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Clinical Paper
Dental Implants

Are success and survival rates of early implant placement higher than immediate implant placement?

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Abstract. Immediate placement refers to the placement of an implant into a tooth socket at the time of extraction; early placement refers to the placement of an implant after substantial gingival healing, but before any clinically significant bone fill occurs within the socket. This study evaluated the success and survival rates of implants following immediate and early placement. 50 implants were placed in 36 patients. 26 immediate (group I) and 24 early placements (group II) were performed. Pain or tenderness with function, mobility, radiographic bone loss from initial surgery and exudate history were evaluated. Mean vertical bone loss in the immediate placement group was 0.55 mm and 0.80 mm in the early placement group. The survival rate for the immediate placement group was 96.16% with 51.6 months follow-up and in the early placement group was 100% with 61.9 months follow-up. The results of this study suggest that although the success and survival rates of early placed implants were a little higher and the follow up period was longer than immediately placed implants, the difference was not remarkable. In conclusion, both implant insertion techniques are safe and reliable procedures with considerably high survival rates.

Key words: immediate; success rate of implant; marginal bone loss; periodontal pocket depth; early placement.

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According to Branemark's protocol, the waiting period between tooth extraction and implant placement is 6–8 months; this is the late placement technique.[1] Series of biological processes such as bone resorption (vertically and horizontally), gingival collapse and migratory movements of the adjacent teeth to the extraction space occur during this period. Other concerns about this protocol include the increased time of edentulism, longer treatment time and additional surgical procedure. Branemark's original protocol is not commonly used because of these disadvantages and new approaches that shorten the waiting period have been used in recent decades.

In 1993 Wilson and Weber[2] used the terms immediate, recent, delayed, and mature, to describe the timing of implant placement after tooth extraction or the extraction socket's healing process. Since then, a number of different descriptive terms have been used to describe implant placement time.[3–6] In the ITI Treatment Guide in 2008 all these descriptive terms were discussed and a new classification system was presented.[7]

According to ITI classification: type 1 (immediate) placement refers to placement of an implant at the same time as the tooth is extracted; type 2 (4–8 weeks after tooth extraction) placement occurs when the implant is placed after soft tissue

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healing, but before any clinically significant bone fill occurs within the socket; type 3 (implant placement with partial bone healing) placement is performed after significant bone healing; and type 4 (late placement after more than 6 months of healing) placement is performed in fully healed and mature bone.[7]

There are advantages and disadvantages for each technique. Type 1 and 2 implant placements are usually preferred by the patient and clinician because the waiting period is shorter than that for other techniques. There are few reported studies that compared type 1 and 2 implant placement techniques.[8–10]

It was hypothesized that the early implant placement protocol may be more successful than immediate placement because of the complete soft tissue healing in early implant placement. In order to test this hypothesis, the present study was performed to evaluate and compare the clinical success and survival rates of immediate and early implant placement procedures with long term follow up.

Materials and methods

This study was approved by Baskent University Institutional Review Board (Project no: D-KA 11/09). 36 patients (20 female and 16 male) were included as two separate groups in this retrospective study. Group I consisted of 26 implants performed with immediate placement (type 1) in 17 patients and, group II included 24 implants performed with early placement (type 2) in 19 patients. 50 Straumann dental implants (4–4.5 mm × 10–12 mm) were performed by the same surgeon. The mean age was 55.7 (±28.5) years (53.88 ± 19.5 and 56.10 ± 28.5 years for groups I and II, respectively).

Inclusion criteria for the study were ASA I and ASA II patients without a known cause of compromised wound healing and the presence of adequate residual bone for primary stability. Exclusion criteria were the presence of any local or systemic factors that would inhibit wound healing, acute infection and major chronic pathologies such as cysts. Patients who did not complete the follow-up period after occlusal loading were also excluded from the study.

If the support of all residual alveolar bone walls was adequate for immediate implant placement following the careful extraction of the multirooted or unirooted teeth, implants were inserted immediately for group I. If there was a chronic periapical infection, implants were placed after the elimination of granulation tissue, epithelium and Sharpey's fibres from the extraction socket. In the buccolingual direction minimally 2 mm of alveolar bone thickness and adequate proximal bone level for complete interdental papilla formation should be preserved for immediate placement.

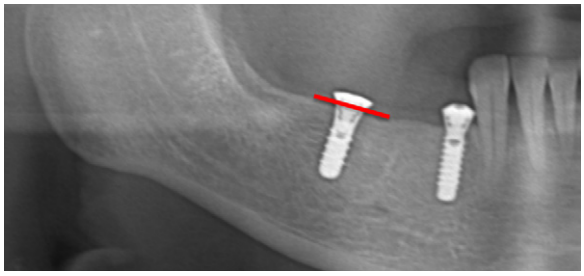

Fig. 1. A transverse line was observed at the junction of the implant neck and cover screw and mesial and distal crestal bone levels were noted on the first postoperative radiograph.

20 implants were placed in the maxilla and 6 in the mandible in group I. In group II, implants were placed 4 weeks after tooth removal for substantial soft tissue maintenance. If there was an acute endodontic or periapical infection without bone defect, lack of gingival tissue, thin periodontal phenotype or compromised mucosal blood supply, implants were placed after the 4-week healing period. 13 implants were inserted in the maxilla and 11 in the mandible in group II.

When the gap between the implant surface and the surrounding bone walls was >2 mm, particulate bone was harvested autogenously from the incision around the dental implant by bone scalpel or xenogenic bone materials were used for both groups I and II.

Antibiotics, anti-inflammatory agents and chlorhexidine mouth-rinse were prescribed to all patients following implant surgery. Panoramic radiographs were taken immediately after all implant placement procedures to determine the initial crestal bone level around the implants and at the last appointment to evaluate the vertical bone loss. Mandibular implants were loaded 2 months and maxillary implants were loaded 4 months after implant placement in both in groups.

The definition of implant success and survival were determined by the using clinical and radiographic evaluation criteria from Misch et al.[11] If there is no pain or tenderness on use, no mobility, no history of exudates and radiographic bone loss is less than 2 mm from initial surgery implant the implant is considered successful. If bone loss is 2–4 mm, the implant is considered to have satisfactory survival. If the radiographic bone loss is less than 4 mm (less than half of the implant body) without mobility and the probing depth is less than 7 mm with a history of exudates, the implant is considered to have compromised survival. If there is pain on use, mobility, radiographic bone loss more than half the length of the implant or uncontrolled exudates it is considered a clinical failure.

Periodontal pocket depth evaluation was performed at five different points around the implant. The deepest pocket depth was chosen as the periodontal pocket depth for each implant. Mesial and distal marginal bone loss was evaluated by digital panoramic radiographs with the Mediadent Program. All radiographs were taken with the same device and transferred with the same program to standardize the results. Initially, a transverse line was observed at the junction of the cover screw and the neck of the implant on the first radiograph and mesial and distal vertical distances between the transverse line and the crestal bone levels were documented (Fig. 1). An additional transverse line was observed at the junction of the prosthetic restoration and the neck of the implant and the same measurements were performed on control radiographs which were taken at the last appointment. The mesial and distal vertical distances between the transverse line and the deepest marginal bone level were evaluated (Fig. 2). Initial and former mesial and distal crestal bone levels were compared and the highest difference was chosen to determine the mean vertical bone loss.

Previously documented exact implant lengths and calculated implant lengths on digital panoramic radiographs were compared for each radiograph and a calibration ratio was found. This calibration ratio was used for elimination of the magnification of digital panoramic radiographs, which found the exact marginal bone loss.

Results

The requirement for additional bone grafting, mobility of the implant, exudation,