Common Abscesses of the Head and Neck

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KEYWORDS

• Abscess • Head • Neck • Mouth

KEY POINTS

- Oral cavity/oropharyngeal abscesses can lead to airway compromise necessitating prompt recognition and treatment.
- Thorough understanding of deep neck spaces can aid the clinician in treating infections and preventing serious complications.
- Ludwig's angina is an airway emergency requiring immediate consultation with an otolaryngologist.

INTRODUCTION

Head and neck abscesses represent a significant clinical challenge, often arising as a result of infection in the anatomic spaces and structures of the region. These abscesses can be classified based on their location, such as peritonsillar, retropharyngeal, submandibular, and parapharyngeal, each with distinct clinical presentations and potential complications. The pathogenesis is direct extension from adjacent infections (eg, dental, tonsillar, or pharyngeal) or hematogenous spread from distant sites. Diagnosis relies heavily on clinical suspicion, supported by laboratory workup and imaging techniques like contrast-enhanced computer tomography (CT) or MRI, while management involves a combination of medical and surgical interventions. Prompt recognition and appropriate treatment are critical, as delayed intervention can lead to severe complications, including airway obstruction, sepsis, and spread of infection to vital structures.

ODONTOGENIC ABSCESS

Odontogenic abscesses are localized infections arising from a dental or periodontal source. They commonly present with pain, swelling, and systemic symptoms, and can have serious complications from local spread if not treated promptly. Understanding their etiology, clinical presentation, diagnosis, and management is crucial for effective treatment.

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Abbreviations	
CRP	C-reactive protein
CT	computer tomography
ESR	erythrocyte sedimentation rate
IV	intravenous
MRSA	methicillin-resistant *Staphylococcus aureus*
NF	necrotizing fasciitis
PTA	peritonsillar abscess

Epidemiology

Odontogenic infections are infections of dental origin and are common due to the prevalence of dental caries and periodontal disease. Risk factors include poor oral hygiene, untreated dental caries, periodontal disease, immunocompromised states, or a history of previous dental procedures.

Classification

Odontogenic abscesses are classified based on their origin and location. Periapical abscesses are limited to the apex of the tooth root. Periodontal abscesses are found in the supporting structures of the tooth, such as the gum and bone. These infections can spread to the surrounding soft tissues of the head and neck or even into the surrounding bone causing osteomyelitis.

Pathophysiology

Odontogenic abscesses typically arise when bacteria from the oral cavity invade the dental pulp or periodontal tissues. This could be a result of a high bacterial load or host factors, such as an immunocompromised state (eg, diabetes). Commonly implicated bacteria include a mix of aerobic and anaerobic bacteria (eg, *Streptococcus*, *Fusobacterium*, and *Bacteroides*).[1] If left untreated, the dental infection can spread to involve the sinuses, soft tissues of the face, and deep spaces of the neck.

Clinical Presentation

Patients typically present with symptoms of localized pain (often severe and throbbing), swelling of the affected area, erythema and tenderness on palpation, purulent drainage, or systemic symptoms of fever, malaise, and lymphadenopathy. A patient will often give a history of recent dental pain or procedure followed by the development of facial or neck swelling. Signs of infection are tenderness to percussion of the affected tooth, mobility of teeth in cases of periodontal involvement, neck pain and swelling, and possibly trismus, which signifies spread of the infection to the muscles of mastication. Patients may have a normal or elevated white blood cell count depending on the degree of infection.

Diagnosis

Evaluation is initiated with a detailed history of dental health, recent procedures, and symptom duration, followed by an extraoral and intraoral examination to assess swelling, drainage, and signs of systemic infection. Palpation of the soft tissues of the head and neck is important to identify swelling, tenderness, erythema, induration, and fluctuance. Imaging is routinely obtained with dental radiographs to visualize periapical changes (eg, bone loss, radiolucencies). Furthermore, CT scan of the neck with intravenous (IV) contrast is indicated in complicated cases with suspected extension into surrounding tissues (eg, orofacial soft tissue and deep neck spaces).

Management

Treatment often requires a combination of medical and surgical therapy. Prompt initiation of broad-spectrum antibiotics is indicated, especially in severe cases. In mild cases managed on an outpatient basis, common antibiotics include amoxicillin-clavulanate or clindamycin for penicillin-allergic patients or in cases of suspected anaerobic infection. In severe cases requiring inpatient management for airway monitoring, deep neck space infection, signs of sepsis, and/or failed out-patient management, ampicillin-sulbactam can be used.[2,3] Consultation with an oral surgeon or dentist is essential for managing abscesses to relieve pressure and promote drainage. Incision and drainage of the offending tooth should be performed under aseptic conditions, ensuring all necrotic tissue is removed. Furthermore, definitive dental treatment (eg, root canal, extraction) is often required following abscess management to eliminate the source of infection. Serious complications of odontogenic infections include osteomyelitis of the jaw, Ludwig's angina, sinusitis, orbital cellulitis, or mediastinitis. Finally, careful attention must be paid to the patient's respiratory status as spread of infection can lead to airway compromise due to extensive swelling of the base of tongue, supraglottis, or glottis. With appropriate treatment, the prognosis for odontogenic abscesses is generally good. Early intervention is critical to prevent complications and ensure a favorable outcome.

PEARL

When caught early, odontogenic abscesses can be managed on an outpatient basis with antibiotic prescription and prompt dental follow-up. Inpatient management is necessary when outpatient therapy has failed, infection has spread to the orofacial soft tissues or deep neck spaces, signs of airway compromise are present, or there is evidence of sepsis.

PERITONSILLAR ABSCESS

Peritonsillar abscess (PTA) is a localized collection of pus that forms in the peritonsillar space, typically as a complication of acute tonsillitis. It is one of the most common deep neck infections encountered and can lead to significant morbidity if not recognized and treated promptly.

Epidemiology

PTAs are more prevalent in adolescents and young adults, but they can occur in any age group. Risk factors include history of recurrent tonsillitis or acute tonsillitis, poor oral hygiene and smoking, or immunocompromised states (eg, diabetes).

Etiology

The most common bacterial pathogen involved in PTA is *Streptococcus pyogenes* (Group A Streptococcus). Other organisms include *Staphylococcus aureus*, *Fusobacterium nucleatum*, and various anaerobes.[4] Although less common, viral infections can predispose individuals to bacterial superinfection.

Pathophysiology

PTA typically develops as a complication of tonsillitis when the infection spreads from the tonsil to the surrounding soft tissue. The peritonsillar space is a potential space bound by the palatine tonsils medially, the pharyngeal constrictors laterally, the palatoglossal arch anteriorly, and the palatopharyngeal arch posteriorly. Factors that

contribute to abscess formation include decreased immune response and tonsillar hypertrophy, which can obstruct drainage and promote pus accumulation.

Clinical Presentation

Patients typically present with severe sore throat, odynophagia, dysphagia, muffled voice (*hot-potato* voice), fever, malaise, and halitosis. Patients may also endorse ipsilateral otalgia, which is referred pain from overlapping sensory nerves of the oropharynx and ear. Classic signs of PTA are unilateral tonsillar swelling with displacement medially, soft palate edema and erythema, uvular deviation to opposite side, trismus, and otalgia. Cervical lymphadenopathy may also occur. White blood cell count can be normal or elevated with elevated inflammatory markers, such as erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), as well.

Diagnosis

Diagnosis is predominantly clinical, based on thorough history and physical exam. Imaging can be used as an adjunct or in complicated cases, but is not often necessary. Ultrasound can be used for initial assessment in some cases, providing a quick, noninvasive way to evaluate for abscess formation. Alternatively, a CT scan of the neck with IV contrast is considered in complicated cases or when there is concern for deeper neck space infections (**Fig. 1**).[4]

Management

Empiric therapy with amoxicillin-clavulanate or clindamycin should cover common pathogens. Ensuring adequate hydration and proper pain control can prevent inpatient admission. Small abscesses may resolve with medical therapy alone. Definitive treatment for larger peritonsillar abscess is drainage. Whether needle aspiration is

Fig. 1. CT of neck with IV contrast showing right PTA.

used or incision with a scalpel, drainage should result in significant improvement of symptoms. This procedure can be done at bedside under local anesthesia. Cultures should be obtained and antibiotic therapy adjusted based on results. Rarely, patients will need an acute tonsillectomy if their symptoms progress despite drainage and antibiotics. Steroids are often given for pain/inflammation, but evidence for the benefits of steroids in the treatment of PTAs is inconsistent and it is not considered standard of care. With appropriate treatment, the prognosis for PTA is generally good, with most patients experiencing significant improvement following drainage and antibiotic therapy. However, delayed treatment can lead to serious complications, including the spread of infection to retropharyngeal space, the internal jugular vein (Lemierre's syndrome), and in rare cases, airway compromise. Patients should be educated on oral hygiene and management of recurrent tonsillitis to help reduce the incidence of PTA. Furthermore, tonsillectomy should be considered in patients with frequent episodes of tonsillitis (> 7 episodes in the past year, 5 episodes per year for 2 years, or 3 episodes per year for 3 years) or in those who have more than one PTA.[4,5]

PEARL

PTA is strongly suspected in the presence of 4 cardinal signs and symptoms: (1) Trismus, (2) palatal fluctuance/asymmetry, (3) deviation of uvula to 1 side, and (4) otalgia (**Figs. 2** and **3**). Alternatively, intratonsillar abscesses may not present with uvular deviation, trismus, or palatal fluctuance due to lack of inflammation of the parapharyngeal musculature and contained location within the tonsil. Initial treatment of intratonsillar abscesses is medical.

DEEP NECK SPACE ABSCESS

Deep neck space abscesses are localized infections that occur in the specific anatomic spaces of the neck. They can lead to significant morbidity and potential life-threatening complications if not promptly recognized and treated. Understanding the anatomy, etiology, clinical presentation, diagnosis, and management of these abscesses is crucial for effective patient care.

Anatomy

The deep neck is divided into several spaces, each with distinct boundaries and contents. The major spaces include

1. Submandibular Space: Located below the mandible, this space contains the submandibular gland and lymph nodes.

Fig. 2. Cardinal signs of a PTA. (*Photo courtesy of* Lauren Buck MD.)

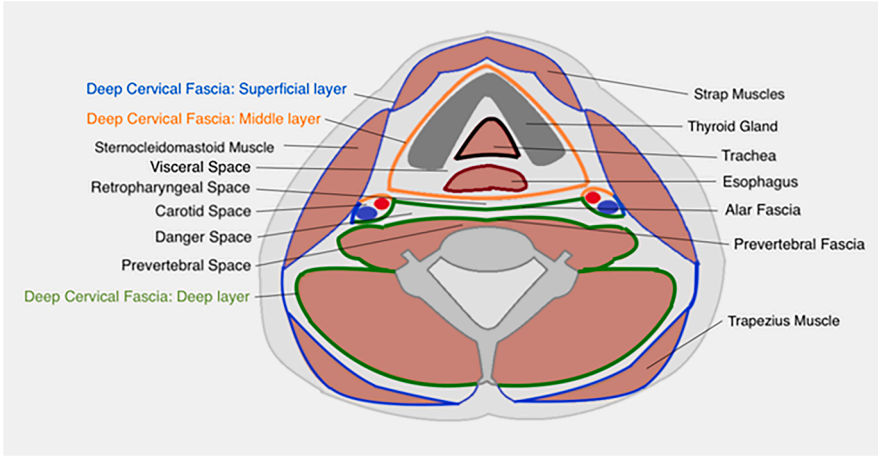

Fig. 3. Deep neck spaces.

2. Sublingual Space: Situated beneath the tongue, bounded by the mylohyoid muscle, this space contains the sublingual gland and associated lymphatics.
3. Retropharyngeal Space: Located behind the pharynx, this space extends from the base of the skull to the mediastinum and can house infections that spread from the oropharynx or nasopharynx.
4. Prevertebral Space: Contains the cervical vertebrae and prevertebral muscles, extends from the skull base to the thorax.
5. Visceral Space: Contains structures such as the trachea, esophagus, and major vascular structures.[6]

PEARL

- The danger space is a potential space between the retropharyngeal space and the prevertebral space. Infections can travel in this space from the upper aerodigestive tract to the mediastinum.

Epidemiology

Deep neck space abscesses can occur in patients of any age, but are more common in children and young adults due to higher incidences of infections like tonsillitis and dental infections. Risk factors include poor oral hygiene, recent dental procedures, history of upper respiratory infections, or immunocompromised state (eg, diabetes).

Etiology

Deep neck space abscesses are typically caused by bacterial infections, often polymicrobial. Common aerobic pathogens include *S pyogenes* (Group A Streptococcus) and *S aureus* (including methicillin-resistant *S aureus* [MRSA]). Anerobic bacteria include *F nucleatum and Bacteroides* sp. Other organisms include *Haemophilus influenzae* and Enterobacteriaceae in certain cases.[7,8]

Pathophysiology

Infection can spread from several sources, including tonsillitis, dental infections, oropharyngeal infections, or direct trauma.

Clinical Presentation

Patients present with symptoms of severe sore throat, odynophagia, trismus, neck swelling and tenderness (often unilateral), decreased range of motion of the neck, fever, malaise and in severe cases, difficulty breathing or swallowing/handling secretions. Depending on the severity of disease, patients can present with signs of sepsis, including fevers, tachycardia, and/or hypotension.

Diagnosis

Detailed history focusing on symptom onset, duration, and associated infections is helpful in obtaining a diagnosis. The clinician should perform a comprehensive head and neck examination, palpating for masses or areas of fluctuation. White blood cell count is usually elevated. Imaging is often needed to diagnose deep neck space abscesses. Ultrasound can be used for initial assessment and potential aspiration, but CT scan of the neck with IV contrast is the gold standard for evaluating deep neck abscesses (**Fig. 4**). It provides detailed information about the extent of the infection, the involvement of adjacent structures, and helps differentiate between cellulitis and abscess formation.[9]

Management

Empiric antibiotic therapy should cover both aerobic and anaerobic bacteria. Broad-spectrum antibiotics are often initially used until culture-directed therapy is used. Supportive care is administered with analgesics and IV fluids if the patient cannot swallow. Incision and drainage are essential for managing most deep neck space abscesses. The route of drainage depends on the abscess location.[10] Finally, and most importantly, if there is any airway compromise or impending compromise, consider intubation or an emergency surgical airway.[11] With timely diagnosis and appropriate management,

Fig. 4. CT of neck with IV contrast at the level of the inferior border of the mandible. Retropharyngeal abscess with bilateral tonsillitis.

the prognosis for deep neck space abscesses is generally good. However, delayed treatment can lead to significant complications, including life-threatening airway compromise, mediastinitis, empyema, or recurrence.

PEARL

Deep neck space infections are almost always managed on an inpatient basis. A thorough understanding of the anatomy is critical for hospitalists to anticipate potential routes of spread to high-risk areas, such as the mediastinum.

LUDWIG'S ANGINA

Ludwig's angina is a serious, potentially life-threatening cellulitis or connective tissue infection of the sublingual, submental, and submandibular space, typically arising from infections of the lower molars (Fig. 5). It is characterized by bilateral swelling of these spaces, leading to airway compromise and systemic symptoms.

Epidemiology

Although rare due to advancements in dental care and antibiotics, Ludwig's angina can occur at any age but is more commonly seen in adults. Risk factors include: poor dental hygiene and untreated dental infections, recent dental procedures particularly involving the lower molars, and immunocompromised states.

Etiology

Ludwig's angina is primarily caused by polymicrobial bacterial infections. Common pathogens include: *Streptococcus milleri* (Group A and other Streptococcus sp), *S aureus*, *F nucleatum*, and *Bacteroides* sp.[8]

Pathophysiology

The infection typically originates from dental sources, submandibular gland infections, or following trauma. The infection spreads rapidly through the fascial planes of the

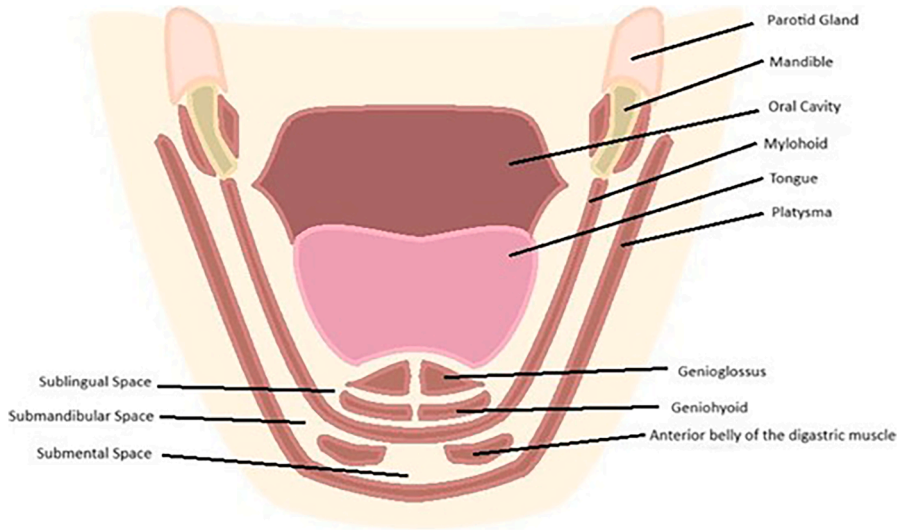

Fig. 5. Oblique/coronal view of sublingual, submandibular, and submental spaces.

neck, affecting both the submandibular and sublingual spaces, leading to bilateral swelling and potentially compromising the airway.

Clinical Presentation

Patients classically present with rapidly progressive swelling of the submandibular region, often described as a *woody induration*, dysphagia, odynophagia, *hot potato* voice, and trismus. Clinicians can observe bilateral swelling of the submandibular area often causing elevation of the floor of the mouth and the tongue, submental swelling and signs of respiratory distress, including stridor, in severe cases. Patients may present with fever, elevated white blood cell count, and elevated inflammatory markers, such as ESR and CRP.

Diagnosis

Diagnosis starts with a thorough history and physical examination with a focus on dental health, recent infections, and symptom onset. Specific attention in the physical examination should be focused on a thorough examination of the neck, oral cavity, and airway. Palpate the floor of mouth—concerning findings are swelling and firm edema; if you cannot see the posterior pharyngeal wall due to inability to compress the tongue, this patient is likely to be a difficult intubation. CT scan of the neck with contrast is the gold standard for assessing the extent of the infection and differentiating between cellulitis and abscess formation.[11]

Management

Early assessment of airway patency is critical. Flexible laryngoscopy is helpful to evaluate for airway edema. The astute clinician needs to be prepared for intubation or emergency tracheostomy if there are signs of impending airway compromise.[12] Once the airway is deemed secure, prompt initiation of broad-spectrum antibiotics is needed to cover common pathogens. If an abscess is identified on imaging, surgical drainage is necessary. Cellulitis without a defined abscess can be managed with comprehensive medical management and close follow-up with low threshold for reimaging. Consultation with a dentist or oral surgeon for evaluation and management is important to remove the source of infection (eg, extraction of affected teeth).[13] With prompt recognition and treatment, the prognosis for Ludwig's angina is generally good. However, delayed treatment can result in severe complications and higher morbidity and mortality rates.

PEARL

A diagnosis of Ludwig's angina by definition is *bilateral* involvement of the sublingual, submandibular, and submental spaces and is an airway emergency. Untreated cases can result in airway compromise within a matter of minutes to hours.

NECROTIZING FASCIITIS

Necrotizing fasciitis (NF) is a rapidly progressing, severe soft tissue infection characterized by the destruction of fascial planes and subcutaneous tissues. It is often associated with systemic toxicity and leads to significant morbidity and mortality if not diagnosed and treated promptly.

Etiology

NF is typically polymicrobial, involving a mix of aerobic and anaerobic, gas producing bacteria. Common pathogens include *S pyogenes*, *S aureus* (including MRSA),

Escherichia coli, *Klebsiella* sp, *Bacteroides*, or *Clostridium* sp.[14] Risk factors include diabetes mellitus, immunosuppression (eg, chemotherapy), chronic kidney disease, recent surgery, trauma or injections in the neck, and obesity.

Pathophysiology

NF typically begins in the subcutaneous tissue and spreads along fascial planes, leading to tissue necrosis. Bacteria release toxins that destroy tissue and cause an inflammatory response. Injury to blood vessels causes ischemia and exacerbates tissue necrosis. The infection may arise from a cutaneous source, dental infections, or oropharyngeal infections, often following trauma or surgical procedures.

Clinical Presentation

Initial symptoms are characterized by the rapid onset of pain, often disproportionate to physical findings. This may be accompanied by localized swelling and erythema in the neck, as well as fever, chills, and malaise. As symptoms progress, there will be increased swelling and tenderness, development of crepitus, fluctuance, or induration over the affected area, and skin changes, such as blisters or necrosis. Systemic signs, such as tachycardia, hypotension, and altered mental status, may develop.

Diagnosis

Diagnosis is often made clinically based on history and physical examination; high suspicion is necessary given the rapid progression of the disease. Imaging with ultrasound can be useful for assessing fluid collections and abscess formation and to guide drainage. CT scan of the neck with IV contrast is the gold standard for evaluating the extent of infection and distinguishing between cellulitis and NF. Soft-tissue air along fascial planes is the most specific finding for NF and suggests the presence of gas-producing bacteria. Blood cultures may be performed, although they are often negative. White blood cell count and serum lactate levels can be elevated, indicating sepsis.

Management

Treatment requires urgent surgical debridement. This is critical to remove necrotic tissue and source of infection. The patient often requires multiple surgeries to achieve adequate debridement. Additionally, empiric broad-spectrum intravenous antibiotics are initiated as soon as possible. Common regimens include piperacillin-tazobactam and vancomycin (for MRSA coverage) or clindamycin and ciprofloxacin or ceftriaxone (especially if polymicrobial). Modification of antibiotics is based on culture results and clinical response.[14] The patient may also require fluid resuscitation and hemodynamic support for septic shock. Monitoring in an intensive care setting is often required. Local complications include loss of skin and soft tissue and/or scarring and functional impairment of the neck structures. Systemic complications include sepsis leading to multiorgan failure or death if not promptly treated (mortality rates can be as high as 30%–50%).[15] The extent of tissue involvement and patient comorbidities are critical factors influencing prognosis.

PEARL

All cases of NF require inpatient management for surgical debridement and intravenous antibiotic therapy.

ACUTE PAROTITIS

Parotitis is inflammation of the parotid gland, the largest salivary gland, located anterior to the ear and extending to the angle of the jaw. It can be acute or chronic, infectious or noninfectious, and can lead to complications if not managed appropriately.

Anatomy and Physiology

The parotid glands are located bilaterally, with the duct (Stensen's duct) opening into the oral cavity near the second maxillary molar. The parotid gland produces saliva, which aids in digestion and oral health.

Etiology

Viral causes of parotitis include mumps (classic cause, now less common due to vaccination), coxsackie virus, cytomegalovirus, Epstein-Barr virus. Bacterial causes include *S aureus*, *Streptococcus pneumoniae*, and *H influenza*.[16] Risk factors for parotitis include dehydration, reduced salivary flow from a sialolith (stone), prolonged period without oral intake (in a hospitalized patient or patients who obtain nutrition via means other than oral intake), and poor oral hygiene.

Clinical Presentation

Patients typically present with swelling and tenderness over the parotid gland, often unilateral. Pain may worsen with eating or salivary stimulation. Patients may develop fever and systemic signs of infection, which can be more pronounced in elderly patients. Laboratory workup often reveals elevated white blood cell count and inflammatory markers. Patients may also complain of foul taste secondary to purulent discharge from the duct in bacterial infections, which can often be visualized on examination with massage of the gland. This purulence should be cultured to direct antibiotic therapy if possible.

Diagnosis

Diagnosis is often based on history and physical examination, focusing on the duration of symptoms and associated factors (eg, recent viral illness, dehydration, poor oral intake). Ultrasound is often first-line imaging to evaluate for sialolithiasis or abscess formation, but CT scan of the neck with IV contrast can provide more detailed information about gland structure and complications (**Fig. 6**).[17] Blood cultures may be performed in severe cases or when systemic infection is suspected. Additionally, viral cultures or polymerase chain reaction (PCR) for specific viral pathogens can be obtained if mumps or other viral etiologies are suspected.

Management

Treatment consists of general supportive care with PO hydration, analgesia, warm compresses to the affected area that help with pain relief and promote drainage, and lastly sialogogues (lemon drops) that stimulate salivation and relieve stasis. In addition, antibiotics are indicated for bacterial parotitis (eg, methicillin-sensitive *S aureus*). Common regimens include ampicillin/sulbactam or clindamycin for severe cases. In patients allergic to penicillin, clindamycin or levofloxacin is considered. Abscess formation may require drainage. If possible, incision and drainage are avoided due to the risk of facial nerve damage, and more conservative measures such as needle aspiration can be employed. Antivirals are generally not needed for cases of viral parotitis. In the event of an obstructing sialolith, if conservative measures fail, surgical removal of the stone is required.[17] Complications of parotitis include abscess or fistula formation, systemic spread of infection, or chronic dysfunction of the gland.

Fig. 6. Right parotitis with associated abscess.

PEARL

Parotitis is commonly seen in elderly patients and as a complication of prolonged hospitalization or nursing home residence. Management can proceed on an outpatient basis once patients can tolerate oral antibiotic therapy, maintain adequate nutrition, and in cases of prolonged hospitalization, the principal problem has been resolved.

SUMMARY

Head and neck abscesses commonly result from the spread of oropharyngeal or dental infections. These abscesses can occur in various anatomic spaces, including peritonsillar, retropharyngeal, submandibular, and parapharyngeal regions. Common pathogens include *Streptococcus* sp, *S aureus*, including MRSA, and anaerobic bacteria, which often complicate abscess formation due to their ability to thrive in anaerobic environments. The presentation typically includes fever, localized pain, swelling, and dysphagia, though the severity and symptoms depend on the abscess location.

Prompt identification and management of head and neck abscesses are critical to prevent life-threatening complications such as airway obstruction, sepsis, and further deep tissue spread. Diagnosis is generally made through clinical examination and imaging studies, with contrast-enhanced CT being the gold standard. Treatment involves drainage, which may be achieved through needle aspiration or surgical incision, along with appropriate antibiotic therapy targeting the responsible pathogens. In severe cases, additional measures such as multisystem supportive care, airway management, and further surgical intervention may be required. Given the anatomic complexity and risk of progression, a multidisciplinary approach, involving internal medicine hospitalists and/or intensivists, otolaryngologists, oral surgeons, radiologists, and infectious disease specialists, is often necessary for optimal outcomes.

CLINICS CARE POINTS

- Most abscesses require surgical drainage with cultures and antibiotic therapy directed toward the offending organism.
- Immunosuppression (eg, diabetes) is a risk factor for infections of the head and neck.
- Ludwig's angina is an airway emergency. Early recognition and establishment of a secure airway is important to improve patient outcomes.
- Necrotizing fasciitis is a surgical emergency. Immediate surgical intervention is needed for source control and to decrease the risk of life-threatening complications of sepsis.
- Parotitis is most often treated with supportive management including hydration, sialogogues, warm compress, gland massage, and antibiotic therapy.

DISCLOSURES

The authors have nothing to disclose.

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