Does implantoplasty during peri-implantitis treatment affect implant strength?

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Aim

To assess the effect of implantoplasty (IP) on the maximum strength of narrow and regular diameter implants after dynamic loading.

Methods and Materials

Implants of different diameter [narrow (3.3mm), regular (4.1mm)], material (Ti-, TiZr-alloy), and design [bone (BL) and tissue level (TL)] of one company were tested. All resulting implant design/type related groups were tested with or without performing IP prior to mechanical testing (7 implants/group).

Dynamic loading was performed prior to maximum loading to simulate regular mastication before loading until failure. Multiple regression analyses were performed with maximum loading strength as dependent variable and IP, material, and design as predictors.

Results

Implants with IP and TL type implants showed statistically significant reduced maximum loading strength irrespective of the diameter. Implant material had a significant impact for regular diameter implants with TiZr being stronger than Ti, while material lacked significance among the narrow diameter implants. However, narrow Ti TL implants with IP suffered 4 fractures already during dynamic loading (i.e., before the actual maximum loading until failure). Otherwise, a fracture during the dynamic loading occurred only once for narrow Ti TL implants without IP and once for narrow TiZr TL implants with IP.

Conclusions

IP significantly reduced the maximum implant strength, irrespective diameter, material, or design. The maximum loading strength of regular diameter and narrow BL implants remained high, while >50% of the narrow Ti TL implants with IP fractured already during dynamic loading, simulating regular mastication. Hence, latter may have an increased risk for mechanical complications if subjected to IP.