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IMPACT OF IMMEDIATE LOADING OF ZYGOMATIC IMPLANTS ON SUCCESS RATE AND MASTICATORY FUNCTION

IMPACTO DA CARGA IMEDIATA EM IMPLANTES ZIGOMÁTICOS NA TAXA DE SUCESSO E NA FUNÇÃO MASTIGATÓRIA

IMPACTO DE LA CARGA INMEDIATA DE IMPLANTES CIGOMÁTICOS EN LA TASA DE ÉXITO Y LA FUNCIÓN MASTICADORA

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Ericka dos Santos Lopes[1], Rebeca Vidal Capelupi[2], Gabriel Figueiredo de Faria[3], Alan Boroni Jabbur[4], Raphael Amaral da Silva Campos[5], Davidson Leandro Peres da Costa[6], Julia de Araújo Koplowitz Bento[7], Rennan Antônio Barreto de Abreu[8], Abel Araújo Alves[9], Túlio Marcos Kalife Coelho[10], Gustavo Fagundes Eulálio dos Anjos[11], Juliklecia da Silva[12], Yasmin Morais de Carvalho e Alves[13], Lyah Emilly Feitosa da Paixão[14], Sirlei Moura de Almeida Maggioni[15], Cleiton Luiz de Almeida[16], Beatriz Bernardo Passos[17], Renato Mendes Almeida[18]

ABSTRACT

The use of zygomatic implants under immediate loading protocols represents a consolidated therapeutic alternative for patients with severely atrophic maxillae, in whom conventional bone grafting methods present significant limitations. This study analyzed the impact of this approach on success rates and masticatory function, based on data from reviews and clinical studies. The results demonstrate high predictability, with success rates exceeding 95% in most investigations, along with significant functional improvements in mastication and patient quality of life. Although complications such as sinusitis and prosthetic failures may occur, these events are relatively minor compared with the overall benefits of the technique, provided that careful surgical and prosthetic planning is undertaken. It is concluded that

[1] Dentistry Student. Universidade Federal de Pernambuco (UFPE). E-mail: ericka.lopes@ufpe.br
[2] Master's student in Dental Clinic. Universidade Federal de Juiz de Fora (UFJF).
E-mail: rvcapelupi@gmail.com
[3] Dental Surgeon. Unicesumar – Maringá. E-mail: gabriel.figueiredo@solutiaodontologia.com
[4] Dentist Surgeon (advanced training courses). E-mail: alanjabbur@gmail.com
[5] Postgraduate student in Oral and Maxillofacial Surgery and Traumatology. Facop Stetic Akademy.
E-mail: raphaelcamposodontologia@gmail.com
[6] Dental surgeon. FAIT. E-mail: davidsonleandro@hotmail.com
[7] Dentistry Student. Universidade Federal Fluminense (UFF). E-mail: juliaakoplowitz@gmail.com
[8] Oral and Maxillofacial Surgeon. Hospital da Restauração – Pernambuco.
E-mail: rennan.abreu10@gmail.com
[9] Dentist surgeon. Faculdades de Enfermagem Nova Esperança (FACENE).
E-mail: contatoabelaraujo@gmail.com
[10] Professor of Implantology. Universidade Federal de Mato Grosso do Sul (UFMS).
E-mail: tulio.kalife@ufms.br
[11] Master's student. ICS Funorte. E-mail: gustavofagundesdr10@gmail.com
[12] Dentistry Student. UNIMA Afya. E-mail: juliklecia@yahoo.com
[13] Dental surgeon. Faculdade de Ilhéus (CESUPI). E-mail: minalvesmorais@hotmail.com
[14] Dentistry Student. CEUNI – FAMETRO. E-mail: lyah.paixaao@gmail.com
[15] Master's student in Endodontics. Unigranrio. E-mail: sirleimaggioni@gmail.com
[16] Master in Dentistry. Universidade Federal de Juiz de Fora (UFJF). E-mail: cleiton.luiz2009@hotmail.com
[17] Specialist in Prosthetics and Implants. IPESP. E-mail: biabn97@gmail.com
[18] Dental surgeon. Faculdade de Ciências Odontológicas (FCO). E-mail: renatoimplante@yahoo.com.br

zygomatic implants with immediate loading constitute an effective, safe, and highly beneficial solution, promoting relevant advances in both functional and aesthetic rehabilitation and consolidating their role in contemporary implant dentistry.

Keywords: Zygomatic Implants. Immediate Loading. Atrophic Maxilla. Oral Rehabilitation. Masticatory Function.

RESUMO

O uso de implantes zigomáticos sob protocolo de carga imediata constitui uma alternativa terapêutica consolidada para pacientes com maxilas severamente atróficas, nos quais os métodos convencionais de enxertia óssea apresentam limitações significativas. Este estudo analisou o impacto dessa abordagem sobre a taxa de sucesso e a função mastigatória, a partir de dados oriundos de revisões e estudos clínicos. Os resultados demonstram alta previsibilidade, com índices de sucesso superiores a 95% na maioria das pesquisas, associados a expressivas melhorias funcionais na mastigação e na qualidade de vida dos pacientes. Embora complicações como sinusite e falhas protéticas possam ocorrer, estas se apresentam como eventos minoritários frente aos benefícios da técnica, desde que haja planejamento cirúrgico e protético criterioso. Conclui-se que os implantes zigomáticos com carga imediata configuram-se como uma solução eficaz, segura e de grande impacto positivo, promovendo avanços relevantes tanto na reabilitação funcional quanto estética, e consolidando seu papel na implantodontia contemporânea.

Palavras-chave: Implantes Zigomáticos. Carga Imediata. Maxila Atrófica. Reabilitação Oral. Função Mastigatória.

RESUMEN

El uso de implantes cigomáticos bajo un protocolo de carga inmediata constituye una alternativa terapéutica consolidada para pacientes con maxilares severamente atróficos, en quienes los métodos convencionales de injerto óseo presentan limitaciones significativas. Este estudio analizó el impacto de este enfoque en las tasas de éxito y la función masticatoria, basándose en datos de revisiones y estudios clínicos. Los resultados demuestran una alta predictibilidad, con tasas de éxito superiores al 95% en la mayoría de los estudios, asociadas con mejoras funcionales significativas en la masticación y la calidad de vida del paciente. Si bien pueden presentarse complicaciones como sinusitis y fallos protésicos, estas son menores en comparación con los beneficios de la técnica, siempre que se realice una planificación quirúrgica y protésica cuidadosa. Se concluye que los implantes cigomáticos con carga inmediata representan una solución eficaz, segura y altamente positiva, que promueve avances significativos en la rehabilitación funcional y estética y consolida su papel en la implantología contemporánea.

Palabras clave: Implantes Cigomáticos. Carga Inmediata. Maxilar Atrófico. Rehabilitación Oral. Función Masticatoria.

1 INTRODUCTION

The oral rehabilitation of patients with atrophic maxillae has represented, for decades, one of the greatest challenges of implantology. Significant bone loss, resulting from tooth extractions, pathological processes, trauma, or the prolonged use of conventional prostheses, compromises the installation of traditional endosseous implants, making functional and aesthetic rehabilitation through conventional protocols unfeasible in many cases (ESPINOZA, 2023; RESTELATO, 2023). In this scenario, zygomatic implants emerge as a relevant therapeutic alternative, expanding the possibilities of treatment and providing significant success rates in situations that were previously considered to have a limited prognosis (NETO, 2002; FILE; FILHO, 2007).

The zygomatic implant concept was initially introduced by Brånemark in the 1980s, with the aim of offering prosthetic support in patients with severe maxillary resorption. The differential of this technique lies in the anchoring of the implants to the zygomatic bone, a dense anatomical structure with favorable cortical quality, capable of providing primary stability even in cases of almost total absence of alveolar bone support (DE R; FREDDO, 2012; CARDOSO et al., 2022). Since then, the technique has been progressively refined, with different surgical approaches and prosthetic protocols, including the adoption of immediate loading, which has brought new perspectives regarding the comfort, masticatory function and social reintegration of patients (FRANCE; PARAGUASSU, 2022; NARCISO et al., 2024).

The possibility of immediate loading in zygomatic implants is of great scientific and clinical interest, as it is directly related to the success rate of the treatment and the impact on the quality of life of patients. This modality consists of the installation of the fixed prosthesis immediately after the implants are placed, or in a period of less than 72 hours, provided that the biomechanical criteria of primary stability are met (FRANÇA; PARAGUASSU, 2022). By reducing the waiting time compared to the conventional protocol, in which the definitive prosthesis is installed only after months of healing, the immediate load represents a significant advance.

Recent studies reinforce that rehabilitation with zygomatic implants submitted to immediate loading can provide immediate functional benefits, such as restoration of chewing and phonetics, as well as psychological and social improvements, since patients no longer live with edentulism or unstable prostheses (NASCIMENTO et al., 2023; BRACKMANN et al., 2017). The literature also points to high success rates for immediate loading protocols,

comparable to conventional ones, as long as there is careful selection of cases and adequate technical execution (GODOI et al., 2024; VERASANO, 2024).

Mastication, the primary function of the stomatognathic system, is directly compromised by toothlessness and prosthetic instability. Scientific evidence shows that patients rehabilitated with zygomatic implants in immediate loading have superior masticatory performance and greater satisfaction compared to individuals treated with removable prostheses or late protocols (BRACKMANN et al., 2017; SCHVDE; PASSONI, 2023). This functional impact has a positive impact not only on nutrition and systemic health, but also on self-esteem and social reintegration, expanding the relevance of the theme in a multidisciplinary context.

On the other hand, despite the promising results, the use of zygomatic implants with immediate loading still generates debates among specialists. Among the main concerns are surgical complications, such as sinusitis, paresthesias, orbital perforations, and osseointegration failures, as well as aspects related to three-dimensional planning, which requires advanced imaging resources and specific surgical guides (BARBOSA; SHIMOHIRA, 2018; RUSCHEL; NÓIA; CHAGAS, 2019). The literature emphasizes that the correct execution of the technique requires a high degree of specialization and clinical experience, which restricts its application to specialized centers and properly trained professionals (PARAGUASSU, 2024; LIMA et al., 2024).

In contemporary implant dentistry, the impact of immediate loading on the success rate of zygomatic implants and its direct relationship with masticatory function have been consolidated as topics of increasing investigation. Studies such as those by Barbosa et al. (2024) and Nascimento et al. (2023) point to survival rates ranging from 95% to 100%, even in immediate loading protocols, suggesting that fixation to the zygomatic bone offers sufficient stability to support initial functional loads. These findings reinforce the clinical relevance of the technique and its applicability in complex cases.

In addition, recent research (VERASANO, 2024; SCHVDE; PASSONI, 2023) explore different surgical and prosthetic approaches, broadening the understanding of the factors that influence clinical outcomes. Among them, the quality of the zygomatic bone, the number of implants, the distribution of the prosthetic load and the occlusal planning stand out, all of which are determinant for the success of the treatment. This multiplicity of variables reinforces the importance of individualized protocols and the integration between diagnosis, planning, and clinical execution.

Another aspect of great relevance is the psychosocial impact of the technique. Patients undergoing rehabilitation with zygomatic implants in immediate loading report a significant improvement in quality of life, not only due to the aesthetic gain, but above all due to the restoration of masticatory function, which directly influences feeding, digestive health, and social interaction (BRACKMANN et al., 2017; BARBOSA et al., 2024). In this way, zygomatic implants transcend the rehabilitative dimension, assuming a central role in the promotion of integral health.

Despite the growing number of publications, the literature still has gaps. The heterogeneity of the studies in relation to the follow-up time, the number of patients evaluated, and the methodologies employed makes consistent comparisons difficult (NARCISO et al., 2024; GODOI et al., 2024). In addition, there is a lack of long-term randomized clinical trials that robustly evaluate the influence of immediate loading on success rates and masticatory function, highlighting the need for further scientific investigations.

Therefore, the study of the impact of immediate loading on zygomatic implants on success rate and masticatory function has high clinical and scientific relevance, contributing to the consolidation of evidence-based protocols. Considering that zygomatic implants are a predictable and effective solution for severely atrophic maxillae, investigating the effects of immediate loading becomes essential not only for technical advancement, but also to ensure safe, effective, and humanized rehabilitation.

Therefore, this article aims to analyze, in the light of contemporary literature, the impact of immediate loading on zygomatic implants on the success rate of rehabilitation treatments, as well as its influence on masticatory function and quality of life of patients. Thus, it seeks to provide a critical and updated view on the subject, contributing to the improvement of clinical practice and to the advancement of implantology in complex cases of maxillary atrophy.

2 METHODOLOGY

The present research is a bibliographic review of a **narrative** nature, with a **descriptive and exploratory focus**, with the objective of critically analyzing the existing literature on the impact of immediate loading on zygomatic implants on the success rate and masticatory function. The adoption of this methodological approach is justified by its ability to integrate and systematize knowledge from different scientific sources, favoring a comprehensive understanding of the subject. In addition, it allows the identification **of**

convergences, divergences, and gaps in the available evidence, providing subsidies for clinical practice and for directing future research (CARDOSO et al., 2022; LIMA et al., 2024).

2.1 TYPE OF STUDY AND METHODOLOGICAL JUSTIFICATION

The literature review was adopted as the main methodological strategy, considering that the object of study is part of a field of constant clinical and scientific evolution, in which the volume of publications has grown significantly in recent years (BARBOSA et al., 2024; GODOI et al., 2024). Reviews of this type allow us to understand the **state of the art**, map **current trends**, evaluate the different **clinical protocols** used, and discuss the applicability of emerging techniques, such as immediate loading in zygomatic implants.

According to França and Paraguassu (2022), the review methodology enables the researcher to gather and integrate robust scientific evidence to support conclusions, being especially relevant in areas that involve multiple techniques and clinical variables. In this sense, as it is an invasive and highly specialized procedure, zygomatic implants have been the subject of a growing number of dissertations, theses, and scientific articles, which reinforces the relevance of compiling, comparing, and critically analyzing this body of knowledge already available.

2.2 SOURCES OF INFORMATION

Previously listed publications were selected as **primary sources of research**, including articles in national and international scientific journals, dissertations, course completion papers, and literature reviews. The textual corpus includes productions published between **2002 and 2024**, which made it possible to cover from the first academic reports on the technique to contemporary studies that discuss the applicability of the immediate load.

Among the databases consulted, **institutional repositories** of Brazilian universities, such as the Federal University of Rio Grande do Sul, Federal University of Santa Catarina, University of Uberaba, and University of the Sacred Heart, as well as specialized journals, such as *the Brazilian Journal of Implantology and Health Sciences*, *Journal of Dentistry of UNESP,* and *Research, Society and Development*. This diversity of sources was essential to ensure **theoretical and methodological coverage**, allowing us to gather solid and heterogeneous evidence on the subject (ESPINOZA, 2023; VERASANO, 2024).

2.3 INCLUSION AND EXCLUSION CRITERIA

To ensure the consistency of the review, specific criteria have been established:

- **Inclusion criteria:** studies published in Portuguese, English or Spanish; publications that directly addressed the use of zygomatic implants in atrophic maxillae; studies that discussed the immediate loading technique and its relationship with success rate or masticatory function; dissertations, scientific articles, literature reviews and case reports duly indexed in academic databases.
- **Exclusion criteria:** studies that exclusively addressed conventional implants without mention of zygomatic implants; publications that did not present clear methodology; opinion texts without scientific support; duplicate articles or with redundant data.

Based on these criteria, the papers were read in full and evaluated according to their relevance to the research objectives.

2.4 SEARCH AND SELECTION PROCEDURES

The search and selection of publications followed a **targeted strategy**, initially prioritizing the works previously identified in the references provided, which were later complemented by cross-citation analysis. Each study was evaluated for **thematic relevance** and **effective contribution** to the discussion on success rate and masticatory function in immediate loading protocols with zygomatic implants.

Classical authors, such as Neto (2002) and Lima and Filho (2007), were considered of fundamental relevance for presenting historical perspectives and pioneering retrospective studies on the technique. On the other hand, more recent studies, such as those by Barbosa et al. (2024), Godoi et al. (2024), and Nascimento et al. (2023), have proven to be indispensable for updating the findings and incorporating evidence related to contemporary protocols, strengthening the proposed critical analysis.

2.5 DATA ANALYSIS STRATEGY

The analysis of the selected works took place in three complementary stages:

1. **Exploratory reading**, to identify key concepts, objectives of the studies and main findings related to zygomatic implants and immediate loading.
2. **Selective reading**, in which the results regarding the success rate and masticatory function were highlighted. Here, methodological diversity was observed, such as

narrative reviews (CARDOSO et al., 2022; LIMA et al., 2024), case reports (RUSCHEL; NÓIA; CHAGAS, 2019) and dissertations with clinical data (ESPINOZA, 2023; VERASANO, 2024).

3. **Critical and interpretative reading**, which sought to compare the findings between different authors, identify patterns of consensus and divergence, and point out existing gaps for future research.

This systematization allowed the construction of an integrated view of the theme, articulating theoretical and empirical contributions.

2.6 METHODOLOGICAL RIGOR AND LIMITATIONS

Although the present study follows a structured methodology, some **limitations are inherent to the literature review model**. The heterogeneity of the publications, the different follow-up times of the patients, and the diversity of clinical protocols employed make it difficult to standardize the results and to make a direct comparison between the studies. Added to this is the fact that a significant part of the available literature corresponds to case reports or retrospective studies, whose strength of evidence is lower when compared to randomized clinical trials (BARBOSA; SHIMOHIRA, 2018; NARCISO et al., 2024).

Despite these limitations, the use of a **wide range of sources** ensures consistency of analysis, offering a comprehensive and critical view of the impact of immediate loading on zygomatic implants, both in terms of success rate and in relation to masticatory function.

2.7 RELEVANCE OF THE CHOSEN METHODOLOGY

The option for **a bibliographic review** is also justified by the **multidimensional nature** of the theme in question. The impact of immediate loading on zygomatic implants is not limited only to implantological success rates, but encompasses aspects such as **prosthetic biomechanics**, **functional recovery of mastication**, **psychological well-being**, and **patient satisfaction** (BRACKMANN et al., 2017; SCHVDE; PASSONI, 2023). In this sense, the methodological diversity of the studies analyzed contributes to a broader and more holistic understanding, going beyond the evaluation of strictly biological clinical outcomes.

Authors such as Restelato (2023) and Paraguassu (2024) emphasize the importance of synthesis studies capable of consolidating findings on zygomatic implants in different

clinical contexts. Thus, the methodology used here is not restricted to describing the literature, but seeks to **critically analyze** the results, offering a **contextualized and integrative** interpretation.

2.8 METHODOLOGICAL SYNTHESIS

In summary, the present study is based on a **narrative and critical literature review**, supported by **20 references** published between **2002 and 2024**. The methodological procedures included the search in **institutional databases** and specialized **journals**, the application of inclusion and exclusion criteria, the reading in multiple stages and the comparative analysis of the data. This strategy made it possible to construct a consistent discussion on the impact of immediate loading on zygomatic implants, with emphasis on **the success rate** and **masticatory function**.

Thus, it is intended to offer a relevant contribution both to clinical practice and to the scientific community, by establishing an updated and grounded overview of the subject, simultaneously evidencing the **methodological limitations** and the perspectives **for future research**.

3 RESULTS

The analysis of the reviewed studies demonstrates that the use of **immediate loading in zygomatic implants** has a significant impact on both the **success rate** and **the masticatory function**, and is currently one of the most effective protocols for the rehabilitation of patients with **severely atrophic maxillae**. The findings reinforce that, although it is a **complex and highly specialized technique**, it presents high **clinical and functional predictability**, in addition to promoting substantial improvements in the **quality of life** of patients, covering functional, aesthetic and psychosocial aspects.

3.1 SUCCESS RATE OF ZYGOMATIC IMPLANTS WITH IMMEDIATE LOADING

Clinical follow-up studies show that the success rate of zygomatic implants submitted to **immediate loading** is comparable, and in many cases higher, than that observed in conventional **delayed loading protocols**. Barbosa et al. (2024), for example, reported success rates of over **95%** in cohorts of edentulous patients rehabilitated with zygomatic implants, at a median follow-up of five years. The authors emphasize that the **primary**

stability obtained by anchorage in the zygomatic bone is a determining factor for a good prognosis.

Similar results were observed by Nascimento et al. (2023), who, when evaluating immediate loading protocols in atrophic maxillae, reported success rates greater than **96%** in a three-year follow-up. According to the authors, the **structural rigidity of zygomatic implants**, associated with the **high cortical density** of the zygomatic bone, ensures favorable biomechanical conditions from installation to the osseointegration phase.

Another relevant study, conducted by Cardoso et al. (2022), reinforces that zygomatic implants, when associated with immediate loading, offer not only **high clinical stability**, but also contribute to the reduction **of treatment time** and **surgical morbidity**, minimizing the need for extensive bone grafts. This characteristic explains the wide acceptance of the technique, especially in elderly patients or those with systemic conditions that restrict more invasive approaches.

Although the success rates are high, some authors point to possible complications associated with the protocol. Lima and Filho (2007) highlight the occurrence of **maxillary sinusitis** as a potential complication, although of low incidence, which can compromise the maintenance of implants in the long term. However, in their retrospective analyses, the authors observed that the adoption of immediate loading did not increase the risk of failure, suggesting that such complications are more related to anatomical and surgical factors than to the prosthetic protocol itself.

The most recent literature corroborates these findings. Espinoza (2023) demonstrated that, in patients rehabilitated with zygomatic implants undergoing immediate loading, the success rate reached **97.1%** in five years, surpassing protocols based on bone grafting followed by conventional implants. This advantage is attributed to the possibility of **immediate functional rehabilitation**, an essential factor for patient adherence and satisfaction, in addition to directly contributing to the improvement of quality of life.

3.2 MASTICATORY FUNCTION AFTER REHABILITATION WITH IMMEDIATE LOADING

In addition to the **success rate**, **the masticatory function** is one of the main clinical indicators of effectiveness in oral rehabilitation. Evidence shows that patients rehabilitated with zygomatic implants submitted to **immediate loading** show significant improvement in masticatory efficiency, often reaching levels comparable to those of individuals with **natural dentition**.

According to Brackmann et al. (2017), patient satisfaction with zygomatic implants is strongly associated with **early recovery of masticatory function**. In their study, when evaluating groups of patients with atrophic maxillary rehabilitation, the authors found that the chewing of solid foods was reestablished in shorter periods than in the late loading protocols, which was reflected in **high quality of life indexes**.

In the same direction, França and Paraguassu (2022) highlight that the adoption of immediate loading in **implant-supported total dentures** allows the patient to recover essential functions, chewing, phonation, and swallowing, in the first days after surgery. This rapid functional reintegration reduces potential **nutritional and psychosocial** impacts that often accompany the edentulous condition.

Nascimento et al. (2023) reinforce that immediate loading plays a **critical** role in restoring masticatory function, since the prolonged absence of masticatory stimulus can compromise **bone and muscle metabolism**, favoring negative functional adaptations. In this sense, the possibility of immediately returning this function to patients with atrophic maxillae represents a **significant advantage** over conventional protocols.

Corroborating these findings, Espinoza (2023) observed that **masticatory strength** and **muscle coordination** evolve progressively after the installation of prostheses in immediate loading, reaching levels close to physiological within six months. Similar results were reported by Restelato (2023), who, in a literature review, identified that patients undergoing immediate loading protocols not only have better masticatory performance in clinical tests, but also report **greater subjective satisfaction** in relation to feeding function.

3.3 PSYCHOSOCIAL AND QUALITY OF LIFE ASPECTS

In addition to the objective results, the studies also show **relevant psychosocial benefits** associated with rehabilitation with zygomatic implants submitted to immediate loading. Schvde and Passoni (2023) point out that this treatment modality directly impacts the **self-esteem** and **social life** of patients, who report greater confidence when smiling, speaking, and eating in public. This effect, although subjective, is considered fundamental for **treatment adherence** and for the **overall perception of clinical success**.

Godoi et al. (2024) reinforce that the psychosocial impact of the immediate burden is as relevant as the functional aspects, since many patients report **immediate relief from the stigma associated with edentulism**. This sense of normality favors the improvement of **mental health** and contributes to **social reintegration**.

Corroborating these findings, Narciso et al. (2024) observed that the **early functional restoration** provided by immediate loading not only improves **nutrition** and **chewing efficiency**, but also facilitates the **reintegration of patients into their social and professional activities**, dimensions often neglected in conventional protocols.

3.4 COMPARISON WITH LATE LOAD PROTOCOLS

When comparing **immediate loading** with **delayed loading** protocols in zygomatic implants, significant clinical and functional advantages are observed. De R. and Freddo (2012) point out that, although late loading presents good **osseointegration** rates, patients remain for months without adequate masticatory function, which directly compromises **quality of life**. In contrast, immediate loading offers **similar clinical stability**, but with **significantly faster functional recovery**.

Verasano (2024) adds that recent advances in **surgical and prosthetic techniques** have consolidated the predictability of immediate loading, making it the preferred option in cases of **severely atrophic maxillae**. The author emphasizes that the standardization of milling protocols, combined with the use of well-adapted **temporary prostheses**, is a decisive factor for the success of the approach.

In summary, the results of the literature suggest that **immediate loading in zygomatic implants** not only maintains **high clinical success rates**, but also ensures early **recovery of masticatory function**, promoting a direct positive impact on the **general health** and **quality of life** of patients.

4 DISCUSSION

The results obtained and analyzed in this study show that the use of **immediate loading in zygomatic implants** exerts **significant and multifactorial impacts** both on the **clinical success rate** and on **the restoration of masticatory function** in patients with atrophic maxillae. Although the literature points to **high levels of predictability and effectiveness**, the critical analysis of the data also reveals the existence of gaps **and challenges** that still need to be overcome for the **continuous improvement of the technique**.

4.1 CONSIDERATIONS ON THE SUCCESS RATE

The reviewed literature consistently demonstrates that **zygomatic implants** achieve **success rates greater than 95%,** even in **immediate loading** protocols (BARBOSA et al., 2024; ESPINOZA, 2023; NASCIMENTO et al., 2023). This finding is of great clinical relevance, especially because such procedures are applied in patients with **unfavorable anatomical conditions**, in whom conventional rehabilitation with dental implants would be unfeasible without the need for **extensive bone grafts**.

The **zygomatic bone**, due to its high cortical density, offers **adequate primary stability** to support immediate loads (CARDOSO et al., 2022), which explains, in part, the expressive success rates reported in the literature. However, Barbosa and Shimohira (2018) warn that the technique requires **in-depth anatomical knowledge** and **high surgical experience**, since technical failures during installation can cause serious complications, such as **orbital perforation** or **chronic sinusitis**.

Classic results by Lima and Filho (2007) confirm that complications related to **the maxillary sinus**, although relatively rare, can compromise the longevity of the treatment. Thus, the high success rate depends not only on the quality of the zygomatic bone and on the adoption of the immediate loading protocol, but also on **thorough surgical planning**.

Another relevant aspect observed is that immediate loading, contrary to what might be supposed, **does not increase the failure rate in relation to late** loading. França and Paraguassu (2022) highlight that osseointegration occurs in a similar way in both protocols, as long as **satisfactory primary stability** is obtained. This data is corroborated by Verasano (2024), who adds that advances in **milling techniques** and **implant design** have contributed to minimizing mechanical risks, increasing **clinical predictability** and the safety of the technique.

4.2 RECOVERY OF MASTICATORY FUNCTION

Masticatory **function** is a fundamental indicator for the success of implant rehabilitation. Several studies have shown that patients undergoing **immediate loading** recover their chewing capacity early, often within a few days after surgery (BRACKMANN et al., 2017; RESTELATO, 2023). This immediate recovery is of great clinical relevance, since the prolonged absence of masticatory stimulus can lead to **nutritional losses** and **significant psychosocial impacts** (FRANÇA; PARAGUASSU, 2022).

Clinical analyses indicate that the **masticatory efficiency** of patients rehabilitated with zygomatic implants in immediate loading reaches levels comparable to those of **natural dentition** in up to six months (ESPINOZA, 2023). Such evidence suggests that, in addition to functional restoration, there is also an **effective neuromuscular adaptation**, favoring the patient's full reintegration into their daily activities.

However, Schvde and Passoni (2023) observe that, in some cases, chewing very hard foods may remain limited in the first few months, due to the need to adapt the **temporary prosthesis**. Despite this, the subjective perception of patients is largely positive: many report a significant improvement in quality of life and satisfaction with masticatory function even before the installation of the definitive prosthesis (BRACKMANN et al., 2017).

4.3 PSYCHOSOCIAL IMPACTS AND QUALITY OF LIFE

In addition to the strictly clinical dimension, rehabilitation with **zygomatic implants in immediate loading** has a significant psychosocial impact. Studies indicate that patients report a **significant improvement in self-esteem, self-confidence, and social interaction** (GODOI et al., 2024; NARCISO et al., 2024). This benefit stems not only from functional recovery, but also from **immediate aesthetic restoration**, an aspect considered fundamental in social and professional contexts.

Ruschel, Nóia, and Chagas (2019) point out that the possibility of **smiling and speaking without embarrassment**, combined with efficient chewing, contributes to reducing social **isolation** often observed in edentulous patients. Thus, the **psychosocial impact** should be recognized as one of the main benefits of the technique, equal in importance to its **clinical predictability**.

4.4 COMPARISON WITH LATE LOAD PROTOCOLS

Late loading **protocols**, while considered safe, have **significant limitations**. De R. and Freddo (2012) emphasize that keeping the patient for months without adequate masticatory function leads **to dietary restrictions, nutritional impairment** and consequent **reduction in quality of life**. In this context, immediate **loading** represents a significant advance in the field of implantology, by shortening this period of functional rehabilitation.

However, it cannot be ignored that late loading still has **advantages in specific situations**. Neto (2002) argues that, in patients with **systemic risk factors** or in **borderline anatomical conditions**, late loading may be the safest option, ensuring greater predictability

in the **osseointegration process**. These data reinforce that the **choice of protocol** must be individualized, taking into account not only the clinical aspects, but also the **general health conditions and the patient's expectations**.

4.5 LIMITATIONS AND CHALLENGES

Although the results available in the literature are largely positive, **there are relevant limitations** that need to be considered. Most studies have **small sample sizes** and **relatively short follow-up periods**, which limits the robustness of the conclusions. Lima et al. (2024) point out that, despite the high success rates reported, **longitudinal studies with a follow-up of more than ten years** are still lacking to confirm the durability and predictability of the technique in the long term.

Additionally, Barbosa and Shimohira (2018) highlight that complications such as **paresthesia, sinusitis,** and even **prosthetic mechanical failures** are not nonexistent. Although infrequent, such events can compromise clinical and functional results, making it essential to adopt **appropriate prevention and management protocols**.

Another important challenge refers to the **cost of the procedure**, which is generally higher than that of conventional techniques. This factor can limit access for patients with lower purchasing power, increasing **inequalities in access to oral health** (RESTELATO, 2023).

4.6 FUTURE PROSPECTS

Based on recent advances, it is possible to project **promising trends** for the use of zygomatic implants with **immediate loading**. The incorporation of **digital technologies**, such as three-dimensional virtual planning and the use of **personalized surgical guides**, tends to increase the **precision of the technique**, reducing intraoperative risks and enhancing functional and aesthetic results (PARAGUASSU, 2024).

At the same time, the development of **new implant surfaces** and **prosthetic rehabilitation protocols** aims to optimize **osseointegration** and minimize mechanical complications. These innovations, coupled with the use of **advanced biomaterials**, have the potential to further increase **clinical and functional success rates**.

Finally, it is expected that **future research** will include **more robust samples**, **long-term follow-ups,** and a **multidimensional evaluation of the results**, incorporating not only

clinical parameters, but also functional, aesthetic, and psychosocial aspects (VERASANO, 2024).

4.7 SUMMARY OF THE DISCUSSION

Immediate loading in zygomatic implants is consolidated as a technique of **high predictability** and **positive impact** in the oral rehabilitation of patients with **severely atrophic maxillae**. The literature reviewed demonstrates **success rates greater than 95%,** associated with **rapid restoration of masticatory function** and **significant psychosocial benefits**, which include improved self-esteem, quality of life, and social reintegration.

Despite these advantages, it is a procedure that requires **high clinical experience**, **rigorous surgical planning,** and **long-term follow-up in** order to prevent and manage complications. In addition, **limitations such as high cost and inherent surgical risks** still represent challenges to be faced.

The current scenario, however, points to a **promising future**, in which zygomatic implants with immediate loading tend to consolidate themselves as the **first-choice therapeutic alternative** in complex cases of severe edentulism, especially with the advancement of digital technologies, biomaterials, and increasingly precise and predictable prosthetic protocols.

5 CONCLUSION

The analysis of the impact of **immediate loading on zygomatic implants** shows that this therapeutic modality represents a **significant advance** in the rehabilitation of patients with **severely atrophic maxillae**, as it offers **high success rates**, **masticatory functional improvement**, and **significant** psychosocial gains. The reviewed literature demonstrates that, when carefully indicated and properly executed, the technique presents comparable and, in many cases, superior results to conventional approaches that rely on **extensive bone grafts** and **prolonged treatments** (NASCIMENTO et al., 2023; BARBOSA et al., 2024; NARCISO et al., 2024).

Among the main findings, the **high clinical predictability stands out**, especially in edentulous patients with **severe bone resorption**, in whom therapeutic alternatives are limited. Studies show that **anchorage in the zygomatic bone** provides robust primary stability, an essential condition for the application of immediate loading, ensuring **early**

functionality and **satisfactory masticatory efficiency** (ESPINOZA, 2023; LIMA et al., 2024; VERASANO, 2024).

Despite the advantages, it is essential to recognize that the technique requires **high surgical mastery** and **careful case selection**, considering the risk of complications such as **sinusitis, paresthesias and prosthetic failures** (DE R; FREDDO, 2012; GODOI et al., 2024). Even so, the literature highlights that such events, although possible, are relatively rare and can be **mitigated through adequate planning, use of surgical guides, and strict postoperative follow-up** (RUSCHEL; NÓIA; CHAGAS, 2019; BRACKMANN et al., 2017).

From a functional point of view, studies show that rehabilitation with zygomatic implants in immediate loading allows the restoration not only of **facial aesthetics** and **phonetics**, but mainly of **efficient masticatory capacity**, favoring better **nutritional quality** and **social** integration(FRANCE; PARAGUASSU, 2022; NETO, 2002; SCHVDE; PASSONI, 2023). This aspect reinforces that the technique transcends the dental sphere, directly impacting the **general health** and **self-esteem of patients**.

Therefore, **immediate loading in zygomatic implants** is consolidated as a **safe, predictable and highly effective** therapeutic option for the rehabilitation of atrophic maxillae. Its positive impact on **the success rate** and **masticatory function** is widely documented, although there is still a need for **long-term clinical studies** that deepen the analysis of the variables involved, especially with regard to **prosthetic longevity**, **patients' quality of life**, and **the standardization of surgical protocols**.

In summary, it is a technique that **broadens the horizons of implantology**, reduces treatment time and offers high-performance functional and aesthetic solutions, configuring itself as a **relevant milestone** in complex oral rehabilitation.

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