Osseoperception: Can implant-mediated sensibility becomes a reality

Sir,

Osseoperception is the capability of osseointegrated titanium implants to transmit certain sensibility, and the term was given by Prof. P-I Branemark.[1] A lot of research was done in the past to find out the mystery whether osseoperception is really associated with dental implants. Today much scientific evidence was present to support the concept of osseoperception. A systematic review by Mishra et al. evaluated the published articles and presented the histological, neurophysiological and psychophysical evidence and also the role of mechanoreceptors to prove the presence of osseoperception in dental implants.[2] Li et al. investigated the biological behavior of periodontal ligament stem cells induced to differentiate into Schwann cells (SCs) on the surfaces of titanium discs. Sandblasted and acid etched titanium surfaces show good biocompatibility for the SC-like cells, which is important for the application of these cells in peri-implant nerve tissue engineering, through which they are expected to improve the osseoperception of dental implants.[3]

The decrease osseoperception of dental implants is due to the absence of periodontal ligaments and Ruffini-like endings around implants. The peripheral nerve fibers which were damaged during surgery were not regenerated properly. Ma et al. studied the calcitonin gene-related peptide-alpha (αCGRP), a neuropeptide widely distributed throughout the central and peripheral nervous systems. They found that αCGRP is a potent vasodilator and a physiologic activator of bone formation. Local application of αCGRP may promote peripheral nerve fi bers regeneration and improve the osseoperception of dental implants.[4] Corpas Ldos et al. studied the nerve fi bers around osseointegrated implants in humans. Failed implants were retrieved from patients, and the light microscopic study of peri-implant bone was done. They observed both myelinated and unmyelinated nerve fi bers inside the Haversian canals of the osteonal bone near the implant threads. However, no differentiated nerve endings could be observed around the implants. This study shows the presence of nerve fi bers in human peri-implant bone.[5]

Huang et al. did a systematic review on the innervation of peri-implant tissues and the influence of implant placement and loading protocols. They concluded that higher density of nerve fi bers was confirmed around loaded dental implants when compared to unloaded implants or extraction sites without implantation.[6] Mishra et al. found in their study that clinical outcomes of patients with dental implant-supported restorations indicate the presence of sensory perception after some time. The evidence available on the plasticity of the central nervous system provides a possible neural basis for our understanding of the accommodation of patients to these changes in dental status. With the loss of teeth and periodontal structure, other peripheral receptors dominate and transmit the afferent projections to the sensorimotor cortex and compensate by providing stimulation to the area of bone-anchored implant restorations.[2]

Animals and human studies had shown that there exist osseoperception and to increase the sensibility of dental implants further research on implant surface coating is required so that implant can be a better alternative to natural tooth in all aspects in near future.

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Conflicts of interest
There are no conflicts of interest.

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