Infection of Oral & Maxillofacial Regions

I. Spread of Dental Infection
II. Non-Specific Infection
III. Specific Infection
Spread of Dental Infection

1. Routes of Spread of Infection
2. Factors which govern the Spread of Infection
   a) Microbial Factors
   b) Host Physiological Factors
   c) Host Anatomical Factors
Routes of Spread of Infection

- Local Spread
- Spread by Lymphatics
- Spread by blood stream
- Spread through tissue continuity
Factors Governing Spread of Infection

I. Microbial Factors
II. Host Physiological Factors
III. Host Anatomical Factors
I. Microbial Factors

We live in a world full of MICROORGANISMS some are PATHOGENIC

Pathogenic microorganism are those who are capable to produce DISEASE in the susceptible host

Factors are:

• Enzymes produced
• Chemotaxis effect
• Mode of growth
• Number of invading organism
Definitions

Pathogenicity
Is the ability of a microorganism to produce a pathogenic condition, i.e. Disease

Depends on VIRULENCE & NUMBER of microorganism

Virulence
Is sum of all characteristics of the microorganism that is harmful to the host
A. Enzymes Produced by Organism

**Coagulase Enzyme**
- Favors the formation of fibrin barrier
- e.g. Staphylococcus

**Hyaluronidase Enzyme**
- Cause lyses or dissolution of the fibrin
- e.g. Streptococcus

**Fibrin Barrier**

**Localization of Infection**

**Spread of Infection**
B. Chemotaxis Effect

**Chemotaxis:** Is the characteristics of the organisms that attract the WBCs

**Bavementation of Leucocytes:** Is the migration of the leucocytes to the area of infection
C. Mode of Growth

- **Colieses**
  - Localization: Staphylococcus

- **Chains**
  - Spread: Streptococcus
Bacteroids – g-ve Anaerobic Bacteria

Produce Endotoxins

Rapid release of large amounts of endotoxins into the tissues which result in initial **flare-up of infection** following the administration of antibiotics.
**Produce Enzymes**

- **Proteolytic Enzyme**: Hydrolysis Collagen & Fibrin → Spread of Infection
  - **Heparinase Enzyme**: Inactivate Heparin
  - Resulting conditions: Thrombophlebitis, Thrombotic Emboli, Metastatic Lesions

**Bacteroides Anaerobic** Infection is to be suspected if
1. Pus have a **foul odor** or gas is present
2. When there is local **tissues necrosis** in the inflammatory lesion
D. Number of Invading Organisms

\[
\text{Organism} \times \text{Virulence} \times \text{Number} \times \text{Resistance} \times \text{Host} = 10,000,000
\]

Organism / mL of Body Fluids
II. Host Physiological Factors

A. Nutritional Status

- **Malnutrition** → Increase susceptibility to **Infection**
  - Interfere with **food intake**
  - **Loss of salts** by excessive sweating due to fever
  - **Increase** demand for cellular energy – Normally this is 1.8 K cal/day and it increases 11-13% for each 1°C increase in body temperature.

**Starvation** → Depletion of endogenous fuel
B & C. Immunohumeral Mechanism & Phagocytosis

- Complement is a substance that is present in the blood that aids the body’s defences when antibody combine with invading antigen.
- Complement is involved with breaking up (lysis), agglutination and opsonization of foreign cells.
- Following Antib-Antig reaction it attracts scavenging cells (phagocytes) to the area of conflict.
Phagocytosis

**Phagocyte** is a cell that is able to engulf and digest bacteria, protozoa, cells and cell debris. Phagocytes include many white blood cells.

**Phagocytosis** is the engulfment and digestion of bacteria and other foreign particles by phagocytes.
Factors Reducing Host Resistance

Phagocytes must be accumulated in a sufficient numbers around the invading organisms to start phagocytosis.

Any factor that may interfere with their accumulation or with their physical contact with the organism will give chance for the organisms to flourish.

Factors that prevent accumulation of phagocytes in the inflammation site include:

- **Ischemia** with decreased blood supply in the area
- **Dead tissues** in the area
- The presence of **foreign body** in the area
- Accumulation of **seroma or hematoma**

These factors may be induced by

- Administration of vasopressor drugs
- Radiation
- Uremia
- Sever malnutrition
- Drugs as steroids
III. Host Anatomical Factors

A. Position of the Teeth in the Alveolus
B. Relation of the tooth apex to the muscle attachment
• Buccal cortical plate is very thin
• Palatal bone is thicker
• Related to Max Sinus
• Related to Max Sinus
Maged Lotfy – Maxillofacial Infection
Maxillary Teeth

- Subperiosteal Intraoral Abscess
- Upper Lip Abscess
- Subperiosteal Abscess

High
Labially

Low
Palatally

Rare
Nasal Cavity

Common with Lateral Incisor
Infraorbital Abscess

To space between Caninus & Quadratus Labii Muscles

Above Caninus Muscle Attachment

As Central & Lateral Labially Maxillary Canine Palatally As Central & Lateral

Upward
Common with palatal roots of upper molars

Maxillary Sinus

Upward

Premolars & Molars

Buccally

Palatally

Subperiosteal Abscess

Buccal Space Abscess

Buccinator Muscle

Above

Below

Buccal Subperiosteal Intraoral Abscess
Mandibular Teeth

Labially

Central, Lateral & Canine

Lingually

Sublingual Abscess

Submental Abscess

Above

Mylohyoid Attachment

Subperiosteal Intraoral Abscess

Subperiosteal Chin Abscess

Mentalis Attachment

Above

Below
Buccinator Attachment

Labially

Premolars & Molars

Lingually

Subperiosteal Lingual Abscess

Mylohyoid Attachment

More Above

Sublingual Space Abscess

Above

Submandibular Space Abscess

Below

Subperiosteal Intraoral Abscess

Above

Buccal Space Abscess

Below

Premolars & Molars

Buccinator Attachment

Labially

Subperiosteal Intraoral Abscess

Buccal Space Abscess

Mylohyoid Attachment

More Above

Sublingual Space Abscess

Submandibular Space Abscess

Above

Below

Labially
C. Organization of Superficial and Deep Cervical Fascia

Fascia is a connective tissue membranous layers of variable thickness in all regions of the body. It surrounds all organs of the body and divided into **SUPERFICIAL FASCIA**, found immediately under the skin and **DEEP FASCIA** which forms sheaths for muscles and glands.
Fascial Space is a potential space.
Submental Space

- Digastric M
- Submental LNs
- Mylohyoid M
- Hyoid Bone
● **Spread of Infection**
  - Dental infection in lower anterior teeth
  - Extension of infection from submandibular or sublingual spaces

● **Signs & Symptoms**
  - Firm swelling beneath the chin
  - Skin is taut
  - Discomfort on swallowing

● **Treatment**
  - Therapeutic
  - I&D
Submandibular Space

This space is located medial to the mandible and below the posterior portion of mylohyoid muscle.
● **Communications**
  - Anteriorly: Submental space around the diagastric muscle
  - Posteriorly: Lateral Pharyngeal space

● **Route of Infection**
  - Spread from communicating spaces
  - Dental infection on lower premolars and molars if opened lingually below the mylohyoid attachment
  - Secondary to submandibular lymphadenopathy
**Signs & Symptoms**
- Swelling in submandibular region
- Moderate limitation of mouth opening
- In severe cases there may be systemic signs and symptoms

**Treatment**
- I&D if suppuration occurs
- Antibiotics
Surgical Anatomy
It is V-shaped trough lateral to the tongue
- **Above**: Mucosa of floor of the mouth
- ** Inferiorly**: Mylohyoid M
- **Antrolaterally**: Body of the mandible
- **Medially**: Median raphe of tongue, Hyoglossus, Genioglossus and Geniohyoid
- **Posteriorly**: Hyoid bone

Contents
- Deep part of submandibular gland
- Warton’s duct
- Sublingual gland
- Lingual nerve
- Hypoglossal nerve
Communications

- **Sublingual space opposite side**: Over the hump of genial muscles
- **Submandibular space**: Around submandibular gland
- **Paraphyrgeal & Pterygomandibular spaces**: Via the tunnel under the superior constrictor for styloglossus muscle

Route of Infection

- Dental infection: When discharge on the lingual side of the mandible at a point **above the mylohyoid** attachment and **below level of mucosa of the floor of the mouth**. Common with lower 12 and 3
- Spread of infection from communicating spaces
Signs & Symptoms
“Sublingual Abscess”

• Firm **painful swelling**, unilaterally on the anterior part of the floor
• Edematous tissues has **gelatinous appearance**
• Very little or **no extra-oral swelling**
• **Tongue** deflected medially and superiorly
• Severe **pain** and discomfort with **swallowing**
• **Lymphadenopathy**
• **General symptoms**

**Treatment**
• Antibiotics
• I&D
• Removal of the cause
Ludwig’s Angina

The condition is not considered true Ludwig’s angina unless all the submandibular spaces are involved bilaterally.

DAA

Lingual plate below mylohyoid M

Submandibular space

Opposite
Sublingual space

Submental space

Over the hump of genial Ms

Sublingual space

Opposite
Submandibular space

Route of Infection
Signs & Symptoms

• Board like swelling both intra- and extra-oral
• Swelling is firm, painful, diffuse, with no signs for localization
• Difficulties in swallowing, limitation of mouth opening
• Impaired breathing due to glottis edema that may lead to suffocation
• Later swelling may extend down the neck and reach the level of the clavicle
• High fever, rapid pulse, moderate leukocytosis, fast respiration
Tongue elevated, partially protruded, stiff motion and wooden appearance

Complete airway obstruction may occur due to glottis edema, Tracheotomy should be considered
Treatment

- **Anaesthesia**: GA is difficult as endotracheal intubation is difficult. Awake intubation is indicated.

- **Tracheostomy** is to be considered but identification of the trachea is difficult in the presence of massive neck swelling.

- **Antibiotics & Supportive measures**

- **Surgery**: Through & Through I&D
Buccal Space

- **Surgical Anatomy**
  - Antero-Medially: Buccinator muscle
  - Postro-Medially: Masseter muscle & anterior border of ramus
  - Laterally: Platysma muscle & Deep fascia
  - Above: Zygomatic process of maxilla & zygomaticus muscle
  - Below: Attachment of the deep fascia to the mandible

- **Contents**
  - Buccal pad of fat
  - Facial lymph nodes

- **Communications**
  - Posterior: Pterygomandibular space
  - Superiorly: Infratemporal space
Maged Lotfy – Maxillofacial Infection
● **Route of Infection**
  - **Pericoronal infection**: Passes under the buccinator origin
  - **DAA**: of any of the molar teeth that passes outside the buccinator attachment to the mandible or the maxilla
  - **Communicating spaces**: By direct extension of infection

● **Treatment**
  - I&D is done through intraoral incision
  - If the abscess pointed through the skin it drained extraorally
Pterygo-Mandibular Space

- **Surgical Anatomy**
  - Laterally: Medial surface of the ramus
  - Medially: Medial pterygoid muscle
  - Above: Lateral pterygoid muscle

- **Contents**
  - Lingual nerve
  - Inferior dental nerve
  - Inferior dental vessels

- **Communications**
  - Posteriorly around medial pterygoid muscle: Lateral pharyngeal space: To lateral pharyngeal space *(This is space is usually occluded by deep part of parotid)*
  - Upward: Direct extension to the Infratemporal space
● Route of infection
  ● Contaminated needle
  ● Pericoronitis of lower third molar
  ● Direct extension from communicating spaces

● Pterygomandibular space Abscess
  ● Moderate swelling over the submandibular region and buccal space
  ● Sever limitation of mouth opening
  ● Tenderness on palpation on the medial aspect of the ramus
  ● Neupoperexia of the lingual and ID nerve is not common

● Treatment
  ● Drainage is done via intraoral incision just medial to the anterior border of the ramus
Infratemporal Space
Zygomatico-Temporal Space, Retrozygomatic space

- **Surgical Anatomy**
  - Laterally: Masseter, Ramus, Zygomatic arch & Temporalis
  - Medially: Med & Lat Pterygoid muscles, Lower part of temporal fossa of the skull

- **Contents**
  - Traversed by maxillary artery
  - Pterygoid venous plexus

- **Communications**
  - The space is continuous with the upper part of the Pterygomandibular space
Signs & Symptoms
- Marked limitation of mouth opening
- Swelling over the temporal region that is difficult to recognize except by filling of the space behind the zygomatic arch
- In severe cases there are pyrexia, headache, irritability, etc.

Prognosis & Complications
- Prolonged limitation of mouth opening
- Spread of infection to Cavernous Sinus
- If not treated, pus may spread to the inferior temporal line and cause necrosis of the bone if not evacuated

Treatment – I&D
- Intraoral: Incision buccal to the upper third molar
- Extraoral: Incision is done at the upper posterior or anterior edge of the temporalis muscle
Lateral Pharyngeal Space
Parapharyngeal Space, Pharyngeo-Maxillary Space

- **Surgical Anatomy**
  It is a cone shaped space
  - **Base**: Base of the skull
  - **Apex**: At the greater horn of hyoid bone
  - Medially:

- **Contents**
  - Traversed by maxillary artery
  - Pterygoid venous plexus

- **Communications**
  - The space is continuous with the upper part of the Pterygomandibular space