Case Presentation

- 64 year old male presented with a painless mass posterior to the right angle of the mandible for 3 months

- PMHx
  - HTN
  - COPD
  - BPH

- PSHx
  - 6/07 Lithotripsy

- NKDA

- Meds:
  - Spirva, Flomax, Lotrel

- Social Hx: 45 pack year smoking history

- Physical exam
  - 3 cm mobile, nontender mass inferior to the angle of the mandible
  - No cervical adenopathy

- CT scan of head and neck
  - 2.5 cm mass in the tail of the right parotid gland
Case presentation

LABORATORY DATA

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PT 10.1 PTT 31.6 INR 1
Case presentation

- Procedure: Right superficial parotidectomy
- Intraoperative findings:
  - 3 cm firm mass attached to the tail of the parotid gland. The marginal mandibular nerve was identified and preserved

Postoperative course

- Discharged home POD #0
- No evidence of facial nerve paralysis

- Pathology:
  - Warthin’s tumor
QUESTION 1

Which of the following is the most common benign parotid mass?

A. Warthin’s tumor
B. Lymphoma
C. Adenocarcinoma
D. Pleomorphic adenoma
E. Squamous cell carcinoma
QUESTION 2

- On routine postoperative follow-up in your office, a patient who underwent superficial parotidectomy reports numbness over the earlobe. Which nerve was injured during the procedure?

A. Greater auricular nerve
B. Hypoglossal nerve
C. Spinal accessory nerve
D. Mandibular branch of the facial nerve
E. Lingual nerve
QUESTION 3

- A 65 year old male presents with a painless, 2 cm mass below the angle of the mandible. Evaluation shows the mass is isolated to the tail of the parotid. What is the correct surgical management?

A. Enucleation
B. Total parotidectomy with facial nerve disruption
C. Total parotidectomy with facial nerve preservation
D. Superficial parotidectomy with facial nerve preservation
Which of the following are risk factors for the development of Warthin’s tumor?

A. Obesity
B. Squamous cell carcinoma
C. Cigarette smoking
D. Melanoma
QUESTION 5

Which of the following signs is suggestive of a parotid malignancy?

A. Mass fixed to the surrounding tissues
B. Trismus
C. Facial nerve weakness
D. All of the above
ANATOMY

- Major salivary glands
  - Parotid
  - Submandibular
  - Sublingual

- Minor salivary glands
  - 600 – 800 glands throughout the submucosa of the oral cavity, oropharynx, hypopharynx, parapharyngeal space, nasopharynx
Parotid gland

- Largest salivary gland
- Divided into 2 lobes by the FACIAL NERVE
  - Superficial (80 %) lobe is lateral to the facial nerve
  - Deep (20 %) lobe is medial to the facial nerve
- On imaging, 2 lobes can be differentiated by retromandibular vein
- Drains into the oral cavity via Stensen’s duct
Borders of the parotid gland

- Superior: Zygomatic arch
- Anterior: Masseter muscle
- Posterior: External auditory canal, mastoid process
- Inferior: Sternocleidomastoid muscle
Facial Nerve Distribution

TEMPORAL

ZYGOMATIC

BUCCAL

MANDIBULAR

POSTERIOR AURICULAR

MAIN TRUNK

CERVICAL BRANCH

Patrick L Lynch, medical illustrator; Carl Jaffe, MD cardiologist

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Salivary gland tumors

**BENIGN**
- Pleomorphic adenoma
- Warthin’s tumor
- Cystadenoma
- Capillary hemangioma
- Oncocytoma
- Basal cell adenoma
- Myoepithelioma
- Intraductal papilloma

**MALIGNANT**
- Acinic cell carcinoma
- Mucoepidermoid carcinoma
- Adenoid cystic carcinoma
- Papillary cystadenocarcinoma
- Oncocytic carcinoma
- Adenocarcinoma
- Lymphoma
- Squamous cell carcinoma
Epidemiology

- Neoplasms of the parotid gland constitute 3 – 4 % of all head & neck tumors
- Location of salivary gland tumors
  - 70% in parotid
  - 22 % in submandibular gland
  - 8 % sublingual and minor salivary glands

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<th>Location</th>
<th>Benign %</th>
<th>Malignant %</th>
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<td>Parotid</td>
<td>80</td>
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<td>Submandibular/Sublingual</td>
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<td>Minor glands</td>
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Townsend: Sabiston Textbook of Surgery, 18th edition
History

- Duration of the mass
- Pain
  - Acute parotitis
    - Acute swelling
    - Bacterial: Staphylococcus aureus
    - Viral: Mumps
- History of any previous head or neck cancers
- History of autoimmune disease
  - Sjörgen’s syndrome: Swelling of parotid that can be secondary to lymphoma
Physical Exam

- Size of the mass
- Mobility
- Examine the scalp, ear and the face for other lesions
  - Majority of metastatic disease to the parotid is from cutaneous melanoma and SCC
  - Rare metastasis from lung, kidney, breast
- Detailed examination of oropharynx, hypopharynx, larynx
Clinical Presentation

- Most common presentation of benign or malignant mass is asymptomatic swelling in the preauricular or retromandibular region.
- Tumors in the deep lobe often present as swelling of parapharyngeal area with medial displacement of tonsil or soft palate.

Cummings et al Otolaryngology Head and Neck Surgery 4th edition

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Clinical Presentation

- Signs that suggest malignancy:
  - Large, fixed mass
  - Facial nerve weakness
    - 12 – 15 % of parotid malignancies have facial nerve involvement at presentation
    - Important to differentiate from Bell’s palsy
      - Symptoms of Bell’s palsy should improve within 6 months
  - Skin involvement
  - Cervical adenopathy
  - Trismus (advanced cases)
Diagnostic evaluation

- **Fine needle aspiration Biopsy**
  - Sensitivity 85 – 99 %
  - Specificity 96 – 100 %
  - Controversial if it should be used routinely for all parotid masses as cytology can be difficult to assess
    - Identify malignancy
    - Diagnose metastatic carcinoma
    - Identify suspected lymphoma
    - Evaluate bilateral tumors
    - Facilitate conservative management of Warthin’s tumor or pleomorphic adenoma in a poor risk patient
Diagnostic evaluation

- CT and MRI
  - Not indicated for small, mobile masses in the superficial lobe of the parotid
  - Indicated for
    - Clinical findings suggestive of malignancy
    - Tumors in the deep lobe or parapharyngeal space
Pleomorphic Adenoma

- Benign mixed tumor
- Most common tumor of the salivary glands
- 90% originate in the superficial lobe of the parotid gland
- Presents as a painless slow growing mass
- **TREATMENT:** SUPERFICIAL PAROTIDECTOMY W/FACIAL NERVE PRESERVATION
- Enucleation is CONTRAINDIQUEATED due to recurrence
- Malignant transformation is rare but is seen in long standing tumors:
  - 1.5 % within 5 years of diagnosis
  - 10 % within 10 years of diagnosis
Warthin’s tumor

- Papillary cystadenoma lymphomatosum
- 2nd most common benign salivary gland tumor
- 10 % of parotid masses
- 10 % are bilateral
- Associated with cigarette smoking
- Will incorporate technetium Tc 99m and appear as ‘hot’ spots on nuclear imaging
- Has almost NO MALIGNANT POTENTIAL
- Presents as an asymptomatic, slow growing mass usually at the angle of the mandible
- Treatment: SUPERFICIAL PAROTIDECTOMY WITH FACIAL NERVE PRESERVATION
Salivary gland malignancies

- Mucoepidermoid carcinoma is the most common malignant tumor
- Other common histological types include:
  - Adenoid cystic carcinoma
  - Adenocarcinoma
  - Malignant mixed tumor
  - Acinar cell carcinoma
- Staging according to the AJCC TNM system
- Prognostic Factors:
  - Age at diagnosis
  - Pain at presentation
  - T stage
  - N stage
  - Facial nerve dysfunction
  - Positive surgical margins at final pathology report
FACIAL NERVE PRESERVATION

GUIDING PRINCIPLE OF PAROTID SURGERY: PRESERVE THE FACIAL NERVE

Facial nerve should only be sacrificed if:

- Diagnosis of malignancy has been confirmed
- Malignant tumor cannot be completely excised without sacrificing the facial nerve or its branches
Incisions for parotidectomy

- Anterior to the tragus
- Curves around the earlobe
- Descends along sternocleidomastoid muscle
- Curves anteriorly along a natural skin crease
Incisions for parotidectomy

- Anterior to the ear
- Curves around earlobe towards the mastoid process
- Caudal extension along the hairline
- Better cosmetic results
- Useful for benign masses in the tail or middle of the parotid

‘Facelift’ incision

Cummings et al Otolaryngology Head and Neck Surgery 4th edition
Parotid gland exposure

- **Anterior flap**
  - Superficial to the parotid fascia
  - Dissection in the vertical direction minimizes trauma to distal branches of the facial nerve
  - Raised until anterior border of the parotid is identified

- **Posterior-inferior flap**
  - Elevated in a similar manner
  - Important to define relationship between parotid tail & anterior border of sternocleidomastoid muscle
  - **GREATER AURICULAR NERVE IS SUPERFICIAL TO STERNOCLEIDOMASTOID MUSCLE**
Locating the facial nerve

- Anterograde approach
  - Locate the main trunk of the facial nerve as it exits the stylomastoid foramen
  - Plane is anterior to the cartilage of the external auditory canal
  - Landmarks:
    - Halfway between the tip of the mastoid process & ear canal
    - 1 to 1.5 cm deep & inferior to tragal pointer
    - 5 mm deep to tympanomastoid suture
Locating the facial nerve

- **Retrograde approach**
  - Locate a peripheral branch and trace backwards towards the main nerve trunk
    - Marginal mandibular branch
      - Lies below horizontal ramus of the mandible
    - Buccal branch
      - Inferior to zygoma
Dissection

- Plane of the facial nerve is uniform throughout the gland and is a landmark for the parenchymal dissection.
- Elevate the parotid tissue from the facial nerve.
- Goal is to resect enough parotid tissue to give negative margins.
- Complete resection of the entire lateral lobe for superficial parotidectomy is only necessary for large tumors.
Surgical Management of Parotid Malignancy

- Superficial lobe: Superficial parotidectomy with facial nerve preservation
- Deep lobe: Total parotidectomy with facial nerve preservation
- Neck dissection for:
  - Advanced stage
  - High histologic grade
  - Clinically palpable lymph nodes
- Postoperative radiation indicated for:
  - Stage III or IV disease
  - Large primary tumor
  - Close surgical margin
  - Perineural spread
  - Gross residual tumor after resection
  - Facial nerve invasion
Complications

- **FACIAL NERVE INJURY**
  - Incidence of temporary paralysis 18 – 65 %
  - Incidence of permanent paralysis < 5 %
  - Most commonly due to a traction injury on the nerve
  - Clinical manifestation is due to extent of injury
    - Main trunk: Complete paralysis of ipsilateral muscles of facial expression
    - Inability to close the eye: temporal nerve
      - Occular lubricants
      - Weights to the upper eyelid
  - Nerve stimulators have not been shown to reduce the incidence of facial nerve paralysis
Facial nerve injury

- **Reconstruction**
  - Most common nerve grafts used are
    - Greater auricular
    - Sural nerve (lower extremity)
    - Ansa hypoglossi
  - Option if part of the nerve has to be sacrificed for tumor removal

- **Recognition of facial nerve injury**
  - Intraoperative
    - Primary repair with monofilament if tension free repair is possible
    - Interposition nerve grafts if tension free repair not possible
  - PACU
    - Unexpected facial nerve dysfunction, return to OR for wound exploration
Risk factors for facial nerve injury

- ‘Risk of facial palsy and severe Frey’s syndrome after conservation parotidectomy for benign disease: Analysis of 610 operations’
- Retrospective study of 610 parotidectomies for benign disease between 1994 – 2004 from a single German center
- Transient facial palsy in 18 %
- Permanent palsy in 4 %
- Identified 3 risk factors for transient palsy
  - Age >70 (p = 0.022)
  - Operation time > 260 min ( p = 0.015)
  - Specimen volume > 70 cm³ (p = 0.016)
- Risk factor for permanent palsy
  - Prior surgery (p = 0.006)
Injury to greater auricular nerve

- Originates from cervical plexus with branches from C2, C3
- Sensory innervation of the lower 1/3 of the pinna, including earlobe, adjacent pre and post auricular skin
- Some surgeons advocate preservation of this nerve
  - Porter MJ, Wood SJ published a retrospective study comparing patients with sacrificed verses preserved greater auricular nerve in 1997
  - Mapping of the sensory loss at 2 weeks, 3, 6, 9, 12 months showed no difference between the 2 groups
  - Area of sensory loss decreased exponentially with time
  - Concluded that preservation of posterior branches of the greater auricular nerve is unnecessary

Frey’s syndrome

- Gustatory sweating
- Presentation
  - Sweating, skin warmth and flushing after chewing food of the ipsilateral side of the parotidectomy
- Pathophysiology
  - Cross innervation of parasympathetic and sympathetic fibers supplying the parotid and the skin
- True incidence unknown but has been reported to be 35 – 60 %
- Minor’s starch/iodine test
- Treatment
  - Antiperspirant over involved skin
  - Botox
Sialocele

- Salivary fistula
- Clear discharge from wound
- Fluid collection under skin flaps
- Self-limiting

Management
- Aspiration
- Pressure dressing
- Wound care
CONCLUSION

- The majority of salivary gland tumors occur in the parotid gland
- Surgical principle for parotidectomy is facial nerve preservation
- Complete removal of lateral lobe is not necessary for superficial parotidectomy. Goal is clear surgical margin.
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