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Original Research Article

Comparative evaluation of pocket depth measurement by using two different periodontal probes

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ABSTRACT

Background: To assess and compare the accuracy of the second-generation TPS probe with the first-generation manual (Williams) probe for assessing pocket probing depth (PD).
Materials and Methods: In this comparative investigation, 90 subjects were used. We categorized the teeth and groups of teeth. Patients were split into three groups—periodontally healthy, gingivitis-free, and periodontitis—based on pocket depth and gingival index. Two probes were used on Ramfjord teeth to measure the depth of the pockets.
Results: Ramfjord teeth group wise, the manual probe's measured pocket depth was more than that of the TPS probe**.**
Conclusion: In all groups, mean PD readings were deeper with the manual probe than with the TPS probe, with the periodontitis group showing the greatest difference, followed by gingivitis and the periodontally healthy groups.

1. Introduction

Gingival and surrounding attachment apparatus inflammation is what characterizes periodontitis. The periodontal pocket is the primary sign of periodontitis. The periodontal pocket depth is determined in order to treat periodontal disease.[1] It ought to be precise, easy, and speedy. All first-generation probes are based on Williams' periodontal probe, which he created in 1936.

However, there are a number of restrictions that affect the precision of periodontal probing. Such factors as root structure, subgingival blockage, and the tissue state in the deepest region of the pocket are connected to the nature of the illness process. The size, shape, and tip of the probe all affect how big a pocket is measured. The operator's approach, including the probe angle, force, and probing pattern, has an impact on the measurement's sensitivity and repeatability.[2]

Operator technique is thought to be the most important component for accuracy and reproducibility of all the factors described above. The patient seems to cooperate less when being probed, especially when the force of the probe is increased. Several modifications in probe design are created to allow the usage of a constant probing force repeatability. The second-generation probe prototype is called the True Pressure Sensitive (TPS) probe. These probes, which Hunter4 first released in 1994, have a disposable probing head and a hemispheric probe tip with a 0.5 mm diameter. Typically, a regulated probing pressure of 20 gm is used. These probes contain a sliding scale with two indicator lines that meet at a predetermined pressure as well as a visual guidance.

Hence, the aim of this study was to compare and evaluate the pocket depth measurement by using conventional William's probe and TPS probe in Ramfjord teeth.

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2. Materials and Methods

Between December 2018 and February 2019, patients who presented to the Periodontology Outpatient Department were screened based on inclusion and exclusion criteria. Patients with or without the periodontal disease who had a healthy overall condition were included. Individuals on periodontal-harming medications and those who had recently received periodontal therapy or surgery were excluded from the study. The study comprised a total of 90 patients who met the inclusion and exclusion requirements.

The study procedure was explained to a select group of patients. PD was evaluated and documented in all of the chosen patients using both the TPS probe and William's probe.

Patients were classified as having periodontally healthy gums, gingivitis, or periodontitis based on the parameters that were documented. Hence, based on PD and GI patients were categorized into three groups:

1. Group A: Periodontally healthy patients[3] (bleeding on probing [BOP] on ≤20% sites,
2. Group B: Patients having chronic generalized gingivitis[3] (BOP on >20% sites, CAL = 0)
3. Group C: Patients having mild to moderate chronic generalized periodontitis with 30% of sites.[4]

For site wise evaluation of two probes, a total of 540 sites (90*6) randomly taken from the included 90 patients, were divided into three categories with 180 sites (30*6) in each category based on PD, measurements:

3. Procedure

The patients participating in the trial were not required to take an oral prophylaxis. Two periodontal probes, the Williams probe and TPS probe, were used to record the clinical parameters in each patient. In each group, the pocket depth was measured by a single examiner using the manual probe initially, followed by the TPS probe after a 15-minute break to prevent bias. Measurements of pocket depth were made in all three groups. All of the Ramfjord teeth were measured for pocket depth at six different locations, including the mesiobuccal, mesiolingual/palatal, mid-buccal, distobuccal, distolingual/palatal, and midlingual/palatal, using two different probes—a manual and a TPS probe—by a single examiner after a 15-minute break.

By inserting the probe tip of the TPS probe into the gingival sulcus, the PD was measured using the TPS probe. The probe had pressure-indicating signs, and when the user applied 25 g of force, the shank moved up to match the mark, recording the reading to the closest millimeter marking.

When measuring PD with a Williams probe, the depth of the pocket was determined by inserting the probe parallel to the vertical axis of the tooth, and the distance between the base of the pocket and gingival margin was manually measured to the nearest millimeter marking.

4. Results

A total of 90 patients (age range 18–52 years, mean age 33.52 years) were enrolled in the study. Based on the parameter recorded, group and site-wise comparisons were done in all the patients. Comparison of probing depth using Williams and TPS probe for three groups are shown in Tables 1, 2 and 3.

5. Discussion

Measurements of PD are currently the most popular and most useful measures for estimating the extent of soft tissue loss, the course of the disease, and the response to periodontal therapy.[5] Different examiners may use varying amounts of force when probing, but even one examiner may use varied amounts of force.[6] Through the provision of consistent and repeatable probe forces, the use of constant pressure probes overcomes the drawbacks of the manual probe.

In the present study, comparison and reproducibility of mean pocket depth measurements with manual and TPS probe were evaluated.

The rise in gingival inflammation, which further suggests the severity of the disease and consequently affects the pocket depth measurements, may be responsible for the considerable increase in mean pocket depth from Group A to Group C as seen in Tables 1, 2, and 3. Probe tip penetration in healthy tissues is lower than that in inflamed tissues because the inflamed tissues provide less resistance to probing than the healthy tissues do.[7]

A minimum of 15 minutes had to pass between two registrations in order to prevent examiner memory bias from influencing the second measurement and to provide the patient enough time to rest between registrations for different probing techniques.

The measurements recorded by manual probe and TPS probe increased from Group A to Group C and from periodontally healthy to periodontitis sites when group and tooth-wise comparisons of PD measurements by manual and TPS probes in Ramfjord teeth were conducted. There were significant differences between these measurements. In all groups, including the Ramfjord tooth, manual probe PD measures were deeper than TPS probe readings. The outcomes were consistent with investigations by Osborn et al.[8] and Wang SF et al.[9]

Based on information from Van der Velden,[10] who claimed that leaving a 15-minute gap between the initial and subsequent probes in a clinical setting lowered the risk of bleeding, the 15-min gap was employed.

Table 1: Comparison of probing depth using williams probe and tps probe in healthy patients (Group A) by paired t test

	16	21	24	36	41	44
Healthy (n=30)						
William's	3.3	3	3.1	2.8	3	3.1
TPS	2.5	2.5	2.4	2.1	2.4	2.4
Mean difference	-0.8	-0.5	-0.7	-0.7	-0.6	-0.7
t value	-10.77	-5.38	-8.22	-8.22	-6.59	-8.22
p value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

*denotes statistically significant difference exists

Table 2: Comparison of probing depth using williams probe and tps probe in gingivitis patients (Group B) by paired t test

	16	21	24	36	41	44
Gingivitis (n=30)						
William's	3.5	3.2	3.1	3.1	3	3.2
TPS	2.7	2.4	2.3	2.4	2.3	2.6
Mean difference	-0.8	-0.8	-0.8	-0.7	-0.7	-0.6
t value	-10.77	-10.77	-10.77	-8.22	-8.22	-4.87
p value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

*denotes statistically significant difference exists

Table 3: Comparison of probing depth using williams probe and TPS probe in pertodontitis patients (Group C) by paired t test

	16	21	24	36	41	44
Periodontitis (n=30)						
Willam's	5.3	4.7	4.7	5.2	4.7	4.7
TPS	4.3	3.9	3.7	4.3	4.2	3.8
Mean difference	-1	-0.8	-1	-0.9	-0.5	-0.9
t value	-15.87	-10.77	-15.87	-13.32	-2.32	-13.32
p value	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*	<0.001*

*denotes statistically significant difference exists

Because of the unregulated probing force used while using the manual probe and the lack of tactile sensitivity, the variations in the PD with manual recordings being deeper than the TPS probe readings may be explained in our investigation.

Even while using constant pressure probes could standardize periodontal assessments since they generate a constant, repeatable force that could aid clinicians in taking more precise data.

6. Conclusion

In all the groups, it was discovered that the manual probe led to deeper mean PD values than the TPS probe did, with periodontitis and gingivitis coming in second and third, respectively.

7. Source of Funding

Nil.

8. Conflicts of Interest

There are no conflicts of interest.

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