Primary stability vs. viable constraint: A need to redefine

By Michael R. Norton, UK

Any regular reader of the journal of Oral & Maxillofacial Implants or indeed of any other publication on dental implants could not fail to have noticed how much attention has been focused on Primary Stabilisation. The concept of primary stabilisation is not new, indeed, as early as the 1970s, there were studies emphasising the need to establish mechanical stability to ensure an uninterrupted healing of the bone-implant was evident in the orthopedic literature as it pertains to hip prostheses.

By the 1990s, numerous reports were being published on immediately loading of dental implants and the ground breaking work by Neil Meredith on the application of resonances is available from the publisher. To report high success rates value cortical tissues that were inserted with low insertion torque.

The stability of the implant is the initial issue. It is a living tissue, so any measure of viability must be representative of the implant's potential to function as intended throughout manual percutaneous insertion. Indeed, it is usual for many practitioners to provide some guidance on optimal insertion torque with some implant designs being specifically tailored to deliver higher insertion torques, in excess of 75 Ncm. This would be a source of comfort for the clinician that the implant is initially "stable." However, such a high torque has not been shown to be propitious to the surrounding bone. Numerous studies have been published that clearly demonstrate that, while the high torque these high torque grades contribute to a micro-fracture of the bone, with a net resorption in the cortical bone and, indeed, an unfavorable delayed healing process with a reduced bone-to-implant contact.

Such a response might well shift the onset for secondary stability and thereby delay or even prevent the possibility of early or immediate loading. At the same time, we need to employ an objective measure of constraint that reliably ensures the implant can tolerate early or immediate loading. As much was recently proposed by Raveh et al.: I have learned this objective measure Viable Constraint (VC), which central parameter of resilience to immediate or even early loading protocols, whereby we want to transfrom simple mechanical fixation to full osseointegration in the shortest possible time.

The most fascinating aspect of this debate is the lack of consensus between insertion torque and the Implant Stability Quotient (ISQ) as measured by RFA, which appears to be counterintuitive. How is it possible for an implant that is driven into an ISQ of 60 Ncm to have the same ISQ as one that required 100 Ncm of torque? Nevertheless, the weight of literature would seem to suggest this to be the case.

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References