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study

Probing dental implants: with or without prostheses?

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Background

The probing of dental implants is considered an essential clinical examination tool for monitoring peri-implant tissue health and diagnosing peri-implant diseases (Berglundh et al., 2018).

Nevertheless, numerous factors such as peri-implant probing force, probe thickness and angulation, and the apical-coronal position of the implant may interfere with the measurement of periodontal probing depth (PPD). Consequently, it is still difficult to establish a consensus regarding the threshold for "healthy" and "pathological" PPD around implants. Some authors have considered bleeding on probing (BOP) as a more reliable parameter than PPD to evaluate peri-implant inflammation (Renvert et al., 2018).

Prosthesis design can also lead to an incorrect PPD measurement. Over-contoured crowns or crowns wider than the implant may limit accessibility for probing. Removing the prosthesis has therefore been proposed to improve the reliability of probing (Serino et al., 2013).

No studies have evaluated the impact of not removing the prosthesis before PPD measurement in single-tooth implant restorations without interproximal bone loss.

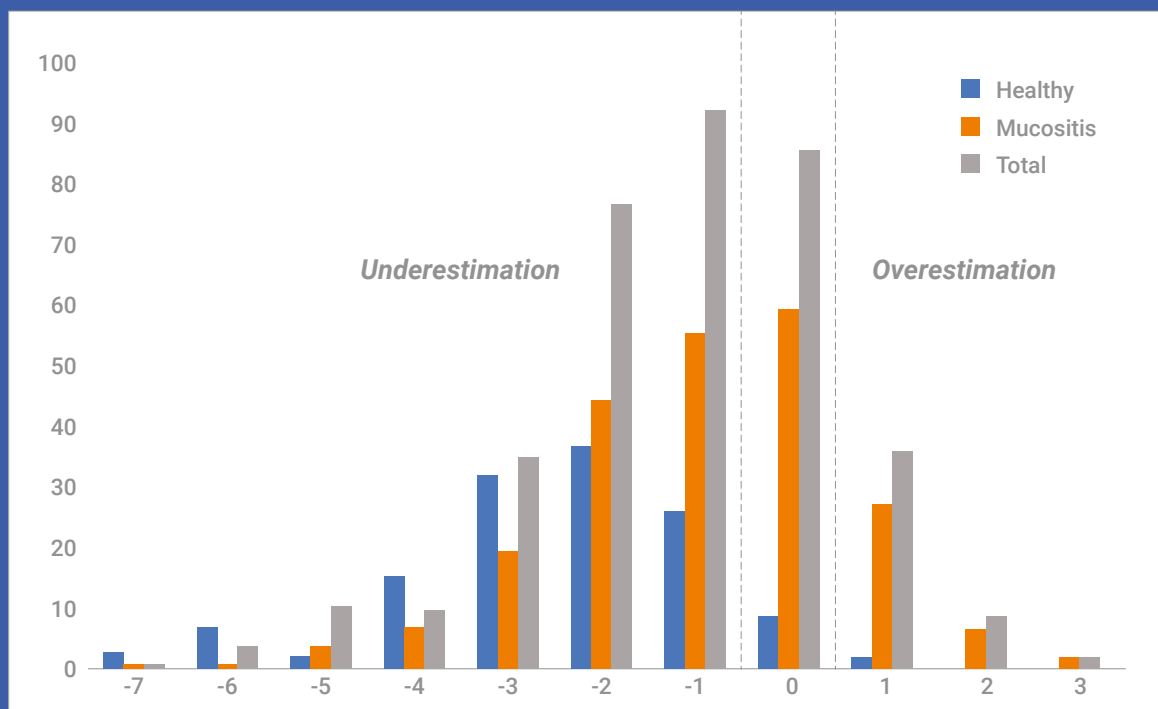
Aims

The primary aim of this study was to evaluate PPD differences with and without prosthesis in single posterior implants without interproximal bone loss (IBL). A secondary aim was to evaluate the effect of diagnosis (healthy vs. mucositis) and implant location (premolar vs. molar) on differences in PPD.

Materials & methods

- This cross-sectional study recruited 62 patients attending the Implant Maintenance Unit at the University of Barcelona, Spain.
- Patients with a posterior single-tooth implant placed at bone level, without radiographically detected IBL or a polished collar, were included. The prosthesis should be screw-retained without an intermediate abutment. Clinical follow-up of at least one year from prosthetic loading was required.
- Only implants in a healthy condition or with mucositis were included (Berglundh et al., 2018).
- A single examiner evaluated the following variables from six sites per implant:
Before removal of the prosthesis: Periodontal probing depth (PPD1), bleeding on probing (BOP), Mombelli modified plaque index (mPI), and keratinised mucosa width (KM).
After removal of the prosthesis: Periodontal probing depth (PPD2) and the distance between implant shoulder and the mucosal margin (DIM), which was further defined as recession or transmucosal height and attachment level (AL). The difference PPD1-PPD2 was calculated for each site and the mean for each implant.
- Plastic curettes and irrigation with chlorhexidine gluconate / Cetylpyridinium chloride were used to clean the implants. Prostheses were recontoured in areas that interfered with oral hygiene. Patients received oral-hygiene instructions and were included in a maintenance programme.
- The primary outcome was PPD1-PPD2 difference with and without prosthesis. Secondary outcomes were PPD1-PPD2 difference according to implant location (premolar vs. molar) and diagnosis (healthy vs. mucositis).

Figure: Differences in mm between PPD1 and PPD2 in healthy group, mucositis group, and total sample



Results

- Sixty-two patients contributed 372 sites with and without prosthesis. The mean age was 54 years, and the mean follow-up was 71 months. Ten patients were smokers. Twenty implants were placed in the premolar area and 42 in the molar region. The mean mPI was 0.3 (± 0.9), the mean KM was 2.2mm (± 1.0 mm), the mean DIM was 2.80mm (± 1.43 mm), and the mean AL was 1.59mm (± 0.51 mm).
- PPD2 was significantly higher than PPD1 for all six implant sites, with a mean difference of 1.15mm (± 1.24 mm) ($p < 0.001$).
- Values of PPD1 and PPD2 were identical in 23.6% of sites. Overestimation was up to 1mm in 12.9% of sites. Underestimation was observed in 63.5% of sites and exceeded 2mm in 38% of the sites.
- Subgroup analysis of both healthy and mucositis implants showed higher PPD2 than PPD1 values ($p < 0.001$). The mean PPD difference was more pronounced in healthy (1.48mm) than in mucositis implants (0.95mm), without reaching statistical significance ($p = 0.115$).
- The DIM did not differ between healthy and mucositis implants.
- The difference between PPD1 and PPD2 was similar for premolars and molars except at the buccal sites, the difference was significantly greater in premolars (1.5mm) compared to molars (0.7mm) ($p = .048$).

Limitations

- It was not possible to use a standardised reference point for reproducible probing depth measurements because of the different implant systems and prosthetic designs.
- A single examiner performed all clinical measurements.
- Implants and prostheses were placed by several dentists in different settings and no further information related to treatment could be obtained.
- Only single posterior implant restorations were included and the results cannot be extrapolated for anterior implants or implant-supported dentures.
- The effect of smoking or plaque control on PPD was not assessed.

Conclusions & impact

- Within the limitations of this study, the presence of prosthesis may alter the PPD recording leading to a mean underestimation of -1.15mm (± 1.24 mm).
- PPD underestimation may be more pronounced in healthy implants compared to implants with mucositis.
- Implant location (molar/premolar) does not affect PPD measurements whether with or without prosthesis.
- Future studies are warranted to evaluate the possible impact of the prosthesis on PPD measurements over time as well as on implants where bone loss is already present.

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