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Ceramic Implants: A Fresh Approach to Dental Rehabilitation

Implantes Cerámicos: Un Nuevo Enfoque para la Rehabilitación Dental

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ABSTRACT: Titanium alloys have long been a staple in the fabrication of dental implants. However, emerging concerns over immunological reactions and potential aesthetic drawbacks have prompted the development of new implant technologies. Since the late 1990s, zirconia has emerged as a promising alternative in dentistry, owing to its superior biomechanical properties compared to other ceramic oxides like alumina. Zirconia implants offer a metal-free solution, making them an attractive option for patients seeking alternatives. The integration of abutment and implant in a one-piece design delivers excellent functional and aesthetic outcomes, meeting high expectations. Additionally, zirconia exhibits superior biocompatibility relative to titanium and other metals, positioning it as a burgeoning trend in dental rehabilitation. This paper aims to provide a brief literature review and present a clinical case highlighting the characteristics of zirconia implants, emphasizing the importance of oral health professionals' awareness of this promising alternative.

KEY WORDS: dental rehabilitation, osseointegration, zirconia implants

INTRODUCTION

Replacing missing teeth with implants in partially or completely edentulous patients has become a widely adopted dental treatment modality. This procedure is based on osseointegration, which refers to the structural and functional stability of implants in the surrounding bone tissues (Adell *et al*., 1981; Arlucea *et al*., 2021).

Zirconia implants have demonstrated the ability to withstand oral forces over prolonged periods, showing surface osseointegration characteristics similar to titanium implants (Buser *et al*., 2017). Although allergy to titanium is rare (0.6 %), in some cases it can lead to implant failure. As an alternative, zirconia implants have been proposed for these patients (Cionca *et al*., 2017).

Ceramic materials offer a significant advantage as they do not contain metals in their structure, compared to conventional dental implants. They represent a biocompatible alternative for patients who cannot use traditional implants or who are looking for a non-metallic option (Comisso *et al*., 2021). The success and advancement of implant dentistry in recent years are remarkable, thanks to its high predictability as a therapy to rehabilitate partially or completely edentulous patients with implant-supported prosthodontics and the prevalence of excellent long-term results (de Holanda *et al*., 2021).

Despite this, reports in the literature highlight cases of allergic reactions and possible discoloration of the peri-implant tissue, negatively affecting

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aesthetics in the anterior region of the maxilla (Hosoki *et al*., 2016). To overcome these limitations, zirconia implants emerge as a promising alternative to titanium implants. Among its advantages are osseointegration similar to that of titanium implants, resistance to wear and corrosion, high biocompatibility and integration with soft tissues, lower affinity to bacterial plaque, which reduces susceptibility to peri-implantitis, and promising clinical results in the short term (de Matos *et al*., 2020).

Given the promising potential of ceramic implants, more research is needed to thoroughly evaluate their benefits and effectiveness in clinical practice. Continued exploration through additional studies will contribute valuable information about the use of ceramic implants and their comparative advantages over traditional titanium implants (Park *et al*., 2013).

Therefore, the present study aims to describe, through a clinical case, the prosthetic steps of a patient rehabilitated with a zirconia implant.

CASE REPORT

A Leucoderm patient, 50 years old, male, attended the private clinic reporting the loss of a tooth 14 many years ago due to a tooth fracture. After an assessment of his general health status and considering the clinical and radiographic findings that indicated favorable bone availability, treatment began (Fig. 1).

Initially, an envelope flap was performed, with a linear incision between the bones of the alveolar crest at the interdental level of the alveolar ridge. Following the usual Straumann® BL protocol, drilling was performed with 2.8 mm and 3.5 mm drills. Next, a position indicator was used to determine the direction and appropriate interocclusal space for the placement of the zirconia implant. Two simple monofilament sutures – Monocryl 5-0, were used to reposition the soft tissues. In the immediate postoperative period, it was possible to observe adequate alignment and positioning of the implant, favoring future prosthetic reconstruction.

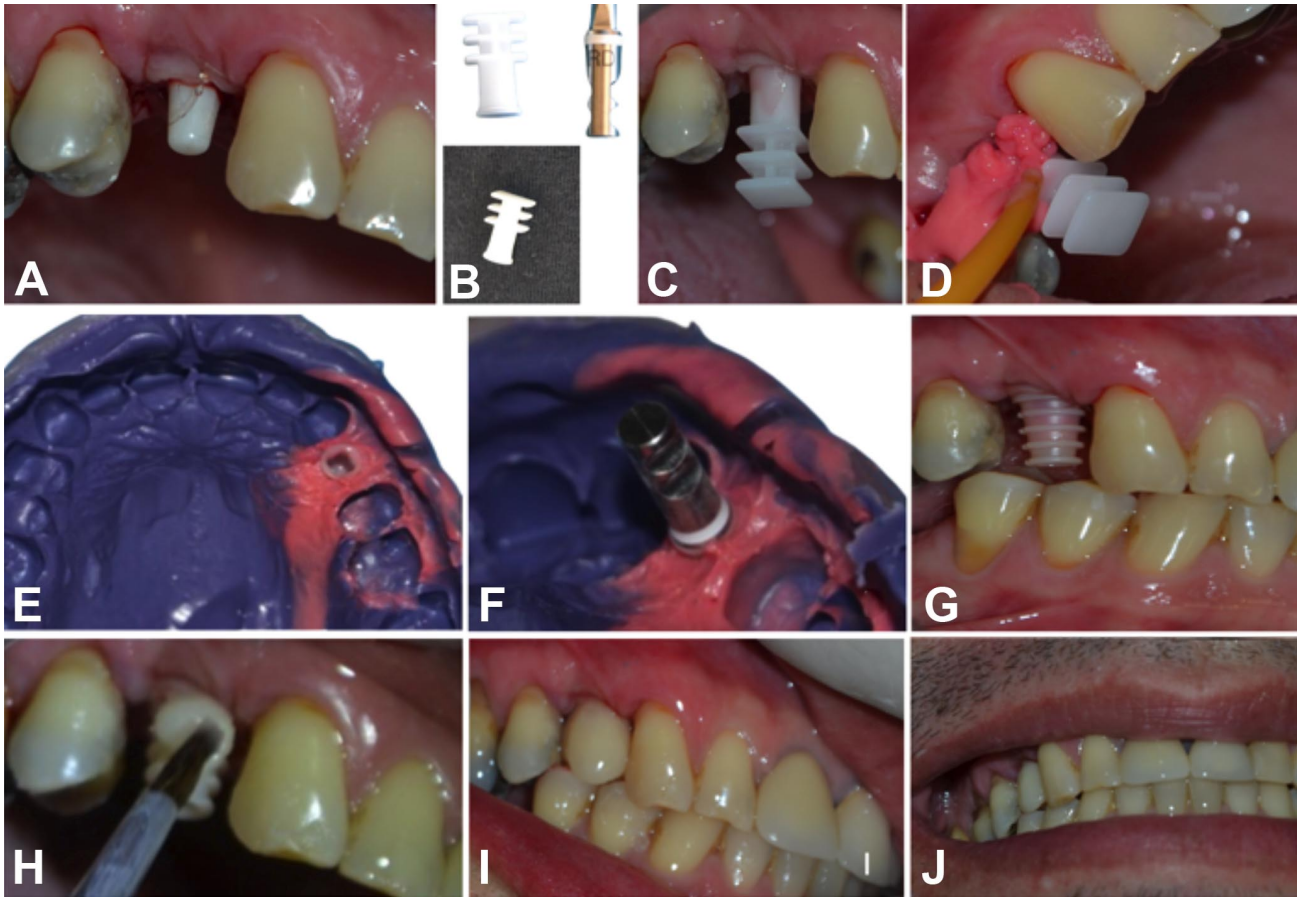

Fig. 1. The correct elaboration of the provisional crown in this case makes possible the maintenance of the marginal integrity of the periodontium and mainly the interdental papillae.

After installing the implant, a temporary crown was made exclusively for aesthetic purposes, positioned in infra-occlusion to avoid excessive chewing forces. The correct preparation of this temporary crown aims to maintain the marginal integrity of the periodontium and, especially, the interdental papillae. After three months, it is planned to create a ceramic crown, followed by the final impression.

DISCUSSION

The prosthetic stage in dental implants with zirconia is a constantly evolving area in modern dentistry. Zirconia is an extremely strong and aesthetic ceramic material that has become a popular choice for prosthetic restorations, including crowns, fixed dentures and even dental implants (de Holanda *et al*., 2021).

When opting for zirconia implants, the creation of the immediate provisional becomes a crucial part of the process. The immediate provisional is a temporary restoration placed immediately after the insertion of the dental implant, providing protection to soft tissues and promoting satisfactory aesthetics during the healing period (de Matos *et al*., 2022).

There are several considerations to take into account when carrying out the prosthetic stage with zirconia implants and the creation of the immediate provisional (Sicilia *et al*., 2008; Thoma *et al*., 2016; Roehling *et al*., 2017; Webber *et al*., 2021).

I. Make sure the provisional material is compatible with zirconia to avoid adverse reactions and ensure the integrity of the implant (Roehling *et al*., 2017; de Matos *et al*., 2020).
II. The immediate provisional should be aesthetically pleasing, mimicking the shape and color of adjacent natural teeth. This is especially important in visible areas of the mouth (Thoma *et al*., 2016).
III. A precise adjustment of the provisional is essential to avoid problems such as bacterial infiltration, gingival irritation, and compromising the healing process (de Matos *et al*., 2020).
IV. The provisional must be properly fixed to ensure stability and comfort for the patient during the healing period (Lopes *et al*., 2022).
V. The occlusion of the provisional must be carefully adjusted to avoid any excessive load on the implant, which could compromise its integration (Zhang & Lawn, 2018).
VI. Provide the patient with clear instructions regarding care and restrictions during the use of the immediate provisional to ensure adequate oral health during the healing process (de Matos *et al*., 2022).

Furthermore, collaboration between the implant dentist and the prosthetist is essential for the success of the procedure (Matos *et al*., 2022). Both must work together to plan and execute the prosthetic stage efficiently, ensuring satisfactory aesthetic and functional results for the patient (de Matos *et al*., 2020).

CONCLUSIoN

Zirconia implants have aroused considerable interest among dentists, due to their favorable aesthetic results, mechanical resistance and toughness, which are equivalent to the elastic modulus of stainless steel. This emerging trend in implant dentistry promises to offer a promising new approach. The compatibility of zirconia implants with hard and soft tissues results in remarkably natural aesthetic solutions. They are especially indicated for patients with thin periodontal biotypes and localized gingival recession. Zirconia proves to be the ideal material for the production of ceramic implants, due to its aesthetic color, mechanical properties, biocompatibility and its low affinity with bacterial plaque.

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RESUMEN: Las aleaciones de titanio han sido durante mucho tiempo un elemento básico en la fabricación de implantes dentales. Sin embargo, las preocupaciones emergentes sobre las reacciones inmunológicas y los posibles inconvenientes estéticos han impulsado el desarrollo de nuevas tecnologías de implantes. Desde finales de la década de 1990, la circona se ha convertido en una alternativa prometedora en odontología, debido a sus propiedades biomecánicas superiores en comparación con otros óxidos cerámicos tal como la alúmina. Los implantes de circonio ofrecen una solución sin metal, lo que los convierte en una opción atractiva para los pacientes que buscan alternativas. La integración del pilar y el implante en un diseño de una sola pieza ofrece excelentes resultados funcionales y estéticos, cumpliendo con las altas expectativas. Además, la circona exhibe una biocom-patibilidad superior en relación con el titanio y otros metales, lo que la posiciona como una tendencia emergente en la rehabilitación dental. Este artículo tiene como objetivo proporcionar una breve revisión de la literatura y presentar un caso clínico de las características de los implantes de circonio, enfatizando la importancia de que los profesionales de la salud oral conozcan esta prometedora alternativa.

PALABRAS CLAVE: rehabilitación dental, osteointegración, implantes de circonio.

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