Prostheses Removal for Suture Removal after Immediate Load: Success of Implants

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ABSTRACT

Purpose: The aim of this cohort study was to evaluate the success of implants after immediate loading in cases when the prostheses were removed for suture removal on the tenth day following implant placement. We describe a technique for fabricating effective definitive prostheses passively fitted to facilitate immediate load in edentulous patients.

Materials and Methods: Seventy-one patients with resin-metal prostheses installed within less than 48 hours after implant placement were recalled. Patients for whom various amounts of time had elapsed since implant placement returned for follow-up. Time elapsed ranged from 6 months to 7 years. Stability of the implants was tested after prosthesis removal by horizontal and vertical percussion tests. Implant success was determined as the number of functional implants displaying no mobility.

Results: Follow-up revealed that all implants from each period evaluated were stable, with no mobility (100% of implants success), except for the 1-year time point (99.5%) and the 2-year time point (98.9%). No signs of inflammation and/or bleeding were observed.

Conclusion: Prosthesis removal for suture removal on the tenth day after implant placement represents a reliable and predictable procedure that did not jeopardize implant stability during bone remodeling.

KEY WORDS: immediate load, prostheses, suture

INTRODUCTION

The immediate load protocol for dental implants is accepted throughout the scientific community.[1–6] After surgery, the protocol prosthesis is installed. Removal of the protocol prosthesis for suture removal, 10 days after surgery, is a procedure that has advantages, such as allowing the protocol prosthesis to be cleaned with disinfectant solutions. Moreover, it is possible to carefully clean the soft tissue that does not cleanse well during the first days following surgery. When the protocol prosthesis is not removable, absorbable sutures are used. However, fragments of absorbable suture can remain, causing local inflammation; prosthesis removal ensures that the suture wire is removable. However, this procedure can only be carried out if the prosthesis is passively fitted, limiting the amount of stress transferred to the bone-implant interface which ensures long-term osseointegration.[7,8]

Implant success indicates that the protocol for prosthesis removal on the tenth day after surgery does not directly affect implant stability or osseointegration. Implant success following application of the immediate load protocol ranges from 98.8 to 100% after 2 years, 94% after 3 years, and 93.5% after 7 years.[5,9–12]

The hypothesis of this retrospective cohort study is that prosthesis removal for the removal of sutures does not negatively impact implant stability in patients.

MATERIALS AND METHODS

The study was based on retrospective patient material obtained from the Latin American Institute of Research

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and Teaching in Dentistry (Instituto Latino Americano de Pesquisa e Ensino Odontológico, ILAPEO), Curitiba, PR, Brazil. During the period from 2000 to 2008, 71 patients were provided with Neodent implants (Neodent, Curitiba, PR, Brazil) subjected to immediate loading. Of the total patient population, we studied only those patients with prostheses removed 10 days after surgery for suture removal. This study had no exclusion criteria. We included healthy patients and those with compromised general health (eg, diabetes, osteoporosis, blood disorders, allergies to titanium), severe maxillo-mandibule space discrepancies, severe parafunctional habits (bruxism or clenching), drug or alcohol abuse, poor hygiene, or the need for tissue augmentation procedures during surgery. Relevant data were acquired from the anamnesis for each patient.

The immediate load applied over implants is based on a passive fit. Prior to implant surgery, a total prosthesis is made in the laboratory. After, when the artificial teeth are in the wax stage, the prosthesis is impressed and resin is poured inside the mold in order to obtain the multifunctional guide. This guide is abraded from behind the right first molar to the left first molar. Then the mini-abutments are exposed and the transfers are tightened to the mini-abutments. The transfers are attached with resin material and are attached to the guide through previously engineered orifices. These orifices are localized under sites corresponding to the buccal and lingual surfaces of teeth. The maxillofacial relation is obtained by biting the antagonist over the guide in the mouth, yielding three loci of resin material (one among the central incisors and two among the right and left first molars; Figure 1). Subsequently, the polyether material impresses the soft tissues. The mini-abutment analogs are placed in the inner surfaces of transfers. Artificial gingival tissue is poured around the mini-abutment analogs; the plaster is poured in order to obtain the working cast (Figure 2). The guide is bitten with the antagonist prosthesis, using the three points previously utilized for occlusion. The articulator incisal pin is adjusted at the zero point in order to maintain the occlusal vertical dimension (Figure 3). In sequence, resin, stainless steel and titanium copings are subjected to immediate load (Neodent) in the prosthetic laboratory (Figure 4). The resin coping is positioned over the stainless steel coping, which is the coping analog of the titanium coping; the titanium coping will be tighter over the mini-abutments. The resin copings are joined with resin material; the steel bar is sculpted with casting wax. A maxillofacial register is created by impressing the occlusion of the antagonist prosthesis on the protocol prosthesis in wax, both are then placed in working casts. The teeth of the protocol prosthesis are removed and transferred to the negative mold of the maxillofacial register, which is fixed to the antagonist prosthesis (or in the antagonist working cast). The coping analogs are placed in the articulator. The resin copings are then abraded according to the height of artificial teeth inner surfaces fixed in the maxillofacial register; the casting wax is used to increase the height of the steel bar. After the steel bar casting, the resin cylinders became part of the steel bar, which is cemented over titanium copings (Figure 5). Then, the artificial teeth are transferred to the

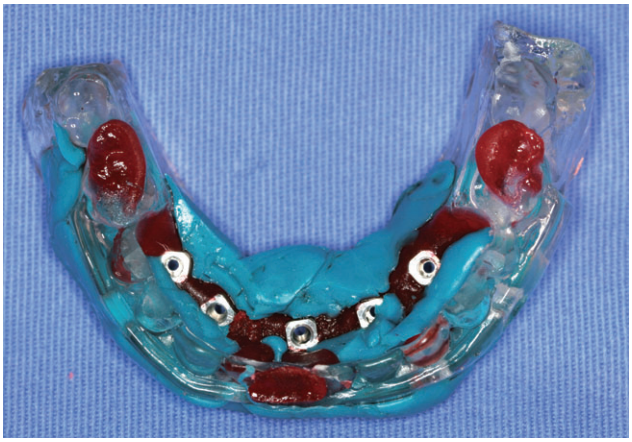

Figure 1 Multifunctional guide with the three points of resin material. Note that the transfers are attached among them as well as to the guide throughout the guide orifices. 124 × 86 mm (300 × 300 DPI).

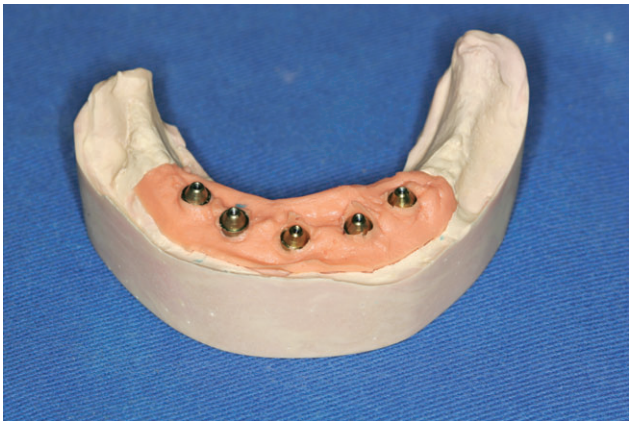

Figure 2 Working cast with the mini-abutment analogs. Note the surrounding artificial gingival tissue. 124 × 83 mm (300 × 300 DPI).

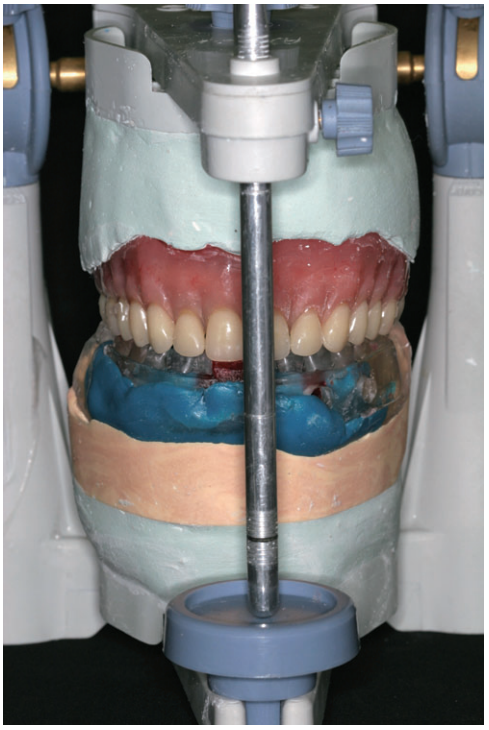

Figure 3 Multifunctional guide occluded with antagonist prosthesis in the articulator. The three points marked with resin material are the references of correct occlusion. Note that the clinically obtained vertical dimension of occlusion is maintained. 124 × 187 mm (300 × 300 DPI).

steel bar and the waxing is carried out over the steel bar. Ultimately, the waxing over the steel bar becomes acrylic (Figure 6). Finally, the finishing and polishing are concluded and the prostheses are passively fit, then cemented over the titanium cylinders, which are tightened to the implants.

The investigation, based on findings in the patient's records, included clinical information obtained at

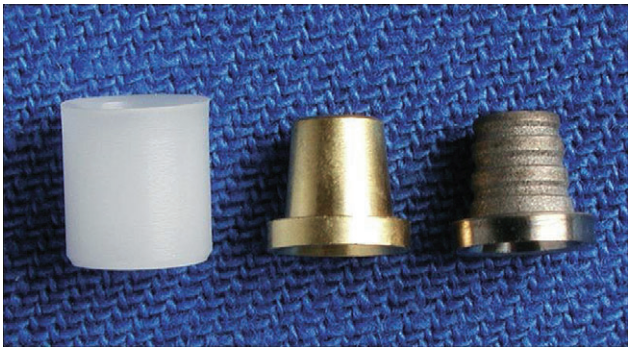

Figure 4 Coping sequence for immediate-load protocol prosthesis (Neodent, Curitiba, PR, Brazil). *A*, Resin coping. *B*, Stainless steel coping. *C*, Titanium coping. 124 × 68 mm (300 × 300 DPI).

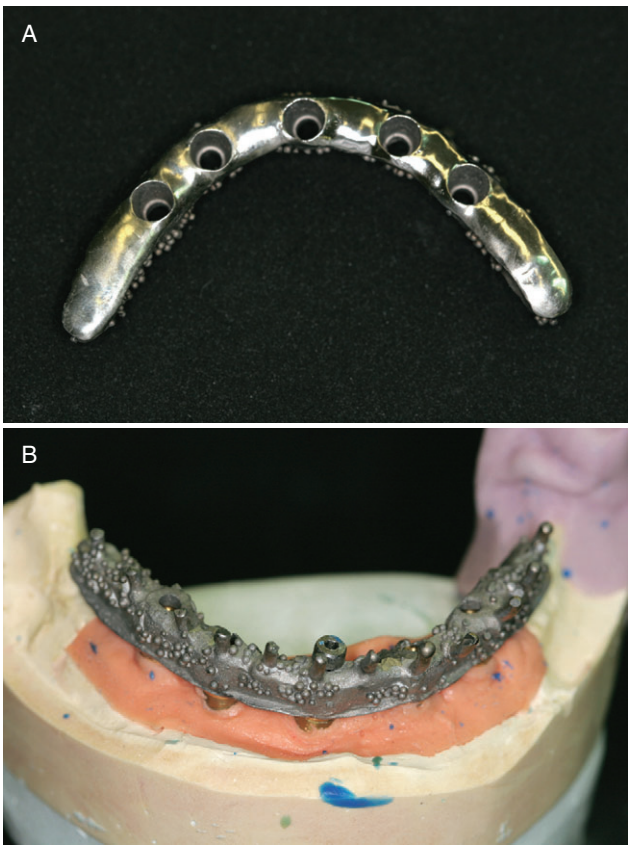

Figure 5 *A*, Inner surfaces of copings that are cemented on titanium copings 124 × 83 mm (300 × 300 DPI). *B*, Titanium copings. 124 × 83 mm (300 × 300 DPI).

baseline (the time of prosthesis placement – immediate load) and at follow-up, which varied for individual patients. The range of follow-up extended from 6 months to 7 years (men: 3.5 years). A follow-up

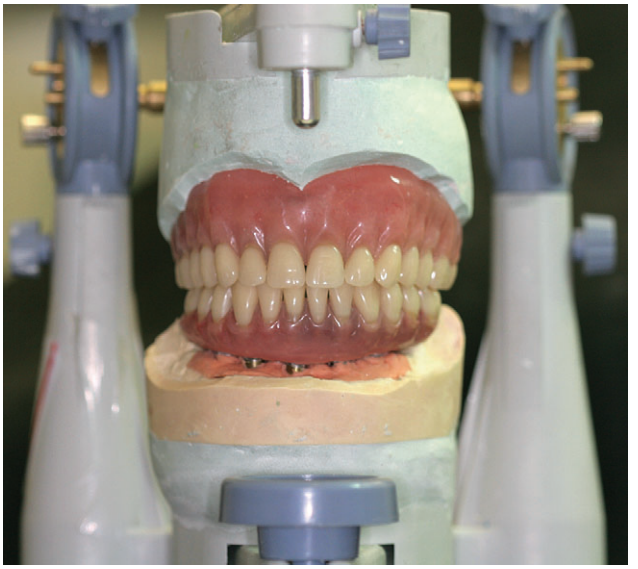

Figure 6 Final aspect of mandibular protocol prosthesis. 124 × 112 mm (300 × 300 DPI).

questionnaire from ILAPEO was administered to each patient. This questionnaire has questions that characterize the behavior of implants over time. Implants' success was determined as the number of implants in function with no mobility. To determine this measure, the implants had their stability tested after prosthesis removal by horizontal and vertical percussion tests. Additional features were also evaluated such as pain and vertical bone loss related to the implants. The bone loss data from follow-up questionnaires were verified by radiographs drawn by the periapical parallelism technique, as compared with the initial radiographs drawn immediately after implants' surgery (also done by periapical parallelism technique).

RESULTS

Follow-up was carried out at different time-points. Implants' success was 100% for all periods evaluated, except for the 1-year (99.5%) and 2-year time points (98.9%) (one implant failure at each period; Table 1). There was no pain related to the implants at percussion tests. Upon radiographic analysis, no vertical bone loss was found surrounding the implants.

DISCUSSION

The results showed that prosthesis removal for suture removal on the tenth day after surgery did not cause implant failure among prostheses subjected to immediate load, as measured in patients when varying lengths of time had elapsed since implant placement. Implant success is an indirect measure of implant stability, revealing whether implants were damaged by prosthesis removal. Implant success rate was 100% for patients with periods to follow-up ranging from 2 to 7 years, except for the 1-year (99.5%) and 2-year time points (98.9%). The successful implants did not cause pain upon being subjected to percussion tests.

The basic principle behind the immediate loading protocol relates to the primary stability obtained upon implant placement. The bone in the macroscopic thread design is stronger on the first days after implant placement. Appositional bone formation (remodeling) onto an implant surface will begin only in the second week, in the presence of micromovement (no more than 100 μm) but not in the presence of macromovement.[13,14] In our study, implants previously stabilized were able to resist the critical degree of micromovement, even with prosthesis and suture removal at 10 days.

The prosthesis passive fit ensures that after being removed for suture removal, the prosthesis can be passively fit once more. Therefore, the possible micromovement from prosthesis removal and placement after suture removal is probably no more than 100 μm, avoiding macromovement or significant micromovement. The detailed prosthesis planning, construction and fitting technique was previously described in the Materials and Methods section.

Published studies on prosthesis removal (with or without suture removal) in the post-operative period are limited. Regardless of whether or not the prosthesis is removed for suture removal, implant success as measured by survival of the immediate load protocol range from 98.8 to 100% after 2 years, 94% after 3 years, and 93.5% after 7 years in the oral cavity.[5,9,11,12] Further studies are needed to conclusively determine whether prosthesis removal affects the success of suture removal and consequent implant stability, as well as the advantages and disadvantages for hard and soft tissues over time.

TABLE 1 Implant Success (%)

Years	Number of implants	Failures	Implant success (%)
0–1	184	1	99.5%
1–2	89	1	98.9%
2–3	69	0	100%
3–4	29	0	100%
4–5	18	0	100%
5–7	25	0	100%
All	414	0	100%

CONCLUSION

Prosthesis removal for suture removal on the tenth day after implant placement and immediate loading did not cause implant failures at any time point examined in this cohort study.

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