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# SECOND AND THIRD GENERATION PERIODONTAL PROBES – A REVIEW

Periodontology

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## ABSTRACT

A key indicator of periodontitis is periodontal pockets. Therefore, meticulous evaluation of periodontal pockets is a key to the recognition of periodontal pockets. The most unswerving way to detect periodontal pockets is by employing periodontal probes. Nowadays, there are a lot of advances in periodontal probing systems. To counter the drawbacks of first-generation probes second-generation periodontal probes were developed.

## KEYWORDS

Second generation, probes, periodontal pockets

## INTRODUCTION

Periodontal disease induced by plaque can be of two types i.e. gingivitis and periodontitis. Gingivitis can be defined as reversible inflammation of the gingiva without loss of connective tissue and when the inflammation involves the supporting periodontal tissues with clinical attachment loss it is termed periodontitis. A pre-eminent symptom of periodontitis is a periodontal pocket. A periodontal pocket is a pathologic fissure between the tooth and pocket epithelium, limited at the base by junctional epithelium. Therefore, precise evaluation of the pocket is important for the diagnosis of periodontitis. The most definitive way to calculate and detect periodontal pockets is by utilizing periodontal probes. Described by Orban as the "eye of operator beneath the gingival margin", periodontal probes are an essential part of a complete dental examination.[1]

### Second Generation Periodontal Probes

They are also called pressure-sensitive probes since they allow for improved standardization of pressure applied by probes. Scientific literature that demonstrated probing pressure should be standardized and not exceed 0.2 N/mm2 led to the development of these probes.[2]

They can be used in general periodontal and dental practices with one of the advantages that it does not require computerization.

### 1. True Pressure-sensitive Probes

It is a prototype for second-generation probes. It was introduced by Hunter in 1994 and works at a controlled probing pressure of 20 grams. It has a hemispheric probe tip diameter of 0.5mm and a disposable probing head. These probes have a visual guide and a sliding scale where two indicator lines meet at a specified pressure.[3]

In 1977, Armitage et al designed a pressure-sensitive probe holder to standardize the insertion pressure and determine how accurate probing pressure of 25 pounds affected the connective-tissue attachment.[4]

In 1978, van der Velden and de Vies devised a pressure-sensitive probe with a cylinder and piston connected to an air-pressure system. Subsequently, it was modified with a displacement transducer for electronic pocket-depth reading.[5]

### 2. Electronic Pressure-sensitive Probes

It was introduced by Polson in 1980, to allow the control of insertion pressure. It has two parts i.e. control base that allows the dentist to control probing pressure and a handpiece. The examiner has to increase the pressure until an audio signal indicates that the preset pressure has been reached.[6] Polson et al's original design was modified by its initial users: that probe is known as the Yeaple probe, which is used in studies of dentinal hypersensitivity.[7]

### 3. Vine Valley Probe (Vine Valley Rexcarch, Middlesex, NY. USA)[8]

It is an electronic pressure-sensitive probe. The concerned area is probed with increasing pressure until one can hear an audible beep from the control box. Once the beep is heard it indicates that the preset probing force is reached. (Poison et al 1980)

### Merits Of Second-generation Probes

1) One of the major advantages of pressure-sensitive probes are standardization of probing forces.
2) It is comfortable for the patient.
3) Constant pressure is applied throughout which helps in proper detection of periodontal pockets.

### Demerits Of Second-generation Probes

1) The tip of the probe may pass beyond the junctional epithelium in inflamed sites.
2) All the readings have to be performed manually, and an extra person is needed to record the same in the patient chart.
3) Also, there is no computerized storage of data.

### Third Generation Periodontal Probes (Automated Probes)

Despite the benefits of second-generation probes, other sources of errors, such as in recording data, calculating attachment level, and reading the probe remained unaddressed.

Third-generation probes were developed to reduce the mistakes by using not only standardized pressure but also digital readouts of the probe readings and computerized data storage.

These probes include computer-assisted direct data capture to minimize the examiner bias and allow for greater probe precision. Automated probes also require the computerization of the dental office.

### 1. Foster-Miller Probe

The Foster-Miller probe was devised by Jeffcoat et al[9] in 1986 and it is a prototype of a third-generation probe. The properties of this probe include controlled probing pressure and automated detection of cementoenamel junction. The components of the probe are a pneumatic cylinder, accelerator, linear variable differential transducer (LVDT), force transducer, and probe tip.

The mechanism of action of the Foster-Miller probe is to detect the CEJ. The ball tip of the probe moves at a controlled speed and preset pressure over the root surface. Abrupt changes in the acceleration of the probe movement that is recorded on a graph indicate when it meets the CEJ and when it is stopped at the base of the pocket.

The probe tip is extended into the pocket under controlled pressure, and when the base of the pocket is reached it is refracted automatically.

The main advantage of the Foster-Miller probe is the automatic detection of CEJ. The CEJ is a better landmark than the gingival margin because the position of the gingival margin changes according to inflammation or recession.[10]

Sometimes the root roughness or irregularities can be deemed as CEJ which is one of its disadvantages.[9]

### 2. Florida Probe

It was devised by Gibbs et al in 1988.[11]

The Florida probe consists of a sleeve and handpiece, displacement transducer, foot switch, and computerized interface. It has a hemispheric probe tip with a diameter of 0.45 mm, and the sleeve has a diameter of 0.97 mm.

Constant probing pressure of 15 gm is applied by coil springs inside the handpiece.

The probe has William's markings. The measurement of pocket depth is made electronically and is automatically recorded in the computer when the foot switch is pressed.

Florida probe can also record recession, missing teeth, bleeding, pocket depth, furcation involvement, plaque assessment, and mobility.[12]

Every measurement is recorded with 0.2-mm accuracy. Comparison to previous data can be made more quickly and accurately. The computer system shows black arrows for changes between 1 mm and 2 mm, and red arrows are used for changes > 2 mm. Also, diseased sites can be shown on a chart, which can be used in patient education.[12]

The disadvantages of Florida probes are lack of tactile sensitivity and underestimating of deep probing depth. Also, a lot of training is required for clinicians to operate these probes.[13]

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