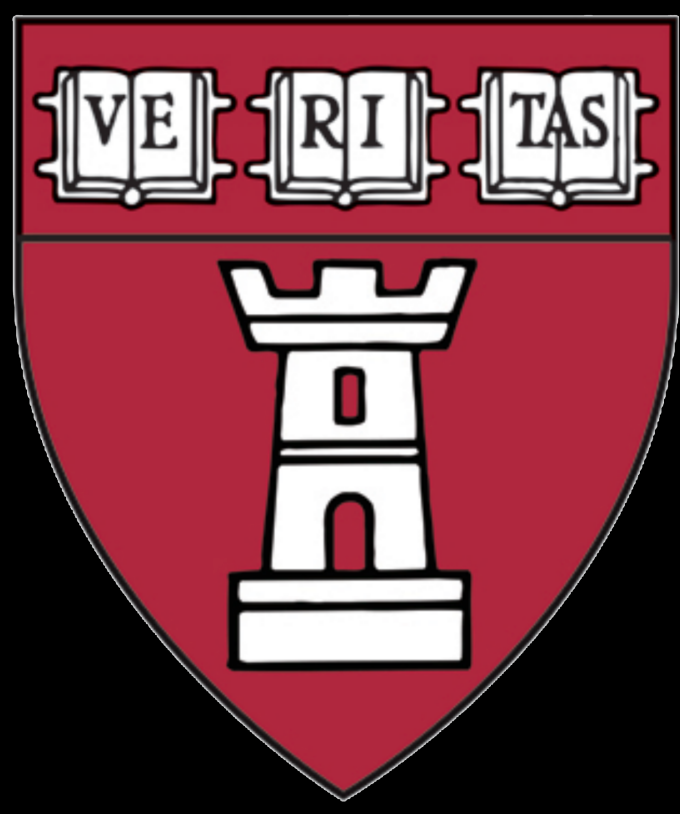




Peri-implant soft tissue health in relation to depth of implants

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Background

Dental implants have become the standard of care for partial and/or complete edentulism. The formation of the biologic width comprised of junctional epithelium and connective tissue attachment forms the basis for successful peri-implant soft tissue integration around dental implants. Positioning the implant abutment interface deeper than 3mm apical to the buccal gingival zenith is frequently observed in the clinical setting for various reasons (e.g., esthetic soft tissue profile, sufficient prosthetic running room). While histological evidence from animal studies have shown that deeper implants exhibited greater biologic width with greater ratio of junctional epithelium to connective tissue attachment, there is a lack of evidence available from human trials to look at the potential effects of differing depths of implants on peri-implant soft tissue health.

Objectives

- The objective of this clinical study is to evaluate peri-implant soft tissue health in relation to depth of implants by comparing peri-implant inflammation level by:
 - Measuring and comparing probing depths, modified plaque indices, modified gingival indices, and proinflammatory cytokine levels (IL-1 β and TNF- α) in the peri-implant crevicular fluid at between 1 to 5 year follow up.

Methodology

This pilot study of partially edentulous patients is being conducted at Harvard School of Dental Medicine under Restorative Dentistry and Biomaterials Sciences department. The study consists of twenty participants with an existing dental implant and restoration in the esthetic zone.

- ✓ All implants are evaluated for successful osseointegration at between 1 and 5 years follow up.
- ✓ Adjacent and opposing teeth must be in the same condition.
- ✓ Implants with soft tissue augmentation are excluded
- ✓ Patients with complex medical history and/or parafunctional habits are excluded as well

□ Intraoral scan superimposition

- Intraoral scan obtained during data collection are merged with the intraoral scan/master cast provided by CUSP dental laboratory to determine the gingival height from the implant platform to the gingival margin on the buccal/facial aspect.

Subjects will be divided into 2 groups:

- 1) **Shallow Group** - Peri-implant soft tissue depth of less than or equal to 3mm
- 2) **Deep Group** - Peri-implant soft tissue depth of greater than 3mm

□ Clinical measurement of peri-implant soft tissue health

- Probing depths, plaque indices, gingival index score (bleeding on probing) will be measured.

□ Proinflammatory cytokine (IL-1 β and TNF- α)

- Sterile paper strips will be inserted on the mid-buccal sulcus of the implant to collect peri-implant crevicular fluid.

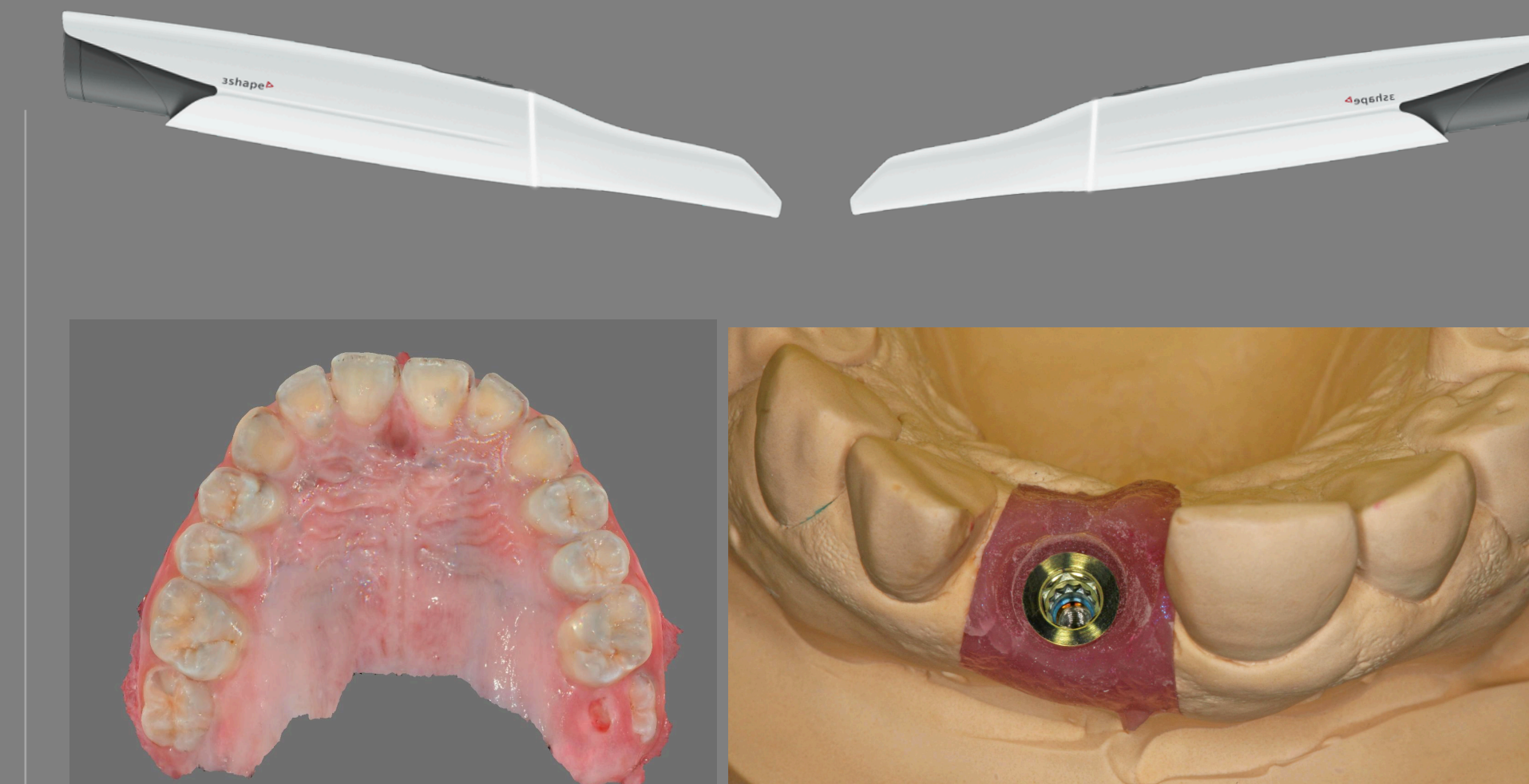


Figure 1. Taking digital scans of master cast and intraoral scans of the patient, followed by superimposition of the two.

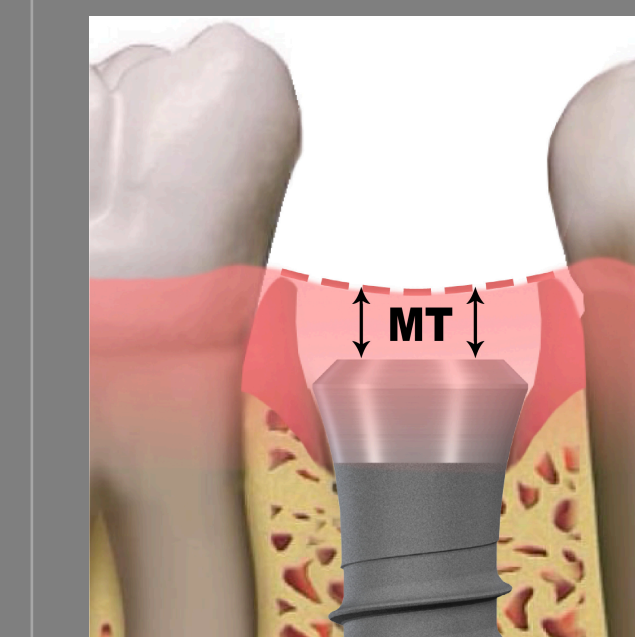


Figure 2. Measuring the gingival height from the implant platform to the gingival zenith



Figure 3. Clinical data collection of probing depths, gingival index scores as well as plaque index scores.



Figure 4. Collection of peri-implant sulcular fluid using sterile paper strips

Result

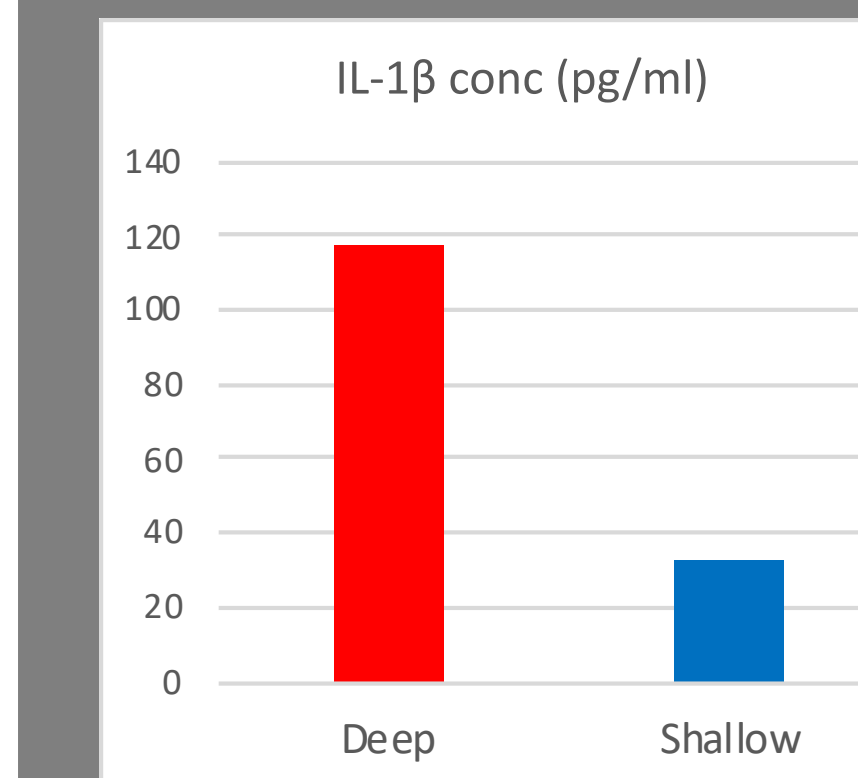


Figure 5. Preliminary data of peri-implant crevicular fluid (PICF) IL-1 β concentrations observed in deep and shallow subjects

Based on the preliminary data, higher concentrations of pro-inflammatory cytokine (IL-1 β) were observed in the deep subjects when compared to the shallow subjects. The overall inflammation level is expected to be significantly higher in deep group when compared to the shallow group, in correlation with higher probing depth, modified plaque and gingival index values.

Significance

The depth of implants relative to the peri-implant soft tissue margin is a critical factor in the ability to resolve peri-implant mucositis and effectively prevent peri-implantitis. The results are expected to mirror those of similar studies on natural teeth, namely that the effectiveness of oral hygiene practices around the implant crowns decreases as the pocket depth increases. Therefore, the deeper the implants, the more delayed and incomplete the resolution of plaque-induced inflammation.

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