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Perception of quality of life and patient satisfaction after immediate implants with immediate provisionalization[1]

Percepção da qualidade de vida e satisfação dos pacientes após implantes imediatos com provisionalização imediata

Percepción de la calidad de vida y satisfacción de los pacientes tras implantes inmediatos con provisionalización inmediata

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ABSTRACT

The primary aim of this study was to evaluate patient-reported outcomes following immediate implant placement with immediate provisionalization in the maxillary esthetic zone and, secondarily, to investigate their association with professional esthetic assessment. Seventeen patients rehabilitated with immediate implant placement and immediate provisionalization were included. Standardized clinical photographs were obtained at baseline and after a 2-year follow-up. At the final evaluation, participants completed the Oral Health Impact Profile-14 (OHIP-14) and a treatment satisfaction questionnaire. Esthetic outcomes were assessed using the Pink Esthetic Score (PES), based on standardized photographs evaluated independently by two calibrated prosthodontists. Oral health-related quality of life was assessed using the OHIP-14, whereas treatment satisfaction was evaluated using two questions answered on a 100-mm visual analogue scale (VAS). A significant improvement in PES was observed after treatment ($p = 0.05$). The low overall OHIP-14 score indicated a minimal impact of oral health on quality of life. Patients also reported high satisfaction with

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the treatment (mean VAS = 98.1) and their current dental condition compared with baseline (mean VAS = 93.9). No significant association was found between changes in professionally assessed esthetic outcomes and patient satisfaction. These findings suggest that, although immediate implant placement with immediate provisionalization provides favorable esthetic and patient-reported outcomes, clinician-reported esthetic assessments may not fully align with patients' perceptions, highlighting the importance of combining clinician- and patient-reported outcomes when evaluating treatment success.

Keywords: Dental implants. Immediate dental implant loading. Quality of life. Patient-reported outcome measures. Dental esthetics.

RESUMO

The primary aim of this study was to evaluate patient-reported outcomes following immediate implant placement with immediate provisionalization in the maxillary esthetic zone and to investigate their association with professional esthetic assessment. Seventeen patients rehabilitated with immediate implant placement and immediate provisionalization were included. Standardized clinical photographs were obtained at baseline and after a 2-year follow-up. At the final evaluation, participants completed the Oral Health Impact Profile-14 (OHIP-14) and a treatment satisfaction questionnaire. Esthetic outcomes were assessed using the Pink Esthetic Score (PES), based on photographs evaluated independently by two calibrated prosthodontists. Oral health-related quality of life was assessed using the OHIP-14, whereas treatment satisfaction was evaluated using two questions answered on a 100-mm visual analogue scale (VAS). A significant improvement in PES was observed after treatment (p = 0.05). The low overall OHIP-14 score indicated a minimal impact of oral health on quality of life. Patients also reported high satisfaction with the treatment (mean VAS = 98.1) and their current dental condition compared with baseline (mean VAS = 93.9). No significant association was found between changes in professionally assessed esthetic outcomes and patient satisfaction. These findings suggest that, although immediate implant placement with immediate provisionalization provides favorable esthetic and patient-reported outcomes, clinician-reported esthetic assessments may not fully align with patients' perceptions, highlighting the importance of combining clinician- and patient-reported outcomes when evaluating treatment success.

Keywords: Dental implants. Immediate dental implant loading. Quality of life. Patient-reported outcome measures. Dental esthetics.

RESUMEN

El objetivo principal de este estudio fue evaluar los resultados reportados por los pacientes después de la colocación inmediata de implantes con provisionalización inmediata en la zona estética del maxilar y analizar la asociación de estos resultados con la evaluación estética profesional. Se incluyeron diecisiete pacientes rehabilitados con implantes inmediatos y provisionalización inmediata. Se obtuvieron fotografías clínicas estandarizadas al inicio del estudio y después de dos años de seguimiento. En la evaluación final, los participantes respondieron al cuestionario Oral Health Impact Profile-14 (OHIP-14) y a un cuestionario de satisfacción con el tratamiento, cuyas respuestas se registraron mediante una escala visual analógica (EVA) de 100 mm. Los resultados estéticos se evaluaron mediante el Pink Esthetic Score (PES), a partir de fotografías analizadas de forma independiente por dos prostodoncistas calibrados. Se observó una mejora significativa en el PES después del tratamiento (p = 0,05). La puntuación general baja en el OHIP-14 indicó un impacto mínimo de la salud bucal en la calidad de vida. Los pacientes también informaron una alta satisfacción con el tratamiento (media en la EVA = 98,1) y con su condición dental actual en comparación con el momento inicial (media en la EVA = 93,9). No se encontró una asociación significativa entre los cambios en los resultados estéticos evaluados profesionalmente y la satisfacción de los pacientes. Estos hallazgos sugieren que, aunque la colocación inmediata de implantes con provisionalización inmediata proporciona resultados estéticos favorables y resultados favorables reportados por los pacientes, las evaluaciones estéticas realizadas por los profesionales pueden no estar completamente alineadas con la percepción de los pacientes, lo que destaca la importancia de combinar la evaluación clínica con los resultados reportados por los pacientes al evaluar el éxito del tratamiento.

Palabras clave: Implantes Dentales. Carga Inmediata del Implantes Dentales. Calidad de Vida. Medidas de Resultados Reportados por los Pacientes. Estética Dental.

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INTRODUCTION

Tooth loss has a negative impact on patients' quality of life, affecting not only masticatory function and the stability of the stomatognathic system but also several psychosocial aspects and social interactions (Sargozaie; Moeintaghavi; Shojaie, 2017; Oliveira; Miranda; Rego, 2023). In this context, dental implants are widely used in oral rehabilitation to predictably replace missing or hopeless teeth with a fixed solution, restoring function, oral health, comfort, and esthetics (Buser; Sennerby; de Bruyn, 2017; de Assis *et al*., 2019).

For hopeless teeth, immediate implant placement can be performed, offering advantages such as lower morbidity, fewer surgical interventions, shorter treatment time, and improved patient acceptance (Gaddale *et al*., 2025). Although immediate implant placement is considered a safe and predictable treatment approach (Slagter *et al*., 2014), it does not eliminate the risk of complications that may compromise the esthetic outcome, including buccal bone remodeling and gingival recession (Araújo *et al*., 2019). To optimize esthetic outcomes, particularly in the esthetic zone, immediate provisionalization can be performed to enhance peri-implant soft tissue contour and preserve the existing gingival architecture (Arora *et al*., 2017; Kan *et al*., 2018; Puisys, 2022).

To assess the soft tissue around single-tooth implant crowns, the Pink Esthetic Score (PES) is typically used. The PES evaluates seven parameters, including papilla fill, soft-tissue level and contour, color and texture, and alveolar process deficiency. These parameters are compared with the contralateral or adjacent tooth, allowing quantitative assessment of the peri-implant esthetic outcome (Fürhauser *et al*., 2005).

In addition to professional esthetic assessment, patient-reported outcomes (PROs), including satisfaction and self-perception, have gained increasing attention in recent years. Patients' subjective evaluation of their oral condition is essential for a comprehensive assessment of treatment outcomes and may influence clinical decision-making in rehabilitation treatment (Esfandiari *et al*., 2009; Kan *et al*., 2018).

According to Reissmann *et al*. (2017), implant-supported rehabilitation is associated with significant improvements in oral health-related quality of life, positively affecting patients' daily lives by restoring chewing function and esthetics, which in turn contributes to enhanced interpersonal relationships (Ali *et al*., 2019). Moreover, in cases of immediate implant placement with immediate provisionalization, patients avoid a period of

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edentulism or the need for a removable provisional prosthesis, providing additional psychosocial benefits (Fu *et al*., 2023). Unlike patients receiving delayed implant therapy, individuals undergoing immediate implant placement still have the failing natural tooth at the time of treatment. Consequently, their expectations and perception of treatment outcomes may differ from those associated with delayed implant therapy. Nevertheless, evidence regarding PROs following immediate implant placement with immediate provisionalization remains limited in this clinical scenario.

Therefore, this study aimed to evaluate patient-reported outcomes, including oral health-related quality of life and esthetic satisfaction, following immediate implant placement with immediate provisionalization in the maxillary esthetic zone, and to investigate their association with professional esthetic assessment using the Pink Esthetic Score.

MATERIAL AND METHODS

Study design and population

The present study was a prospective longitudinal study conducted at the Dental Clinic of Veiga de Almeida University and approved by the Research Ethics Committee of Veiga de Almeida University (approval number: 2.994.074). The study was registered at the Brazilian Registry of Clinical Trials (REBEC; RBR-8t6c99). All participants received information about the research objectives and procedures, and provided written informed consent before enrollment, in accordance with the Declaration of Helsinki.

For the present 2-year follow-up analysis, participants were considered eligible if they met the following inclusion and exclusion criteria. The inclusion criteria were systemically healthy adults (≥18 years) rehabilitated with at least one immediately placed and immediately provisionalized implant in the maxillary esthetic zone, with at least two years of follow-up, who received the definitive implant-supported prosthesis, presented no signs of peri-implant disease, and exhibited an adequate prosthetic emergence profile. The exclusion criteria comprised pregnancy or lactation, smoking, and failure to receive the definitive implant-supported prosthesis.

Seventeen patients (10 men and 7 women; mean age 54.35 ±13.33 years), who had previously undergone immediate implant placement with immediate provisionalization in the maxillary esthetic zone, were included.

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Surgical and prosthetic protocol

The implants were placed by a single experienced operator following atraumatic extraction without flap elevation. Implants were positioned approximately 2 mm below the crestal bone level, according to the manufacturer's instructions. The Helix Grand Morse implant system (Neodent, Curitiba, Brazil) was selected based on preoperative cone-beam computed tomography (CBCT). The gap between the implant and the extraction socket was grafted with a synthetic bone substitute (Alobone, Osseocon, Rio de Janeiro, Brazil). In patients with a thin gingival phenotype or a high smile line, a connective tissue graft was performed using the tunneling technique.

Immediate provisionalization was performed using a universal abutment selected according to implant position and the available interocclusal space. Provisional restorations were fabricated with autopolymerizing acrylic resin and cemented without exerting pressure on the peri-implant soft tissues or occlusal contacts.

Two months after implant placement, the provisional restorations were adjusted to obtain an adequate emergence profile. Definitive implant-supported restorations were then fabricated using stratified zirconia.

Clinical photography

Standardized clinical photographs were obtained before treatment and at the 2-year follow-up. The photographs were subsequently used for esthetic evaluation using the PES. All photographs were acquired using a professional DSLR camera equipped with a macro lens and ring flash under standardized conditions. Frontal views with a black background were obtained for incisors and canines, lateral views for premolars, and occlusal views according to the implant location.

Professional clinical esthetic assessment

The PES was used to assess the esthetic outcome of the peri-implant soft tissues surrounding single implant-supported crowns in the anterior zone. This index comprises seven parameters, each scored from 0 to 2, and is described in **Table 1**. The PES was assessed independently by two calibrated prosthodontists using standardized photographs obtained at baseline and at the 2-year follow-up. For incisors and canines, the contralateral

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tooth served as the reference, whereas for premolars, the adjacent premolar was used as the reference.

Inter-examiner agreement was assessed using the intraclass correlation coefficient (ICC). Calibration was performed using 10 photographs from patients not included in the study, yielding an ICC of 0.82.

Table 1- PES index parameters.

Variable		**Score** 0	**Score** 1	**Score** 2
Mesial papilla	Shape vs. reference tooth	Absent	Incomplete	Complete
Distal papilla	Shape vs. reference tooth	Absent	Incomplete	Complete
Gingival margin level	Level vs. reference tooth	Discrepancy > 2mm	Discrepancy > 2mm	No discrepancy < 1mm
Contour	Natural, according to tooth reference	Unnatural	Reasonably natural	Natural
Alveolar process	Alveolar process deficiency	Obvious	Light	None
Color	Color vs. reference tooth	Obvious difference	Moderate difference	No difference
Texture	Texture vs. reference tooth	Obvious difference	Moderate difference	No difference

Source: Adapted from Fürhauser *et al*., 2005.

Patient-reported outcomes assessment

Of the 17 patients included in this study, 13 completed the PROs questionnaires. Analyses of PROs were performed using the available responses.

OHIP-14 questionnaire

Oral health-related quality of life was assessed using the validated Brazilian Portuguese version of the Oral Health Impact Profile-14 (OHIP-14) (Oliveira and Nadanovsky, 2005). The questionnaire comprises 14 items distributed across seven domains (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap), each scored on a five-point Likert scale ranging from 0 ("never") to 4 ("always"), resulting in a total score ranging from 0 to 56, with higher scores indicating poorer oral health-related quality of life (Slade; Spencer, 1994; Silva *et al*., 2010). OHIP-14 results were analyzed according to the prevalence of impacts within each domain and the overall severity score represented by the total OHIP-14 score (Lawrence *et al*., 2008).

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Satisfaction with treatment questionnaire

Patient satisfaction with treatment was assessed using a questionnaire comprising two questions: 1) "How satisfied are you with your treatment?" and 2) "How satisfied are you with your current dental condition compared with when you started treatment?" Responses were recorded using a Visual Analogue Scale (VAS), from 0 to 100 mm, in which 0 represented the lowest level of satisfaction and 100 the highest level of satisfaction.

Statistical analyses

Statistical analyses were performed using IBM SPSS Statistics version 25 (IBM Corporation, Armonk, USA), and Microsoft Excel 365 (Microsoft Corp. Redmond, WA, USA). Differences in the PES before and after treatment were analyzed using the paired t-test. OHIP-14 data were analyzed descriptively, and responses were presented using a diverging Likert plot. To explore the relationship between professional esthetic assessment and patient perception, participants were categorized according to the change in PES from baseline to the 2-year follow-up (final PES higher vs. lower than baseline), and satisfaction scores were compared using the Mann-Whitney U test. Analyses of PROs were performed using the available responses. The sample size calculation was based on a minimum clinically relevant difference of 2 points in the PES score, according to Puisys *et al.* (2022), and was performed using G*Power version 3.1 (Heinrich Heine University, Düsseldorf, Germany). Statistical significance was set at $p \leq 0.05$.

RESULTS

Sample power

The post hoc power analysis for the PES comparison yielded a statistical power of 0.91, with an α level of 0.05 and an effect size of 1.0.

Professional clinical esthetic assessment results

A significant improvement in the esthetic outcome was observed after treatment. The mean PES increased from 10.4 ± 2.5 (median: 10.5) at baseline to 12.2 ± 2.1 (median: 12.5) at the final evaluation ($p = 0.05$).

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Patient-reported outcomes

The OHIP-14 total score was low, ranging from 1 to 15 out of a maximum possible score of 56, indicating a minimal perceived impact of oral health on patients' quality of life. The response “never” predominated across all OHIP-14 dimensions, ranging from 61.6% for psychological discomfort to 88.5% for handicap. Among responses indicating some degree of impact, “rarely” was the most frequently reported category. The distribution of responses according to frequency categories across the OHIP-14 dimensions is presented in **Table 2**.

Table 2 – Distribution of responses across OHIP-14 dimensions.

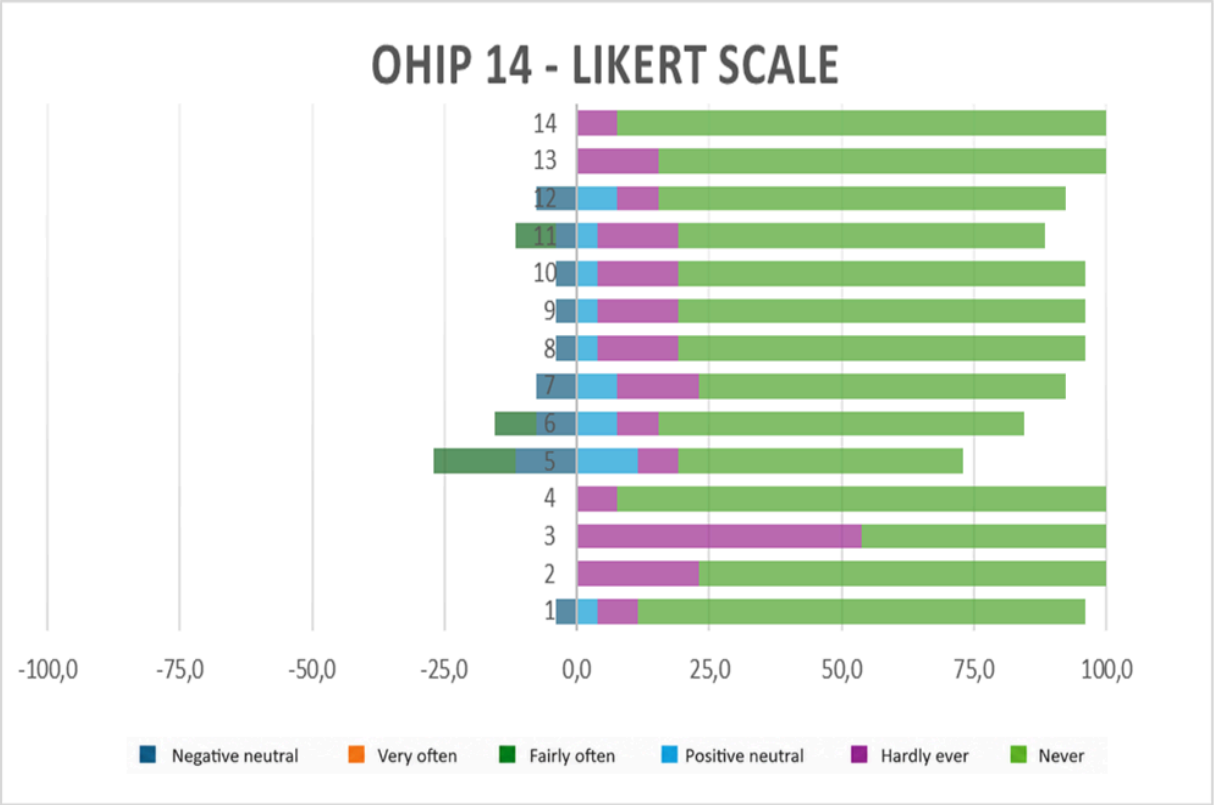
DIMENSION (OHIP)	FREQUENCY				
	NEVER Mean n (%)	HARDLY EVER Mean n (%)	OCCASIONALLY Mean n (%)	FAIRLY OFTEN Mean n (%)	VERY OFTEN Mean n (%)
Functional Limitation	10.5 (80.8)	2 (15.4)	0.5 (3.8)	0	0
Physical pain	8.5 (65.4)	4.5 (34.6)	0	0	0
Psychological discomfort	8 (61.6)	2 (15.4)	1.5 (11.5)	0	1.5 (11.5)
Physical disability	9.5 (73.1)	2 (15.4)	1.5 (11.5)	0	0
Psychological disability	10 (76.9)	1 (7.7)	1 (7.7)	0	1 (7.7)
Social disability	9.5 (73.2)	1.5 (11.5)	1.5 (11.5)	0	0.5 (3.8)
Handicap	11.5 (88.5)	1.5 (11.5)	0	0	0

Source: The authors (2025). **Note:** Each OHIP-14 dimension comprises two items. Values represent the mean frequency of responses across the two items within each dimension, calculated for the 13 participants, with the corresponding percentage shown in parentheses.

The distribution of OHIP-14 responses is presented in **Figure 1** using a diverging Likert plot. Most responses were concentrated in the categories "Never" and "Rarely", indicating a low perceived impact of oral health on quality of life. Responses indicating frequent negative impacts ("Fairly often" and "Very often") were uncommon across all domains.

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Figure 1 – Distribution of responses to the 14 OHIP-14 items using a diverging Likert scale.



Source: The authors (2025). **Caption:** Responses are presented according to the five frequency categories of the instrument: never, hardly ever, occasionally, fairly often, and very often. For graphical representation, the intermediate category ("occasionally") was equally divided between the negative (negative neutral) and positive (positive neutral) sides of the central axis.

Overall, patients reported high satisfaction with treatment. Mean VAS scores were 98.1 for satisfaction with treatment (Question 1) and 93.9 for satisfaction with the current dental condition compared with the beginning of treatment (Question 2).

Association between professional assessment and patient perception

No significant differences in satisfaction scores were observed between participants whose final PES was higher (n=10) or lower (n=3) than their baseline PES. Mean VAS scores for Question 1 were 97.5 ± 4.8 and 100.0 ± 0.0, respectively ($p = 0.406$). For Question 2, the corresponding values were 97.0 ± 6.7 and 83.3 ± 28.8 ($p = 0.499$) (**Table 3**).

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Table 3 - Comparison of patient satisfaction between groups based on changes in the PES.

Question	PES	Group	Mean (SD)	P
How satisfied are you with your treatment?	Final PES higher than the initial one	1	97.5 (4.8)	0.406
	Final PES lower than the initial one	2	100 (0.0)	
How satisfied are you with your current dental condition compared with when you started treatment?	Final PES higher than the initial one	1	97.0 (6.7)	0.499
	Final PES lower than the initial one	2	83.3 (28.8)	

Source: The authors (2025). **Note:** Group 1: final PES higher than baseline; Group 2: final PES lower than baseline. Data are presented as mean and standard deviation. PES: Pink Esthetic Score.

DISCUSSION

The present study demonstrated a significant improvement in esthetic outcomes following immediate implant placement with immediate provisionalization, as evidenced by the increase in the mean PES from 10.4 to 12.2. These findings are consistent with previous studies reporting similar esthetic outcomes after one year of follow-up (Arora *et al*., 2017; Groenendijk *et al*., 2020; Cosyn *et al*., 2016). The favorable esthetic outcomes may be attributed to the surgical and prosthetic protocol adopted, including immediate provisionalization and soft tissue management aimed at preserving the peri-implant architecture. Selective connective tissue grafting was performed in patients with a thin phenotype and a high smile line, based on studies with similar characteristics by Levine *et al*. (2022) and Araujo *et al*. (2026), as well as on the systematic review by Seyssens; de Lat; Cosyn, (2021). Since the final PES is of particular importance in esthetic areas, the selective use of connective tissue grafting may have influenced the PES outcomes when the phenotype variable was analyzed.

The low overall OHIP-14 score observed in this study suggests that rehabilitation with immediate implant placement and immediate provisionalization was associated with a favorable oral health-related quality of life. This interpretation is further supported by the high levels of satisfaction reported in the treatment satisfaction questionnaire, assessed using a 100-mm visual analogue scale (VAS). Across all seven OHIP-14 dimensions, “never” was the predominant response, ranging from 61.6% for psychological discomfort to 88.5% for handicap. Psychological discomfort showed the greatest variability in response frequency, with 38.4% of responses distributed across categories other than

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"never", whereas physical pain showed 34.6% of responses in the "rarely" category. Previous studies have similarly identified physical pain, psychological discomfort, and psychological disability among the OHIP dimensions most frequently affected (Lawrence *et al*., 2008; Silva *et al*., 2010; Dahl *et al*., 2011).

Overall, patients reported very high satisfaction with treatment, regardless of whether the final PES increased or decreased compared with baseline. This finding agrees with the recent systematic review by Sadilina *et al*. (2025), which demonstrated no significant association between clinician-reported esthetic outcomes and patient-reported esthetic satisfaction. This discrepancy likely reflects the different perspectives adopted by clinicians and patients. Whereas professionals evaluate objective parameters of peri-implant soft tissue esthetics, patients tend to judge the overall appearance and functional improvement, which may explain why small variations in PES are not necessarily reflected in patient satisfaction.

It is important to note that PROs are known to be influenced by factors beyond clinical success, including socioeconomic status and educational level (Sanders and Spencer, 2004; Oliveira and Nadanovsky, 2005; Locker and Quiñonez, 2009; Johansson *et al.* 2010). In the present study, patients also incurred costs related to imaging examinations, grafting materials, and laboratory procedures. Although these variables were not assessed, they may have influenced patients' perceptions regarding treatment and should be considered in future studies.

Despite the favorable esthetic and PROs observed, some limitations should be acknowledged. The absence of baseline PROs assessments prevented evaluation of changes in quality of life and satisfaction following treatment. In addition, the low OHIP-14 scores observed may indicate a floor effect, potentially limiting the instrument's ability to detect differences in oral health-related quality of life. Furthermore, questionnaire data were available for only 13 participants, reducing the sample size for subgroup analyses according to changes in PES from baseline. Therefore, the lack of association between professional esthetic assessment and patient satisfaction should be interpreted cautiously until confirmed in larger prospective studies including pre- and post-treatment patient-reported outcome measures.

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CONCLUSION

Immediate implant placement with immediate provisionalization resulted in favorable esthetic outcomes, with significant improvements in the professionally assessed Pink Esthetic Score. Patients also reported high treatment satisfaction and a minimal impact of oral health on quality of life. However, improvements in professionally assessed esthetic outcomes were not associated with patient-reported treatment satisfaction, highlighting the importance of combining clinician-reported and patient-reported outcomes when evaluating treatment success.

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