

Periodontitis and Atherosclerotic Cardiovascular Disease

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Atherosclerotic cardiovascular diseases (ACVDs) are a leading cause of death and disability across the developed world and impose a vast burden on healthcare resources. This category of diseases includes:

- Coronary heart disease, which presents as angina or heart attack (myocardial infarction).
- Ischaemic cerebrovascular disease, which may manifest as stroke or mini-stroke (transient ischaemic attack or TIA).
- Peripheral vascular disease.

Periodontitis, although not a cause of mortality, is also a major public health concern because of its high prevalence in the population and its negative impact on oral health, ability to chew, appearance, quality of life, dental care costs and tooth loss. In addition, as a progressive, chronic inflammatory disease, untreated periodontitis has the potential to undermine overall health and even exacerbate other inflammatory conditions, such as ACVD.

Recently, an international panel of leading clinicians and research scientists convened at a landmark meeting in Spain, organised jointly by the European Federation of Periodontology (EFP) and the American Academy of Periodontology (AAP), to review the latest scientific research into periodontitis and ACVD. The EFP is one of the foremost dental organisations in Europe, with a membership comprising 26 National Periodontal Societies with over 13,000 members, and works to promote awareness and understanding of, and best practice within periodontology. The AAP is the leading professional organisation for periodontists in the United States, with a membership of more than 8,000 specialists.

After a detailed systematic review of the evidence, the experts produced a consensus report outlining our current understanding of the relationship between periodontitis and atherosclerotic cardiovascular disease. They also formulated new evidence-based guidelines for general dental practice. A brief summary of their findings is presented here, followed by the new professional recommendations.

Effects of periodontitis on the incidence of cardiovascular events

Periodontitis has been shown to increase the risk of a first ACVD event, (such as heart attack or stroke), independent of other known cardiovascular risk factors. The size of the increase in risk varies according to the type of ACVD event, and also depends upon age and gender. For example, the extra risk posed by periodontitis is greater for cerebrovascular disease than for coronary heart disease, and also greater in males and in younger people (studies show no increased risk in individuals aged 65 years or more). However, given the

high prevalence of periodontitis in the population, it is clear that even a low-to-moderate increase in risk has important implications for public health.

Although some risk factors, such as smoking and diabetes, are known to play a role in the development of both periodontitis and ACVD, their presence does not fully explain the observed link between periodontitis and the increased cardiovascular risk. Moreover, additional risk due to periodontitis was shown in people who had never smoked and was also apparent in studies that controlled for diabetes status. It is possible, however, that there are as yet unknown genetic factors that may influence both of these inflammatory diseases and may therefore explain the association found in clinical studies.

At the moment, there is not enough evidence to show whether periodontitis could increase the probability of a second ACVD event in patients with established ACVD who have previously suffered an event.

What is the link between periodontitis and ACVD?

The most likely explanation for how periodontitis affects ACVD is that periodontal bacteria and their products (e.g. endotoxin) from periodontal pockets enter the circulation and provoke an acute-phase and subsequent inflammatory response. Mediators produced as part of this host response then promote the development, maturation and instability of fatty lesions (atheroma) in the arteries, increasing the risk of an ACVD adverse event.

Research shows that the likelihood of periodontal bacteria entering the bloodstream (bacteraemia) after chewing, brushing, flossing or scaling depends upon the patient's periodontal health. Bacteraemia is more common, and involves a wider range of bacteria (including periodontal pathogens), in patients with periodontitis, compared with patients who have gingivitis or healthy mouths.

Further support for the direct involvement of periodontal bacteria in ACVD has come from studies demonstrating:

- a link between the prevalence of bacteraemia and plaque/gingival indices
- the presence of periodontal pathogens in atherothrombotic lesions, and a correlation with periodontal status
- a correlation between the subgingival flora and pathogens detected in atheroma
- live and viable periodontal bacteria living within atheroma.

Another possible mechanism by which periodontitis might contribute to ACVD risk is that antibodies produced in response to plaque bacteria may promote the development of atheroma by cross-reacting with the cells lining the arteries (endothelial cells) and with blood lipids.

What are the effects of periodontal treatment on cardiovascular outcomes?

Studies have demonstrated that periodontal treatment reduces the overall level of inflammation within the circulation. Specifically, periodontal therapy had favourable effects on two key factors known to be important in ACVD risk: levels of a pro-inflammatory acute-phase protein agent called C-reactive protein (CRP); and measures of endothelial cell function. Cholesterol levels, however, were not affected by treatment.

More limited evidence suggests that periodontal therapy improves other known markers of inflammation, coagulation and endothelial cell activation, and also arterial blood pressure and subclinical ACVD.

To date, no intervention studies have tested the effect of periodontal treatment on preventing first ACVD events (primary prevention) or on preventing recurrence (secondary prevention). The focus has been on surrogate

endpoints such as vascular stiffness and biomarkers of cardiovascular risk. Further research is needed, in carefully selected patient populations (< 65 years of age, preferably) with well-defined minimum disease levels and treatment goals, to explore the possible benefits of periodontal treatment on cardiovascular health.

Can ACVD treatments influence treatment outcomes for periodontitis?

There is some new evidence that various anti-inflammatory agents prescribed to patients with ACVD - such as aspirin, statins, fish oil and vitamin D - may also help reduce periodontal inflammation.

Implications for general dental practice

There is gathering evidence that periodontitis is a risk factor for future cardiovascular disease and that periodontal therapy can reduce systemic inflammation. It follows that effective prevention and early treatment of periodontitis may have an important role in reducing an individual's susceptibility to ACVD events and also in contributing to improved cardiovascular health at a population level. Patients should therefore be advised about the health risk associated with untreated periodontitis, particularly if they have other ACVD risk factors, and offered comprehensive periodontal care and advice. In patients who have suffered an ACVD event, good oral hygiene should be established and periodontal treatment staggered over several sessions, in order to minimize the magnitude of any intra-operative bacteraemia and the subsequent inflammatory sequelae.

You may also access videos from the organisers at www.perioworkshop.org

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