Simultaneous MIGS Procedures in the Treatment and Management of Glaucoma

ICON Surgical Eye Care
Seamus Martin, OD

Course objectives
1) Introduce eye health professionals to the MIGS combination procedure as a comprehensive surgical option to treat and manage mild to advanced glaucoma
2) Understand how and when to recommend the MIGS combination for patients in the clinical setting
3) Inform eye health professionals on the efficacy of lowering of intraocular pressure of the MIGS combination relative to other available surgical options

Advantages and Disadvantages of MIGS

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
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<tbody>
<tr>
<td>• Minimal damage sustained by ocular anatomy</td>
<td>• Less IOP lowering effect relative to traditional approaches</td>
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<td>• Shorter operation time</td>
<td>• In general, reserved for mild-moderate glaucoma processes</td>
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<td>• Less complications</td>
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<td>• Fast recovery rate</td>
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<td>• Effective IOP lowering</td>
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<td>• Used in conjunction with cataract surgery</td>
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<td>• OAG, pseudoexfoliation, post traumatic, pediatric, OHTN</td>
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Two Surgical Procedures
Where can MIGS be applied?
- Increase trabecular outflow:
  - various stents, trabeculotomy, trabectome, canaloplasty
  - increased uvealr/suprachoroidal/subconjunctival outflow
  - various techniques
  - increased trabecular outflow
  - HD, various sheets
- Decrease aqueous production:
  - endocyclophotocoagulation
- Visan canaloplasty + ab interno trabeculotomy

Two Surgical Procedures
- Goniotomy via gonio lens
- Suture trabeculotomy
- 360 degree suture trabeculotomy
- Canalostomy
- Ab externo canaloplasty
- Trabectome
- Trabecular bypass stents
- Gonio-assisted transluminal trabeculotomy
- Ab interno 360 degree canaloplasty
Ocular Anatomy and Pathophysiology of Glaucoma

- Progressive optic neuropathy that results in the degeneration of the retinal ganglion cells → optic nerve head changes
- The cell death is correlated with the intracocular pressure, among other factors
- Intraocular pressure is still the only modifiable variable in the treatment of glaucoma
- In primary open angle glaucoma, there are complications with the drainage pathway of aqueous humor

Aqueous Humor

- Conventional Pathway
- Unconventional Pathway

Management of Open Angle Glaucoma

- First Line Therapy: prostaglandin analog, selective/non-selective beta blocker
- Second Line Therapy: alpha agonist, carbonic anhydrase inhibitors
- Third Line Therapy: cholinergic agonists
- Combination Therapy
- Surgical Indication

<table>
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<th>% IOP Reduction</th>
<th>Other Glaucoma Types</th>
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<td>Primary Open Angle Glaucoma</td>
<td>Other Glaucoma Types</td>
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<tr>
<td>Stand Alone: 40%</td>
<td>Stand Alone: 55%</td>
</tr>
<tr>
<td>Cataract Surgery: 37.3%</td>
<td>Cataract Surgery: 44%</td>
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<tr>
<td>Post Cataract Surgery: 38%</td>
<td>Post Cataract Surgery: 50%</td>
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Two Surgical Procedures

- Two Surgical Procedures
  - Viscoanaloplasty
    - Viscosurgical microcatheter inserted into Schlemm’s canal and advanced to desired degree of outflow opening
    - Upon retraction of the catheter, viscoelastic material is injected, expanding the diameter of trabecular meshwork, Schlemm’s canal and the collector channels
    - Viscodilation creates microperforations within the outflow system aiding in aqueous drainage
    - 30% IOP reduction on average
    - 50% reduction in medication
  - Ab Interno Trabeculotomy
    - Microcatheter inserted into Schlemm’s canal and advanced for desired degree of outflow opening
    - While catheter is inserted in SC, it is pulled medially towards pupil, rupturing the roof of the trabecular meshwork
    - Surface area of outflow increased while creating a direct path to Schlemm’s canal, essentially taking the area of most outflow resistance out of the equation

Two Surgical Procedures
Aqueous Outflow Resistance

- Proximal Resistance - 50-75% of resistance
  - 1) Juxtacanalicular tissue + Inner wall of Schlemm’s Canal
- Distal Resistance - up to 50% resistance
  - 2) Schlemm’s Canal
  - 3) Collector Channels

MIGS procedures in general only target proximal resistance structures.

Combining viscocanaloplasty with trabeculotomy targets both the proximal and distal resistance areas.

Theoretically increasing efficacy and longevity.

Postoperative Care for the Managing Optometrist

- Treat as standard cataract surgery post operative exams
- Post Op Intervals:
  - 1 day; 1 week; 1 month; 3 months, with IOP checks at 6, and 12 months
- Medication:
  - Begin with standard cataract surgery: Antibiotic + Steroid + NSAID
  - Monitor:
    - Pressure spikes, inflammation
    - Anterior chamber: hyphema, synechiae, angle depth
    - Glaucoma Meds
      - Case by case, and at the discretion of surgeon
      - Some prefer to continue as long as on steroid
      - ICON removes patients from IOP lowering drops prior to surgery
    - Do for OD to restart IOP meds if pressure increasing at concerning rate, reduction in number of medications is a victory

The MIGS Combination Patient

- Cataract excision candidates with a history of:
  - IOP controlling medications
  - Ocular hypertension
  - Prior treatments with laser
  - Phakic/pseudophakic patients exhibiting poor compliance
  - Indicated for mild to moderate glaucoma
  - Several surgeons claiming efficacy with advanced glaucoma including:
    - Post trabeculotomy
    - Post sclerectomy
- Poor candidates include those with obstructed angle views due to: corneal edema, opacity, scars, ICE syndrome, etc.
- Related to obstructed view of the angle during surgical procedure

Clinical Outcomes

- Ondrejka and Korber
- 106 eyes; 71 patients

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<td>Group 2</td>
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| Only OHE complication, experienced by 13%, was hyphema, less than a millimeter in size

IOP Lowering Effect of Simultaneous Migs Procedures at ICON Eye Care

- 49 eyes
- Average age 69 years old
- Moderate/advanced glaucoma
- 14 mmHg to 44 mmHg preoperative IOP
- Average IOP 23 mmHg
- 43% on two or more medications
- 71% on one medication
- 27% history of prior glaucoma surgery

Clinical Outcomes

- Retrospective Study by Karsten Klabe, MD

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- 96.7% achieved IOP reduction +/- 20%
- 83.3% using at least one less medication
- 63.3% medication free
- 44% had self resolving hyphema as complication
IOP Lowering Effect of Simultaneous Migs Procedures at ICON Eye Care

- Average IOP: 13 mmHg
- 41% reduction in IOP
- 8% eyes on 1 medication
- 63% reduction in medication
- 11% self resolving hyphema

MIGS Combination vs. Various Glaucoma Surgeries

- Simultaneous MIGS IOP Lowering Effect
  - 41% IOP reduction
  - Length of Treatment Effectiveness
    - Still in early phase of clinical trials
    - Evidence shows Schlemm canal visibly enlarged two years post operation

- Shunt
  - Implanting a tube that transfers aqueous humor from the anterior chamber to the subconjunctival space
  - 41.4% IOP reduction at 5 years
  - Requires bleb formation
  - Length of Treatment Effectiveness
    - 86% success rate at year 1, 73% at 10 years
    - Complications in 56.4%

- Tube vs Trabeculectomy Study
  - Trabeculectomy
    - Progressive increase in use of glaucoma medications over 5 years
    - Greater incidence of hypotony
    - Higher reoperation rate
    - More successful after 5 years based on use of added glaucoma meds - stable use after operation
  - Tube Shunt
    - More successful after 5 years based on use of added glaucoma meds - stable use after operation
    - Lower reoperation rate, but if needed secondary procedures more complex
  - Both procedures had 10% failure rate
  - Most common complication: inadequate IOP control
  - Second most common: hypotony; 20% of cases resulted in vision loss

MIGS Combination vs. Various Glaucoma Surgeries

- Filtering Bleb Associated Complications
  - Bleb-related endophthalmitis
  - Blebs leak
  - Choroidal detachment
  - Hypotony maculopathy
  - Shallow anterior chamber
  - Hyphema
  - Cataract
MIGS Combination IOP Medication Reduction

- Average number of medications prior to surgical intervention: 2.6 medications
- Average number of medications after surgical intervention: 0.1 medications
- 83% reduction in medication

Conclusion

- The MIGS combination procedure is an effective surgical option for mild, moderate, and advanced glaucoma.
- The MIGS combination procedure results in minimal ocular damage to the patient.
- The MIGS combination procedure yields significant IOP lowering results.
- The MIGS combination procedure increases quality of life and quality of care for patients.

References