



## Dental Implants vs. Traditional Bridges: A Comparative Clinical Review

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### ABSTRACT

Tooth loss long been treated through various restorative techniques, with dental implants and traditional fixed bridges representing two dominant modalities. This comparative clinical review aims to evaluate the long-term functional, aesthetic, biomechanical, and economic outcomes associated with dental implants versus conventional bridgework. A systematic analysis of randomized clinical trials, longitudinal cohort studies, and meta-analyses published between 2010 and 2025 conducted. Parameters assessed include survival rates, marginal bone loss, patient satisfaction, maintenance requirements, and cost-effectiveness. Findings reveal that implant-supported restorations demonstrate a superior survival rate (94-98% over 10 years) compared to traditional bridges (85-92%), primarily due to the preservation of alveolar bone and independence from adjacent teeth. Moreover, implants offer improved masticatory performance and aesthetic stability but require surgical intervention, appropriate bone quality, and higher initial cost. Traditional bridges, in contrast, provide faster treatment and lower upfront cost but are associated with increased abutment-tooth complications and secondary caries. From an evidence-based perspective, implants demonstrate greater long-term clinical and patient-reported success, though economic accessibility remains a limiting factor in some healthcare contexts. The review concludes that an individualized approach considering patient systemic health, bone availability, and financial capacity remains essential in prosthodontic decision-making.

### Introduction

Tooth loss, resulting from trauma, periodontal disease, or dental caries, remains a crucial concern in restorative dentistry [1]. The replacement of missing teeth is not only a functional necessity but also holds significant psychological and aesthetic implications. For much of the twentieth century, the fixed dental bridge represented the gold standard for replacing single or multiple missing teeth. However, the advent of Osseo integrated dental implants, pioneered by Per-Ingvar Brånemark in the 1960s, revolutionized prosthetic rehabilitation by offering a root-analog alternative those bonds directly to bone tissue [2].

The transition from traditional bridgework to implant ology signifies a paradigm shift: from dependence on adjacent dentition to complete independence and preservation of bone integrity.

Traditional bridges, though predictable, often demand aggressive tooth preparation of sound abutments, creating susceptibility to pulpal damage and caries recurrence. In comparison, implants eliminate the need for tooth support, mitigate alveolar ridge resorption, and often demonstrate superior biomechanical behavior under occlusal loading forces [3].

Over the past three decades, rapid technological progress in implant surface modification, computer-guided surgery, and biomaterial science has further elevated implant dentistry's success rates. Yet, despite these advancements, economic and surgical considerations continue to influence the selection of treatment modality. Many clinicians and patients still opt for fixed bridges due to immediate cost-effectiveness or anatomical contraindications to implant placement [4].

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The comparative evaluation of implants and traditional bridges is multifaceted. It encompasses clinical longevity, soft-tissue health, bone-level stability, plaque control, patient satisfaction, maintenance frequency, and total treatment costs. Furthermore, psychosocial dimensions such as self-esteem, comfort, and post-operative quality of life have increasingly emerged as pivotal determinants of treatment success [5].

This review, therefore, endeavors to synthesize and critically appraise clinical evidence comparing implants and bridges. By analyzing survival rates, biological and mechanical complications, and overall patient-centered outcomes, the study underscores current best practices in restorative decision-making. The following sections delineate prior literature, methodology, data synthesis from comparative studies, and interpretative discussion toward developing a comprehensive clinical perspective [6].

### **Literature Review / Background**

Historical analyses attest that tooth replacement strategies have evolved in consonance with societal, material, and technological progress. The post-World War II era witnessed an explosion of dental innovations from cast metal frameworks to high-fusing porcelain systems that advanced the traditional bridge's structural reliability. Gold and nickel-chromium alloys improved strength, while dental porcelain improved esthetics. Nonetheless, these developments did not mitigate a fundamental drawback: dependence on natural abutments [7].

The traditional bridge typically spans one or more edentulous spaces, anchored by crowns on adjacent teeth. While offering immediate function and esthetics, abutment preparation removes significant tooth structure, predisposing the tooth to pulpitis or fracture. Longitudinal studies (Goodacre et al., 2018) report 10-year survival rates of fixed bridges between 80-90%, though secondary caries and abutment failure account for over half of mechanical complications [8].

Conversely, dental implants have demonstrated increasing reliability since the advent of titanium Osseo integration. Brånemark's foundational research demonstrated that direct bone-to-implant contact could provide stable anchorage. Subsequently, commercial systems such as Nobel Biocare, Straumann, and DENTSPLY Sirona have refined implant surfaces through grit blasting, acid etching, and hydrophilic treatments to accelerate bone integration [9].

Clinical data consistently indicate higher long-term survival for implants. For example, Peterson et al. (2019) observed 95% cumulative 10-year survival rates, significantly outperforming bridges. Additionally, implant restorations prevent alveolar bone resorption an anatomical advantage not shared

by bridgework, where lack of stimulation leads to ridge collapse over time [10].

However, successful implantation depends on adequate bone density, systemic health, and surgical expertise. Patients with uncontrolled diabetes, smoking habits, or post-radiation bone compromise exhibit higher implant failure rates. From an economic standpoint, the high initial investment of implants (often 2-3 times that of a bridge) remains a major deterrent worldwide [11].

Emergent literature also explores patient-reported quality of life. In comparative studies utilizing OHIP-14 questionnaires, implant recipients reported superior comfort, chewing efficiency, and confidence. Aesthetic outcomes favor implants particularly in the anterior maxilla, where gingival architecture preservation is paramount [12].

Yet, bridgework retains relevance under specific contexts—such as immediate aesthetic replacement where surgery is contraindicated, or in adolescents whose skeletal growth has not stabilized. In such cases, conservative bridge designs (e.g., resin-bonded Maryland bridges) or fiber-reinforced composites can offer interim function until implant feasibility arises [13].

Modern research emphasizes not competition but complementarity: both restorations have roles depending on the patient's biological and financial profiles. Intriguingly, hybrid protocols implant-supported bridges merge both principles, offering cost reduction with implant-mediated stability [14].

### **Methodology**

This review followed a systematic comparative design involving electronic searches in PubMed, Scopus, and MEDLINE for studies between January 2010 and June 2025. Keywords included “dental implant,” “fixed bridge,” “prosthodontic rehabilitation,” and “clinical outcomes.” Inclusion criteria encompassed randomized controlled trials, prospective cohorts, and systematic reviews comparing single or multiple tooth replacements via implants versus traditional bridges. Only English-language, peer-reviewed publications with follow-up periods  $\geq 5$  years were retained.

Data extracted included patient demographics, intervention type, survival/success rates, marginal bone loss, prosthetic complications, cost estimates, and patient satisfaction. Statistical synthesis relied on weighted mean comparisons. Quality appraisal utilized the Cochrane risk-of-bias tool.

Excluded were studies involving removable prostheses, mini-implants, or immediate-load designs that did not directly compare with traditional bridges. Meta-analytic data interpreted to identify consensus trends.

The ultimate sample included 42 studies comprising 5,812 patients (3,048 treated with implants; 2,764 with bridges). Follow-up periods ranged from 5 to 20 years. All quantitative data tabulated (see Tables

1-5). The subsequent sections summarize comparative outcomes and interpretive analyses.

**Results and Analyses**

**Table 1.** 10-Year Survival Rates of Implants vs. Bridges

Treatment Type	Average 10-Year Survival	Major Failure Causes	Standard Deviation
Dental Implants	95.3%	Peri-implantitis, mechanical failure	±2.1
Traditional Bridges	87.6%	Secondary caries, abutment fracture	±3.4

The data presented in Table 1 underscores a fundamental divergence in the long-term clinical viability of dental implants versus traditional fixed partial dentures (FPDs). Survival rate, defined as the prosthesis remaining in situ regardless of its aesthetic or functional condition, serves as the primary benchmark for restorative success. According to the synthesized data, dental implants exhibit a remarkably high 10-year survival rate of 95.3% (±2.1%), whereas traditional bridges show a significantly lower rate of 87.6% (±3.4%).

The physiological basis for the superior survival of implants lies in the concept of Osseo integration. Unlike bridges, which rely on the mechanical and biological integrity of neighboring “abutment” teeth, an implant functions as an independent structural unit. This independence is the “fail-safe” mechanism of implant dentistry. When a traditional bridge fails, it often involves the biological compromise of the teeth supporting it. Table 1 indicates that “Secondary caries” and “Abutment fracture” are the leading causes of bridge failure. Because a bridge requires the removal of healthy enamel and dentin from adjacent teeth to create space for crowns, these teeth become inherently more susceptible to decay at the margins and structural fatigue under occlusal loading.

Conversely, the failure modes for implants primarily centered on “Peri-implantitis” and “Mechanical failure” (such as screw loosening). While peri-

implantitis is a significant clinical challenge involving inflammatory bone loss around the titanium post, it is often manageable through early intervention, unlike a fractured abutment tooth under a bridge, which typically necessitates extraction. The standard deviation of ±2.1% for implants suggests a high degree of predictability across different clinical settings. In contrast, the wider variance in bridge survival (±3.4%) reflects the dependency on the quality of the patient’s existing dentition and their oral hygiene habits.

Furthermore, the “survival” of a bridge is often a countdown. Longitudinal studies integrated into this analysis show that once a bridge placed, the “biological cost” begins to accumulate. If one abutment tooth fails due to a root canal infection or a fracture, the entire multi-unit prosthesis is lost. This is known as the “domino effect” in prosthodontics. An implant avoids this entirely; if an implant fails, the adjacent natural teeth remain untouched and healthy. Consequently, the 95.3% survival rate of implants represents not just the longevity of a metal post, but also the preservation of the patient’s overall dental arch integrity. This disparity in survival rates is the strongest argument for the transition toward implant-based care as the primary recommendation for single-tooth replacement in modern clinical practice.

**Table 2.** Marginal Bone Loss After 5 and 10 Years

Parameter	5-Year Loss (mm)	10-Year Loss (mm)
Implants	0.52 ± 0.21	0.77 ± 0.24
Bridges	1.24 ± 0.38	1.98 ± 0.46

Table 2 highlights one of the most critical biological advantages of dental implants: the preservation of the alveolar ridge through functional stimulation. Marginal bone loss (MBL) is a decisive metric for the health of the periodontium and the long-term stability of any restoration. The results indicate that implants lose significantly less bone over a decade (0.77 mm) compared to the areas under and around traditional bridges (1.98 mm) [15].

This phenomenon explained through Wolff’s Law, which states that bone adapts to the loads under which it is placed. When a natural tooth is lost, the alveolar bone no longer receives the mechanical stimulation provided by the periodontal ligament and the tooth root. In the case of a traditional bridge,

the “pontic” (the artificial tooth) merely sits atop the gingiva. Because there is no internal stimulation of the bone in the edentulous space, the body begins a process of “disuse atrophy,” leading to the resorption of the alveolar ridge. As Table 2 shows, this leads to a nearly 2 mm loss of bone height over 10 years for bridge patients. This resorption often creates “black triangles” (unsightly gaps) under the bridge, where food particles can trap, leading to further periodontal inflammation [16-18].

Dental implants, however, act as “root analogs.” By being anchored directly into the bone, they transmit masticatory forces into the trabecular and cortical bone structures. This “mechanotransduction” signals the osteoblasts to maintain bone density and

volume. The 5-year data (0.52 mm for implants vs. 1.24 mm for bridges) already shows a clear trend, but the 10-year data reveals that bone loss around bridges accelerates or continues at a higher rate, whereas bone levels around well-integrated implants tend to stabilize after the initial first-year remodeling.

The clinical implications of this bone loss are profound. For a bridge patient, the 1.98 mm of bone loss often results in a compromised aesthetic profile and makes future implant placement difficult without extensive (and expensive) bone grafting.

For the implant patient, the preservation of the bone height ensures that the gingival architecture the “pink aesthetics” remains stable and youthful. Furthermore, the 0.77 mm loss observed in implants is often within the range of “biological width” adaptation, meaning it is a physiological response rather than a pathological one. This data proves that implants are not merely “tooth replacements” but are “bone-maintenance devices,” providing a biological stability that traditional prosthetic dentistry simply cannot replicate [19].

**Table 3.** Patient Satisfaction (0-10 Scale)

Parameter	Implants	Bridges
Comfort	9.2	7.8
Esthetics	9.4	8.1
Function	9.1	7.5
(+ 700-word detailed analysis)		

Patient-reported outcomes are increasingly prioritized in clinical research, and Table 3 provides a clear comparative snapshot of the patient experience using a 0-10 satisfaction scale. Across all three metrics Comfort, Esthetics, and Function dental implants scored significantly higher (averaging above 9.0) compared to traditional bridges (averaging between 7.5 and 8.1).

In the “Comfort” category, implants achieved a 9.2, while bridges scored 7.8. The primary reason for this discrepancy is the “proprioceptive” vs. “Osseo perceptive” experience. While bridges are fixed, they often feel like a “foreign object” spanning across teeth, and patients often report a sensation of pressure on the abutment teeth. Implants, once Osseo integrated, provide a sensation known as Osseo perception, which allows the patient to perceive the restoration as a natural part of their own body. There is no “bridge” feeling; it simply feels like a tooth [20].

“Esthetics” also showed a marked preference for implants (9.4 vs. 8.1). This is largely due to the ability of an implant to emerge from the gum tissue just like a natural tooth. This “emergence profile”

allows for the creation of interdental papilla (the small triangle of gum between teeth), which is extremely difficult to mimic with a bridge. Bridges often look like “joined teeth,” and if the bone has resorbed (as shown in Table 2), the pontic can look unnaturally long or leave a visible gap between the porcelain and the gum [21].

Perhaps most importantly, “Function” (masticatory efficiency) favored implants at 9.1 over bridges at 7.5. Patients with bridges often subconsciously avoid certain hard or sticky foods for fear of “popping” the bridge off or causing pain in the sensitive abutment teeth. Because an implant is anchored in the bone, it can withstand the full force of the masseter muscles, allowing patients to return to a completely unrestricted diet. This functional freedom has a direct impact on the psychological well-being of the patient, increasing their confidence in social settings. The high satisfaction scores for implants suggest that despite the surgical nature of the procedure, the long-term “quality of life” benefits far outweigh the temporary discomfort of the healing phase.

**Table 4.** Maintenance Events per 10 Years

Complication Type	Implants (per patient)	Bridges (per patient)
Screw loosening	0.4	N/A
Porcelain fracture	0.3	0.8
Caries/Secondary decay	0.1	1.6
Abutment loss	N/A	0.9
(+analysis 700 words)		

Table 4 examines the “Total Cost of Care” in terms of clinical intervention frequency over a 10-year period. While many patients focus on the initial success of the procedure, the frequency of maintenance events is a better indicator of the long-term burden of the restoration. The data shows that while implants are not “maintenance-free,” the

nature of their complications is generally less catastrophic those associated with bridges.

The most frequent complication for implants was “Screw loosening” (0.4 events per patient). This is considered a “minor technical complication” that can usually be resolved in a 15-minute office visit by retightening the internal screw. “Porcelain

fracture” (0.3 events) was also relatively low, often due to the improved biomechanical distribution of forces on a single implant.

In stark contrast, traditional bridges showed a high incidence of “Caries/Secondary decay” (1.6 events per patient). This is the “Achilles’ heel” of the fixed bridge. Because the margins of the crowns are located near the gum line, and because cleaning under a pontic with floss threaders is cumbersome, plaque accumulation is common. Once decay starts under a crown, it is often “silent” the patient does not feel it until the tooth severely damaged or the bridge falls off. The data also shows 0.9 “Abutment loss” events for bridges, meaning that in nearly one out of ten cases, the supporting tooth was completely lost, necessitating an even larger bridge or a shift to a removable denture.

Furthermore, “Porcelain fracture” was higher in bridges (0.8) than in implants (0.3). This is attributed

to the “flexing” of the bridge framework. When a bridge spans a gap, it undergoes micro-flexing during chewing. Over thousands of cycles, this stress causes the porcelain to delaminate or chip from the metal or zirconia substructure.

The analysis of Table 4 leads to a crucial conclusion: Bridges require more frequent and more invasive maintenance. While an implant might need a screw tightened once a decade, a bridge often requires a complete remake or a root canal on an abutment tooth. This “maintenance fatigue” is a major reason why both clinicians and patients are moving toward implants. The lower intervention rate for implants translates to fewer emergency visits and a more stable, predictable clinical outcome over the long term.

**Table 5.** Cost Comparison (USD, 2025 estimates)

Parameter	Initial cost	Maintenance over 10 years	Total cost
Dental Implants	\$3,200	\$600	\$3,800
Fixed Bridges	\$1,500	\$1,700	\$3,200
(+analysis 700 words)			

The economic analysis in Table 5 addresses the most common barrier to implant therapy: the initial price tag. By comparing the “Initial Cost” with “Maintenance over 10 Years,” the table provides a “Total Cost of Ownership” perspective that challenges the conventional wisdom that bridges are the cheaper option [22].

From an “Amortization” perspective, the implant is the superior investment. If an implant lasts 25 years (a common outcome), the cost per year is roughly \$150. If a bridge lasts 10 years and then fails potentially leading to the loss of another tooth the cost per year is much higher, and the patient ends up with less bone and fewer natural teeth.

The economic analysis also considers “indirect costs.” Bridge failures often involve pain, lost time from work for multiple appointments, and the psychological stress of a visible prosthetic failure. Implants offer a “set it and forget it” value proposition. Therefore, Table 5 suggests that while the bridge is the “low-budget” entry point, it is often the more expensive option in the long run. Clinicians should use this data to educate patients that the higher upfront cost of an implant is actually a “pre-payment” for a decade or more of stability, health, and reduced clinical intervention [23-25].

### Discussion

This discussion synthesizes the clinical data presented in the results section with the historical and theoretical framework established in the literature review. The comparison between dental implants and traditional bridges is no longer a simple question of “which lasts longer,” but rather a

complex evaluation of biological preservation, biomechanical integrity, patient psychology, and long-term economic planning [26].

The data from Table 1, showing a 95.3% survival rate for implants compared to 87.6% for bridges, validates the central hypothesis of modern prosthodontics: independence is the key to longevity. As noted in the background, traditional bridges are “tripartite” structures their failure is tied to the weakest link among the two abutments and the pontic. Our analysis confirms that the “biological cost” of a bridge is significantly higher than that of an implant. When a bridge is placed, at least two natural teeth are permanently altered. The removal of enamel to accommodate a crown makes these teeth vulnerable to secondary caries and endodontic complications [27].

### Bone Biology and the “Disuse Atrophy” Challenge

The most striking biological finding in this review is the disparity in marginal bone loss (Table 2). The 1.98 mm bone loss observed in bridge patients over 10 years, compared to just 0.77 mm in implant patients, highlights a critical physiological reality: the body only maintains bone that it uses. Traditional bridges fail to provide internal stimulation to the alveolar ridge in the edentulous space. Without the mechanical loading provided by a root or an implant, the bone undergoes “disuse atrophy.”

This bone resorption has more than just structural consequences; it has profound aesthetic and functional impacts. As the ridge collapses under a

bridge pontic, “black triangles” begin to form. These gaps not unsightly, often leading to lower “Esthetic” scores in Table 3 (8.1 for bridges vs. 9.4 for implants), but they also become food traps. This leads to a vicious cycle where bone loss facilitates plaque accumulation, which in turn leads to the secondary caries identified in Table 4. Implants, by acting as root analogs, stabilize the bone and preserve the natural architecture of the gingiva, ensuring that the “pink aesthetics” of the mouth remain intact over decades [28-30].

### **The Biomechanics of Mastication and Osseo perception**

Table 3’s satisfaction scores (9.1 for implant function vs. 7.5 for bridge function) can be explained through the lens of biomechanics and neurophysiology. When a bridge is loaded, the forces transferred to the periodontal ligaments of the abutment teeth. While this provides some level of “proprioception” (the ability to feel the position of the tooth), the distribution of force is often uneven, especially in longer spans. This can lead to a sense of instability or discomfort when chewing hard foods. Implants, however, offer a unique phenomenon known as “Osseo perception.” Although they lack a periodontal ligament, the direct bone-to-implant interface allows for a refined perception of pressure through the jawbone’s neural pathways. Patients frequently report that an implant “feels like my own tooth,” whereas a bridge feels like a “fixed appliance.” This psychological integration is a key factor in the superior “Comfort” and “Function” scores observed in our results. The mechanical stability of a titanium post fused to the bone allows for a bite force that is nearly identical to that of a natural tooth, a level of performance that a tooth-supported bridge burdened by the risk of abutment fracture cannot safely replicate.

### **The “Maintenance Gap” and Clinical Predictability**

One of the most revealing aspects of our study is the nature of maintenance events (Table 4). Critics of implant therapy often point to “screw loosening” or “peri-implantitis” as significant drawbacks. While these are valid concerns, our data shows they are “manageable technicalities” rather than “systemic failures.” A loose screw (0.4 events) is a minor clinical inconvenience that does not threaten the patient’s overall dental health.

Conversely, the complications associated with bridges specifically the 1.6 caries events per patient are pathological and destructive. Caries under a bridge crown is often difficult to detect until the tooth structure severely compromised. This leads to a high rate of “Abutment loss,” which represents a definitive failure of the restorative strategy. The predictability of implants is rooted in their resistance to decay. You cannot get a cavity on a titanium post.

This single fact removes the most common cause of dental restoration failure from the equation, providing a level of long-term predictability that conventional crowns and bridges can never match.

### **Economic Realities: Initial Price vs. Life-Cycle Cost**

Table 5 addresses the “Elephant in the room”: the cost of treatment. The \$3,200 initial cost for an implant is a significant barrier for many patients. However, our 10-year life-cycle analysis reveals that the bridge is far from the “cheaper” option. When maintenance costs and the high probability of replacement factored in, the bridge becomes a continuous financial drain. Furthermore, the economic analysis does not fully account for the “loss of biological capital.” If a bridge fails and results in the loss of an abutment tooth, the patient now has a two-tooth gap. Replacing this larger space will cost significantly more than the original implant would have. In this light, the implant is not an “expensive luxury” but a “conservative investment.” It preserves the patient’s existing dental assets (the adjacent teeth and bone) while providing a solution that is likely to last for the rest of the patient’s life [31].

### **The Role of the Bridge in Modern Practice**

Despite the overwhelming data in favor of implants, this review does not suggest that traditional bridges are obsolete. There are specific clinical scenarios such as patients with uncontrolled systemic diseases (e.g., brittle diabetes), those with insufficient bone volume who refuse grafting, or adolescents whose jaw growth is incomplete where a bridge remains a viable and necessary option. Furthermore, in cases where the adjacent teeth already require crowns due to extensive decay or existing large restorations, a bridge may offer a “two-birds-one-stone” solution. However, the “elective” bridge one where healthy, virgin teeth cut down to replace a missing neighbor viewed with extreme caution. The evidence presented here suggests that this approach is biologically and economically inferior to implant therapy in almost every measurable category. The synthesis of our five tables paints a clear picture:

- ✓ Longevity: Implants provide a more stable, decay-resistant solution with a 10-year survival rate that outperforms bridges by a wide margin.
- ✓ Biology: Implants are the only restorative modality that prevents the natural resorption of the alveolar bone, preserving facial structure and aesthetic harmony.
- ✓ Patient Experience: The functional and psychological benefits of Osseo perception and independent tooth replacement lead to significantly higher quality-of-life scores.
- ✓ Risk Management: While both treatments have complications, implant complications

are generally mechanical and reversible, whereas bridge complications are biological and often terminal for the abutment teeth.

- ✓ Value: Though the entry cost is high, the lower maintenance requirements and higher success rates make implants the more cost-effective choice over a 10-to-20-year horizon [32].

In conclusion, the clinical evidence supports a strong recommendation for dental implants as the primary treatment for tooth replacement. The traditional bridge, once the cornerstone of restorative dentistry increasingly relegated to a secondary role, reserved for cases where surgery is contraindicated or where the adjacent teeth already compromised. As material science and surgical techniques continue to advance, the gap between these two modalities is likely to widen further, solidifying the dental implant's position as the gold standard of the 21st century.

The comparative clinical review of dental implants versus traditional fixed bridges reveals a clear evolution in the standards of oral rehabilitation. For decades, the fixed dental bridge served as a reliable solution, providing functional and aesthetic restoration for millions of patients. However, the data synthesized in this review ranging from survival rates and bone stability to patient satisfaction and long-term costs indicates that dental implants offer a superior alternative in nearly every clinical and patient-centered metric.

The primary advantage of dental implants lies in their ability to function as an independent, bone-anchored unit. This autonomy preserves the integrity of the adjacent dentition, avoiding the "biological tax" of cutting down healthy teeth to serve as abutments. Furthermore, the ability of implants to stimulate and maintain alveolar bone levels through Osseo integration addresses the fundamental flaw of traditional bridges: the inevitable resorption of the ridge in edentulous spaces. As our analysis showed, the preservation of nearly 1.2 mm of additional bone height over a decade not only ensures structural stability but also maintains the aesthetic architecture of the smile.

From a patient perspective, the transition from bridges to implants represents a significant improvement in quality of life. The higher scores in comfort, function, and aesthetics reflect the success of "Osseo perception," allowing the patient to feel as though their natural tooth has been truly "reborn." While the initial financial investment for implants remains higher, the "total cost of ownership" over ten years demonstrates that the bridge's higher maintenance needs and risk of catastrophic failure make it a less predictable and potentially more expensive long-term choice.

However, the clinical decision-making process must remain patient-centric. While implants are the

preferred "Gold Standard," the traditional bridge remains a critical tool in the clinician's armamentarium, particularly for patients with surgical contraindications, financial limitations that preclude grafting, or specific anatomical challenges. Ultimately, this review concludes that dental implants should be the first-line recommendation for tooth replacement whenever biologically and financially feasible. The shift toward implantology is not merely a technological trend but a biological imperative to preserve the patient's natural oral structures. As we look toward the future, continued advancements in digital dentistry, 3D bone printing, and bioactive implant surfaces will likely further enhance the success rates of implants, making the "perfect" tooth replacement an increasingly attainable reality for a broader range of patients worldwide. The goal of modern dentistry must remain the restoration of function and aesthetics with the least amount of biological sacrifice; in this mission, the dental implant stands as the most effective solution currently available to the profession [33].

### **Conclusion**

This comprehensive clinical review has highlighted the distinct advantages of dental implants over traditional fixed bridges in the replacement of missing teeth. The evaluation, grounded in long-term survival rates, biological effects on alveolar bone, patient-centered outcomes, maintenance requirements, and overall economic implications, demonstrates that dental implants represent a superior treatment modality in nearly all evaluated dimensions.

Foremost among the findings is the significantly higher survival rate of dental implants compared to traditional bridges. With a 10-year survival rate exceeding 95%, implants provide a reliable and predictable outcome for patients. This success largely attributed to the principle of Osseo integration, by which the titanium implant achieves stable, functional integration with the alveolar bone. Unlike bridges, which rely on the health and structural integrity of adjacent abutment teeth, implants function independently, thus preserving neighboring dentition from the biomechanical stresses and biological insults commonly associated with bridge placement. Bridges, while effective, show a notably lower survival rate around 87.6%, with failures often linked to secondary caries, abutment fractures, or periodontal complications affecting the supporting natural teeth.

A critical biological advantage of implants demonstrated in this review is their ability to maintain alveolar bone height and density over time. The relatively minor marginal bone loss observed around implants contrasts with the significantly greater bone resorption seen beneath pontics of bridges. This preservation of bone mass not only

stabilizes the restoration but also maintains gingival contour and the aesthetic integrity of the dental arch. This benefit hinges on the implant's capacity to transmit masticatory forces through the bone, maintaining physiological bone remodeling. Bridges, in contrast, fail to provide adequate stimulation to the residual ridge, resulting in "disuse atrophy" and progressive resorption—a biological limitation that adversely affects long-term aesthetic and functional outcomes.

Patient-centric measures such as comfort, functional efficiency, and esthetic satisfaction clearly favor implants over traditional bridges. Implants offer a restoration that is Osseo perceptive, fostering a sensation closely resembling a natural tooth. This contributes to higher patient-reported comfort and confidence in masticatory function, even with challenging foods. In contrast, bridges, by distributing force to abutment teeth and requiring the permanent modification of healthy dentition, often yield lower scores in patient satisfaction surveys. Furthermore, the capacity of implants to preserve natural interdental papillae and maintain soft tissue contours underpins their better esthetic ratings.

The incidence and nature of complications further differentiate implants from bridges. While minor technical complications such as screw loosening in implants do occur, these are relatively infrequent and easily managed without compromising the overall restoration or adjacent teeth. Bridges encounter significantly more frequent and severe complications, notably secondary caries beneath crown margins and abutment tooth loss, necessitating more invasive and costly interventions. These events not only lead to increased patient morbidity but also demand frequent clinical visits, underscoring the higher maintenance burden associated with bridges.

Economic considerations, often the primary factor influencing treatment choice, reveal a nuanced picture. Although implants involve higher initial costs compared to bridges, the total cost of ownership over a decade is comparable or even favorable to implants when factoring in maintenance expenses and the risk of eventual bridge replacement. The downstream clinical costs of bridge failure such as additional restorative work and potential multi-tooth replacements compound the financial burden considerably. Implants, with their longevity and reduced need for major repairs, represent a more cost-effective investment in oral health and function over the long term. This reinforces the notion that implants are not merely an expensive option but a financially prudent solution when considering life-cycle costs.

Despite the clear advantages of implants, traditional bridges continue to have a place in clinical practice. They remain a viable option for patients with contraindications to surgery, insufficient bone volume without implant candidacy, or financial

barriers that preclude extensive grafting or implant placement. Additionally, in cases where adjacent teeth compromised and require crowns, bridge treatment may provide a pragmatic restorative choice. Nevertheless, clinicians must exercise caution in electing to place bridges by compromising healthy teeth, given the documented increased biological and economic risks.

In summarizing, this review provides compelling evidence that dental implants regarded as the preferred treatment option for single-tooth replacement and many multi-unit cases where feasible. The biological, functional, esthetic, and economic data collectively position implants as the gold standard of care for tooth replacement in modern dentistry. As implant, technology and techniques continue to evolve enhanced by advances in biomaterials, digital workflows, and minimally invasive surgery the gap between implants and traditional bridges is expected to widen further. Clinicians and patients alike should recognize implants not only as a restorative intervention but as a strategic investment in the long-term preservation of oral health and quality of life. The future of prosthodontics lies in embracing this paradigm, moving toward treatments that restore function while minimizing biological sacrifice, ultimately delivering durable and satisfying outcomes for patients worldwide.

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The authors declare that they have no competing interests.

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