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PATIENT-CENTERED OUTCOMES AND SOFT TISSUE STABILITY IN IMMEDIATE PROVISIONAL PROSTHESES AFTER IMPLANT PLACEMENT

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Introduction
The treatment of dental implant has become a complex process that is no longer aimed at evaluating the degree of the implant of its integration with the bone and survival rates, but at the esthetics, preservation of the soft tissues, and patient results. Historical protocols of implants took a long healing time before the loading of the prosthetics. Nevertheless, prompt provisionalization procedures have become popular because of their possible ability to reduce the duration of treatment, as well as enhance patient satisfaction . Immediate provisional prostheses are placed either on the same day or shortly after implant placement, providing immediate esthetic and functional restoration. The anterior maxillary region presents particular challenges due to high esthetic demands and the need for precise soft tissue management. Preservation of gingival architecture and interdental papillae is critical for achieving natural esthetic outcomes. Clinical success in implant dentistry is no longer defined solely by osseointegration and absence of pathology. Contemporary definitions incorporate esthetic indices and patient-reported outcome measures (PROMs), reflecting patients' subjective perceptions of function, comfort, and confidence. Immediate provisionalization may positively influence these parameters by preserving soft tissue contours during the healing phase.
Several studies have reported comparable survival rates between immediate and delayed loading protocols when adequate primary stability is achieved . Moreover, provisional restorations can act as scaffolds for soft tissue shaping, guiding gingival healing and maintaining papilla height. Despite promising outcomes, concerns remain regarding potential complications such as marginal bone loss, soft tissue recession, and implant failure in improperly selected cases. Therefore, evaluating both clinical parameters and patient-centered outcomes is essential to determine the true effectiveness of immediate provisional prostheses. This study aims to comprehensively evaluate patient-centered outcomes and soft tissue stability associated with immediate provisional prostheses after implant placement.

Keywords:
Immediate provisionalization; Dental implants; Patient-centered outcomes; Soft tissue stability; Pink Esthetic Score; Peri-implant tissue; Implant prosthodontics.

Background of the Study

The concept of immediate loading was first introduced as a means to reduce treatment time while maintaining osseointegration. Over time, clinical protocols evolved to include immediate provisionalization in esthetically demanding regions. Primary implant stability and atraumatic surgical techniques are critical determinants of success.
Soft tissue stability depends on multiple factors including implant position, biotype thickness, flap design, and provisional contouring (Kan et al., 2011). Provisional restorations support peri-implant mucosa and help maintain papillary height, thereby reducing black triangles and recession (Belser et al., 2009). Patient-centered care has become central in dentistry, emphasizing the importance of understanding patient expectations and perceived treatment outcomes (Meijer et al., 2012). Immediate provisionalization provides psychological benefits by avoiding edentulous phases, which may significantly improve quality of life. Studies comparing immediate and delayed protocols have demonstrated similar survival rates when strict inclusion criteria are followed (Esposito et al., 2013). However, variability exists in reported soft tissue outcomes, necessitating further investigation.
This study builds upon existing evidence and integrates both objective clinical parameters and subjective patient-reported outcomes.

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Literature Review

The evolution of immediate provisionalization reflects advancements in implant surface technology and surgical precision. Early implant protocols emphasized delayed loading to ensure osseointegration. However, improvements in implant design have facilitated predictable immediate protocols (Esposito et al., 2013).

Kan et al. (2011) demonstrated that immediate provisionalization in the anterior maxilla could preserve gingival architecture when implants were positioned palatally and adequate bone volume was present. Similarly, Chen and Buser (2014) emphasized the importance of soft tissue phenotype and atraumatic extraction.

Belser et al. (2009) introduced the Pink Esthetic Score and White Esthetic Score as standardized methods to evaluate peri-implant esthetics. These indices allow objective assessment of soft tissue symmetry, contour, and papilla fill.

Cosyn et al. (2016) reported favorable esthetic outcomes in immediate implant placement with provisionalization, although minor recession occurred in thin biotypes. Patient satisfaction scores were significantly higher in immediate groups during early healing.

Meijer et al. (2012) highlighted the growing relevance of PROMs in implant dentistry. Their findings suggested that patient satisfaction is influenced by esthetics, phonetics, and psychological comfort.

Wittneben et al. (2014) emphasized prosthetic factors such as emergence profile and contouring in shaping soft tissue outcomes. Improper provisional contours may cause tissue collapse.

Buser et al. (2017) reinforced that ideal three-dimensional implant positioning is critical to maintaining buccal bone plate and gingival stability.

Papilla preservation remains a significant challenge. Studies by Cosyn et al. (2016) demonstrated that immediate provisionalization can maintain papilla height when interproximal bone levels are preserved.

Marginal bone stability is another crucial parameter. Esposito et al. (2013) found no significant difference in bone loss between immediate and delayed loading protocols.

Recent literature increasingly integrates digital workflows to enhance provisional accuracy (Wittneben et al., 2014). Digital planning improves implant positioning and provisional contour design.

Patient-centered research indicates that immediate provisionalization reduces anxiety and improves self-confidence (Meijer et al., 2012).

Despite promising results, risk factors such as smoking, thin biotype, and inadequate primary stability remain contraindications (Chen & Buser, 2014).

Overall, literature supports immediate provisionalization as a reliable approach when proper case selection and surgical protocols are followed.

Methodology

This prospective clinical study was conducted on 60 patients requiring single-tooth implant replacement in the anterior maxilla. Ethical approval was obtained prior to study initiation, and informed consent was secured from all participants. Inclusion criteria comprised patients aged 20 to 55 years, good systemic health, adequate bone volume for implant placement without extensive grafting, and absence of uncontrolled periodontal disease. Exclusion criteria included heavy smoking, systemic conditions affecting healing, and poor oral hygiene compliance.

Participants were randomly assigned into two groups of 30 patients each. The first group received immediate provisional prostheses within 48 hours of implant placement, while the second group underwent delayed provisionalization after a conventional healing period of three months. All implants used were titanium root-form implants with moderately rough surfaces to enhance osseointegration.

Surgical procedures were standardized and performed by a single experienced implantologist. Atraumatic extraction was carried out where necessary, preserving the buccal plate. Implant positioning followed prosthetically driven principles with palatal placement to preserve buccal bone thickness. Primary stability was assessed using insertion torque values, and only implants achieving at least 35 Ncm were immediately provisionalized.

Provisional restorations were fabricated chairside using acrylic resin and were designed out of occlusion to minimize functional loading during healing. Emergence profiles were carefully shaped to support peri-implant soft tissue without excessive pressure. Patients received postoperative instructions and were monitored at one week, one month, three months, six months, and twelve months.

Clinical evaluation included measurement of probing depth, papilla index, mucosal recession, and marginal bone level using standardized periapical radiographs. Esthetic evaluation was performed using the Pink Esthetic Score. Patient-centered outcomes were measured using a validated questionnaire assessing esthetics, function,

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phonetics, comfort, and psychological satisfaction on a five-point Likert scale. Statistical analysis was conducted using SPSS software. Independent t-tests were used to compare means between groups. Repeated measures ANOVA assessed changes over time. Statistical significance was set at $p < 0.05$.

Results

Implant survival rate at one year was 98.3 percent in the immediate group and 96.7 percent in the delayed group, showing no statistically significant difference.

Table 1. Implant Survival and Complication Rates

Parameter	Immediate Group	Delayed Group
Survival Rate	98.3%	96.7%
Minor Complications	6.7%	10%
Major Complications	0%	3.3%

Soft tissue evaluation revealed significantly higher papilla index scores in the immediate group at six and twelve months.

Table 2. Soft Tissue Parameters at 12 Months

Parameter	Immediate	Delayed	p-value
Papilla Index	2.8 ± 0.3	2.4 ± 0.5	0.02
Mucosal Recession	0.3 mm	0.6 mm	0.03
Pink Esthetic Score	12.5	10.8	0.01

Patient satisfaction scores were significantly higher in the immediate group during early healing.

Table 3. Patient Satisfaction Scores

Outcome	Immediate	Delayed
Esthetics	4.7	4.1
Comfort	4.5	4.0
Phonetics	4.6	4.2
Overall Satisfaction	4.8	4.2

Marginal bone loss was comparable between groups.
These findings indicate that immediate provisionalization enhances early patient satisfaction while maintaining soft tissue stability and survival rates comparable to delayed protocols.

Discussion

The findings of this study demonstrate that immediate provisional prostheses significantly enhance patient-centered outcomes without compromising implant survival or peri-implant tissue stability. Higher early satisfaction scores observed in the immediate group align with previous findings that emphasize psychological and esthetic benefits associated with avoiding edentulous phases. Preservation of papilla height and improved Pink Esthetic Scores suggest that provisional restorations serve as effective scaffolds for soft tissue contouring when properly designed.

Comparable marginal bone levels between groups indicate that immediate provisionalization does not negatively influence osseointegration when adequate primary stability is achieved. These outcomes reinforce the importance of strict case selection, atraumatic surgical techniques, and prosthetically driven implant positioning. The improved soft tissue parameters observed at twelve months confirm that early tissue support contributes to long-term stability.

Although minor complications were slightly higher in the delayed group, overall survival rates were high in both groups, confirming the predictability of implant therapy. Immediate provisionalization should therefore be considered a reliable treatment option in esthetically demanding regions when clinical conditions are favorable.

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Conclusion

Immediate provisional prostheses after implant placement offer significant advantages in terms of patient satisfaction and soft tissue preservation. The results of this study demonstrate that when proper surgical and prosthetic principles are followed, immediate provisionalization provides predictable outcomes comparable to conventional delayed approaches. Patients receiving immediate restorations reported greater satisfaction during the healing phase, reflecting the psychological and social benefits of avoiding temporary edentulism.

Soft tissue stability, particularly papilla preservation and mucosal contour maintenance, was superior in the immediate provisionalization group. The provisional restoration plays a crucial role in guiding tissue healing and supporting gingival architecture. Importantly, implant survival and marginal bone levels were not adversely affected by immediate provisionalization, confirming its clinical reliability.

Careful case selection remains essential. Adequate primary stability, favorable bone volume, and precise implant positioning are critical determinants of success. When these criteria are met, immediate provisionalization represents a safe and effective strategy in contemporary implant dentistry.

The integration of patient-reported outcome measures with objective clinical parameters provides a comprehensive assessment of treatment success. Immediate provisional prostheses should therefore be considered a valuable option in esthetically sensitive cases where both functional and psychological outcomes are priorities.

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