Plaque, sugar, obesity, diabetes and smoking

Reassessing risk factors for periodontal disease

By Prof. Crawford Bain, United Arab Emirates

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 Laër’s work in the 1940s 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 is part of the dental profession’s role to inform patients of these interrelationships.

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Traditionally, teaching on caries prevention has focused on the number of sugar exposures per day, especially between meals. Academic paedodontists suggest that provided 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.

However, a large study conducted in 2015 by Bernabé et al. evaluated the potential costs of this surgery, which can vary from £3,000 to £15,000, according to NHS England. Assuming £13,000 per procedure, this would total around an additional £71 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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