The Influence Of Topographical And Chemical Properties Of Dental Implants On Soft Tissue Integration

Associate Professor Yasunori Ayukawa
Japan Prosthodontic Society
Section of Implant and Rehabilitative Dentistry, Division of Oral Rehabilitation, Faculty of Dental Science, Kyushu University, Fukuoka, Japan

Long-term good prognosis of dental implant is supported by the peri-implant soft tissue (PIS) stability. Periodontal health is endorsed by biologic width with biological barrier characteristics against bacterial stimulation. Although biologic width is reported to be seen even in PIS, little is known about the barrier property. In the present study, cell adhesion characteristics and the nature of biologic width around implant with various surface such as machined (M), sandblasted and acid-etched (SA), and anodized (A) surfaces were elucidated and the differences of barrier property of each surface were investigated. In addition, we recently developed novel surface modification procedure, CaCl₂ hydrothermal treatment (CaHT), by which we could obtain good tissue compatibility without altering surface roughness. The effect of CaHT was also investigated. As culture study, rat oral epithelial cells (OECs) and fibroblasts were cultured on M, SA, A or CaHT plates. As a result, the adhesions of OECs were weaker on SA and A plates, than those on M and C plates. Furthermore, Sirius red staining indicated that collagen expressions in fibroblasts on M and CaHT plates were lower than those on other plates. As animal study, maxillary molars of rats were extracted and implants with various surfaces were immediately placed into extraction sockets and PIS was histologically observed. As a result, PIS had similar structure to that around the natural teeth, but epithelium-connective tissue ratio varied among the groups. When horseradish peroxidase (HRP) was applied to peri-implant sulcus as a mimic of bacterial endotoxin, HRP penetration around M and SA was deeper than that around CaHT implants, despite the shortest attachment length of epithelium in CaHT. These results suggest that the strong epithelial seal to the implant surface is a fundamental defense against foreign body stimulation.

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