Tubes, Ties and Videotape: Surgical Video of Glaucoma Implants and Managing Complications

Herbert Fechter MD, PE
Eye Physicians and Surgeons of Augusta
American Society for Cataract and Refractive Surgery
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Financial Disclosure
I have no financial interests or relationships to disclose.

Objectives
Review the pre-operative considerations, intra-operative surgical techniques, and post-operative management of complications encountered during Glaucoma Tube Implant surgery.

Are you performing more aqueous shunts now than 10 years ago?
50% Yes
30% No
5% Maybe
15% I do not perform Shunts

In your opinion, what is the principal advantage of aqueous shunts over trabeculectomy?
18% More versatile procedure with broader indications
11% Higher success rate
42% Avoidance of bleb related complications
25% Less intensive and/or more predictable postoperative course
4% None (i.e. aqueous shunts have no advantage over trabeculectomy)

Five Year TVT Results
IOP Similar

TVT Glaucoma Medications
Similar at 5 years

<table>
<thead>
<tr>
<th></th>
<th>Tube Group</th>
<th>Trabeculectomy Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>107</td>
<td>59</td>
<td>0.3</td>
</tr>
<tr>
<td>1 year</td>
<td>106</td>
<td>59</td>
<td>0.6</td>
</tr>
<tr>
<td>2 years</td>
<td>72</td>
<td>53</td>
<td>0.8</td>
</tr>
<tr>
<td>3 years</td>
<td>62</td>
<td>53</td>
<td>1.0</td>
</tr>
<tr>
<td>4 years</td>
<td>64</td>
<td>53</td>
<td>1.2</td>
</tr>
<tr>
<td>5 years</td>
<td>63</td>
<td>53</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Gedde S. Tube versus Trabeculectomy Study: 5-Year Results. American Glaucoma Society Meeting, Dana Point, 4 March 2011

Five Year TVT Results
Cumulative Proportion Failing

ABC/AVB Study: 3 Year Results

<table>
<thead>
<tr>
<th></th>
<th>Ahmed</th>
<th>Baerveldt</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOP (mmHg)</td>
<td>14.3</td>
<td>12.9</td>
<td>0.049</td>
</tr>
<tr>
<td>Medications</td>
<td>1.8</td>
<td>1.1</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>


Mean intraocular pressure (IOP) during the 3 years after surgery.

Mean number of glaucoma medications during the 3 years after surgery.
### Postoperative Complications during 3 Years of Follow-up.

<table>
<thead>
<tr>
<th></th>
<th>Ahmed (n = 124)</th>
<th>Baerveldt (n = 114)</th>
<th>P Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow anterior chamber</td>
<td>18 (14%)</td>
<td>19 (17%)</td>
<td>0.72</td>
</tr>
<tr>
<td>Choroidal effusion</td>
<td>16 (13%)</td>
<td>18 (16%)</td>
<td>0.65</td>
</tr>
<tr>
<td>Posterior bleb</td>
<td>7 (6%)</td>
<td>11 (10%)</td>
<td>0.33</td>
</tr>
<tr>
<td>Posterior capsular oedema</td>
<td>9 (7%)</td>
<td>10 (9%)</td>
<td>0.59</td>
</tr>
<tr>
<td>Expanding bleb</td>
<td>14 (11%)</td>
<td>7 (6%)</td>
<td>0.011</td>
</tr>
<tr>
<td>Tube complication†</td>
<td>18 (14%)</td>
<td>18 (16%)</td>
<td>0.86</td>
</tr>
<tr>
<td>Corneal progression†</td>
<td>7 (6%)</td>
<td>10 (9%)</td>
<td>0.45</td>
</tr>
<tr>
<td>Isotonic disorder</td>
<td>7 (6%)</td>
<td>3 (3%)</td>
<td>0.14</td>
</tr>
<tr>
<td>Posterior hypotony</td>
<td>4 (3%)</td>
<td>6 (5%)</td>
<td>0.51</td>
</tr>
<tr>
<td>No light symptom</td>
<td>8 (6%)</td>
<td>6 (5%)</td>
<td>0.76</td>
</tr>
<tr>
<td>Hypotony glaucoma</td>
<td>2 (2%)</td>
<td>4 (4%)</td>
<td>1.00</td>
</tr>
<tr>
<td>Retinal detachment</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
<td>0.31</td>
</tr>
<tr>
<td>Retinal/choroidal detachment</td>
<td>1 (1%)</td>
<td>3 (3%)</td>
<td>0.35</td>
</tr>
<tr>
<td>Endophthalmitis</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
<td>0.50</td>
</tr>
<tr>
<td>Patients with complications</td>
<td>14 (11%)</td>
<td>14 (12%)</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Package Insert: Indications

- Medically uncontrollable glaucoma
- Poor surgical prognosis
  - Neovascular glaucoma
  - Aphakic/pseudophakic glaucoma
  - Failed conventional surgery
  - Secondary glaucoma
  - Uveitis
  - Epithelial downgrowth
  - Congenital glaucoma
- Primary “Tube vs. Trabeculectomy” study

Drainage Devices
Tubes, Ties and Videotape: Surgical Video of Glaucoma Implants and Managing Complications

Needles for Tube Placement

Tube Between Synechia

Tube Through Iris

Tube Behind the Iris

Infero-Nasal Implant

Package Insert: Complications/Adverse Events:
- Hyphema
- Hypotony
- Flat anterior chamber
- Serous choroidal effusion
- Uveitis
- Tube block by iris/vitreous
- Retinal detachment
- Bullous keratopathy
- Tube erosion
- Tube comes touch
- Diplopia
- Choroidal hemorrhage
- Endophthalmitis
- Phthisis bulbi
Early Post-op Hyphema

Early Hypotony
Post-Operative Day #1
Shallow Anterior Chamber

Rip Cord Technique

What to expect when tube opens

Fibrin Obstruction
Tubes, Ties and Videotape: Surgical Video of Glaucoma Implants and Managing Complications

- Thick Capsule
- Uveitis with Iris Bombe
- Tubes Blocked by Iris
- Blood in Tube
- Tube Blocked by Vitreous
- Tube too Short
Extend Tube with 22 Gauge Angiocath

Tube Corneal Touch

Tubes too Long

Exposed Tube

 Extruded Tube

Exposed Ahmed Plates
Prominent Ahmed Plate

Ahmed Plate + Tube Migration

Plate Malposition with Diplopia

Phthisis

Schocket 3 Year Follow-up
IOP 11 mmHg

Tube Too Anterior
Tubes, Ties and Videotape: Surgical Video of Glaucoma Implants and Managing Complications

Summary
Reviewed pre-operative considerations, intra-operative surgical techniques and post-operative management of complications encountered during Baerveldt Glaucoma Implant surgery.

Take Home Pearls
- Tubes and Trabs are equally effective in lowering pressure
- One 7-0 vicryl suture can be used for the entire case
- Hypertensive phase can last 3 months or longer
- Prior planning, meticulous surgical technique and diligent follow-up reduces risk of complications

Clinical Vignettes
1. Glaucoma Implant with Post-op Hyphema
2. Combined Phaco – Baerveldt
3. Inferonasal Implant with Scarred Conjunctiva
4. Baerveldt for Epithelial Down-growth
5. Nanophthalmos with Angle Closure
6. Trabeculectomy Revision with a Baerveldt Implant
7. Uveitic Glaucoma and Baerveldt Implant
8. Early Laser Lysis of Baerveldt Tube Ligature
9. Tube Reposition into the Pars Plana
10. Tube Extenders and Reinsertion
11. Unravelled Bleb due to displaced plate
12. Pars Plana Tube with Corneal Transplant
13. Retinal Detachment Repair with the Hoffman Elbow
14. Baerveldt over a Scleral Buckle
15. Phacoemulsification with a Prolene Stent
16. Phacoemulsification with Two Pre-existing Tubes
17. Baerveldt, Phaco and Pars Plana Tube Insertion
18. Hypotony with Recurrent Choroidal Effusions
19. Permanent Ligature for Post-Operative Hypotony
20. Tube Occlusion with Penetrating Keratoplasty
21. Iridodialysis Repair and Baerveldt Implant
22. Baerveldt BGI with a Failed Penetrating Keratoplasty
23. Trabeculotomy in Infantile Glaucoma
24. Combined Phaco –Trabeculectomy
25. Exposed Tube

“Extra” Clinical Vignettes
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