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Clinical Study
Dental Implants

Initial bone preparation followed by a 2-week delay before implant placement enhances the clinical and radiographic outcome: a randomized controlled trial

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Abstract. Initial bone preparation followed by a 2-week delay before implant placement enhances the biological activity at the osteotomy site, which may improve the treatment outcome. The aim of this study was to compare the clinical and radiographic outcomes of initial bone preparation and a 2-week delay in implant placement with the conventional method. Subjects were outpatients selected from a department of periodontology and oral implantology. The implant sites were randomly allocated to a test group and a control group ($n = 7$ each). Test sites were treated with initial bone preparation followed by implant placement after a 2-week delay; control sites were treated with the conventional protocol. All sites were assessed over 12 months for the keratinized mucosa index, probing depth, implant mobility, and radiographic peri-implant crestal bone levels. A total of 14 implants were placed in 12 subjects (five males and seven females, mean age 31.5 years, range 18–45 years). The results showed a statistically significant reduction in peri-implant probing depth and crestal bone levels in the test group ($P < 0.01$). This randomized controlled trial demonstrated better clinical and radiographic outcomes for initial bone preparation followed by a 2-week delay in implant placement; this may be an alternative to the conventional protocol.

Key words: initial bone preparation; conventional implant placement; delayed implant placement; immediate loading; aesthetics.

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The last decade has seen a profound shift in implant dentistry from function to aesthetics, with enhanced aesthetics being the patient's need and desire. The focus has evolved from a 'surgically driven approach' to a 'prosthetically driven approach' with the goal of optimizing and maintaining aesthetics.[1] The delicate balance between function and aesthetics must be maintained, as both contribute to the treatment outcome.

Switching from the original lengthy healing protocols to immediate loading of

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implants has demanded a veritable intellectual revolution and a paradigm shift. Immediate loading of oral implants is an innovative and attractive treatment approach in implant dentistry today. It has been recommended that special surgical techniques be used to increase the bone density of the implant bed before implant insertion in order to improve primary stability, reduce micro-movements, and establish long-term success with immediate loading.[2]

An animal study involving initial osteotomy preparation followed by implant placement with a delay of approximately 2 weeks, revealed enhanced biological activity at the osteotomy site that may improve implant treatment outcomes.[3] Offering a relaxed healing implant bed, ready to receive a fixture, is preferable to inserting a fixture at a traumatized and heated site; this may be a healthier method, enhancing the alveolar binding capability before implantation.[3]

The aim of the present study was to evaluate and compare the protocols of initial bone preparation followed by a 2-week delay before implant placement with the conventional method of implant placement, on the basis of clinical and radiographic parameters.

Materials and methods

Study design

The study subjects were selected from the outpatient section of a department of periodontology and oral implantology. The study population consisted of subjects who had presented to the department for the replacement of missing teeth. The study was conducted between October 2011 and December 2012. The selected subject implant sites were randomly assigned in a 1:1 ratio to a test group and a control group by the examiner, to minimize selection bias and confounding. The test group comprised implant sites at which initial bone preparation was done followed by a 2-week delay before implant placement. The control group comprised implant sites at which implant placement was carried out immediately after bone preparation.

The subjects were informed about the proposed treatment protocol and it was made clear that participation was voluntary. Written informed consent was obtained from the subjects, and ethical clearance for the study was received from the institutional ethics committee and review board.

Selection criteria

Systemically healthy subjects who were cooperative, motivated, and committed to the study, with one or more missing teeth in the anterior and/or premolar region of either the maxillary or mandibular arch, with adequate bone volume and quality, and a stable soft tissue architecture and dental health status, were included in the study. Subjects were excluded if they had a specific systemic disease that would contraindicate implant placement surgery; if there was an infection or insufficient dimensions at the edentulous site; if they had adverse habits such as smoking, tobacco chewing, or alcohol consumption; if they had parafunctional habits; or if there was a previous history of head and neck irradiation.[4,5]

Pre-treatment protocol

Standard intraoral peri-apical radiographs, orthopantomographs, were taken to check for the proximity to anatomic landmarks and to evaluate the mesiodistal and buccolingual bone width.[6] Study models, working cast models, and prosthetic wax-ups of the proposed implant sites were made for treatment planning.[5] Ridge mapping with impression tracing and bone sounding was accomplished to evaluate the buccolingual width of the implant site.[7]

The principles of presurgical preparation were strictly adhered to. Interdisciplinary treatment was initiated to treat active dental or periodontal infections. Oral prophylaxis was given before the scheduled implant placement. Subjects were advised to use 0.2% chlorhexidine gluconate mouthwash, twice daily, for a period of 15 days.

Surgical procedures

For the test group, the surgical site was anaesthetized with local anaesthesia by nerve block and/or infiltration as indicated. After achieving adequate local anaesthesia, a minimally invasive paracrestal mucoperiosteal flap not involving the buccal or palatal mucosa was raised using a No.11 Bard Parker blade at the planned osteotomy site (Fig. 1a). Full thickness flaps were elevated using a periosteal elevator to expose the alveolar crest. Bone preparation or an osteotomy specific to the implant dimensions was then performed, as per the manufacturer's instructions. The flap margins were then repositioned and sutured tension-free with a 3–0 braided silk suture. The sutures were removed after about 7–10 days. Approximately 2 weeks after the procedure, the osteotomy site was exposed using a soft tissue punch (Fig. 1b). Then, slight curettage and saline irrigation of the socket was done. The implant was removed from

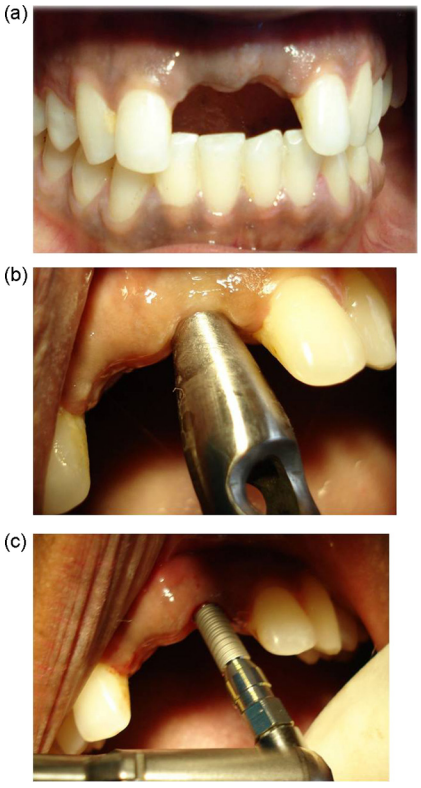

Fig. 1. (a) Preoperative photograph. (b) Use of a soft tissue punch to expose the osteotomy site. (c) Implant placement with a torque-controlled hand wrench.

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