

Osseointegration: Promise Fulfilled?

Let's take a trip back in time. Some of us remember the days before osseointegration as a time during which we would do anything we could to save natural teeth. The reason for this was simple: once teeth were gone, there was no acceptable solution for edentulism.

Oh, we had complete dentures as an approach that provided esthetic tooth replacement. From a functional standpoint, however, complete dentures failed to restore masticatory forces. The problem with removable dentures is that they depend upon support from the underlying oral mucosa, and that tissue is constantly undergoing changes in response to the forces applied to the dentures. Expert clinicians would debate the goals of treatment specifically as they related to support from the jaws, but there were no absolute solutions to the ever-changing foundation.

A variety of different impression techniques were developed, embracing different theories. Some would favor the approach whereby pressure was applied evenly to the underlying mucosa. Others were proponents of avoidance of any pressure upon the resting prosthesis. Ultimately, the solution to the pressure situation was identified by selectively placing pressure on those anatomical areas that could tolerate it while avoiding forces on those areas that could not. Thus, we witnessed the nearly ubiquitous creation of "selective pressure" techniques to make impressions of the underlying tissues.

Likewise, prosthetic teeth have demonstrated a number of variations over time. Some have favored the use of anatomical teeth; these are prosthetic teeth that are designed to more carefully match the shape of natural teeth. Others have recommended non-anatomical teeth, believing that flat occlusal surfaces would cause less denture base movement and thereby reduce adverse forces to the underlying bone. Debates on the different designs continue without a clear identification of the ideal form for prosthetic teeth.

In the early 1980s, reports began to circulate on the achievement of a direct contact between living bone and an alloplastic device. The descriptions of the achievement of "osseointegration" provided new hope for edentulous patients. No longer would denture wearers be expected to juggle loose teeth on residual ridges. Instead, dental implants would provide absolute security to the prostheses that were mechanically connected to them.

As with most revolutionary concepts, implants appeared to provide patients with benefits that could not have been envisioned previously. Not only were dental implants providing support, retention, and stability to fixed dental prostheses, they did so predictably for years, if not decades, to come.

When implants were described, there was a perception that implant-supported prostheses would outperform natural teeth. Since there was no periodontal ligament, there could be no periodontal disease. Because dental implants were made from commercially pure titanium or titanium alloy, the risk of tooth decay became a distant memory.

It all sounded so good. Many clinicians began to find new and innovative ways to use dental implants. Rather than just looking at implants for full-arch reconstructions with fixed prostheses, dentists started to use them to support short-span fixed dental prostheses and even single crowns. The use of implants to retain overdentures grew, while the number of implants necessary to support prostheses diminished. In recent years, we have even seen the recommendation that as few as one implant can be used to retain an entire complete denture while still maintaining predictability.

Perhaps the most exciting aspect of dental implant treatment is related to the implant's effect on other systems. One example is an apparent positive influence of implants on neuroplasticity.

It appeared that a new treatment paradigm was upon us. Even in the event of catastrophic prosthesis breakage or inevitable wear and tear to the prosthesis, its removal would be as easy as unscrewing the prosthesis and repairing it for reinsertion.

Alas, nothing in life is perfect. Implants are pretty good, but perfection does not exist. Perhaps we can seek excellence as our treatment goal. The question then becomes, how can we do so with a high level of predictability? Certainly, dental implants require patients to make a commitment to their implant-supported prostheses. One does not have teeth removed and implants placed and then anticipate that they are immune from all forms of biologic deterioration.

Perhaps it's time to rein in Secretariat. We have a great horse here, but just as the racehorse needs to be appropriately groomed and maintained, the tissue that is in proximity to dental implants must also be well maintained. Brushing and flossing along

with irrigation and professional maintenance are all required to maintain the health of bone surrounding implants. Peri-implantitis is a reality that we are facing today, but we also have to appreciate that we have no consistent treatment that eliminates peri-implantitis for every patient. There is no magic potion we can sprinkle on our implants to regrow bone. The solution to bone loss demands patient cooperation in maintenance.

While the patient remains committed to maintaining structural integrity, clinicians must do the same. When implants entered the marketplace, there was routine use of acrylic denture teeth to act as a buffer toward heavy occlusal forces. Advances in restorative

materials have made excellent strides in terms of durability and beauty, but the appropriate use of materials to control forces has yet to be established.

Has the promise of osseointegration been fulfilled? Perhaps we put too many demands on this process, expecting it to do too many things for us. And yet, osseointegration remains as a predictably successful component toward overall patient care.



Steven E. Eckert, DDS, MS
Editor-in-Chief

