

## Modified Manual Periodontal Probe

Many attempts at automating periodontal probing have been made over the years, however the manual probe is still the one used most often in practice today.

Since the manual probe is still the number-one choice of clinicians, researchers at the Tokyo Medical and Dental University in Japan modified a manual probe by attaching a fiber optic sensor to record probing depths. They compared the sensor probe to a standard manual probe for accuracy of measurements.

The fiber optic sensor mechanism is an external sheath that covers the manual probe, adding approximately 8mm of length. As the probe is inserted into a sulcus, the sheath is stopped by the gingival margin and slides back as the probe moves forward. A spring-loaded mechanism is used as the sheath slides back. The sliding distance is detected by the

fiber optic sensor and transmitted by cable to a personal computer outside the mouth.

This pilot study compared probing and bleeding scores on six individuals with moderate to severe periodontitis. Six measurements per tooth were recorded around the first molar in each quadrant. Measurements were repeated one week later for comparison.

Averaging all probing scores together, the manual probe score was 3.03mm and the fiber optic probe was 3.08mm. In pockets 7mm or deeper, the fiber optic probe scores were not as deep as the manual probe. This may be due to pressure buildup on the gingival margin, pushing the margin down, thus giving a shallower reading.

**Clinical Implications: New options might become available that modify manual probes rather than creating automated probes. ■**

*Ishihata, K., Wakabayashi, N., Wadachi, J., Akizuki, T., Izumi, Y., Takakuda, K., Igarashi Y.: Reproducibility of Probing Depth Measurement by an Experimental Periodontal Probe Incorporating Optical Fiber. J Perio 83:(2)222-227, 2011.*

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## Interdental Brush Provides Patient Self-test and Plaque Removal

Gingival bleeding can be assessed between the teeth, professionally using a periodontal probe, or by the patient using a triangular-shaped wooden stick moved in and out from facial to lingual four times. Self-assessment by patients of their own gingival health provides them with feedback and a means of cleaning between the teeth.

Researchers at the University of Zürich in Switzerland compared periodontal probing to the use of an interdental brush to determine if the information about bleeding, plaque and gingivitis was similar. The test subjects were 64 consecutive patients being seen for their semi-annual periodontal maintenance visit with the dental hygienist. All had gingival inflammation with at least 50 percent papillary height and no pocket depths exceeding 4mm.

All four quadrants were tested, half with the probe inserted 2mm into the gingival sulcus and the other half with one pass through with an interdental brush. Rather than using the probe on one side of the mouth and the interdental brush on the other side of the mouth, contralateral quadrants were assigned. Randomly assigned quadrants were either the maxillary right and the mandibular left or the maxillary left and the mandibular right. The presence or absence of both plaque and bleeding were recorded.

Average bleeding scores were similar for the sites measured with the periodontal probe and the sites tested with the interdental brush. Scores were 47 percent for the periodontal probe and 46 percent for the interdental brush.

**Clinical Implications: Correctly sized interdental brushes can be used as a reliable self-test for interproximal bleeding. ■**

*Hofer, D, Sahrman, P, Attin, T, Schmidlin, P.: Comparison of Marginal Bleeding Using a Periodontal Probe or an Interdental Brush as Indicators of Gingivitis. Int J Dent Hyg 9:(3)211-215, 2010.*

## Bacteria Cling to Periodontal Probes

In 1985 researchers reported the translocation of *Actinobacillus actinomycetemcomitans* (Aa) from infected sites to healthy sites. Although the bacteria were moved, they were unable to survive the ecology of the healthy sulcular environment. While inoculation is possible, suitable growth conditions are required for successful colonization.

Dental hygiene researchers at University of Missouri, Kansas City compared four probes in sites 3mm or less and sites 4mm or greater. A total of eight probes were tested, four in shallow sites and four in deep sites. The probes were inserted subgingivally, held there for two seconds and removed directly to a vial of transport medium and sealed with wax. Each probe was then processed for evaluation under a scanning electron microscope.

Microbial samples from 80 pockets were collected and cultured to compare shallow and deep pockets. As expected, shallow pockets had fewer bacteria than deep pockets. The researchers were surprised to see just how rough the probe surfaces were. Striations around the metal probes indicated use of a lathe in the manufacturing process. Roughness and barbed edges were typical of the cuts for millimeter markings. The plastic probes had smoother surfaces than the metal probes and were made of two identical halves sealed together. Excess plastic flashing around the ball tip of these probes was evident.

All probes tested retained bacteria and epithelial cells. No differences in bacteria retention were observed between probe types in either shallow or deep pockets.

**Clinical Implications: Despite the fact that bacteria and epithelial cells cling to probe surfaces, clinical effects of bacterial translocation have not been shown. ■**

*Holt, L., Williams, K., Cobb, C., Keselyak, N., Jamison, C., Brand, V.: Comparison of Probes for Microbial Contamination Following Use in Periodontal Pockets of Various Depths. J Perio 75: 353-359, 2004.*



## The Future is Ultrasonic Probing

To diagnose periodontal disease, radiographs and periodontal probing are always used. Radiographs provide a two-dimensional image of three-dimensional structures and require ionizing radiation. Periodontal probing is an invasive procedure influenced by clinician technique, force used, probe size and topography of the pocket. Researchers are looking for a non-invasive approach to diagnosis that overcomes current sources of error. Ultrasonography may be the answer.

Researchers in London used a non-invasive 20MHz ultrasonic imaging system to determine bone and tissue levels from the facial surfaces of three teeth in each of three pig jaws. A fourth pig jaw was used for histological evaluation. A notch was made on each tooth as a landmark. An ultrasonic gel was used between the ultrasonic probe tip and the gingival tissues on the facial surface of the tooth. Measurements were taken through the gingival tissue and provided 15mm X 6.25mm images within one second. Images were captured in a computer and compared to actual measurements of the pig jaws. Trans-gingival measurements or “soundings” were done with a periodontal probe from the gingival margin through the attachment to the bone crest. Direct measurements were taken after surgical reflection of the tissue. Measurements and ultrasound images were repeated to determine accuracy.

Differences between ultrasonic images were only 0.44mm. This was less than the 1mm error found between sounding measurements and the 0.6mm difference between surgical measurements. Within a preset range of plus or minus 0.6mm there was good agreement between ultrasound measurements and direct surgical measurements.

**Clinical Implications: The advantages of a non-invasive ultrasound diagnostic technique will be a welcome addition to clinical practice in the future. ■**

*Tsiolis, F., Needleman, I., Griffiths, G.: Periodontal Ultrasonography J Clin Perio 30: 849-854, 2003.*

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## Pain on Probing

Painful probing might deter patients from continuing on for needed periodontal treatment. Based on published research, we know that probing the anterior region is more painful than the posterior. This is explained by anatomy, identifying a greater density of free nerve endings in the anterior gingiva compared to the posterior gingiva. Both manual and automated probes are associated with pain and discomfort. The level of inflammation can also influence pain experienced during probing.

This multi-center study in Belgium evaluated patients' experience of pain and discomfort during probing, scaling and root planing (SRP) and maintenance therapy. Local anesthesia was provided in 90 percent of SRP cases, two percent of maintenance cases and not at all for probing. Patients completed a computer questionnaire following each clinic visit to measure pain and discomfort.

Less than 10 percent of patients undergoing probing reported severe pain, more than 20 percent reported moderate pain and approximately 60 percent reported mild pain. Just over 20 percent reported no pain on injections, while more than 70 percent reported some level of pain with the injections. Overall pain levels reported for SRP and maintenance were lower than those reported for probing. One third of the SRP group and two percent of maintenance patients reported taking pain medication after treatment.

This study was funded by the original developers of Oraqix, a topical local anesthetic used in place of injections, as justification for an alternative to anesthetic injections to control pain associated with probing, SRP and maintenance therapy.

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**Clinical Implications: Pain control options should be considered for probing and subgingival instrumentation. ■**

*Van Steenberghe, D., Garmyn, P., Geers, L., Hendrickx, E., Maréchal, M., Huizar, K., Kristofferson, A., Meyer-Rosenberg, K., Vandenhoven, G.: Patients' Experience of Pain and Discomfort During Instrumentation in the Diagnosis and Non-Surgical Treatment of Periodontitis. J Perio 75: 1465-1470, 2004.*

## Pain on Probing Varies by Site

Depending on the amount of pressure used, probing can be painful for some patients and some areas of the mouth seem to be more sensitive than others.

Researchers at the University of Florida evaluated probing pain associated with varying probing pressures using a Florida Probe. Patients listened to an audio tape explaining what sensations they would feel when the probe was inserted into the sulcus. There would be the initial touch, followed by the pressure and then the transition from pressure to pain. It was this transition point they wanted to identify. Patients were given a control switch to indicate when the pressure became pain. The goal was not to see how much pain they could endure, but rather the point at which pain began.

The 10 test subjects were periodontally healthy. Mid-facial and mid-lingual surfaces were measured for all maxil-

lary first molars and maxillary central incisors. Probing was repeated weekly for three weeks. Scores for each of the three visits for each person were similar and were combined to give a single mean for each surface for each patient. Scores ranged from 14 to 182 grams of pressure. The pain tolerance was more than four times greater for some patients than others.

It is apparent from this small pilot study that setting an average probing pressure for all patients will not take into consideration the variations between patients, nor the variations between sites within the same mouth. No reasons for these differences were given.

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**Clinical Implications: When probing, incisors are more sensitive than molars and facial surfaces are more sensitive than lingual surfaces. ■**

*Heins, P., Karpinia, K., Maruniak, J., Moorhead, J., Gibbs, C.: Pain Threshold Values During Periodontal Probing: Assessment of Maxillary Incisor and Molar Sites. J Perio 69: 812, 1998.*