

## A COMPARATIVE STUDY OF TWO PRESSURE SENSITIVE MANUAL PERIODONTAL PROBES

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يعتبر المسبر حول السني من الأدوات التشخيصية الأساسية لتقييم حالة الأنسجة حول السنية . تتأثر عملية سير الجيوب بعدة عوامل كالضغط المطبق أثناء السير والذي يعتبر من أهم العوامل و ذو إرتباط وثيق بحالة الأنسجة حول السنية . تتوفر في الأسواق أنواع متعددة من هذه المسابر . كانت الغاية من هذه الدراسة إجراء مقارنة بين نوعين من المسابر اليدوية الحساسة للضغط (بورودونتيك و هانتر) من الناحية الإحصائية لم يلاحظ وجود أي إختلاف بين نوعي المسابر . من الناحية السريرية ، ينصح بإستعمال مسبر هانتر لسهولة إستعماله. يجب إجراء دراسة لمقارنة المسابر المزودة بالكمبيوتر مع المسابر اليدوية الحساسة للضغط .

The periodontal probe is one of the basic diagnostic tools being used for the assessment of periodontal conditions. There are various factors that influence the probing depths of periodontal pockets like the probing force which is important in relation to the tissue condition. In this study, a comparison has been made on two manual pressure sensitive probes - the Borodontic and the Hunter periodontal probes. There was no statistically significant difference found between the two probes. Clinical convenience and acceptability of patients suggest preference for the Hunter probe. However, further research is needed to compare the computer-aided probes with the manual-pressure sensitive periodontal probes.

### Introduction

The periodontal probe is one of the basic diagnostic tools used for the assessment of periodontal condition. Various factors influence the probing depth measurement of periodontal pocket. These factors include gingival health and disease<sup>1,3</sup>, probing force and examiner variability<sup>4,5</sup>, as well as the probing design<sup>6</sup>.

At present, there are more than twenty different hard rigid steel instruments in the market with varying diameters (between 0.4 mm - 0.8mm), shape and design. Yet, all are used to assess the same clinical criteria for pocket depth, gingival bleeding, attachment levels and calculus.<sup>7</sup>

Philstrom<sup>8</sup> described them as first, second and third generation periodontal probes. The first generations are conventionally thin, with millimeter marked at selected points; the second generation being introduced to provide a constant probing force; and the third generation is the automated probe which has been introduced, following an NIDR workshop<sup>9</sup>, to further reduce measurement errors.

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Hunter et al<sup>10</sup> found that probing forces can vary from 20 gm to as much as 400 gm when using conventional, rigid, non-pressure-sensitive periodontal probe. Ideally, the periodontal probe should have an integrated simple visual guide to identify the force being exerted on the tip.<sup>11,12</sup>

Various pressure-sensitive probes have been introduced to reduce the variability of force, like for example the Borodontic® pressure probe<sup>13</sup> and the Florida probe®<sup>14,15</sup>. In 1990, Hunter et al<sup>10</sup> introduced a manual pressure-sensitive probe - TPS -, with a changeable flexible plastic probe tip that could be exerted with a pressure of 20 gm during probing.

The aim of this study was to compare the reproducibility of measurements obtained by the Hunter\* and the Borodontic" pressure-sensitive probes.

#### Materials and Method

Ten adult male subjects, with an age-range of 25-50 years, having moderate to advanced periodontitis in otherwise systemically healthy, were included in this study at the Division of Periodontics, King Saud University College of Dentistry in Riyadh, Saudi Arabia. Patients had received preliminary treatment comprising oral hygiene instruction, crown and root debridement 4-6 weeks before inclusion in the study. The plaque index<sup>16</sup> (<1), gingival index<sup>17</sup> (<1) and papilla bleeding index<sup>18</sup> (<1) were assessed before probing. Each pocket was probed twice with both probes at 15 minutes interval to avoid excessive bleeding.<sup>2</sup> The probe was inserted gently paralleled along the root surface.<sup>19</sup> When the pre-set force was achieved, probing depth was recorded to the nearest millimeter. The probe was withdrawn carefully in order to maintain the form of the pocket for the following measurement. Reading was taken from the gingival margin to the bottom of the pocket which represents probing depth.

The Borodontic probe, having conventional William's markings at 1,2,3,5,7,8,9 and 10mm, and with a probe tip diameter of 0.5mm, was used.<sup>20</sup> The tines are mounted in a hinged handle adjusted to 0.25 N (25 gm)\*. The accuracy of the tine was checked using a photo microscope; for Borodontic the accuracy was tested by using the Ingestrom machine®.<sup>21</sup> The TPS Hunter" probe is made of plastic and has a color-coded black /white bands marked at 1,2,3,4,5,6,7, 8,9 and 10mm, with a standardized pressure of 0.20 N (20 gm). The tip is designed as a hemisphere with a diameter of 0.5mm [Figs. 1a,b ]. The Hunter probe was tested for reliability using an electrical balance<sup>1</sup> machine and was found constant at 80%.

Before embarking on the main study, a pilot study to test the reproducibility of both pressure-sensitive probes was carried out on five patients

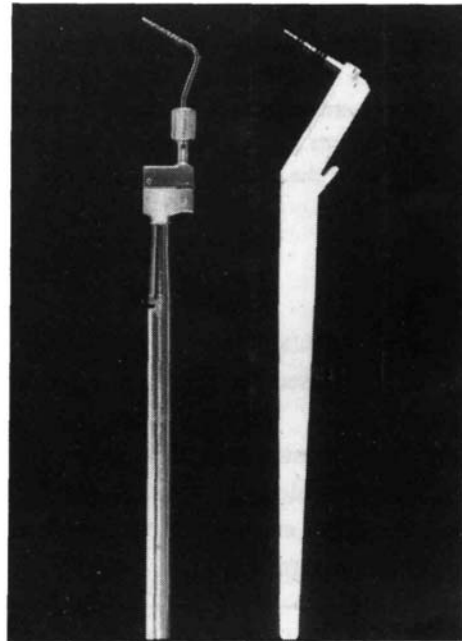


Figure 1a. Borodontic (metal) and Hunter (plastic) pressure sensitive probes.

\* Borodontic, Prima, Byfleet, England.

<sup>§</sup>In gestrom Machine, England.

<sup>†</sup>Precisa 1600C, Switzerland.

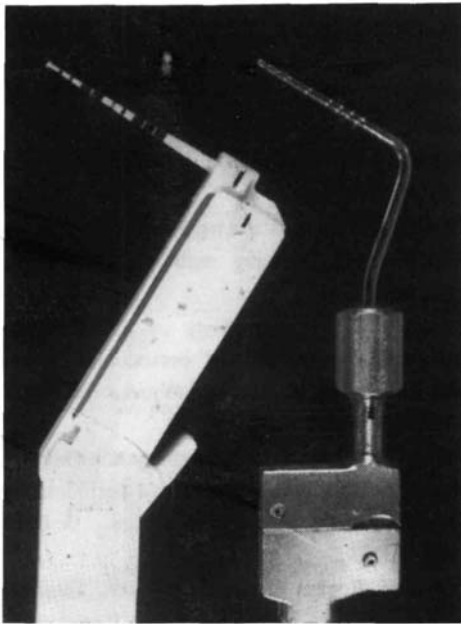


Figure 1b. Markings visible in the tine of the Borodontic and Hunter probes.

with thirty-one sites in total. Dahlberg test was used in the pilot study,<sup>22</sup> while mean and standard deviation with paired " *t* ' test were used in the main study.

**Results**

Dahlberg test has been used in the pilot study due to the continuous variability of the measurements for which the comparison range showed no significant difference. The Dahlberg value for Hunter probe was 0.18 (94 %) and 0.28 (82%) for the Borodontic probe. Statistically, the difference between the Hunter and Borodontic probes was not significant.

The mean and standard deviation of the pocket depth measurements between the Hunter (4.68 ± 1.74mm) and the Borodontic probes (4.70 ± 1.72mm) was compared. However, there was no statistically significant difference found between its measurements within 1 mm. The *P* value was 0.944 at 95% confidence interval (*P*<0.05) and *t*'value was = -0.07 [Fig. 2].

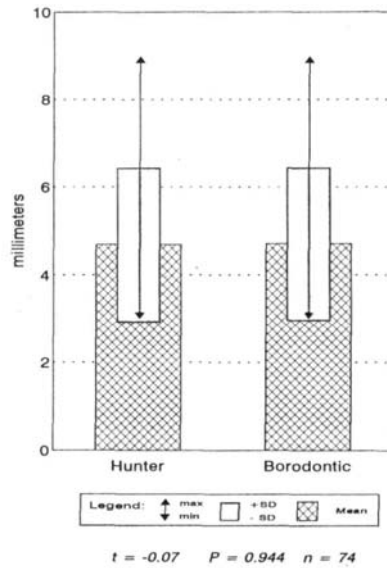


Figure 2. A bar graph showing the comparison of the Hunter and Borodontic pressure sensitive probes.

**Discussion**

The study showed that there was no significant difference between the periodontal probing pocket measurements of the Hunter and Borodontic pressure-sensitive probes. Many studies have been carried out on the validity and reliability of periodontal probes<sup>23,27</sup> but none has been done to compare the two pressure sensitive probes. The two-tip diameter did not differ but not in shapes of the tine for which the Borodontic is rounded while the Hunter is flat and tapered. However, both of them have the same tip diameter of 0.5 mm.. Atassi et al<sup>20</sup> recommended that the tine should be as thin as possible, as long as it is compatible with the discrete and accurate markings.

Keeping the tip diameter constant at 0.5 mm for both probes, it was evident that the difference of 5 gm force in probing pressure has no effect on the mean probing depth. This is in agreement with the study of van der Velden and de Vries<sup>28</sup>. Further explanation of this effect is based on the direct relationship between the tonus of the gingiva and the degree of inflammation.<sup>29</sup>

In this study, it has been found that the Hunter probe is more convenient to use although there was no difference observed between the two probes in measuring the pocket depth. There was a better visual impact due to the color contrast of this plastic probe and besides it is cheaper, with disposable or autoclavable tips and handles. In addition, it is more handy and is equally good for clinical and epidemiological purposes. Moreover, being a plastic, it is lighter in weight and more acceptable to patients than the metallic probes.

Based on our clinical experience, the above characteristics and idiosyncrasies had compelled us choose the TPS -Hunter probe. However, further investigation is needed in order to compare the third generation computer-aided automated probes with the manual-pressure-sensitive probes.

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