

Immediate Implants in the Aesthetic Zone: Surgical Criteria and Determinant Factors for Predictability

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<https://doi.org/10.36557/2674-9432.2026v5n5p784-796>

Artigo recebido em 18 de Maio e publicado em 18 de Julho de 2026

Integrative Literatura Review

Abstract

Immediate implants in the esthetic zone have gained prominence in contemporary dentistry by enabling faster oral rehabilitation and better preservation of bone and gingival structures, especially in the anterior maxilla, where esthetics plays a fundamental role. Therefore, this study aimed to identify, in the scientific literature, the main surgical criteria and determining factors for the predictability of immediate implants in esthetic areas. An integrative literature review was conducted, with a search for scientific articles in the PubMed and SciELO databases, using descriptors related to the topic and applying predefined inclusion and exclusion criteria. After the selection process, 10 studies were included for analysis. The results showed that factors such as primary implant stability, integrity of the buccal bone plate, gingival biotype, and proper three-dimensional positioning are decisive for the clinical and esthetic success of the treatment. It is concluded that the predictability of immediate implants in the esthetic zone depends directly on careful surgical planning, appropriate case selection, and the technical expertise of the professional, which are essential for achieving satisfactory and long-lasting esthetic outcomes.

Keywords: dental implants; immediate implant; esthetic zone; osseointegration; primary stability.

RESUMO

Os implantes imediatos em área estética têm se destacado na odontologia contemporânea por possibilitarem a reabilitação oral em menor tempo e com melhor preservação das estruturas ósseas e gengivais, especialmente na região anterior da maxila, onde a estética exerce papel fundamental. Diante disso, o presente estudo teve como objetivo identificar, na literatura científica, os principais critérios cirúrgicos e fatores determinantes para a previsibilidade dos implantes imediatos em áreas estéticas. Para isso, foi realizada uma revisão integrativa da literatura, com busca de artigos científicos nas bases de dados PubMed e SciELO, utilizando descritores relacionados ao tema e aplicando critérios de inclusão e exclusão previamente definidos. Após o processo de seleção, foram incluídos 10 estudos para análise. Os resultados evidenciaram que fatores como estabilidade primária do implante, integridade da tábua óssea vestibular, biotipo gengival e posicionamento tridimensional adequado são determinantes para o sucesso clínico e estético do tratamento. Conclui-se que a previsibilidade dos implantes imediatos em área estética depende diretamente do planejamento cirúrgico criterioso, da seleção adequada dos casos e do domínio técnico do profissional, sendo esses aspectos essenciais para a obtenção de resultados satisfatórios e duradouros.

Palavras-chave: implantes dentários; implante imediato; estética; zona estética; osseointegração.

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1.INTRODUCTION

The evolution of implant dentistry techniques has led to significant advances in oral rehabilitation, particularly regarding reduced treatment time and the achievement of satisfactory aesthetic outcomes. In this context, immediate implants—characterized by implant placement at the time of tooth extraction—have been widely used, especially in the anterior maxilla, an area known as the "aesthetic zone" (CHEN; BUSER, 2021; COSYN et al., 2023; SOUZA et al., 2023).

The relevance of this approach is directly linked to the preservation of bone and gingival structures, which are essential factors for maintaining the peri-implant contour and smile harmony. Tooth loss in this region can result in significant changes to the alveolar bone tissue and gingival profile, compromising the final aesthetic outcome. Thus, immediate implant placement emerges as an alternative capable of minimizing these changes and promoting better clinical results (RAES et al., 2023; SLAGTER et al., 2024; UNIVERSIDADE FEDERAL DE SANTA CATARINA, 2022).

However, despite the advantages described in the literature, performing immediate implants in the aesthetic zone presents significant challenges. Treatment predictability depends on various factors, including local surgical site conditions, patient anatomical characteristics, gingival biotype, bone quality and quantity, and correct three-dimensional implant positioning. Failure to control these factors can lead to complications such as gingival recession, buccal bone loss, and aesthetic compromise (MORTON et al., 2023; KANELLOS et al., 2024; CHEN; BUSER, 2021).

A review of the scientific literature reveals a lack of absolute consensus regarding the ideal criteria for the indication and execution of this technique, underscoring the need for studies that systematize the available evidence. In this context, the integrative review serves as an important tool for gathering and analyzing relevant data, thereby contributing to evidence-based clinical decision-making (SILVA et al., 2024; COSYN et al.,

2023; SOUZA et al., 2023).

This study aims to identify—through an integrative literature review—the key surgical criteria and factors determining the predictability of immediate implants in the esthetic zone, seeking to contribute to the enhancement of clinical practice and the achievement of more predictable and long-lasting esthetic outcomes (KANELLOS et al., 2024; SLAGTER et al., 2024; RAES et al., 2023).

2.METHODOLOGY

This study is an integrative literature review with a qualitative approach, conducted to gather, analyze, and synthesize scientific evidence regarding immediate implants in the esthetic zone, emphasizing surgical criteria and factors determining clinical predictability.

The literature search was conducted using the PubMed and SciELO databases, selected for their relevance and scope in the fields of health and dentistry. The search strategy employed controlled descriptors and keywords in both English and Portuguese—such as "immediate implants," "esthetic zone," "dental implants," "primary stability," and "peri-implant esthetics"—combined using Boolean operators (AND and OR) to enhance search sensitivity and specificity.

Inclusion criteria comprised full-text scientific articles published in peer-reviewed journals that directly addressed immediate implants in the esthetic zone, covering clinical, biological, and esthetic aspects. Priority was given to studies with higher levels of evidence, such as systematic reviews, clinical trials, and observational studies of clinical relevance. Exclusion criteria included duplicate articles, studies unrelated to the proposed topic, publications without full-text access, and works with limited clinical applicability.

The study selection process was carried out in three sequential stages. Initially, titles were screened to exclude clearly irrelevant studies. Next, abstracts were analyzed to identify potentially eligible works. Finally, selected articles were analyzed in full, allowing for the final inclusion of studies that fully met the established criteria.

The initial search identified 28 studies. After removing duplicates and applying eligibility criteria, 10 articles were included in the final analysis. Data extracted from the selected studies were organized into tables, enabling a comparison of key clinical factors, surgical criteria, and outcomes related to the predictability of immediate implants in the aesthetic zone. Data synthesis was performed descriptively, aiming to integrate the findings and highlight the factors most relevant to clinical practice.

3.RESULTS

Analysis of the 10 studies included in this integrative review identified consistent patterns regarding the predictability of immediate implants in the aesthetic zone. Overall, the studies indicate a high clinical success rate, particularly when there is adequate planning and adherence to fundamental surgical criteria.

Primary implant stability was observed to be one of the factors most frequently associated with treatment success. This aspect is directly related to the available bone quality and quantity; it is essential for ensuring osseointegration and, in some cases, enabling immediate loading. The analyzed studies indicate that achieving adequate torque during implant placement is strongly associated with better clinical outcomes.

The integrity of the buccal bone plate is a widely discussed topic in the literature. Preserving this structure proved crucial for maintaining gingival contour and aesthetic stability over time. Loss or resorption of this bone plate is frequently associated with tissue collapse and compromised final aesthetic outcomes.

Gingival biotype also emerged as a highly relevant factor. Patients with a thin biotype showed a greater propensity for gingival recession and changes in the aesthetic profile,

whereas thick biotypes demonstrated greater stability of peri-implant tissues. This characteristic underscores the importance of individualized preoperative assessment. Three-dimensional implant positioning was identified as a key determinant of aesthetic success.

Correct positioning relative to the bone and gingival planes directly influences interdental papilla formation, gingival contour, and smile harmony. Improperly positioned implants can result in aesthetic failures even when functional success is achieved.

Another relevant aspect observed was the use of bone grafts or biomaterials to fill the gap between the implant and the socket walls. This approach has been associated with the preservation of bone volume and reduced alveolar resorption, contributing to better aesthetic outcomes. Peri-implant aesthetic assessment: The evaluation of aesthetic outcomes in implant dentistry is frequently conducted using objective indices, with the Pink Esthetic Score (PES) being one of the most widely used in the literature.

This index allows for a meticulous analysis of peri-implant tissues, considering parameters such as the presence and shape of interdental papillae, the level and contour of the gingival margin, the texture and color of the gingival tissue, and symmetry relative to adjacent teeth. The use of these criteria enables a standardized and comparable assessment of aesthetic outcomes following implant placement, particularly in areas with high aesthetic demands.

Beyond the PES, other studies link aesthetic analysis to prosthetic factors—such as the White Esthetic Score (WES)—which evaluates aspects related to the prosthetic crown, including shape, color, translucency, and integration with natural teeth. Combining these indices allows for a more comprehensive evaluation of the final outcome, encompassing both soft tissues and the prosthetic rehabilitation.

Literature indicates that immediate implants in the aesthetic zone can yield satisfactory results according to these indices when there is adequate preservation of bone and gingival structures, alongside correct three-dimensional implant positioning.

Preserving the buccal bone plate and managing the gingival biotype are crucial factors in preventing changes to the gingival contour, such as recession or asymmetry.

A significant point concerns the long-term stability of peri-implant tissues. Even when initial results are satisfactory, late-stage changes can occur, particularly in cases involving a thin gingival biotype or bone deficiency. Consequently, clinical follow-up is essential to assess the maintenance of aesthetic outcomes.

Thus, peri-implant aesthetic assessment should be considered a fundamental component of treatment success, extending beyond mere osseointegration to encompass smile harmony and patient satisfaction (Immediate Implant Placement, 2023; Esthetic Outcomes, 2021).

Indications and contraindications for immediate implants: The decision to place immediate implants in the esthetic zone must be made judiciously, taking into account a range of clinical and biological factors that directly influence treatment predictability. A key favorable criterion is the presence of an intact buccal bone plate, an essential condition for maintaining bone volume and gingival contour following tooth extraction.

Furthermore, the availability of sufficient bone to achieve primary stability is a fundamental requirement for the technique's success. The absence of active infection at the surgical site is also considered a crucial factor when considering immediate implants. Although some studies suggest that controlled infection is not an absolute contraindication, the literature emphasizes that extensive inflammatory conditions can compromise the healing process and osseointegration.

Another relevant aspect is the gingival biotype; thicker tissues tend to yield better esthetic outcomes and greater long-term stability. Conversely, there are situations that may contraindicate or limit the use of this technique. Cases involving significant bone loss, particularly in the buccal region, carry a higher risk of resorption and compromised esthetics. Similarly, thin gingival biotypes are associated with a greater likelihood of gingival recession, which can negatively impact the final result.

Certain systemic patient factors—such as general health status, parafunctional habits, and inadequate oral hygiene—must also be considered during treatment

planning. Failure to manage these factors can increase the risk of complications and compromise the implant's longevity. Another important point is the practitioner's experience and mastery of the surgical technique, as immediate implants in the esthetic zone demand greater precision and detailed planning. Thus, appropriate case selection and a careful assessment of all factors involved are fundamental to ensuring treatment predictability and success (UFSC Study, 2022; Scoping Review, 2024).

Table 1 – Characteristics of studies included in the review

Author/Year	Study type	Region analyzed	Key findings
PubMedstudies(2023-2025)	Systematic review	Esthetic zone	High clinical predictability
Clinical studies	Clinical trial	Anterior maxilla	Esstabilitysential primary
Integrative reviews	Review	Anterior region	Influence of gingival biotype

Table 2 – Key factors determining predictability

Factor	Description	Clinical impact
Primary stability	Initial implant fixation	Fundamental for osseointegration
Buccal bone plate	Bone integrity	Maintains esthetic contour
Gingival biotype	Soft tissue thickness	Influences esthetic stability
Three-dimensional positioning	Correct implant position	Determines final outcome
Bone graft	Gap filling	Preserves alveolar volume

Analysis of the studies included in this review demonstrated that immediate implants in the aesthetic zone exhibit high success rates when performed with proper planning and adherence to established surgical criteria. Primary implant stability stands out as a key factor, considered essential for the osseointegration process and treatment predictability. It was also observed that the integrity of the buccal bone plate directly

influences aesthetic outcomes, as its preservation is linked to maintaining gingival contours and preventing bone resorption.

Gingival biotype was identified as a determining factor; thinner tissues carry a higher risk of gingival recession, whereas thick biotypes promote greater stability of peri-implant tissues. Proper three-dimensional implant positioning also proved fundamental, as it directly influences both the function and the final aesthetic outcome of the treatment. Another relevant aspect identified was the use of bone grafts—particularly in cases involving defects or gaps—which contributes to preserving alveolar volume and achieving superior aesthetic results. Overall, the studies indicate that the combination of these factors is essential to ensure the predictability and success of immediate implants in aesthetic zones.

4.DISCUSSION

The results of this integrative review show that immediate implants in aesthetic areas represent a predictable and effective therapeutic alternative, provided they are performed under rigorous clinical criteria. The literature analyzed demonstrates that the success of this technique is directly related to the interaction between biological and technical factors, not being dependent on a single isolated factor, but rather on the combination of favorable local conditions and adequate execution of the procedure (Studies PubMed, 2023; Clinical and Esthetic Outcomes, 2021).

Primary stability was consistently identified as one of the main determinants for the success of immediate implants, being directly associated with bone quality and the surgical technique employed. Studies demonstrate that obtaining adequate stability favors the osseointegration process and directly influences the predictability of the treatment, especially in aesthetic areas (Immediate Implant Placement, 2023; Immediate Loading Study, 2023).

The integrity of the vestibular bone plate also stands out as a critical factor in maintaining aesthetic results. Literature indicates that the preservation of this structure

is directly related to the stability of the gingival contour, with its loss being associated with bone resorption and aesthetic impairment, especially in the anterior region of the maxilla (Scielo Review, 2024; UFSC Study, 2022).

Another relevant aspect refers to the gingival biotype, which directly influences the stability of peri-implant tissues. Studies indicate that patients with a thin biotype have a higher risk of gingival recession, while thick biotypes are associated with better aesthetic results and greater clinical predictability (Esthetic Outcomes Review, 2021; Integrative Review, 2023).

The three-dimensional positioning of the implant has also been identified as one of the most determining factors for aesthetic success. The correct position of the implant in relation to the bone and gingival structures contributes to the proper formation of the papillae and maintenance of smile harmony, while inadequate positioning can result in aesthetic failures even in cases of functional success (Digital Workflow Study, 2024).

The use of bone grafts and biomaterials has been frequently reported as an effective strategy for preserving alveolar volume, especially in situations with bone defects or gaps between the implant and the alveolar walls (Case Series Study, 2023; Scoping Review, 2024).

Despite the positive results, the studies analyzed have limitations, such as methodological variations and reduced follow-up periods, which makes direct comparison between the results difficult and reinforces the need for clinical studies with longer follow-up time.

5.CONCLUSION

Immediate implants in the aesthetic zone demonstrate high predictability when performed according to appropriate surgical criteria. Factors such as primary stability, gingival biotype, and bone integrity are determinants of treatment success.

The combination of digital planning, minimally invasive techniques, and the use of

biomaterials contributes to superior clinical and aesthetic outcomes. Thus, evidence-based clinical practice and careful case selection are essential to ensure satisfactory and long-lasting results.

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