Probing questions: how good are we at probing periodontal pockets; what can go wrong?

George Cheesman

SCHOOL OF DENTISTRY
Liverpool, L69 3GN, UK. email: highchees@liverpool.ac.uk

Introduction

Without a doubt, probing clinical pockets is recognised as one of the most valuable skills a dentist has when assessing periodontal status [1]; this is determined by the depth of the sulcus - a depth of 1-3mm is recognised as good gingival health and a clinical attachment level (CAL) loss of 1-2mm, 3-4mm, and ≥5mm respectively indicate slight, moderate, and severe periodontitis [2].

The most commonly used probe by UK dentists is the ‘Round Williams Probe’ [2] which has markings on its tip to indicate depths of 1.2, 3.5, 7, 8.9, 10 mm. With no possibility of measuring the probing force while using this instrument variance in force applied is inevitable, thus, decreasing the reliability of the pocket depth measurements [1]. Larger forces can increase the likelihood of bleeding on probing (BOP) [2] which is used as an indicator of periodontal disease [3]. Therefore, a non-standardised pressure could possibly decrease the reliability of a diagnosis as BOP and measured pocket depth are directly related to the probing force [2] [4]. Probing can also penetrate the junctional epithelium allowing periodontal bacteria to enter the bloodstream causing bacteremia [4].

The purpose of this poster is to consider how ‘good’ a practitioner and their tools are at probing periodontal pockets and whether the risk factors associated with probing can be minimised.

Results

How good are we at probing periodontal pockets?

Results from research on the intra-examiner reproducibility of probing depths have shown that, over 60% of patients, a test of independent samples (p < 0.01) proved there was no statistically significant difference between initial and repeated probes. This result was repeated across three examiners – all showing high intra-examiner repeatability.

Analysis of the inter-examiner variability showed a statistically significant difference (p < 0.05) between the three examiner’s probing depths [5]. This difference of depth was hypothesised to be due to a variance in probing force. A study by Hassell TM et al. [6] justified the reasoning behind the hypothesis as it revealed a positive linear correlation between probing force and probing depths – hence a variance in the examiner’s probing pressure would produce a variance in measured probing depth. Research by Lang NP et al. also shows a positive linear correlation between probing force and bleeding on probing - BOP increases by approximately 30% from a probing force of 0.25N to 1.0N [2]. Therefore, indicating that the reliability of the two diagnostic symptoms which the periodontal probe tests for (BOP and gingival sulcus depth) can be affected negatively by a variance in probing pressure.

In a study of 58 clinicians, it was found that posterior regions were probed with greater force than anterior regions [7] - showing that is not only a discrepancy between practitioners [8] but between regions of the gingiva. The use of a manual probe has proven to be more reliable at measuring deeper pocket depths compared to an electronic pressure sensitive probe [9] - hence the most commonly used probe, Round Williams Probe, is superior at probing deep pockets according to this study. However, E. Buduneli et al. demonstrated that this probe results in lower inter-examiner repeatability [9]. This probe is used by many inter-examiner studies.

What can go wrong?

C Daly et al. discovered in a study of 30 patients with periodontal disease that 43% of them contracted bacteremia as a result of gingival probing – with 80% of the bacteria found being bacteria which colonise affected periodontal pockets [4] – this is due to the probe penetrating the junctional epithelium which allows bacteria to enter the bloodstream. More recent data collected by C Daly et al. (2001) again found that patients with periodontitis contracted bacteremia after gingival probing (40%) – this research also found that 10% of patients with gingivitis contracted bacteremia after probing [10]. However, most research with the same method as C Daly–by DF Kinane et al. (2004) showed that only 20% of the subjects contracted bacteremia after probing [12].

Discussion

There is some ambiguity associated with the adjective ‘good’ in the question title – if we’re referring to the intra-examiner repeatability of depth measured and force applied then Dentists are very good at probing periodontal pockets; if we’re referring to inter-examiner repeatability and consistency between two practitioners then there is still room for improvement. Therefore, using a constant pressure probe would improve the possibility of misdiagnosis as the force applied would have increased uniformity between practitioners [10] – thus ensuring the clinical features of periodontitis and gingivitis (periodontal pocket depths and BOP) are recorded reliably. However, even with the benefit of a more accurate diagnosis, there is still a risk of contracting bacteremia when undergoing invasive periodontal probing [11]. In ‘at risk’ patients bacteremia could develop and cause infective endocarditis – which is potentially life-threatening [14]. This risk can be reduced in one of two ways: the administration of antibiotic prophylaxis to the ‘at risk’ patients as a form of selective prevention [11], or, the use of fifth generation non-invasive probes which cannot penetrate the junctional epithelium.

Conclusions

Fifth generation probes utilise ultrasound to map the gingival sulcus, hence causing no disruption to the epithelium which prevents the contraction of bacteremia and the development of infective endocarditis [15]. One drawback is that fifth generation probes are newly developed and mostly used in research or academic facilities; while first generation (manual) and second generation (constant pressure) probes are frequently used in widely accessible general dental practices [16].

References