COMPARATIVE STUDY ON THE EFFICIENCY OF PERIODONTAL PROBING WITH ELECTRONIC PERIODONTAL PROBE VERSUS CONVENTIONAL PERIODONTAL PROBE

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Abstract

Scope of the study: Periodontal probing plays an important role in the clinical examination of the periodontally affected patient; in this respect, different types of periodontal probes have been described. The authors proposed a comparative evaluation of the efficiency of periodontal probing between the conventional and electronic periodontal probe. Materials and method: The investigation was performed on 57 patients, each of them subjected to both conventional and electronic probing. The tolerance degree for each probing type and also the time consumed with probing and periodontal charting were recorded. Results and discussion: Periodontal probing with an electronic probe gave better results as to the accuracy of measurements, tolerance level and time consumed, appearing as an exceptionally precise method in establishing the diagnosis, as well as in assessing the treatment results. Conclusions: The electronic periodontal probe represents an efficient and useful tool for measuring gingival sulcus and the periodontal pockets, and also for determining the periodontal risk.

Keywords: periodontal probing, conventional periodontal probe, electronic periodontal probe

1. INTRODUCTION

The periodontal disease represents an inflammatory malady which may affect both the superficial and the profound periodontal tissues, provoking periodontitis. Whichever its manifestation (chronic or aggressive) forms, periodontitis is characterized by different degrees of periodontal tissue destructions. The periodontal disease forms are determined by a rigorous clinical examination, accompanied by paraclinical tests [1-3]. Periodontal probing plays an important role in the clinical examination of a patient with periodontal impairments; it has to be precise, rapid, involving a relatively simple technique. Furthermore, the pressure of the probe in the sulcus should not exceed 0.2N/mm² [4].

For now, different types of periodontal probes used for measuring the gingival sulcus, from the free gingival margin to its base, represented by the attached epithelium, have been described [5]. These periodontal probes have been grouped in five generations, as follows: the first generation includes the conventional periodontal probes, which present a handle, a shank and an active part. The active part presents a rounded tip (to avoid a harmful manoeuvre) and different types of millimetric gradations for quantifying the depth of the gingival sulcus. Until now, the periodontal probe of C.H.M. Williams (1936) remains the most frequently used instrument in the examination of periodontal pockets.

The second generation of periodontal probes refers to the pressure-sensitive ones. This type of probes solves the problems of the previous ones, but still presents a lack of tactile sensitivity. The third generation of periodontal probes includes electronic, computerized probes, having a hardware component which conducts probing, and a software component which analyzes the transmitted data through a wired or wireless connection between the two components; these probes are extremely accurate but also highly expensive, which is the main reason for their limited utilization [6].
The fourth generation of periodontal probes includes tridimensional probes, while the fifth generation presents a non-invasive type of probes, still under investigation, based on the principle of echography [7].

**SCOPE OF THE STUDY.** The aim of the present study was to assess the efficiency and accuracy of periodontal probing of the electronic _versus_ the conventional probe.

# 2. MATERIALS AND METHOD

The study was conducted on a group of 57 patients, in the Periodontology Clinic of “Gr.T.Popă” University of Medicine and Pharmacy of Iași, between February and July 2013.

The patients were submitted to a clinical examination also including assessment of the periodontal clinical indices and periodontal charting, with the unique purpose of establishing a periodontal diagnosis and a periodontal treatment plan.

Two methods were applied for periodontal charting. First, periodontal probing was conducted with a conventional periodontal, Williams type probe (fig.1), followed by conventional periodontal charting, both steps being performed by the same operator. Further on, the electronic periodontal probe was conducted on the same patient, with an electronic periodontal probe (Pa-on Periometer, Orangedental GmbH & Co. KG) (fig.2).

The values registered by the hardware piece were simultaneously transmitted to a PC previously installed in the software component (Byzz 5.5 by orangedental GmbH & Co. KG); thus, the electronic periodontal chart and the risk chart were automatically generated (fig.3).

Patients’ tolerance degree to these two types of periodontal probing (excellent, satisfactory, unsatisfactory) was also registered, along with the time consumed with probing and charting. The obtained data were registered and submitted to statistical analysis, performed with Microsoft Excel and PASW 18 Statistics software.
Comparative analysis of the probing depths offered noticeably favorable results for electronic periodontal probing (tab. I). The differences recorded between the measurements of the two periodontal probing types were statistically significant.

![Fig. 4. Distribution of satisfaction degree among patients (EP:Electronic Probing; CP:Conventional Probing)](image)

<table>
<thead>
<tr>
<th>Satisfaction</th>
<th>Excellent</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
</tr>
</thead>
<tbody>
<tr>
<td>EP</td>
<td>12</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>CP</td>
<td>35</td>
<td>17</td>
<td>5</td>
</tr>
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![Table 1. Overall mean values of periodontal probing depths](image)

<table>
<thead>
<tr>
<th>Periodontal probe</th>
<th>Mean probing depth (mm) (Standard deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional probe</td>
<td>4.43 (1.52)</td>
</tr>
<tr>
<td>Electronic probe</td>
<td>5.03 (1.69)</td>
</tr>
</tbody>
</table>

Also important is to stress the much lower time consumption - comparatively to the conventional probe. If the average time spent on conventional probing + periodontal charting was 34.20 ± 6.8 min, the mean value of electronic probing + periodontal charting was 11.30 ± 3.3 min.

Electronic periodontal probing offered clearly favorable results as to patients’ compliance. Even if this appreciation is a subjective one, the high extent of compliance makes the electronic periodontal probe an easier tool to tolerate than the conventional probe.

In several cases, the high error intervals may determine sub-appreciation of the degree of tissue destruction, leading to a faulty periodontal

3. RESULTS AND DISCUSSION

Patients’ response to the two types of periodontal probing was definitely in favor of electronic periodontal probing (fig.4).

![Fig. 3. 59 year-old patient, SI a) electronic perio chart; b) conventional perio chart; c) perio risk assessment](image)
diagnosis, which makes the electronic periodontal probe an exceptionally accurate method for establishing diagnosis and also for assessing the treatment results. This instrument is very useful, especially for unexperienced operators.

As to the time consumed with periodontal probing and charting, the electronic periodontal probe gave a 3 times decrease of the probing time, which is an extremely valuable result.

The software of the electronic periodontal probe also permits a risk evaluation for periodontal diseases, which is especially important for the medical investigator, offering him a global view of the patient, but also for the patient himself, who can be directly informed and motivated on his own periodontal status.

The results of the present study are consistent with several literature data [8-10], however further studies are still needed to evaluate the effectiveness of electronic probing and of other probes in various dental sites (such as the furcation area).

**4. CONCLUSIONS**

Electronic periodontal probing provided more accurate results regarding gingival sulcus and periodontal pockets values. Patient tolerance was higher when using the electronic probe; also, the time necessary for this type of survey, together with the periodontal charting and risk assessment, was considerably diminished.

### References