TUMORS OF THE PARAPHARYNGEAL SPACE

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DISCLOSURE

• Principal Investigator: Grant Support for “Skull Base Approach Selection”. Resident Course- Stryker Corporation.
  • A combined Neurosurgery and Otolaryngology lecture/anatomic dissection course for senior level residents.

• Patent Technology related to gold nanorods for therapy and diagnosis of cancer.
PPS TUMORS
• .5% of Head and neck neoplasms
• 80% are benign
• Many still require surgical removal.
• Most tumors are 2.5-3cm before clinical detection
• Morbidity of surgery should be considered along with natural history of disease in making a treatment plan

ANATOMY PPS
• Inverted Pyramid from skull base to hyoid bone?
• Medial
  • Tensor veli palitini
  • Pharyngobasilar fascia and superior constrictor
  • Separates PPS from retropharynx space
PPS BOUNDARIES

- Anterior and Lateral:
  - Pterygoids
  - Parotid
  - Stylomanidbular ligament gives rise to dumbbell tumor shape

THE PARAPHARYNGEAL SPACE
LIGAMENTS

- Stylomandibular ligament
  - Separates parotid from PPS
  - Causes the classic dumbbell shape parotid tumors

- PPS is divided by a layer called the tensor-vascular-styloid fascia
  - TVS is composed of tensor veli palatini and fascia superior
  - TVS is composed of stylopharyngeal and styloglossus muscle inferiorly

SPACES

- PPS
- Masticator Space
- Parotid Space

Image modified from web
THE PPS

- Tumor pathology is related to the space
  - The Pre-styloid space
    - Fat, salivary tissue, vessels
  - The Post-styloid (carotid space)
    - Contains great vessels, nerves, lymph nodes

TUMORS OF THE PPS

- Primary Tumors
- Primary lymphoproliferative disease
- Metastatic lymph nodes
- Tumors extending from adjacent structures

- 80% Benign
- 50% Parotid or minor salivary gland
- 20% neurogenic
PRESENTATION OF PPS LESIONS

- Often asymptomatic?
- Mass in Oropharynx
- Serous Effusion
- Delayed diagnosis typical – usually 2.5-3cm in size before detection
- Late symptoms due to mass effect
  - Cranial nerve dysfunction
PRIMAR Y TUMORS OF THE PPS

• Neurogenic

• Vascular

• Salivary

SALIVARY TUMORS

• 50% off PPS lesions arise from deep parotid lobe or minor salivary gland

• Can extend through stylomandibibular ligament- dumbbell appearance

• Ectopic rests of salivary tissue possible

• Majority are pleomorphic adenomas
PARAGANGLIOMA IN PPS

- Tumors of paraganglia
  - Carotid body most frequent paraganglioma
  - Vagale frequent in PPS
  - Jugulare from T-Bone
- Syndromic
  - Von Hippel-Lindau, NF 1
  - MEN 2a, MEN2b
- Nonsyndromic
  - Familial cases
  - Spontaneous

PARAGANGLIOMA

- 10% malignant
- 10-20% multicentric
PARAGANGLIOMA

- 10% familial
  - 6 genes identified
  - 30-50% of familial cases

PARAGANGLIOMA GROWTH RATE

- Slow persistent growth
  - 2cm every 5 years
  - Doubling time ~7 years (Jansen et al)
PARAGANGLIOMA

• Treatment
  • Surgical
  • Radiation can have a static effect
    • Fails in 1/3 of patients
    • Reserved for elderly, medically frail
    • Bilateral tumors with risks of bilateral CN 10/12 injury
  • If multicentric consider role of surgery carefully

EMBOLIZATION

• Role of embolization is controversial for paraganglioma

• May increase complication rate
  • Added invasive procedure
  • Does not decrease
NEUROGENIC LESIONS

- Schwannoma
  - Most commonly vagal or sympathetic chain

- Neurofibroma
  - Typically multiple
  - Associated with nerve of origin
  - Risk of malignant transformation over time.

NEUROGENIC

- 45% of Schwannomas occur in HN
- IN PPS most commonly vagal and less often sympathetic chain
- Schwannomas can affect adjacent tissues by pressure effect
  - Cause CN dysfunction of 9,10,12
- Relatively radioresistant
- Slow growth, low recurrence rate
WORK UP AND ASSESSMENT PPS LESIONS

- Imaging: MRI is image of choice
- Laboratory:
  - If HTN, Flushing sweating: check urine and plasma catecholamines
- FNA
  - Not necessary when paraganglioma is detected
  - Will be “nondiagnostic” for schwannoma, paraganglioma
  - Can be useful for solid tumors
- Biopsy
  - Transoral biopsy condemned
    - Bleeding risk
    - Tumor implantation

IMAGING

- MRI characteristic for several lesions
  - Pleomorphic adenoma
    - T2 hyperintense
    - Look for fat plane
  - Schwannomas
  - Paraganglioma
IMAGING PARAGANGLIOMA

- Carotid body tumor can extend superiority in PPS
  - Carotid body tumors exhibit Lyre sign
  - T2 Salt and Pepper on MRI
    - Flow void-pepper
    - Hemorrhage-salt

IMAGING SCHWANNOMAS

- Can predict the nerve of origin
  - CN10 or sympathetic most common
  - Pattern of vessel distribution around the nerves is helpful.
PREDICT THE NERVE

- Vagal Schwannoma
  - Splays carotid and IJ vein

- Sympathetic chain schwannoma
  - Displace both the carotid and jugular posteriorly without separating them


TREATMENT

- Cancers require treatment
- Lymphoma only diagnostic tissue
- Benign lesions should be considered case by case.
  - Paraganglioma-continued growth
  - Schwannoma- possible growth
  - Pleomorphic –continued growth
DOES THE PATIENT HAVE EXISTING CN10/12 INJURY?

- If partial paralysis with vagale paraganglioma
  - Can wait for 1 year for complete paralysis to develop
  - Cannot resect the lesion without sacrifice of the nerve
  - Patients compensate better and can often swallow/speak

SCHWANNOMA

- Resect nerve completely
- Some will preserve the external capsule with intratumoral debulking, this can possibly preserve nerve function.
SURGICAL APPROACHES

- Transcervical
- Transcervical/transparotid
  - Identify facial nerve
  - For tumors of the parotid
- Transscervical/transmastoid
  - If jugular foramen is involved
- Transcervical with mandibulotomy
  - With double mandibulotomy
  - With glossotomy?
  - May require trachetomy
  - Risk injury to alveolar nerve

CHOICE OF APPROACH

- Location of lesion
  - High Low
  - Anterior –Posterior
- Histopathology
  - Schwannoma debulkable,
  - Pleomorphic-requires no tumor spillage
- Tumor size?
WHAT IS OLD IS NEW AGAIN

- Transoral was common in 1930’s
  - condemned in 1970’s due to “blind nature” of approach
- And now revived,
  - Small Prestyloid lesions amenable
  - with TORS for select lesions.

TRANSORAL APPROACH: DUCIC

Incision along anterior tonsil pillar  Expose carotid

Ducic et al OHNS 2006
TORS TRANSORAL

- Robot described to provide access to larger lesions


TRANSCERVICAL TECHNIQUES TO INCREASE EXPOSURE

- Nasotracheal intubation to remove ETT from oral cavity
- Divide the digastric and stylohyoid
- Remove the styloid process
- Selective level II lymphadenectomy
STYLOMANDIBULAR LIGAMENT LYSIS

TRANSCERVICAL APPROACH
TRANSCERVICAL APPROACH

ELEVATE DIGASTRIC AND FOLLOW CN12
LYSE THE STYLOMANDIBULAR LIGAMENT

ALLOW RELEASE OF MANDIBLE
POSTOPERATIVE DEFECT
• Intact Specimen

TRANSCERVICAL- TRANSPAROTID
TRANSCERVICAL - TRANSMASTOID

Solitary Fibrous Tumor – Low Neck  SFT – High Neck

SUPERIOR – POST STYLOID MASS
TRANSMASTOID- TO JUGULAR BULB

ROLE OF OSTEOTOMIES

- Parasympathetic
- Vertical ramus osteotomy
- Double Osteotomy

DOUBLE OSTEOTOMY

Kolokythas A, Eisele DW, El-Sayed I, Schmidt BL

DIFFERENT PATIENT DOUBLE OSTEOTOMY
UCSF EXPERIENCE 2003-2006

- 79 pts PPS surgery
- 14 mandibulotomy
- 9 double osteotomy
- Start with arch bars
- Rigid fixation plate pre contoured
- Interdental splint
- Parasymphaseal osteotomy is made first
- If only a prestyloid lesion, only a single osteotomy was used in our series.
OSTEOTOMY

single
- Useful for prestyloid lesions
- More traction on TMJ

Double
- Avoids traction on TMJ
- Requires arch bars and lingual splint
- Two fracture sites to heal

OTHER APPROACHES?
- Endoscopic Transfacial Maxillotomy to superior Prestyloid lesion involving skull base
- + Transscervical approach
- Only useful in select lesions that can be debulked
  - Not pleomorphic adenoma
DOUBLE OSTEOTOMY

- Risk of nonunion, infection
- Avoids TMJ retraction and disarticulation

COMPLICATIONS OF SURGICAL TREATMENT

- CN9,10,11,12 injury
- Horner’s syndrome
- TMJ Dysfunction
- First Bite Syndrome
  - Due to destruction of sympathetic postganglionic supply to the parotid gland
  - Cramping in parotid with first bites of meal
  - Goes away as eating
  - Treatment
    - Carbamazepine
    - Botox Injection
SURGICAL EXPERIENCE

• 27% salivary tumors
• 42% vascular tumors
• 49% neurogenic tumors

• 70% excised transcervically
• Prestyloid and Poststyloid did not influence
• 60% had extended procedure with division of digastric and styloid muscle

Cohen, Burekey, Netterville, Head and Neck 2005

PPS TUMORS

• Most commonly benign

• Surgical strategy is determined by location, size and pathology

• Management should consider morbidity vs natural course of disease

• Adequate access is needed surgically to ensure complete resection, avoid tumor rupture
Adequate access is needed surgically to ensure complete resection, avoid tumor rupture.

CONSIDER LOCATION

THANK YOU