

# Ludwig Angina

## Risk

- Main risk factor is odontogenic infection, especially of the second and third molars (90% of all cases). Other factors include dental and gingival disorders, bacterial infection of the floor of the mouth, peritonsillar abscess, IV drug abuse, mandible fracture, tongue piercing, sialadenitis, and puncture wounds of the floor of mouth.
- Infrequently encountered with contemporary oral hygiene practices and antibiotics.
- Often occurs in otherwise healthy pts but predisposing factors include immunosuppressed states, diabetes mellitus, alcoholism, acute glomerulonephritis, systemic lupus erythematosus, and aplastic anemia.

## Perioperative Risks

- Airway obstruction and respiratory distress, aspiration pneumonia secondary to inability to handle secretions, sepsis, descending mediastinitis, subphrenic abscess, empyema, and cervical or mandibular osteomyelitis

## Worry About

- Airway obstruction, sepsis, jugular venous thrombosis, pneumothorax, pericardial/pleural effusions, infection of carotid sheath structures, descending necrotizing mediastinitis occurring via the retropharyngeal space and carotid sheath

## Overview

- Potentially lethal, rapidly spreading cellulitis of the bilateral submandibular space, which is comprised of the sublingual and submaxillary spaces. Five characteristics: Submandibular cellulitis; involvement of more than one space; progression of cellulitis to gangrene; extension of cellulitis to connective tissue, fascia, and muscles; and spread of cellulitis by continuity and not via the lymphatics. Infection often starts as a periapical dental abscess of the second and third mandibular molars (the roots of these teeth penetrate the mylohyoid ridge such that any abscess or dental infection has direct access to the submaxillary space) usually with elevation and posterior displacement of the tongue.

Infection may spread to adjacent neck tissues and the thorax, causing airway obstruction and other serious complications, including mediastinitis.

- Presents with painful neck swelling, laryngeal edema, tooth pain, dysphagia, dyspnea, fever, and malaise. Neck swelling and protruding or elevated tongue are seen in the vast majority. Stridor, trismus, cyanosis, and tongue displacement suggest impending airway crisis.

## Etiology

- Most commonly results from bacterial infection: Usually polymicrobial but also *Streptococcus viridans* and *Staphylococcus aureus*. Less commonly from *Bacteroides*, *Fusobacterium*, *Actinomyces*, or *Haemophilus influenzae*.

## Usual Treatment

- Early airway control: Administration of IV dexamethasone (antiinflammatory) and nebulized epinephrine (reduction of airway obstruction)
- Antibiotics: Penicillin, clindamycin, metronidazole
- Surgical decompression

## Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Airway edema, elevation, and posterior displacement of tongue	Dysphagia, dyspnea, pain	Stridor, drooling, cyanosis, tongue displacement, altered airway anatomy, redness and swelling of neck and face, trismus, poor mouth opening	MRI/CT with IV contrast, ultrasound if abscess present
PULM	Pneumonia, pneumothorax, empyema, pleural effusion, subphrenic abscess	Pleuritic pain, cough, dyspnea, generalized SOB	Unequal breath sounds, tachycardia, cyanosis, tactile fremitus	CXR, CT Thoracentesis for pleural effusion and empyema
CV	Pericardial effusion, hypovolemia	Poor PO intake, hypotension	Fever, orthostatic hypotension, tachycardia, arrhythmia, decreased CO, JVD	Blood cultures, fluid gram stain and culture, ECHO, pericardiocentesis

**Key References:** Kremer MJ, Blair T: Ludwig angina: forewarned is forearmed, *AANA J* 74(6):445–451, 2006; Farish SE: Ludwig's angina. In Bagheri SC, Bell RB, Khan HA editors: *Current therapy in oral and maxillofacial surgery*, Philadelphia, PA, 2012, Saunders, pp 1092–1098.

## Perioperative Implications

### Preoperative Preparation

- Ensure availability of fiberoptic bronchoscope, video laryngoscope, and surgical airway equipment with personnel trained in their use.

### Preinduction/Induction

- For fully developed Ludwig, direct laryngoscopy is associated with a high rate of failure, and any airway instrumentation may itself cause obstruction and bleeding, leading to acute deterioration in respiratory status and the need for emergency tracheostomy.
  - Elective, awake tracheostomy using local anesthesia is the preferred method of airway management in pts with fully developed Ludwig.
  - In cases not fully advanced, consider awake nasal fiber optic intubation.
- An initial dose of 10 mg of IV dexamethasone followed by 4 mg every 6 h helps to decrease edema

and cellulitis. Nebulized epinephrine (1 mL of 1:1000 diluted in 5 mL of 0.9% saline) is also believed to help to relieve upper airway obstruction. Pt must be maintained in sitting position, and surgeon should be immediately available for tracheostomy.

- The first attempt should be performed by the most experienced operator, and induction should occur after airway has been secured. For mild cases that have not progressed, one may elect to do an inhalational induction but the majority of cases require awake intubation and then induction. Muscle relaxation should occur after endotracheal intubation is accomplished.

### Monitoring

- Standard monitors.
- Large-bore IV access should be obtained. Central line placement in the neck is not advised.

### Maintenance

- Avoid nitrous oxide in case of pneumothorax.

### Adjuvants

- IV steroids and nebulized epinephrine as previously discussed

### Extubation

- Based on intraop findings; consider continued intubation postop until edema resolves

### Postoperative Period

- Monitoring in a critical care setting; consider extubation as previously discussed.

## Anticipated Problems/Concerns

- Blind nasotracheal intubation should not be attempted in Ludwig angina given the potential for bleeding and abscess rupture.

# Lyme Disease

## Risk

- Approximately 30,000 new cases are reported to the CDC each year; however, this number is likely underestimated. The CDC is currently conducting research, and preliminary results suggest the number of new cases to be around 300,000.
- Lyme disease is the most commonly reported vector-borne illness in USA. In 2013 95% of confirmed Lyme disease cases were reported from 14 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New

Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and Wisconsin. Reported cases of Lyme disease are most common among boys aged 5–9 y. Incidence was highest among children aged 5–14 y; a disproportionate increasing trend was observed in children and in young males compared with other demographic groups. The majority of pts had onset in June, July, or August.

- Gender predilection: Male (53.4%).
- Children <15 y; adults 30–59 y.

## Perioperative Risks

- Increased risk of dysrhythmias and CHF in pts with cardiac involvement.

## Worry About

- Cardiovascular: Volume overload, CHF, and AV block
- Neurologic: Hyperkalemia from muscular weakness or paralysis, facial muscle paralysis (Bell palsy), peripheral neuropathy and muscle weakness, meningitis, and confusion

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**Overview**

- Stage 1: Early localized infection; chills, fever, headache, lethargy, muscle pain, erythema migrans (rash spreads centrifugally; lesion usually occurs at site of bite) in 68% of pts.
- Stage 2: Early disseminated infection; arthritis, aseptic meningitis, cranial neuritis (Bell palsy), and peripheral radiculoneuritis are neurologic manifestations.
  - Carditis occurs in 4–8% of pts during this stage of disease.
  - Second- and third-degree AV block and myocarditis may be documented by ECG and heart failure; symptoms resolve in days to weeks.
- Stage 3: Late persistent infection; over time 60% of pts with untreated infection will develop intermittent bouts of arthritis, with severe joint pain and swelling. Large joints are most often affected,

particularly the knees. In addition, up to 5% of untreated pts may develop chronic neurologic complaints months to years after infection. These include shooting pains, numbness or tingling in the hands or feet, and problems with concentration and short-term memory.

- Approximately 10–20% of pts with Lyme disease have symptoms that last months to years after treatment with antibiotics. These symptoms can include muscle and joint pains, cognitive difficulties, sleep disturbances, or fatigue. The cause of these symptoms is not known, but according to current research, these symptoms are not due to ongoing infection with *Borrelia burgdorferi*. This condition is referred to as PTLDS. There is some evidence that PTLDS is caused by an autoimmune response, in which a person's immune system continues to respond, doing damage to the body's tissues, even after the infection

has been cleared. Studies have shown that continuing antibiotic therapy is not helpful and can be harmful for persons with PTLDS.

**Etiology**

- Lyme disease is caused by the spirochete *B. burgdorferi*, which is transmitted by the tick *Ixodes dammini*.

**Usual Treatment**

- Early doxycycline prevents infection in high percentages of pts. Amoxicillin, cefuroxime, and ceftriaxone are also effective. Pts with certain neurologic or cardiac forms of illness may require IV treatment with drugs, such as ceftriaxone. Antibiotic therapy for 10–21 up to 28 d generally aborts stages 2 and 3. Pts may benefit from a second 4-wk course of therapy.
- Vaccine available for adults.

**Assessment Points**

System	Effect	Assessment by Hx	PE	Test
CV	AV node block CHF	Palpitations Fatigue Dyspnea Dizziness with exercise	Bradycardia Tachycardia	ECG ECHO
RESP	Dyspnea	SOB	Rales	CXR
DERM	Erythema chronicum migrans	Erythematous annular lesions	Erythematous circular rash	
CNS	Meningitis Bell palsy Radiculoneuritis	Headache Cognitive impairment Memory deficit	Cranial nerve facial palsy Numbness, tingling Muscular weakness	Serology Lumbar puncture EMG
MS	Arthritis	Joint pain and swelling Musculoskeletal pain	Swelling of one or a few joints Erythema of joints	

**Key References:** Shapiro ED: Clinical practice. Lyme disease, *N Engl J Med* 370(18):1724–1731, 2014; Gupta B, Agrawal P, D'souza N, et al.: Anaesthetic management and implications of a case of chronic inflammatory demyelinating polyneuropathy, *Indian J Anaesth* 55(3):277–279, 2011.

**Perioperative Implications****Preoperative Concerns**

- Ensure antibiotic Rx and cure of carditis prior to all but emergency operations.

**Monitoring**

- Consider invasive monitoring with an arterial line based on cardiac manifestations.

**Airway**

- Routine

**Preinduction/Induction**

- Avoid depolarizing muscle relaxants.

**Maintenance**

- Routine

**Extubation**

- Usually routine but might be delayed due to generalized muscle weakness

**Adjuvants**

- Avoid depolarizing muscle relaxants on induction because of hyperkalemia.

**Postoperative Period**

- Depends on the cardiac and neurological manifestations of the disease if present

**Anticipated Problems/Concerns**

- Pts may develop dysrhythmias or CHF.

**Lymphomas**

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**Risk**

- 5.3% of all cancers; 55.6% of all blood cancers (USA National Institutes of Health Registry)
- Per annum risk 2.9:100,000 population (European Age-Standardized Incidence UK, 1993–2012)

**Perioperative Risks**

- Tumor: Mechanical obstruction, compression effect on organs systems (e.g., airway or bowel obstruction)
- Systemic effects: Myelosuppression including immunosuppression, anemia, thrombocytopenia, paraneoplastic syndromes
- Cachexia

**Overview**

- Group of blood cell tumors developed from lymphatic tissues
- WHO classification: Prognosis depends upon correct diagnosis and classification based on the Revised European-American Lymphoma Classification five types

**Etiology**

- Epstein-Barr virus, family history, autoimmune disorders, immunosuppressant, and pesticides

**Usual Treatment**

- Low-grade lymphomas: Radiation and rituximab.

- High-grade lymphomas: R-CHOP (Rituximab, Cyclophosphamide, Hydroxydaunorubicin, Oncovin (vincristine), Prednisone or Prednisolone), and stem cell transplantation).
- R-Maxi-CHOP is used in mantle cell lymphoma and is given in 21-day intervals, alternating with R-HDAC (rituximab + high-dose cytarabine).
- Hodgkin lymphoma: Radiation alone.