Int. J. Oral Maxillofac. Surg. 2015; 44: 1411–1415
http://dx.doi.org/10.1016/j.ijom.2015.06.021, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Clinical Paper
Dental Implants

Evaluation of single implants placed in the posterior mandibular area under immediate loading: a prospective study

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L.G.C. Guidetti, M.S. Monnazzi, A.C.G. Piveta, M.A.C. Gabrielli, M.F.R. Gabrielli, V.A. Pereira Filho: Evaluation of single implants placed in the posterior mandibular area under immediate loading: a prospective study. Int. J. Oral Maxillofac. Surg. 2015; 44: 1411–1415.

Abstract. The aim of this study was to evaluate the survival of single dental implants subjected to immediate function. Twelve patients with edentulous areas in the posterior mandible were included in the study. All received at least one regular platform dental implant (3.75 mm × 11 mm or 3.75 mm × 13 mm). Clinical and radiographic parameters were evaluated. The survival rate after 12 months was 83.3%. The implants showed no clinical mobility, had implant stability quotient values (ISQ; Osstell) around 70, bone loss of up to 2 mm, and a probing depth of ≤3 mm. Although the posterior mandible is an area in which the immediate loading of dental implants should be performed with caution, this treatment presented a good success rate in the present study sample.

Key words: dental implants; immediate loading; single implants.

Accepted for publication 25 June 2015
Available online 18 July 2015

Oral rehabilitation with dental implants has a high success rate.[1] With the conventional protocol, the implants are loaded 3–6 months after their installation. This is to avoid a fibrotic union between bone and implant, which is the main cause of implant failure.[1,2]

In implant therapy, the survival rate is often used to describe a situation in which the implants are functional, whether or not they fulfil all of the success criteria. Several parameters are used to define implant success, including stability, the amount of bone loss, and the periodontal probing depth. The probing depth is among the clinical parameters most often used to evaluate peri-implant soft tissue and health.[3] It is considered one of the most accurate methods to detect a peri-implant pathology.[4]

Some studies have compared the immediate loading of implants with delayed loading and have concluded that both techniques are predictable in totally and partially edentulous patients.[5] However, the great majority of studies that have evaluated immediate loading have involved implants placed in the anterior areas of the maxilla and mandible. The aim of the present study was to evaluate

immediate loading of single implants placed in the posterior mandible.

Materials and methods

This study was approved by the Ethics Committee of Araraquara Dental School, São Paulo State University (UNESP) and was conducted in accordance with the guidelines of the Declaration of Helsinki. All patients were informed of the study methodology and signed a consent form.

Twelve adult patients who presented tooth loss in the posterior mandible, and for whom osseointegrated implants were indicated, were recruited consecutively into this study; study recruitment took approximately 9 months. The following inclusion criteria were applied: agreement by the patient to participate; having at least one tooth posterior to the edentulous area to be implanted; sufficient bone width for the insertion of a 3.75-mm implant; sufficient bone height to insert an implant of at least 11 mm; no bruxism; no systemic health issue that could compromise the technique; no drug addiction; satisfactory oral hygiene. These patients were evaluated prospectively from inclusion.

All procedures were performed in the ambulatory care setting under local anaesthesia. The patients received antibiotics 1 h before the procedure, either 1 g of oral amoxicillin, or in the case of allergy to amoxicillin, 300 mg of clindamycin. The antibiotic and 0.12% chlorhexidine mouth rinse were prescribed for 7 days postoperatively.[6]

A semilunar incision was used in order to improve papilla formation. The surgical sockets were prepared according to the manufacturer's guidelines (PROSS Dabi Atlante, São Paulo, Brazil). After implant insertion, a healing abutment was installed to facilitate soft tissue repositioning and 4–0 Vicryl sutures were placed. The implants used were of a cylindrical design with an acid-etched surface treatment, which confers roughness; all implants used had an external hexagon connection (Fig. 1).

The healing abutment was removed and the transfer casting was done. Provisional crowns were installed within a maximum time frame of 48 h and were kept in infra-occlusion (1 mm) during the first 6 months after surgery.

The evaluation parameters used in this study were the probing depth, implant stability, and peri-implant bone loss. These parameters were assessed immediately after prosthesis installation (T1) and at 3 months (T2), 6 months (T3), and 12 months (T4) postoperatively. All evaluations were done by the same individual and the data were tabulated and registered for later analysis. The parameter evaluation was done by a periodontology specialist dentist (independent observer) and not the surgeon who performed the implant insertion or the dentist who made the crowns.

Fig. 1. Macroscopic view of the implant system used in this study.

The peri-implant probing was done according to the technique of Watzek et al.,[7] with the use of a Hu-Friedy millimetre probe, in the mesial (M), distal (D), vestibular (V), and lingual (L) faces of the implant.

Implant stability was measured through resonance frequency analysis by magnetic transduction using an Osstell ISQ apparatus (Osstell AB, Göteborg, Sweden) and SmartPeg A3 (Osstell AB, Göteborg, Sweden). For the measurements, the crowns were removed and the SmartPeg A3 was positioned in the implant platform. The Osstell sensor was then positioned perpendicular to the implant axis and the analysis was done in duplicate, in accordance with the manufacturer's guidelines. The results were calculated from the peak amplitude and expressed in implant stability quotient (ISQ) units, on a scale of 1–100. The value is directly proportional to the stability of the implant.

Regarding the alveolar peri-implant bone, each implant underwent radiological evaluation. Peri-apical radiographs were obtained using the parallel X-ray technique with modified positioners and an individualized bite block made of condensed silicone. After the radiographs had been taken, the silicone block was washed, disinfected, and kept in a freezer to avoid drying. Each patient's block was stored in a container labelled with the owner's name for subsequent use in all postoperative evaluations.

All radiographs were taken with a GE 1000 (General Electric) X-ray machine, working on 90 kV, 10 mA, film-focus distance stable at 40 cm, and exposure time of 0.2 s. Speed group F sensitivity film was used (Kodak).

Processing was done automatically by a Dent-X 9000 processor (Philips, USA) inside a dark chamber. After developing, the films were digitized using a table scanner (SnapScan 1236; Agfa, Germany) and the image obtained was saved in JPEG format on the hard disk of a computer. The