Combined Phacoemulsification with Express Device: A Procedure of choice in Advanced Open Angle Glaucoma

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• Nil
Introduction

• Goal of glaucoma treatment in advanced cases of glaucoma: Preservation of the residual visual field and visual acuity
Chain of events

FIRST LINE
- MEDICATION

SECOND LINE
- MEDICATION
- LASERS

SURGERY
- TRABECULECTOMY
- MICROINVASIVE SURGERIES

Combined with cataract
- Conventional Phacotrabeculectomy
- Phacotrabeculectomy using express device
Postoperative hypotony, macular splitting, and a spike in intraocular pressure (IOP) just after surgery are reportedly risk factors for the postoperative loss of central visual field. These events can happen in the context of advanced glaucoma intervention. Patients that did not progress had a mean IOP of 12 mm Hg. Diurnal (short-term fluctuation) and long-term changes (visit to visit fluctuation) are important considerations in the management of glaucoma.

Chain of events: Advanced Glaucoma

- **AGGRESSIVE IOP LOWERING**
- Advanced glaucoma intervention study (AGIS), patients that did not progress had a mean IOP of 12 mm Hg
- Diurnal (short-term fluctuation) and long-term changes (visit to visit fluctuation)
• Randomized clinical trial comparing the outcomes of medical, laser and surgical interventions – Lacking

• National Institute for Health and Clinical Excellence guideline of UK - Recommends primary glaucoma surgery in advanced glaucoma

• Cochrane review of medical versus surgical interventions for open angle glaucoma
  ▫ insufficient evidence to determine how well recently available medications work compared with surgery
  ▫ Cost-effective option

National Institute for Health and Clinical Excellence (NICE) Glaucoma: diagnosis and management of chronic open angle glaucoma and ocular hypertension. Clinical Guidelines CG85, UK National Institute for Health and Clinical Excellence (NICE) guidelines. Developed by the National Collaborating Centre for Acute Care. 2009 Apr
Surgical Options: Cataract with Advanced Glaucoma

- Conventional Phacotrabeculectomy
- Phacotrabeculectomy using express device
What Differentiates one Filter from the Next

<table>
<thead>
<tr>
<th>Intraoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC shallowing</td>
<td>Hypotony</td>
</tr>
<tr>
<td>Tissue trauma</td>
<td>Shallow/flat AC</td>
</tr>
<tr>
<td>Bleeding</td>
<td>Choroidals</td>
</tr>
<tr>
<td>Length of procedure</td>
<td>Hyphema</td>
</tr>
<tr>
<td></td>
<td>Bleb leak</td>
</tr>
<tr>
<td></td>
<td>Bleb encapsulation</td>
</tr>
<tr>
<td></td>
<td>Bleb dysthesia</td>
</tr>
<tr>
<td></td>
<td>IOP control</td>
</tr>
<tr>
<td></td>
<td>Visual recovery</td>
</tr>
<tr>
<td></td>
<td>Postop interventions</td>
</tr>
</tbody>
</table>
Evolution of the Guarded Filtration Procedure

- Wound healing strategies
- Suture tension & laser suture lysis
- Fornix-based flaps
- Non-penetrating approaches
- EX-PRESS® glaucoma filtration device
Concern in advanced cases

- Wipe out phenomenon
- Risk factors: Postoperative hypotony, macular splitting, and a spike in intraocular pressure (IOP) just after surgery

Crucial step in trabeculectomy: Internal Sclerostomy and surgical iridectomy
EX-PRESS® Glaucoma Filtration Device
A Limbal Aqueous Device

- **Ex-PRESS stands for** “excessive pressure regulating shunt system”
- **Made of rigid stainless steel** – same as cardiac stents
- **< 3mm long**
- **Internal lumen size** – 50µm/200µm
- **Biocompatible**
- **MRI of the head is permitted, however not recommended, the first two weeks post implantation.**

Source: EX-PRESS® glaucoma filtration device package insert
Purpose

- To determine the intraocular pressure control and visual outcomes following combined phacoemulsification with express device in cases of advanced open angle glaucoma
Design

• Retrospective, interventional, consecutive, noncomparative case series
Methods

- Six eyes of 6 patients
- 100% males
- Mean Age 62 ± 04 yrs
- Mean Preop IOP 30.66 ± 3.59 mm Hg on 3.83 ± 0.37 antiglaucoma eye drops
**Inclusion criteria (Patients)**

- Visually Significant Cataracts
- Advanced glaucoma Intraocular pressure not reaching target IOP on medical management
Advanced glaucoma

- Patients were defined to have advanced glaucoma due to the presence of near total cupping of the optic nerve with or without severe visual field (VF) loss within 10° of fixation, i.e. scotoma encroaching on or splitting fixation.

- A mean deviation of $< -12$ dB and a pattern standard deviation $P < 0.5\%$

- With or without the presence of RAPD
### Pre Op:

<table>
<thead>
<tr>
<th>SERIAL NO</th>
<th>VA</th>
<th>CATARACT</th>
<th>RAPD</th>
<th>IOP</th>
<th>GLAUCOMA MEDICINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>0.1</td>
<td>YES</td>
<td>PRESENT</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>Patient 2</td>
<td>0.25</td>
<td>YES</td>
<td>ABSENT</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>Patient 3</td>
<td>0.16</td>
<td>YES</td>
<td>PRESENT</td>
<td>32</td>
<td>4</td>
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<tr>
<td>Patient 4</td>
<td>0.25</td>
<td>YES</td>
<td>ABSENT</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>Patient 5</td>
<td>0.1</td>
<td>YES</td>
<td>PRESENT</td>
<td>34</td>
<td>4</td>
</tr>
<tr>
<td>Patient 6</td>
<td>0.32</td>
<td>YES</td>
<td>ABSENT</td>
<td>26</td>
<td>3</td>
</tr>
</tbody>
</table>
CDR 0.8 with inf near notch
Sup arcuate scotoma, inferiorly evolving arcuate
CDR 0.8 with inf near notch
Sup arcuate scotoma, inferiorly evolving arcuate
Disc pallor + with RAPD
CDR 0.9 with bipolar notch
Biarcuate scotoma
Disc pallor + with RAPD
## Visual field indices

<table>
<thead>
<tr>
<th>Patient</th>
<th>MD (dB)</th>
<th>PSD (dB)</th>
<th>VFI (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>-32.19</td>
<td>3.69</td>
<td>4</td>
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<tr>
<td>Patient 2</td>
<td>-20.28</td>
<td>9.7</td>
<td>37</td>
</tr>
<tr>
<td>Patient 3</td>
<td>-13.79</td>
<td>9.47</td>
<td>57</td>
</tr>
<tr>
<td>Patient 4</td>
<td>-32.07</td>
<td>2.18</td>
<td>0</td>
</tr>
<tr>
<td>Patient 5</td>
<td>-25.68</td>
<td>7.23</td>
<td>51</td>
</tr>
<tr>
<td>Patient 6</td>
<td>-18.78</td>
<td>7.69</td>
<td>42</td>
</tr>
</tbody>
</table>
Procedure

• Two site Phacoemulsification with implantation of acrylic IOL followed by filtrating surgery- Ex-PRESS miniature glaucoma shunt implantation was performed using 0.02 % MMC
Results: Visual Acuity
Results: Intraocular Pressure

<table>
<thead>
<tr>
<th>Patient</th>
<th>Pre op IOP</th>
<th>Post op Day 1</th>
<th>Post op Day 7</th>
<th>Post op Day 30</th>
<th>Post op Day 90</th>
<th>Post op Day 180</th>
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</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>28</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
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<tr>
<td>Patient 2</td>
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<td>13</td>
<td>14</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Patient 3</td>
<td>32</td>
<td>0</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Patient 4</td>
<td>36</td>
<td>18</td>
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<td>Patient 5</td>
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<td>Patient 6</td>
<td>26</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>
Results: Intraocular Pressure (Contd)

![Graph showing intraocular pressure changes over time for Patient 1, Patient 2, and Patient 3.](image-url)
Results: Intraocular Pressure (Contd)

![Graph showing Intraocular Pressure over time for different patients. The graph includes data points for Pre op IOP, Post op Day 1, Post op Day 7, Post op Day 30, Post op Day 90, and Post op Day 180. The graph compares Patient 4, Patient 5, and Patient 6.](image-url)
Results: Glaucoma medications

<table>
<thead>
<tr>
<th>Patient</th>
<th>No of antiglaucoma drops (Preop)</th>
<th>No of antiglaucoma drops (Post op)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Patient 2</td>
<td>4</td>
<td>0</td>
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<tr>
<td>Patient 3</td>
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<td>0</td>
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<tr>
<td>Patient 4</td>
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<td>2</td>
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<tr>
<td>Patient 5</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Patient 6</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Results: Bleb morphology
Case 1: H1E4V2S0
Express Device in situ
Results: Bleb morphology
Case 2: H1E4V3 SO
Case 3 : H1E3V2S0
Phacotrab Vs Express

Phacotrabeculectomy without device

Phacotrabeculectomy with device
Discussion

• Combined surgery has become the most commonly used surgical treatment for medically uncontrolled primary glaucoma with coexisting cataract

• Major apprehension in advanced glaucoma cases are the development of a wipe out phenomenon in the postoperative period
• Controlled trabeculectomy reduces the risk of wipeout

• Lumenal Control with express device provides a uniform filtration;
  ▫ uniform filtration helps to stabilize IOP during and after the procedure which means greater predictability
Ex-PRESS Implantation Versus Trabeculectomy in Uncontrolled Glaucoma: A Meta-Analysis

Objective: To evaluate the efficacy and tolerability of Ex-PRESS implantation (Ex-Press) compared with trabeculectomy (Trab) in the treatment of patients with uncontrolled glaucoma.

Methods: A comprehensive literature meta-analysis was performed according to the Cochrane Collaboration methodology to identify controlled clinical trials comparing Ex-Press with Trab.

Results: Eight controlled clinical trials meeting the predefined criteria were included in the meta-analysis. A total of 605 eyes from 559 patients with medically uncontrolled glaucoma were included. The weighted mean difference of the percentage IOP reduction from baseline was 2.33 (95% confidence interval: 2.59–7.24) when comparing Ex-Press with Trab. Ex-Press was associated with numerically greater, but nonsignificant, IOP lowering efficacy than Trab. The pooled odds ratio comparing Ex-Press with Trab were 0.93 (0.39, 2.23) for the complete success rate and 1.00 (0.39, 2.56) for the qualified success rate. Ex-Press was associated with a significantly lower frequency of hypotony and hyphema than Trab, with pooled ORs of 0.29 (0.13, 0.65) and 0.36 (0.13, 0.97), respectively.

Conclusion: Ex-Press was associated with equivalent efficacy to Trab in lowering IOP. Ex-Press was better tolerated than Trab.
Comparison Of Trabeculectomy Versus The Ex-PRESS Miniature Glaucoma Device In The Same Patient: A Prospective Randomized Study (XVT-USF)

Purpose: To compare standard trabeculectomy to the Ex-PRESS mini glaucoma shunt implantation under a scleral flap in eyes with open-angle.

Design: Prospective, randomized clinical trial.
• Participants: 15 subjects with bilateral primary open-angle glaucoma

• Complete (without medications) and qualified (with or without medications) successes were more common at all IOP cut-off values in Ex-PRESS eyes than trabeculectomy eyes

• Postoperative complications were uncommon in both groups, but trabeculectomy eyes required more postoperative interventions than Ex-PRESS eyes
Five-year extension of a clinical trial comparing the EX-PRESS glaucoma filtration device and trabeculectomy in primary open-angle glaucoma
Leo de Jong, Anto ine Lafuma, Anne-Sophie, Gilles Berdeaux. Clinical Ophthalmology April 2011

- This five-year analysis confirmed and extended the results reported after one year

- Compared with trabeculectomy, EX-PRESS provided better intraocular pressure control in the first three years, and patients required fewer intraocular pressure medications and fewer surgical interventions during the five-year study period
Ex-Press Miniature Glaucoma Device Implanted Under a Scleral Flap Alone or in Combination with Phacoemulsification Cataract Surgery


Compared with baseline values, the postoperative intraocular pressure and number of glaucoma medications were significantly lowered in both groups.
Less hypotony with Express !!!
Moorfields Bleb Grading System revealed less vascularity and height but more diffuse area associated with the Ex-PRESS blebs.
Our experience:

- Advanced cases
- Good IOP control till date
- No intraop or postop hypotony
- No choroidals
- Less no of glaucoma medications postoperatively
- Bleb morphology:
  - Low height
  - Posterior
  - Highly vascularised
Conclusion

- The Express Device demonstrates good IOP control in cases of advanced glaucoma with less propensity to hypotony or wipe out
Thank You ....