I have no financial disclosures

Goals

How glaucoma surgery works
Who to refer/When to refer
Expected outcomes
Glaucoma Philosophy

Glaucoma can be a visually debilitating disease.
Cannot be reversed.
My role is to maintain quality of life by:
Minimizing disease with least cost, burden, and side effects

CIGTS

Outcomes:
Surgery = Medicine
Complications:
Surgery >>> Medicine

### Table 9. Intraoperative and Postoperative Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Intraoperative (n = 448)</th>
<th>Postoperative (n = 448)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conjunctival ulcers</td>
<td>5 (1.1)</td>
<td>3 (0.7)</td>
</tr>
<tr>
<td>Scleral flap problems</td>
<td>3 (0.7)</td>
<td>0</td>
</tr>
<tr>
<td>Partial avulsion of superior rectus tendon</td>
<td>18 (4.1)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>Hypotony</td>
<td>20 (4.5)</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>Anaphylactic or systemic</td>
<td>1 (0.2)</td>
<td>0</td>
</tr>
<tr>
<td>complications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wound leak</td>
<td>18 (4.1)</td>
<td>26 (5.8)</td>
</tr>
<tr>
<td>Iris prolapse</td>
<td>11 (2.5)</td>
<td>4 (0.9)</td>
</tr>
<tr>
<td>Subconjunctival hemorrhage</td>
<td>2 (0.4)</td>
<td>3 (0.7)</td>
</tr>
<tr>
<td>Anterior chamber bleeding</td>
<td>37 (8.3)</td>
<td>44 (10)</td>
</tr>
<tr>
<td>Scleral choroidal detachment</td>
<td>2 (0.4)</td>
<td>12 (2.7)</td>
</tr>
<tr>
<td>Sphinctor choroidal hemorrhage</td>
<td>9 (2.0)</td>
<td>7 (1.6)</td>
</tr>
<tr>
<td>Hyphaema</td>
<td>4 (0.9)</td>
<td>0</td>
</tr>
<tr>
<td>Corneal endothelial defect</td>
<td>0</td>
<td>2 (0.4)</td>
</tr>
<tr>
<td>Corneal stromal defect</td>
<td>0</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Cystoid macular disease</td>
<td>0</td>
<td>5 (1.1)</td>
</tr>
<tr>
<td>Retinal or fovea macular detachment</td>
<td>0</td>
<td>10 (2.3)</td>
</tr>
<tr>
<td>Asymmetric induction</td>
<td>0</td>
<td>3 (0.7)</td>
</tr>
<tr>
<td>Noncorrelate or adherence</td>
<td>0</td>
<td>24 (5.4)</td>
</tr>
<tr>
<td>Depopulated IOL</td>
<td>0</td>
<td>16 (3.6)</td>
</tr>
<tr>
<td>Osher</td>
<td>0</td>
<td>14 (3.2)</td>
</tr>
<tr>
<td>Pneum</td>
<td>0</td>
<td>18 (4.1)</td>
</tr>
</tbody>
</table>

### Patient Selection

- Progressive glaucoma despite medication
- Cannot tolerate medication
- Moderate/advanced disease
Patient Selection

Surgeon’s role
- Lower IOP
- Minimize risk

Patient Selection

Optometrist’s role
- Help maintain visual function
- Co-manage

Patient Selection

Surgery does NOT
- Improve vision (not LASIK)
- Cure glaucoma
Poor Candidates

Young
African American
Uveitic Glaucoma
Rubeotic Glaucoma
Prior failed glaucoma surgery

Good Candidates

Virgin eyes
Older
POAG
White
Define Success

IOP <18
IOP <21
No HVF or ONH progression
Additional Medication?

Trabeculectomy

Conjunctival flap
Make scleral flap
Remove section of TM
Create Iridectomy*
Suture

Trabeculectomy

Goal
Create a non-healing fistula
Allow direct access from AC to subconj
Bypass TM and Schlemm’s canal
Bleb

Functional Bleb
Cystic
Diffuse
Good IOP
Non painful

Remove TM
New passage
Filtering bleb

A partial thickness flap of sclera reduces the rate at which aqueous drains

A small hole is made in the corneal scleral region to allow aqueous to leave the anterior chamber

The bleb under the conjunctiva, this is where the aqueous drains

http://www.ngoglaucoma.com/images/trab.jpg
Trabeculectomy

Improvements

Guarded/Partial Thickness
Anti-metabolites
Suture Manipulation

Guarded
Antimetabolites

Mitomycin C
5 Fluorouracil (5 FU)

Suture Manipulation

http://www.glaucoma-surgery.org/trab_closing_one.html

Suture Manipulation

https://es.slideshare.net/mobile/namratagupta96780/trabeculectomy-trabeculotomy-goniotomy-and-their-complications
Bleb Complications

- Hypotony
- Leak
- Flat A/C
- Infection
- Pain

Wound Leak

Blebitis

https://www.reviewofophthalmology.com/article/filtering-surgery-late-complications
Complications

20 Year Follow Up
Complete Success
13% failure first year
1.6% per year after

Ophthalmology 2012;119:694-702

Complications

20 Year Follow Up
Qualified Success
7% failure first year
0.3% per year after

Complications

At 20 years 15% were blind
Other complications
  Expulsive Hemorrhage
  Phthisis
  Endophthalmitis
Tube vs Trab

**TVT study**

- Similar IOP post-op
- Similar number post-op meds
- Failure Trab (47%)
- Failure Tube (30%)

Ahmed vs Baerveldt

Mean IOP

Ahmed - 16 mmHg
Baerveldt - 14 mmHg

Am J Ophthalmol. 2017 Apr;176:118-126
Ahmed vs Baerveldt

Post-Op Meds
Ahmed - 2
Baerveldt - 1

Ahmed vs Baerveldt

Failure
Ahmed - 51%
Baerveldt - 34%

Ahmed vs Baerveldt

Complications
Ahmed - 52%
Baerveldt - 62%
Complications

Success

ExPRESS Mini-Shunt


ExPRESS Mini-Shunt

Advantage
  Lower rate of Hypotony
  No Iridectomy
  Standard trabecular opening
ExPRESS Mini-Shunt

Define "success"
3 Trials
No complications (i.e. Hypotony)
IOP 6-18 mmHg
IOP <21 mmHg with or without med

ExPRESS Mini-Shunt

Complications
Hypotonous maculopathy
ExPRESS - 4%
Trabeculectomy - 6%

ExPRESS Mini-Shunt

Success
IOP 6-18 mmHg
(Qualified success) - 54%
ExPRESS Mini-Shunt

Success
IOP <21 mmHg with or without meds
ExPRESS - 94%
1/4 were on meds

J Ophthalmol. 2015;2015:720109

MIGS
Microinvasive Glaucoma Surgery
iStent
Trabectome
Cypass
Xen Gel Stent
Only FDA approved MIGS surgeries

http://www.drdylanjoseph.com/istent-exciting-technology-for-the-treatment-of-your-glaucoma/
Advantages
- Minimally invasive
- No cutting conjunctiva
- Less risk (infection, hypotony)
- Can perform trab or tube later

Disadvantages
- Has to be combined with CE
- Not for Advanced Glaucoma
- Not for Secondary Glaucomas
Success

Reduce medication (1.6 to 0.4)
Reduce IOP (range 22% - 40%)


Complication

Hyphema (transient) - 3-70%
Malposition - up to 16%

iStent Inject
Trabectome

http://gusgazzard.com/trabectome/trabectome-ab-interno-surgery-condon/

Advantages
- Minimally invasive
- No cutting conjunctiva
- Less risk (infection, hypotony)

Disadvantages
- Not for Advanced Glaucoma
- Not for Secondary Glaucomas
- Less effective if IOP is already low
Success

Reduce medication (1.2 to 0.4)
Reduce IOP (range 18% - 40%)


Complication

Hyphema (transient) - 60-78%
PAS - up to 25%

CyPass Micro-Stent

CyPass - COMPASS Trial

Success
IOP reduction 20% at 2 years
77% CyPass
60% CE

Ophthalmology 2016;123:2103-2112

Success
IOP between 6-18
65% CyPass
44% CE

Success
Average number of meds
CyPass 1.4 pre-op -> 0.2
CE 1.3 pre-op -> 0.7
Complication
Iritis - 9%
Hyphema (transient) - 3%
(IOP < 6%) - 3%

XEN 45 Gel Stent (Ab-Interno)

XEN 45 Gel Stent
**XEN - 12 month Trial**

- 65 patients
- 75% had $\geq 20\%$ reduction in IOP
- Avg reduction 9 mmHg
- Meds decreased from 3.5 to 1.7

*Ophthalmology 2014;123:2103-2112*

**MIGS**

**Pros**
- Minimally invasive
- Good results

**Cons**
- Currently combined with CE
- Select group benefits
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