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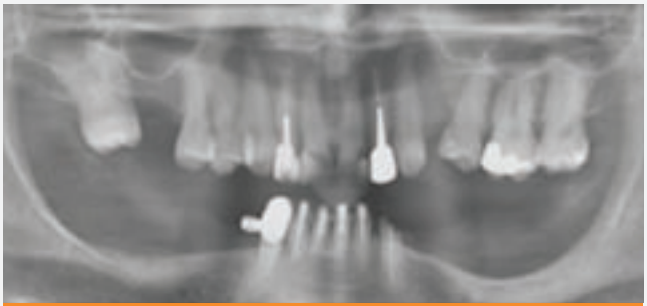
Immediate Implant and Occlusal Loading of 100 MIS SEVEN® Implants. A Final Report of a Prospective Study.



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Immediate Implant and Occlusal Loading of 100 MIS SEVEN® Implants. A Final Report of a Prospective Study.

Troiano Miguel Angel[1], Closas Jose[2], Benincasa Mauricio[3], Sanchez Patricia[4].

Abstract

Objective: This paper reports the results of a prospective clinical study on immediate occlusal loading of implants inserted in partially edentulous maxillae and mandibles.

Materials and methods: Twelve patients were enrolled in one clinical center. One hundred implants were inserted and immediately loaded according to an immediate loading protocol. The temporary prostheses were delivered within 4 hours from surgery. The final prostheseis were delivered 4 months post-op. Marginal bone loss was monitored based on local and panoramic radiographs.

Results: None of the implants failed. At six-months post-op evaluation, the accumulative implant success rate was 100%. Crestal bone loss around the immediately loaded implants was similar to that reported for standard, non-immediate loading protocols.

Conclusions: The results of this prospective study suggest that the rehabilitation of the partially edentulous maxillae and mandibles by immediate implant placement and immediate occlusal loading by five to six MIS implants (mandible) and eight to ten MIS implants (maxilla), represents a viable alternative treatment option to classic delayed loading protocols.

Introduction

The widespread therapeutic use of dental implants over the last 20 years has led to the revision of several aspects (Szmukler-Moncler et al. 2000) of the original two-stage Bränemark protocol, developed in the early 1970s (Bränemark et al. 1977; Bränemark et al. 1985). After using the single-stage approach as a valid treatment procedure for many years (Ledermann 1979; Schroeder et al. 1983; Babbush et al. 1986; Buser et al. 1997), one of the most dramatic changes in implant dentistry has been the increased acceptance of immediate loading protocols as a viable therapeutic alternative, under certain circumstances (Schnitman et al. 1990; Balshi, & Wolfinger 1997; Schnitman et al. 1997; Tarnow et al. 1997; Wöhrle 1998; Bränemark et al. 1999; Ericsson et al. 2000; Jaffin et al. 2000).

The ultimate goal of an immediate loading protocol is to reduce the number of surgical interventions and shorten the time frame between surgery and the delivery of a prosthetic solution, all without sacrificing implant success rates. These new protocols will ultimately lessen patients' reservations and result in increased acceptance of implant therapy.

Implant macro-geometry and micro-geometry (Szmukler-Moncler et al. 1996) as well as the loading mode (Szmukler-Moncler et al. 1998) play a crucial role during the healing phase. Therefore, it is important to identify clearly the type of implant and the type of rehabilitation being used, when documenting immediate loading cases.

Material and Methods

The study was performed in one clinical center by six investigators who followed the same surgical and prosthetic protocols for immediate implant placements and immediate occlusal loading of these implants, when placed in the partially edentulous maxilla and mandible.

Twelve patients (5 male, 7 females) were enrolled in the study between August 2011 and December 2012. All patients were reported nonsmokers.

Inclusion and Exclusion Criteria

Patients were included in the study according to the following criteria: (1) partially edentulous both in maxilla and mandible; (2) rehabilitation with dental implants was the treatment of choice; (3) all patients were physically able to tolerate conventional surgical and restorative procedures; (4) informed consent signed; (5) implants were placed with a torque of 32 Ncm demonstrating good primary stability; and (6) dense/normal bone quality in the relevant areas. Bone quality was scored according to the classification proposed by Trisi & Rao (1999) as dense (type I) according to the classification proposed by Lekholm 3 & Zarb (1985), normal (type II–III) and soft (type IV) bone. The exclusion criteria were: (1) active infection in the sites intended for implant placement; (2) systemic diseases such as diabetes (all types, regardless of control); (3) treatment with therapeutic radiation to the head within the past 12 months; (4) severe bruxism; (5) pregnancy; and (6) patients consuming more than 10 cigarettes a day.

Success Criteria

The following success criteria were applied in evaluating each implant: (1) no clinically detectable mobility when tested with opposing instrument pressure; (2) no evidence of peri-implant radiolucency on periapical radiographs; (3) no recurrent or persistent peri-implant infection; (4) no complaint of pain at the site of treatment; (5) no complaint of neuropathies or paraesthesia; (6) Crestal bone loss not exceeding 1.5 mm by the end of the first year of functional loading, and less than 0.2 mm/year in the following years (Albrektsson et al. 1986).

Surgical Procedures

All patients received MIS SEVEN® implants. The surgical protocol provided for Crestal implant

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Table 1. Clinical cases.

POSITION	CASES	CONTROL RANGE	PROVISIONAL RESTORATION	FINAL RESTORATION		EXECUTION TIME
				CERAMIC-METALLIC RESTORATION	HYBRID RESTORATION	
MAXILLA	4	31/08/2011 05/03/2012	ACRYLIC CROWN CEMENTED	3	1	3 MONTHS
MANDIBLE	8	31/08/2011 05/03/2012	HYBRID RESTORATION SCREWED	3	5	3 MONTHS

Table 2 and 3. Characteristics of immediately loaded SEVEN® implants.

MAXILLA*				
LENGTH (mm)	DIAMETER (mm)			TOTAL
	3.75	4.20	5.0	
10	4	4	1	9
11.5	4	8		12
13	5	12		17
TOTAL	13	24	1	38

MANDIBLE			
LENGTH (mm)	DIAMETER (mm)		TOTAL
	3.75	4.20	
10	6	7	13
11.5	8	14	22
13	13	14	27
TOTAL	27	35	62

TOTAL
100

* Not loaded qty
4.2 x 11.5 (1)
4.2 x 13 (1)

Table 4. Diagram illustrating the cumulative implant success rate vs time.

INTERVAL TIME (months)	No. PATIENTS	No. IMPLANTS	FAILED IMPLANT	INTERVAL SURVIVAL RATE (%)	CUMULATIVE SURVIVAL RATE (%)
0-6	6	47	0	100	100
6-12	12	100	0	100	100
12-18	12	100	0	100	100

placement as prescribed in the literature (Testori et al. 1999; Darvanapah et al. 2000). Clinician followed the implant manufacturer's instructions for implant site preparation and implant insertion procedure. The initial primary stability was assessed by setting the insertion torque of the surgical unit and recorded according to the following classification: 'tight' when torque was 32 Ncm, 'firm' (Testori et al. 2002a). The length and the diameter of the individual implants varied, depending on bone quality and quantity at each surgical site.

Prosthetic Procedures

The treatment objective involved delivery of the provisional prosthesis within 4 hours of implant placement, by utilizing the prosthetic procedure that best suited the clinical case.

The design of the prosthesis was determined by a collaborative effort between the surgeons and the restorative doctor, as long as the outcome was consistent with the study's objectives.

Either a metal reinforced acrylic provisional bridge (for cement retained) or a resin hybrid restoration (for screw retained) was delivered to ensure immediate function. The occlusion was carefully monitored.

Follow-up Procedures

No specific diet was recommended to the patients. The patients were on a strict recall program during the first 6 months: Visits took place every week during the first month, and once a month between the 2nd and 18th month.

Orthopantograms and local rediographs were obtained for bone level analysis at implant insertion 6 months post-op.

Success Rate

None of the patients dropped out from the study. No failures occurred at any time during the study period.

All implants were clinically stable and met the success criteria. The overall implant success rate was 100%.

Discussion

There is a trend in medicine to reduce treatment time and simplify the treatment in order to increase patient acceptance and reduce the risk of complications. Treatment simplification for implant dentistry might be obtained by immediate loading procedures (Schnitman et al. 1990; Balshi & Wolfinger 1997; Schnitman et al. 1997; Tarnow et al. 1997; Wöhrle 1998; Bränemark et al. 1999; Jaffin et al. 2000; Malo et al. 2000; Chaushu et al. 2001).

Immediate occlusal loading procedures can be successful only when the amount of micro-motion at the bone–implant interface is kept beneath a certain threshold during the healing phase (Szmukler-Moncler et al.

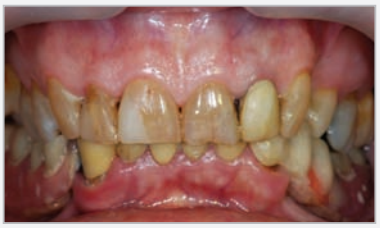

Fig. 1 Preoperative appearance

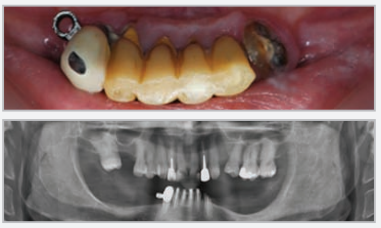

Fig. 1a Preoperative appearance Fig. 1b Panoramic Rx

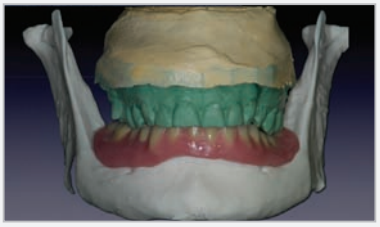

Fig. 2 Stereolitographic model complete

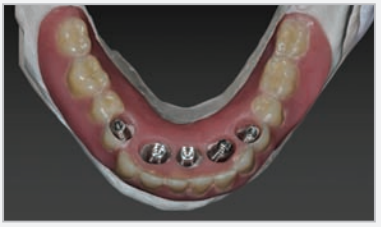

Fig. 3 Denture provisional design

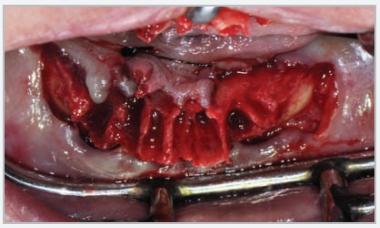

Fig. 4 Surgical procedure

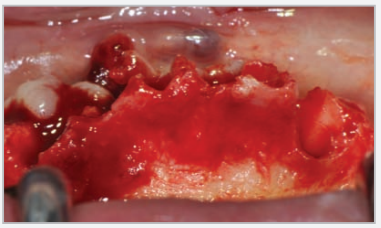

Fig. 5 Surgical procedure

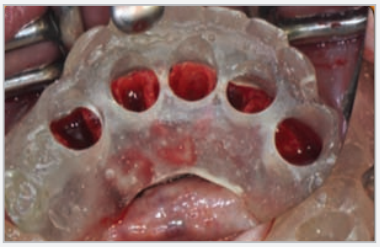

Fig. 6 Surgical guide preparation

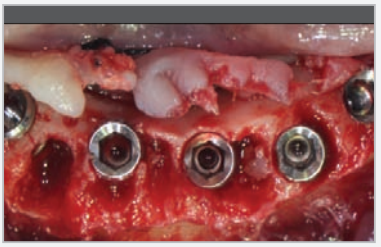

Fig. 7 Implant placement

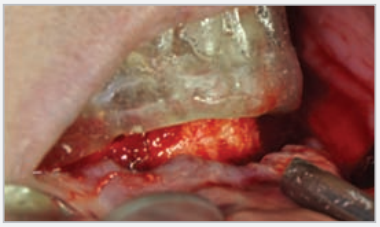

Fig. 8 Validating surgical guide

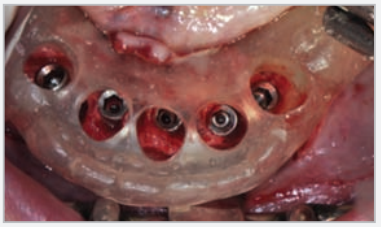

Fig. 9 Placement of 5 MIS implants (SEVEN®) using the surgical guide

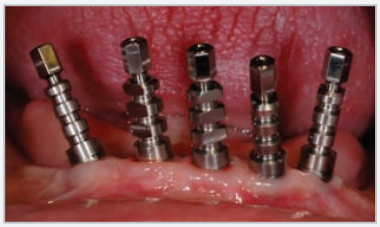

Fig. 10 Impression technique

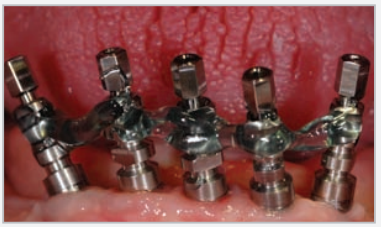

Fig. 11 Impression technique

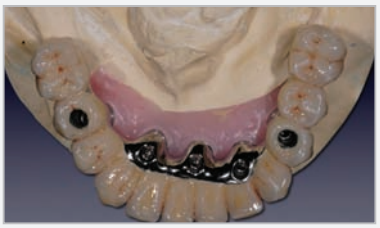

Fig. 12 3 months later. Preparation of a fixed prosthesis screwed porcelain

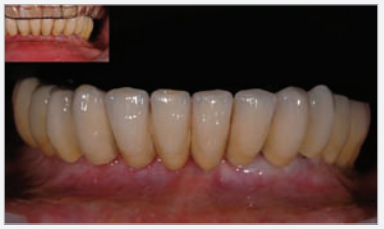

Fig. 13 Clinical aspects. Occlusal and vestibular view

1998; Szmukler- Moncler et al. 2000). Several studies have reported higher failure rates for immediate-loaded implants when compared to delayed-loaded ones (Schnitman et al. 1997; Ericsson et al. 2000; Jaffin et al. 2000; Chaushu et al. 2001). This shows that this procedure, although predictable, is technique-sensitive and should be applied cautiously. A gradual and progressive approach to immediate loading is therefore recommended, due to the B.I.C principle (Bone implant contact).

The literature demonstrated that most failures occur during the first 6 months of function (Babbush et al. 1986; Schnitman et al. 1990; Balshi & Wolfinger 1997; Schnitman et al. 1997; Ericsson et al. 2000a; Jaffin et al. 2000; Szmukler-Moncler et al. 2000; Chaushu et al. 2001).

The authors demonstrated, with 47 implants placed in six patients followed-up during the first six months, that the implants supported several different final restorations without any problems.

In the present prospective clinical study, the use of standard implants with a diameter of 3.75 / 4.20 mm was preferred because it offers more prosthetic and surgical flexibility. The technique utilized in this study avoids excessive obligatory osteoplasty. In addition, the use of more than three implants allows the prosthesis to be functional even in the event of a single failure of one of the implants.

Finally, the present preliminary data suggest that five to six MIS SEVEN® implants in the mandible and eight to ten implants in the maxilla can maintain a level of micro-motion beneath the critical threshold for implant survival with success rates the same as with standard delayed protocol. Based on the results provided by this study, the delivery of an immediate provisional restoration, within 48 hours, has been introduced in our practices as a routine treatment protocol for the partially edentulous maxillary and mandible.

Conclusion

Rehabilitation of partially edentulous maxillae and mandibles by immediate implant placement and immediate occlusal loading by provisional prosthesis supported by five to six MIS implants (in mandibles) and eight to ten MIS implants (in maxillae) is a viable alternative treatment when compared to classical delayed protocols.

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