

Syncrystallization: A new Technique for Temporization of Immediately Loaded Implants

Marco Degidi¹, Peter Gehrke², Adriano Piattelli³



¹ M.D., D.D.S., Private Practice, Bologna, Italy, Visiting Professor University of Chieti- Pescara, Italy
² D.D.S., Private Practice, Ludwigshafen, Germany
³ M.D., D.D.S., Professor of Oral Pathology and Medicine, Dental School, University of Chieti-Pescara, Italy

Purpose

In case of immediate loading, adequate fixation and immobility of the implants are of utmost importance to prevent the risk of micromovements with regard to the surrounding bone. Rigid splinting seems to have a significant impact on the peri-implant tissue response since it keeps the mechanical stress exerted on each implant below the critical threshold of 150 μm ¹. Several reports have proven the high predictability of immediate implant loading with fixed provisional restorations^{2,3}. Material stability and fracture strength are essential for maintaining the rigidity of provisional restorations on immediately loaded implants on the long-term. Under occlusal load, long span acrylic resin restorations are however subject to flexion, fracture and luting cement failures. Techniques previously described for reinforcing acrylic resin provisional restorations involve laboratory processed and time consuming incorporation of wires, fibers or cast metal frameworks covering the facial and/ or lingual surfaces of the restoration^{4,5}. The objective of the present investigation was to evaluate a prosthetic concept for accelerated rigid splinting of multiple implants in the edentulous mandible and maxilla for same-day immediate loading with metal-reinforced acrylic resin provisional restorations. A new technique of welding temporary implant abutments with a pre-fabricated titanium bar directly in the oral cavity was applied.

Results

All of the 107 rigidly temporized immediately loaded implants osseointegrated with an implant success rate of 100% over six months post placement. During the observation period, no fracture or luting cement failure of the provisional restoration occurred.

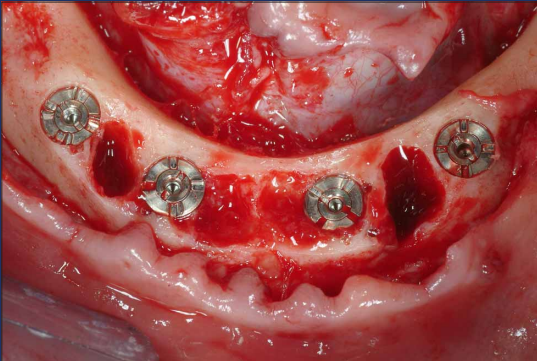
Conclusion

An optimal biomechanical stress distribution, both at the level of the provisional superstructure and at the level of the implant infrastructure, is the primary aim of the rigid temporization of multiple immediately loaded implants. Prosthodontic challenges in fixed immediate temporization of multiple implants can be both safely and predictably addressed when using the Syncrystallization technique. The preliminary results of the present pilot study indicate that this technique allows for an expedite and adequate rigid splinting of multiple implants for same-day immediate loading. The temporization procedure can be significantly accelerated and causes minimal discomfort, interruption in function and cosmetic disadvantages for the patient. Since no fracture occurred, no time was spent for repairing provisional restorations. Beside implant splinting, the provisional restoration serves as a guide for the final superstructure while addressing the patient's esthetic and phonetic requirements.

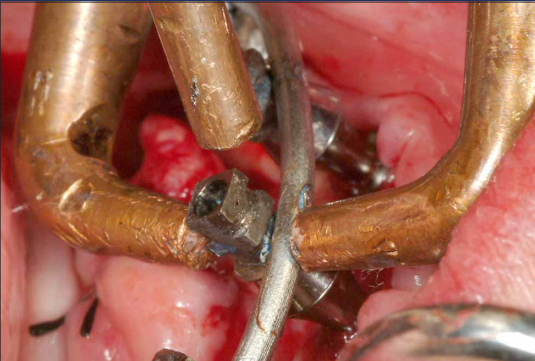
Materials and Methods

Between June 2004 and January 2005, immediate loading of multiple implants with a metal-reinforced provisional restoration was evaluated in 15 edentulous patients with 107 implants. (Maxilla: 42 implants in 6 patients; Mandible: 65 implants in 9 patients). The minimum insertion torque for all implants was 30 Ncm. They were all clinically stable. The distribution of totally 107 implants was as follows: 15 FRIALIT[®], 49 XiVE[®], 13 XiVE[®] TG, and 12 Ankylos[®] (all DENTSPLY Friadent, Mannheim, Germany), 11 Maestro[®] and 7 Prodigy[®] (both Biohorizons, Birmingham, AL, USA). Temporary titanium abutments were connected to the implants after surgical placement. A titanium bar matching the curvature of the implants positioned was fabricated. The temporary titanium implant abutments were then welded with the titanium bar in the oral cavity using the

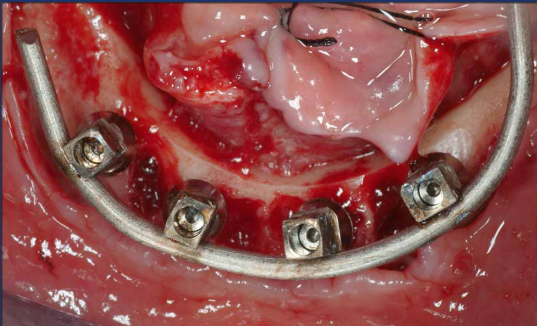
Syncrystallization Unit (System Argon Control, IMPLAMED, Cremona, Italy). The welding process is electrical and protected by an argon gas supply (Syncrystallization). The two elements to be welded were placed between the two electrodes of a welding clamp. Electricity flowing through the contact points warmed up to the point of fusion resulting in a solid, welded junction. The Syncrystallization Unit takes only a fraction of a second to weld the pieces. There was no discomfort to the patient or damage to surrounding tissues since no heat is produced. The procedure was finalized by removing the prosthetic framework and applying opaque. A previously fabricated diagnostic wax-up converted to an autopolymerizing resin shell relined, trimmed, polished and screw retained the same day. Occlusal contact was avoided in centric and lateral excursions.



Four Ankylos[®] implants in the edentulous mandible



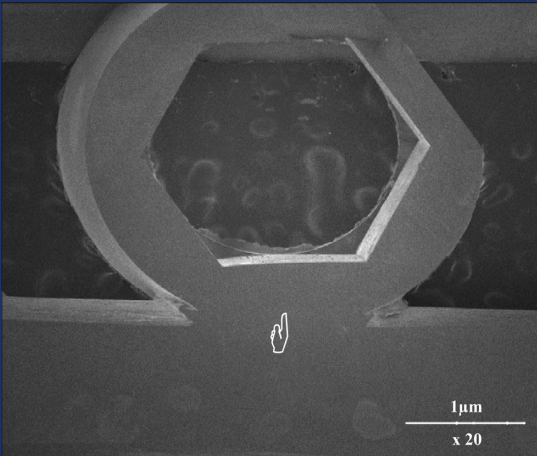
Intraoral welding of temporary abutments with the syncr unit



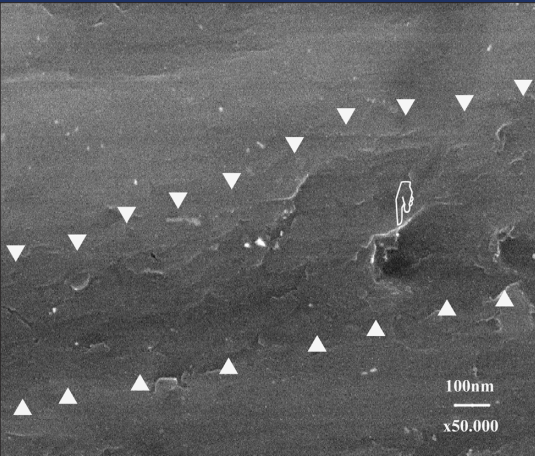
A round bar is welded to the abutment (note bilateral cantilever: framework is extremely rigid due to the effectiveness of the welding procedure); cantilevering in immediate loading is unusual because occlusal surface is increased.



Intraoral view of screw retained Toronto bridge - a few hours after surgery



Cross section of a welding joint at 20-fold magnification. Temporary abutment (round section above) and titanium bar (straight section below).



Welding joint at 50,000-fold magnification. Only minor porosity can be detected.

Number of patients and implants

	N° Patients	N° Implants
Edentulous mandible	9	65
Edentulous maxilla	6	42
Total	15	107

Number of implant types inserted in totally edentulous patients

Implant	N°
FRIALIT [®]	15
XiVE [®]	49
XiVE [®] TG	13
Maestro [®]	11
Prodigy [®]	7
Ankylos [®]	12
Total	107

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Marco Degidi, MD, DDS
Via Spina 12
40139 Bologna, Italy
E-mail: info@degidi.it