

Is The Peri-Implantitis Involved With Brain Inflammation And May Contribute To Neurodegenerative Disorders?

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Abstract:

Oral rehabilitation encompasses the restoration of oral function, addressing issues related to the teeth, gums, and other oral structures. Dental implants have become the gold standard for the replacement of single or multiple missing teeth, but in individuals with poor oral hygiene, the accumulation of dental plaque biofilm can trigger a local immune and inflammatory host response leading to peri-implant mucositis (a reversible condition with localized therapies) or peri-implantitis (characterized by bone loss accompanied by a persistent immune and inflammatory host response). The presence of periodontal pathogens at sites with peri-implantitis has been reported in several studies, and there is extensive documentation of similarities in microbial profiles between periodontitis sites and peri-implantitis sites. Thus, periodontitis/apical periodontitis can reach distant organs, especially the brain. This can lead to the development or exacerbation of inflammatory conditions. Similarly, the microorganisms and their products responsible for inducing peri-implantitis can potentially cause inflammatory conditions in the brain like periodontitis/apical periodontitis. Then, it is plausible to infer that peri-implantitis may be used the same way to induce and/or potentialize brain inflammation

Key Word: Nervous system; Neuroinflammation; Periodontitis; Peri-implantitis; Neurodegenerative disorders.

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I. Letter To The Editor

Dear Editor,

Oral rehabilitation encompasses the restoration of oral function, and addressing issues related to the teeth, gums, and other oral structures. It involves a comprehensive approach to restore overall oral health and functionality. In contemporary dentistry, dental implants have become the gold standard for the replacement of single or multiple missing teeth. They contribute not only to functional restoration but also to phonetic and aesthetic improvements [1]. However, in individuals with poor oral hygiene, the accumulation of dental plaque biofilm can trigger a local immune and inflammatory host response leading to peri-implant mucositis (a reversible condition with localized therapies) or peri-implantitis (characterized by bone loss accompanied by a persistent immune and inflammatory host response) [2,3].

Periodontitis and apical periodontitis are two pathologies observed in the oral cavity, and they have been linked to various systemic disorders, including type 2 diabetes, cancer, adverse pregnancy outcomes, cardiovascular disease, respiratory tract infections, and neurological diseases. In summary, discussions have suggested that periodontitis and apical periodontitis can initiate and/or exacerbate systemic brain disorders due to several mechanisms: (1) microorganisms and/or their products reaching the bloodstream, triggering systemic inflammatory or immunological responses far from the initial site; (2) receptors located in trigeminal nerve endings serving as potential pathways for bacteria and their products to reach the brain; (3) vesicular trafficking through the trigeminal nerve, allowing bacteria with the ability to block phagosome-lysosome complexes to reach the brain; (4) bacteria with the ability to inhibit the phagosome-lysosome complex traveling to the brain via the lymph nodes; (5) virulence factors and inflammatory mediators diffusing into the peripheral circulation from the gastrointestinal tract or traveling through the vagus nerve; (6) anatomical spaces being used by microorganisms to reach the cranial cavity and access brain tissue [4-6].

The presence of periodontal pathogens at sites with peri-implantitis has been reported in several studies, and there is extensive documentation of similarities in microbial profiles between periodontitis sites and peri-

implantitis sites [for review see reference number 7]. Furthermore, peri-implantitis and periodontitis/apical periodontitis share many common features: both are inflammatory reactions leading to soft or bone tissue destruction in response to biofilm. These pathologies exhibit similar characteristics in both human and animal models, including the loss of supporting tissues and significant infiltrating inflammation around implants and teeth. Notably, plasma cells and lymphocytes are the predominant cells in both types of lesions, and the host response is remarkably similar [8,9].

Building on the information discussed above, it is noteworthy that both teeth and dental implants within the same oral cavity may be affected by pathological conditions (periodontitis/apical periodontitis or peri-implantitis) that exhibit similarities. Additionally, during the installation of a dental implant, anatomical components (such as anatomical spaces) and physiological components (including inflammatory and immunological responses) are present. Therefore, it is pertinent to infer that through the same routes discussed earlier, bacteria and their products, responsible for the development of periodontitis/apical periodontitis, can reach distant organs, especially the brain. This can lead to the development or exacerbation of inflammatory conditions. Similarly, the microorganisms and their products responsible for inducing peri-implantitis can potentially cause inflammatory conditions in the brain. This, in turn, may contribute to or exacerbate pre-existing diseases such as Alzheimer's and Parkinson's diseases. Thus, it is very important that dental practitioners know the axis from the mouth to the brain to improve the treatment of their patients and sprout this information to the worldwide population to know the importance of oral hygiene.

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