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”

The Effect of Alterations on Resorbable Blasting Media Processed Implant Surfaces on Early Bone Healing: A Study in Rabbits”

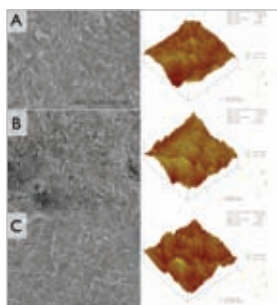
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Scanning electron microscopy and atomic force microscopy imaging ($10 \times 10 \mu\text{m}$) for the (A) GBAA surface, (B) RM, and (C) RMAA groups.

ABSTRACT.

Objectives

Etching resorbable blasting media (RM) processed implants is a common engineering procedure, but the interplay between the resulting physicochemical properties and its effects on early bone healing have not been thoroughly addressed.

Methods

Screw-root form implant surfaces were treated with 1 of 3 methods: grit (alumina) blasted/acid etching, RM, and RM acid etching (RMAA). Surface topography ($n = 3$ each) was characterized by scanning electron microscopy and atomic force microscopy and chemical characterization by x-ray photoelectron spectroscopy analysis. The implants were placed at the distal femur of 16 rabbits, where 3 implants, 1 from each surface, were placed bilaterally remaining 4 and 8 weeks in vivo. After euthanization, one half of the specimens were torqued to interface failure at a rate of 0.196 radians/min and the other half were nondecalcified processed for histomorphology and bone-to-implant contact evaluation.

Results

Physicochemical characterization showed that the grit (alumina) blasted/acid-etched surface was rougher than RM and RMAA. Higher levels of calcium and phosphorous were observed for the RM surface compared with the RMAA surface. No significant differences were observed in torque and bone-to-implant contact between surfaces at 4 or 8 weeks. Histomorphologic evaluation showed woven bone formation around all surfaces at 4 weeks, and its initial replacement by lamellar bone at 8 weeks.

Conclusion

Despite differences in texture/chemistry, all implant surfaces were biocompatible and osseointegrative, and led to comparable in vivo bone fixation and measurable histomorphometric parameters.

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