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Case report of a novel injection molded two-piece ceramic dental implant surgery with immediate loading

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CASE REPORT

ABSTRACT

This paper aims to briefly review the use of zirconia implants, question the particular indications of these kind of implants and to demonstrate the usage of a novel injection molded two-piece ceramic dental implant from Neodent system (Neodent Zi Implant, Curitiba, Brazil) in a patient presenting a tooth fracture. The implant was performed in a single stage procedure: tooth extraction, implant placement and restoration with a peek abutment and provisional tooth.

Keywords: Ceramic implant, Immediate loading, Immediate placement, Single implant, Yttria stabilized tetragonal zirconia

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INTRODUCTION

The use of ceramic implants is a global trend as patients are more concerned of their general health and searching for alternatives of a "non-metal" treatment in their mouths.[1] The ceramic implants not only do not release titanium-based particles yet also represent an attractive alternative: an aesthetic advantage in case of a posterior recession of the implant and also in thin gingival phenotypes cases.

When we think of dental implants immediately we think of titanium, this classic material is vastly used and was the precursor of osseointegration concepts and studies, titanium type IV implants have been a proven solution for tooth replacements for many years[2], yet we still face some challenges, as stated in a recent systematic review by Rocuzzo et. al.[3] that found a high prevalence of up to 22% of peri-implantitis. This pathology etiology still remains debatable and controversial, one of the factors that could be related to its incidence is tribocorrosion of the titanium implant.[4] The theory is that the degradation of the implant over time releases titanium particles that generate an inflammatory response of macrophages, T lymphocytes and monocytes.[5] Another topic that needs more research with few studies is patients presenting titanium allergy[6,7], that can be an ideal indication for zirconia implants.

One of the first reports of research on ceramic implants (aluminum oxide) dates to 1968[8]. Currently, the material of choice for ceramic implants is yttria-stabilized tetragonal zirconia polycrystal (YTZP)[9], a high stability and resistant ceramic. In stress tests, this material demonstrated high bending and fracture resistance. In in-vitro studies showed low affinity to plaque and bacterial colonization and a high biocompatibility.[10]

At present, as stated by Geninho et. al.[11] the majority of zirconia implants are a one-piece system or two-piece system fabricated with subtractive milling techniques. Neodent new "Zi implant" is manufactured with a different technique: ceramic injection molding, thus producing high-quality implants at reduced costs.

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CASE REPORT

A 32-year-old male patient presented at the dental clinic with a fractured upper premolar (24) with an asymptomatic extensive loss of the coronal portion of the tooth, requiring a dental implant. It was proposed to the patient the use of a zirconia implant as treatment, adjunct with a immediate provisional. The surgery was performed under local anesthesia and oral administration of an anxiolytic drug (midazolam 5mg). The tooth (Figure 1, 2) was removed with an atraumatic extractor type Benex (Neodent, Curitiba, Brazil), maintaining the gingival tissues intact and without soft tissues detachment. The drilling sequence consisted of only three drills: 2.0, 3.5 and 3.75 conical drills. The implant of size 3.75 x 13 mm (Figure 3) was placed with a high insertion torque allowing immediate loading. The alveolus gap was filled with xenogeneic graft material, Cerabone® 0,5-1,0 mm granules (Straumann, Basel, Switzerland). The peek abutment with a passive removable screw was installed and a provisional crown made (Figure 4).

Fig. 1. Initial aspect of fractured #24 tooth, with almost complete loss of coronal portion.

Fig. 2. Axial view of the tooth

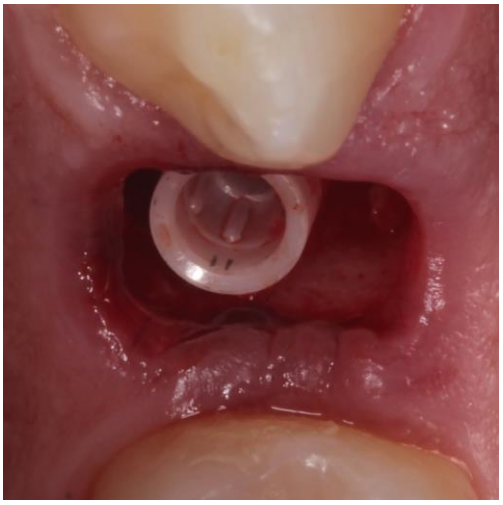

Fig. 3. Axial view of the Neodent Zi implant in place, with not detachment of gingival tissues.

Fig. 4. Immediate provisional with no occlusal contact.

DISCUSSION

The use of ceramic implants displays better patient acceptability and interest[1], despite the fact those implants are available for dental surgeons to use it over 20 years[8], the old design of only one piece presented some disadvantages: the prosthetic crown has to be cemented, the implant position has to be in perfect prosthetic position for a good result, the insertion torque cannot exceed in some cases 35N-cm and additionally the inability to perform a delayed implant uncovering.

The two-piece dental zirconia implant eliminates the risk of peri-implantitis due to cement extravasation on the soft tissues[12], also some professionals prefer to work with screw-retained prosthetics, consequently this change of implant platform design gives a fair amount of possibilities and flexibility for teeth restoration. The new injection molded technique for the fabrication of zirconia implant allows a higher insertion torque for the implants and a better predictability for immediate loading cases.

Some researches demonstrated a better soft tissue response and decreased plaque retention around peri-implant tissues of zirconia implants in comparison to

titanium implants[13,14], therefore the increasing use of ceramic implants could result in an overall lesser incidence of peri-implantitis and should be perceived in the long term as more research and reports are produced.

CONCLUSION

Zirconia implants are a viable alternative and a growing option for the rehabilitation of single and multiple elements in the anterior region, due to their aesthetic advantage, greater acceptance by the patient and, in cases of two-piece implants, their similar use to conventional titanium implants.

The use of zirconia implants should be considered in failed implants sites due to possible titanium allergy, thin gingival phenotypes and patients seeking for “non-metal” implant treatments. The two-piece implant should be the favored design, as it exhibits superiority over the one-piece implant.

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