Ceramic dental implants: What benefits do they offer?

By Brendan Day, DTI

Although the search for metal-free implant materials began in the late 1960s, recent improvements in ceramic materials have made their development process considerably easier. As an alternative to titanium-based implants, ceramic implants offer greater aesthetic appeal and sinus-friendly properties. This article highlights some of the companies currently offering ceramic implants and explores why they are still much less commonly used than their titanium counterparts.

For the better part of four decades, titanium and titanium-alloy dental implants have been successfully used as tooth replacements. However, recent research findings have raised fears regarding these implants’ tendency to corrode and decay. During the corrosion process, titanium implants release particles or ions into their surrounding tissue, which could lead to implant failure and bone disintegration. A 2014 paper published in the Open Journal of Stomatology, titled “Corrosion aspect of dental implants—An overview and literature review”, detailed this process by explaining that the compatibility of titanium implants is largely the result of a thin layer of oxide that forms on their surface. This layer can erode due to movements between bone tissue and the implant during loading conditions, which could lead to corrosion, leaking and an overall weakening of the implant. Given their non-metallic nature, ceramic implants are not susceptible to this form of decay.

However, the lack of concrete evidence concerning the mechanical properties and osseointegration of ceramic implants has impeded their uptake, although this is partially due to their relative newness. The FDA only approved ceramic implants in 2007. Additionally, there have also been relatively few clinical studies conducted on their long-term use. However, in the Clinical Implant Dentistry and Related Research journal, a 2015 study of zirconia implant abutments that supported entirely ceramic crowns found that after 11 years of use, these abutments had a cumulative success rate of 96.3% per cent. In addition, a 2010 study in the journal for Clinical Oral Implants Research found that the osseointegration of zirconia implants is similar to that of titanium implants. Despite these positive findings, the sheer lack of depth in research has deterred the majority of dental professionals from using ceramic implants. plastic should continue to grow in popularity.

“Ceramic implants today, in my experience and for many fellow ceramic implantologists, have the same success rate as titanium implants. They are now as versatile as metal implants thanks to the evolution in design, surface enhancement protocols and biomaterial improvements”, says Dr Sammy Noumbissi, President of the International Academy of Ceramic Implantology (IAOCI), an association entirely dedicated to ceramic alternatives of metal-based implants. “Various treatment modalities are applicable with ceramic implants: implant-supported, all-ceramic, screw-in implant, allowing for a flexible restoration with a high level of biocompatibility. Combining this with a higher resistance to corrosion results in a product that rivals titanium implants in performance.”

2. Systems is a Switzerland-based company that, through their Zirkalités range of products, offers extensive ceramic implant options. Similar to TAV Dental, they offer both one-piece and two-piece implants and their osseointegration rate is similar to titanium implants. Another company, VITA Zahndarß-rich, has entered the ceramic implant market with its own one-piece cylindrical ceramic im-

The one-piece design of ceramic implants is another element that has both positive attributes and drawbacks. A one-piece implant eliminates the connective point between the abutment and the fixture, ideally reducing bacterial growth and improving overall oral health. However, a high level of attention to detail with regards to the implant’s placement is required, as it does not possess the same capability as titanium implants to correct errors in placement with an angled abutment. This inability to correct errors in placement created the demand for two-piece ceramic implants that allow for more flexible placement options and better healing.

The American Academy of Implant Dentistry estimates that, while three million Americans currently have at least one dental implant, this number is rising by half a million each year. Given the growing global demand for dental implants, it is more important than ever to provide patients with options that best suit their individual needs. Although they are an expensive option, ceramic implants are increasingly meeting the standards for stability, compatibility and osseointegration that titanium-based implants have set. Combining this with their aesthetic appeal and sinus-friendly nature, ceramic implants are increasingly meeting the demand for dental implants, allowing for a faster, safer healing than titanium-based implants. With a compatibility rate of 98 per cent for more recent models, zirconia-based ceramic implants are increasingly matching the standards set by titanium implants and have thereby become a more viable option.

As Noumbissi concludes, ‘the future of ceramic implants is really bright for many reasons. Patients increasingly ask for safer, less invasive solutions, as well as metal-free alternatives for teeth repair or replacement. Dental atttitudes and understanding of zirconia and bioceramics are slowly but steadily evolving, with a definite shift towards biological and inert materials. There has also been a shift in the healthcare industry towards wellness and well-being, and providing therapies that have little to no side effects.”

Since some of the last players in the implant industry are incorporating, or have already adopted ceramic implants in their product lines, either by development or by corporate acquisitions, implantologists could eventually look at ceramic implants as a viable alternative to titanium.