

Point of Care

The Point of Care section answers everyday clinical questions by providing practical information that aims to be useful at the point of patient care. The responses reflect the opinions of the contributors and do not purport to set forth standards of care or clinical practice guidelines. This month's responses were provided by speakers at the FDI World Dental Congress, which will be held August 24 to 27 in Montreal, Quebec (pre-Congress courses will take place August 22 and 23). For more information on the Congress, visit www.fdiworldental.org.



Question 1 What protocol can I incorporate into my practice to improve the outcome of pit and fissure sealant application?

The successful application of pit and fissure sealants represents a unique opportunity to expose children and young adults to our profession's best disease-reducing procedure. Yet regarding sealant application as a "simple" adhesive procedure ignores the complex clinical reality, which demands that the dental team respond appropriately to a continuum of challenging presentations. In fact, sealants require at least as much attention to protocol as traditional composite restorations if the outcome is to be successful.

Sealant failure usually results from one or more of the following situations:

- *Existing demineralization or caries:* It is possible to "seal in" biologically active caries with resin sealants. The challenge (clinical, ethical and legal) lies in accurately

assessing the threshold point for determining carious involvement and determining how to avoid falling prey to the phenomenon of "hidden caries."

- *Poor preparation of the tooth surface:* Although the past several decades have seen clinical improvements in adhesive restorations, sealant application remains relatively unchanged. Simple and affordable technologies exist that can greatly enhance the bond strength of sealant to tooth by ensuring removal of materials that contribute to inadequate adhesion.
- *Isolation:* All members of the dental team must be capable of meeting the various clinical presentations of teeth requiring pit and fissure sealants where first-line efforts at isolation have been inadequate. The rubber dam, the gold standard for isolation, can be counted on to provide



Figure 1: Rubber dam isolation is easy to achieve.



Figure 2: Disclosing dye shows the extent of plaque requiring removal.



Figure 3: Plaque remaining after use of a rotary pumice for 30 seconds.



Figure 4: Prophy-Jet air-polishing system allows proper treatment for etching.



Figure 5: The etchant is placed beyond the area which will be covered by the sealant and left for 30 seconds.



Figure 6: The sealant is placed and cured.

the entire team with superior working conditions when isolation from soft tissues and saliva is required.

Case Report

A 6-year-old girl needs application of sealants to all first molars. The patient's records indicate that sealants were recommended at the last recall visit, but the child's and the parents' busy schedules have delayed "ideal" timing of treatment. Readings from a DIAGNOdent laser caries detector (KaVo America Corp., Lake Zurich, Ill.) suggest a small upward change (from 0 to 8) in 1 or 2 fissures. Her active tongue, an excess of saliva and a predisposition to heavy plaque present a challenge to our dental auxiliaries, so a decision is made to place a rubber dam. Isolation is achieved by delivering liquid topical anesthetic circumferentially in the sulcus to the depth of the junctional epithelium. This step greatly facilitates the placement of an aggressive rubber dam retainer with no discomfort (Fig. 1), yet is ideal for minimally invasive restorative procedures where syringe delivery of local anesthetic is not required.

A plaque-disclosing dye is applied to the occlusal and buccal surfaces for demonstration purposes (Fig. 2). The fissures are cleansed for 30 seconds with rotary instrumentation and pumice and are then evaluated for efficacy of plaque removal (Fig. 3). More thorough removal of plaque is achieved by a 15-second treatment with a Prophy-Jet air-polishing prophylaxis system (Dentsply, York, Pa.) (Fig. 4), followed by selective removal of demineralized enamel with a small air abrasion instrument. When optimal preparation of the pit and fissure surface has been achieved, traditional etchant is extended beyond the

intended sealant domain and left for at least 30 seconds (Fig. 5). A sealant material is carefully delivered to the fissures and extended to include secondary grooves along the incline planes of the cusps (Fig. 6).

Conclusion

Pit and fissure decay now accounts for a disproportionate amount of the dental disease experienced by children and young adults. Dentists who have been frustrated by the failure of sealants to counter the insidious nature of fissure caries can significantly improve their clinical success by implementing some of the steps outlined above. On the horizon we can look forward to advances in glass ionomer sealant materials, which offer promise for dealing with situations involving suboptimal isolation or the need for a cariostatic restorative material. ♦



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The author has no declared financial interests in any company manufacturing the types of products mentioned in this article.

Dr. Bryant's pre-Congress session at the FDI meeting, titled "Air abrasion — its role in the evolving continuum of minimally invasive dentistry: a diagnostic and hands on experience on the various forms of conservative tooth preparation," will be presented on Tuesday, August 23.

Further Reading

- Brown JR, Barkmeier WW. A comparison of six enamel treatment procedures for sealant bonding. *Pediatr Dent* 1996; 18(1):29-31.
- Ellis RW, Latta MA, Westerman GH. Effect of air abrasion and acid etching on sealant retention: an in vitro study. *Pediatr Dent* 1999; 21(6):316-9.
- Simonsen RJ. Pit and fissure sealant: review of the literature. *Pediatr Dent* 2002; 25(5):393-414.

Question 2

What do we know about preventing root caries in older adults?

Background

With the aging of the population and improvements in dental care, more older adults are retaining more of their natural dentition throughout their lives. In addition, various chronic medical conditions and the medications to treat them can decrease salivary flow, which may result in an increased risk of root caries.

Periodontal diseases and related therapy, particularly gingival recession and periodontal surgery with exposure of root surfaces, place these surfaces at increased risk for caries. Since root surfaces are essentially composed of cementum and dentin, with only 70% mineralization, they are much more susceptible to carious breakdown than the coronal enamel surfaces.

Restoration of these lesions can be difficult. Isolation, identification of the extent of the lesion along the root surface and selection of materials are critical (Figs. 1a and 1b). For both the clinician and the patient the best approach is prevention, because restoring these lesions can be very difficult and technically demanding.¹ Furthermore, with increasing income and education levels among the well elderly population, patients are much more interested in maintaining their oral health. So what can be done to prevent the problem of root caries?

Clinical Management

Most studies on the prevention of dental caries have been done in children and have focused on the use of

fluorides, chlorhexidine and sealants. Research in the 1980s demonstrated that fluorides were effective in preventing coronal and root caries in adults and older adults as well. Fluorides work primarily through their remineralizing effect on the outer surfaces of the tooth. Stamm and others² found that community water fluoridation resulted in fewer root caries among Canadian adults who were lifelong residents of a community with this type of water treatment than among those living in communities without fluoridation. Billings and others³ found that 5% sodium fluoride was effective in preventing root caries and in remineralizing early lesions in populations of older adults. Fluoride varnishes have been effective in preventing coronal caries in the primary and permanent dentitions in children. These results have been extrapolated to support the current use of fluoride varnishes as a preventive measure in older adults, although little clinical research has been conducted in the latter age group.

Chlorhexidine has been studied for its effectiveness in preventing caries in children, but few studies have been conducted in adults. The greatest drawback of this compound is its propensity for staining; however, its antibacterial effects can outweigh this disadvantage among patients for whom bacterial control is important, such as those with Sjögren's disease or other immune-compromising conditions.

In clinical practice, the first step in preventing root caries is to identify patients who are at high risk (Figs. 2 and 3). Existing caries are the best predictor of future caries. A patient with one root-surface carious lesion should be considered at high risk, since the breakdown of one surface signals the likelihood of other surfaces breaking down quickly.

The medical history will identify patients with chronic medical conditions and those taking multiple medications. Patients taking medications with anticholinergic effects, such as blood pressure medications, antidepressants and antipsychotic medications, are at greater risk. The oral examination will identify patients with gingival recession and decreased salivary flow. Salivary flow can be assessed quickly by "milking" the parotid glands and the submandibular glands and looking for fluid output at the Stensen's and Wharton's ducts.

Once a patient at high risk is identified, several measures should be taken. The patient should be counselled about



Figure 1a: Patient with root caries on the distal surface of the mandibular molar.



Figure 1b: The mandibular molar has been restored with amalgam.



Figure 2: Patient at risk for root caries as a result of heavy plaque on the root surfaces around the crowns of the prosthesis.



Figure 3: Patient at risk for root caries as a result of periodontal disease, which causes exposure of multiple root surfaces. (Slide courtesy of Dr. Jon Suzuki.)

the importance of brushing 3 times daily with a fluoride dentifrice. He or she should be advised to modify the diet to decrease intake of refined carbohydrates. In addition, the dental professional should prescribe (for patients who can brush) 1.1% neutral sodium fluoride (e.g., Preident, Colgate-Palmolive, Toronto, Ont.; NeutraCare, Oral-B, Mississauga, Ont.) for home use. For patients who may be medically compromised or unable to brush thoroughly because of arthritis, Parkinson's disease or dementia, the dental professional should consider applying a fluoride varnish to the root surfaces 3 or 4 times per year to promote remineralization (Duraphat, Colgate-Palmolive; AllSolutions 5% Sodium Fluoride Varnish, Dentsply, Woodbridge, Ont.).

Chlorhexidine mouth rinses should be considered as adjunct therapy to control bacterial populations. One research group advocates a one-week chlorhexidine mouth rinse regimen, to be performed once each month (Professor John Featherstone, University of California at San Francisco, personal communication, May 2004), on the assumption that the chlorhexidine rinse will disrupt the bacterial biofilm. Since *Streptococcus mutans* recolonizes within 2–3 weeks, the monthly rinse serves to continuously disrupt the biofilm and thereby inhibit caries formation.

The clinician should bear in mind that successful remineralization of root caries can cause a soft yellow lesion to become hard and brown. Depending on the location, esthetic considerations may become an issue. However, for

medically compromised patients, particularly those with dementia and other conditions in which the provision of dental care is particularly difficult, this may be preferred over allowing the lesion to progress. ♦



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Dr. Niessen's session at the FDI meeting, titled "Practical tips for caring for older adults," will be presented on Friday, August 26.

References

1. Jones JA. Root caries: prevention and chemotherapy. *Am J Dent* 1995; 8(6):352-7.
2. Stamm JW, Banting DW, Imrey PB. Adult root caries survey of two similar communities with contrasting nature fluoride levels. *J Am Dent Assoc* 1990; 120(2):143-9.
3. Billings RJ, Brown LR, Kaster AG. Contemporary treatment strategies for root surface dental caries. *Gerodontology* 1985; 1(1):20-7.

Question 3 Is there a benefit to light-activated tooth whitening?

Background

Tooth whitening has exploded in popularity in recent years. Patients now have many more options for whitening their teeth, and many dentists are looking for something unique to offer to their patients. Because of media coverage about light-activated bleaching, patient demand for this process is increasing.

Few peer-reviewed papers have been published about light-activated bleaching, and much of what has been published had corporate sponsorship. My colleagues and I have done 3 studies, which indicated that light activation is not as effective as previously thought.¹⁻³ In 2 of these studies,^{1,2} we used a variety of evaluation methods to assess the degree of whitening achieved with a combination of light and bleaching gel compared with gel only. We found little to no difference between the light-activated side and the side that received the bleaching gel alone. In a more recent publication,³ we used a large sample of patients to examine one of the more popular light-activated systems; the method was only minimally effective. Furthermore, there was significant colour relapse at 30 days (Figs. 1 to 4).

All systems recommend a take-home tray as an adjunct, so the question is whether any observed benefit is due to the light or the tray. My sense is that use of a tray for delivery of the whitening material causes most of the lightening effect. However, even if the lights confer some benefit, the minimal effect leads me to question whether their use is justified.



Figure 1: Preoperative photograph before bleaching.



Figure 2: This photograph obtained after 60 minutes of light activation in combination with whitening gel shows an immediate whitening effect.



Figure 3: Seven days after treatment, there is significant rebound (darkening) of the bleached teeth.



Figure 4: Thirty days after treatment the rebound is significant, with levels approaching the baseline levels. No take-home tray was given to this patient.

Clinical Management

I recommend an office-generated tray system because it is more clinically effective and more cost-effective for both the patient and the dentist. The clinician also has the option of using a prefabricated tray (e.g., Trey White, Ultradent Inc., South Jordan, Utah) or professional Crest White Strips (Procter & Gamble, Cincinnati, Ohio), both of which have been shown to be clinically effective.

My first choice for whitening material is 16% carbamide. If the patient experiences discomfort, the

concentration of carbamide can be reduced to 10% and the wearing time can be shortened. The major benefit comes during the first 2 hours of wearing the tray. Thus, the real benefit of wearing a tray overnight is convenience.

Dentists and office staff need to be aware of several issues when providing tooth-whitening services: potential tooth sensitivity, appropriate concentrations of products, duration of application and safety. Approximately 50% of patients will experience sensitivity, usually mild and transient.⁴ However, in our recent study³ of light-activated systems, 90% of the patients experienced sensitivity, with about half experiencing moderate to severe sensitivity.

In my experience, many dentists — even those who use bleaching every day — know very little about the mechanism of bleaching and related issues. Bleaching is primarily an oxidation process, whereby organic materials, particularly superficial chromophores, are oxidized; this process penetrates the enamel and dentin. The literature indicates that at 6 years after bleaching, approximately 60% of patients felt they did not need to rebleach their teeth. However, patients' demands are changing, and these numbers are changing, with more patients wanting to bleach more often.

Two years after bleaching is completed, I usually recommend one day of rebleaching for every week of initial bleaching. Some patients abuse bleaching by overuse, but there is no evidence that overbleaching causes permanent damage to the tooth structure.⁵ In a recent study⁶ we bleached patients' teeth with tetracycline stain continuously for 6 months and found no damage to tooth hard tissue or pulp. There was also no evidence of systemic damage.

Bleaching should not be considered a money-generating service for the office; rather it should be thought of as a practice-building service that increases patients' interest in esthetic dental procedures in general. ♦



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Dr. Kugel has received corporate grants for whitening research from Procter & Gamble, Ultradent, Den-Mat, 3M and Sonicare.

Dr. Kugel will be a panellist on the pre-Congress symposium on esthetics to be held Wednesday, August 24. He will be discussing "Principles of esthetic dentistry" and "Do's and don'ts."

References

1. Papathanasiou A, Kastali S, Perry RD, Kugel G. Clinical evaluation of a 35% hydrogen peroxide in-office whitening system. *Compend Contin Educ Dent* 2002; 23(4):335–8, 340, 343–4.
2. Kugel G, Papathanasiou A, Williams AJ. Clinical evaluation of two different in-office tooth whitening systems. *IADR* 2003; 81:[abstr 897].
3. Kugel G, Ferreira S, Sharma S, Barker ML, Gerlach RW. Clinical trial assessing light enhancement of in-office tooth whitening. *J Dent Res* 2005; 84(3):[abstr 0287].
4. Kugel G, Aboushala A, Zhou X, Gerlach RW. Daily use of whitening strips on tetracycline-stained teeth: comparative results after 2 months. *Compend Contin Educ Dent* 2002; 23(1A):29–34.
5. Kugel G, Ferreira S. The art and science of tooth whitening. *J Mass Dent Soc* 2005; 53(4):34–7.
6. Kugel G, Aboushala A, Zhou X, Gerlach R. Six-month continuous use of two at-home professional bleaching systems on tetracycline stain. *J Dent Res* 2003; 82(3):32.

Question 4

How can tooth loss affect diet and health, and what nutritional advice would you give to a patient scheduled for extractions?

Background

The primary function of teeth is chewing; hence, the loss of even a few teeth adversely affects chewing ability, which in turn has an impact on diet, nutrition and, potentially, systemic disease. A reduction in masticatory ability, manifested as reduced ability to chew harder foods, can lead to lower levels of specific nutrients. For example, a reduction in the intake of carrots causes levels of carotene to decline. Several studies have shown that tooth loss is associated with a decreased intake of specific foods such as fruits and vegetables and nutrients such as fibre and carotene.¹

Many foods and nutrients (in either excessive or inadequate amounts) have been related to major chronic diseases such as cardiovascular disease, diabetes and cancer. Dietary

guidelines are based on the aggregate evidence from several diet – disease relationships. The most up-to-date dietary guidelines are summarized in the new healthy eating pyramid (Fig. 1),² which is widely accepted as the current standard; this food pyramid improves on and replaces the earlier U.S. Department of Agriculture food pyramid. The Canadian “Food Guide to Healthy Eating” also suggests the kinds of foods that contribute to health.³ These general guidelines must be adapted for individual patients to address specific systemic conditions or other special needs.

Some cross-sectional studies suggest that people with fewer teeth may have an increased risk of systemic disease because of their diet. Our longitudinal study demonstrated that tooth loss could actually lead to changes in diet.⁴ Tooth loss has also been directly associated with cardiovascular disease. The extent to which an association between tooth

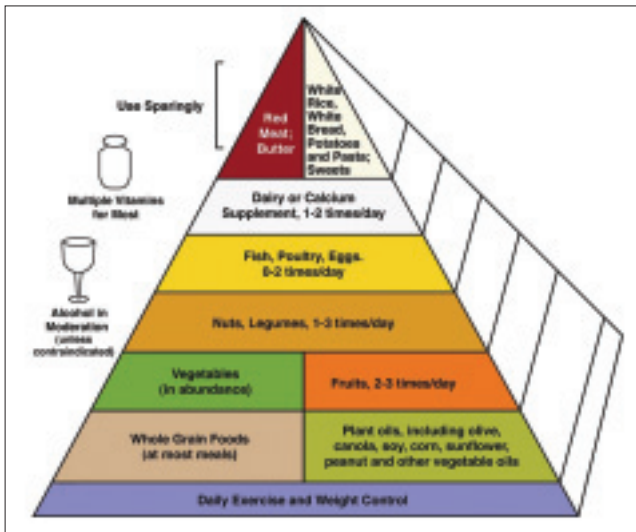


Figure 1: Healthy eating pyramid. Source: Willett WC. *Eat, drink, and be healthy. The Harvard Medical School Guide to Healthy Eating.* New York: Simon & Schuster; 2001. Adapted from www.hsph.harvard.edu/nutritionsource/.

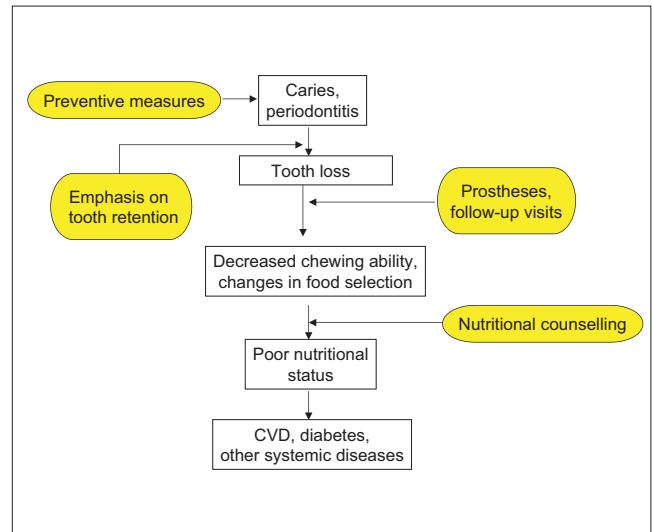


Figure 2: The dentist's roles in prevention and treatment of tooth loss and related nutritional counselling (yellow boxes). CVD = cardiovascular disease.

loss and cardiovascular disease could be due to diet, antecedent periodontal disease or other factors is unclear.⁵

Role of the Dentist in Nutritional Counselling

When multiple extractions have been scheduled, the dentist should inform the patient of the possible consequences of tooth loss on nutrition and systemic health. The visit during which the extractions are performed is also an opportunity to inform the patient about the value of a healthy diet, for both dental and systemic health (Fig. 2). Because the health conditions and dietary needs of individual patients vary, standard dietary guidelines are often inappropriate. Referral to a dietitian for individual counselling may be necessary, especially if systemic disease or other special needs are already present. The dentist should use judgement in deciding when to refer a patient to a dietitian.

The need for a good prosthesis, to enable patients to chew more efficiently after tooth loss, should also be emphasized. Although chewing efficiency is better with a prosthesis and improves even more with implants, food selection and nutritional status do not return to pre-extraction levels. Because the ability to eat certain foods is hampered by tooth loss, targeted efforts should be made to maintain a good diet. Even with a prosthesis, it may be necessary to adjust the preparation of some food items. For example, whole carrots and carrot sticks are difficult to chew, but carrots can be grated or pureed and incorporated into recipes. Similarly, other foods can be processed to make them easier to eat without diminishing their nutritional value.

It is beneficial to schedule follow-up visits for any patient with a new prosthesis, not only to check the fit and comfort of the prosthesis, but also to specifically inquire about any difficulty encountered while eating. The dentist

can offer help, advice and referrals as indicated. Given that tooth loss not only leads to a detrimental diet, but may also increase the risk of systemic disease, the best approach is for dentists to help prevent or minimize tooth loss. Hence, more attention should be given to preventing and controlling the progression of dental caries and periodontal disease, the major indicators for tooth loss. The importance of retaining teeth and the consequences of tooth loss should be stressed to patients before problems develop, and maintaining good nutrition should be emphasized before extractions are performed. ♦



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Dr. Joshipura's session at the FDI meeting, titled "Oral health, nutrition and systemic disease," will be presented on Thursday, August 25.

References

- Ritchie CS, Joshipura K, Hung HC, Douglass CW. Nutrition as a mediator in the relation between oral and systemic disease: associations between specific measures of adult oral health and nutrition outcomes. *Crit Rev Oral Biol Med* 2002; 13(3):291–300.
- Willett WC. *Eat, drink, and be healthy. The Harvard Medical School Guide To Healthy Eating.* New York: Simon & Schuster; 2001.
- Health Canada. *Canada's Food Guide to Healthy Eating.* Available from: URL: http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html.
- Hung HC, Colditz G, Joshipura KJ. The association between tooth loss and the self-reported intake of selected CVD-related nutrients and foods among US women. *Community Dent Oral Epidemiol* 2005; 33(3):167–73.
- Joshipura KJ, Douglass CW, Willett WC. Possible explanations for the tooth loss and cardiovascular disease relationship. *Ann Periodontol* 1998; 3(1):175–83.