A modern approach to implantology with the TBR Z1 hybrid implant

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Introduction

A clinical case illustrating a modern approach to implantology is presented. This educational case describes a clinical protocol and materials perfectly aligned with a new approach to implantology. This is a simplified, minimally invasive method that integrates modern imaging tools and the most recent advances in tissue engineering and biology.

Beyond the simple osseointegration of implants, today we seek an immuno-integration that reinforces the long-term stability of peri-implant tissues in the area of the implant neck, which is the site of a significant conflict to establish a balance between the immune system and the host's microbial flora.[1,2] Consequently, stable and healthy peri-implant tissues lead to the aesthetic appearance of the implant restoration. It is a comprehensive approach that allows you to secure your restorations and improve your results to meet the growing demands of your patients.

The concept of a comprehensive minimally invasive approach

Today, implantology has undergone a paradigm shift with the advent of osteoimmunology and the elevation of peri-implant aesthetic standards.[16]

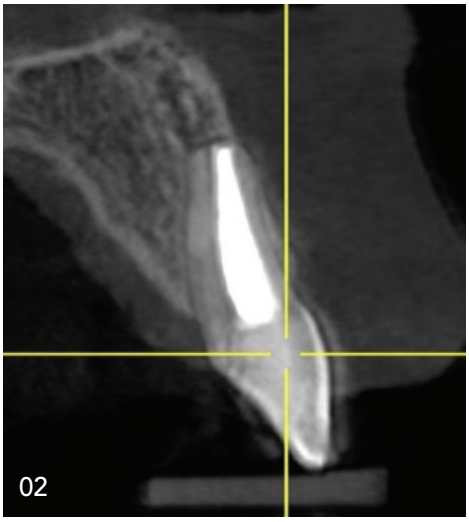
It is no longer simply a matter of replacing a missing tooth with an implant and accepting progressive bone loss over time as normal, with biological and aesthetic consequences. The quality standards of prosthetic restorations on implants and the success criteria of implant treatments have evolved. The notions of "survival rate" and "success rate" are obsolete today and no longer meet the expectations of our patients, who demand more from their implant restorations, particularly in the anterior sector.

The concept of peri-implant health goes beyond the fundamental notion of implant stability. We are no longer just looking for implants capable of simply remaining in the mouth, but implants that are biologically stable and situated in an aesthetic and functional tissue environment that is perfectly in harmony with nature over the long term. These are reconstructions on implants that have a positive impact on the physical and mental health of our patients. Today, our implant restorations should be evaluated according to the PROMs recommended by an ITI consensus group in 2018.[3]

The immuno-integration of our implant restorations supersedes simple osseointegration. This concept, which is the true paradigm shift in implantology, requires the mastery of a strict protocol and adapted materials. It is a reasoned

01
Modern implantology using minimally invasive surgery: simplicity serving sophistication for optimised implant restorations closer to the natural tooth.

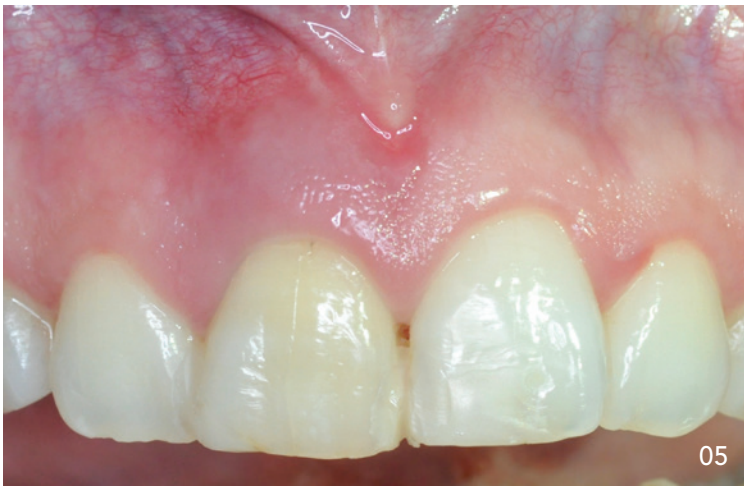
02
3D preoperative examination objectifying the horizontal coronal fracture and the available bone volume for the indication of immediate extraction/ implantation.

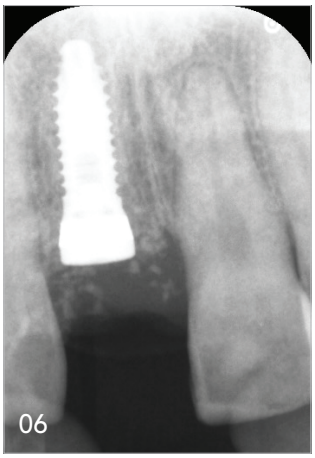


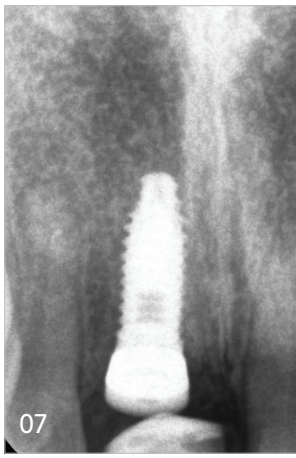
03
Clinical view before extraction.

04
Clinical view after extraction and implantation.

05
View of healing one week after implantation.







06+07
Postoperative control radiograph of the placed implant and the filling, and integration of the implant and bone reconstruction at two months postoperative: establishment of an optimal biological space.

approach to implantology where simplification is at the service of sophistication.

Operative protocol

A patient presents to the pre-implant consultation with a recent subcrestal horizontal corono-radicular fracture. The cortical bone and the periodontium are not yet affected by an infection.

The preoperative 3D examination shows a very thin, almost non-existent bone cortex. A biological examination evaluating the inflammation indexes SII, SIRI, and vitamin D is performed before making the indication for reconstructive implant surgery.[4,5] Any deficiency or defect in the inflammation index values is corrected prior to intervening to guarantee the patient's healing capabilities.

The initial therapeutic objective is the replacement of the tooth by an implant while preserving tissue volume for an aesthetic integration of the prosthetic restoration. With this in mind, the indication for immediate postextraction implantation is made alongside an alveolar preservation technique.[6,7] It is also decided to temporise with the natural tooth bonded to the adjacent teeth so as not to risk immediate loading and to favour the stability of the periodontal tissues around the natural tooth.

Temporisation with the natural tooth to increase soft-tissue stability

During planning, the peri-radicular crestal bone volume is sufficient to consider freehand placement without a surgical guide, allowing more operative freedom in this simple case where the adjacent teeth guide us perfectly in the 3D placement of the implant. To begin, or for more security, a guided or navigated approach can be considered. The entire intervention will be performed under a surgical microscope for a perfect analysis of the operated anatomical structures.

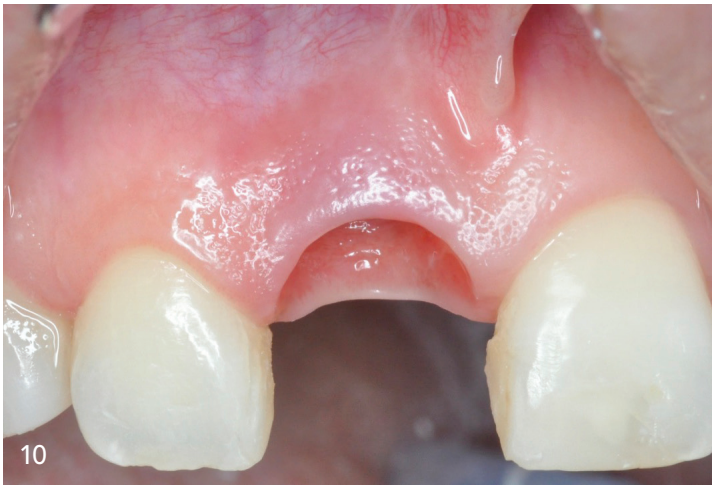
1. The tooth is extracted in an atraumatic manner by sliding an ultra-thin syndesmotome via progressive reptation along the alveolo-dental ligament of the root.

2. Alveolar cleaning is done by tissue microablation using the anti-inflammatory and bactericidal properties of the Er:YAG laser. This microsurgical tool allows us a selective cleaning of the wound, primarily targeting inflammatory tissues and biofilms associated with the root fracture. Furthermore, it also eliminates hydroxyapatite debris which can constitute foreign bodies that slow down healing. Wounds treated by Er:YAG laser irradiation heal faster and the inflammatory reaction is reduced in the very short term, as can be observed on the clinical views at six days.[8]
3. Preparation of the implant site for the placement of a 4/11.5 TBR Z1 implant. The pointer drill is positioned on the palatal wall of the socket at the level of the apical 1/3 and in the prosthetic axis to have the emergence of the prosthetic screw on the palatal face of the future prosthesis. The pilot drill allows establishing the position of the implant in both the palato-vestibular and mesio-distal dimensions. This step is crucial for the rest of the treatment; it requires good 3D vision guided by the final prosthetic goal and a strong analysis of the preoperative 3D planning.
4. The socket will be filled with a mixture of autogenous plasma/porcine xenograft.[9,10] The filling is packed around a stent formed by the last drill used for the preparation of the implant site before the placement of the implant.
5. The position of the implant is determined by the position of the alveolar crests and the cementoenamel junctions (CEJ) of the adjacent teeth 11. Here we use a tissue-level implant with a zirconia neck. The prosthetic margin is supracrestal and ideally located at the level of the CEJs. Zirconia is generally strictly supracrestal with this type of hybrid implant, but in this postextraction case, we take a small safety margin by positioning a portion of the zirconia neck in an infracrestal situation. The implant stabilised perfectly with a torque of 32 Ncm.

Technical platform and understanding of modern implantology

The interest of this case lies in illustrating a modern approach to implantology, where it is no longer merely about replacing a tooth using protocols and implants showing a good survival or success rate. Today, driven by the more demanding requests of our patients, we go further; we have a comprehensive approach that integrates the immune, aesthetic, and psychological dimensions of the patients into the therapeutic success. The ultimate goal of our therapies is to sustainably improve the quality of life of our patients.

This modern evolution in implantology is centred around four key points:
– A preoperative consultation focused on the patient's immune profile: on their capacities to heal from our interventions and to maintain our implant restorations in biological balance over the long term.



08 Stage 2 microsurgical Er:YAG laser by selective microablation.

09 Quality and stability of the implant tissues obtained around the zirconia neck of the Z1 TBR implant.

10 Quality of peri-implant tissues before atraumatic and non-compressive digital impression taking.

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– Using surgical materials that are respectful of the patients' biology to secure the result of our interventions. Tissue engineering with the use of autogenous plasma 12 and the titanium/zirconia hybrid implant are foundations of this therapeutic strategy.

We cannot describe here all the protocols of digital planning and the advantages of implant microsurgery; the focus instead is on the implant material. The use of the Z1 TBR titanium/zirconia hybrid implant perfectly aligns with this comprehensive modern approach to implantology, whose long-term objective is to guarantee healthy, stable, and aesthetic implant restorations.[13,14]

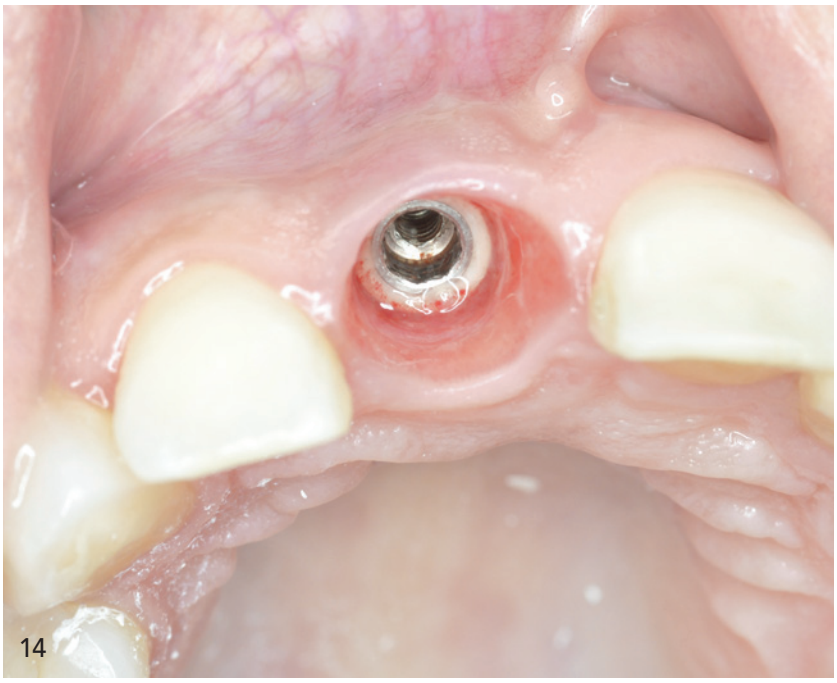
The hybrid implant allows benefiting from the advantage of the two materials that compose it: the biological properties of zirconia in the transmucosal zone and the mechanical resistance of titanium for the body of the endosseous implant.[15]

Titanium for the implant body (in patients who are not intolerant to metals) allows us to use small-diameter implants (3.5 mm diameter), which remain resistant and usable in premolar or canine zones under significant functional loads. The second advantage of being able to use small diameters is leaving space for a larger bone volume to favour vascular supply around the implant: a fundamental aspect for optimising long-term immune balance.[15,16]

The use of small implant diameters fits into the minimally invasive approach by authorising us to limit the indications for surgical augmentation of peri-implant bone volume.

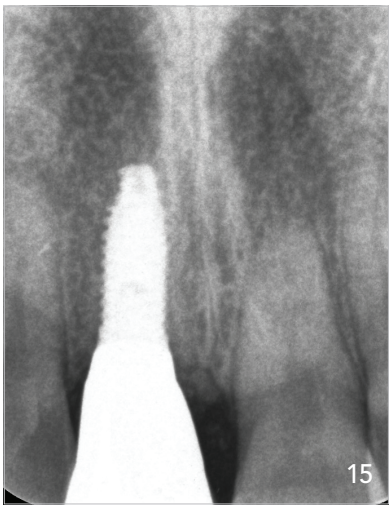
Transmucosal zirconia, a critical zone where a major immune conflict occurs between the host and oral biofilms,

11+12
Presentation of the laboratory work on digital models. Private laboratory of Dr Baudot, laboratory technician David Ruiz.



13+14
Screw-retained prosthetic connection in a biological space developed and secured by the zirconia neck of the implant.

15+16
Bone and gingival integration of the Z1 TBR hybrid implant. Functional and aesthetic biological stability of the implant-supported prosthetic restoration.



helps regulate the biological balance: an aspect that is also fundamental to long-term stabilisation of the immune and aesthetic equilibrium of our implant restorations.[17,18]

The "tissue level" concept of the Z1 TBR implant combined with polished zirconia in the transgingival zone reduces the formation and accumulation of biofilms in the coronal periimplant zone, the entry point for peri-implantitis.[19]

Transgingival zirconia favours the establishment of an interaction via hemidesmosomes with peri-implant soft tissues. This type of tissue connection and the light colour of the zirconia contribute to improving the stability of peri-implant soft tissues and the aesthetics of our prosthetic restorations on implants by re-establishing a peri-implant biological space close to the natural tooth.[20]

The quality of the peri-implant tissue interface is a key point in peri-implant stability. The zirconia neck of the Z1 TBR hybrid implant is a major asset in this perspective and proved to be decisive in the success of the clinical case presented in this article.

Conclusions

This illustration of modern implantology, of the paradigm shift in our implant restorations with the advent of osteo-immunology, is presented in an educational clinical case. The concept here is to obtain the best result biologically and aesthetically through a simple, non-invasive protocol, without major postoperative complications. The focus is placed on the patient's experience during the therapeutic phase and on improving their quality of life. PROMs must supersede simple "survival rates" or "success rates" when evaluating our implant restorations. The minimally invasive approach is a form of simplification serving sophistication to improve operative ergonomics, and to respect vascularisation and the integrity of operated tissues to make the results of our interventions more reliable. This approach relies on the tools of modern implantology: 3D imaging for intervention planning, the use of the surgical microscope to operate and extract the tooth atraumatically, the Erbium:YAG laser to clean the wound in its micrometric dimension, tissue engineering for alveolar preservation, the Z1 TBR hybrid implant to benefit from the advantages of the two materials that are titanium and zirconia, and finally the prosthetic laboratory integrated into the clinic for the creation of high-quality provisionals placed on the day of stage two of the implantation protocol to obtain optimised tissue maturation.

References

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