Factors Influencing the Outcome of Goniotomy and Trabeculotomy in Primary Congenital Glaucoma

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by

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The study was presented as a poster at the AAPOS meeting, Washington DC, March 2018.
Total corneal opacity with intact Descemet’s membrane

Iris covers the scleral spur


Courtesy of Prof Dr Zeinab El Sanabary, MD

SURGICAL
Risk factors

- Corneal diameter
- Higher IOP
- Family history
- Females
- Early age at presentation
- Middle Eastern race

Barkan (1953)
Lister (1966)
Shaffer (1982)
Elder (1993)

Correlations

- Shaffer Goniotomy Age: <1 month and >2 years
- Quigley Trabeculotomy HCD: >14 mm
- Dietlein 3 surgeries Age: <3 months and AXL >24 mm
- Levy 4 surgeries Initial IOP and CD ratio
- Yalvac Trabeculotomy AXL: >22 mm
- Bowman Goniotomy Female gender
- Fieß Goniotomy Preop IOP, CD ratio and >2 years
### Classification used for PCG by Al-Hazmi, et al (2005)

<table>
<thead>
<tr>
<th>Severity</th>
<th>IOP (mmHg)</th>
<th>Corneal diameter (mm)</th>
<th>Corneal clarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>&lt;25</td>
<td>&lt;13</td>
<td>Good</td>
</tr>
<tr>
<td>Moderate</td>
<td>25-35</td>
<td>13-14.5</td>
<td>Fair</td>
</tr>
<tr>
<td>Severe</td>
<td>&gt;35</td>
<td>&gt;14.5</td>
<td>Poor</td>
</tr>
</tbody>
</table>

### Classification used for PCG by Al-Hazmi, et al (2005)

<table>
<thead>
<tr>
<th>Severity</th>
<th>Goniotomy</th>
<th>Trabeculotomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>81 %</td>
<td>90 %</td>
</tr>
<tr>
<td>Moderate</td>
<td>13 %</td>
<td>40 %</td>
</tr>
<tr>
<td>Severe</td>
<td>—</td>
<td>10 %</td>
</tr>
</tbody>
</table>
Aim of work

• To study prognostic factors influencing intraocular pressure (IOP) reduction and success rates of pediatric goniotomy and trabeculotomy.

(help in the proper selection of the type of intervention)

Methods

• Retrospective review
• Patients aged ≤12 years
• January 2013-January 2016
• Minimum of 6 months follow-up
• Pediatric ophthalmology department of Cairo University Hospital (Abureish Hospital)
Methods

• Multivariate linear regression analysis was used to predict the correlation of preoperative and operative risk factors to the percent IOP reduction.

• Multivariate logistic regression was done to detect independent predictors of failure.

• Failure was defined as a final IOP>18 mmHg on medications or the need for another glaucoma procedure.

Results

452 eyes (303 patients) met the inclusion criteria and were distributed as follows:

120 eyes (88 patients) underwent goniotomies (9.4 ± 11.4 months)
332 eyes (215 patients) underwent trabeculotomies (9.1 ± 13.1 months)
Goniotomy (120 eyes)

- Mean percentage of IOP reduction was $14.7 \pm 37.5\%$ and was significantly correlated with high initial IOP ($p<0.001$)

Trabeculotomy (332 eyes)

- Mean percentage of IOP reduction was $28 \pm 33\%$ and was mostly influenced by
  - preoperative IOP ($p<0.001$)
  - extent of trabeculotomy ($p=0.003$)
  - corneal clarity ($p=0.04$)
  - gender ($p=0.04$)
  - consanguinity ($p=0.03$)
Highly significant IOP reduction in 360° vs 180° *(p= 0.003)* (Sarkisian, 2010)
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Goniotomy</th>
<th>Trabeculotomy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correlation with % IOP reduction</td>
<td>Correlation with failure rate</td>
</tr>
<tr>
<td>Gender</td>
<td>P-value 0.64</td>
<td>P-value 0.44</td>
</tr>
<tr>
<td>Consanguinity</td>
<td>0.29</td>
<td>0.42</td>
</tr>
<tr>
<td>Family history</td>
<td>0.82</td>
<td>0.46</td>
</tr>
<tr>
<td>Previous surgery</td>
<td>0.96</td>
<td>0.5</td>
</tr>
<tr>
<td>Laterality</td>
<td>0.21</td>
<td>0.72</td>
</tr>
<tr>
<td>Age at presentation</td>
<td>0.32</td>
<td>0.56</td>
</tr>
<tr>
<td>Age at surgery</td>
<td>0.1</td>
<td>0.26</td>
</tr>
</tbody>
</table>

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<tr>
<td></td>
<td>Correlation with % IOP reduction</td>
<td>Correlation with failure rate</td>
</tr>
<tr>
<td>Time from presentation to surgery</td>
<td>0.68</td>
<td>0.97</td>
</tr>
<tr>
<td>Preoperative IOP</td>
<td>&lt;0.001</td>
<td>0.08</td>
</tr>
<tr>
<td>Preoperative C/D ratio</td>
<td>0.14</td>
<td>0.03</td>
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<tr>
<td>Preoperative corneal diameter</td>
<td>0.64</td>
<td>0.16</td>
</tr>
<tr>
<td>Extent</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Corneal clarity</td>
<td>--</td>
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Cup-to-disc ratio:
In the *goniotomy group*, 20 eyes (16.7 %) showed reduction in cupping by at least 0.2

In the *trabeculotomy group*, reduction of the cup-to-disc ratio by at least 0.2 was seen in 62 eyes (32% of eyes in eyes in which the disc was seen both pre- and postoperatively) ($p = 0.0007$)

Cornea Clarity:
In the *trabeculotomy group*

| Preop     | 199 eyes | Vs | Postop    | 281 eyes |
Goniotomy (120 eyes)

Follow-up duration:
• Mean = 9.36 ± 9.05 m (range= 0.33 - 40.57 m)
Trabeculotomy (332 eyes)

Follow-up duration:
- Mean = 11.61 ± 9.39 m (range = 1.17-50.13 m)
The survival time for *trabeculotomy* was significantly longer than *goniotomy* ($p<0.001$).

**Conclusion and recommendations**

- Identification of risk factors associated with poorer outcome in pediatric angle surgery can help in guiding the choice of surgery.

- Initial IOP and cup-to-disc ratio influenced the outcome in goniotomy.
• Earlier manifestation, initial IOP, positive consanguinity and female gender were the most important predictors of final outcome in trabeculotomy.

• Both procedures achieve a success rate similar to that previously reported in other patient populations, with trabeculotomy having a higher success rate and longer survival than goniotomy.

• Success in trabeculotomy is higher when the extent of the incision is bigger.

Thank you