

Case Report

Ludwig's Angina

Urgent message: Thoroughly evaluate patients who complain of dental or oral pain.

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Ludwig's angina is a serious and potentially life-threatening connective tissue infection found on the floor of the mouth and in the deep neck spaces. More specifically, it is a bilateral infection of the submandibular space. The two compartments affected are the sublingual space and the submylohyoid space.¹ This condition usually presents in individuals who have dental infections, are immunocompromised and/or have poor oral hygiene. In children, tonsillitis is the most common cause of Ludwig's Angina or deep neck space infections, whereas an odontogenic origin is the leading factor in adults. The latter condition is of particular concern because if left untreated, it has the potential to cause sepsis, obstruct the airway, and cause respiratory collapse requiring an emergency surgical airway.²

Case Presentation

A 42-year-old male with type 1 diabetes presents to the urgent care clinic with a 2-day history of fever, chills, and facial swelling. Review of his past medical records reveals he has visited the center on multiple occasions, typically complaining of oral pain caused by dental caries. Despite multiple referrals to a local dentist, he continues to frequent the urgent care center and has not sought dental care. The patient's records contain multiple notes indicating that he says he cannot afford to get his teeth pulled. In addition, a note in the chart cautions that he is a "drug-seeker" and not to give him narcotics.

The patient tells you that for the last 2 days, he has had malaise, felt feverish, and his blood sugar has been elevated. He also notes a foul taste in his mouth and dif-



iculty swallowing. Examination of the patient's oral cavity reveals several cavities, dry oral mucosae, and woody, tender edema of the floor of the mouth and anterior neck.

Observations and Findings

Physical exam

Evaluation of the patient revealed the following:

Temp: 103.1 °F

BP: 168/90

P: 140

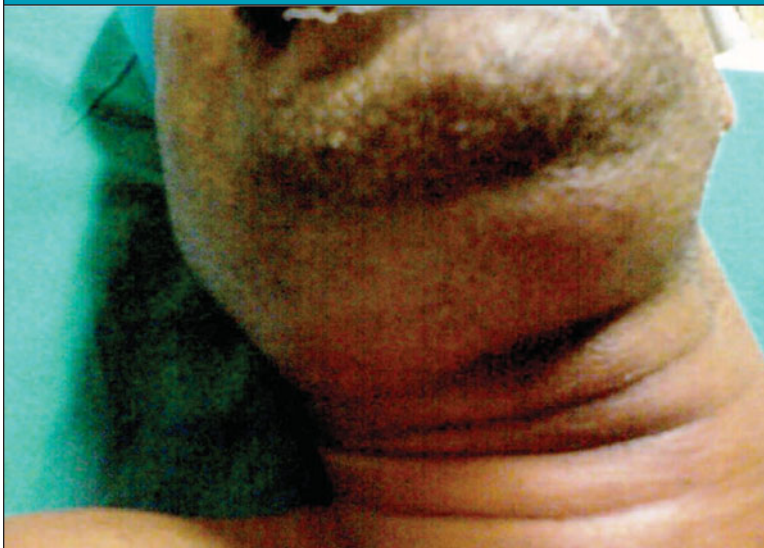
RR: 20

General: Awake, diaphoretic male in mild respiratory distress

HEENT: PERRL, TM'S NL, Oral Cavity: Dry mucosa, multiple dental carries, soft tissue swelling and boggy-ness to the sub-glottic tissue. Airway grossly patent,

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Figure 1.



Swelling in the submandibular area in a patient with Ludwig's angina. en.wikipedia.org/wiki/File:Ludwig_angina.jpg. Accessed September 28, 2012. Source: <http://www.casesjournal.com/content/1/1/19> *Laboratory Results/Imaging*

Figure 2.



CT scan showing a large tooth abscess (right) with significant inflammation of fatty tissue under the skin. http://en.wikipedia.org/wiki/File:Abc%C3%A9s_dentaire_TDM_1.JPG Accessed September 28, 2012.

however, unable to visualize the posterior pharynx. Swelling pictured left.

Neck: Swelling of the submandibular area, extending to the thyroid cartilage (**Figure 1**); multiple, tender anterior and posterior lymph nodes; no meningeal signs, but patient cannot flex his neck forward due to swelling. Carotid pulse palpable bilaterally with bruits or thrills.

Lungs: Clear, equal breath sounds

Heart: Tachycardia without murmur

Neuro: No focal deficits, Cranial nerves grossly intact but cannot adequately test due to facial and neck swelling.

The rest of the exam is unremarkable.

Laboratory Results/Imaging

Imaging as well as laboratory studies are necessary in the diagnosis of a deep neck space infection such as Ludwig's angina. Lateral neck radiography may be necessary because of its ability to quickly reveal soft tissue swelling in the pre-vertebral region. These radiographs can also reveal radiopaque foreign bodies, subcutaneous air, air fluid levels, and erosion of the vertebral bodies. Mandible series also may be helpful in evaluating the presence of dental abscesses in the patient.²

A computed tomography (CT) scan is the most helpful imaging procedure because it can indicate the location, boundaries, and relation of infection to surrounding neurovascular structures. A CT scan should be the first option for imaging because of its ability to simplify deep neck space infections. A simple clinical examination is not sufficient for this situation and can lead to an improper or incomplete diagnosis.

Abscesses, as shown in **Figure 2**, are displayed as low-density lesions with rim enhancement, occasional air fluid levels, and loculations.³ A CT scan of the chest may be necessary if there is concern for spread of infection into the mediastinum. Magnetic resonance imaging can be used in the case of deep neck space infections, but it is not the first choice for imaging because of the time and costs associated.²

Laboratory examination includes a com-

plete blood count with differential, electrolytes, and in this case serum acetone; blood cultures; and culture and gram stain of the abscess. The most common organism observed as a result of the deep neck space cultures is *Streptococcus viridans*.²

Note: unnecessary agitation could result in laryngospasm and complete upper airway obstruction, so any direct examination should only be performed with emergency airway equipment and personnel standing by.

Differential Diagnosis

1. Peritonsillar abscess
2. Dental or apical abscess
3. Epiglottitis
4. Parotitis or salivary gland infection/abscess
5. Severe gingivitis
6. Angioneurotic edema
7. Lingual carcinoma²

Diagnosis

Ludwig's angina

Important physical exam findings:

- Sub-glottic swelling
- Difficulty breathing
- Fever
- Neck pain
- Neck swelling
- Difficulty/painful swallowing
- Impaired speech
- Poor oral hygiene⁴

To confirm the diagnosis and ensure proper treatment, a needle aspiration of the submandibular space is indicated to direct therapy.

Ludwig's angina has four significant signs:

1. bilateral involvement of multiple deep tissue spaces;
2. gangrene with seroanguinous, putrid infiltration with little or no frank pus;
3. involvement of connective tissue, fasciae, and muscles but not glandular structures; and
4. spread via fascial space continuity, as opposed to the lymphatic system. Brawny induration of the floor of the mouth should signal airway stabilization.³

Course and Treatment

Depending on the severity of the infection, there are several courses of treatment that should be considered. In patients who have excessive swelling that leads to potential airway compromise, all precautions must be

undertaken to prepare for airway collapse. It is hoped collapse can be avoided with close observation and aggressive and proper antibiotic treatment.

If a patient's airway is blocked, fiberoptic intubation via the nasal route is a viable option. That should only be necessary if the cellulitis and swelling worsen or if respiratory compromise occurs.¹

Broad antibiotic coverage, typically penicillin-based, is emergently indicated. Antibiotic therapy should be administered for 2 to 3 weeks, or until there is evidence of clinical resolution. In most cases, follow-up dental treatment is necessary to definitively correct the dental infections and/or abscesses.

In addition, if an abscess has formed, surgical intervention for drainage is required, particularly if a patient is not responding to intravenous antibiotics. However, surgery is not normally done because of the rarity of a drainable collection of pus early in the course of the disease.⁵ Before the development of antibiotics, Ludwig's angina had a 50% mortality rate. Today, mortality due to Ludwig's angina has declined to less than 4%.²

Antibiotics and proper drainage are almost always preferable over surgical treatment and/or intubation. According to a review of deep neck infections by Broughton, 50% of deep neck infections can be treated with simple fluid aspiration, and should not necessitate a formal airway intervention. Another study by Plaza and McClay suggests that surgical drainage be introduced only if there is no improvement after administration of broad-spectrum antibiotics for 48 hours.³

Discussion

Ludwig's angina is a dangerous and potentially airway-compromising infection of the floor of the mouth and neck and, if not diagnosed and treated correctly, can prove life-threatening. This condition is complex for a plethora of reasons, the first being the complicated anatomy involved with the deep neck spaces. This complexity can lead to imprecise localization of the infection. However, in patients presenting with Ludwig's angina, nearly two-thirds have a dental source of infection involving the second or third mandibular molar teeth. In addition, the tissue most often affected by this condition is located under a substantial amount of uninfected soft tissue. Finally, an infection found in the deep neck spaces is unlikely to remain localized.²

Once the infection has established itself within the deep neck space tissue, it is known to spread rather quickly. Increase in tongue size to more than two to three times normal has been documented in some cases.

Ensuring an adequate airway is of utmost importance when dealing with a patient suffering from Ludwig's angina.

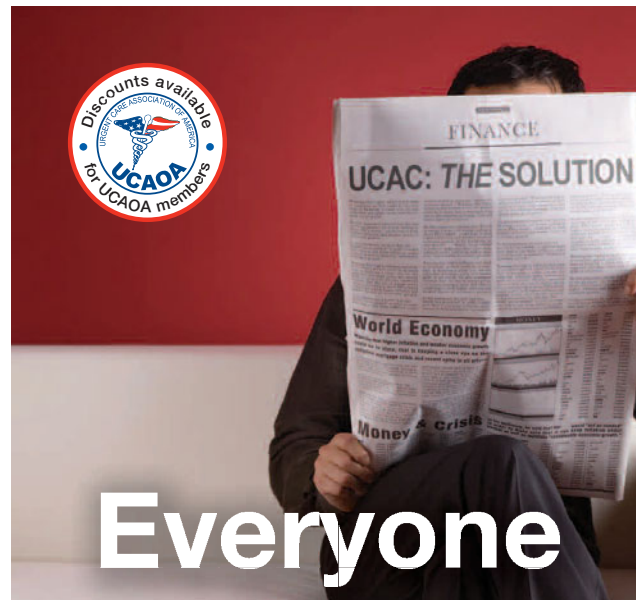
That can ultimately lead to posterior distention into the hypopharynx, superiorly against the palate, and protrusion from the mouth. In addition, the cellulitis from the submandibular space may spread from the styloglossus muscle into the parapharyngeal space, and then continue to the retropharyngeal space and the superior mediastinum.³

Ensuring an adequate airway is of utmost importance when dealing with a patient suffering from Ludwig's angina. This condition can prove incredibly difficult for even the most experienced physicians because of the potential for extensive swelling and distortion of the anatomy. However, if the airway is initially patent, proper antibiotic coverage should prove sufficient to mitigate the infection in the deep neck spaces.

Ludwig's angina is generally a rare condition, but one that can be treated with aggressive antibiotic use and airway support with or without surgical drainage. Full recovery should be expected if the infection is treated properly and attended to in a timely manner. Patients suffering from deep neck infections show no signs of predisposition for recurrence once their original infection and its source have been fully treated. ■

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