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FOCAL INFECTION – A RISK FACTOR FOR SYSTEMIC DISEASE!!!

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ABSTRACT

Periodontal disease is a polymicrobial infectious disease where the environmental, physical, social and stress may affect the disease expression. Periodontal disease is considered as a risk factor for systemic conditions such as Diabetes Mellitus, Cardiovascular disease, Chronic Obstructive Pulmonary Disease and Low Birth Weight. Periodontitis is considered as the sixth complication of diabetes. Matilla found that there is a significant correlation between periodontitis and myocardial infarction. Vast majority of pulmonary diseases are due to anaerobic bacteria that are found in oral flora.

KEYWORDS: Oral foci of infection, Mechanism, Significance, Systemic diseases, Periodontitis.

INTRODUCTION

In 1900, William Hunter, a British Physician, first developed the idea that oral microorganisms were responsible for a wide range of systemic conditions that were not easily recognized as being infectious in nature (*Dussault G, Sheiham A*, 1982).[1] In addition to caries, pulpal necrosis and periapical abscess, Hunter also identified gingivitis and periodontitis as foci of infection.[2] He advocated extraction of teeth with these conditions to eliminate the source of sepsis. Hunter believed that the teeth were liable to septic infection primarily due to their structure and relationship to alveolar bone. He stated that the degree of systemic effect produced by oral sepsis dependent on the virulence of the oral infection and degree of resistance of the individual. He also felt that the oral organisms had specific actions on different tissues and that these organisms acted by producing toxins resulting in low grade "subinfection" which produced systemic effects over prolonged periods. Hunter believed that the interlink between oral sepsis and resulting systemic conditions could be shown by the

removal of the causative sepsis via tooth extraction and observation of the improvement in systemic health.

Definition

Focal infection is the metastasis from the focus of infection from organisms or their toxins affecting systemic health. Focus of infection refers to a circumscribed area of tissue which is infected with exogenous pathogenic microorganisms and which is usually located near mucous on a cutaneous surface.

Mechanism of focal infection

Two generally accepted mechanisms involved in the possible production of focal infection.

1. There may be metastasis of microorganisms from an infected focus by either hematogenous or lymphogenous spread.
2. Toxins or toxic products may be carried through the blood stream or lymphatic channels from a foci of infection to a distant site where they may incite a hypersensitive reaction in the tissues.

The spread of microorganisms through vascular or lymphatic channels is a recognized phenomenon, as is their localization in tissues.

Significance of oral foci of infection

Based on the clinical evidence, reports showed that the oral foci of infection either cause or aggravate many systemic diseases. The diseases most frequently mentioned are:

1. Arthritis- Rheumatoid and Rheumatic fever types
2. Valvular heart disease - particularly Subacute Bacterial Endocarditis
3. Gastrointestinal diseases
4. Ocular diseases
5. Skin diseases
6. Renal diseases.

Arthritis patients have a high antibody titer to group A hemolytic streptococci. It was only logical that dental infection would be complicated because of the occurrence of streptococcal infection in the mouth. The "Ninth Rheumatism Review" emphasized several points in favour of the septic foci theory of etiology of rheumatoid arthritis[3]. These include the following:

1. Streptococcal infections of the throat, tonsils or nasal sinuses may precede the initial or recurrent attacks.
2. Dramatic improvement sometimes follows removal of a septic focus.
3. The pathologic or anatomic features of lymphoid tissue in tonsillar infection, sinus infection and root abscess suggest that toxic products can be absorbed into circulation.

Limitations of this theory

1. Often no infectious focus can be found.
2. Usually when a focus has been extirpated no dramatic results are produced.
3. Antibiotics and vaccines have failed to produce a beneficial effect.

Subacute bacterial endocarditis can be related to oral infection since[4]

1. There is a close similarity in most instances between the etiologic agent of the disease and microorganisms in the oral cavity, in the dental pulp and in the periapical lesions.
2. Symptoms of subacute endocarditis have been observed in some instances shortly after extraction of teeth.
3. Transient tooth bacteriemia frequently follows extraction.

Oral foci of infection

The sources of focal infection in the oral cavity which may set up distant metastasis:

1. Infected periapical lesions such as the periapical granuloma, cyst and abscess.
2. Teeth with infected root canals.
3. Periodontal diseases.

Infected periapical lesions particularly those of a chronic nature, are usually surrounded by a fibrous capsule which effectively walls off or separates the area of infection from the adjacent tissue but does not prevent absorption of bacteria or toxins.[5] The periapical granuloma has been described as a manifestation of a vigorous body defense and repair reaction, while the cyst appears to be progressive form of granuloma. The abscess may be considered a reaction occurring where the repair or defensive phase is minimal. Teeth with infected root canals and periodontal disease are equally significant as a potential source of dissemination of both microorganisms and toxins.[6]

Bacteriemia has been found to be related to the severity or degree of periodontal disease present after manipulation of gingiva or more commonly after tooth extraction. The usual

organism recovered was 'Streptococcus viridians'. The rocking of teeth in their sockets by forceps before extraction favor bacteriemia in patients who have periodontal disease.[7] The pumping action occurring during dental extraction may force microorganisms from the gingival crevice into the capillaries of gingival as well as into the pulp of the tooth. Even oral prophylaxis may be followed by bacteriemia.[8] It is mandatory that prior to dental prophylaxis antibiotic premedications - as advocated by American Heart Association - be employed for those children diagnosed as having Rheumatic or Congenital heart disease because of the possible serious consequences of bacterial endocarditis.

Gastrointestinal diseases - Constant swallowing of microorganisms might lead to a variety of gastrointestinal diseases. The lack of either clinical or experimental evidence of a relationship between oral foci of infection and gastrointestinal diseases suggests that such a relation is highly questionable.

Ocular diseases - Woods evaluated the role of foci infection in ocular diseases. Factors supporting the hypothesis are[9]

1. Many ocular diseases occur in which systemic cause in addition to the presence of remote foci of infection can be demonstrated.
2. Dramatic healing of ocular diseases is reported to be followed by the removal of the foci.
3. The presence of blood stream infections in the early stages of ocular diseases has been reported.

Limitations to these points are

1. Many, otherwise healthy people can be found to have focal infection but no ocular disease.
2. Spontaneous cures occur frequently if nothing is done.

Skin diseases have been suggested by some dermatologists to be related to foci of infection. Some forms of Eczema and Urticaria can be related to oral foci of infection. A few other dermatoses are Erythema multiforme, Pustular dermatitis, Lupus erythematosus, Lichen planus. But there is minimal scientific proof for this association.

Renal diseases are sometimes blamed on foci of infection. The microorganism most commonly involved in urinary infection is Escherichia coli. Staphylococci and streptococci

also may be cultured. There is only minimal scientific evidence correlating the renal diseases and oral foci of infection.

The focal infection theory fell into dispute in 1940s and 1950s when widespread extraction of the entire dentition failed to reduce or eliminate the systemic conditions to which the supposedly infected dentition had been linked. This theory had little if any scientific evidence. Hunter and other advocates were unable to explain how focal oral sepsis produced these systemic maladies. They were unable to elucidate possible interactive mechanisms between Oral diseases and Systemic health status.

CONCLUSION

Periodontitis, a bacterial origin, a common oral pathology is most evident example of foci of infection today. Bacteria are able to migrate, develop and create health problems such as Diabetes mellitus, Cardiovascular disease, Respiratory disease and Osteoporosis. Knowing about recent studies on microbiota movement inside the body helps in prevention of oral sepsis'', as well as of the possible systemic implications, that may be successfully performed with the help of new technologies.

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