

Oral rehabilitation using zirconia implants and zirconia prostheses – Case report

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Introduction

The zirconia used in dental implants has the following properties: greater resistance to fracture and torsion as well as greater flexural strength than titanium¹.

Several animal studies using zirconia were carried out with encouraging results in histological terms. In addition, comparative results with titanium implants showed that the "bone to implant contact" (BIC) standards are similar between zirconia and titanium².

In terms of prosthetic rehabilitation, full-arch implant retained prostheses using acrylic resin, which has low functional durability and doubtful esthetic stability was replaced by metal fused to ceramic prostheses. Assuming the popularity of metal-free reconstructions in Dentistry, all-zirconia full-arch prostheses with anterior teeth stratification have been indicated for esthetic excellence³.

Background / Aim

2001, the authors perform the placement of 211 impacted zirconia monobloc implants including this clinical case on 10 implants. A resin-based restoration was fabricated in order to avoid excessive hardness of a zirconia framework.

2003, the same authors establish during the Congress of the AB⁴ the specificities of an ideal zirconia implant⁵ namely:
screwed implant + two parts implant + possible angulated abutment + presence of a shock absorber...

2012 ... introduction of the Hexalobe Axis Biodental implant, today named CERALOG® Implant System...!

The goal is to know if this implant meets the defined specifications at long-term!

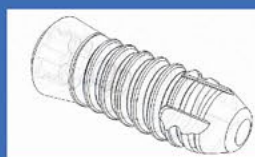


Materials

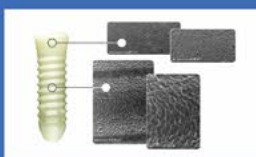
1. Implants

Zirconium oxide (ZrO₂), as a metal substitute, presents good physical properties⁶ and, furthermore, its biocompatibility as a dental implant material has been demonstrated in several animal investigations⁷. The excellent tissue reactions of the bone and the peri-implant mucosa confirm the good alternative for tooth replacement, especially in esthetical areas⁸.

The placement of eight 10- or 12mm-long CERALOG Hexalobe implants was planned according to the location of the remaining bone without using bone grafts.



The macro-design of the implant promotes its primary stability, prerequisite for success...



The micro-design of the implant leads to the macroscopic destiny of each specific tissue

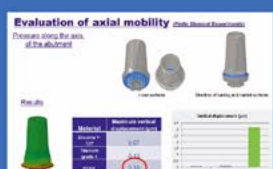


Surgical and prosthetic kit

2. Abutments

The main reason for choosing CERALOG® implant system was the possibility of using Pekkton® (PEKK - Poly Ether Ketone Ketone) prosthetic abutments.

This is a high-performance polymer that simulates the peri-dental movement. Its high adherence capacity makes it adequate as the interface between two zirconia surfaces (implant and denture), thus preventing excessive transversal and longitudinal forces both on the implants and the denture.



3. Prostheses

The Zirkozahn® system has automated milling machines that produce a pressed zirconia block, the measures of which are compliant with the fabrication of a complete prosthesis.

This denture is subsequently synthesized and stratified, also at the gum portion, so that it may be adapted upon the implant abutments that are already integrated in the patient's mouth⁹.



Methods

We strictly followed the manufacturer's data according to the surgical procedure.



Results



Patient before surgery



Pre-operative exams: orthopantomogram, CT scan



Implants insertion and healing screws (PEEK)



Zirkozahn® modelisation



Final prostheses



Implementation of PEKK abutments



Oral views



Smile of the patient... makeup on and hair styled!



Patient after 5 years



Orthopantomogram after 5 years

Conclusion

Full-mouth rehabilitation of a totally upper edentulous patient with no metal at all seemed a very faraway dream for a modern Dentistry. However, the combination of technologies in Implantology and Prosthodontics was possible in this case, giving the patient not only her former function and esthetics but also the biocompatibility of zirconia both within the bone and outside the mouth, with excellent resistance, and incomparable prosthetic resolution.

In fact, according to the patient, she feels safe and confident in her social and family life. The CERALOG® Implant System counts with all the necessary elements so that any type of prostheses upon implants be developed, ranging from one-piece restoration to a full-arch rehabilitation.

Bibliography

1- Andreioteletti M, Wenz HJ, Kehal R-J. Are ceramic implants a viable alternative to titanium implants? A systematic literature review. *Clin. Oral Impl. Res.* 2009; 20(4): pp 32-47. 2- Page T. Surface characterization of three types of dental implants by means of confocal laser scanning microscope. *Objectif Perio.* 2006; 10(1): pp 13-15. 3- Albrektsson T, Hansson HA, Ivarsson B. Interface analysis of titanium and zirconium bone implants. *Biomaterials.* 1985; 6(6): pp 97-101. 4- Page T, Sicoli EA. 2º Congresso Internacional da ABO, 1-4 de Outubro 2003, Foz de Iguaçu, Brasil in "Zirconia: Implantodontia do século XXI". 5- Gahlert M, Burtscher D, Grunert I, Kriha H, Steinhäuser E. Failure analysis of fractured dental zirconia implants. *Clin. Oral Impl. Res.* 2012; 23: pp 287-293. 6- Koch FP, Weng D, Kramer S, Biesterfeld S, Jahn-Eimermacher A, Wagner W. Osseointegration of one-piece zirconia implants compared with a titanium implant of identical design: a histomorphometric study in the dog. *Clin. Oral Impl. Res.* 2010; 21: pp 350-358. 7- Oliva X, Oliva J, Oliva JD. Full-mouth oral rehabilitation in a titanium allergy patient using zirconium oxide dental implants and zirconium oxide restorations. A case report from an ongoing clinical study. *Eur. J. Esthet. Dent.* 2010; 5: pp 190-203. 8- Sicoli EA. Zirkozahn®: Zirconia, função, estética, conforto, resistência e longevidade. *Curso e Prática sobre Implantodontia UNIOESTE*, 2010.