EFFICACY AND SAFETY OF CANALOPLASTY IN SAUDI PATIENTS WITH UNCONTROLLED OPEN ANGLE GLAUCOMA

DR. FAISAL ALMOBARAK
ASSISTANT PROFESSOR AND CONSULTANT DEPARTMENT OF OPHTHALMOLOGY
COLLEGE OF MEDICINE AND KING SAUD UNIVERSITY
SAUDI ARABIA
INTRODUCTION

Trabeculectomy, first described in 1967, was based on the principle: guarded filtration under guarded flap. The initial success rates were 37-85% depending on the patients population & series. Englart et al 1999

MMC was introduced in 1983, but it’s application was not popular until 1991. Since that time, it increased the success rate to about 67-100% but also the rate of vision threatening complications increased. Beck et al 2003
INTRODUCTION

In the 1980s, Fyodorov, Kozlov & Zimmerman took the next step in the evolution of glaucoma surgery by modifying the NPGD to have a scleral flap.
THE QUEST CONTINUE FOR A MORE PREDICTABLE & PHYSIOLOGIC GLAUCOMA PROCEDURE WITH GREATER MARGIN OF SAFETY
INTRODUCTION

Canaloplasty in a non-penetrating glaucoma surgery that increase aqueous flow from the anterior chamber, through the trabecular meshwork & descemetic window, into & around the schlemm canal, & out through the collector channels, thereby reducing the intra-ocular pressure (IOP). Thus, canaloplasty restores the natural aqueous outflow system & avoid the presence of blebs & their complications.

INTRODUCTION

It involves catheterization & controlled viscodilation of the entire circumference of schlemm canal – unlike standard viscocanalostomy which involves only a section of it – in conjunction with placement of trabecular tensioning suture facilitated by a flexible microcatheter coupled to ophthalmic viscosurgical device source (OVD)

INTRODUCTION

INDICATIONS:

• Patients with open angle glaucoma

CONTRAINDICATIONS:

• Neovascular glaucoma
• Chronic angle closure
• Angle recession
• Narrow angle
• Narrow approach with plateau iris
• Previous surgery preventing 360 degree catheterization of Schlemm’s canal
INTRODUCTION
INTRODUCTION
INTRODUCTION

POSTOPERATIVE CARE:

- Postoperative ophthalmic evaluation
- Topical antibiotics
- Topical steroids
- Might have transient borderline to moderately high IOP
INTRODUCTION
INTRODUCTION

Complications are few & mostly non vision-threatening:

• Microhyphema-Hyphema
• Early elevated IOP (0 - 3 months postop)
• Blebs at 24 months
• Late elevated IOP (> 3 months postop)
• Wound Hemorrhage
• Descemet membrane detachment
• Suture extrusion through TM
• Hypotony


• Intracorneal hematoma (new reports)
INTRACORNEAL HEMATOMA

Patient A

Patient B
80 MHz UBM WAS DONE INTRAOPERATIVELY & SHOWED A RUPTURED INNER WALL OF SCHLEMM CANAL AT 4 O’CLOCK POSITION
INTRACORNEAL HEMATOMA

Patient A

Patient B
OCT AS + UBM:
INTRACORNEAL HEMATOMA

Patient A

Patient B
REASONS

1-VISCODILATION:

The entry of the high-weight viscoelastic substance through the ruptured inner wall of sclemm canal with reflux of blood was due to high pressure in the high-weight viscoelastic substance injection process which lead to descemet detachment by the OVD & reflux bleeding from the sclemm canal with subsequent entrapement of the hematoma by the surrounding high-weight OVD
MICROCATHETER:

A false passage of the microcatheter can rupture the inner wall of sclemm canal causing bleeding which could dissect through the descemet membrane
MANAGEMENT & PROGNOSIS

The management options are determined by the location, size, & visual impairment.

1-MEDICAL:

Medical management awaiting the spontaneous reabsorption of the hemorrhage which could take up to 6 months is a reasonable option in cases with small hematomas, peripherally located or those with preserved BCVA.

2-SF 6:

SF6 20% injection in the presence of peripheral hematoma


3-ENDORTHELIAL MICROPUNCTURE:

Endothelial micropuncture to facilitate the drainage of the entrapped OVD with the hemorrhage coupled with SF6 20% injection to push the hematoma to the AC can be useful in hematomas that affect the visual axis (size?)

4-PARTIAL THICKNESS CORNEAL INCISION:

a partial thickness pre-descemet corneal incision to evacuate the hematoma can facilitate the spontaneous drainage but over longer time (risk of corneal stain?)

Sharma PS ET AL. Corneal blood staining secondary to hemorrhagic descemet membrane detachment. Cornea. 2007 Dec;26(10):1273-4
5-PRE-DESCEMET INCISION WITH TAMPONAD:

A partial thickness pre-descemet incision with the injection of OVD in the anterior chamber through another paracentesis then using the Rycroft blunt canula to wash the OVD & hematoma & then washout the OVD from the AC & injecting air bubble to reattach the descemet membrane is a useful option for large hematomas involving the visual axis. Thus, the risk of staining is less & the visual prognosis is better.

Which patient will develop such complication?
No clear answer till now, could be overdilation of the canal or just a weak wall.
EFFICACY AND SAFETY OF CANALOPLASTY IN SAUDI PATIENTS WITH UNCONTROLLED OPEN ANGLE GLAUCOMA
**Purpose:** To evaluate the outcome of Saudi patients with open angle glaucoma with uncontrolled IOP.

**Design:** Prospective study.

**Inclusion criteria were:**
- Open angle
- Vergin eyes
- Uncontrolled IOP &/or progressive visual field deterioration with possible incompliance to medications

**Exclusion criteria were:**
- Closed, narrow or narrow inlet angle
- Previous glaucoma surgery
## VARIABLES

### Mean age (months) (±SD)
- At time of surgery: 46.8 (±16.3)

### Mean follow-up
- 4.2 (±2.7) range (3-9 months)

### Gender (n=38 eyes, 32 patients)
- Male: 19 (59%)
- Female: 13 (41%)

### Diagnosis
- POAG: 14 (63.6%)
- NTG: 2 (9.1%)
- Pigmentary: 2 (9.1%)
- PXF (open angle): 1 (4.5%)
- Juvenile open angle: 3 (13.6%)

### Preoperative (±SD)
- IOP: 28.2 (±8.1)
- Medications: 2.7 (±0.95)
- Cup/Disc Ratio: 0.9 (±0.3)
- Visual Acuity (LogMAR): 0.5 (±0.7)
# RESULTS

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>PREOP. MEAN (SD)</th>
<th>POSTOP. MEAN (SD)</th>
<th>%REDUCTION / IMPROVEMENT</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IOP</td>
<td>28.2 (8.1)</td>
<td>14.4 (4.9)</td>
<td>48.9 %</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>NUMBER OF MEDICATIONS</td>
<td>2.7 (0.95)</td>
<td>0.05 (0.21)</td>
<td>98.1 %</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>VISUAL ACUITY (LogMAR)</td>
<td>0.5 (0.7)</td>
<td>0.3 (0.6)</td>
<td>40 %</td>
<td>0.157</td>
</tr>
</tbody>
</table>
RESULTS

P < 0.0001

REDUCED 48.9%

P < 0.0001

REDOCED 98.1%

P = 0.157

IMPROVED 40%
RESULTS

Only 2 cases failed: one at the first month & the second at the second month
RESULTS

- DMD
- Vitreous hemorrhage
- Intra-corneal hematoma
- Hyphema
DISCUSSION

- A major advantage of canaloplasty surgery is the ability to have a low IOP by restoring the physiologic pathway & thus, avoids the presence of blebs & their related complications.

- Klink et al showed that blebs occurs rarely after canaloplasty & were not detected clinically in one eye out of 20 (Journal of Glaucoma 2011)

- In a retrospective comparative study, Ayyala et al showed a comparable IOP reduction in both canaloplasty & trabeculectomy group (Ophthalmology 2011)
Shingleton et al reported transient IOP elevation followed by hyphema as the most encountered in a 54 eyes study population who underwent combined Phaco-canaloplasty & the IOP at 12 months was 13.7 (4.4) which is comparable to our results.

*J Cataract Refract Surg 2007*

Grieshaber et al reported a success rate of 81.6% at 36 months & a higher rate at 12 months which is comparable to our study & a low rate of complications mainly DMD. *BJO 2010*
Bull et al reported an IOP of 15.1 ± 3 mmHg at 3 years follow-up compared to 23.4 ± 3.3 mmHg preoperatively in canaloplasty alone & 13.8 ± 3.2 mmHg at 3 years follow-up compared with 24.3 ± 6 mmHg preoperatively in combined cataract-canaloplasty. *Graefes Arch Clin Exp Ophthalmol 2011*

Lewis et al reported an IOP of 15.2 ± 3.5 mmHg at 3 years follow-up in canaloplasty alone compared with 23.8 ± 5 mmHg preoperatively & 13.6 ± 3.6 mmHg at 3 years compared to 23.5 ± 5.2 preoperatively in combined cataract-canaloplasty. The complications were cataract (12.7 %), transient IOP elevation (6.4 %), & partial suture extrusion through the trabecular meshwork (0.6 %) *J Cataract Refract Surg 2011*
CONCLUSION

- Canaloplasty can offer a low IOP by restoring the normal physiologic aqueous pathways.

- Being independent on subconjunctival outflow, it avoids the presence of blebs & their related complications.

- Canaloplasty complications are rare, mostly transient & if visually significant, should be dealt with early.

- Intermediate-term outcomes are encouraging. However, further long-term studies are needed.
Thank you