



Pulsed Electromagnetic Field Increases Bone-Implant Contact in the Cervical Region of the Implant: A Pilot, Double-blind, Split mouth Clinical Study

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Aim

Pulsed electromagnetic field (PEMF) is a non-invasive technique that increases osteoblastic activity and healing of peri-implant tissues. The objective of this study is to evaluate how much PEMF can increase bone-implant contact (BIC) in the cervical region of the implant, the region with the highest incidence of forces.

Method

Six edentulous patients (12 implants in total) were selected for the clinical study, and received temporary implants with the installation of healing devices containing a miniature electromagnetic device (MED) classified as A or B. All patients received the MED type A (control) on one side of the mouth and type B (test) on the other side. To evaluate the BIC, after 8 weeks the temporary implants were removed with a trephine and slides were prepared for histometry performed using ImageJ software. The bone-titanium implant interface was analyzed at micro and nano scales using scanning electron microscopy (SEM) and high-angle annular dark-field scanning transmission electron microscopy (HAADF-STEM) techniques respectively.



Figure.1 A cross-sectional view of the Miniaturized Electromagnetic Device (MED) healing abutment

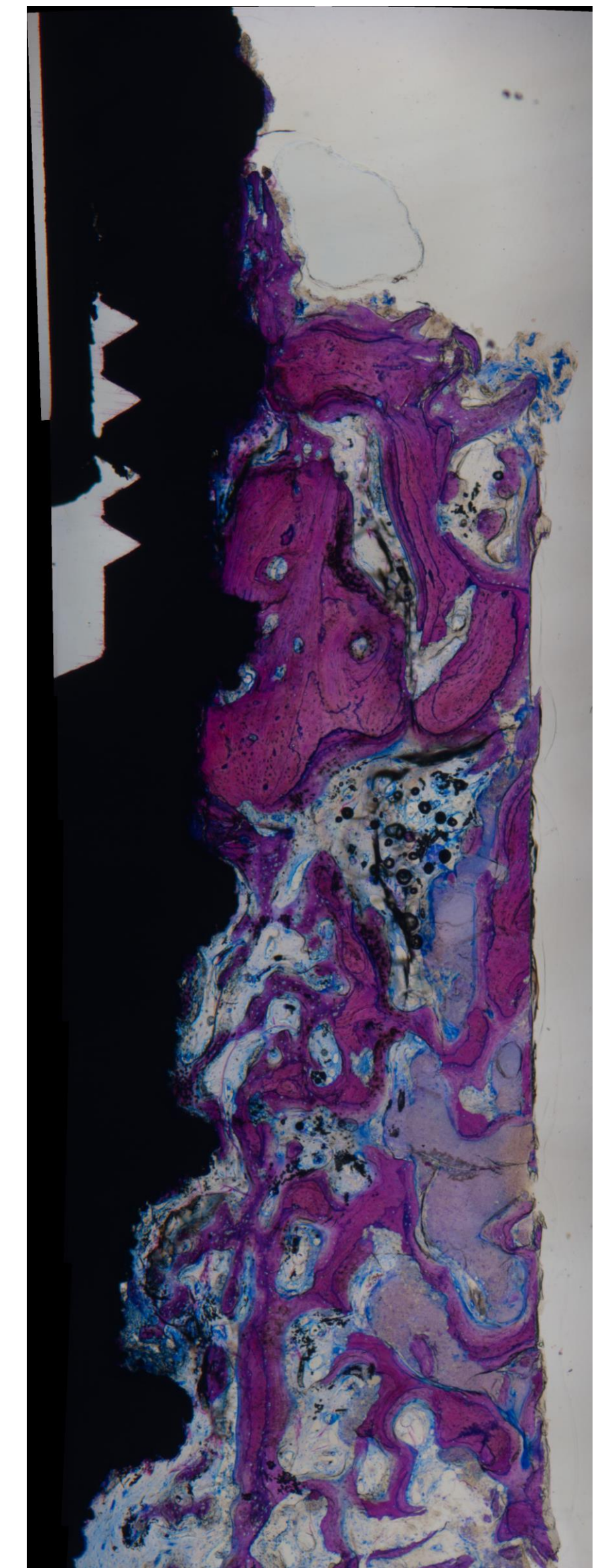


Figure.2 Histological ground section of experimental dental implant retrieved after 60 days of human maxilla with the use of MED applying PEMF

Results

The test group showed an average BIC of 55.92% while the control group had an average BIC of 45.64%. The SEM and HAADF-STEM techniques showed that while no significant difference in bone-implant contact was found, indications of new bone growth and remodeling at the implant interface were shown around PEMF samples.

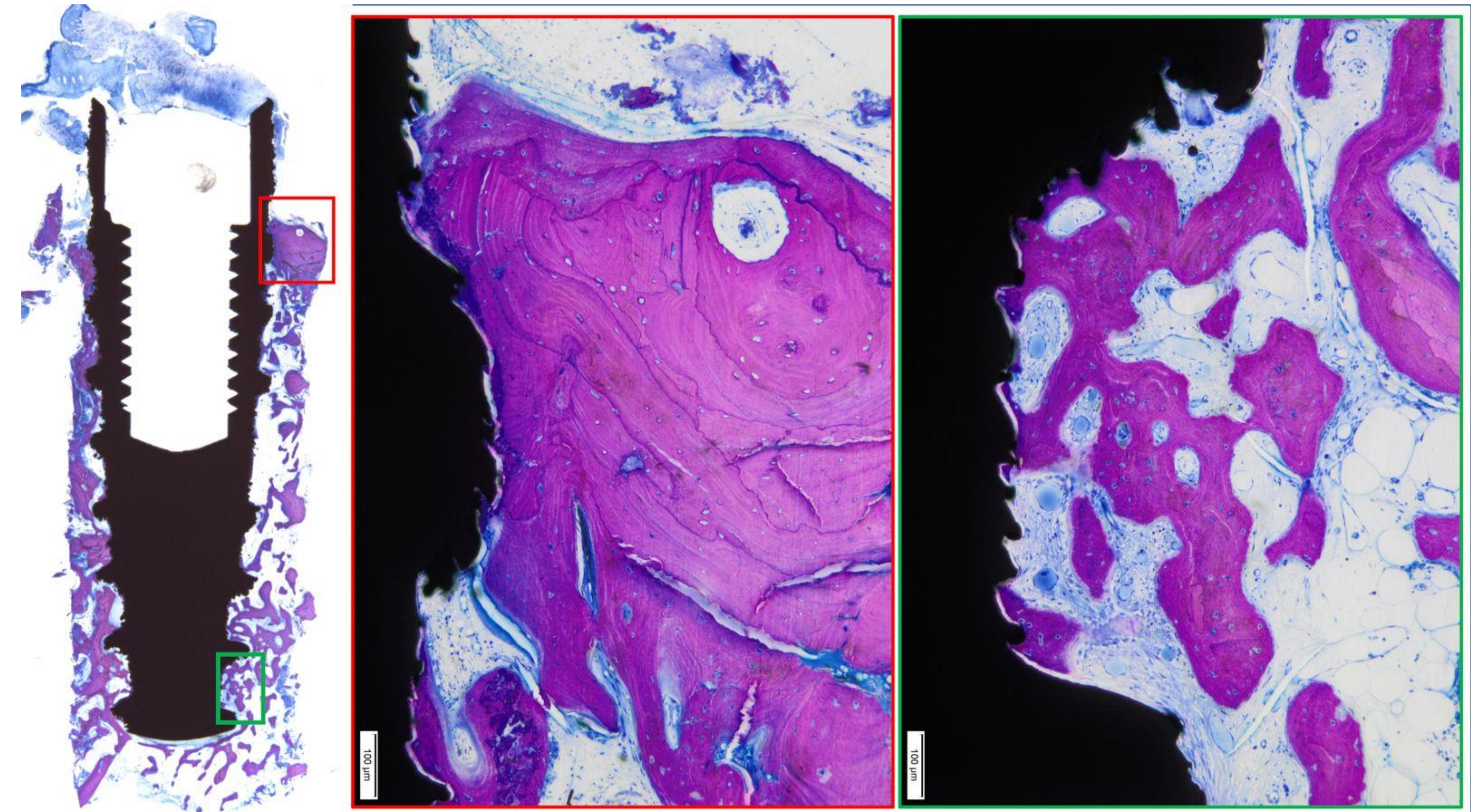


Figure.3 Histological ground section of experimental dental implant retrieved after 60 days of human maxilla with the use of MED applying PEMF

Conclusion

The pulsed Electromagnetic Field generated by the MED can be used to accelerate the increase in bone-implant contact in the initial weeks of healing. These results may contribute to rehabilitated patients with early loading and low bone density areas.