Surgery for Salivary Glands Cancer

Ehab Hanna
Major Salivary Gland Cancer

Histology

- Mucoepidermoid: 33%
- ACC: 22%
- Adenocarcinoma (Adenoca): 18%
- Malignant Mixed: 13%
- Acinic cell: 7%
- SCC: 4%
- Other: 3%
Outline

• Questions
  – Preoperative clinical evaluation
  – Extent of surgery for the primary tumor
  – Management of the facial and other cranial nerves
  – Role of neck dissection
  – Loco-regional palliative surgery in the presence of distant disease
  – Indications of postoperative adjuvant therapy
  – Management of unresectable disease
Patient Evaluation

• Clinical features
• Imaging
• Fine Needle Aspiration
Case Presentation

- 51 yo female with a six month history of a painless parotid mass
- She reports significant growth over the last 6 months.
- She denies pain, facial weakness, otalgia, dysphagia, odynophagia, symptoms of airway obstruction, trismus.
Clinical Features

• What is the most common presentation of parotid neoplasms?
  1. Painless mass
  2. Well defined
  3. Non-tender
  4. Mobile
  5. Tail of the parotid
Deep Lobe Tumors
Signs and Symptoms of Malignancy?

• Pain
• Rapid increase in size
• Facial Paralysis
• Skin involvement
• Nodal metastasis
• History of cutaneous cancer
  – scalp, face, ear, lids
Differential Diagnosis
Inflammatory Pseudo Tumor
Imaging

Indications, Type of study?

• Indications
  – Suspected or confirmed malignancy
  – Deep lobe tumors
  – Larger tumors
  – Minor salivary gland tumors

• Studies
  – MRI (soft tissue detail, PNS)
  – CT (bone invasion)
  – US (diagnosis of lesion and associated LN)
  – PET-CT?

• Findings
  – Intra or extra glandular
  – Extent of tumor
  – Relationship to critical structures
  – Associated LN
  – Diagnosis?
Evaluating Extent of Disease

CT & MRI Complimentary
KJ (254255): parapharyngeal mass
- overall 3D reference from CT + mass from hybrid CT/MR segmentation
- parotid in blue and submandibular in green, lesion in magenta and mandible in ocre
Accuracy of FNAB

Sensitivity to diagnose malignancy 83%
Specificity to diagnose malignancy 99%
Positive predictive value 98%
Negative predictive value 97%

Head and Neck 32:104-108, 2010
FNAB

- Is FNAB really necessary? Would it change the course of management?
- Overall, FNAB resulted in a change in the clinical approach to 35% of a study of 100 patients
- Examples:
  - avoiding surgical resection for lymphomas and inflammatory masses.
  - adopting a more conservative approach with benign tumors in elderly and high surgical risk patients.
  - better preoperative counseling of patients regarding the nature of the tumor, the likely extent of resection, management of the facial nerve, and the likelihood of a neck dissection.

Treatment of Major Salivary Gland Cancer

Principles of management

• Resect disease to negative margins whenever possible.
• Therapeutic neck dissection for clinically positive necks.
• Elective neck dissection for select indications.
• Adjuvant radiotherapy in select cases.
• Chemotherapy under study
Parotidectomy
Extent of Resection?

• Partial Parotidectomy
  – Small, localized, lesions of the parotid (usually tail)
  – Adequate cuff of normal parotid tissue

• Lateral Lobe “Superficial” Parotidectomy
  – Larger tumors of the superficial lobe

• Total Parotidectomy
  – Tumors extending to the deep lobe
  – Tumors with intra-parotid LN metastasis

• Extended Parotidectomy
  – Skin
  – Ear and temporal bone
  – Mandible
  – Parapharyngeal space
  – Infratemporal fossa
Parotidectomy Incision
Flap Elevation
Greater Auricular Nerve
Posterior Belly of Digastric Muscle
Tragal Pointer
Identification of Main Trunk of the Facial Nerve
Inferior Division of the Facial Nerve
Superior Division of the Facial Nerve
Removal of the lateral “superficial” lobe
Management of the Facial Nerve

- The facial nerve is dissected and preserved unless
  - Directly involved by the tumor
  - Facial paralysis or paresis prior to surgery
- Nerve Margins
Management of the Facial Nerve Rationale

Preoperative Facial Paresis

Involvement of surrounding structures

Clinical History, Prognostic Factors, and Management of Facial Nerve in Malignant Tumors of the Parotid Gland. Bussu F. et al

Clinical and Experimental Otorhinolaryngology Vol. 7, No. 2: 126-132, June 2014
Resection of the Facial Nerve
Facial Nerve Rehabilitation

- If the facial nerve is sacrificed
  - Nerve anastomosis or Cable grafts
  - Eye care
  - Gold weight
  - Tarsal strip canthoplasty
  - Trasorrhaphy
  - Brow lift
  - Static slings
  - Dynamic reanimation
Facial Nerve Monitoring

### Postoperative Outcome, n (%)*

<table>
<thead>
<tr>
<th>Surgical Technique</th>
<th>Normal Function</th>
<th>Facial Paralysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EMG Group</td>
<td>Control Group</td>
</tr>
<tr>
<td>Superficial parotidectomy</td>
<td>29 (71)</td>
<td>22 (58)</td>
</tr>
<tr>
<td>Total parotidectomy</td>
<td>2 (22)</td>
<td>6 (50)</td>
</tr>
</tbody>
</table>

### Time, Average±SD (min)

<table>
<thead>
<tr>
<th>Surgical Technique</th>
<th>EMG Group</th>
<th>Control Group</th>
<th>All</th>
<th>n</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial parotidectomy</td>
<td>115.3±37.4</td>
<td>141.2±53.9</td>
<td>129.5±48.7</td>
<td>69</td>
<td>P = 0.04</td>
</tr>
<tr>
<td>Total parotidectomy</td>
<td>140.0±67.4</td>
<td>147.3±44.3</td>
<td>144.5±51.7</td>
<td>13</td>
<td>P = 0.72</td>
</tr>
<tr>
<td>Sum&lt;sup&gt;A&lt;/sup&gt;</td>
<td>118.7±42.4</td>
<td>142.2±52.0</td>
<td>131.9±49.1</td>
<td>82</td>
<td>P = 0.03</td>
</tr>
</tbody>
</table>

### Final Outcome, n (%)*

<table>
<thead>
<tr>
<th>Surgical Technique</th>
<th>Total Recovery</th>
<th>Defective Healing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EMG Group</td>
<td>Control Group</td>
</tr>
<tr>
<td>Superficial parotidectomy</td>
<td>37 (90)</td>
<td>36 (95)</td>
</tr>
<tr>
<td>Total parotidectomy</td>
<td>9 (100)</td>
<td>12 (100)</td>
</tr>
<tr>
<td>Sum</td>
<td>46</td>
<td>48</td>
</tr>
</tbody>
</table>
Facial Nerve Monitoring
Revision Parotidectomy
Parapharyngeal Space
Spaces and Contents
Parapharyngeal Salivary Tumors
Parapharyngeal Tumors Imaging: Coronal Plane
Tumor of the deep lobe parotid
Pre-styloid, attached to parotid

Neurogenic tumor
Post-styloid, diffuse enhancement

Paraganglioma
Post-styloid, “Salt and Pepper”
Imaging: Axial Plane
Pre-styloid or Post-styloid? Relationship to parotid?

Enhancement?

Post-styloid, diffuse enhancement

Pre-styloid, connected to parotid

Tumor of the deep lobe of the parotid

Post-styloid, non-diffuse enhancement, flow voids “Salt and Pepper”

Paraganglioma

Neurogenic tumor
Dumbell Tumor
Parapharyngeal Tumors Imaging: Sagittal Plane Cranial Base Extension
Parapharyngeal Tumors
Angiography
KJ (254255): parapharyngeal mass
- overall 3D reference from CT + mass from hybrid CT/MR segmentation
- parotid in blue and submandibular in green, lesion in magenta and mandible in ocre
Parapharyngeal Tumors: Biopsy
Pre-auricular trans-cervical approach
Incision and Flap Elevation
Exposure of the Carotid Sheath

Contents
Management of the Facial Nerve
Dividing the Stylo-mandibular Ligament
Exposure of the Parapharyngeal Space and Delivery of the Tumor
Postoperative Appearance
Management of the Mandible

Mandibulotomy

- High Parapharyngeal Space
- Medial Masticator Space
- Pterygo-maxillary Space
Trans-mandibular Approach
Trans-mandibular Approach
Approach

91%

9%

Transcervical transparotid without mandibulotomy
Transcervical transparotid with mandibulotomy
Mandibulectomy

Adenoid Cystic Carcinoma
Temporal Bone
Temporal Bone Resection

- 263 patients with cancer involving ear canal or temporal bone
- 1999-2011
- Ages 7 to 91 years
  - Average = 60 years
- 75% men
Location of Primary Parotid Gland

- Peri-auricular skin: 25%
- Ear Canal: 15%
- External ear: 15%
- Skull base: 10%
- Temporal bone: 10%
- Parotid gland: 25%
Temporal Bone Invasion

- Lateral temporal bone resection
- Parotidectomy
- Neck dissection
- Free flap
- Vistafix implant
Pathology

Adenoid cystic ca invading bone.

PNI in facial nerve
Second Stage Surgery

Performed 15 months after first stage surgery.
07/2012

Auricular prosthesis in place
09/2012
Overall Survival by Primary Location

Overall Survival of Temporal Bone Cancer Patients: Primary Site

- Ear Canal, n = 25
- External Ear, n = 26
- Parotid, n = 40
- Periauricular Skin, n = 40
- Skull Base, N = 13
- Temporal Bone, N = 13

Cumulative Proportion Surviving vs. Months from Presentation at MDACC
Infratemporal Fossa
Infratemporal Approach
Zygomatic Osteotomy
Infratemporal Approach
Submandibular Gland Resection

- Clearance of the submandibular triangle
- Special attention to regional nerves:
  - Marginal mandibular
  - Lingual
  - Hypoglossal
  - Nerve to mylo-hyoid muscle
- Extensions beyond the gland:
  - Skin and subcutaneous tissue
  - Floor of mouth
  - Mandible
Lymph Node Metastasis

- Metastatic cervical adenopathy is uncommon.
- SEER database review: 16% incidence

*Int J Radiation Oncology Biol Phys Vol. 76(1), 2010*
Surgical Management of the Neck

- cN+, a neck dissection is performed in conjunction with resection of the primary cancer.
- However, controversy still exists on the surgical management of the (N0) neck.
- The indications and type of elective neck dissection are not well defined in the literature.
- Collectively, the risk of occult metastasis in ACC of the major Salivary Glands is around 12%.
Incidence of cervical lymph node metastasis and its association with outcomes in patients with adenoid cystic carcinoma. An International Collaborative Study

FIGURE 1. Management of the 495 patients of the International Study Group of the adenoid cystic carcinoma (ACC) cohort. cN, clinical nodal status; pN, pathological nodal status; END, elective neck dissection; TND, therapeutic neck dissection.
Incidence of cervical lymph node metastasis and its association with outcomes in patients with adenoid cystic carcinoma. An International Collaborative Study

Overall rate of LN metastasis 29%

TABLE 2. Incidence of neck metastases according to the primary site.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Major salivary glands (n = 95)</th>
<th>Oral cavity (n = 148)</th>
<th>Sinonasal (n = 25)</th>
<th>Larynx (n = 2)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipsilateral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>I–III</td>
<td>10 (10%)</td>
<td>47 (31%)</td>
<td>4 (16%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV–V</td>
<td>8 (8.5%)</td>
<td>8 (5%)</td>
<td>1 (4%)</td>
<td>1 (50%)</td>
<td></td>
</tr>
<tr>
<td>Contralateral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I–III</td>
<td>2 (1%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall rate of occult metastasis

17%  12%  22%  16%

Moran Amit et al Head & Neck April 2014

Moran Amit et al. Head & Neck April 2014
Risk of Nodal Metastasis

- 145 patients with cancer of the parotid gland, the following variables were significantly associated with a risk of lymph node metastasis:
  - histological type, T stage, desmoplasia, facial palsy, perineural invasion, extraparotid tumor extension, and necrosis.
- By multivariate analysis, histological type and T stage had the highest correlation with lymph node metastasis.

Elective Neck Dissection

• **Indications**
  - Advanced stage (T3-T4)
  - High-grade tumors
    - Undifferentiated carcinoma, high-grade MEC and ACC, SCC, adenocarcinoma, and salivary duct carcinoma
• A selective (supra-omohyoid) neck dissection may be used as a staging procedure in such cases.
• Suspicious nodes should be sent for frozen-section diagnosis, and if positive for metastatic carcinoma, then a comprehensive neck dissection is performed.

Is there a role for surgery in patients with M1 disease?
Case Presentation

77-year-old woman with a recent diagnosis of left parotid gland adenoid cystic carcinoma
CT Chest

- There are numerous bilateral pulmonary nodules compatible with metastasis, the largest one in the right upper lobe, measures 11 mm in long axis.
- Surgery?
Factors Influencing Survival

- Stage
- Histology
- Site
- Facial nerve paralysis
- Perineural Spread
- Positive margins
- Bone/SKB invasion
- Skin involvement
- Recurrent disease
- Nodal metastasis
- Systemic metastasis
- Treatment modality
Major Nerve Involvement by ACC

Extent of surgery in presence of major nerve PNI?

As much as feasible one should achieve GTR, R0 or R1
Surgery + XRT + Margins and PNI in ACC

- 83 Pts microscopically + margins
- 55 Pts close or uncertain margins
- 136 PNI - 55 PNI of Major nerve
- Median 60Gy(50-69Gy) Post-op XRT
- Median f/u 93months(5-341)
- 37% DM with 31% disease free at primary site

Surgery + XRT + Margins and PNI in ACC

• **Local Recurrence Rate**
  - **Margins**
    • Positive 18%
    • Close 9%
    • Negative 5%
  - **PNI**
    • Major nerve 18%
    • Minor nerve 9%
Surgery + XRT +Margins and PNI in ACC

- Actuarial Local Control
  - 5yr  95%
  - 10  86%
  - 15  79%

- Dose and Local control for + Margins
  - <56 Gy  40%
  - >56Gy  88%

Effect of Nodal Metastasis on Outcome

![Graph showing the effect of nodal metastasis on disease-specific survival. The graph illustrates two lines: one for no metastatic nodes and another for metastatic nodes. The x-axis represents months from diagnosis, ranging from 0 to 300, and the y-axis represents disease-specific survival, ranging from 0.0 to 1.1. The graph shows a significant difference in survival between the two groups, with a p-value of 0.0037.](image_url)
Adenoid Cystic Carcinoma

Cribiform type

Perineural invasion

Bone invasion – solid type
Extraparenchymal Extension

Extraparenchymal Spread

Cancer 2000;89:1195-204
## Salivary Gland Malignancy

### Independent Predictors of LRR

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard Ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LN Metastasis</td>
<td>4.80</td>
<td>0.001</td>
</tr>
<tr>
<td>High Tumor Grade</td>
<td>4.18</td>
<td>0.003</td>
</tr>
<tr>
<td>Positive Margins</td>
<td>2.61</td>
<td>0.03</td>
</tr>
<tr>
<td>T3-4 Disease</td>
<td>2.05</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Indications for Postop XRT

• **Indications**
  – high-grade tumors,
  – large primary lesions (T3-4)
  – perineural invasion
  – bone invasion
  – cervical lymph node metastasis
  – positive margins.

• Although a clear-cut survival advantage has not been proven, the addition of postoperative XRT improves loco-regional control for patients with such adverse prognostic parameters.
  
RTOG 1008: A Randomized Phase II Study of Adjuvant Concurrent Radiation and Chemotherapy Versus Radiation Alone in Resected High-Risk Malignant Salivary Gland Tumors

- Intermediate/High grade adenocarcinoma or MEC
- High Grade acinic cell carcinoma or ACC (>30% Solid)
- Salivary Gland Carcinoma
  - T3-4, or N1-3
  - T1-2 N0 patients with positive or close (≤1mm) microscopic margins
  - M0

Radiation: 60-66 Gy in 2 Gy daily fractions

Radiation: 60-66 Gy in 2 Gy daily fractions + Cisplatin: 40 mg/m² weekly during radiation for 7 doses
Unresectable Disease?
Concurrent platinum and IMPT: @ year follow up
Thank you