

Immediate or Delayed - Clinical Evidence Guiding Implant Placement Protocol

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Abstract

Background: Dental implant placement is a cornerstone in modern prosthodontics, providing predictable functional and esthetic rehabilitation for partially or completely edentulous patients. A long-standing debate exists regarding whether implants should be placed immediately after tooth extraction or delayed until socket healing is complete. Immediate implant placement is attractive for reducing treatment time and preserving alveolar dimensions, whereas delayed placement is traditionally considered safer and more predictable in terms of osseointegration and peri-implant stability.

Objective: To systematically review and discuss the available clinical evidence comparing immediate and delayed implant placement protocols with respect to survival rates, marginal bone stability, esthetic results, patient satisfaction, and potential complications.

Methods: This narrative review synthesizes findings from randomized controlled trials, cohort studies, and systematic reviews published in the last two decades.

Emphasis is placed on quantitative outcomes (implant survival, marginal bone loss, soft tissue stability) and qualitative aspects (esthetic perception, patient-reported satisfaction, and clinical applicability).

Results: Evidence indicates that survival rates for both protocols are consistently high (90–98%). Immediate placement demonstrates clear advantages in reducing treatment time, minimizing surgical interventions, and preserving alveolar ridge dimensions. However, it shows higher risks in sites with infection, insufficient bone volume, or poor soft tissue quality. Delayed placement, while extending rehabilitation time, offers greater predictability in osseointegration and esthetic outcomes in compromised sites.

Conclusion: There is no universal superiority of either protocol; rather, patient-specific factors dictate the choice. Immediate placement is advantageous in carefully selected cases with intact sockets, adequate bone, and high patient demand for rapid treatment. Delayed placement remains the standard in compromised

sites where infection, bone grafting, or complex esthetic demands are present. Future directions point toward hybrid or staged approaches, combining the benefits of both protocols.

Keywords: Immediate Implant Placement; Delayed Implant Placement; Dental Implants; Osseointegration; Marginal Bone Loss.

Introduction

Dental implantology has transformed the landscape of oral rehabilitation by offering a highly reliable solution to tooth loss. Traditionally, the delayed implant placement protocol — waiting several months post-extraction for the socket to heal — was considered the gold standard. This ensured optimal bone healing, reduced infection risks, and maximized osseointegration predictability.

However, growing patient expectations for faster, less invasive treatments, coupled with the desire to maintain natural soft and hard tissue contours, gave rise to immediate implant placement strategies. By inserting the implant directly into the extraction socket, clinicians can reduce treatment time and surgical stages, while potentially preserving the alveolar ridge dimensions.

Despite these advantages, immediate implant placement carries challenges such as achieving primary stability in fresh sockets, risk of mucosal recession, and difficulty in managing peri-implant soft tissue. Conversely, delayed placement, though more predictable, involves a longer treatment course and possible ridge resorption during healing.

This paper explores the clinical evidence guiding implant placement timing, highlighting survival rates, esthetic considerations, patient outcomes, and risk management strategies to provide clinicians with evidence-based decision-making tools.

Discussion

Implant Survival and Osseointegration

- **Survival rates:** Both immediate and delayed placement show survival rates above 90–95% in most long-term studies.
- **Immediate placement:** Comparable survival to delayed placement, provided that primary stability (>30–35 Ncm torque) and atraumatic extraction are achieved.
- **Delayed placement:** Offers slightly higher predictability in compromised sockets due to complete healing of bone and soft tissue before implant insertion.
- **Evidence summary:** Recent meta-analyses indicate no significant statistical difference in survival rates between the two approaches.

Marginal Bone Loss and Soft-Tissue Stability

- **Immediate placement:** Helps preserve ridge volume by reducing the post-extraction remodeling process. However, bone remodeling still occurs, and buccal bone thickness <2 mm increases the risk of bone loss and soft-tissue recession.
- **Delayed placement:** Allows bone healing before implant insertion, which may result in slightly more predictable marginal bone levels, though at the expense of greater alveolar resorption during the waiting phase.
- **Soft-tissue perspective:** Delayed placement allows for better soft-tissue conditioning and management. Immediate placement often requires provisional restorations and meticulous handling to minimize esthetic complications.

Esthetic and Functional Outcomes

- **Immediate placement:** Favored in esthetically demanding zones (anterior maxilla) because it helps preserve gingival contour and interdental papillae.

However, studies show higher risks of mucosal recession in thin gingival biotypes.

- **Delayed placement:** Provides controlled soft-tissue architecture shaping, ensuring stable long-term esthetic outcomes, particularly in patients with compromised sites.
- **Clinical evidence:** Some RCTs suggest esthetic scores (Pink Esthetic Score, White Esthetic Score) are comparable between both protocols if strict surgical and prosthetic protocols are followed.

Patient-Centered Outcomes

- **Immediate placement:** Shorter treatment duration, fewer surgical interventions, and psychological benefits due to immediate replacement of missing teeth. These factors contribute to higher patient satisfaction.
- **Delayed placement:** While less convenient for patients due to longer timelines, it reassures them with greater predictability and reduced risks of early implant failure.
- **Practical consideration:** Patient compliance and preference often influence the final decision more than clinical evidence alone.

Risk Factors and Clinical Decision-Making

- **Immediate placement is suitable when:**
 - Extraction sockets are intact (no infection).
 - Adequate bone thickness and volume are present.
 - Primary stability of the implant is achievable.
 - Patients have strong esthetic and time-related demands.
- **Delayed placement is preferable when:**
 - Sites show infection or periapical pathology.
 - Significant bone loss or dehiscence is present.
 - Ridge augmentation or sinus lifting is required.
 - Patient presents with high esthetic risk factors (thin gingiva, high smile line).

Conclusion

The choice between immediate and delayed implant placement is not a **binary decision**, but rather a patient- and site-specific judgment.

- **Immediate placement** provides faster treatment, esthetic preservation, and high patient acceptance in carefully selected cases.
- **Delayed placement** ensures greater predictability in compromised conditions, though at the cost of longer treatment duration and possible ridge resorption.
- Both protocols are highly successful, with survival rates exceeding 90%, provided proper case selection, surgical expertise, and prosthetic planning.

Future directions include hybrid protocols (early implant placement after 4–8 weeks), use of digital planning, guided surgery, and biomaterials for simultaneous augmentation, which may bridge the gap between immediate and delayed approaches.

Ultimately, clinical expertise, patient expectations, and biological feasibility remain the guiding pillars of protocol selection.

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