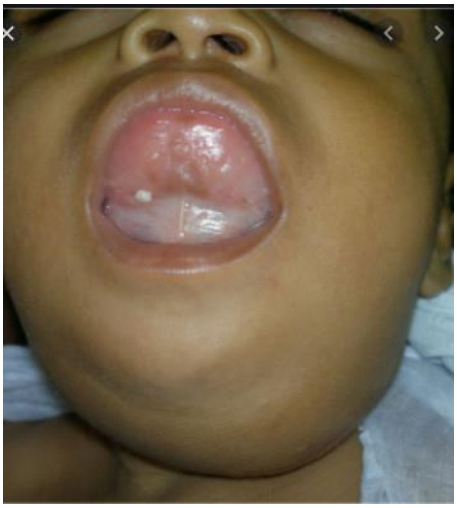
odontogenic infection

In dentistry, one of the most difficult problems to manage is an **odontogenic infection**.

Odontogenic infections arise from teeth and have a characteristic flora. Caries, periodontal disease, and pulpitis are the initiating infections, that can spread beyond teeth to the alveolar process and to the deeper tissues of the face, oral cavity, head, and neck. These infections may range from low-grade, well-localized infections that require only minimal treatment to severe, life threatening deep fascial space infections.

Although the overwhelming majority of odontogenic infections are readily managed by minor surgical procedures and supportive medical therapy that includes **antibiotic administration**, the practitioner must constantly bear in mind that these infections occasionally become severe and **life threatening** .



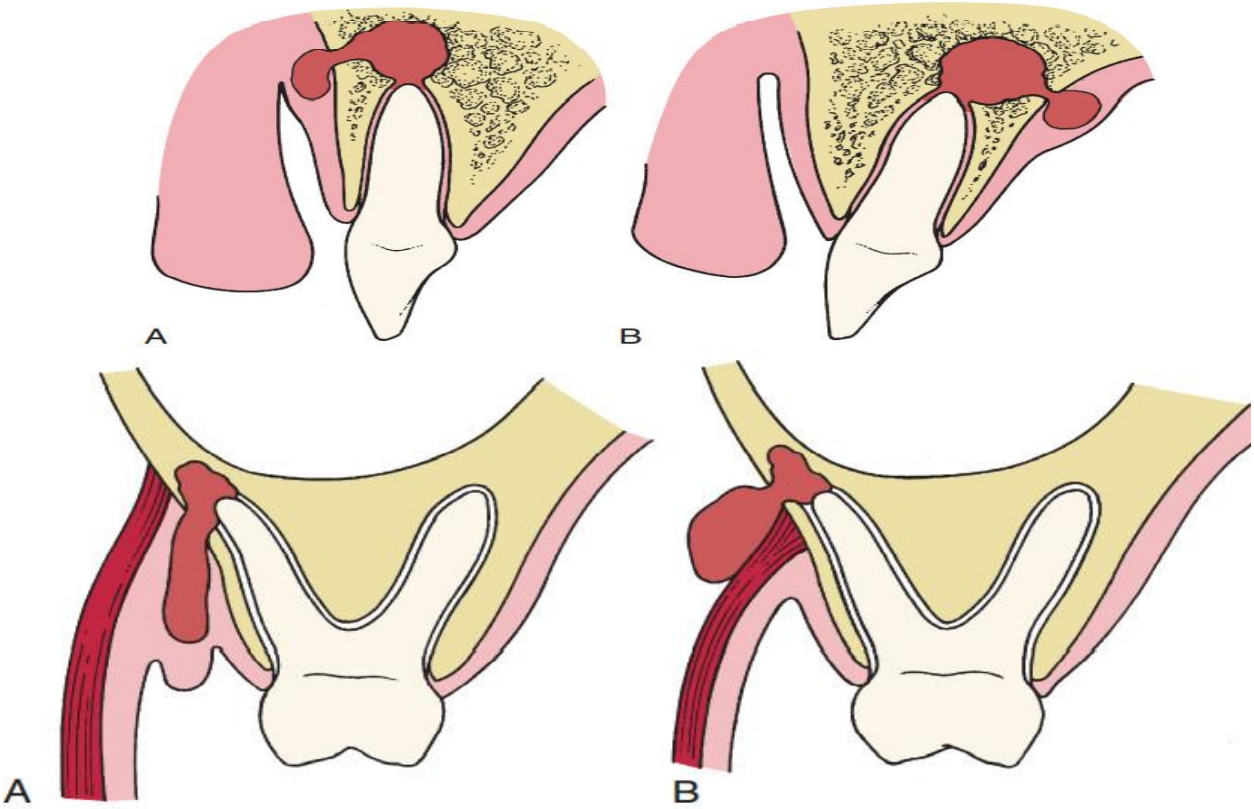
odontogenic infections seem to pass through four stages. In the first 3 days of symptoms, a soft, mildly tender, doughy swelling represents the **inoculation stage**, in which the invading streptococci are just beginning to colonize the host. After 3 to 5 days, the swelling becomes hard, red, and acutely tender as the infecting mixed flora stimulates the intense inflammatory response of the **cellulitis stage**. At 5 to 7 days after the onset of swelling, the anaerobes begin to

predominate, causing a liquefied abscess in the center of the swollen area. This is the **abscess stage**. Finally, when the abscess drains spontaneously through skin or mucosa, or it is surgically drained, the resolution stage begins as the immune system destroys the infecting bacteria, and the processes of healing and repair ensue.

Odontogenic infections have two major origins: (1) periapical, as a result of pulpal necrosis and subsequent bacterial invasion into the periapical tissue, and (2) periodontal, as a result of a deep periodontal pocket that allows inoculation of bacteria into the underlying soft tissues. Of these two, the periapical origin is the most common in odontogenic infections

Necrosis of the dental pulp as a result of deep caries allows a pathway for bacteria to enter the periapical tissues. Once this tissue has become inoculated with bacteria and an active infection is established, the infection spreads equally in all directions, but preferentially along the lines **of least resistance**. The infection spreads through the cancellous bone until it encounters a cortical plate. If this cortical plate is thin, the infection erodes through the bone and enters the surrounding soft tissues

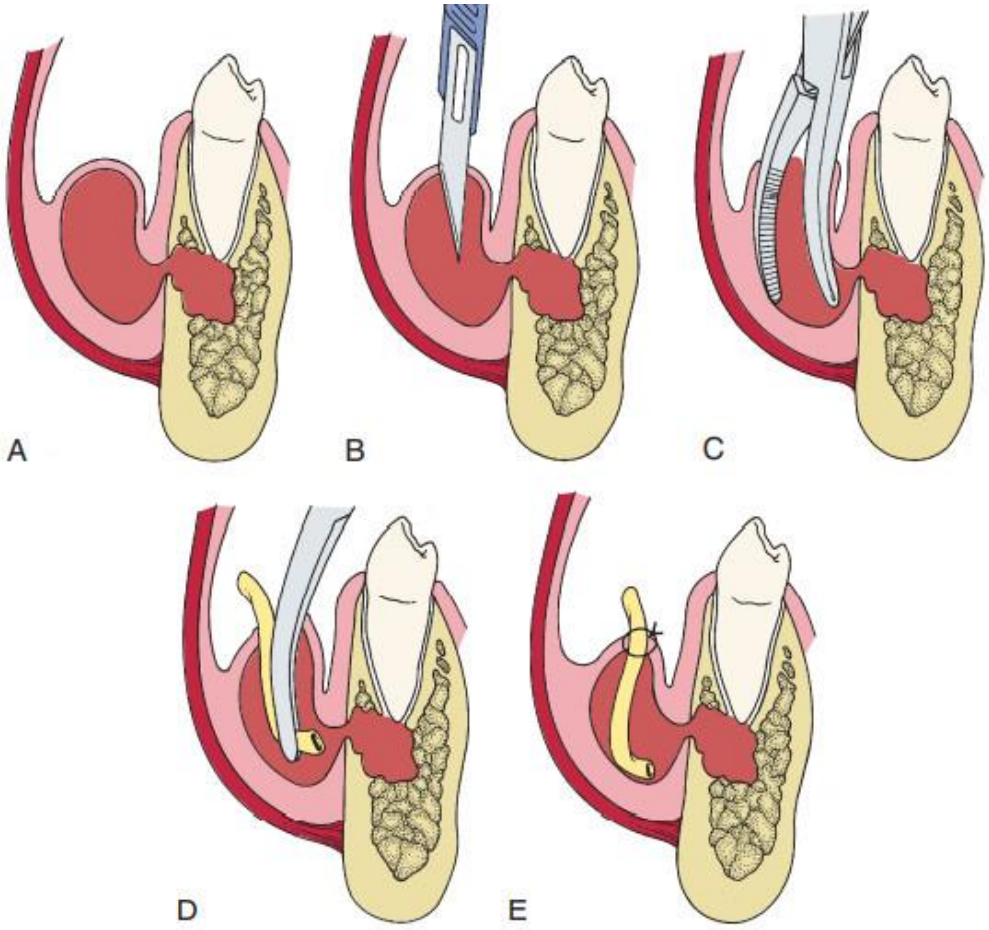
When the infection erodes through the cortical plate of the alveolar process, it spreads into predictable anatomic locations. The location of the infection arising from a specific tooth is determined by the following two major factors: (1) the thickness of the bone overlying the apex of the tooth and (2) the relationship of the site of perforation of bone to muscle attachments of the maxilla and mandible



The most common odontogenic deep fascial space infection is a vestibular space abscess

After the physical examination, the practitioner should begin to have a sense of the stage of the presenting infection. Very soft, mildly tender, edematous swellings indicate the **inoculation** stage, whereas an indurated swelling indicates the **cellulitis** stage and central fluctuance indicates an **abscess**. Soft tissue infections in the inoculation stage may be cured by removal of the odontogenic cause, with or without supportive antibiotics; infections in the cellulitis or abscess stages require removal of the dental cause of infection plus incision and drainage and antibiotics.

Treat Infection Surgically



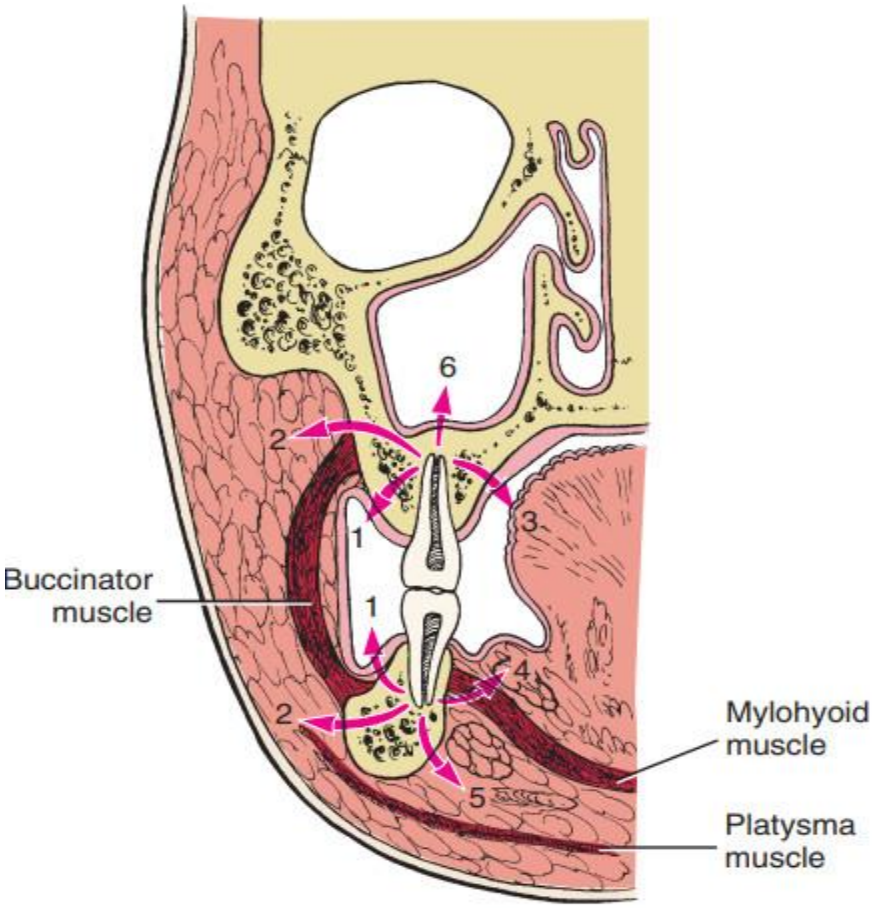
, Periapical infection of lower premolar extends through buccal plate and creates sizable vestibular abscess. B, Abscess is incised with No. 11 blade. C, Beaks of hemostat are inserted through incision and opened so that beaks spread to break up any loculations of pus that may exist in abscessed tissue. D, A small drain is inserted to depths of abscess cavity with a hemostat. E, The drain is sutured into place with a single black silk suture

DEEP FASCIAL SPACE INFECTIONS

fascial spaces are fascia-lined tissue compartments filled with loose, areolar connective tissue that can become inflamed when invaded by microorganisms. The resulting process of inflammation passes through stages that are seen clinically as edema (inoculation), cellulitis, and abscess.

Infections arising from maxillary teeth also tend to spread into the infraorbital, palatal, orbital, and infratemporal spaces, and the maxillary sinus.

Mandibular dental infections also tend to spread into the submandibular, sublingual, submental, and masticator spaces.



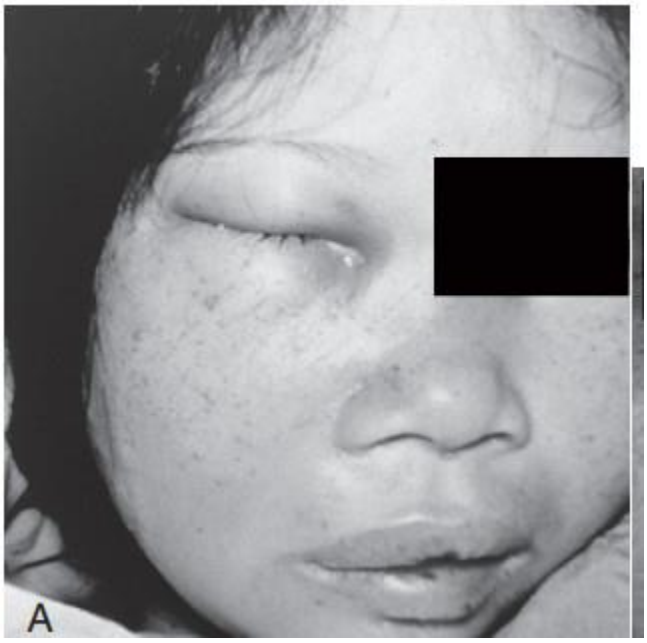
As infection erodes through bone, it can express itself in a variety of places, depending on thickness of overlying bone and relationship of muscle attachments to site of perforation. This illustration notes six possible locations: vestibular abscess (1), buccal space (2), palatal abscess (3), sublingual space (4), submandibular space (5), and maxillary sinus (6).

Infections Arising from Maxillary Teeth

1-The infraorbital space

The infraorbital space is a thin potential space between the **levator anguli oris** and the **levator labii superioris muscles**. The infraorbital space becomes involved primarily as the result of infections from the maxillary canine tooth or by extension of infections from the buccal space. The canine root is often sufficiently long to allow erosion to occur through the alveolar bone that is superior to the

origin of the levator anguli oris and below the origin of the levator labii superioris muscle. When this space is infected, swelling of the anterior face obliterates the nasolabial fold.



Infraorbital space abscess that is about to drain medial to the attachment of the levator labii superioris muscle.

Spontaneous drainage of infections of this space commonly occurs near the medial or the lateral canthus of the eye because the path of least resistance is to either side of the levator labii superioris muscle, which attaches along the center of the inferior orbital rim

2-The buccal space

The buccal space is bounded by the overlying skin of the face on the lateral aspect and the buccinator muscle on the medial aspect

A, Buccal space lies between buccinator muscle and overlying skin and superficial fascia. This potential space may become involved via maxillary or mandibular molars (arrows). B, Typical buccal space infection, extending from the level of the zygomatic arch to the inferior border of the mandible and from the oral commissure to the anterior border of the masseter muscle

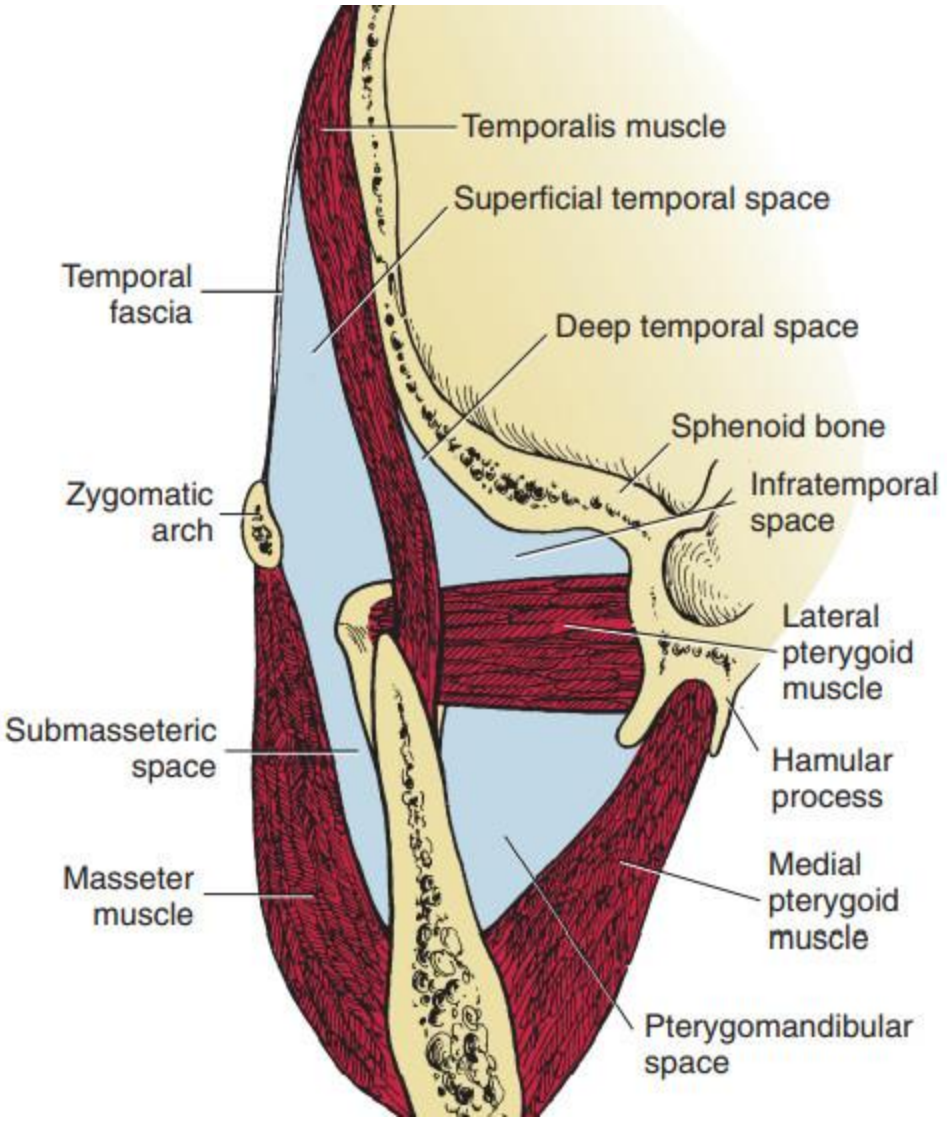
This space may become infected from extensions of infection from maxillary teeth through the bone superior to the attachment of the buccinator on the alveolar process of the maxilla. Posterior maxillary teeth, most commonly molars, cause most buccal space infections.

Involvement of the buccal space usually results in swelling below the zygomatic arch and above the inferior border of the mandible. Infections may follow the extensions of the buccal fat pad into the superficial temporal space, the infratemporal space, the infraorbital space, and the periorbital space.

Buccal space infection that has followed the extensions of the buccal fat pad into the infraorbital, periorbital, and superficial temporal spaces.

3-The infratemporal space

The infratemporal space lies posterior to the maxilla. The space is bounded medially by the lateral pterygoid plate of the sphenoid bone and superiorly by the base of the skull. Laterally and superiorly, the infratemporal space is continuous with the deep temporal space



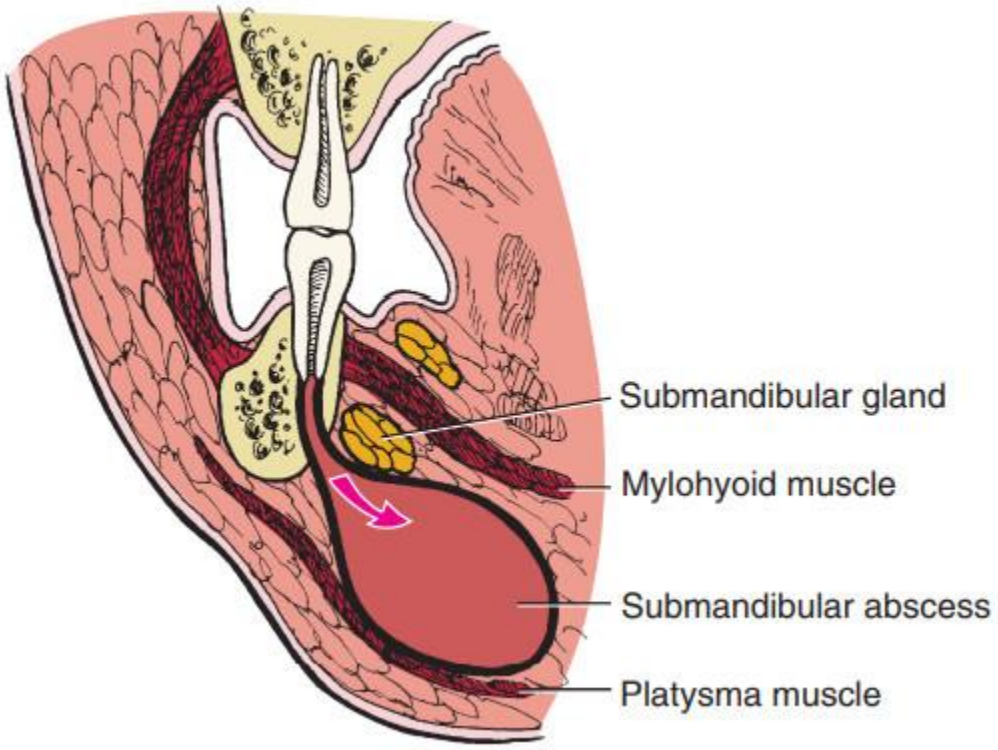
The masticator space is bounded by the fascia overlying the masseter muscle, medial pterygoid muscle, temporalis muscle, and the skull. The superficial and deep temporal spaces are separated from each other by the temporalis muscle. The lateral pterygoid muscle divides the pterygomandibular space from the infratemporal portion of the deep temporal space, and the zygomatic arch divides the submasseteric space from the superficial temporal space.

Infections Arising from Mandibular Teeth

Although many infections arising from mandibular teeth erode into the vestibular space, they may also spread into other deep fascial spaces. Initially, such mandibular infections tend to enter the space of the body of the mandible, the submandibular, sublingual, submental, or masticator spaces. From there, severe infections can spread into the deep fascial spaces of the neck, and even extend into the mediastinum to threaten the heart, lungs, and great vessels.

The sublingual and submandibular spaces have the medial border of the mandible as their lateral boundary. These two spaces are involved primarily by lingual perforation of infection from mandibular molars, although they may be involved by premolars as well.

The factor that determines whether the infection is submandibular or sublingual is the **attachment of the mylohyoid muscle on the mylohyoid ridge of the medial aspect of the mandible.**



If the infection erodes through the medial aspect of the mandible above this line, the infection will be in the sublingual space. This is most commonly seen with

premolars and the first molar. If the infection erodes through the medial aspect of the mandible inferior to the mylohyoid line, the submandibular space will be involved. The mandibular third molar is the tooth that most commonly involves the submandibular space directly. The second molar may involve the sublingual or submandibular space, depending on the length of individual root

Table 17-1 Borders of the Deep Fascial Spaces of the Head and Neck

Space	Anterior	Posterior	Superior	Inferior	Superficial or Medial*	Deep or Lateral†
Buccal	Corner of mouth	Masseter muscle Pterygomandibular space	Maxilla Infraorbital space	Mandible	Subcutaneous tissue and skin	Buccinator muscle
Infraorbital	Nasal cartilages	Buccal space	Quadratus labii superioris muscle	Oral mucosa	Quadratus labii superioris muscle	Levator anguli oris muscle Maxilla
Submandibular	Anterior belly digastric muscle	Posterior belly digastric muscle Stylohyoid muscle Stylopharyngeus muscle	Inferior and medial surfaces of mandible	Digastric tendon	Platysma muscle Investing fascia	Mylohyoid muscle Hyoglossus muscle Superior constrictor muscles
Submental	Inferior border of mandible	Hyoid bone	Mylohyoid muscle	Investing fascia	Investing fascia	Anterior bellies of digastric muscles†
Sublingual	Lingual surface of mandible	Submandibular space	Oral mucosa	Mylohyoid muscle	Muscles of tongue*	Lingual surface of mandible†
Pterygomandibular	Buccal space	Parotid gland	Lateral pterygoid muscle	Inferior border of mandible	Medial pterygoid muscle*	Ascending ramus of mandible†
Submasseteric	Buccal space	Parotid gland	Zygomatic arch	Inferior border of mandible	Ascending ramus of mandible*	Masseter muscle†
Lateral pharyngeal	Superior and middle pharyngeal constrictor	Carotid sheath and scalene fascia	Skull base	Hyoid bone	Pharyngeal constrictors and retropharyngeal	Medial pterygoid muscle†

Table 17-2 Relations of the Deep Fascial Spaces of the Head and Neck

Space	Likely Causes	Contents	Neighboring Spaces	Approach for Incision and Drainage
Buccal	Upper premolars Upper molars	Parotid duct Anterior facial artery and vein	Infraorbital Pterygomandibular	Intraoral (small) Extraoral (large)
	Lower premolars	Transverse facial artery and vein Buccal fat pad	Infratemporal	
Infraorbital	Upper canine	Angular artery and vein Infraorbital nerve	Buccal	Intraoral
Submandibular	Lower molars	Submandibular gland Facial artery and vein Lymph nodes	Sublingual Submental Lateral pharyngeal Buccal	Extraoral
Submental	Lower anterior teeth Fracture of symphysis	Anterior jugular vein Lymph nodes	Submandibular (on either side)	Extraoral
Sublingual	Lower premolars Lower molars Direct trauma	Sublingual glands Wharton's ducts	Submandibular Lateral Pharyngeal	Intraoral Intraoral-extraoral
		Lingual nerve Sublingual artery and vein	Visceral (trachea and esophagus)	
Pterygomandibular	Lower third molars Fracture of angle of mandible	Mandibular division of trigeminal nerve	Buccal	Intraoral
		Inferior alveolar artery and vein	Lateral pharyngeal Submasseteric	Intraoral-extraoral
Submasseteric	Lower third molars Fracture of angle of mandible	Masseteric artery and vein	Buccal	Intraoral
			Pterygomandibular Superficial temporal Parotid	Intraoral-extraoral
Infratemporal and deep temporal	Upper molars	Pterygoid plexus Interior maxillary artery and vein Mandibular division of trigeminal nerve Skull base foramina	Buccal Superficial temporal Inferior petrosal sinus	Intraoral Extraoral Intraoral-extraoral
Superficial temporal	Upper molars Lower molars	Temporal fat pad Temporal branch of facial nerve	Buccal Deep temporal	Intraoral Extraoral Intraoral-extraoral
Lateral pharyngeal	Lower third molars Tonsils Infection in neighboring	Carotid artery Internal jugular vein Vagus nerve	Pterygomandibular Submandibular Sublingual	Intraoral Intraoral-extraoral