TRENDS & APPLICATIONS

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 Lea’s work in the 1950s 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 more significant risk factors in context.

Plaque

Gingivitis is a naturally 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 10 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 diabetes significantly increases the risk of developing periodontal disease as a result of smoking constituting a range: 2.5 to 3.97 for current smokers and 1.68 for former smokers, and 3.25 for light smokers to 7.28 for heavy smokers. A smoker with 20 pack years (20 cigarettes per day for 20 years) is up to 600 per cent more likely to lose teeth owing to periodontal disease, whereas a patient with poor plaque control has around 15 per cent risk of progressing to destructive periodontitis. Why then do we refer to hygiene phase therapy when smoking is a much greater risk factor than poor oral hygiene? How many dentists spend as much time on smoking cessation counselling as they do on oral hygiene instruction?

Sugar

Traditionally, teaching on caries prevention has focused on the number of sugar exposures per day, especially between meals. Academic paedodentists 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 1,702 adults over 11 years and concluded that the amount of, but not the frequency of, sugars intake was significantly associated with DMFT (decayed, missing and filled teeth) and that while some patients are susceptible to significant caries and caries progression, a prediabetic state of hyperglycaemia is a significant factor. A meta-analysis of the other common risk factors showed that body mass index was significantly associated with periodontal disease. Other studies have indicated a less strong association, and with the confounding variable of blood sugar levels in peridontitis, it is presently unclear what the independent risk factor is or associated with the established role of diabetes.

Smoking

We have known for over 20 years that smoking increases the risk of periodontal breakdown. Odds ratios for developing periodontal disease as a result of smoking constitute 2.5 to 3.97 for current smokers and 1.68 for former smokers, and 3.25 for light smokers to 7.28 for heavy smokers. A smoker with 20 pack years (20 cigarettes per day for 20 years) is up to 600 per cent more likely to lose teeth owing to periodontal disease, whereas a patient with poor plaque control has around 15 per cent risk of progressing to destructive periodontitis. Why then do we refer to hygiene phase therapy when smoking is a much greater risk factor than poor oral hygiene? How many dentists spend as much time on smoking cessation counselling as they do on oral hygiene instruction?

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 qualitatively aware of the other common risk factors outlined in this article.

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

Crawford Bain, a UK-certified specialist in periodontology, prosthodontics and restorative dentistry, is currently Professor of Post-Graduate Periodontics at the Hamdan bin Mohammed College of Dental Medicine in Dubai in the United Arab Emirates. He can be contacted at crawford.bain@hhms.ac.ae.