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THE ORAL-HEART LINK: EXPLORING INFECTIVE ENDOCARDITIS

Dental Science

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ABSTRACT

Infective endocarditis is a severe inflammation of the heart's inner lining, often caused by staphylococcus and streptococci, particularly in patients with certain heart conditions. This article reviews literature on the link between oral health and endocarditis and explores differing recommendations.

KEYWORDS

Heart,Valve, Endocarditis, Congenital heart disease, Oral , Infection

Introduction-

Infective endocarditis (IE) is an uncommon but usually severe and often fatal inflammatory disease of the endocardium. The potentially prominent role of oral pathogens in the development of endocarditis, which enter the bloodstream as part of physiological processes, but especially during certain dental procedures, has been emphasized for decades.[1] It is commonly accepted that the development of infective endocarditis requires bacteremia with microorganisms that can successfully adhere to the endocardial surfaces.[2] The oral cavity is colonized by a complex microflora and is frequently affected by two of the most prevalent human diseases, i.e., caries and periodontitis. Both are substantially caused by the manifestation of dysbiotic bacterial infections of tooth related structures.[3]

Infective endocarditis:

Patients with IE are always hospitalized and treated with long-term intravenous antimicrobials alone or in combination with cardiac surgery.[4] During the first days of hospitalization possible infection foci other than the heart valves, should be identified and eliminated. As part of this, patients admitted for IE should routinely be referred to a dentist for investigation and elimination of potential oral infectious foci.[5]

Bacteraemia may also occur during normal daily activities such as toothbrushing, flossing, and chewing.[6]

Also, recent dental or surgical procedures have been suggested to increase the risk for IE in risk patients.[7] However, up to 40% of patients diagnosed with IE lacks previously known risk factors.[8]

Neglected oral hygiene and following periodontal disease are thought to increase the likelihood of bacteraemia in connection to normal daily activities such as chewing and toothbrushing .[9]

Dental conditions and oral bacteria

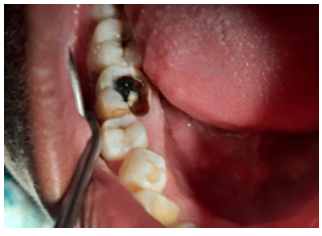
Dental caries and periapical conditions

Dental caries is considered an infectious disease mediated by a pathogenic bacterial biofilm that may form on tooth surfaces.[15]

Continuous intake of fermentable carbohydrates, i.e., sugar leads to a prolonged reduction of pH value in the biofilm[15], which causes the demineralization of hydroxyapatite [16-17], ultimately resulting in manifestation of a clinically detectable caries lesion, including discoloration and cavitation[18](Figure 1).

Figure 1

Caries lesion affecting the posterior mandibular dentition showing severe decay of the clinical crown due to improper oral hygiene maintenance.



Consequently, bacteria initially colonize the necrotic tissue and then penetrate the periapical tissue, i.e., the apical parts of the periodontal ligament and the surrounding alveolar bone (Figure 2).

Figure 2

Radiography of mandibular incisors with canine and premolars. The periapical tissues present with a round radioleucent area within the osseous tissue indicating infection.

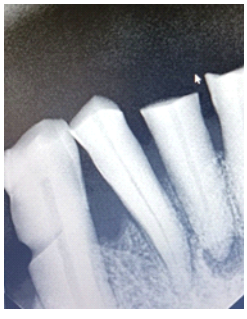


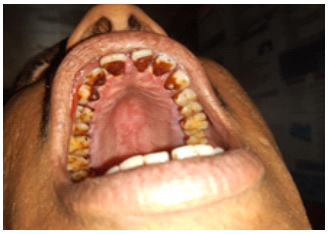
Figure 2

Radiography of mandibular incisors with canine and premolars. The periapical tissues present with a round radioleucent area within the osseous tissue indicating infection.

Periodontal disease

Periodontitis is a multifactorial disease that is associated with dysbiotic dental biofilms and is considered one of the most common chronic inflammatory disease in humans.[21]

Figure 3
Maxillary dentition showing damage to the surrounding tissue due to excess amount of stains and calulus which will eventually lead to pocket formation and further bone loss, resulting in tooth loss.



Dental conditions causing bacteremia

Iatrogenic gingival or mucosal traumas mainly occur during dental procedures such as tooth extractions, periodontal and apical surgery, removal of caries affecting cervical or subgingival portions of the tooth, dental prophylaxis as well as non-surgical periodontal therapy.[19] Since, it is commonly accepted that the presence and the magnitude of bacteremia caused by odontogenic infections are directly proportional to the severity of oral inflammation,[30-31] good oral and dental health has to be highlighted as a major factor regarding prevention of infective endocarditis.[10,13,19,22,23]

Current strategies on prevention

In the 1950s, the American Heart Association (AHA) have released the first clinical guideline for the prevention of IE highlighting dental procedures and antibiotic prophylaxis.[23] Since then, the AHA ,[19,24-30] the European Society of Cardiology (ESC)[10,14,31] and several other national and multinational societies have published guidelines and regular updates for the prevention of infective endocarditis with various recommendations regarding the requirement of antibiotic prophylaxis before dental procedures. Especially considering patients suffering from congenital heart defects (CHD), however, there is still no uniform opinion on whether these recommendations on prevention can be fully applied.[32-33]

However, a survey of American Association of People with Disabilities members showed that most pediatric dentists Preferred extraction of primary teeth with irreversible pulpitis, While pulpotomy was preferred for teeth with reversible pulpitis In patients with CHD.[34] Therefore, the prevention of oro-dental infections and the consistent adherence to oral maintenance care including regular dental and periodontal examinations as well as prophylaxis are crucial in the prevention of infective endocarditis, especially in patients at increased risk for IE and those at high risk of severe disease outcome.[11,12,13]

Antibiotic Prophylaxis Regimens

The net benefit of antibiotic prophylaxis for infective endocarditis is more difficult to assess, as only a few of the recipient ever benefit from from it.[20]

All doses shown below are administered once as a single dose 30-60 min before the procedure:

- Standard general prophylaxis: Amoxicillin 2 g PO
- Unable to take oral medication: Ampicillin 2 g IV/IM or cefazolin/ceftriaxone 1 g IM or IV
- Allergic to penicillin: Cephalexin 2 g PO or other first- or second-generation oral cephalosporin in equivalent dose (do not use cephalosporins in patients with a history of immediate-type hypersensitivity penicillin allergy, such as urticaria, angioedema, anaphylaxis)
- Allergic to penicillin: Azithromycin or clarithromycin: 500 mg PO
- Allergic to penicillin: Doxycycline 100 mg
- Allergic to penicillin and unable to take oral medication: Cefazolin or ceftriaxone (do not use cephalosporins in patients with a history of immediate-type hypersensitivity penicillin allergy, such as urticaria, angioedema, anaphylaxis): 1 g IV/IM[35]

CONCLUSION

Patients with congenital heart disease have a higher risk of infective endocarditis from oral infections and are more prone to oral diseases like periodontitis and caries. While evidence in adults is limited, they often show more plaque and gingival inflammation and poor oral hygiene, suggesting a higher prevalence of periodontitis compared to healthy individuals.

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