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Immediate placement of implants in periapical infected sites: A prospective randomized study in 50 patients

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Objective. To determine clinical success when implants are placed in chronic periapical infected sites.
Study design. Fifty patients (25 females, 25 males, mean age 39.7 ± 14.5 years) were included in this prospective controlled study. After randomization, 25 Frialit-2 Synchro implants were immediately placed (IP) after extraction, and 25 Frialit-2 Synchro implants were placed after a 3-month healing period (DP). Thirty-two implants were placed in the anterior maxilla and 18 implants were placed in the premolar region. Implant survival, mean Implant Stability Quotient (ISQ) values, gingival aesthetics, radiographic bone loss, and microbiologic characteristics of periapical lesions were evaluated for both groups.
Results. Overall, 2 implants belonging to the IP group were lost, resulting in a survival rate of 92% for IP implants versus 100% for DP implants. Mean ISQ, gingival aesthetics and radiographic bone resorption, and periapical cultures were not significantly different with the IP and DP implants.
Conclusions. Immediate implant placement in chronic periapical lesions may be indicated.
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Immediate postextraction implant placement is a well-accepted protocol due to the preservation of aesthetics, shorter total treatment time, maintenance of socket walls, reduced surgical time, and better actual implant placement.[1] The concept of immediate placement of dental implants after removal of a tooth with periapical pathology, however, is a matter of debate. Only a few studies on this subject have been published, and no prospective randomized studies have been conducted to determine the feasibility of this approach. The placement of implants into the sockets of teeth with periapical lesions offers advantages: it minimizes the number of surgical procedures by combining extraction, implant placement, and bone grafting in 1 appointment. The disadvantage of the technique is the potential for implant contamination during the initial healing period due to remnants of the infection.

Periapical lesions are areas of inflammatory reactions to various antigens present in infected root canals; histological examination of these lesions reveals the presence of granulation tissue infiltrated by immunocompetent cells such as lymphocytes, plasma cells, macrophages, polymorphonuclear leukocytes, and mast cells.[2] Macrophages and lymphocytes are the predominant inflammatory cells. Microorganisms located at the apical part of the root canal system are usually delineated from the inflamed periradicular tissues, either by a dense accumulation of polymorphonuclear neutrophils or by an epithelial plug at or near the apical foramen.[3]

Novaes and Novaes[4] reported that, in immediate implant placement for replacement of teeth with periapical lesions, success can be achieved if certain preoperative and postoperative measures are followed, such as antibiotic administration, meticulous cleaning, and alveolar debridement, before surgical procedure. In histomorphometric evaluations of immediate implantations in dogs with induced periapical lesions, investigators

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reported that osseointegration occurred in both the experimental and control sites.[5]

The purpose of this prospective randomized study was to evaluate the outcome of immediate placement of Frialit-2 Synchro (Dentsply Friadent Ceramed, Mannheim, Germany) implants when used in the replacement of teeth with chronic periapical lesions.

PATIENTS AND METHODS

The present study was performed within the guidelines of the Helsinki Declaration for biomedical research involving human subjects. The study was conducted at the department of Oral and Maxillofacial Surgery, Academic Medical Center, Amsterdam.

All patients were given emphasis-placed detailed explanations of the study protocol and were asked to sign surgical consent forms. The primary indication for placement of implants was a maxillary anterior or premolar single-tooth replacement. Fifty consecutive patients (25 females and 25 males) ranging in age from 19-69 years (mean 39.7 $\pm$ 14.5 years) were included. All patients in this study were at least 18 years old and physically able to tolerate the procedure. Patients had to be in good health, with no chronic disease or smoking habits. In addition, primary stability (torque $>$25 N/cm) of the implants had to be achieved during surgical procedure. Patients were excluded if any of the following were evident: untreated caries or uncontrolled periodontal disease; smoking; any disease, condition, or medication that might compromise healing or osseointegration; or inability or unwillingness to return for follow-up visits. All implants in this study were Frialit-2 Synchro implants. All treated teeth demonstrated radiographic signs of chronic periapical periodontitis. Preliminary diagnostic procedures consisted of a panoramic radiographic evaluation supplemented with periapical radiographs.

Patients were randomly allocated (computer randomization program) to an immediate placement or a delayed placement protocol.

Surgical procedure

One hour before surgical procedure, patients began a prophylactic regimen of 600 mg clindamycin. All procedures were performed by using local anesthesia with epinephrine. In the immediate implant group, implant surgical procedure was immediately performed after extraction of the involved tooth and thorough degranulation of the socket. Samples of granulation tissue were collected for microbiologic analysis. Subsequently, 2 sterile paper points (Fine, UDM, West Palm Beach, FL) were inserted in the apical defect and left in place for 10 seconds. The material was transferred to a vial containing 2 mL of RTF[6] and sampled for bacterial growth. In the delayed group, the implant procedure was carried out after a healing period of 12 weeks.

Implant surgical procedure. A pedicled mucoperiosteal flap was raised to expose the maxilla, after which osteotomies were prepared with the 2.0 and 3.0 drills with maximum use of the bone apical to the extraction socket to achieve primary stability. Subsequently, osteotomies were pushed in the osteotomy site while using a rotatory action. After completion of site preparation, a Frialit-2 Synchro implant was placed with a minimal torque of 25 Ncm by using a torque controller. Selection of implant diameter was based on both primary stability and fill of the socket. The implant was placed 2 mm below the cervical junction of the adjacent teeth. Because of the apical infection, part of the buccal plate had been lost, and bone augmentation utilizing autogeneous corticocancellous bone from either the trigonum retromolar or chin regions was harvested. The corticocancellous block was grinded in a bone mill and placed buccally to totally cover the implant. After adaptation of the mucoperiosteal flap to achieve tension-free wound closure, a bioresorbable collagen membrane (Bio-Gide®, Geistlich AG, Wolhausen, Switzerland) was placed and the wound was closed by means of 5-0 Ethilon sutures (Johnson & Johnson Gateway, LLC, Piscataway, NJ).

Postoperative management

After surgical procedure, chlorhexidine rinses were used for 7 days, and patients were seen on a weekly basis for 4 weeks. After 2 weeks, a removable provisional partial denture with clasps was placed. A nonloaded healing period of 6 months was allowed for all placed implants.

Follow-up

Following the healing period, second-stage surgical procedure was performed with the placement of a healing abutment on the implant. Implant mobility assessment and resonance frequency measurements were performed when the implant was uncovered after 6 months. The study protocol required the removal of any implant determined to be mobile or symptomatic. These implants were scored as failures.

Prosthetic rehabilitation started 2 weeks after second-stage surgical procedure. The crowns were cemented with temporary cement. Follow-up evaluation was conducted at 1 year and radiographs were taken to determine changes in bone level. In addition, assessment of gingival aesthetics was performed.

Data collection

The following variables were recorded: culture results at extraction, ISQ at 6 months, implant success or failure at 6 months after implant placement, and