PR-I-7. The Effects of Ion Beam-Assisted Deposition of Hydroxyapatite on the Rough Surface of Endosseous Implants in Minipigs

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Background

This study compared the effects of coating implants with hydroxyapatite (HA) using an ion beam-assisted deposition (IBAD) method those prepared with machined, anodized and sandblasted and large-grit acid etched (SLA) surfaces in minipigs, and verified excellency of coating method with HA using IBAD.

Materials and Methods

Four male Minipigs (Prestige World Genetics, Korea), 18 to 24 months old and weighing approximately 35 to 40 kg, were chosen. All premolars and the first molars of the maxilla were carefully extracted on each side. The implants were placed on the right side after a healing period of eight weeks. The implant stability was assessed by resonance frequency analysis (RFA) at the time of placement. Forty implants were divided into five groups; machined, anodized, anodized plus IBAD, SLA and SLA plus IBAD surface implants. Four weeks after implantation on the right side, the same surface implants were placed on the left side. After four weeks of healing, the minipigs were sacrificed and the implants were analyses by RFA and histological analysis.

Results

RFA showed a mean implant stability quotient (ISQ) of 75.625 ± 5.021, 76.125 ± 3.739 ISQ and 77.941 ± 2.947 at placement, after four weeks healing and after eight weeks, respectively. Statistical analysis showed no significant differences in the values between the 5 groups. Neither for the time intervals could a significant

difference be found. Histological analysis of the implants demonstrated newly formed, compact, mature cortical bone with a nearby marrow spaces. HA coating didn't separate from the implant surfaces coated HA using IBAD. In particular, the SLA implants coated with HA using IBAD showed an improved contact osteogenesis, with a coverage of the implant surface with a bone layer as a base for intensive bone formation and remodeling. No inflammatory infiltrates were present around the implants.

Conclusion

We could conclude that rough surface implants coated HA by IBAD demonstrated improved biocompatibility, and clinical and histologic analysis showed no differences with other established implant surfaces.