Surgical management of salivary gland tumors

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Long Island College Hospital
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Case presentation

- 51M with no significant PMHx presents with progressively enlarging right facial mass for the last 2yrs
- Denies pain with chewing, facial numbness or paresthesia.
- No history of previous facial masses, fevers, chills or weight loss.
Case presentation

- General: AVSS
- ENT: 3cm parotid mass
- No evidence of regional adenopathy, facial nerve palsy, skin lesions or tenderness
Case presentation

Labs

- CBC  4.3>15.5/46<276
- BMP   138/4.3/103/28/13/0.9
- Ca   8.6
- PTT/PT/INR  25.6/10.7/1.0
Case presentation

- MRI - 2.5cm x 2.4cm x 2.6cm mass superficial/deep portion of the right parotid

- FNA – clusters of epithelial & myoepithelial cells, consistent with pleomorphic adenoma
Case presentation

- 3/11/13 - Right total parotidectomy with lymphadenectomy
Operative details

- Adhesion of the superior division of facial nerve to tumor capsule
- Frozen section-benign pleomorphic adenoma
Operative details
Post-operative course

- POD#1 - D/C Home
Management of salivary gland tumors
Anatomy of the salivary glands and ducts

The three major salivary glands are the parotid, submandibular, and sublingual glands. Stensen’s duct drains the parotid gland opposite the upper second molar. Wharton’s duct drains the submandibular and some of the sublingual glands into the floor of the mouth near the frenulum of the tongue.
Anatomy

- Cranial border = zygoma
- Caudal border = SCM
- Posterior = mastoid process
- Anterior = masseter muscle
Facial nerve

- **Origin**: Facial nerve nucleus
- **Exit**: Stylomastoid foramen
- **5 Main Branches**
  - Temporal: Raises forehead
  - Zygomatic: Eyes closure
  - Buccal: Flairs nostrils
  - M. Mandibular: Oral continence
  - Cervical: Platysma
In parotid malignancies, the first site of lymphatic spread is the intraparotid lymph nodes, followed by level I and level II cervical nodes. Lymph nodes in the neck are grouped into levels I-V, corresponding with the submandibular and submental nodes (level I); upper, middle, and lower jugular nodes (levels II, III, IV); and posterior triangle nodes (level V). Refer to the following image.
Epidemiology

- Incidence: 1.5/100,000 individuals in US.
- Approximately 3000-4000 cases/yr
- 700 related deaths/yr
- 5th-6th decade of life.
- Malignant lesions - >60 years of age
- Benign lesions: F>M
- Malignant lesions: F=M
Risk factors

- Radiation - salivary gland malignancy
- Smoking - Warthin’s tumor
- Increased incidence - HIV, environmental factors and industrial exposure.
- EBV - lymphoepithelial carcinoma.
Salivary gland tumors

- Account for 6-8% of Head/Neck tumors
- Parotid glands - 80% of salivary neoplasms
- Submandibular glands: 10-15%
  - 40 to 45% are malignant
- Sublingual or minor glands: 1-5%
  - 70 to 90% are malignant
Risk of malignancy- 25:50:75 rule

- Parotid: 20-25%
- Submandibular: 40 to 45 %
- Sublingual: 70 to 90 %
<table>
<thead>
<tr>
<th>Malignant epithelial tumours</th>
<th>Benign epithelial tumours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acinic cell carcinoma</td>
<td>Pleomorphic adenoma</td>
</tr>
<tr>
<td>Mucoepidermoid carcinoma</td>
<td>Myoepithelioma</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td>Basal cell adenoma</td>
</tr>
<tr>
<td>Polymorphous low-grade adenocarcinoma</td>
<td>Warthin tumour</td>
</tr>
<tr>
<td>Epithelial-myoepithelial carcinoma</td>
<td>Oncocytoma</td>
</tr>
<tr>
<td>Clear cell carcinoma, not otherwise specified</td>
<td>Canalicular adenoma</td>
</tr>
<tr>
<td>Basal cell adenocarcinoma</td>
<td>Sebaceous adenoma</td>
</tr>
<tr>
<td>Sebaceous carcinoma</td>
<td>Lymphadenoma</td>
</tr>
<tr>
<td>Sebaceous lymphadenocarcinoma</td>
<td>Sebaceous</td>
</tr>
<tr>
<td>Cystadenocarcinoma</td>
<td>Non-sebaceous</td>
</tr>
<tr>
<td>Low-grade cribriform cystadenocarcinoma</td>
<td>Ductal papillomas</td>
</tr>
<tr>
<td>Mucinous adenocarcinoma</td>
<td>Inverted ductal papilloma</td>
</tr>
<tr>
<td>Oncocytic carcinoma</td>
<td>Intraductal papilloma</td>
</tr>
<tr>
<td>Salivary duct carcinoma</td>
<td>Sialadenoma papilliferum</td>
</tr>
<tr>
<td>Adenocarcinoma, not otherwise specified</td>
<td>Cystadenoma</td>
</tr>
<tr>
<td>Myoepithelial carcinoma</td>
<td>Soft tissue tumours</td>
</tr>
<tr>
<td>Carcinoma ex pleomorphic adenoma</td>
<td>Haemangioma</td>
</tr>
<tr>
<td>Carcinosarcoma</td>
<td></td>
</tr>
<tr>
<td>Metastasizing pleomorphic adenoma</td>
<td></td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>Haematolymphoid tumours</td>
</tr>
<tr>
<td>Small cell carcinoma</td>
<td>Hodgkin lymphoma</td>
</tr>
<tr>
<td>Large cell carcinoma</td>
<td>Diffuse large B-cell lymphoma</td>
</tr>
<tr>
<td>Lymphoepithelial carcinoma</td>
<td>Extranodal marginal zone B-cell lymphoma</td>
</tr>
<tr>
<td>Sialoblastoma</td>
<td></td>
</tr>
</tbody>
</table>

Benign salivary gland tumors

- Pleomorphic adenoma
- Warthin’s lymphoma
- Oncocytoma
Benign- Pleomorphic adenoma

- Most common benign salivary gland tumor.
- Mixed growth patterns- myoepithelial & epithelial cells with stromal hyperplasia
- Slow growing, lobular, and not well encapsulated
- Recurrence rate: 1-5%
- Carcinoma ex-pleomorphic adenoma: 2-10% of adenomas malignant degeneration in long term
Pleomorphic adenoma
Benign – Warthin’s tumor

- 2nd most common benign tumor (5%)
- Higher incidence in smokers and males
- 6th-7th decades
- Papillary cystadenoma lymphomatosum-lymphocytic & cystic epithelial proliferation
- 10% bilateral and multifocal parotid involvement
- Malignant transformation very rare
Benign - Oncocytoma

- Accounts for 1% of salivary gland tumors
- Most often occur in the parotid glands.
- Large uniform cells with distinct capsule.
- Composed of large oxyphilic cells - oncocytes.
MALIGNANT SALIVARY GLAND TUMORS

Mucoepidermoid carcinoma
Adenoid cystic carcinoma
Acinic cell carcinoma
Malignant- Mucoepidermoid CA

- Most common malignant - 30%
- 2\textsuperscript{nd}-7\textsuperscript{th} decade: F>M
- Limited local invasiveness
- Composition- mucous, epidermoid & intermediate cells
- High-grade tumors behave like SCC
  - Lymph node metastasis, 5-year survival only 5%
- Low-grade tumors behave like benign lesion.
  - No nodal or distant metastasis, 5-year survival: 75-95%
Malignant- Adenoid Cystic CA

- 2nd most common; 5th-6th decade, M=F
- Well circumscribed but un-encapsulated
- Perineural invasion & late distant metastasis (30-50%)
- Lung metastases most frequent.
- Three types: cribrose, tubular, and solid.
  - Solid-worst prognosis, Cribrose-best prognosis
- Requires aggressive initial resection.
- 5yr survival-35%, 10yr survival-20%.
Malignant- Acinic cell CA

- 1-3% of all salivary gland neoplasms
- 90% arise in the parotid
- Pathology- acinic & dense lymphoid cells
- Surgery with negative margin most important therapy
- 33% recurrence rate
- 10-15% lymph node metastasis
Malignant pleomorphic adenoma

- **Carcinoma ex pleomorphic**
  - Malignant transformation - 20 years
  - Frequent local recurrences & distant metastases
  - Prognosis- survival based on grade
    - Low grade- 96%, High grade-30%

- **Carcino-sarcoma**
  - Recurrent pleomorphic adenoma or de novo
  - Highly aggressive with distant metastasis to lung
Clinical Evaluation

- History / Physical Examination
- Masses-painless & slow growing
- Acute pain- Obstructive/Inflammatory process
- Features suspicious for malignancy:
  - *fixed tumor with skin involvement*
  - *regional adenopathy*
  - *facial nerve paralysis*
- History of H&N skin cancer
- Medial displacement of oropharyngeal wall suggests deep lobe involvement
Imaging

- US/CT/MRI - Description of mass
- Preoperative biopsy - FNAB
  - Sensitivity: 99%
  - Specificity: 96-100%
Treatment: benign tumors

- Superficial parotidectomy - treatment of choice.
- Facial nerve preservation - mandatory
- Deep lobe tumors - total parotidectomy with facial nerve preservation.
- Recurrence - postoperative radiation
  - local control rates exceed 95%.
## Treatment: Malignant Tumors

**Tumor node metastases (TNM) staging system for cancer of the major salivary glands**

### Primary tumor (T)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX</td>
<td>Primary tumor cannot be assessed</td>
</tr>
<tr>
<td>T0</td>
<td>No evidence of primary tumor</td>
</tr>
<tr>
<td>T1</td>
<td>Tumor 2 cm or less in greatest dimension without extraparenchymal extension*</td>
</tr>
<tr>
<td>T2</td>
<td>Tumor more than 2 cm but not more than 4 cm in greatest dimension without extraparenchymal extension*</td>
</tr>
<tr>
<td>T3</td>
<td>Tumor more than 4 cm and/or tumor having extraparenchymal extension*</td>
</tr>
<tr>
<td>T4a</td>
<td>Moderately advanced disease</td>
</tr>
<tr>
<td>T4b</td>
<td>Very advanced disease</td>
</tr>
<tr>
<td></td>
<td>Tumor invades skin, mandible, ear canal, and/or facial nerve</td>
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### Regional lymph nodes (N)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NX</td>
<td>Regional lymph nodes cannot be assessed</td>
</tr>
<tr>
<td>N0</td>
<td>No regional lymph node metastasis</td>
</tr>
<tr>
<td>N1</td>
<td>Metastasis in a single ipsilateral lymph node, 3 cm or less in greatest dimension</td>
</tr>
<tr>
<td>N2</td>
<td>Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension, or in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension, or in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>N2a</td>
<td>Metastasis in a single ipsilateral lymph node, more than 3 cm but not more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>N2b</td>
<td>Metastasis in multiple ipsilateral lymph nodes, none more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>N2c</td>
<td>Metastasis in bilateral or contralateral lymph nodes, none more than 6 cm in greatest dimension</td>
</tr>
<tr>
<td>N3</td>
<td>Metastasis in a lymph node, more than 6 cm in greatest dimension</td>
</tr>
</tbody>
</table>

### Distant metastasis (M)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>M0</td>
<td>No distant metastasis</td>
</tr>
<tr>
<td>M1</td>
<td>Distant metastasis</td>
</tr>
</tbody>
</table>

### Anatomic stage/prognostic groups

<table>
<thead>
<tr>
<th>Stage</th>
<th>T1</th>
<th>N0</th>
<th>M0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage II</td>
<td>T2</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td>Stage III</td>
<td>T3</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T1</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N1</td>
<td>M0</td>
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<tr>
<td>Stage IVA</td>
<td>T4a</td>
<td>N0</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T4b</td>
<td>N1</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IVB</td>
<td>Any T</td>
<td>Any N</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T2</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td></td>
<td>T4a</td>
<td>N2</td>
<td>M0</td>
</tr>
<tr>
<td>Stage IVC</td>
<td>Any T</td>
<td>Any N</td>
<td>M1</td>
</tr>
</tbody>
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The major salivary glands include the parotid, submandibular, and sublingual glands. Tumors arising in minor salivary glands (mucous-secreting glands in the lining membrane of the upper aerodigestive tract) are staged according to the anatomic site of origin (e.g., oral cavity, sinuses, etc).

*Extraparenchymal extension is clinical or macroscopic evidence of invasion of soft tissues. Microscopic evidence alone does not constitute extraparenchymal extension for classification purposes.*

Used with the permission of the American Joint Committee on Cancer (AJCC), Chicago, Illinois. The original source for this material is the AJCC Cancer Staging Manual, Seventh Edition (2010) published by Springer New York, Inc.
## Histologic grades of salivary gland cancers

<table>
<thead>
<tr>
<th>High-grade</th>
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<tbody>
<tr>
<td>High-grade mucoepidermoid carcinoma</td>
</tr>
<tr>
<td>Salivary duct carcinoma</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
</tr>
<tr>
<td>Carcinoma ex-pleomorphic adenoma</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
</tr>
<tr>
<td>Anaplastic or undifferentiated carcinoma</td>
</tr>
<tr>
<td>Malignant mixed carcinoma</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Low- to intermediate-grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-grade mucoepidermoid carcinoma</td>
</tr>
<tr>
<td>Acinic cell carcinoma</td>
</tr>
<tr>
<td>Polymorphous low-grade adenocarcinoma (PLGA)</td>
</tr>
<tr>
<td>Epithelial-myoepithelial carcinoma</td>
</tr>
</tbody>
</table>

Data from:
T1-T2 low grade tumors

- Parotidectomy (superficial or total)- adequate margin and preservation of the facial nerve.
- First level nodal resection.
T1-T2 high grade tumors

- Total parotidectomy with neck dissection
- Facial nerve preservation unless direct infiltration.
- Nerve resection to clear margins with immediate cable graft reconstruction.
- Postoperative radiation.
T3 tumors

- Parotidectomy & facial nerve resection for tumor free margins.
- Cable graft reconstruction.
- Neck dissection for N+ disease.
- Postoperative radiation.
T4 tumors

- Radical parotidectomy with excision of the involved structures (e.g. facial nerve, mandible, mastoid tip, skin).
- Complex facial reconstruction
  - Neck dissection for N+ disease
  - Postoperative radiation therapy.

www.downstatesurgery.org
Complications

- Facial nerve Injury
- Hematoma
- Salivary fistula
- Frey syndrome- commonest
- Sensorineural hearing loss (radiation)
Neuropraxia
Frey syndrome

- Gustatory sweating: flushing & sweating of ipsilateral facial skin with eating
- Pathophysiology: aberrant parasympathetic cross re-innervation from parotid to sympathetic fibers innervating sweat glands of the skin
- Incidence: up to 50% post op
- Symptomatic treatment: Botox may have a role in severe cases
- Skin flaps
Prognosis

5-year survival

- Stage I - 85%
- Stage III - 53%
- Stage II - 66%
- Stage IV - 32%

10-year survival

- Low-grade: 80-95%
- High grade: 25-50%
Metastasis

- Parotid tumors- metastasis in 21% of cases.
- High grade tumors- 32%.
- Adenoid cystic CA- 50%.
- Metastasis- Lung, liver and bone.
- Treatment- Palliation
Summary

- Salivary gland tumors - rare and diverse group of benign and malignant lesions.
- Histology, staging and tumor grade are essential for treatment plan.
- Frozen section imperative for appropriate surgical resection.
References

- http://entdoc-crc.com/Parotid_Disease.htm
- CURRENT Diagnosis & Treatment in Otolaryngology – Head & Neck Surgery, 3e
  - Chapter 18. Benign Diseases of the Salivary Glands (Fidelia Yuan-Shin Butt, MD)
  - Chapter 19. Malignant Diseases of the Salivary Glands (Adriane Concus, MD and Theresa Tran, MD)