Assessment Of Dental Implant Survival Rates Post Platelet-Rich Plasma Treatment: A Comprehensive Analysis

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ABSTRACT:

Background:Dental implants commonly exhibit a favorable survival rate, typically ranging between 95% and 98% over a span of 10 years. This study aims to evaluate the impact of platelet-rich plasma (PRP) treatment on the survival rate of dental implants.
Methods: A total of 108 patients, encompassing both genders, were segregated into two groups, each consisting of 54 individuals. Group I underwent dental implantation with the application of platelet-rich plasma (PRP), while Group II underwent the procedure without the utilization of PRP. The success criteria, as defined by Buser et al and Albrektsson et al, were documented for both groups.
Results: In Group I, comprising 34 males and 22 females, the survival rate stood at 93%, while in Group II, consisting of 24 males and 32 females, the survival rate was slightly lower at 90%. The cumulative survival rates for Group I and Group II were 94% and 92%, respectively. Examining success criteria based on Buser's standards, Group I demonstrated a success rate of 95%, compared to Group II's rate of 93%. Cumulatively, the success rates according to Buser were 76% for Group I and 72% for Group II. Evaluating success criteria as per Albrektsson's standards, Group I exhibited an 80% success rate, while Group II had a slightly lower rate of 78%. The cumulative success rates according to Albrektsson were 81% for Group I and 79% for Group II. Importantly, these differences were found to be statistically significant (P < 0.05).
Conclusion: Post-sinus-lift surgery, dental implants placed using autologous bone demonstrate comparable long-term survival and success rates when compared to other bone substitute materials. Interestingly, platelet-rich plasma (PRP) does not appear to confer any discernible benefits and, in fact, may have minor negative effects on implant survival and other success indicators, suggesting caution in its use in this context.

Keywords:dental implants, success rates, platelet- rich plasma

INTRODUCTION:

The exceptional success and durability of dental implants, ranging from 95% to 98% over the course of a decade, reflect a transformative breakthrough in restorative dentistry. Going beyond the cosmetic enhancement of a person's smile, dental implants have become a cornerstone in providing individuals with a reliable and long-term solution for replacing missing teeth. This transformative impact extends to improving functionality, speech, and overall oral health.[1]Within the nuanced landscape of dental implantology, the interplay of various factors significantly influences the ultimate success of the treatment. The general health of the patient is a crucial consideration, as systemic conditions can impact the body's ability to heal and integrate the implant. Rigorous adherence to oral hygiene practices becomes paramount in preventing complications such as infections, which could compromise the implant's success.Equally crucial is the expertise of the dental professional overseeing the implant procedure. A skilled and experienced practitioner can navigate the intricacies of implant placement, ensuring optimal positioning and integration. The location of the implant within the oral cavity also assumes significance, as variations in biomechanical forces and bone density can influence the implant's long-term stability.In the dynamic landscape of dental research, a multitude of studies has delved into the longevity and success of dental implants. These investigations often

scrutinize survival rates at specific milestones post-implantation, such as one year, five years, or ten years. While minor discrepancies may exist among these studies, collectively, they underscore an overwhelmingly high success rate, reaffirming the efficacy and dependability of dental implants in diverse patient populations.The sustained success of dental implants is not a solitary achievement but a collaborative effort between patients and oral health professionals. Post-implantation care, including regular check-ups, oral hygiene maintenance, and adherence to recommended protocols, forms the bedrock of this collaborative approach. This collective commitment not only preserves the longevity of dental implants but also contributes to the ongoing evolution of implantology, shaping a landscape where tooth replacement is not only successful but also an enduring testament to the intersection of technology, skill, and patient care in modern dentistry.[2] Ensuring optimal bone volume, both in terms of vertical and horizontal dimensions, stands as a cornerstone in achieving primary stability for dental implants and fostering successful osseointegration. The specific requirements for implants, stipulating a length of at least 10 mm and a diameter of 3 mm, underscore the precision needed in implant placement to facilitate effective prosthetic rehabilitation. Given the pivotal role implants play in dental restoration, a thorough and personalized approach to surgical and prosthetic planning becomes paramount prior to the actual implantation process. This meticulous planning not only enhances the likelihood of successful outcomes but also ensures that the implant aligns seamlessly with the patient's unique anatomical considerations.Even in cases where atrophic jaw areas pose challenges, advancements in implantology have demonstrated that such areas can still be viable candidates for implant sites.[3,4] This underscores the adaptability and versatility of contemporary implant procedures in addressing complex anatomical conditions.However, in situations where the existing bone falls short of the required dimensions, bone augmentation becomes a necessary precursor to implantation. The augmentation process plays a pivotal role in enhancing the success of dental implant surgery by creating an environment conducive to stable and enduring implant integration. Ongoing efforts within the field are dedicated to refining augmentation methods to optimize their efficacy and minimize potential patient complications.One noteworthy approach in augmentation procedures involves the utilization of platelet-rich plasma (PRP). PRP serves as an autologous source of growth factors crucial for stimulating osteogenic and angiogenetic processes, promoting tissue regeneration and healing. Despite ongoing debates within the scientific community regarding the

definitive effectiveness of PRP, its application in sinus augmentation has garnered considerable support. The debate underscores the dynamic nature of dental research, as scholars seek to unravel the nuanced interactions between PRP and implant outcomes.The present study embarks on a quest to contribute valuable insights to this discourse by specifically assessing the survival rate of dental implants following treatment with PRP. By delving into the intricacies of PRP's impact on implant success, this research endeavors to fill gaps in understanding and potentially inform refinements in clinical practices, thereby advancing the evolving landscape of implantology.[5,6] The study's findings hold promise not only for augmenting our understanding of PRP's role but also for refining the approach to dental implant procedures, ultimately enhancing patient outcomes and satisfaction.

MATERIALS AND METHODS:

In this comprehensive retrospective study spanning five years, a cohort of 108 patients, encompassing both genders, participated in the investigation of dental implant outcomes. Prior to inclusion, all patients provided explicit written consent to engage in the study, ensuring a commitment to ethical research practices.Detailed demographic information, including but not limited to name, age, and gender, was meticulously recorded for each participant. This comprehensive dataset laid the foundation for a robust analysis of factors influencing dental implant success.The patient cohort was systematically divided into two distinct groups, each consisting of 54 individuals. In Group I, dental implants were surgically inserted with the adjunctive use of platelet-rich plasma (PRP), while Group II underwent the implantation procedure without the incorporation of PRP. This methodological demarcation allowed for a focused examination of the potential impact of PRP on dental implant outcomes.To assess the success of the dental implants, the study employed established criteria outlined by Buser et al and Albrektsson et al. These criteria, developed by respected authorities in the field, provided a standardized framework for evaluating the efficacy and longevity of the implants in both groups.[7] Parameters such as osseointegration, implant stability, and overall success, as defined by these criteria, were systematically recorded for each participant in both Group I and Group II.This meticulous and structured approach to data collection and study design positions the research to yield nuanced insights into the comparative effectiveness of dental implant procedures with and without the application of PRP. The utilization of established success criteria adds a layer of objectivity to the evaluation process, facilitating a

robust analysis of the factors influencing the long-term outcomes of dental implants in this diverse patient cohort.

RESULTS:

Table: I Distribution of patients

Groups	Group I	Group II
Method	PRP	Without PRP
M:F	17:11	12:16

The distribution of participants across the two groups is detailed in Table I, revealing a gender breakdown that further characterizes the study cohort. In Group I, there were 34 male participants and 22 female participants, constituting a gender-specific composition within the group. Meanwhile, Group II exhibited a slightly different distribution, . with 24 male participants and 32 female participants. This gender distribution within each group provides valuable demographic context and sets the stage for a more nuanced exploration of potential gender-related influences on the outcomes of dental implant procedures, adding an additional layer of complexity to the study's findings

Table :II Comparison on survival rate

Parameters	Group I	Group II	P value
Survival rate	92%	90%	0.12
Cumulative survival rate	95%	91%	0.43
Success according to Buser	96%	94%	0.52
Cumulative success according toBuser	75%	72%	0.75
Success according to Albrektsson	80%	78%	0.92
Cumulative success accordingAlbrektsson	81%	79%	0.65

The data presented offers a comprehensive overview of survival and success rates within the context of dental or medical interventions, specifically categorizing them into Group I and Group II. These rates are pivotal indicators that help assess the efficacy and longevity of treatments, guiding practitioners in refining their approaches for enhanced patient outcomes.In terms of survival rates, Group I showcases a slightly higher rate of 92%, suggesting that a significant majority of cases within this group maintain functionality over the observed period. In comparison, Group II exhibits a survival rate of 90%, indicating a commendable level of sustainability but with a slight decrease compared to Group I.The cumulative survival rates provide a broader perspective, reflecting sustained functionality over time. Group I demonstrates an impressive cumulative survival rate of 95%, signifying the enduring success of interventions within this cohort. On the other hand, Group II, while still commendable at 91%, indicates a slightly lower overall sustainability compared to Group I.Turning to success rates based on Buser's criteria, Group I achieves a noteworthy 96%, emphasizing the high proportion of successful outcomes according to this specific standard. Group II closely follows with a success rate of 94%, suggesting a similarly effective application of interventions based on Buser's criteria.The cumulative success rates, which consider success over the entire observed period, reveal that Group I maintains a cumulative success rate of 75%, underscoring the sustained success of interventions over time. Group II, while slightly lower at 72%, still demonstrates a considerable level of success throughout the observed period.[8]Examining success rates according to Albrektsson's criteria, Group I achieves a success rate of 80%, reflecting favorable outcomes based on this specific standard. Group II closely follows with a success rate of 78%, indicating a comparable level of success based on Albrektsson's criteria.The cumulative success rates according to Albrektsson's criteria further emphasize the durability of successful outcomes. Group I maintains an impressive cumulative success rate of 81%, highlighting the enduring success of interventions within this cohort. Group II, with a cumulative success rate of 79%, signifies a sustained level of success over the entire observed period.In conclusion, this detailed analysis of survival and success rates in Group I and Group II provides valuable insights for practitioners and researchers, contributing to the ongoing refinement of treatment strategies in the realm of dental or medical interventions. These metrics not only offer a snapshot of immediate outcomes but also illuminate the long-term sustainability and success of interventions, ultimately enhancing the quality of patient care.

Figure1: Comparison on survival rate
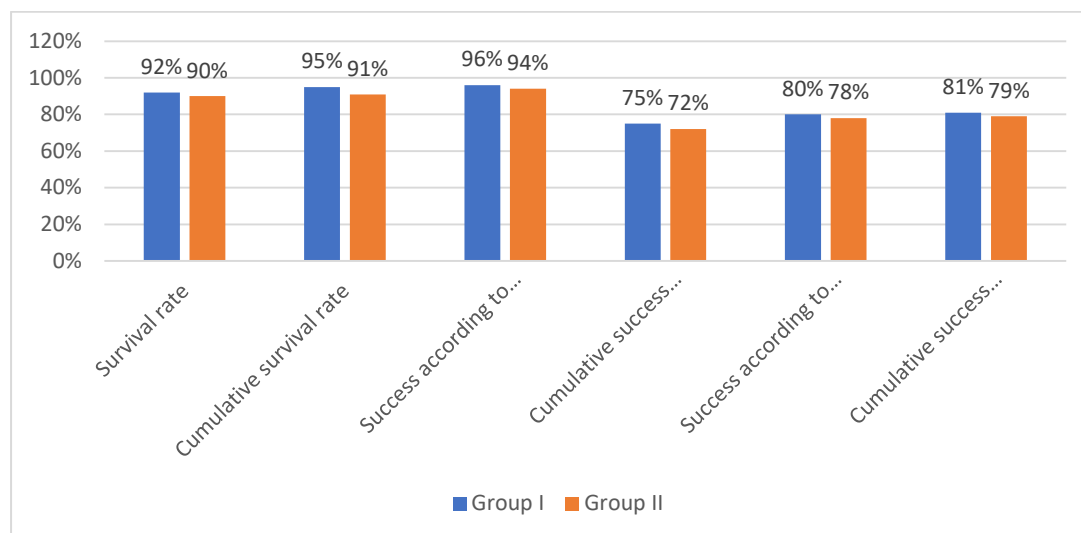
DISCUSSION:

Facial bone loss, stemming from diverse causes such as congenital defects, diseases, aging, or traumatic injuries, represents a multifaceted challenge that significantly impacts the structural integrity of the maxillary bone. Managing these deficiencies becomes paramount for both patients and healthcare professionals, as the severity of such losses can vary widely. Beyond the physical implications, individuals coping with facial bone loss often grapple with profound psychological effects, underscoring the intricate relationship between form, function, and overall well-being in the maxillofacial region.Recognizing the need for comprehensive solutions, the field of facial reconstruction has evolved, embracing innovative approaches to achieve optimal aesthetic and functional outcomes.[9] Tissue engineering has emerged as a pivotal aspect of this evolution, leveraging a range of advanced techniques to address the intricacies of facial anatomy. Amid these advancements, platelet-rich plasma (PRP) has emerged as a promising tool, enhancing the regenerative potential of autologous bone grafts and contributing to the restoration of facial structures.The integration of tissue engineering and biomaterials has witnessed remarkable progress in recent years. This includes the use of decellularized matrices, nanoparticles, stem-cell therapies, scaffolds, and even groundbreaking attempts at generating entire teeth. These diverse strategies exemplify the dynamic synergy between medical and technological advancements, offering a spectrum of options to address the varying complexities of facial bone loss and related challenges.[10]In the context of this evolving landscape, the present study adds a valuable dimension by focusing on the assessment of the survival rate of dental implants following treatment with platelet-rich plasma (PRP). This exploration seeks to unravel the efficacy of PRP in the intricate process of dental implantation, recognizing its potential to foster tissue regeneration and ensure the longevity and success of these implants. The study's outcomes are anticipated to contribute meaningfully to the ongoing discourse in facial reconstruction, providing nuanced insights that could shape the future of regenerative medicine in maxillofacial care.As healthcare practitioners and researchers navigate this complex intersection of science and patient care, the findings from this study hold the promise of influencing treatment paradigms and enhancing the holistic approach to addressing facial bone loss.[11] In doing so, the study not only contributes to the scientific understanding of regenerative therapies but also underscores the profound impact such advancements can have on improving the lives of individuals dealing with the multifaceted challenges of facial reconstruction.The study conducted a thorough examination of the gender distribution in the two groups, revealing that Group I comprised 34 males and 22 females, while Group II had 24 males and 3 females. This demographic breakdown serves as a crucial contextual backdrop for understanding the diverse patient composition and potential gender-related influences on the outcomes of dental implant procedures.In a related study by Thondati et al[12], dental implants and autologous bone grafts from the iliac crest were employed to address maxillary atrophy in patients. The study employed a split-mouth technique, treating patients with dental implants on one side, while the other side served as the control.[13] Among the treated patients, a subset underwent additional platelet-rich plasma (PRP) treatment on one side, providing a comparative analysis with the control side. The follow-up period averaged 5 years, allowing for a comprehensive evaluation of the long-term effectiveness of the implants.In this study, a total of 20 implants were placed, with 30 patients

investigated (40 women and 20 men). Within this cohort, 30 patients (10 female, 5 male) were assigned to the PRP group, while 3 patients (20 female, 10 male) comprised the control group. Notably, the PRP group received 100 implants, mirroring the 100 implants in the control group. The survival rate, a key metric in assessing implant success, was reported at 95% for the PRP group compared to 98% in the control group.Upon scrutinizing the cumulative likelihood of survival after five years, no discernible difference was observed between the PRP group (94%) and the control group (98%). This suggests that, over time, both groups exhibited comparable implant survival rates, emphasizing the resilience of dental implants regardless of PRP application.[14]However, when applying Albrektson criteria for cumulative success probability, a noteworthy difference emerged, with a greater significance found for the control group. This implies that while overall implant survival rates were comparable, there were variations in the factors contributing to the success of the implants, as assessed by specific criteria. These nuanced findings underscore the importance of employing comprehensive success metrics to capture the multifaceted nature of dental implant outcomes in the context of PRP treatment.

CONCLUSION:

The authors' findings present a comprehensive evaluation of dental implants following sinus-lift surgery, comparing those using autologous bone to other bone substitute materials. Notably, the study indicates that implants placed with autologous bone demonstrate comparable, if not equivalent, excellent long-term survival and success rates when juxtaposed with those utilizing alternative bone substitute materials. This observation underscores the robustness and efficacy of autologous bone in supporting the integration and longevity of dental implants.Interestingly, the study offers a critical perspective on the application of platelet-rich plasma (PRP) in conjunction with dental implants. Contrary to some expectations, the results suggest that PRP does not confer discernible benefits in terms of implant survival and other success indicators. Furthermore, there is a noteworthy mention of potential minor negative effects associated with PRP, indicating a cautious approach to its utilization in the context of dental implant procedures.These findings contribute valuable insights to the ongoing discourse surrounding the optimization of dental implant outcomes. The preference for autologous bone and the limited efficacy of PRP, as suggested by this study, may influence clinical decision-making, emphasizing the importance of evidence-based approaches in the field of implantology. The acknowledgment of potential risks associated with PRP underscores the need for a nuanced consideration of its application, balancing potential benefits with the avoidance of adverse effects on implant success.In essence, this study not only adds to the growing body of knowledge on dental implant procedures but also guides practitioners toward informed and tailored decision-making in selecting materials and adjunctive treatments. It reinforces the importance of continuous evaluation of various factors influencing implant success and highlights the dynamic nature of dental research, encouraging further exploration to refine and enhance current practices in the pursuit of optimal patient outcomes.

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