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A TECHNIQUE FOR AN ACCELERATED RIGID SPLINTING OF MULTIPLE IMPLANTS FOR IMMEDIATE LOADING

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Different protocols have been developed in case of immediate loading for a full arch replacement. Several reports show that a syncrystallization - welded framework exhibits a more precise fit than a one-piece casting. The intra-olral syncrystallization welding technology can not only create a passive-fitting implant prosthesis, but also pre-fabricate implant components, including titanium bars and attachments, and can be syncrysallization-assembled directly on the master cast. This article describes a technique developed to fabricate an immediately loaded prosthesis using syncrysallization a new component for welding a passive-fitting implant prosthesis.The aim of this article was to describe a technique developed for an accelerated rigid splinting of multiple implants for same-day immediate loading with metal-reinforced provisional restorations using a technique of welding temporary implant abutments with a prefabricated titanium connection tab directly performed in the oral cavity. Between June 2009 and July 2011, immediate loading of threaded implants with a metal- reinforced acrylic resin provisional restoration at stage 1 surgery was evaluated in 22 consecutive patients. A total of 232 implants were placed in selected edentulous patients using the syncrystallization technique. All of the 232 rigidly temporized immediately loaded implants were osseointegrated. An implant success rate of 100% was achieved over a period of 6 months postplacement. No fracture or luting cement failure of the provisional restoration occurred during the observation time. The technique allows for a highly accurate, passively fitting prosthesis in only 6 hours with excellent patient satisfaction.

Although traditional implant supported prostheses is a standard of care for edentulous patients (1-3) an increasing interest has been noticed in immediate loading of implants and esthetic replacement of missing teeth. Different protocols have been developed in case of immediate loading for a full arch replacement. The advantages of an immediately loaded implant-supported prostheses are: reduced surgical and prosthetic visits, improved patient's comfort and delivery of a functional prostheses immediately after surgery (4, 5). On the other hand, the immediate exposure of the implants to occlusal and muscular forces may lead to implant micro movements and finally to an early implant failure (6, 7). However, clinical and experimental animal trials demonstrated that long –term success of removable and fixed prostheses of immediately loaded implants can be achieved. Degidi et.al (8) demonstrated comparable outcomes of a 7 year follow up study of immediately loaded implants compared to delayed one. A successful rehabilitation of immediate loading implants depends on several factors: accurate presurgical diagnostic, treatment planning, rigid splinting of the implants and fixed provisional restorations that are of utmost importance to prevent the risk of micro movements related to the surrounding bone. It has been suggested that a movement of 30 μm or less has no adverse effect on integration, while a movement of 150 μm or more results on fibro encapsulation to the implant (7, 9, 10). Rigid splinting has shown the ability to keep the stability of the prosthetic restoration and the micromovements below the critical threshold.

Different techniques has been described to increase the immediately lading implant predictability as: bar-

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supported overdentures (11), retrofitting of pre-existing prostheses (12, 13) to implants or fabricating acrylic resin provisional restorations (14, 15).

Longoni and colleagues (16) described a method to reduce prosthetic misfit of implant-supported complete dentures using a combination of intraoral luting and extraoral laser welding. While Mondani (17) introduced a time- effective intraoral welding technique of titanium components for different dental implant restoration to avoid long laboratory procedures. Degidi et al. (18) described a technique of welding temporary implant abutments with prefabricated titanium bar directly in the oral cavity for a same day immediate loading metal-reinforced acrylic resin provisional restoration. Also Degidi and Piattelli published recently several papers to describe the intraoral welded bar technique that seems to offer a solution for the stabilization of the implants inserted with low Insertion Torque values (19). The aim of this article was to describe a technique developed for an accelerated rigid splinting of multiple implants for same-day immediate loading with metal-reinforced provisional restorations using a technique of welding temporary implant abutments with a prefabricated titanium connection tab directly performed in the oral cavity (syncrystallization).

MATERIALS AND METHODS

Between June 2009 and July 2011, immediate loading of threaded implants with a metal- reinforced acrylic resin provisional restoration at stage 1 surgery was evaluated in 22 consecutive patients. A total of 232 implants were placed in selected edentulous patients using the syncrystallization technique. The inclusion criteria were: fully edentulous. The exclusion criteria were: severe illness, head and neck radiation therapy, chemotherapy, uncontrolled diabetes, uncontrolled periodontal disease, smoking and unsuitable quantity of

bone. After a thorough oral and physical examination, patients were scheduled for immediate loading, they were extensively informed concerning the surgical procedures and they were asked for their full cooperation during treatment. A hydrocolloid impression, face bow transfer and centric relation record were used to mount the diagnostic casts on a semi-adjustable articulator. Subsequently, a diagnostic wax-up for a preliminary study of the case and a surgical guide was fabricated. Prior to surgery, the patients mouths were rinsed with a chlorhexidine digluconate solution 0,2% for 2 minutes. Local anesthesia was obtained with Articaine® (Ubistesin 4% - Espe Dental AG Seefeld, Germany) associated with epinephrine 1:100.000. A full-thickness flap was then carefully elevated to expose the crestal ridge and six implants were placed. No bone-grafting material was used. Each of them received six 4.1 mm implant (Bone System, Milano, Italy). The transmucosal collars are friction fitted to the implant and become its transmucosal extension. They thus allow for excellent peri-implant tissue healing and prevent bacterial contamination at the gap.

A pre-fabricated implant components were used as titanium hub, connection tab, and hub fixing screws.

The titanium hub (Bone System, Milano, Italy) has been applied on top of ST transmucosal collars with Ø of 4.6 mm or on top of cover collars. Hub fixing screws used to screw temporary appliances to the hub reinforcement structure, either manually or using the dynamometric instrument and 1.5 mm hexagonal driver, with a torque of 20-25 Ncm. These screws

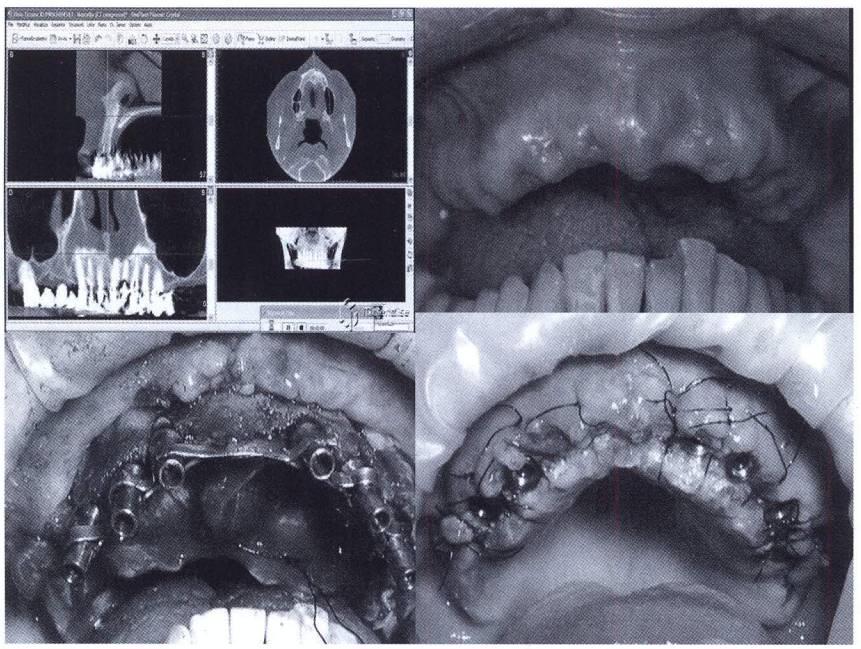

Fig.1. *Edentulous maxilla before surgery, and intraorally welded titanium connection tab.*

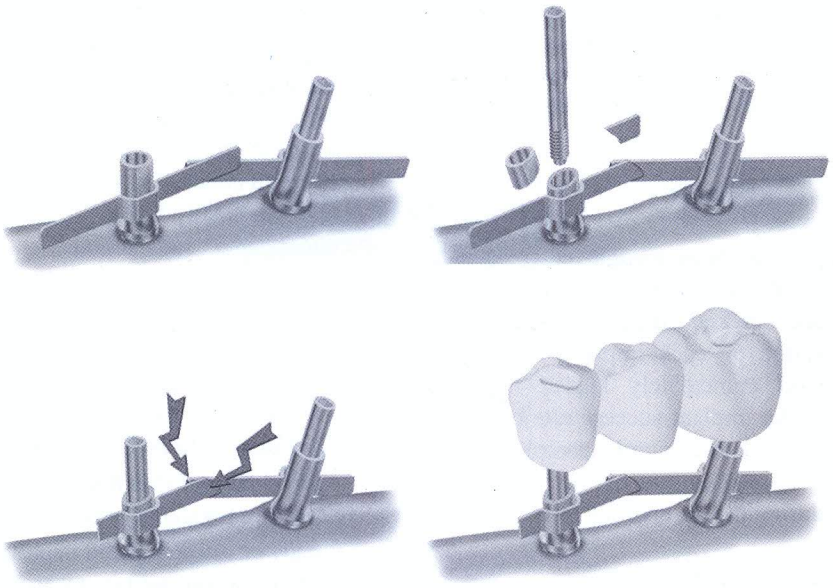

Fig.2. *A component for welding a passive-fitting implant prosthesis.*

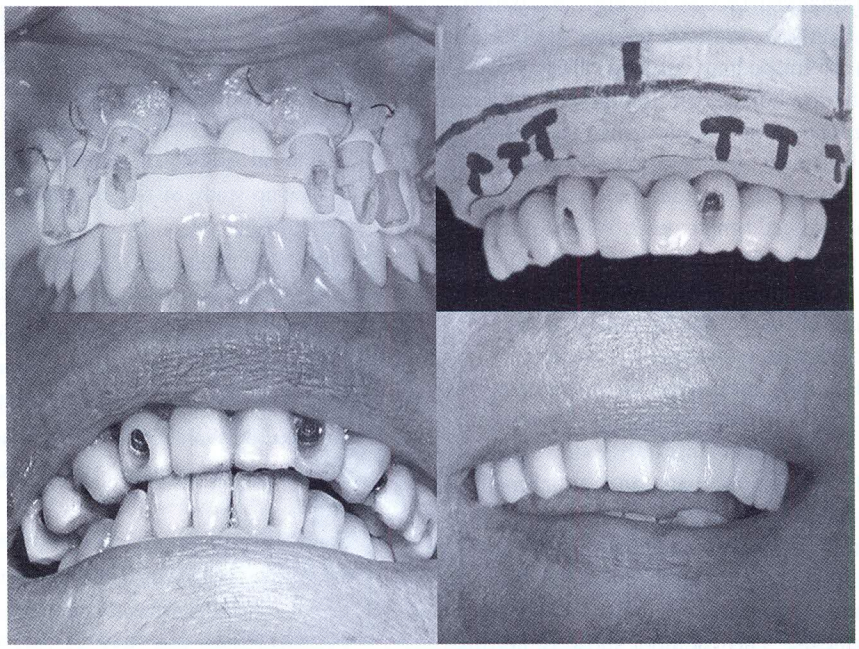

Fig.3. *The framework was incorporated in the acrylic resin matches a pleasant tooth color for the patient. After finishing and polishing and the occlusion adjusted the prosthesis was delivered to the patient.*

come in 3 lengths, one for each collar height.

The connection tab was then shaped with a pair of how straight utility pliers so that its curve made a gentle contact with the titanium hub next to the one that had just been welded. The process was repeated for all titanium tab. Finally, a sterile pick –up impression method of the prosthetic framework was taken. The provisional restoration was fabricated and delivered after 6 hours. Once the connection tab bar was welded intraorally to the titanium hub, opaque was applied and the provisional restoration was relined and screw-retained the same day. The

framework was incorporated in the acrylic resin matches a pleasant tooth color for the patient. After finishing and polishing and the occlusion adjusted the prosthesis was delivered to the patient. It was functional at the same day of the delivery. The radiographically detectable alteration of the welded framework were assessed using periapical radiographs immediately after prostheses insertion.

RESULTS

Rigid temporization has been recognized to have a significant impact on the peri-implant tissue response in immediate implant loading since it reduces the mechanical stress exerted on each implant. All of the 232 rigidly temporized immediately loaded implants were osseointegrated. An implant success rate of 100% was achieved over a period of 6 months postplacement. No fracture or luting cement failure of the provisional restoration occurred during the observation time.

DISCUSSION

A Better understanding of the bone-to-implant healing process, improved implant surface technology, and patient desires have led not only to reduced healing times, but also to the practice of immediate loading. The surgical technique for a patient planned for immediate loading of dental implants presents no change from the delayed loading technique; however, the restorative dentist must adapt to the shortened protocol, in order to deliver the final prosthesis within the reduced time period. When splinting multiple implants, passive fit of the framework should be achieved to avoid excessive force distribution to the implants. Several reports show that a syncrystallization - welded framework exhibits a more precise fit than a one-piece casting (18, 19). The intra-olral syncrystallization welding technology can not only create a passive-fitting implant prosthesis, but also pre-fabricate implant components, including titanium bars and attachments, and can be syncrysallization-assembled directly on the master cast. This article describes a technique developed to fabricate an immediately loaded prosthesis using syncrysallization a new component for welding a passive-fitting implant prosthesis. The method showed in this article involves little change to the surgical protocol, but it provides a framework that can accommodate any anatomic situation using any implant system. This technique can not only compensate for less-thanideal angulated implant placement, but it will also eliminate the casting distortion and improve the fit of the framework without the need for sectioning and soldering. The pre-fabricated implant components, titanium hub, connection tab, and hub fixing screws technique presented in this work indicate that the syncrystallization technique allows an expedite and adequate rigid splinting of multiple immediately loaded implants. The advantages of the technique are: (1) reduction of treatment time for immediate temporization at stage 1 surgery; (2) predictable fixation and immobility of implants in the early stages of bone healing; and (3) less time for repairing provisional restorations. As a result, less clinical chair time and greater patient satisfaction are possible. In conclusion the technique allows for a highly accurate, passively fitting prosthesis in only 6 hours with excellent patient satisfaction.

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