Review of management of Shamblin III tumors

Should we look at more?

Guillermo A. Escobar
(On behalf of Henry Zhan)
Shamblin Classification

• First CBT surgery by Riegner in 1880 (died)
• First successful without stroke nor ligation 1889 (Albert)
• Shamblin classification first described in 1971
• Anatomic description of 49/90 CBT excised
• Described vascular morbidity but not neurological

Group I: localized and easily resected
Group II: adheres to, or partially surrounds the carotid arteries
Group III: completely surrounds or encases at least one of the carotid arteries.
Metaanalysis shows increased CN injury and ECA ligation in Shamblin III

- 27 articles selected.
- CN injuries (3%, 17% and 39%) and complications (0%, 1% and 10%) were significantly related to Shamblin class (P < .01).

Jansen TTG, Marres HAM, Kaanders J, Kunst HPM. A meta-analysis on the surgical management of paraganglioma of the carotid body per Shamblin class. *Clinical otolaryngology*. 2018
Metanalysis shows increased CN injury and ECA ligation in Shamblin III

- Shamblin III had RR 3.12 (95% CI 1.29-7.59), for CN injury
- ECA ligation (RR 3.48 with a 95% CI of 0.88-13.81).

Jansen TTG, Marres HAM, Kaanders J, Kunst HPM. A meta-analysis on the surgical management of paraganglioma of the carotid body per Shamblin class. *Clinical otolaryngology*. 2018
But does Shamblin alone predict other difficulties and outcomes?

• A series of 21 CBT resections
  – Median F/U 94 months
  – Five (23.8%) Shamblin III

• Shamblin class correlated to operative time, blood loss, and incomplete resection

• It did not predict postoperative complication

Vascular 2017 Apr;25(2):184-189
<table>
<thead>
<tr>
<th></th>
<th>Shamblin I and II (n=5)</th>
<th>Shamblin III (n=8)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vascular repair</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary closure</td>
<td>1 (8)</td>
<td>1 (8)</td>
<td>0.299</td>
</tr>
<tr>
<td>Saphenous vein graft</td>
<td>-</td>
<td>2 (15)</td>
<td></td>
</tr>
<tr>
<td>Prosthetic vascular graft</td>
<td>-</td>
<td>1 (8)</td>
<td></td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transient</td>
<td>-</td>
<td>1 (8)</td>
<td>0.243</td>
</tr>
<tr>
<td>Permanent</td>
<td>-</td>
<td>1 (8)*</td>
<td></td>
</tr>
<tr>
<td><strong>Postoperative CN deficit</strong></td>
<td></td>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td>IX</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>-</td>
<td>3 (23)*</td>
<td></td>
</tr>
<tr>
<td>XI</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>XII</td>
<td>-</td>
<td>1 (8)</td>
<td></td>
</tr>
<tr>
<td>Sympathetic nerve</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Superior laryngeal nerve</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Is it only the wrapping around the vessels?

- 50 CBT
- Nerve injury occurred in
  - 1 (12.5%) from group I
  - 6 (35%) from group II
  - 9 (37.5%) from group III
- No statistically significant difference existed for injury

Why is there so much discordance?
Is it only the wrapping around the vessels?

• Luna-Ortiz evaluated adhesion to the vessels during resection.

• IIIa represents the original III described by Shamblin.

• IIIb: tumor of any size intimately adherent to the vessels.

• Using new classification predicted vascular sacrifice (P = 0.001).

LFDC collection of CBT Distance to Base of Skull

- 356 patients

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>DTBOS</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson (P)</td>
<td>Pearson (P)</td>
</tr>
<tr>
<td>EBL, mL</td>
<td>−0.292 (&lt;.001)</td>
<td>0.262 (&lt;.001)</td>
</tr>
<tr>
<td></td>
<td>Regression P</td>
<td>Regression P</td>
</tr>
<tr>
<td>Cranial nerve injury</td>
<td>.004</td>
<td>.120</td>
</tr>
</tbody>
</table>

*DTBOS*, Distance to brain correlation coefficient; *regression*, logistic regression.
## Risk per 1cm decrease in DTBOS

<table>
<thead>
<tr>
<th>Bleeding</th>
<th>Odds ratio (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>EBL &gt;250 mL</td>
<td>1.79 (1.25-2.55)</td>
</tr>
<tr>
<td>Transfusion</td>
<td>1.36 (0.94-1.97)</td>
</tr>
<tr>
<td>CN injury</td>
<td>Odds ratio (95% CI)</td>
</tr>
<tr>
<td>Glossopharyngeal (CN IX)</td>
<td>2.08 (1.10-3.93)</td>
</tr>
<tr>
<td>Vagus (CN X)</td>
<td>2.53 (1.54-4.15)</td>
</tr>
<tr>
<td>Superior laryngeal</td>
<td>1.39 (0.97-1.97)</td>
</tr>
<tr>
<td>Hypoglossal (CN XII)</td>
<td>1.74 (1.24-2.45)</td>
</tr>
<tr>
<td>Any CN injury</td>
<td>1.51 (1.19-1.92)</td>
</tr>
<tr>
<td>Multiple CN injuries</td>
<td>2.66 (1.67-4.21)</td>
</tr>
</tbody>
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Case Presentation

- 54 F who presents for R neck mass x 10 years
- Slowly been growing
- Complains of jaw pain associated with mass
- Hx of submandibular mass s/p biopsy, found to have Warthin’s tumor, resected 30 yrs prior
- No dysphagia, dysphonia or difficulty breathing
Case Presentation

- **PMH:** endometrial cancer (s/p chemo & XRT), GERD
- **PSH:** TAH/BSO 2016
- **PE:**
  - No carotid bruises
  - ~4x4 cm mass on R neck mass
  - BL brachial, radial pulses present and symmetric
  - CN II-XII intact
Case Presentation

- Balloon occlusion of RICA – negative
Case Presentation

• Ascending pharyngeal artery embolization with microparticles
Operative intervention

- Nasopharyngeal intubation
- Dissection using bipolar cautery and harmonic scalpel
- Most proximal residual tumor at skull base marked
2 month follow up

- No neuro deficits
- No dysphagia/dysphonia nor difficulties breathing
- Remains asymptomatic
- Referal to oncology
Conclusions

• Shamblin was originally designed to classify according to likelihood of resecting the entire bifurcation

• CN injury is obviously higher according to how high the tumor is (like CEA)

• Shamblin III generally is harder to do, and more likely to have more bleeding and potentially CN injury (?)exposure?)
Conclusions

• If not a change in classification, we should all consider reporting Shamblin, DTBOS, and adherence

• In cases of more complex tumors adding more "belts and suspenders" may help minimize risk
Thank you!