Plaque, sugar, obesity, diabetes and smoking
Reassessing risk factors for periodontal disease
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Traditionally, dentists have been taught that both dental caries and periodontal disease develop and progress as a direct result of patients’ over-frequent consumption of refined sugars and patients’ failure to remove bacterial plaque effectively. Miller’s aetiological theory of caries development and the non-specific plaque hypothesis based on Lew’s work in the 1960s allow dentists to present a simple cause-and-effect explanation to patients.

Since then, the dental profession has blamed patients’ poor oral hygiene for periodontal breakdown and dental caries while often failing to diagnose and treat other contributing causative factors. Unfortunately, while plaque is generally a necessary ingredient of common dental diseases, the explanation contained in these theories of its pivotal role is simplistic given current knowledge. This brief article will attempt to put the more significant risk factors in context.

Plaque
Gingivitis is a natural bodily response to bacterial accumulation and as such is non-specific. Effective plaque removal will generally reverse gingivitis. The concept of inevitable progression from gingivitis to destructive periodontitis if oral hygiene is not good is, however, flawed. Figure 1 shows a 46-year-old patient with non-existent oral hygiene over several years. Figure 2 shows the same patient one month later after around 90 minutes of scaling and polishing by a student dental hygienist. He had no active caries and no more than ten per cent bone loss.

It has become increasingly evident that while some patients are “susceptible” to periodontal breakdown, others are more “resistant”. Common among these host-based factors leading to greater breakdown are the presence of diabetes and a smoking habit.

Diabetes
Several authors have demonstrated a clear relationship between degree of hyperglycaemia and severity of periodontitis, and it has become increasingly evident that while some patients are “susceptible” to periodontal breakdown, others are more “resistant”. Common among these host-based factors leading to greater breakdown are the presence of diabetes and a smoking habit.

In the UK Prospective Diabetes Study, it was shown that Type 2 diabetics who reduce their HbA1c by 1 per cent are 19 per cent less likely to suffer caries.16,17,18 Of these 16 per cent less likely to suffer caries failure and 43 per cent less likely to suffer amputation or death due to peripheral vascular disease.

Sugar
Traditionally, teaching on caries prevention has focused on the number of sugar exposures per day, especially between meals. Academic paedodentists suggest that provid- ed there are two daily exposures to fluoride in toothpaste, a maximum of six sugar exposures a day is unlikely to lead to significant enamel decalcification or caries.

However, a large study conducted in 2005 by Bernabe et al evaluated 17,072 adults over in years and concluded that “the amount of, but not the frequency of, sugars intake was likely to lead to significant enamel decalcification or caries”.8

Recently research in England has suggested that 1.4 million obese patients would benefit from gastric band or bypass (bariatric) surgery. Currently, around 8,000 people a year receive the treatment on the National Health Service (NHS). If all 1.4 million were offered surgery, the researchers estimate it would aver nearly 5,000 heart attacks and 40,000 cases of Type 2 diabetes over four years.

They don’t, however, discuss potential costs of this surgery, which can vary from £3,000 to £3,150 according to NHS England. Assuming £3,000 per procedure, this would total around an additional £7 billion in health costs. Nor is there much discussion on death rates (0.5 to 1 per cent with the present skill level of surgeons). Even if surgical skills do not diminish, we should anticipate between 7,000 and 14,000 additional deaths. It is likely that comprehensive periodontal treatment of all obese/prediabetic patients would be significantly less costly and, hopefully, result in few if any fatalities.

Conclusion
It is clear that the simple story of plaque control preventing progression of common dental diseases is largely fiction rather than evidence-based fact. While effective oral hygiene will always be a significant part of the management of dental diseases, the modern dental professional must be equally aware of the other common risk factors outlined in this article.

Editorial note: A complete list of references is available from the publisher.

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