

# Space Infections And Spread Of Oral Infections-A

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## **ABSTRACT:**

*Severe infections of the head and neck region may lead to life threatening complications. The infections of the odontogenic and upper airway origin may spread to fascial planes and led to space infection. The morbidities and fatalities from these infections have reduced to a large extent with the advent of modern antibiotics. However early diagnosis plays an important role in preventing the lethal complications. The aim of this review article is to discuss the etiology, manifestations and management of space infections.*

**KEYWORDS:** space infection, odontogenic infections, fascial planes

## **INTRODUCTION:**

Head and neck space infections are simply defined as infections that spread along the fascial planes and spaces of the head and neck. They can be divided into superficial and deep neck space infections<sup>(1)</sup> may extend to potential spaces formed by fascial planes of the lower head and upper cervical area. Spread of infection can be directly through lymphatic or hematogenous route and depends on the patient's local and systemic factors and on the virulence of the pathogen<sup>(2)</sup>. Complications include airway obstruction, mediastinitis, necrotizing fasciitis, cavernous sinus thrombosis, sepsis, thoracic empyema, Lemierre's syndrome, cerebral abscess, orbital abscess and osteomyelitis

Superficial neck space infections are usually easy to treat. In contrast, deep neck space infections (DNSI) are difficult to diagnose early. Even in the modern antibiotic era, life-threatening complications, such as airway obstruction, mediastinitis, necrotizing fasciitis, cavernous sinus thrombosis (CST), sepsis, thoracic empyema, cerebral abscess, and osteomyelitis have to be diagnosed early to avoid fatal complications<sup>(3)</sup>.

## **SPREAD OF ORAL INFECTIONS:**

The superficial fascia extends from the head and neck to the thorax, shoulders, and axilla. Deep to the superficial fascia lies the deep cervical fascia made of three layers: Superficial, middle, and deep layer.

- The submandibular and sublingual spaces communicate around posterior border of mylohyoid. Edema and swelling of this space will cause superior and posterior displacement of the floor of the mouth and tongue causing airway compromise
- The parapharyngeal space has the shape of a cone with its base facing the skull and communication with the brain can result in a cerebral abscess<sup>(4)</sup>
- The pre tracheal space lies anterior to the trachea, and it descends into the anterior mediastinum. This is a very uncommon route of spread of infection and account for only 7% of cases. <sup>(5)</sup>
- The retropharyngeal space abscess can reach the mediastinum causing mediastinitis and more rarely, pericarditis. About 70% of cervical infections extend into the mediastinum via retropharyngeal space<sup>(6-8)</sup>
- Danger space: Anterior to the vertebral bodies, the prevertebral fascia divides into the alar fascia (anterior) and the true prevertebral fascia (posterior). Between these fascial layers is a potential space called the "danger space"<sup>(9,10)</sup>

## **PRE-DISPOSING FACTORS:**

- Poor oral hygiene

- Advancing age
- Tobacco use
- Sugar-rich diet (dental caries)
- Hormonal effects, such as puberty, menstruation, and pregnancy (periodontal disease)
- Underlying systematic disease (i.e., diabetes mellitus, rheumatoid arthritis, steroids, neutropenia).

The predisposing factors for these infections are commonly the dental caries and periodontal infections that have extended beyond the alveolar bone to involve the fascial spaces around face and oral cavity. These infections tend to spread along planes of least resistance from the supporting structures of the affected tooth. In the maxilla, the alveolar bone is weakest on the buccal side throughout. In the mandible, the alveolar bone is weakest in the lingual aspect posteriorly affecting the molar teeth, and on the buccal side more anteriorly involving the incisors and canine teeth. Thus, location of the affected tooth predicts the route of spread and which orofacial spaces become infected.

## SYMPTOMS AND FINDINGS

Major symptoms include:

- antecedent toothache
- facial swelling and pain
- fever and chills
- halitosis
- bleeding gums with minor trauma

Prominent physical findings include:

- dental plaques, tooth decay (caries), gingivitis or periodontal pockets
- facial or neck swelling and tenderness
- inability to open the jaw (trismus)
- difficulty in swallowing (dysphagia) dyspnea with inspiratory stridor.

## ASSESSMENT OF PATIENTS WITH SEVERE ODONTOGENIC INFECTION:

Assessment of patients with space infections should mainly focus on the complications such as airway compromise, the spaces involved, the precise etiology of the infection, and identifying sepsis symptoms which may develop if the infection is left untreated. The classic signs of space infections should be looked for in the cases. A sublingual space infection shows a sign of interfered articulation of sounds as the tongue gets elevated. A retropharyngeal or lateral pharyngeal space abscess can result in muffling of the voice. An impending airway collapse should be suspected if the patient is sitting in a sniffing position, drooling, and the use of accessory muscles of respiration. Pterygomandibular space or lateral pharyngeal space infection can deviate the uvula to the opposite side. Patients with trismus and an interincisal opening of <30 mm correlates with difficulties in endotracheal intubation.<sup>[11]</sup>

## INVESTIGATIONS:

An orthopantomogram is a useful radiograph in identifying dental sources of infection.<sup>[12]</sup> An important diagnostic tool is a posteroanterior and lateral view radiograph of the neck and chest. These can show gas in the tissues, loss of the normal cervical spine lordosis, and mediastinal widening.

MRI has been shown to be superior to CT in the initial evaluation of deep space infection, but may not be practical in an emergency setting.<sup>[13]</sup> Laboratory investigations will include blood investigations like blood count, serum glucose, electrolytes, coagulation screen, blood cultures, and an arterial blood gas. If the pus is accessible it can be drained and sent for culture sensitivity.<sup>[14]</sup>

## CLINICAL MANIFESTATIONS OF SPECIFIC ODONTOGENIC OROFACIAL SPACE INFECTIONS

The local anatomic barriers of bone, muscle, and fascia predetermine the routes of spread, extent, and clinical manifestations of many orofacial infections of odontogenic origin.

- If pus perforates through either the maxillary or mandibular buccal plate inside the attachment of the buccinator muscle, infection will be intraoral; if the perforation is outside this muscle attachment, infection will be extraoral. Thus, infection of the upper and lower molars, lower incisors, and lower canine teeth is often accompanied by extraoral manifestations.
- When a mandibular infection perforates lingually, it presents in the sublingual space if the apices of the involved teeth lie above the attachment of the mylohyoid muscle (e.g., mandibular incisor, canines, premolars, and first molars) and in the submandibular space if below the attachment of the muscle (e.g., the second and third molars)
- Other superficial odontogenic orofacial space infections include the buccal, submental, masticator, canine, and intratemporal spaces.

Unique clinical presentations of superficial odontogenic orofacial space infections include:

- **Buccal space infections** – These arise primarily from mandibular or maxillary bicuspid or molar teeth, the apices of which lie outside of the buccinator muscle attachments. They are readily diagnosed because of marked cheek swelling but with minimal trismus or systemic symptoms.
- **Canine space infections** – These originate from the maxillary incisors and canines and manifest as dramatic swelling of the upper lip, canine fossa, and frequently the periorbital tissues. Pain is usually moderate, and systemic signs are minimal. Occasionally, direct extension of infection into the adjoining antrum leads to purulent maxillary sinusitis.
- **Submental space infections** – These originate from a mandibular incisor that perforates below the mentalis muscle. The chin appears grossly swollen and is firm and erythematous.
- **Masticator space infections** – These infections typically originate from the third molar tooth to involve the masticator spaces consisting of the masseteric, pterygoid, and temporal space components. These spaces intercommunicate with each other, as well as the buccal and deeper peripharyngeal fascial spaces.
- The clinical hallmark of infection is trismus with pain in the area of the body or ramus of the mandible. Swelling may not be prominent since the infection is beneath large muscle masses. When present, swelling tends to be brawny and indurated, suggesting the possibility of cervicofacial actinomycosis or mandibular osteomyelitis.
- **Temporal space infections** – These infections typically originate from the posterior maxillary molar teeth. Swelling may be limited to the preauricular region and an area over the zygomatic arch. As infection progresses, the cheek, eyelids, and whole side of the face may be involved. Infection may extend directly into the orbit via the inferior orbital fissure and produce proptosis, optic neuritis, and abducens nerve palsy.
- **Infratemporal space infections** – An infratemporal space infection usually originates from the third maxillary molar tooth. Clinically, marked trismus and pain are present, but very little swelling is observed early in the course. Late manifestations are similar to those of temporal space infections, including extension into the orbit through the inferior orbital fissure. Infection may also extend internally to involve an area close to the lateral pharyngeal wall, resulting in dysphagia.

## COMPLICATIONS OF SPACE INFECTIONS:

### Respiratory Obstruction

This is another most concerning complication of odontogenic infections<sup>[15-17]</sup>. Odontogenic infection may involve the spaces and lead to airway obstruction. Respiratory obstruction may be due to swelling of floor of mouth, trismus, edema, and abscess formation leading to narrowing and eventually to the loss of airway. Epiglottitis, peritonsillar abscess, and retropharyngeal abscess may also lead to respiratory obstruction.

### **Cavernous Sinus Thrombosis**

Septic CST is a rare condition<sup>[18,19]</sup>. Seven percent of all cases of thrombosis of the cavernous sinus are of dental origin. Organisms may reach the cavernous sinus from the face by an anterograde route along ophthalmic veins connected to angular veins, or by a retrograde route along emissary veins connected to the pterygoid venous plexus. Contrast enhanced CT scan is useful in revealing the source of infection. If the diagnosis is not made at the right time it can become fatal in 4-7 days. Management is done with broad spectrum antibiotics and surgical intervention.

### **CONCLUSION:**

Head and neck space infections if not diagnosed early may become life threatening. The infections of these spaces exert fatal effect by causing local airway obstruction or extension to vital areas, such as the mediastinum or carotid sheath. Though the development of stronger antibiotics and availability of dental care have reduced the fatalities and shown dramatic improvement in treating these infections there still remains a factor of risk in association with the space infections. The attention to airway maintenance, appropriate antibiotic therapy, and judicious surgical intervention enable the health care professions to continue their remarkable progress in treating these once-dreaded infections. The general practitioners also play a very important role in diagnosing the classic signs of space infections early so that the further complications may be avoided.

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