Contemporary Perspectives on Vestibular Schwannoma

Mario Zuccarello, MD
Chairman, Department of Neurosurgery

Ravi N. Samy, MD, FACS
Department of Otolaryngology
Program Director, Neurotology Fellowship
ACOUSTIC NEUROMA

- Benign tumor of the vestibulocochlear nerve (VIII cranial nerve)
TREATMENT OPTIONS

- **SURGERY**
- **RADIATION THERAPY**
  - Radiosurgery (GammaKnife, Cyberknife)/ FRT
- **OBSERVATION**
- **COMBINATION OF THE ABOVE**
- **CHEMOTHERAPEUTIC AGENTS?**
  - Aspirin
  - VEGF inhibitors
WHAT IS THE BEST TREATMENT?

- TUMOR SIZE
- TUMOR LOCATION
- HEARING
- DIZZINESS
- COMORBIDITIES
- PATIENT/PHYSIOLOGIC AGE
- PATIENT PREFERENCE
- SURGEON EXPERIENCE / SKILL
### CLINICAL EVALUATION: SYMPTOMS FROM 2012 ANA SURVEY

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-sided hearing loss or deafness</td>
<td>88</td>
</tr>
<tr>
<td>Tinnitus</td>
<td>74</td>
</tr>
<tr>
<td>Vertigo or balance disturbance</td>
<td>63</td>
</tr>
<tr>
<td>Facial weakness or paralysis</td>
<td>33</td>
</tr>
<tr>
<td>Headaches</td>
<td>28</td>
</tr>
<tr>
<td>Eye problems</td>
<td>21</td>
</tr>
<tr>
<td>Change in smell or taste</td>
<td>15</td>
</tr>
<tr>
<td>Facial twitching</td>
<td>15</td>
</tr>
<tr>
<td>Facial numbness</td>
<td>23</td>
</tr>
<tr>
<td>Fullness in ear</td>
<td>45</td>
</tr>
<tr>
<td>Difficulty swallowing</td>
<td>9</td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>16</td>
</tr>
<tr>
<td>Fatigue</td>
<td>25</td>
</tr>
<tr>
<td>Depression</td>
<td>14</td>
</tr>
<tr>
<td>Memory difficulties</td>
<td>20</td>
</tr>
<tr>
<td>No symptoms</td>
<td>11</td>
</tr>
</tbody>
</table>
DIAGNOSTIC EVALUATION: ANA PATIENT SURVEY- 2012

- MRI scan 92%
- Audiogram (hearing) 68%
- CT scan 16%
- ENG (balance) 19%
- Brainstem Auditory Evoked Response (BAER) 12%
## TREATMENT OPTIONS - ANA SURVEY

<table>
<thead>
<tr>
<th>Treatment **</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Translabyrinthine approach</td>
<td>25</td>
</tr>
<tr>
<td>Retrosigmoid/sub-occipital approach</td>
<td>15</td>
</tr>
<tr>
<td>Middle fossa approach</td>
<td>7</td>
</tr>
<tr>
<td>Don’t know which surgical approach</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total microsurgical resection</strong></td>
<td>50</td>
</tr>
<tr>
<td>Stereotactic radiosurgery, such as Gamma Knife (SSR)</td>
<td>15</td>
</tr>
<tr>
<td>Fractionated stereotactic radiosurgery (FSR)</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total radiosurgery/radiotherapy</strong></td>
<td>24</td>
</tr>
<tr>
<td>Watch &amp; wait</td>
<td>26</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
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</tbody>
</table>
SURGICAL APPROACHES

- **MIDDLE CRANIAL FOSSA**: for tumors where preserving facial function and hearing is optimal.
- **RETROSIGMOID**: for small and large tumors while preserving facial function and a degree of hearing if possible.
- **TRANSLABYRINTHINE**: for patients who already have hearing loss or tumor size and position indicate removing the labyrinth.
IMPROVED OUTCOMES WITH:

- Early detection
  - Education leads to earlier hearing tests
  - Imaging leads to detection of smaller tumors
## TUMOR SIZE - ANA SURVEY

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<th></th>
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<tbody>
<tr>
<td>1.5 cm or less</td>
<td>43</td>
<td>38</td>
<td>23</td>
<td>17</td>
</tr>
<tr>
<td>1.6–2.5 cm</td>
<td>25</td>
<td>27</td>
<td>36</td>
<td>42</td>
</tr>
<tr>
<td>Larger than 2.5 cm</td>
<td>20</td>
<td>27</td>
<td>35</td>
<td>28</td>
</tr>
<tr>
<td>Did not know size</td>
<td>12</td>
<td>8</td>
<td>6</td>
<td>15</td>
</tr>
</tbody>
</table>
IS THE MCF APPROACH UNDERUTILIZED?
MCF SURGICAL PRIORITIES

- Quality of life
  - Low risk of intracranial complication
  - Excellent facial nerve outcomes
  - Arguably best in hearing preservation
Retrospective review
N= 162 patients
107 tumors were IVN tumors
Ages: 19-70
Tumor size: 0.2-2.5cm
113 had preop WRS >70%
Correlation between preop WRS / tumor size and postop WRS
At least some hearing preserved in 60% (94) of the 156 patients who had hearing before surgery
If the WRS was >70% before surgery, 50% maintained that WRS improved for 12 patients to >70% after surgery
Facial nerve function: grade 1 (140), grade 2 (17), grade 3 (5)
INTRAOPERATIVE MONITORING
INCLUDING CNAP FOR MCF, ABR, FACIAL NERVE
ULTRASONIC ASPIRATOR

- Reduction of Bone Dust with Ultrasonic Bone Aspiration: Implications for Retrosigmoid Vestibular Schwannoma Removal.

- Laryngoscope. 2007 May;117(5):872-5.
- Use of a novel ultrasonic surgical system for decompression of the facial nerve.
MIDDLE FOSSA
MIDDLE FOSSA
In last 10 years, MCF approach for:
- 80 patients:
  - IAC tumors (39)
  - SSCD / encephaloceles / CSF leaks: 22
  - Facial nerve decompression: 6
  - Non-IAC tumors: 4
  - Vascular lesions: 4
  - Cholesteatomas: 2
  - Malignancy: 3
  - No temporal lobe aphasia, no seizures
  - 1 epidural hematoma
In last 10 years:
- 1205 patients
- 420 acoustic neuroma surgeries
- $\frac{39}{420} = 9\%$ of AN surgeries: MCF
- $\frac{39}{1205} = 3\%$ of all pts presenting with AN underwent MCF approach
UC MCF ALGORITHM?

- For tumors under 2cm in size (fundus to brainstem with good hearing):
  - Middle fossa approach

- Unless:
  - Elderly
  - Significant comorbidities
  - Patient desires
  - Only hearing ear
  - NF2
FINAL CONSIDERATIONS

- Tumor size is most important factor in determining outcome and guiding treatment selection

- Treatment of large tumors has higher risk

- Observation has risks:
  - 5% of tumors have profound HL
  - Tumor growth not linear
  - 50% of tumors grow over 3-5 year period
BUT SRS/FRT AND OBSERVATION ARE STILL OPTIONS
INTERACTIVE QUESTIONS FOR THE AUDIENCE AND THE PRESENTERS
WHO HERE HAS BEEN SEEN/TREATED FOR AN ACOUSTIC NEUROMA?
WHO HAS HEARING LOSS?
HEARING REHABILITATION: REGARDLESS OF TREATMENT

- LIFESTYLE ADJUSTMENT
- AIR-CONDUCTION HEARING AID
- BAHA
- COCHLEAR IMPLANTATION
- ABI IMPLANTATION
BAHA: Bone Anchored Hearing Aid
Attract and Connect
How a cochlear implant works:

1. External processor captures sound and converts it into digital signals.
2. Processor sends digital signals to internal implant.
3. Internal implant converts signals into electrical energy, sending it to an electrode array inside the cochlea.
4. Electrodes stimulate the hearing nerve, bypassing damaged hair cells, and the brain perceives signals; you hear sound.
Auditory Brainstem Implants (ABI)
WHO HAS TINNITUS?
WHAT ARE YOU DOING WITH YOUR DIZZINESS?
HOW ARE YOU MANAGING YOUR HEADACHE IF YOU STILL HAVE IT?
HOW DOES ONE HANDLE TUMOR REGROWTH AFTER SURGERY OR RADIATION THERAPY?