

Management Of Odontogenic Infection: A Review

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Abstract:

Background:

Odontogenic infection is one of the most common diseases in oral and maxillofacial region. Odontogenic infections include a wide range of conditions from localized abscess to deep-neck space infections. As oral surgeons, we need to be prepared to deal with any infection-related emergencies varying from toothache, localized vestibular abscess to deep head and neck infections. This review article is aimed to give a comprehensive view about the aetiologies, diagnosis and the management of odontogenic infection.

Keywords: odontogenic infection, management, complication, oral surgery

Introduction:

Odontogenic infections are frequently encountered in the practice of oral and maxillofacial surgery and one of the most common diseases in the oral and maxillofacial region. They often respond to antimicrobial and surgical management. Dentoalveolar infections include a wide range of conditions from localized abscess to deep-neck space infections. As oral surgeons we need to be prepared to deal with any infection-related emergencies varying from toothache, localized vestibular abscess to deep head and neck infections. Management of odontogenic infections are considered to be challenging due to its complex microbiology of the odontogenic infections and potential for advancement to a life-threatening emergency. It is essential and important that the oral and maxillofacial surgeon to possess the knowledge of anatomic boundaries and fascial spaces for accurate diagnosis and perform prompt surgical management. Patients with odontogenic infections may have high chances of morbidity and mortality if not treated on time. Complications of severe odontogenic infections can include airway obstruction, mediastinitis, necrotizing fasciitis, Cavernous Sinus Thrombosis (CST) pulmonary complications (such as pleural effusion and thoracic emphysema), sepsis, hypoxia, cardiac arrest and death. Dentoalveolar infections are associated with a mortality rate of 10-40%; with the advent of modern antibiotics, mortality rates have been reduced significantly. Odontogenic infections arise either from dental caries or from periodontal infections that may have extended beyond the alveolar bone to involve the fascial spaces around the face and oral cavity. These odontogenic infections may vary from low grade, well-localized infections that require only minimal treatment, to severe, life threatening deep facial space infections. Most of the odontogenic infections can be managed by minor surgical procedures and supportive medical therapy that includes antibiotic administration. The practitioner must constantly remember that these infections can occasionally become severe and life threatening in a short period time.

Microbiology of odontogenic infections:

Bacteria that cause odontogenic infections are part of normal flora – aerobic gram-positive cocci; anaerobic gram-positive cocci; anaerobic gram-negative rods. Predominant aerobic bacteria in OI are *S. anginosus*; *S. intermedius*; *S. constellatus*.

4 stage of odontogenic infections:

- 1- Inoculation stage-1st 3 days-soft mildly tender doughy swelling (invading *Streptococci*)

- 2- Cellulitis stage-after 3-5 days-swelling becomes hard, red, acutely tender (mixed flora)
- 3- Abscess stage-5-7 days- liquefied abscess in the center of swelling (anaerobic microorganisms begin to predominate)
- 4- Resolution stage - spontaneous or surgical drainage of abscess -destruction of bacteria by immune system - healing

HISTORY OF PROGRESSION OF ODONTOGENIC INFECTIONS:

Odontogenic infections have two major origins:

- 1) Periapical: It is the most common origin. Occurs as a result of pulpal necrosis and subsequent bacterial invasion into the periapical tissues
- 2) Periodontal origin – inoculation of bacteria in the deep periodontal pocket.

When odontogenic infection erodes through the cortical plate of the alveolar process, the infection spreads into the predictable anatomic locations. The location of the odontogenic infection arising from a specific tooth is determined by the following two major factors:

- 1) The thickness of the bone present above the apex of the tooth
- 2) The relationship of the site of perforation of bone to muscle attachment of the maxilla and the mandible.

Factors influencing the spread of infection:

- Thickness of bone adjacent to the offending tooth
- Position of muscle attached in relation to root tip
- Virulence of the organism
- Status of patient's immune system

Predisposing factors such as alcoholism, uncontrolled diabetes mellitus (DM), and multiple underlying medical conditions have been reported to increase the risk of infections.

Anatomical location is graded in severity by the level to which the airway and other vital structures are threatened:

- Low: buccal, vestibular, subperiosteal
- Moderate: masticator space
- Severe: lateral pharyngeal, retropharyngeal space.

Principles of therapy of odontogenic infections:

Management of odontogenic infections:

Depends on the following factors-

- Severity of infection: By monitoring the rate of progression
- Checking for potential for airway compromise or affecting vital organs
- Anatomic location of infection
- History:
 - Duration of infectious process
 - Sequence of events and changes in symptoms/signs.
 - Antibiotics prescribed, dosages and responses
 - Review of systems with emphasis on neuro-ophthalmologic and cardiopulmonary and immune systems

1. Determining the severity of the infection:
 - Assess the history of onset and progression perform physical examination of area:
 - Determine character and size of swelling
 - Establish presence of trismus.
2. Evaluate the host defense- evaluate diseases that compromise the host, medications that may compromise the host
3. Decide on setting of care- The presence of any of the following criteria can justify hospital admission of infected patient:
 - Fever over 101⁰F
 - Dehydration
 - Impending airway compromise
 - Threat to vital structures
 - Infection of deep cervical spaces or the masticatory space
 - Need for general anesthesia
 - Need for inpatient control of systemic disease
4. Treat surgically
5. Support medically
6. Choose and prescribe antibiotics appropriately
7. Follow up

Facial spaces involved:

Primary spaces are spaces directly adjacent to the origin of the odontogenic infections. Infections spread from the odontogenic origin into these spaces, which are:

- Vestibular
- Canine
- Buccal
- Submental
- Sublingual
- Submandibular

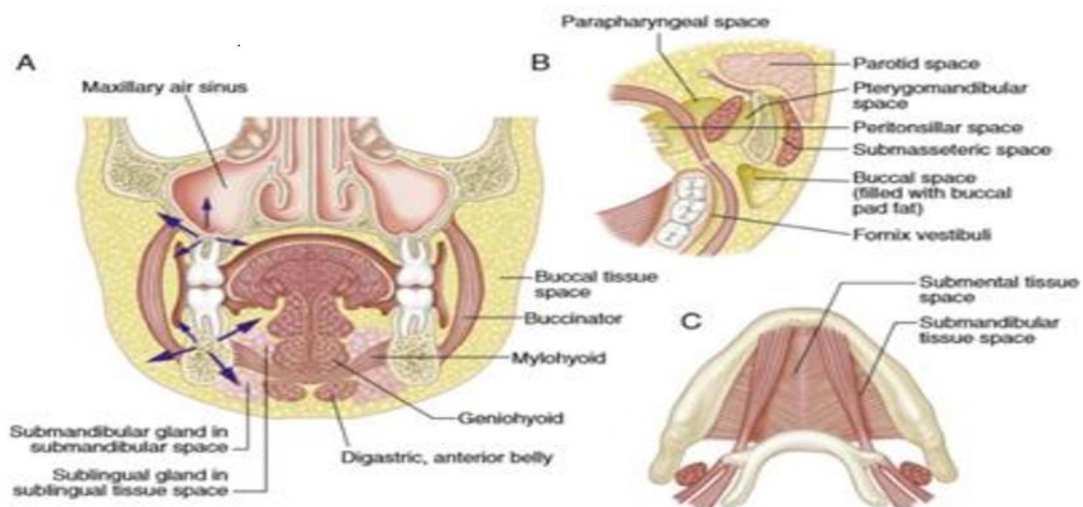
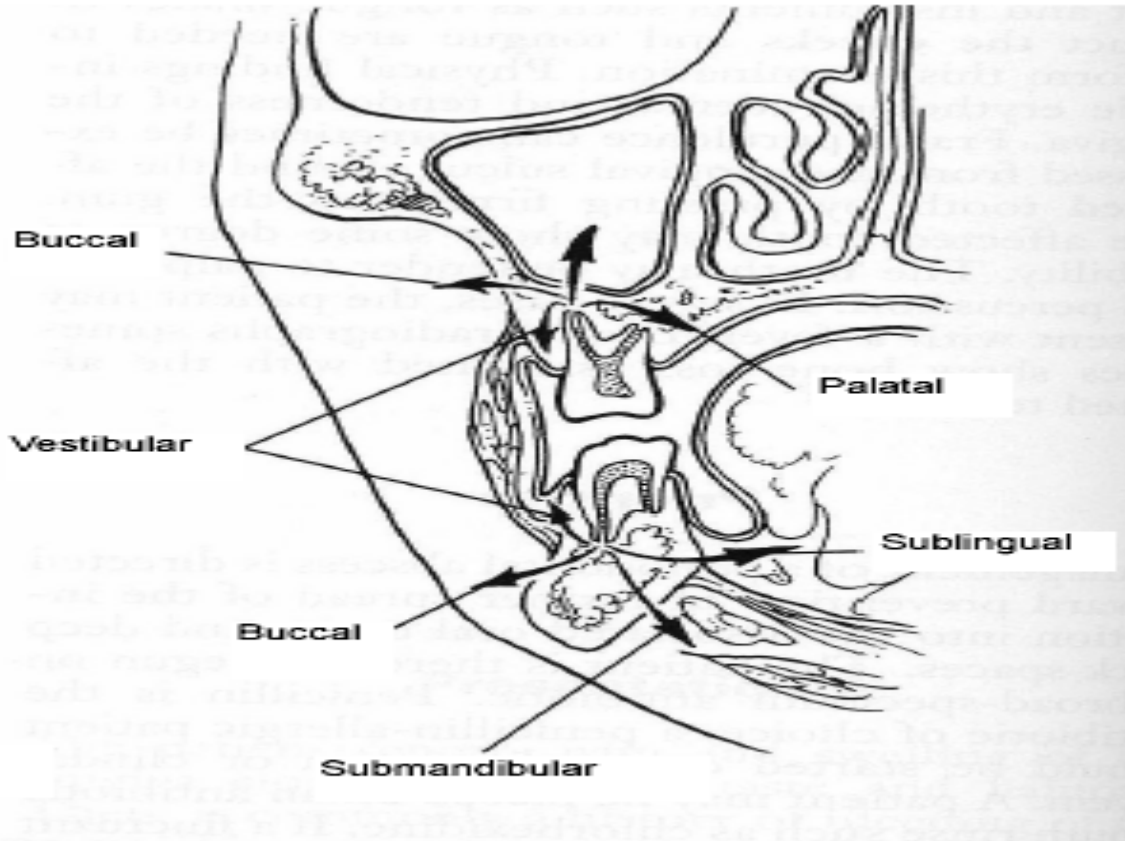
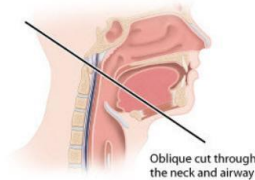


Figure 1: Primary Facial Spaces



Route of infection into the buccal space, vestibular spaces, submandibular space, sublingual space, and palatal space. Reprinted with permission from Eisele D, McQuone S. *Emergencies of the Head and Neck*. Mosby; 2000: figure 16-2.

Sagittal section through neck



The *Fascial Spaces* seen as a transverse section cut at an oblique angle.

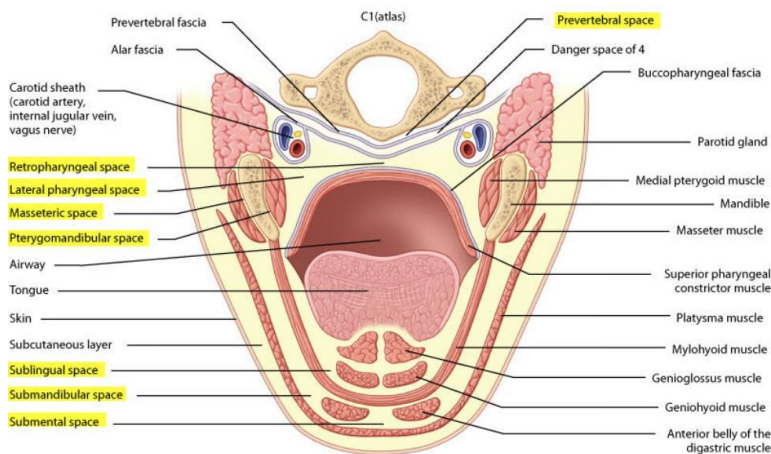


Figure 2: Primary and secondary fascial spaces

Secondary facial spaces are Facial spaces that become involved following the spread of infection from the primary spaces:

- Pterygomandibular
- Masseteric
- Superficial and deep temporal spaces
- Infratemporal
- Lateral pharyngeal
- Retropharyngeal (can lead directly into mediastinum)
- Prevertebral

INCISION AND DRAINAGE:

- The production of laudable pus by mucosal incision, extraction, endodontic access, periodontal curettage, incise in healthy skin, incise in gravity - dependent, esthetic area if possible.

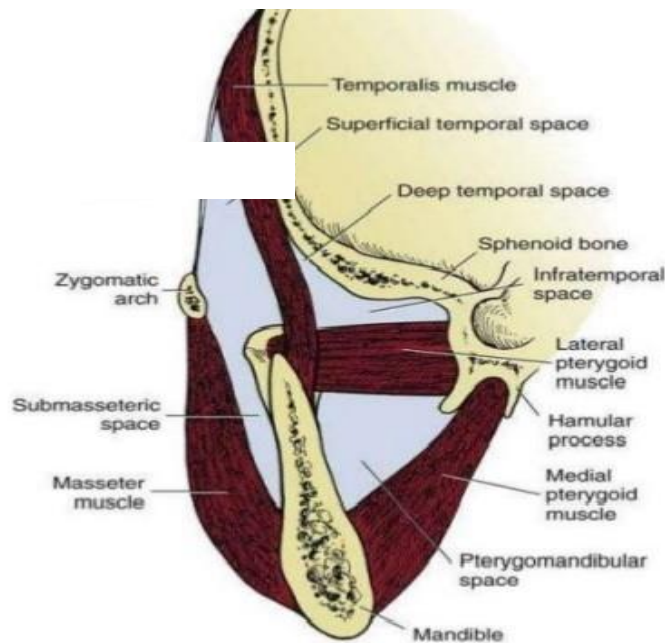
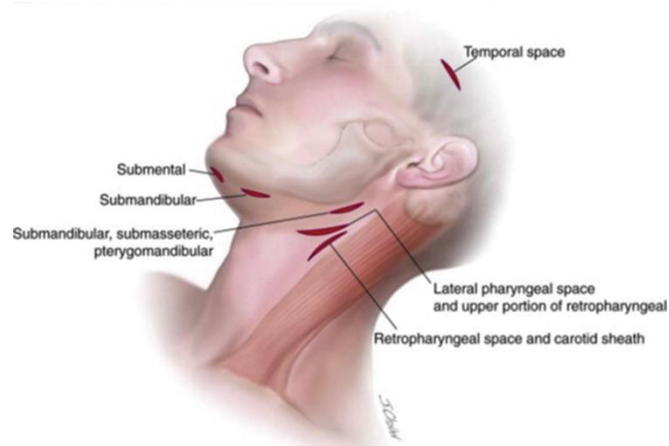
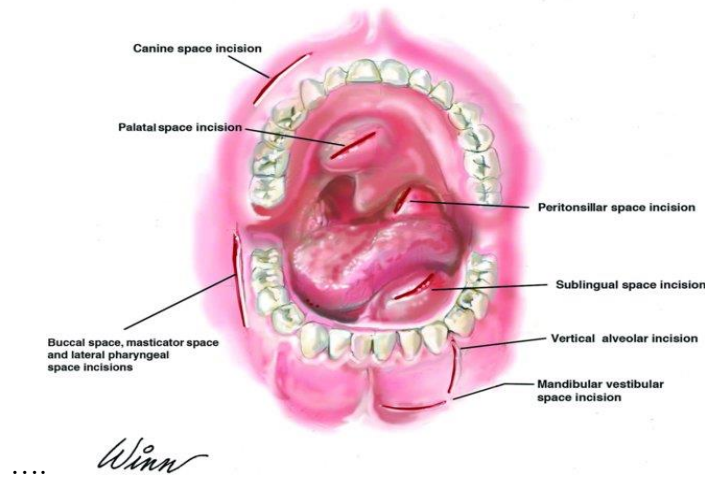


Figure 3: Secondary Facial Spaces; Pic. Courtesy: Dr. Weam Mahmoud Faroun



Intraoral Incisions

- Explore the entire abscess cavity
- Placement of non-absorbable drains as and when required. Latex Penrose drains are best used unmodified.
- Drained wounds to be cleansed frequently
- Bacteria may migrate into wound along the drain surface- hence, drains must be cleaned frequently
- Indications for culture:
 - Presence of non-resolving infection in spite of appropriate care
 - Atypical flora expected long term antibiotic treatment; age extremes (<2 years or >65 years of age)
 - Patients with malignancies
 - Infections with systemic involvement
 - Immunocompromised or myelosuppressed patients

Empirical therapy: Involves administration of one or a combination of a few of the following drugs-

- Amoxicillin
- Clindamycin
- Cephalexin
- Azithromycin
- Metronidazole
- Moxifloxacin

Conclusion:

Odontogenic infections are seen in our daily practice. As oral and maxillofacial surgeons, we need to use a disciplined approach to prevent and appropriately manage these infections. we should also become part of the solution to antibiotic resistance and prescribe only when needed.

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