RADY 401 Case Presentation:
Ludwig’s Angina
and
Descending Necrotizing Mediastinitis

Jerry Zhang, MS4
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Focused patient history and workup

53 yo. F history of severe obesity (BMI 66), COPD, past DVT, HTN who presents to the ED at Cape Fear with 3-day history of increasing jaw pain and left sided neck swelling.

Vitals: 36.8 °C (98.3 °F)   HR 110   RR 18   BP 168/95
WBC 19, normal lactate

Physical Exam:
Mouth: Tongue is elevated but subglottic area is soft and nontender. Unable to visualize posterior oropharynx

Neck: Patient has significant swelling to the right side of her neck underneath her mandible on the left side. The area is firm and tender to palpation. Patient has muffled phonation but is maintaining secretions. No stridor noted.
Focused patient history and workup continued

Imaging at presentation to OSH: (could not obtain images)

CT Neck: Inflammatory changes at the left neck, involving the left parotid gland, left submandibular gland, uvula, left pharyngeal and left aryepiglottic fold. No fluid collection to suggest abscess.

Patient admitted to hospital and treated with antibiotics + supportive management.

On hospital day 3, patient developed acute respiratory distress requiring intubation

Repeat imaging was obtained suggesting acute mediastinitis requiring surgical intervention and patient was transferred to UNC.
List of imaging studies

Initial:
• Portable Chest X-ray
• CT Neck with contrast

Follow up
• Serial Chest X-ray
• CT Chest with contrast
Findings:
Bilateral pleural effusions (red)

Diffuse R > L interstitial opacities (green)

Moderate enlargement of mediastinum and cardiac silhouette* (blue)

Support devices:
PICC line in R arm terminating in RA
ETT terminating above carina
NGT tip not seen
Findings:

- Air fluid level within sphenoid sinus (green)
- Significant swelling of tongue and tissues of submandibular space space (blue)
- Extensive gas tracking through prevertebral soft tissue (red)
CT Neck with IV contrast - axial

Reactive cervical adenopathy (green)
Significant R sided soft tissue emphysema (red)

Bilateral R>L pleural effusions (blue)
Mediastinal emphysema (red)
Diffuse inflammatory changes in mediastinum (purple)
Patient treatment and outcome

- Patient taken emergently to OR for mediastinal washout, cervical dissection and dental extraction. (Joint case between thoracic, ENT, OMFS).

- Extensive infection of the mediastinum required chest to be left open with antiseptic packing and admission to ICU. Patient ultimately required 5 serial washouts in the OR over the course of 3 weeks.

- Throughout hospital course, stay complicated by renal failure requiring inpatient dialysis, GI bleed, altered mental status and stroke workup

- Patient was discharged from the hospital after 2 months of antibiotics with tracheostomy, G tube, and admitted to long term rehab.
Comparison chest CTs HD 2 vs 17

Hospital day 2 – open chest with packing

Hospital day 17 – post chest closure

Interval decrease in mediastinal size.

Resolution of mediastinal emphysema.

R pleural effusion decreased in size.

Inflammatory changes within R major fissure (blue)

Chest tubes (green)
Initial workup for soft tissue infections of the head/neck

ACR guidelines do not explicitly state recommendations for imaging deep neck space infections. CT neck with IV contrast usually appropriate for neck masses, especially given severity of this infection.¹

Costs from UNC chargemaster:³
- Chest X-ray - $165
- CT Neck with contrast - $3477
- CT Chest without contrast - $3327

Relative radiation doses (background radiation):²
- Chest X-ray – 0.1 mSv (10 days)
- CT Neck – 1.2 mSv (5 months)
- CT Chest – 6.1 mSv (2 years)

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<th>Variant 1: Nonpulsatile neck mass(es). Not parotid region or thyroid. Initial imaging.</th>
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Ludwig’s angina

• Infection of the submandibular space commonly arising from dental infection ~85%.

• May present with general sx of pharyngitis, cellulitis, neck swelling, lymphadenopathy but is rapidly progressing and has high risk of airway obstruction.

• Red flags for impending airway collapse
  • Stridor
  • Tracheal deviation
  • Inability to tolerate secretions
  • Swollen/raised tongue
  • Muffled voice

4 diagnostic criteria per Dr. Grondinsky (1939)

• Bilateral infection involving >1 spaces
• Productive of serosanguinous, putrid fluid.
• Involving connective tissue/fascia but not glandular tissue
• Spreading via fascia planes but not lymphatics or hematogenous routes
Superiorly/posteriorly displaced tongue (blue)

Generalized edema of:
Submylohyoid space (green)
Sublingual space (red)

Hyoid - white arrow
Descending necrotizing mediastinitis (DNM)

Rapidly progressing infection that travels down from naso-oropharynx to the mediastinum via deep cervical fascial planes and its spaces. Once had a mortality up to 42% in 1980’s but now is cited to be between 5-14% with advances in surgical management.⁶,⁷

Diagnostic criteria of DNM Estrera (1983)\textsuperscript{6}

1. clinical manifestations of severe infection;
2. demonstration of characteristic radiographic findings;
3. documentation of necrotizing mediastinal infection in operation
4. establishment of oropharyngeal/cervical infection with descending necrotizing mediastinitis relationship.

**Radiographic Findings:**
- **Xray** - subcutaneous emphysema, prevertebral soft-tissue swelling, mediastinal gas, and/or superior mediastinal widening.
- **CT** - mediastinal gas +/- fluid collections, fat stranding, lymphadenopathy, tissue thickening, enhancement of cervical fascia and muscles
Guidelines for surgical management

Radiographic correlation for extent of infection on CT Chest helps guide surgical management.\(^8\)

- **Type I** – does not require aggressive mediastinal drainage, transcervical

- **Type IIA** - transcervical + anterior mediastinal drainage through a subxiphoid incision

- **Type IIB**- most aggressive, recommends open thoracic approach.

*Endo (1999)*\(^8\)
UNC Top Three

- Ludwig's angina commonly presents as a complication of a primary tooth infection. Patients generally will present with diffuse edema of bilateral submandibular space without evidence of fluctuance or abscess on imaging. Must know the red flags for impending airway compromise!

- Infections of head and neck can rapidly spread across avascular fascial planes and into the mediastinum. Patients require early broad-spectrum antibiotic therapy, imaging, and close monitoring.

- Surgical management often guided by imaging findings. Extent of surgical invasiveness dictated by extent of infection evidenced on CT neck and CT chest.
References

1. ACR Appropriateness Criteria – Neck mass/adenopathy. Available at acsearch.acr.org/docs/69504/Narrative.


3. UNC Chargemaster. Available at www.unchcare.org/patients-families-visitors/billing-financial-assistance/chargemaster


