

Periodontal disease: is it about tooth and nothing but the tooth?

Manny Vasant examines the evidence that strongly associates periodontal disease with systemic conditions

At the beginning of the 20th century, medicine and dentistry were searching for reasons to explain why individuals were afflicted with systemic disease. In the absence of much research or insight, it was two eminent individuals, Willoughby Miller and William Hunter, that found oral bacteria and infection were likely causes of most systemic illnesses. The theory of 'focal infection' developed and prospered for the next 40 years.

However, by the 1940s and 50s clinicians began to question this philosophy that led to an era of retreat until about 1989 when it resurfaced with vengeance.

Literature, which has been published since the 1990s, suggests that periodontitis may be a risk for certain systemic conditions such as cardiovascular disease, adverse pregnancy outcomes, diabetes mellitus, and pulmonary disease. Collectively, the findings gathered from investigators worldwide are very compelling, and it would appear that periodontal disease is strongly associated with systemic conditions.

Based on current literature, responsible health workers would wish to, quite rightly, address the following question:

'Do I recommend a patient with historical or on going periodontal disease regular and frequent scaling visits in order to reduce or prevent the risk of systemic diseases (rather than merely controlling the periodontal condition)?'

Let us examine the evidence gathered thus far.

Periodontitis as a risk factor for cardiovascular disease

In 1989, Kimmo Mattila and co-workers conducted a case control study on patients who had suffered myocardial infarction. Mattila and co-workers reported a highly significant association between poor dental health and acute myocardial infarction. The association was independent of other risk factors for heart attack, such as age, total cholesterol, high-density lipoprotein (HDL), triglycerides, C peptide, hypertension, diabetes, and smoking (Mattila et al, 1989).

Scannapieco and colleagues (2003a) conducted a systemic review of evidence supporting or refuting any

relationship, in response to the focused question: 'does periodontal disease influence the initiation/progression of atherosclerosis and therefore cardiovascular disease, stroke and peripheral vascular disease?' Having looked at 31 studies they noted (not absolute) consistency and concluded 'periodontal disease may be moderately associated with atherosclerosis, myocardial infarction and cardiovascular events'.

An accompanying consensus report by the American Academy of Periodontology recommends 'patients and health care providers should be informed that periodontal intervention may prevent the onset or progression of atherosclerosis induced diseases'.

A responsible clinician should ask if you treat periodontitis, do you prevent the onset or reduce severity of these systemic complications?

This is not an easy task and some studies will take a considerable time before we know the answer. However, whilst the effects of periodontal therapy on cardiovascular disease events in patients have yet to be determined, the available pilot data suggest that periodontal therapies can improve the surrogate cardiovascular outcomes like biomarkers and endothelial functions. Students and clinicians who are astute in 'critical reading or thinking' will appreciate that surrogate outcomes (i.e. chemical values) may not necessarily be true measures of diseases, although they might be good indicators and true in many cases.

Biologic rationale

Scientists have noted that a patient who has, for example, 28 teeth with pocket depths of 6-7mm and bone loss has a large overall surface area of infection and inflammation (Waite and Bradley, 1965). In patients with moderate periodontitis, the surface area could be the size of a palm of a hand or larger. In addition, the sub gingival area in the periodontal pockets exists in highly organised biofilm. Since periodontal infections result in low-grade bacteremias and endotoxemias in affected patients (Sconyers et al, 1973; Silver et al, 1980), systemic effects on vascular physiology via these exposures appear biologically plausible.

Periodontitis as a risk factor for adverse pregnancy outcomes

In considering adverse pregnancy outcomes, four published intervention studies provide early evidence that preventive and treatment interventions aimed at reducing maternal periodontal infection and inflammation may reduce the likelihood of preterm low birth weight infants, whilst one study did not find the effect. Overall, these clinical trials suggest that mechanical intervention in pregnant mothers with gingivitis or periodontitis can reduce the incidence of preterm low birth weight.

Pre-eclampsia is a hypertensive disorder that independently contributes to infant morbidity and mortality. Accordingly, atherosclerotic-like changes in placental tissues involving oxidative and inflammatory events is thought to initiate the development of pre-eclampsia (Ramos et al, 1995).

Xiong and workers (2006) have reviewed all of the existing evidence to date that examines the influence of periodontitis on pregnancy outcomes. This report concludes that more methodologically vigorous studies are needed. These studies are currently being conducted.

Periodontitis as a risk for diabetic complications

Similar to cardiovascular disease, diabetes mellitus is a common, multifactorial disease process involving genetic, environmental and behavioral risk factors.

Clinicians and investigators working with patients who have diabetes mellitus have studied whether periodontal treatment can improve glycemic control. Several studies have sought to answer this question using periodontal mechanical treatment as an intervention (Seppala, Ainamo, 1994; Aldridge et al, 1995; Smith et al, 1996; Christgau et al, 1998; Stewart et al, 2001). The results are not equivocal. Some researchers have found an improvement, while others have not. Clearly, further studies are to be done to answer this question.

In subjects with severe periodontitis, the death rate from ischaemic heart disease was 2.3 times higher than that of subjects with no or mild periodontitis after accounting for known risk factors. The death rate from diabetic neuropathy was 8.5 times higher in those with severe periodontitis. When deaths from renal and cardiac causes were analysed together, the mortality rate from cardiorenal disease was 3.5 times higher in patients with severe renal periodontitis (Saremi et al, 2005).

These findings further suggest that periodontal disease is a risk for cardiovascular and renal mortality in people with diabetes (Janket et al, 2003; Scannapieco et al, 2003a; Mealey, Rose, 2005; Saremi et al; Mealey, Oates, 2006).

What is unquestionable is that the diabetic patients have improved oral health with improvements in plaque scores.

Periodontitis as a risk for respiratory infections

There is emerging evidence that in certain at-risk populations, periodontitis and poor oral health may be associated with several respiratory conditions.

Respiratory diseases contribute to morbidity and mortality in human populations. Lower respiratory tract infections were ranked as the third most common cause of death worldwide in 1990, and chronic obstructive pulmonary disease (COPD) was ranked sixth (Scannapieco, 1999; Scannapieco et al, 2003).

There are a number of studies that examine the effect of treating oral infection in reducing the risk of pneumonia in high-risk populations. DeRiso and colleagues (1996) studied subjects admitted to a surgical intensive care unit. When subjects received a chlorhexidine rinse twice a day compared to control subjects receiving a placebo rinse, the incidence of pneumonia was reduced 60% in the chlorhexidine treated group compared to the control group. Fourrier and colleagues (2000) found a similar 60% reduction in pneumonia with the use of a 0.2% chlorhexidine gel.

In a landmark study, Yoneyama and co-workers (2002) examined the role of supervised tooth brushing plus providone-iodine on the incidence of pneumonia in a group of elders living in nursing homes in Japan. When these subjects had their mouths cleaned, with supervision, there was a 39% reduction in pneumonia over a two-year period compared to the control group.

Recent reviews of the evidence clearly indicate that when bacterial plaque is reduced in the mouth of at-risk subjects, the risk of pneumonia is reduced. The findings are, at present, limited to populations who are in special-care.

Summary

Dentistry has come a long way since it was proclaimed in 1900 that oral disease caused most systemic disease. In the 1950s we questioned and dismissed this theory. Another 40 years following this, we have come to a full circle. So, is it true that dentistry has a wider role in preserving general health? This is now the serious question.

References

For the full list of references to accompany this article, please email the editor at siobhan.lewney@fmc.co.uk.

Comments to pd@fmc.co.uk

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Manny Vasant MBE BDS MGDS FDS FFGDP Dip Imp Dent, is a specialist in prosthodontics.