DECISION MAKING IN JUGULAR FORAMEN TUMORS

Prof. Essam Saleh, MD
Prof. of Otolaryngology Alex.Univ., Egypt
Consultant of Otolaryngology KAMC, Makkah
Jugular foramen

Anatomical Difficulties
- Deep Location.
- Complex Anatomy.
- Relation to different neurovascular structures.
Complex Anatomy
The facial nerve straddles the jugular bulb
Jugular Foramen

Compartments

- Pars nervosa !!
- Pars venosa !!

The IX nerve lies in a separate compartment in 2/3 of cases.
Pathologies

- Glomus jugulare
- Meningioma
- LCN Schwannoma
- Chondrosarcoma, chordoma, petrous bone cholesteatoma, etc.
Pathologies

- Glomus
- LCN Schwannoma
- Meningioma
- Chordoma
Jugular foramen Tumors

- Invasive pathologies
- High tendency to recurrence
- Different patterns of growth
  - CPA
  - Petrous bone
  - Neck
Management Options

- Total Surgical Removal
- Planned Subtotal & Radiotherapy
- Radiotherapy
- Wait & See
Factors to be considered

- Tumor type & extent.
- Age of the patient.
- Preoperative LCN status.
- Preoperative hearing.
- Preoperative FN function.
- Patient’s expectation.

Your management should be tailored
What Approach??

- Cervical transmastoid
- Infratemporal fossa A (FN Rerouting)
- Petrooccipital transsgimoid
- Infratemporal with partial FN rerouting
- Infratemporal without FN rerouting
- Others
Infratemporal Fossa Approach
Infratemporal Fossa Approach

Indications

- Most cases of Glomus jugulare tumors.
- Few cases of meningioma & schwannomma with massive involvement of ICA.
Infratemporal Fossa Approach

Advantages

- Excellent control of jugular foramen area
- Excellent control of the ICA
- Excellent control of the upper neck.
Infratemporal Fossa Approach

**Disadvantages**

- Temporary facial nerve paresis
- Conductive hearing loss
- Staged operation for intradural component.
Petro-occipital Trans-sigmoid (POTS)

- Retro-labyrinthine (Presigmoid) petrosectomy
- Suboccipital craniotomy
- Transsection of the sigmoid sinus.
Petro-occipital Trans-sigmoid (POTS)

**Indications**

- Tumors or lesions of the jugular fossa:
  - Lower cranial nerve schwannomas.
  - Jugular foramen meningioma.
  - Some selected cases of C1-type glomus tumors.
Petro-occipital Trans-sigmoid (POTS)
Petro-occipital Trans-sigmoid (POTS)
Petro-occipital Trans-sigmoid (POTS)
### Petro-occipital Trans-sigmoid (POTS)

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>• Excellent jugular foramen exposure</td>
<td>• Inadequate exposure of the vertical internal carotid.</td>
</tr>
<tr>
<td>• Hearing &amp; facial nerve preservation.</td>
<td>• Insufficient control in cases of vascular &amp; aggressive tumors.</td>
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<tr>
<td>• One stage intra &amp; extracranial tumor</td>
<td></td>
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<tr>
<td>removal.</td>
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Approaches Modifications

- Infratemporal Fossa Approach without facial nerve rerouting
Intact bridge technique

- C1 Glomus Jugulare
- Postop:
  - FN Grade I
  - Intact LCN.
Transcochlear transcervical (Staged)
Transcochlear transcervical (Staged)
Jugular Foramen Tumors

- 27 cases (14 females, 13 males)
  Age: 23-65 yrs (mean: 42.9 yrs).
- 18 primary jugular foramen and 9 secondary extension.
- Angiography in 19 cases.
- Embolization in only 7 cases.
Jugular Foramen Tumors

- Glomus Jugulare: 13*
- Meningioma: 5 (1 malignant)
- Schwannoma: 5*
- Chordoma: 2
- Glomus Vagale: 1
- Carcinoma: 1

*2 cases are managed by follow-up imaging
**Extension**

- ICA involvement 20
- Petrous apex 16
- Neck 19
- Transdural extension 11
Approaches (n=26)

- Infratemporal type A 15
  (4 cases without FN rerouting)
- POTS 6
- POTS + Transotic 2
- TL 1
- TC-Trans-cervical (staged) 1
- Mastoid-trans-cervical 1
# Approaches vs Tumor

<table>
<thead>
<tr>
<th></th>
<th>G.J</th>
<th>Mening</th>
<th>Schwan</th>
<th>G.V</th>
<th>Chord.</th>
<th>Ca</th>
<th>Total</th>
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<tbody>
<tr>
<td>IFA</td>
<td>12</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>POTS</td>
<td>1*</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>POTS-TO</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>TC-Tcx</td>
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<td>-</td>
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<tr>
<td>Ms-Tcx</td>
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<td>1</td>
</tr>
<tr>
<td>TL</td>
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<td>1</td>
<td>-</td>
<td>-</td>
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<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>26</td>
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</table>

* 2nd stage removal of intradural glomus jugulare
Facial nerve function n=19

<table>
<thead>
<tr>
<th>FN Grade</th>
<th>Immediate</th>
<th>Late</th>
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<tbody>
<tr>
<td>I</td>
<td>9(47.4%)</td>
<td>10(52.6%)</td>
</tr>
<tr>
<td>II</td>
<td>-</td>
<td>2(10.5%)</td>
</tr>
<tr>
<td>III</td>
<td>-</td>
<td>4(21.0%)</td>
</tr>
<tr>
<td>IV</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>3(15.8%)</td>
<td>2(10.5%)*</td>
</tr>
<tr>
<td>VI</td>
<td>7(36.8%)</td>
<td>1(5.3%)*</td>
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*two cases, the nerve was cut during transposition due to faulty retraction*
## Lower Cranial Nerve Deficits

<table>
<thead>
<tr>
<th>Cranial Nerve</th>
<th>Preop Deficit</th>
<th>New Postop deficit</th>
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</thead>
<tbody>
<tr>
<td>IX</td>
<td>10/25 (40%)</td>
<td>5/15 (33.3%)</td>
</tr>
<tr>
<td>X</td>
<td>10/25 (40%)</td>
<td>3/15 (20.0%)</td>
</tr>
<tr>
<td>XI</td>
<td>7/25 (28%)</td>
<td>1/18 (5.6%)</td>
</tr>
<tr>
<td>XII</td>
<td>10/25 (40%)</td>
<td>1/15 (6.7%)</td>
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</tbody>
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## Complications

- Incomplete removal: 12*
- CSF leak: 4 (3 Re-operated)
- Meningitis: 2
- Death: 1
- Temporal lobe infarction: 1

* 1 case awaiting a Planned 2\textsuperscript{nd} stage removal
Conclusions

- Jugular foramen tumors management represent a real challenge.
- More conservative approaches are evolving through the year in selected cases.
- Management should be individualized.
- LCN palsy is the most important morbidity of these cases.
Thank you!