SURFACE CLEANLINESS OF DENTAL IMPLANTS

Dear Editor

Oral implants have seen a clinical breakthrough thanks to osseointegration. The first Osseo integrated oral implants were minimally rough, turned implants, with the first patient treated in 1965[1]. With 75 percent of all studies in long-term reports [2] turned screws remain the most clinically reported implants of all. Other clinically documented oral implant systems have become increasingly popular over time. Those systems may have favored slightly different surfaces; since the turn of the millennium, moderately rough implants have been the treatment of choice, as they have shown improved clinical results[3]. Surfaces of fairly rough implant systems can be made in a variety of ways, including subtractive processes like blasting and acid etching or anodization, as well as additive techniques like hydroxyapatite coating. Osseo Speed implants from Dentsply–Sirona, SLA-implants from Straumann, and TiUnite implants from Nobel Biocare have all been clinically documented in multiple articles spanning a period of over 5 to over 10 years of follow up with very high levels of survival and success [4-6].

Many new implant manufacturers have attempted to emulate the surfaces and geometries given by the major businesses since some osseointegrated dental implant systems have been adequately recorded with a very good clinical outcome. These are so-called "copy-cat" or "look-alike" implant systems that frequently lack clinical proof but promise to be as excellent as the originals as the original implants they are trying to mimic. However, in clinical reality these implants lack the scientific evidence of similar performance.

Surface cleanliness of dental implants

The cleanliness of the surface of sterile packaged oral implants is one of their distinguishing features. Oral implants can have a variety of surfaces, both inorganic and organic. These contaminants may have remained on the commercially accessible implant due to production handling and packaging processes. Currently, we don't have a good understanding of the clinical dangers of implant impurities. Contaminations, on the other hand, are technically avoidable, and the authors presume that we would all want clean implants to avoid potential complications from surface pollutants.

The purpose of this study was to evaluate the cleanliness of well documented clinical implant systems to implants with similar design and surface. Dentsply Implants' OsseoSpeed was compared to Cumdente, a German look-alike implant; Straumann's Standard Plus Implant SLA was compared to Bioconcept, a Chinese look-alike implant that claimed to be 100 percent compatible with Straumann and a titanium implant with a TiUnite surface NobelActive from Nobel Biocare was pitted against Biodenta, a Swiss/Taiwanese implant system. Our hypothesis was that the three large and well-established implant systems had far more complete clinical documentation and produced implants in far cleaner conditions than the corresponding look-alike systems. Every single dental implant must be free of contaminants, as this is a medical item that could hurt patients—even if we discovered one implant with impurities, it was sold for the therapy of one genuine patient. The goal of this study was not to reveal a statistically significant number of average contaminations for different implant types. In this trial, all implants were purchased at random and labelled for clinical use. Each sample of these medical gadgets was made under a strict quality control regime. A single implant with large contaminants, which are theoretically avoidable, is proof of a lack of quality if a manufacturer's quality control cannot maintain a specific level of purity.

Other foreign materials commonly observed close to implants, such as titanium particles [7-9] or the unintentional presence of cement in the bone-to-implant contact, which has been found in 59 percent of cemented implants [10], may combine to induce peri-implantitis [11]. As this work showed, metal particles and contamination with organic substances such as thermoplastic materials, synthetic polymers, or polysiloxanes might generate impurities on sterile packaged implants. When dental practitioners learn about the contamination of an implant system and the next patient for implant therapy is their partner or child, the academic debate over how much implant pollution is acceptable usually ends soon. We should avoid utilising sterile packed implants that include contaminants that can be verified and as an outgrowth of the ancient medical principle of "primum non nocere," the well-established "precautionary principle" is followed. However, it is unclear whether the look-alike implants' relative lack of cleanliness suggests that they perform poorly clinically in comparison to the larger systems. Having said that, oral implants are implanted in people, thus it is highly advisable to publish clinical data in peer-reviewed publications for any dental implant system that will be used in clinical practise. The look-alike implants are inferior to the major recorded oral implant systems in this aspect, and none of the look-alike systems reviewed had any clinical documentation of their own, which must be considered a severe flaw. Because there are clear distinctions between the major systems and the look-alike implants, practitioners employing the latter devices must tell their patients of this fact, as well as the fact that the implants implanted are completely undocumented in terms of therapeutic outcomes. [11]

Conclusion

Compared to the original implants from market-leading manufacturers, the assessed look-alike implants had much more contaminants, emphasising the necessity for independent organisations to conduct periodic quality checks on the manufacturing process. Patients are exposed to unknown dangers due to several organic particles and PTFE remnants (Cumdente), organic particles containing sulphur, particles containing iron (Bioconcept), or impurities with aluminium (Biodenta), all of which are small enough to be phagocytosed. The lack of clinical documentation of the studied look-alike implants, in addition to the results of SEM/EDS study, raises concerns.

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Conflict of interest

All the authors declare no conflict of interest

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