“Plaque, Sugar, Diabetes, and Smoking – Reassessing Risk Factors”

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Introduction

Most people base their practice on an understanding of various risk factors thought to contribute to the common Dental Disorders. It has been taught that Dental Plaque (biofilm) is a product of caries and periodontal diseases, the former requiring the added ingredient of frequent sugar exposure and the latter, if it is to progress to significant bone loss, needing the presence of one or more complicating factors such as Genetic Susceptibility, Smoking and Diabetes.

Accordingly dental prevention has focused on effective regular plaque removal and a reduction in the frequency of exposure of cigarette use, as well as the overeat- ing/under-exercising combination which appears to tip the Type 2 Diabetes. Twice daily brushing with a fluoride containing toothpaste communi- cates the need for such measures to the general public. Surrogate Outcomes to measure ef- fectiveness have been widely advocated as effective preventive measures, while twice yearly check- ups have been recommended to fa- cilitate early detection and manage- ment of dental problems. It is the purpose of this article to re- view the existing justifications for these commonly held beliefs, and whether or not there are new preven- tive approaches to the effec- tive prevention and ideally preven- tion of Dental Caries and Periodontal Diseases.

Measuring the Effectiveness of Preventive Measures

Webster’s dictionary defines an OUTCOME as “Something that occurs as a result or consequence of an action.” Surrogates are measures of effect without direct treatment interventions. These include a Plaque Index; less than desirable diet, or one with high percentages of bacterial pathogens and reductions in other easily meas- ured parameters related to the level of plaque. Surrogates have demonstrated indices which assess hard or soft tissue as well as the quantity and qual- ity of life. In medicine a new cancer drug may easily be assessed in its effectiveness by reducing blood white cell counts (a Surrogate Outcome) whereas 5 and 10 year survival rates when us- ing the drug, compared to alterna- tive treatments or a placebo are the Real Outcomes which are important to the patient, its use, and the time they take many years to establish. In den- tistry we are often presented with Surrogate Outcomes. For example, plaque removal using power versus manual toothbrushes, but seldom find Outcomes from complete toothbrushing or caries develop- ment. Such practices are simple realistic reasons for this. Studies using Surrogate Outcomes are relatively fast and cheap giving a sponging company results and a researcher a publication within a few years. The results from such studies as measures are very costly, need larger sample sizes and take years to complete, and few companies and few researchers see corporate or academic benefits in participating. Yet these are the studies we need for long term effective prevention. Let’s look at one tomorrow.

Dental Caries

There are essentially 2 diseases to consider. Enamel Caries, most com- monly the cause of 1 out of 3 years of life, and Root Caries, common in the last 30 years of life. From age 10 to 59 years, enamel caries is the most common except in extreme cases. Surrogate outcomes include plaque evidenced reduction in and/to reduction and ideally preven- tion in Lactobacil- lasa counts. For many years we have known that with use of minimal fibre diet and fluoride toothpaste, plaque formers can be identified and eventually improved.

If we cannot, however, advocate the use of fibre to prevent caries, how about toothbrushing? Fortunately we have a longitudinal study with a 20 year follow-up showing that brushing at least once a day reduces caries progression in almost impos- sibly improve.

We have known for over 20 years of the association between smoking and progression of Dental Caries. We have also known for over 20 years of the association between smoking and progression of Periodontal Diseases. Smoking cessation counseling and long term periodontal care is the only other treatment which has been shown to help smokers, it being 10 to 100 times more effective than gum disease alone (8) and there are many other encouraging studies which show that quitting smoking is a good investment in extending the life of teeth and perhaps also in extending your life time. We have also known for over 20 years that smoking is a contributory cause of many different diseases, routine use of dental fl ossing little if any benefit. The profes- sion should focus on effective brush- ing and regular attendance.

Smoking

We have known for over 20 years of the association between smoking and progression of Dental Caries. We have also known for over 20 years of the association between smoking and progression of Periodontal Diseases. Smoking signifi cantly in- creased the risk of tooth loss due to periodontal disease (Odds ratios [OR] 2.5 to 6.6). When corrected for other variables, smoking signifi cantly in- creased the risk of increased attach- ment loss compared to matched controls (OR 2.0 to 5.2) (10). In a longitudinal study of 393 patients followed for 10 years that smokers lost almost twice as much bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod, while a smoker with gum disease, had double bone as non-smokers over this pe- riod. According to Diabetes UK, if such a reduction could be sustained in Diabetic patients it might result in a diabetic living long 5% less likely to suf- fer cataracts, 15% less likely to suffer heart failure and 45% less likely to suffer amputation or death due to peripheral vascular disease. Clearly these are enormous potential health benefits.

Discussion

It seems apparent that many of our traditional approaches to preven- tion, while truly well intentioned, have a weak evidence base. It is chal- lenging for any health care profes- sionals to be asked to question the veracity and benefits of a long used set of preventive recommendations that continue to be presented outof context to lapse into Cognitive Disso- nance and possibly even denial. It is however our Duty of Care to offer all patients the most current evidence based advice for the prevention and management of dental diseases. It is beyond the scope of this article.
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to address the relationship of the various risk factors to Peri-Implant diseases and implant failure. In view of the rapid increase in the use of dental implants and the self-evident truth that the vast majority of implant patients lost their teeth due to Caries or Periodontal Disease, it is equally important that dental health care professionals appreciate the relative importance of the risk factors outlined above on Peri-implant diseases. In a very recent extensive retrospective study Derks et al (18) identify moderate to severe peri-implantitis in 14.5% of implant patients examined, and report on the Odds Ratios inlined above on Peri-implant diseases.

Conclusions

Our understanding of the relative importance of the various major risk factors for Caries and Periodontal diseases should be evidence based and current. At present it is reasonable to conclude the following:

1. Recent research has indicated that the total amount of sugar consumption is more important than the number of sugar exposures per day in the development of carious dental lesions.
2. There is little to support the use of dental floss as a preventive measure for dental caries or gingivitis.
3. Effective toothbrushing, using a fluoride toothpaste and a power brush, is by far the most effective preventive measure to minimize dental caries and periodontal diseases.
4. To minimize the incidence of root caries in the elderly oral hygiene must be supplemented with peri-apical application of a fluoride or chlorhexidine preparation.
5. While oral hygiene is important in controlling Periodontitis in the susceptible patient, compliance with a comprehensive Supportive Periodontal Maintenance Recall regimen is likely even more critical in preventing progression and tooth loss due to Periodontitis.
6. To achieve the best outcomes in periodontally susceptible patients who smoke, smoking cessation programs must accompany traditional “Hygiene” phase therapy.
7. To achieve the best outcomes in diabetic patients with Periodontitis the dental professional must work closely with the medical clinician responsible for diabetes care. Improvements in one disease are likely to be complemented by improvements in the other.