ENDODONTIC INFECTION

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It is the infection of the dental root canal system and the major etiologic agent of apical periodontitis. Although chemical and physical factors can induce peri-radicular inflammation, a large body of scientific evidence clearly indicates that micro-organisms are essential to the progression and perpetuation of the different forms of apical periodontitis.

CLASSIFICATION OF ENDODONTIC INFECTIONS

Endodontic infections are classified according to the location of infection in relation to the root canal:

I Intraradicular infections

II. Extraradicular infections

INTRARADICULAR INFECTIONS

Intraradicular infections are characterized by the presence of microorganisms within the root canal system. They are according to the time of organism entry into the canal.

1.Primary Intraradicular Infections:

Primary intra radicular infections are caused by microorganisms that initially invade and colonize the necrotic pulp tissue. They are characterized by a mixed consortium dominated by anaerobic bacteria, particularly:

a) Gram- negative anaerobes such as Prevotella, Fusobacterium, Tannerella, Dialister, Porphyromonas, Campylobacter, and Treponema. Prevotella species, especially P. intermedia, P. nigrescens, P. tannerae, and P. denticola, have been frequently isolated from primary endodontic infections.

(b) Gram-positive anaerobes from genera Peptostreptococcus, Eubacterium, Actinomyces, and facultative or microaerophilic streptococci can also be commonly found in primary intraradicular infections.

2. Secondary Intraradicular Infections

Secondary intraradicular infections are caused by microorganisms that were not present in the primary infection, but were introduced in the root canal at some time after professional intervention (secondary to

intervention). Pseudomonas aeruginosa, Staphylococcus sp., Escherichia coli, Candida sp., and E. faecalis are commonly found in such infections. Microorganisms can penetrate the pulp space system even after the completion of root filling

3. Persistent Intraradicular Infections

Persistent intraradicular infections are caused by microorganisms that resisted the intracanal antimicrobial procedures. These microbes endure periods of nutrient deprivation in a prepared canal

• However, fewer species are present than primary infections.

• Higher frequencies of fungi (Candida species) are present than in primary infections.

• Gram-positive facultative bacteria, particularly E. faecalis (Fig. 2.3), are predominant in such cases. Rocas et al. had detected that root-canal-treated teeth are 9 times more likely to harbor E. faecalis than cases of primary intraradicular infections.

Enterococcus faecalis

E. faecalis is a gram-positive, facultative anaerobic coccus that is strongly associated with endodontic infections

• E. faecalis is a persistent organism that, despite making up a small proportion of the flora in untreated canals, plays a major role in the aetiology of persistent peri radicular lesions after root canal treatment.

• It is commonly found in a high percentage of root canal failures and is able to survive in the root canal as a single organism or as a major component of the flora.

• They can grow in extremely alkaline pH, salt-concentrated environment, in a temperature range of 10–45°C, and survive a temperature of 60°C for 30 minutes.

• The prevalence of E. faecalis is 40% in primary endodontic infection and 24%–77% in persistent endodontic infection.

• Although E. faecalis possesses several virulence factors, its ability to cause peri radicular disease stems from its ability to survive the effects of root canal treatment and persist as a pathogen in the root canals and dentinal tubules of teeth.

II. EXTRARADICULAR INFECTIONS

If microorganisms invade the peri radicular tissues overcoming the defines mechanisms of the body, then extra-radicular infection occurs. The most common species are Actinomyces, Streptococcus, and P. propionicum. The extra-radicular infection is dependent on or independent of intra-radicular infection:

(a) Extra-radicular infection dependent on intra-radicular infection This infection occurs if microorganisms invade the peri radicular tissues overcoming the defence mechanisms the body or debris extrusion due to over-instrumentation. **Acute alveolar abscess** is an example of extra radicular extension or a sequel to intra radicular infection.

(b) Extra radicular infection independent of intra-radicular infection Actinomyces species have been found in association with unhealed periapical lesions and may be one of the causes of extra radicular infection, e.g., **periapical actinomycosis**.

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Reference:

1. Grossman endodontic practice 14th edition.

2. Siqueira Jr, Rôças I, Diversity of Endodontic Microbiota Revisited, J Dent Res 88(11):969–981, 2009.