Effect of different healing abutment materials on parameters of peri-implant infections

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Abstract

Research is increasingly being conducted on polymethylmethacrylate (PMMA) as a material for fixed dentures and/or healing abutments. In this prospective study, the effects of different healing abutment materials (Ti, Zr, PMMA) on parameters of peri-implant infections were investigated.

30 subjects with two-piece Ti implants received healing abutments made of Ti, Zr or PMMA. Subsequently, different parameters of peri-implant infections were assessed at placement of healing abutments and follow-ups (after 2 weeks, 2, 3, 6, 12, and 15 months):

- Inflammatory response mediated by α MMP-8 level in peri-implant sulcus fluid
- Clinical and radiographic periodontal status: pocket probing depths (PPD), bleeding on probing (BOP), plaque index (PI), marginal bone loss (MBL)

No significant differences for preliminary results in α MMP-8 level and in clinical parameters (PPD, BOP, PI, MBL) between the three groups were found. Compared to other studies (e.g. [1], [2]) no signs of peri-implant diseases were observed.

Results

Assessment at baseline (placement of healing abutments) and follow-ups (after 2 weeks, 2, 3, 6, 12, and 15 months) revealed no significant differences in α MMP-8 level and in clinical parameters (PPD, BOP, PI, MBL) between the three groups.

Preliminary α MMP-8 levels showed that Ti had the highest mean values at each examination date followed by PMMA and Zr. All mean values were below 10 ng/ml, whereas values below 8 ng/ml are considered as healthy in most standardized α MMP8-tests (e.g. dentoELISA α MMP-8, dentognostics GmbH, Jena) .

Preliminary 12-months results of PPD, BOP, and PI are displayed. Compared to other studies (e.g. [1], [2]) these values represent no signs of peri-implant diseases.

Background and Aim

Besides Zr- and Ti-based materials, research is increasingly being conducted on PMMA as a material for fixed dentures and/or healing abutments. The effects of healing abutments with PMMA surfaces on parameters of peri-implant infections have not been investigated.

Aim of this prospective study was to compare the effect of different healing abutment materials (Ti, Zr, PMMA) on parameters of peri-implant infections. The hypothesis was that there is no difference in clinical and histological parameters.

Conclusion

The presented results showed that clinical parameters were comparable to the results of other publications. Thus, all materials seem appropriate as healing abutments concerning biological complications.

Further long-term investigations are necessary prior to application of PMMA as material for abutments and permanent prosthetic restorations.

Methods and Materials

30 subjects with two-piece Ti implants received healing abutments made of Ti, Zr or PMMA. 6 months after surgery, prosthetic restoration was performed (Ti, Zr: all-ceramic; PMMA: PMMA restoration). The following parameters were evaluated:

- Inflammatory response mediated by α MMP-8 level in peri-implant sulcus fluid
- Parameters of peri-implant infections: PPD, BOP, PI, MBL

References

- [1] Linkevicius, T. & Vaitelis, J. 2015, "The effect of zirconia or titanium as abutment material on soft peri-implant tissues: a systematic review and meta-analysis", Clinical oral implants research, vol. 26 Suppl 11, pp. 139-147.
- [2] Zembic, A., Bosch, A., Jung, R.E., Hammerle, C.H. & Sailer, I. 2013, "Five-year results of a randomized controlled clinical trial comparing zirconia and titanium abutments supporting single-implant crowns in canine and posterior regions", Clinical oral implants research, vol. 24, no. 4, pp. 384-390.