

# Effect of crown length and implantoplasty on the fracture resistance of narrow implants. An *in vitro* study

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## ***Abstract***

This study aims to analyze macroscopic changes after implantoplasty (IP), whether a higher crown-to-implant-ratio (CIR) reduces implant fracture resistance and if implants are more fracture-prone after IP and if in the presence of 50% vertical bone loss.

Narrow platform (3.5mm) 15mm long titanium dental implants with a rough surface and hexagonal external connection were placed in standardized bone-like resin casts leaving 7.5mm exposed. Half were selected for IP. Macroscopic changes were observed using plain standardized x-rays and ImageJ software. The IP and control groups were each divided into 3 subgroups with different clinical CIR (2:1, 2.5:1 and 3:1). A static load test was performed and scanning electron microscopy (SEM) was used to evaluate failure loads and implant fractures.

IP effect was similar across the sample in all reference points and no perforations were observed. Only 2.5:1 group showed a significant reduction in fracture resistance between the IP and control implants. Significant reductions in mechanical resistance in the 2.5:1 and 2:1 group, compared to 3:1 group, were found.

Our results suggest that implants with higher CIR are more prone to fracture in the presence of 50% vertical bone loss; Fracture resistance does not differ significantly between IP and intact implants and CIR seems more relevant than IP considering implant fracture resistance.

**Keywords:** Peri-implantitis, Dental implants, Compressive strength, Titanium, Implantoplasty.