation and opinion on her glaucoma. She states her night-time vision is terrible, and she has started to struggle during the day as well.

Ocular History
- **POHX:** Primary Open Angle Glaucoma OS>OD
- **FHX:**
  - Mother – glaucoma, age-related macular degeneration
- **Previous Treatment Regimen:** None
- **Current Treatment Regimen:**
  - Bimatoprost 0.01% qd OU
  - IOP max:
    - OD: 23 mm Hg
    - OS: 23 mm Hg

Medical History
- **PMHX:** Hyperlipidemia
- **All Medications:** Fluoxetine, Atorvastatin
- **Allergies:** Penicillin

Ocular Exam
- **Best corrected visual acuity (UCVA):** 20/40 OD, 20/40 OS; BAT: 20/400 OU
- **External exam:** Normal appearance, symmetrical
- **Pupil exam:** Equal, round, reactive to light and (-) APD
- **Slit-lamp exam**
  - Lids/Lashes: Clear, no debris, no signs of MGD OU
  - Conjunctiva: Clear, no injection OU
  - Cornea: Clear, no corneal staining OU, no pigment present OU
  - Anterior Chamber: Clear, no cells, no flare OU
  - Iris: Clear, no exfoliative material present, no transillumination defects OU
  - Lens: See Image/Slide
- **Goldmann Applanation Tonometry:** 16 mm Hg OD, 17 mm Hg OS
- **Central corneal thickness (CCT):** 499 OD, 504 OS
- **Gonioscopy:** Open to CB in all quadrants, no pigment in the TM, and normal iris approach
- **Corneal Hysteresis:** 9.4 mm Hg OD, 9.3 mm Hg OS

OS
- Cup-to-Disc: 0.50/0.50, Flat, Distinct

OD
- Cup-to-Disc: 0.70/0.70, Deep cup, Distinct
Minimally or Micro Invasive Glaucoma Surgery (MIGS)

<table>
<thead>
<tr>
<th>Schlemm's Canal Type</th>
<th>Stents</th>
<th>iStent</th>
<th>iStent Inject</th>
<th>Hydrus</th>
<th>iStent Supra</th>
<th>OMNI</th>
<th>ABiC</th>
<th>Kahook Dual</th>
<th>OMNI/GATT</th>
<th>Ablation</th>
<th>Curing</th>
</tr>
</thead>
<tbody>
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<td>Stents</td>
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<td>Ablation</td>
<td>Curing</td>
</tr>
</tbody>
</table>

Ideal Patient Candidate

Trabecular Meshwork Bypass Stents and Schlemm Canal Microstent
(iStent, iStent Inject, Hydrus)
<table>
<thead>
<tr>
<th>HORIZON Trial – 4 Year Update</th>
<th>Stent + Cataract (n=369)</th>
<th>Cataract Only (n=187)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline IOP (mm Hg) after washout</td>
<td>25.5 (+/ - 3.0)</td>
<td>25.4 (+/ - 2.9)</td>
</tr>
<tr>
<td>Baseline IOP (mm Hg) preoperative</td>
<td>26.3 (+/ - 3.3)</td>
<td>26.4 (+/ - 3.3)</td>
</tr>
<tr>
<td>30 minutes, unmedicated</td>
<td>14.7 (+/ - 3.1)</td>
<td>17.3 (+/ - 3.1)</td>
</tr>
<tr>
<td>30 minutes, unmedicated, 1 out of 1/2 post op</td>
<td>14.4 (+/ - 3.1)</td>
<td>17.3 (+/ - 3.1)</td>
</tr>
<tr>
<td>1/2 post op</td>
<td>52.0%</td>
<td>54.0%</td>
</tr>
<tr>
<td>1/4 post op</td>
<td>50.0%</td>
<td>54.0%</td>
</tr>
</tbody>
</table>

Aqueous Angiography Video

Aqueous Angiography Before and After Stenting
Alex Huang, MD, PhD
Ideal Patient Candidate

Excisional Goniotomy and Ab Interno Trabeculotomy + Viscocanalostomy
(Kahook Dual Blade, OMNI, ABiC)

Excisional Goniotomy
(Kahook Dual Blade)

AS-OCT image after KDB treatment. Arrows indicate area of TM removal revealing minimal residual leaflets. (Source: Nate Radcliffe)
Cataract Surgery plus Goniotomy 6-Month Outcomes

1 Day 1 Wk 1 Mo. 3 Mo. 6 Mo.

% of eyes ≥ 20% IOP reduction from baseline
- 50%
- 52.5%
- 49.3%
- 63.8%
- 58.3%

% of eyes using ≥ 1 fewer medications from baseline
- 60%
- 62.7%
- 59.7%
- 62.1%
- 61.7%

-4.6 mmHg from baseline
-0.7 meds from baseline

Patients (n=26) with baseline IOP ≤ 16.5 mmHg

12-Month Outcomes

1 Day 1 Wk 1 Mo. 3 Mo. 6 Mo. 12 Mo.

% of pts ≥ 20% IOP reduction from baseline
- 54.4%
- 57.8%
- 55.1%
- 67.4%
- 60.9%
- 57.7%

% of pts using ≥ 1 fewer medications from baseline
- 56.5%
- 64.4%
- 63.3%
- 60.5%
- 60.9%
- 63.5%

12 Mo.

% of eyes ≥ 20% IOP reduction from baseline
- 15.4%
- 100%

% of eyes using ≥ 1 fewer medications from baseline
- 84.6%
- 42.3%


**Ab-interno Trabeculotomy + Viscoanalostomy (OMNI)**

- Treats all 3 points of resistance
- Stand-alone or combined with CE
- Titratable
- 7.3mmHg mean IOP reduction from 23.7mmHg mean medicated baseline
- Mean 12-month IOP of 15.7mmHg.


### Results

<table>
<thead>
<tr>
<th></th>
<th>before</th>
<th>1 week</th>
<th>1 month</th>
<th>3 m</th>
<th>6 m</th>
<th>1 year</th>
<th>18 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All eyes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>21.42</td>
<td>13.73</td>
<td>15.00</td>
<td>12.40</td>
<td>13.88</td>
<td>13.85</td>
<td>12.82</td>
</tr>
<tr>
<td></td>
<td>2.92</td>
<td>1.05</td>
<td>0.67</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
</tr>
<tr>
<td><strong>OMNI alone</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>0.60</td>
<td>0.32</td>
<td>0.17</td>
<td>0.17</td>
<td>0.17</td>
<td>0.17</td>
</tr>
<tr>
<td><strong>Phaco OMNI</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IOP</td>
<td>18.70</td>
<td>12.70</td>
<td>14.20</td>
<td>13.90</td>
<td>14.75</td>
<td>14.71</td>
<td>14.60</td>
</tr>
<tr>
<td></td>
<td>2.80</td>
<td>0.10</td>
<td>0.10</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Complications were limited to: IOP-spikes (9 eyes), hyphema (6 eyes) and fibrin in the anterior chamber (5 cases) that resolved in the first week after surgery.

Endocyclophotocoagulation (ECP)

TREATS INFLOW
- It uses a laser endoscope containing three fiber groupings:
  - a light source (illuminate)
  - an image guide (visualize)
  - diode laser (treat)
- Direct visualization
- Precise delivery to the ciliary processes:
  - no damage to the underlying ciliary body and surrounding tissue

Case 2

Ocular History
- POHX: Primary Open Angle Glaucoma OS>OD
- FHX: – Father – glaucoma, age-related macular degeneration
- Previous Treatment Regimen: None
- Current Treatment Regimen:
  - bimatoprost 0.01% qd OU
  - dorzolamide/timolol bid OS
  - brimonidine 0.1% bid OS
- IOP max:
  - OD: 25 mm Hg
  - OS: 25 mm Hg

Medical History
- PMHX: Nothing of significance
- All Medications: None
- Allergies: Penicillin
- CH:
  - OD: 10.5
  - OS: 7.5

64-year-old, Caucasian male with progressive glaucoma in his left eye.
Ideal Patient Candidate

Subconjunctival Stent (XEN)

Subconjunctival Stent (Xen)

Xen 45 Gel Stent: US Pivotal Clinical Trial

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>12 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicated IOP</td>
<td>25.1 (3.7)</td>
<td>15.9 (5.2)</td>
</tr>
<tr>
<td>Glaucoma Meds</td>
<td>3.5 (1.0)</td>
<td>1.7 (1.5)</td>
</tr>
</tbody>
</table>

76.3% of patients reported a mean diurnal IOP reduction of \(\geq 20\%\) from medicated baseline at 12 months
Postoperative Adverse Events

<table>
<thead>
<tr>
<th>Condition</th>
<th>Count (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotony (IOP &lt; 6 mmHg at any time)</td>
<td>16 (24.6%)</td>
</tr>
<tr>
<td>Anterior chamber shallow with peripheral irido-corneal touch</td>
<td>1 (1.5%)</td>
</tr>
<tr>
<td>Anterior chamber fill</td>
<td>1 (1.5%)</td>
</tr>
<tr>
<td>Bleb Needling</td>
<td>21 (32.3%)</td>
</tr>
</tbody>
</table>

Ab Externo

I currently comanage patients that have undergone a MIGS procedure?

Yes
No - I don't have an interest
No - I am not interested
Post-operative Considerations with MIGS
1. Stopping GLC Meds
2. IOP Spikes
3. Hyphema
4. Hypotony
5. Establish New Baselines

Stopping Glaucoma Medications

Severity of the Glaucoma
Preoperative IOP vs Postoperative IOP
IOP progression was occurring

New baseline hopefully off a med or combo

Likely on med in combo with MIGS

PAS to Stents

US Pivotal iStent Inject Trial
1.8% @ 24 months

HORIZON Trial
13% @ 48 months
Hyphema

IOP Spikes

Ocular Hypotony – Is it a Concern with MIGS?

Hypotony – An IOP below which the eye does not maintain its normal shape and may subsequently lose vision.
Definitions vary slightly – IOP < 5 or 6
Episceral Venous Pressure and its role
Establish New Baselines

In Conclusion...

- Glaucoma is both a medical and surgical disease
  - Key to success is collaboration

- Trends in treatment aim to balance effectiveness and safety

- MIGS procedures allow for interventional glaucoma

Thank You!

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