

Role of Anaerobes in Dental Infection-A Review

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Abstract:

Aim:To make a review on role of anaerobes in dental infection.

Objective:To secure knowledge about the role played by anaerobes in dental infections.

Background: Anaerobic bacteria have been shown to play a role in infection of all types in humans. Anaerobes make up a significant part of the oral and dental indigenous and pathogenic flora. Common anaerobic isolates include Fusobacterium, Bacteroides, Actinomyces, Peptococcus, Peptostreptococcus, Selenomonas, Eubacterium, Propionibacterium, and Treponema. Their role in periodontal disease, root canal infections, infections of the hard and soft oral tissue, as well as their importance as foci for disseminated infectious disease is well established.

Reason: To enumerate the part played by anaerobes in dental infection and to know how they are interacting towards the infection and to make the people aware of those anaerobes and causes in dental infection.

INTRODUCTION :

Infections caused by anaerobic bacteria are common, and may be serious and life-threatening. Anaerobes predominant in the bacterial flora of normal human skin and mucous membranes, and are a common cause of bacterial infections of endogenous origin. Infections due to anaerobes can evolve all body systems and sites(1). The predominate ones include: abdominal, pelvic, respiratory, and skin and soft tissues infections. Because of their fastidious nature, they are difficult to isolate and are often overlooked. Failure to direct therapy against these organisms often leads to clinical failures(2). Their isolation requires appropriate methods of collection, transportation and cultivation of specimens. Treatment of anaerobic bacterial infection is complicated by the slow growth of these organisms, which makes diagnosis in the laboratory only possible after several days, by their often polymicrobial nature and by the growing resistance of anaerobic bacteria to antimicrobial agents.

CAUSES OF ANAEROBIC INFECTION IN ORAL MANIFESTATIONS :

Condition predisposing to anaerobic infections include: exposure of a sterile body location to a high inoculum of indigenous bacteria of mucous membrane flora origin, inadequate blood supply and tissue necrosis which lower the oxidation and reduction potential which support the growth of anaerobes. (3). Conditions which can lower the blood supply and can predispose to anaerobic infection are: trauma, foreign body, malignancy, surgery, edema, shock, colitis and vascular disease. Other predisposing conditions include splenectomy, neutropenia, immunosuppression, hypogammaglobinemia, leukemia, collagen vascular disease and cytotoxic drugs and diabetes mellitus. The hallmarks of an anaerobic infection include suppuration, establishment of an abscess, thrombophlebitis and gangrenous destruction of tissue with gas generation(4). Anaerobic bacteria are very commonly recovered in chronic infections, and are often found following the failure of therapy with antimicrobials that are ineffective against them, such as trimethoprim-sulfamethoxazole (co-trimoxazole), aminoglycosides, and the earlier quinolones.(13).

ANAEROBIC BACTERIA IN THE ORAL CAVITY

Mucous membranes of the mouth and pharynx are often sterile at birth but may be contaminated by passage through the birth canal. Viridans streptococci become established and remain prominent for life. Other microorganisms such as gram-negative diplococci, diphtheroids, and occasionally lactobacilli are added afterwards (5). When teeth erupt anaerobic conditions begin to exist in the gingival, crevicular, and interproximal areas. Anaerobic spirochetes, Bacteroides, Fusobacterium, some anaerobic vibrios, Actinomyces, and lactobacilli establish themselves. The oral cavity, as a matter of fact, represents a host environment possessing features that favor the location and growth of a great

variety of microorganisms(12). There are soft and hard structures, and certain areas show differences in oxygen tension and in nutrition. Some surfaces protect the organisms from friction and the flow of oral secretions, whereas other surfaces do not.

ANAEROBIC INFECTIONS OF THE ORAL CAVITY

It may be appropriate to discuss these infections according to their origin as odontogenic and non-odontogenic.

Odontogenic infections:

-These involve the general inflammatory conditions affecting the periodontium.

Gingivitis: Healthy gingival sulci usually harbor some scant microflora that are dominated by gram-positive organisms and include species of Streptococcus and facultative Actinomyces (6). Initiation of gingivitis is believed to be a major consequence of the bacteria present in the supragingival plaque(11). The later appearance of gram-negative rods and proliferation of anaerobes clearly indicates this sequential process. Species of Bacteroides, Fusobacterium, Hemophilus, and other gram-negative rods comprised about 45% of the total gingivitis isolates. While microorganisms and their products played a significant role in the inflammatory lesion, a variety of metabolic factors had to determine the host resistance (7).

Pericarditis: Once the disease process involving the gingival tissue extends to include periodontal fiber destruction and loss of alveolar bone concomitant with apical migration of the epithelial attachment, the disease is designated periodontitis. The most common form of periodontitis is chronic in nature and is characterized by the presence of 30-40% gram-positive filamentous organisms, mainly Actinomyces. Subgingival plaque in this condition harbors many anaerobic gram-negative rods and spirochetes, as documented by electromicroscopy (8). Predominant microflora inhabiting the base of deep pockets in advanced adult periodontitis constituted an average of 74.3% gram-negative rods that were generally difficult to maintain and identify. Black-pigmented Bacteroides(BPB) and Fusobacterium nucleatum were the most frequent organisms isolated from this disease.

NON ODONTOGENIC INFECTIONS:

Actinomycosis: These are a heterogeneous group of filamentous bacteria, the anaerobic species of which are part of the normal flora of the mouth. Oral actinomycosis is a chronic suppurative disease that spreads by direct extension, forms draining sinuses, and is caused by Actinomyces israelii and related anaerobic filamentous bacteria (9). It is now clear that this organism and others (Actinomyces viscosus and Actinomyces naeslundii) possess efficient mechanisms to establish themselves

at the site of gingival inflammation, and furthermore, they are able to participate in the activation of host reactions assumed to be involved in tissue destruction"(10).

Abcesses. -Many cases of dental abscesses present annually worldwide. Such abscesses are either associated with frank dental carious lesions and pulp tissue exposure or with advanced periodontal disease ". However, some are without obvious antecedent pathology "(14).Historically, bacteria of the viridans Streptococcus group have been thought to be the major organisms in periapical abscesses. Recent studies incorporating anaerobic sampling and culture techniques have reported a greater number of mixed infections and larger populations of bacteria ". In Egypt, it appears that combinations of BPB, Veillonella, and F. nucleatum are rather frequent in the samples collected from dental abscesses. Incidences of completely anaerobic abscesses were comparatively low in this region ". Evidence from our laboratory and findings of others " " suggest an efficient synergistic activity between most microbial combinations identified in oral abscesses. (15)

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