Abstract

New technology has transformed the practice of modern dentistry over the past few decades. Digital radiography, lasers, improved materials for enhanced aesthetics, magnification loupes with illumination and computerized systems that now provide for a “paperless” practice are just some of the many examples of how dentistry has evolved. However, the method for obtaining periodontal health data has largely remained unchanged over these same decades. To date, the periodontal probe is still the most relied upon instrument utilized for obtaining the information necessary to make an accurate and comprehensive diagnosis with regard to periodontal health status.

Educational Objectives

At the end of this program, participants will be able to:

• Recognize the value of the periodontal probe for diagnosis.
• List the five generations of periodontal probe development.
• Describe the clinical features the periodontal probe is used to measure.
• Describe the col area anatomy and correct probing angles in this area.
• List the factors that contribute to accurate probing measurements.

The Latin word *probo* means “to test.” The history of diagnosis dates back to the time of Hippocrates, and the premise that a proper diagnosis is required before treatment may be prescribed is commonly understood today. In 1882, an American dentist, John W. Riggs, was very interested in diseases of the gingiva and was the first to limit his practice to periodontics. Riggs was also the first to describe the periodontal probe as a tool in the diagnosis of periodontal disease. Prior to Riggs, there was no mention of periodontal probes in the literature; diagnosis of periodontal disease, or “Rigg’s disease,” as it was called then, was based on tooth mobility and suppuration. Riggs developed the concept of oral prophylaxis and prevention and was a true pioneer of conservative periodontal therapy, noting that “teeth with their accretions and roughened surfaces are the existing cause of the disease.”

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margin” and it stands today that a comprehensive dental examination cannot be accomplished without the use of the periodontal probe.

Interestingly, the periodontal probe is remarkably similar to its original designs dating back to the early 1900s. Hanford and Patten’s design of a periodontal probe, then called a Periodontometer and made of silver, is nearly the same in appearance as the probes that are routinely used in clinical practice today. Differences in probes currently used include a variety of materials, various incremental markings designated by lines and/or colors, and variable thicknesses and shapes, depending upon the probe’s particular intended area of use. The working end can be some combination of flat or round, and straight or curved.

In 1992, B. L. Pihlstrom created a classification of periodontal probes. The classification system included three generations of probes: first, second and third generations. In 2000, Watts extended the classification system to include a fourth and fifth generation of probes.6

First-generation probes are manual, handheld instruments, also called conventional probes. These probes are typically made of stainless steel, although titanium and plastic (polymeric material) are used as well, and are dependent upon the clinician’s manual pressure. In 1936, Charles H. M. Williams, a periodontist, designed a prototype for first-generation probes.6 The Williams’ probe is a straight probe, 13 millimeters in length and one millimeter in diameter, with demarcation lines at 1, 2, 3, 5, 7, 8, 9 and 10 millimeters, and is still widely used in clinical practice today. Other examples of conventional probes include the color-coded Marquis’ probe, the University of Carolina-15 (UNC-15) probe and the Naber's probe (Fig. 1). The Marquis probe, first available in 1965, was the first color-coded probe and was designed for patient comfort and ease of reading. It is available in both straight and curved designs, has the slimmest tip on the market, and is designed with alternating black and silver incremental markings at 3, 6, 9 and 12 millimeters (Marquis Dental). The University of Carolina-15 (UNC-15) probe is a straight probe with black incremental markings at every millimeter from 1 through 15 and is particularly favored for use in research. The Naber’s probe is a curved probe, used for detecting and measuring horizontal periodontal furcation involvement in multi-rooted teeth. These first-generation probes are still used by the majority of dental hygienists, periodontists and dentists today.

Second-generation probes, also called Constant Pressure probes, are manual probes designed to provide for the standardization of controlled probing pressure. Invented by Frank Hunter in 1994, the TPS (True Pressure Sensitive) probe was designed to obtain accurate and reliable measurements utilizing the same 20 grams of force every time it’s used.6 When the probe encounters resistance and the indicator lines coincide, a constant pressure of 20 grams has been reached, and the reading is then taken. It is designed to obtain consistent results, even when utilized by different clinicians. Constant pressure probes, like conventional probes, do not require computerization to record the collected data.

Third-generation probes refer to automated probing systems. Software integrates with existing computer systems to provide computerized periodontal charting and the data is collected and stored electronically. Automated probing systems are designed to streamline the periodontal charting examination by using a computerized probe handpiece and foot switch to record probing measurements, eliminating the need for an assistant to record data. The Florida Probe, first available in 1987, is one such automated probing system that efficiently allows for hands-free charting and generates a detailed, computerized periodontal chart. The Florida Probe has a constant pressure of 15 grams and a precision of 0.2 millimeters, providing a highly accurate periodontal examination.

Fourth-generation probes refer specifically to 3D technology, with the goal of obtaining a precise and continuous reading of the base of the sulcus or pocket. Fifth-generation probes are designed to utilize ultrasound, in addition to 3D. These probes aim to accurately measure attachment levels without penetrating the junctional epithelium, as conventional probes often do, providing for a more comfortable examination and a precise mapping of the base of the sulcus or pocket. While not currently used in conventional practice, the development of these fourth- and fifth-generation probes offers the potential for error-free probing measurements, particularly in the very early stages of periodontal disease. Earlier screening is becoming even more important, now that periodontal disease is associated with systemic conditions such as diabetes and heart disease.

Comprehensive periodontal charting involves the measurements of sulcus or pocket depth around a tooth. However, probing depths alone are not reliable enough to indicate the degree of bone support present. Because the position of the gingival margin can change with such factors as gingival hyperplasia or

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recession, the clinical attachment level (CAL) is a critical measurement to obtain. The clinical attachment level is measured from the fixed position of the cemento-enamel junction (CEJ), whereas probing depths are measured from the gingival margin. Also referred to as clinical attachment loss, the clinical attachment level indicates “the extent of periodontal support that has been destroyed around a tooth” and is the “gold standard” for the measurement of periodontal disease activity.

While the primary purpose of periodontal probing is to measure both sulcus/pocket depth and clinical attachment levels, more information is needed to enable a complete periodontal diagnosis. A complete periodontal examination also includes the measurement and recording of gingival recession, mobility, furcation involvement, bleeding and suppuration. The probe is used to measure intra-oral lesions of the hard and/or soft tissues, and other existing factors such as calculus, plaque and changes in the dentition should also be noted. Failure to obtain all these criteria results in the inability to make a thorough and comprehensive periodontal diagnosis.

Typically, the periodontal examination begins with the recording of six-point probing depth measurements, measuring the distal, direct and mesial aspects of both the buccal and the lingual surfaces of each tooth. A systematic routine is usually established by the clinician, often beginning with the distofacial aspect of the most posterior maxillary tooth and working forward and around the arch, then probing the same way maxillary lingually. The mandibular arch is probed in the same fashion. While this is a perfectly acceptable routine, another routine used to enhance patient education is to first systematically measure all the direct surfaces, buccally and lingually, followed by measuring the distal and mesial aspects of the buccal and lingual surfaces. Reading the measurements out loud in this way can help patients more easily distinguish between areas of the teeth that are brushed vs. flossed, and help them make the connection that periodontal disease often begins in the interproximal areas.

Periodontal probing technique is critical to obtaining accurate measurements. Probing involves moving the probe along the perimeter of the base of the sulcus or pocket, called a walking stroke. The entire circumference of the sulcus/pocket base is “walked” to determine the topography of the junctional epithelium. It is not uncommon for depth differences to exist in the same sulcus/pocket, so the walking stroke is carefully performed to accurately record the deepest existing depth measurements.

The probe is inserted into the sulcus/pocket while maintaining the probe tip against the tooth surface. When the probe encounters resistance at the epithelial attachment, the probe is then gently “walked” or “bobbed” up and down, keeping strokes close together and moving forward along the base of the sulcus/pocket. This walking stroke is performed without removing the probe tip from the sulcus/pocket, and maintaining contact with the base of the epithelial attachment on each downstroke. The deepest reading is recorded for each of the six aspects: distofacial, direct facial, mesiofacial, mesiolingual, direct lingual and distolinguval.

It is commonly taught to position the probe parallel to the long axis of the tooth. When probing the faciolingual dimension, parallel positioning is easy to achieve. However, when probing interproximally, some adaptation is necessary, as maintaining the probe parallel to the long axis is difficult, if not impossible at times, and can result in an inaccurate measurement. In figure 5, the diagram on the left demonstrates how positioning the probe parallel to the long axis misses a deep interproximal defect as it encounters the contact.

When probing interproximally, particularly with adjacent teeth in contact and no gingival recession, inserting the probe at the line angle and tilting the probe slightly into the col, the depression in the interdental tissues just below the interproximal contact, to reach under the contact area, then walking the probe interproximally to drop into the depths of the mesial or distal pocket, can provide a more accurate reading. In figure 5, the diagram on the right demonstrates how tilting the probe slightly and walking it interproximally, from either the buccal or lingual aspect, can better enable detection of interproximal bony defects. On the other hand, using too much angulation can also result in missing interproximal defects. This is where the skill and expertise of the clinician is paramount to obtaining accurate periodontal probing measurements.

Probing accuracy can also be influenced by other factors. Calculus, especially subgingival calculus located at the line angles, can make probing particularly difficult. And, a patient’s unmanaged pain or discomfort can interfere with obtaining accurate measurements. While local anesthesia is not typically given for a periodontal examination, it can be advantageous if a patient’s discomfort prevents obtaining accurate measurements. In the case of patients requiring periodontal therapy, it is good practice to reprobe at the initial SRP appointment, after local anesthesia is given, to confirm probing measurements obtained during examination.

Until technology delivers a more accurate and reliable way to measure periodontal disease, the periodontal probe is still the most valuable instrument we have to gather clinical data involving the periodontium. With respect to accurately diagnosing periodontal disease, one thing remains unchanged – periodontal probing accuracy is completely dependent upon the clinician’s knowledge of root morphology and skilled technique. Ultimately, and most importantly, the single factor critical to obtaining excellent diagnostic information has always been, and still is, the skill and expertise of the clinician.


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1. The periodontal probe is designed to:
   a. measure sulcus or pocket depths.
   b. measure clinical attachment levels.
   c. locate and measure furcation involvement of multi-rooted teeth.
   d. measure the size of intra-oral lesions.
   e. All of the above

2. The first to describe the periodontal probe as a tool in the diagnosis of periodontal disease was:
   a. Hippocrates.
   b. Riggs.
   c. Simonton.
   d. Williams.
   e. Hunter.

3. All periodontal probes utilize one standardized demarcation system for consistency.
   a. True
   b. False

4. A periodontal probe designed to detect and measure furcation involvement in multi-rooted teeth is the Naber's probe.
   a. True
   b. False

5. Automated probing systems such as the Florida Probe:
   a. utilize constant pressure.
   b. have a variable calibrated precision between 0.2 and 0.8 millimeters.
   c. generate a computerized periodontal chart and store data electronically.
   d. Both a and c.
   e. All of the above

6. Periodontal probes utilizing ultrasound technology:
   a. are currently used only in research studies.
   b. provide more accurate results than 3D technology.
   c. first became available in 1991.
   d. Both a and b
   e. None of the above

7. Earlier periodontal screening is becoming even more important because:
   a. of the association with systemic diseases such as diabetes and heart disease.
   b. insurance coverage may be adversely affected by delaying treatment.
   c. of the availability of in-office diagnostic laboratory testing.
   d. patient compliance with treatment usually declines with advanced disease.
   e. Any of the above

8. The col is:
   a. another name for the junctional epithelium.
   b. a defect often observed in the furcations of molars.
   c. a depression in the interdental tissues just below the interproximal contact area.
   d. the point of attachment between the handle and working end of a periodontal probe.
   e. None of the above

9. The factor(s) that can contribute to inaccurate probing measurements is/are:
   a. subgingival calculus.
   b. incorrect probe positioning.
   c. a patient’s unmanaged pain or discomfort during probing.
   d. Both a and b
   e. All of the above

10. Probing accuracy is dependent upon:
    a. the clinician’s choice of probing system.
    b. the clinician’s knowledge of root morphology.
    c. the clinician’s skilled technique.
    d. Both b and c
    e. All of the above

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continued on page 11
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Periodontal Probes by Lorraine Frey, RDH, LDH, BAS

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