Case Studies of the Larynx

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Objectives
- See varied presentations of SCC
- Explore differentials beyond SCC for various findings in the larynx
- Learn differentials for more diffuse pathologies of the larynx
- Gain understanding of more rare laryngeal masses, both intrinsic and extrinsic

Case # 1
- 68 year old male with vague globus sensation

CT neck with contrast

Gas-Filled Outpouching
- Simple laryngocele
- Mixed laryngocele
- Secondary laryngocele
- Complicated laryngocele
- Severe infection
Right mixed and left internal laryngoceles

Secondary internal laryngocele

Complicated (fluid-filled) laryngocele

Case # 1 = Mixed laryngocele

- Outpouching from the aerodigestive tract
  - Laryngeal ventricle, vallecula, or pyriform sinus
  - Extends into paraglottic space
  - Extends through thyrohyoid membrane
  - Can be gas or fluid-filled

Laryngoceles, Clinical

- Acquired lesions
  - Associated with musicians, glass blowers
  - Chronic extensive coughing
  - Often asymptomatic
  - When symptomatic, often vague symptoms
    - Dysphagia/Odynophagia, globus sensation
  - Can be secondary to underlying mass
  - Can become superinfected

Laryngoceles, Findings

- Circumscribed lesion in paraglottic space
- Connects to airway (laryngeal ventricle)
  - Connection site may not be evident (coaptation)
  - Extralaryngeal extension may go upwards or downwards (Coronal reformats)
- Can be gas or fluid-filled, can be infected
- Look carefully for underlying mass
Infected secondary internal laryngocele

Case # 2

- 58 year old male with *slowly progressive hoarseness*

CT neck with contrast

Focal Vocal Cord Lesion

- Squamous cell carcinoma, glottic
- Glottic papilloma
- Vocal cord nodules
- Vocal cord paralysis

Papilloma, glottic
Vocal Cord Nodules

Our current case in question

Repeat CT neck 3 months later

Case # 2 = Squamous cell carcinoma, glottic

- Most common primary tumor of larynx
- Most common site of laryngeal SCC (~50%)
  - Not always most commonly imaged
- Arises from true vocal cord
- Can be cause of or mimicker of vocal cord paralysis

Glottic SCC, Clinical

- Often presents early due to hoarseness
- Less likely to metastasize
  - Poor lymphatics of the true vocal cords
- Presence of vocal cord mobility key to staging
  - Automatically upgrades T1 to at least T2
  - Not an imaging diagnosis
- If no significant spread, can be treated locally
  - Laser fulguration

Glottic SCC, Findings

- Asymmetric enhancing mass
- Critical to assess for spread to anterior commissure
  - AC should be <1 mm thick
- Critical to assess for spread to posterior commissure, supraglottic/subglottic tissues, or adjacent cartilage

Vocal Cord Paralysis with “Pseudonodule”
Case # 3

- 52 year old female with finding on PET/CT
- Remaining history withheld

Axial PET-CT, fused and CT only

Vocal Cord FDG Uptake

- Squamous cell carcinoma, glottic
- Contralateral vocal cord paralysis
- Prior laryngoplasty

Glottic SCC
Injection laryngoplasty

Case # 3 = Vocal Cord Paralysis

- Decreased mobility of the true vocal cord due to neurologic impairment
- Unilateral far more common than bilateral
- Left > Right
  - Longer course of left recurrent laryngeal nerve
- Imaging may be obtained to evaluate for VCP or is may be found incidentally

Vocal Cord Paralysis, Clinical

- Classically presents as hoarseness
  - Patients may describe voice as “breathy”
  - Patients may report more vague symptoms
    - Dysphagia, globus sensation
  - If bilateral, patients may have dyspnea or even respiratory distress

Vocal Cord Paralysis, Findings

- FDG uptake of contralateral normal cord due to increased compensatory activity
- FDG uptake of vocal cord should prompt evaluation for other findings of paralysis (more to come)

Case # 4

- 63 year old female with dysphonia

Continued FDG avidity of non-injected vocal cord
CT neck with contrast

Vocal Cord Paralysis, Findings
• Sail sign = Medialized posterior vocal cord dilated laryngeal ventricle
• Anterior/Medial deviation of arytenoid
• Enlarged pyriform sinus
• Thickened aryepiglottic fold
• Position of vocal cord variable

Vocal Cord Paralysis, Findings

Vocal Cord Paralysis Differential
• Medullary pathology
• Skull base mass or inflammation
• Carotid space lesion
• Mediastinal process
• Laryngeal mass or injury

Nucleus ambiguous infarct, vertebral artery occlusion

Our patient with dysphonia
Case # 5

- 39 year old male with slowly progressive globus sensation and now hoarseness
CT neck with contrast

Axial T1 pre and post contrast

Axial T2 and TOF MRA

Enhancing Laryngeal Mass

- Squamous cell carcinoma, transglottic
- Vascular malformation
- Nerve sheath tumor
- Paraganglioma
- Invasive thyroid cancer

Enhancing mass

Trans-glottic, not mucosal based

Axial T1 isointense to muscle

Avidly enhancing

Small foci of hypo and hyperintensity

Non-mucosal based

T1 hypointense

Foci of hypointensity

Enhancing and T2 hyperintense

Small dots of elevated T1 signal and low T2 signal

Mass

Slow-flow venous malformation (Hemangioma)

Trans-glottic SCC

Slow-flow venous malformation (Hemangioma)
Schwannoma

Anaplastic Thyroid Carcinoma

Patient has SDHD mutation

Case # 5 – Paraganglioma, laryngeal

- Tumors arising from clustered neuroendocrine cells
- Head and neck tumors are typically parasympathetic in origin and associated with CN IX and X
- Increased incidence with SDHD mutations

Laryngeal Paraganglioma, Clinical

- Symptoms attributable to regional mass effect
- Nearly always benign
  - 2-20% malignant
  - Malignancy defined by presence of metastases
- Not associated with secretory syndromes

Laryngeal Paraganglioma, Findings

- T1 hypointense to muscle
  - Small foci of high T1 due to sequela of microhemorrhage
- T2 hyperintense to muscle
  - Small foci of low T2 due to flow voids
- Enhancement robust and heterogenous
- Multiple nuclear medicine radiotracers used
- Looks for multiple tumors in SDHD patients
SDHD mutation with multiple paragangliomata

- 52 year old female with **rapidly progressive shortness of breath**
- Recent stroke

**CT soft tissue with contrast**

- Diffuse mild soft tissue thickening
- Hypopharynx as well

**Diffuse Laryngeal Process**

- Laryngeal edema
- Post-radiation changes
- Lymphoproliferative process
- Other infiltrative process

**Post-radiation Changes**
Lymphoma of Laryngeal Mucosa

Relapsing Polychondritis

Case #6 = Laryngeal Edema

- Diffuse soft tissue thickening of the larynx due to accumulation of interstitial fluid
- When severe can lead to stridor and life-threatening airway closure
  - May require urgent communication
- Variety of potential causes

Case #6 = Laryngeal Edema due to tPA

- Rare but known side-effect of IV tPA
- Typically orolingual in distribution
- Increased incidence in patients on ACE inhibitors
- Treated with antihistamines, epinephrine, and corticosteroids

Laryngeal Edema, Findings

- Can be difficult to appreciate
  - Patient motion
  - Phonation during exam
- Typically diffuse, symmetric process
- Diffuse soft tissue thickening
- Long segment airway narrowing
- Look for edema elsewhere or potential cause
Hereditary Angioedema

Traumatic edema due to thyroid fracture

Case # 7

- 46 year old male with progressive hoarseness and now stridor

Axial CT soft tissue

Axial and Coronal CT soft tissue
Mass with Abnormal Cartilage

- Squamous Cell Carcinoma
- Chondrosarcoma/Chondroma
- Locally invasive malignancy
- Inflammatory cricoiditis
- Metastatic disease

Anaplastic thyroid carcinoma

Chemical cricoiditis, bleach ingestion

Case # 7 = Chondrosarcoma, Cricoid

- Rare lesion of the larynx, <1% of laryngeal cancer
- Most commonly occurs in cricoid cartilage
  - Thyroid cartilage 2nd most common, rarely arytenoid

Chondrosarcoma Clinical

- Most common in older males (mean 64 years)
- Slowly progressive hoarseness/dyspnea
  - Symptoms may be present for years
- Cannot distinguish between chondroma and chondrosarcoma by imaging
  - Chondroma statistically less likely
- Depending on extent, surgery can be voice-sparing
Chondrosarcoma Findings

- Rings and arcs mineralization
  - Cartilage calcifies variably, but usually symmetrically
- Arises from cartilage, expanded
- Hypoattenuating on CT
- T2 hyperintense
- Enhancement mild, heterogeneous

Chondrosarcoma, low grade

Chondroma

Giant Cell Tumor
Multiple Myeloma

Closing Points
- Mass in the aerodigestive tract is SCC until proven otherwise
- Masses in younger patients or masses with unusual enhancement/mineralization patterns suggest other diagnoses
- FDG uptake may represent malignancy, complications thereof, or prior treatment
- Diffuse laryngeal processes may be life threatening and may result from medications
- When identifying vocal cord paralysis, don’t forget to go one step further

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