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study

# Surgical treatment of peri-implantitis: will the tissues always shrink?

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## Background

Peri-implantitis is a biofilm-associated chronic disease, characterised by soft-tissue inflammation and radiographic loss of supporting bone around the implant. Among various approaches to treat peri-implantitis, surgical treatments have proven to be the most effective in preventing further disease progression.

However, mucosal recession, vestibular mucosal thickness changes, and their potential aesthetic implications are common clinical outcomes following surgical treatment. These aesthetic complications are arguably highly relevant clinical outcomes from the patient's point of view.

There is at present a lack of information regarding post-operative volumetric changes in soft and hard tissues after surgical treatment of peri-implantitis.

## Aims

The aim of this pilot study was to assess post-operative volumetric tissue changes over a period of six months in patients being treated for peri-implantitis, applying a combined surgical protocol.

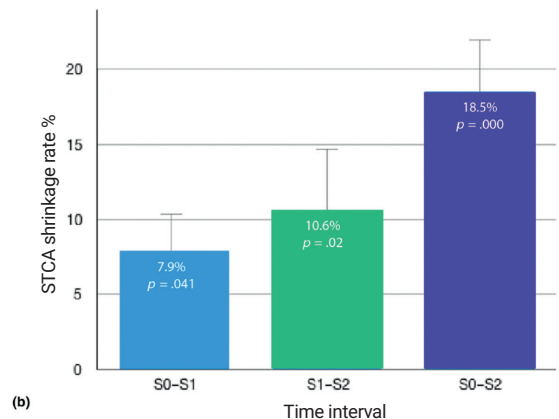
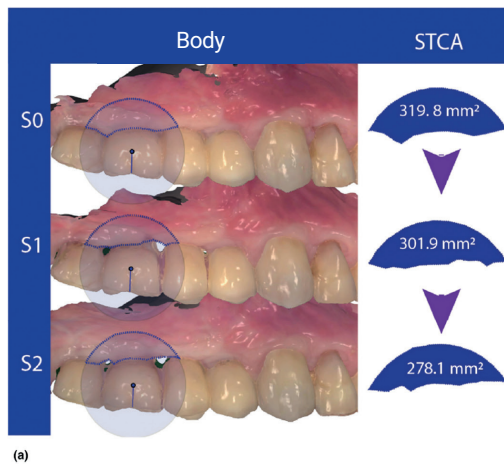
## Materials & methods

- This pilot study included 20 patients with 28 implants in total.
- Peri-implantitis was defined as the combination of bleeding on probing with or without suppuration, a pocket of  $\geq 6$  mm and radiographic bone loss.
- The primary endpoint of this study was defined as the vestibular mucosal thickness change (measured in millimetres) at the implant with peri-implantitis, after a combined surgical protocol.
- The vestibular mucosa was intraorally scanned using an optical scanner before surgery (S0), at one month after surgery (S1), and at six months after surgery (S2).
- This mucosal site was subdivided into three equidistant regions (marginal, medial, and apical) for individual volumetric assessment.
- After a pre-operative single episode of non-surgical therapy, all patients received a surgical protocol consisting of a full-thickness mucoperiosteal access flap, granulation tissue removal and debridement, implantoplasty, grafting of the intrabony defects with bovine porous bone mineral, and application of a collagen membrane.
- The surgical treatment was supported by a single dose of a perioperative antibiotic.
- Secondary endpoints evaluated peri-implant soft-tissue contour area (STCA) changes and various clinical parameters such as plaque index, bleeding on probing, and keratinized-mucosa width.

## Figure: Volumetric assessment of tissue changes following combined surgical therapy of peri-implantitis: a pilot study

Demonstrative scan files depict: (a) the delineated peri-implant soft-tissue contour area (STCA) perimeter before surgery (S0), one month after surgery (S1), and six months after surgery (S2);

(b) the STCA contraction rate between the mentioned periods.  $p < 0.05$  was considered statistically significant (post hoc Tukey's test).



## Results

- A total of 78.6% of the implants were placed in the posterior area and 85.8% of the implants were originally placed in non-grafted bone.
- The implants were equally placed in the maxilla and the mandible.
- The severity of peri-implantitis at the sites was moderate in 71.4% of the cases.
- Probing depth, bleeding on probing, amount of keratinized mucosa, and mucosal recession were significantly reduced at six months both at implant level and patient level.
- There was an 18.5% shrinkage in the tissues between pre-surgery and six months post-operatively, which was statistically significant.
- The biggest thickness change took place on the marginal level of the implant site, followed by the medial level, while the least shrinkage occurred at the apical level of the implant site.
- Linear regression analysis showed a significant negative correlation between the baseline keratinized-mucosa width and the rate of shrinkage of the soft tissues after surgery at six months. More specifically, the larger the baseline keratinized mucosa, the less shrinkage was expected after surgery.
- No correlations were observed between initial bone loss and tissue shrinkage after surgery or between mucosal recession and later tissue shrinkage.

## Limitations

- To our knowledge, the accuracy of an intraoral scanner and the reproducibility of different scanners (3Shape Trios Move) have not been validated at determining gingival margins. An alternative method could therefore have been included as a reference to assess the reliability of the intra-oral scanner(s).
- Additionally, since the intra-oral scans were measured in triplicate, it can be assumed that the mean of the measurements was used to calculate dimensional changes – but this was not reported.
- Based on this study, we cannot conclude with certainty whether the tissue shrinkage resulted from to hard- or soft-tissue alterations.
- The reported volumetric changes were observed after a combined surgical approach on 28 peri-implantitis sites in 20 patients. However, this study did not include a control group to investigate whether another type of surgery (open-flap debridement, for example) would yield similar results.

## Conclusions & impact

- Peri-implant mucosa undergoes considerable volumetric changes after combined surgical treatment of peri-implantitis.
- The amount of post-operative reduction is inversely related to the baseline width of the keratinized mucosa around the implant.
- Volumetric changes should be taken into consideration by clinicians treating peri-implantitis with a surgical approach, especially in aesthetic areas and in patients with high aesthetic expectations.

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