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 authors and do not purport to set forth standards of care or clinical practice guidelines. This month's contributors are from the University of Toronto's faculty of dentistry.

QUESTION 1

Are any practical supplementary tests available for diagnosing active periodontal diseases in the dental office?

Although periodontal disease is largely a host-innate immune response to bacterial infection, diagnosis in the average private dental practice is currently limited to traditional assessment based on signs of previous periodontal destruction. This evaluation includes intraoral observation of gingival inflammation, periodontal probing depths, loss of clinical attachment, radiographic bone loss, and signs and symptoms of active disease including ulceration and suppuration.[1]

Currently, determining the severity of chronic periodontitis, as classified by the American Academy of Periodontology,[2] is based on loss of clinical attachment as measured by a periodontal probe. However, periodontal probing is a poor predictive measure of future attachment loss.[3] Diagnosing disease and selecting appropriate treatment in medicine and dentistry should ideally rely on the knowledge that disease is in fact active and progressing. A common dilemma faced by dental practitioners is the differentiation between active periodontitis and quiescent disease that is superimposed on an already reduced periodontium. Our current clinical parameters are not effective at predicting progression of periodontal disease.[4]

Supplemental Diagnostic Tests

There is much research in the field of periodontal diagnostics. Studies have been directed at a deeper understanding of the immunopathophysiology of the disease, including the microbial infection itself and the host immune response. Current supplemental diagnostic tests can be divided into 4 categories.

Detection of Periodontal Pathogens

To detect the presence of microbial pathogens, microscopy, DNA analysis, assessment of antigenic profiles and enzymatic activities of certain members of the subgingival flora have all been studied as possible diagnostic tests.[1] Research has shown these tests to be only moderately successful in identifying ongoing disease and many involve specialized equipment and increased clinic time, which make them impractical for use by the dentist in private practice.

Host-Derived Enzymes, Tissue Breakdown Products, Inflammatory Mediators

Several studies have aimed at developing a chairside assay for markers of active disease in the gingival crevicular fluid (GCF). Host-derived enzymes that have received the most attention are aspartate aminotransferase, alkaline phosphatase, ß-glucuronidase, elastase, cathepsins, dipeptidyl peptidase, prostaglandin E2 and cytokines. Although some of these markers hold promise, the collection of GCF is labour intensive and impractical in the dental office. Currently none of these assays is at the stage where it can be used as a practical clinical diagnostic test.[1]

Genetic Testing

Currently, the only available test in this category is a test for polymorphisms in the IL-1 gene cluster. Those who carry this composite genotype may be more susceptible to bleeding on probing, severe chronic periodontitis, tooth loss and reduced ability to gain attachment after guided tissue regeneration procedures. This test cannot be used in all ethnic groups. For example, in some oriental populations, prevalence of this polymorphism is very low and is not a good marker for periodontal risk. Therefore, this test is more of a risk identifier than a diagnostic tool.[1]

White Blood Cells

Elevated levels of white blood cells (WBCs), primarily neutrophils, are found in the saliva and plaque of patients with periodontitis. WBCs arrive at these inflamed sites in response to the presence of bacteria and their by-products. Currently,

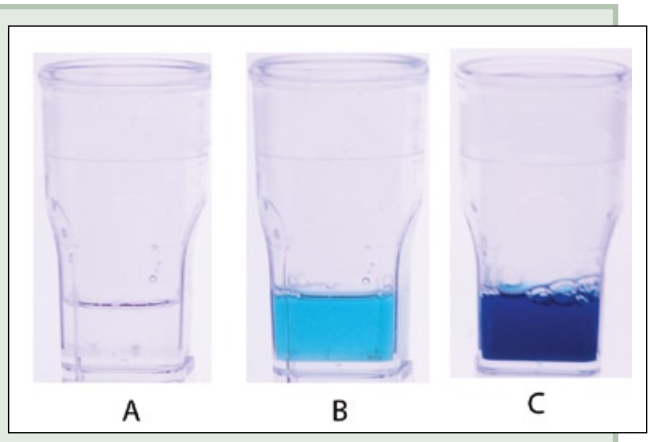

Figure 1: Rinses exhibiting colour change 3 minutes after addition of colour reagent. Rinse from (a) healthy patient, (b) patient with moderate periodontitis and (c) patient with severe periodontitis.

researchers are looking at WBC levels in both plaque and saliva as diagnostic indicators of active periodontal disease. Results of 1 study[5] have suggested that WBC counts in the subgingival plaque are more indicative of active inflammation and ongoing disease than probing depths. The authors also suggest that by using WBC counts as a diagnostic test, surgical treatment of non-active sites can be avoided and active sites can be detected and treated without deep probing. A limitation of this technique is the requirement for phase-contrast microscopy, which involves additional equipment, training and time. However, the authors state that the entire sampling and counting procedure takes only 3 minutes, which is not a significant addition to the time required for complete periodontal examination.

A recent study[6] has shown that elevated levels of WBCs in the mouth, as collected in a 30-second mouth rinse, reflect the presence and severity of ongoing disease. Furthermore, following periodontal treatment, oral WBCs return to low levels. Although this study also used a microscope to count cells, which is impractical for chairside diagnosis, a new colorimetric adaptation of the rinse test from the same laboratory is currently being tested for use in daily dental practice and by patients at home. As shown in **Fig. 1**, the addition of a colour-changing reagent to the oral rinse sample accurately shows neutrophil levels in the patient's mouth and aids in diagnosing active periodontitis quickly at chair side.

Conclusion

Periodontal examination in the private dental and periodontal practice involves the use of the periodontal probe as the standard examination tool. Due to limitations described above, research is ongoing into the development of supplementary diagnostic tests. Currently, no practical tests are available for identifying active disease in the dental office setting, although promising data show that supplementary tests may be available in the near future.

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QUESTION 2

What are the new guidelines to treat an avulsed tooth?

Avulsion of a tooth is one of the most stressful dental injuries that patients and dentists can face. According to the international literature, avulsions represent 1% to 16% of all dental injuries.[1] The only Canadian study examining the incidence of avulsions was a study of self-reported frequency conducted in the province of Ontario,[2] in which 25% of those who reported dental injuries had suffered an avulsion. The high incidence of these injuries indicates a need to reinforce and disseminate current knowledge about management and treatment among health care professionals. The prognosis depends on measures taken on site immediately after the avulsion. Dentists should be prepared to give appropriate advice to the public about first aid for an avulsed tooth, especially specific instructions to parents or patients at the emergency site. The dentists' instructions should include the following:[3]

- Keep the patient calm.
- Find the tooth and pick it up by the crown; avoid touching the root.[4]
- Wash the tooth briefly (for 10 seconds) under cold running water and reposition it (**Fig. 1**).
- If replantation on site is not possible, place the tooth in a suitable storage medium, e.g., cool milk or saline. The tooth can also be transported in the mouth, between the molars and the inside of the cheek. Avoid storage in water.
- Recommend to the patient or a parent to seek emergency dental treatment immediately.

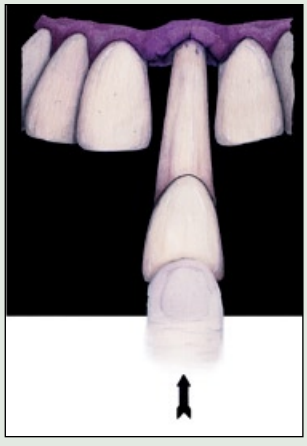

Figure 1: Replantation of an avulsed tooth. Reproduced with permission from reference 4.

Avulsion Guidelines

The biggest challenge in the management of avulsions has been the limited number of human clinical trials supporting available treatment guidelines.[5,6] However, on the basis of the available literature and group discussions involving experts in the field, the International Association of Dental Traumatology has developed a consensus statement[3] offering dentists and other health care professionals advice about the most appropriate care

One of the most significant changes in the current guidelines is that pretreatment of the avulsed tooth (i.e., before replantation) with Emdogain enamel matrix (Straumann Canada Ltd., Burlington, Ont.) derivative is no longer recommended; studies to date have not been able to clarify whether this material improves outcome.[7–11] In addition, replantation is recommended for avulsed teeth (with open or closed apex) even if there is a delay of more than 60 minutes after the trauma, although the long-term prognosis for such teeth is poor. In these cases the periodontal ligament will be necrotic, and healing is not expected; instead, an eventual outcome of ankylosis and resorption of the root can be anticipated. The goal of delayed replantation is to maintain the contour of the alveolar ridge. If ankylosis occurs in a child less than 15 years of age with infraposition of the tooth crown by more than 1 mm, decoronation is recommended to preserve the contour of the alveolar ridge.[11,12]

As with any other guideline, the health care provider must apply clinical judgment according to the conditions of the particular traumatic situation and must keep in mind that following the guidelines will not guarantee a favourable outcome, although it will increase the chances of success. For the complete course of action in treating avulsed teeth, dentists should refer to the guidelines of the International Association of Dental Traumatology.[3]

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QUESTION 3

How do I select an alloy for cast gold restorations, and what should I include on the prescription for the laboratory?

Given that the dentist is responsible for the materials that dental laboratories use in constructing restorations, the prescription is a core document in the treatment process. However, if terms in the prescription such as high noble, noble and predominately base metal are used to prescribe the gold content and type I, II, III or IV to indicate the strength, then selection of the specific alloy is left to the laboratory. This approach is a problem because of the explosive growth of brands available and the nature of the differences between them.

It is prudent to take precautions to ensure that the specific alloy to be used meets your requirements in terms of composition and strength. Not only do you want the best alloy for the patient, but you may also have to defend your treatment should legal issues arise related to a restoration that you placed. Your prescription is part of the evidence that will demonstrate the degree of responsibility you assumed in selecting the alloy used for treatment. For example, if a restoration is suspected of being associated with an allergy or the source of a metallic taste, you may be asked why the specific alloy was used. If the restoration fails by fracture or deformation, you may be asked whether the alloy was managed properly after casting, for example by heat hardening.

Hardening heat treatment required to optimize the strength of the alloy is an important instruction often missing from prescriptions. Normally laboratory technicians allow the casting to cool slowly in air after casting. Air cooling is often called "bench cooling." Depending on the composition of the alloy, air cooling results in strength that varies from approximately 70% to 90% of the maximum strength that can be achieved by complete heat hardening. This may be sufficient strength for restorations subjected to moderate stress, but to achieve maximum strength, most alloys need to be subjected to the exact heat treatment specified by the manufacturer. Therefore, both the composition

of the alloy and appropriate heat treatment are extremely important in frameworks that will be subjected to high levels of stress.

Alloy Selection

Here are the steps that I follow in selecting an alloy. First, I ask the laboratory for the brand names of the alloys it stocks and I verify that these brands comply with specifications set out by the International Organization for Standardization (ISO). Then, I look at the technical data sheets on the manufacturers' websites to learn the composition and mechanical properties of the alloys used by the laboratory and compare them with other alloys that might have better properties. If the technical data tables are not posted on the Internet, I ask for them to be sent to me by fax or mail. I am particularly interested in finding a gold-based alloy with a high yield strength if it is to be used for long-span restorations. In some cases I can use the alloy held in stock by the laboratory for restorations that will be subjected to average stress. However, for high-stress cases, I may choose a different alloy. If I choose an alloy that the laboratory does not stock, the laboratory may ask me to cover the cost of holding inventory for those restorations.

A full hardening heat treatment normally results in a significant increase in strength over bench cooling and should be used for restorations that are subjected to high stress. The required time and temperature is different for different alloy systems; therefore, it is essential to follow the manufacturer's specifications for this procedure to optimize strength. Heat hardening can be performed in a normal inlay furnace or a furnace dedicated to heat treatment processing. The laboratory practice of letting the casting cool in air results in variable degrees of hardening depending on the bulk of the casting and the thickness of the investment. There are too many variables associated with bench cooling to rely on it if you need to optimize strength.

Therefore, when I write a prescription, I name the brand of the alloy to be used. I also request that age hardening heat treatment be performed according to the manufacturer's recommendation if the restoration will undergo heavy loading.

To avoid any misunderstanding and to minimize mistakes, I ask the laboratory to confirm in writing that the heat treatment has been carried out and that the specified brand was used. Laboratories may return an "Identalloy Certificate" to confirm the name of the brand used, but the laboratory should also confirm that the heat treatment was performed according to the manufacturer's recommendation. The prescription and the laboratory confirmation become part of the patient's treatment record.

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