ACOUSTIC NEUROMA
TREATMENT OPTIONS 2009
27th Alexandria International Combined ORL Congress
Alexandria, Egypt   April 10, 2009

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House Ear Institute    Los Angeles, California
History of AN

Sandifort E, 1777
- First AN in autopsy

Bell, 1830
- First to diagnose AN in a living patient
- Confirmed cpa tumor at autopsy

Cruveilhier, 1935
- First to describe pathology
History of AN

Sir Charles Ballance, 1894
- First to operate on acoustic neuroma
- Finger extraction

Cushing H: 1908
- Intracapsular debulking
- 1906, described a death
- Mortality
  - 40% initially
  - 20% after thirty operations
  - 7.7% in series of 176 cases
  - Others reported 75%
History of AN

Walter Dandy, 1917
- Moved focus to surgical cure
- 1917-1941 > perfected the SOC
- Mortality of 2.4% in last 41 cases

Olivecrona, 1950, 1967
- 304 tumors
- GTR in 217
- 40% facial nerve preservation rate
- 20% recovered facial nerve function
- 29% mortality
History of AN

- William House, 1960
  - Temp. bone anatomy
  - Translabyrinthine approach
  - Middle fossa app.
  - First to remove AN with the microscope
Vestibular Schwanomas
Early Diagnosis

- History and Physical Exam
- Audiological Evaluation
- Balance System and ENG
- Imaging of Auditory Canals

Vestibular Schwanomas
Early Diagnosis

- Audiological Evaluation
- Balance System and ENG
- Imaging of IAC and CPA
Vestibular Schwanomas
Definite Diagnosis

- CT & MRI **must** have contrast
- MRI + contrast => early diagnosis
T2 FAST SPIN ECHO

Phelps, 1994
ACOUSTIC NEUROMA

Treatment Options

1- Observation and Re-Scan
2- Radiosurgery- Gamma Knife
3- Total excision, single stage

ACOUSTIC TUMOR 2009
MANAGEMENT OPTIONS
N=400

- Observation 20%
- Surgery 70%
- Radiation 10%
ACOUSTIC TUMOR MANAGEMENT
OBSERVATION + RE-SCAN

- Older patients
- Small tumors with poor hearing - any age
- Treat - if tumor growth is <2-3 mm/yr
Acoustic Neuroma Surgery

Priorities

- Complete tumor removal
- Preserve facial nerve function
- Avoid brain injury
- Hearing preservation if possible
SURGICAL APPROACHES

- Translabyrinthine
- Middle Fossa
- Retrosigmoid/Suboccipital

HEC Vestibular Schwannoma Surgeries
Procedure Type by Year

Year of Surgery

Number of Procedures

- MFC
- TLC
- RSC
BAHA
(Bone Anchored Hearing Amplifier)
TRANSLABYRINTHINE

Dr M. Kageyama Mexico, DF
CSF Leak Prevention

- Block ET and Middle Ear with Wax-Surgicel
- Suturing of presigmoid dura
- Strips abdominal fat extending into CPA
- Titanium mesh cranioplasty
- Pressure dressing & Elevate HOB 30°

Titanium Mesh Cranioplasty

- Subperiosteal elevation of surrounding tissue
- Mesh based on 3 sides (use 4 screws)
- Anterior edge placed behind posterior EAC
- Provide lateral support to fat graft
Incision Closure

CSF Leaks and Reop Rates

<table>
<thead>
<tr>
<th></th>
<th>Titanium</th>
<th>Classic</th>
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<tbody>
<tr>
<td>CSF Leak</td>
<td>3.3%</td>
<td>10.9%</td>
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<tr>
<td>Re-Op Rate</td>
<td>0.5%</td>
<td>2.5%</td>
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Fayad J, Schwartz M et al, COSM 2006

Post-Op CSF Rhinorrhea

Treatment

Early or Late

- Direct obliteration of Eustachian tube, infracochlear and middle ear spaces
- Blind Sac Closure of EAC
- Lumbar drain
FACIAL NERVE FUNCTION
POST ACOUSTIC NEUROMA SURGERY

*House Ear Clinic*

\[N=500\]

<table>
<thead>
<tr>
<th>Facial Grade</th>
<th>(&lt;1.5\text{cm})</th>
<th>(&lt;3.5\text{cm})</th>
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<tbody>
<tr>
<td>I-II</td>
<td>81%</td>
<td>53%</td>
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<tr>
<td>III-IV</td>
<td>15%</td>
<td>31%</td>
</tr>
<tr>
<td>V-VI</td>
<td>4%</td>
<td>16%</td>
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Delayed Facial Paralysis

- Retrospective 11 year review 1992-2003
- Incidence 25.5%

FAMVIR® (famciclovir)
All patients undergoing AN Surgery

- Facial Nerve Function Measured Daily
- Famvir® 500 mg BID P.O.
  - Started 3 days prior to surgery
  - Continued 5 days post-operatively

Delayed Facial Paralysis

Controls  25.5%
Famvir Treated  14.5%
ACOUSTIC NEUROMAS COMPLICATIONS

Meningitis

1.5% (.1% > bacterial)
HEARING PRESERVATION
Middle Fossa Approach
Retrosigmoid Approach

HEARING PRESERVATION
Favorable Indicators
Good ABR
Tumor not to fundus of IAC
RVR on ENG
ACOUSTIC NEUROMA MANAGEMENT
MIDDLE FOSSA APPROACH

- Tumor ↓ 1.5 cm.
- May be to the fundus
- Hearing 30 dB & 70% SDS
- Age ↓ 65
MIDDLE FOSSA APPROACH

- Wide bone removal
- Medial to lateral dissection
- Remove tumor only
- Topical papaverine

ACOUSTIC NEUROMA MANAGEMENT
RETROSIGMOID APPROACH

Tumor = or < 2.5 cm
Hearing <30 dB >70% SDS
No history of headaches
Medial – not involving distal ½ of IAC
Residual Tumor Growth

*Post-op MRI + Gadolineum*  
+ *Fat Suppression*

Hearing Preservation Attempt => 1 Yr  
No Attempt of Hearing Preservation => 3 Yrs
Acoustic Neuromas

Residual Tumor Growth

All Approaches  0.03 %
Translabyrinthine App. 1:1000
ACOUSTIC TUMOR MANAGEMENT
STEREOTACTIC RADIATION THERAPY (RADIOSURGERY)

• Gamma Knife
• Cyberknife
• Linac
• Proton Beam
Radio-Surgery Failures
Salvage Surgery N=89

• Poor hearing salvage
• Facial nerve outcomes 50% poorer
• Increased perioperative complications (CSF leak, ataxia, hydrocephalus)
• Poor ABI performance
• Gamma knife

ACOUSTIC NEUROMA MANAGEMENT
STEREOTACTIC RADIATION
INDICATIONS

• Growing tumor
• Tumor ↓ 3 cm with little doubt of diagnosis on imaging
• Younger patients who refuse surgery
**Stereotactic Radiosurgery**
Contraindications

- Tumors 3 cm
- NF 2 (p53)
- Uncertain diagnosis
- Dizzy patients?
- Facial nerve symptoms

**Radio-Surgery Failures**

**Salvage Surgery**
ACOUSTIC NEUROMA MANAGEMENT

STEROTACTIC RADIATION FAILURES

• To date 95 patients surgically treated after irradiation failure
• Size at time of irradiation average 1.7; range 1.1 – 2.6 cm
• Size at time of salvage surgery average 2.9; range 1.5 – 3.8 cm
Stereotactic Radiosurgery

Malignant Transformation

- 20 cases in the literature
- 4-5 year latency
- All Fatal
ACOUSTIC NEUROMAS

Surgical Mortality

- Schisano et al., 1956 - 41% mortality
- Arseni et al., 1970 - 25% mortality
ACOUSTIC NEUROMAS

House Clinic


(N = 1687)

• 2 patients (0.12%)

W. Slattery, MD

CONCLUSIONS
Vestibular Schwanomas
Early Diagnosis

- History and Physical Exam
- Audiological Evaluation
- Balance System and ENG
- Imaging of Auditory Canals

ACOUSTIC TUMOR MANAGEMENT
3 OPTIONS
- Observation + re-scan
- Surgery
  - Middle Fossa
  - Retrosigmoid
  - Translabyrinthine
- Radiation
  - Gamma Knife
  - Focused Stereotactic Radiation (FSR)
Hearing Preservation
Outcome Predictors

- Preop hearing levels
- Tumor location
- Tumor size
- ABR
- ENG (calorics)

ACOUSTIC TUMOR
MANAGEMENT OPTIONS
N=400

- Observation 20%
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ACOUSTIC NEUROMA MANAGEMENT HEC
CONCLUSIONS 2009

- Microsurgery remains our treatment of choice
- Radiotherapy does not achieve a cure
- 5-10% failure: excludes the chance of surgical hearing preservation, 50% worse facial nerve results
- Follow-up and re-scan in selected patients