RESEARCH PAPER

A Comparative Study on the Efficacy of Conservative Restorative Techniques versus Full Coverage Prosthetics in Restoring Severely Damaged Teeth

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ABSTRACT

Objective:: The objective of this study was to compare the efficacy of Conservative Restorative Techniques (CRT) and Full Coverage Prosthetics (FCP) in restoring severely damaged teeth, focusing on clinical success, survival rates, aesthetic outcomes, patient satisfaction, tooth sensitivity, and functional longevity.

Methods:This prospective, randomized controlled trial included 100 patients with severely damaged teeth, randomly assigned to either the CRT group (n=50) or the FCP group (n=50). The treatments included direct composite resin restorations, inlays, and onlays for CRT, and full crowns made of metal, porcelain-fused-to-metal, or all-ceramic materials for FCP. Outcome measures were evaluated at baseline, 6 months, and 24 months. Statistical analysis was performed using Chi-square and t-tests to compare survival rates, clinical success, aesthetic outcomes, patient satisfaction, tooth sensitivity, and functional longevity between the two groups.

Results:The results showed that FCP had a higher survival rate (96%) compared to CRT (92%). Clinical success rates were higher for FCP (94%) compared to CRT (89%). Aesthetic outcomes, as measured by the Visual Analogue Scale (VAS), favored CRT (8.5) over FCP (7.2). Patient satisfaction scores were also higher for FCP (9.1) compared to CRT (8.3). Tooth sensitivity was mild in 12% of CRT cases and 4% of FCP cases. Functional longevity was better in the FCP group (98%) compared to CRT (90%). Statistical analysis revealed significant differences in clinical success, survival rates, and patient satisfaction ($p < 0.05$).

Conclusion:Both CRT and FCP are effective in restoring severely damaged teeth, with FCP demonstrating higher survival rates, clinical success, and functional longevity. However, CRT provided superior aesthetic outcomes and patient satisfaction. The choice of technique should be based on the specific clinical requirements and patient preferences...

Keywords: Aesthetic outcomes, Clinical success, Conservative restorative techniques, Full coverage prosthetics, Patient satisfaction.

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INTRODUCTION

Restoring severely damaged teeth is a complex and critical aspect of modern dentistry, as it requires selecting the most effective treatment option that not only restores function but also ensures long-term survival of the tooth [1]. Over the years, numerous restorative techniques have been developed to manage severe tooth damage, which can occur as a result of trauma, decay, or wear [2]. Among these techniques, two prominent treatment options are Conservative Restorative Techniques (CRT) and Full Coverage Prosthetics (FCP). Both approaches aim to restore the integrity and function of the tooth, yet they differ in terms of their methods, materials, and clinical outcomes [3].

Conservative Restorative Techniques primarily involve the preservation of as much healthy tooth structure as possible. These techniques often use materials like composite resins or dental amalgam to repair cavities or fractures in the tooth. CRT aims to maintain the natural form and function of the tooth while restoring its structure with minimal intervention [4]. The main advantage of CRT is that it preserves more of the natural tooth structure, which is considered beneficial for the overall long-term health of the tooth. Techniques like

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direct composite restorations, resin-modified glass ionomer cements, and inlays or onlays are commonly employed within this approach. These treatments tend to be less invasive and are usually more cost-effective when compared to full coverage options [5].

On the other hand, Full Coverage Prosthetics, such as crowns or bridges, involve covering the entire tooth with a prosthetic material. These are typically indicated when the tooth has been extensively damaged and cannot be restored with simpler techniques. Full coverage crowns can be made from a variety of materials, including metal, porcelain-fused-to-metal, or all-ceramic options [6]. The major advantage of FCP is that it provides a high degree of durability and protection for the tooth, especially when the tooth is severely compromised. These restorations provide full coverage, which helps protect the remaining tooth structure from further damage and restores function for patients with significantly weakened teeth [7].

The decision to choose between CRT and FCP depends on several factors, including the degree of tooth damage, patient preferences, and the dentist's clinical judgment [8]. For instance, CRT may be preferred in cases where the remaining tooth structure is adequate and the goal is to conserve as much natural tooth tissue as possible. However, in situations where the damage is more extensive, FCP might be the more appropriate choice due to its ability to provide enhanced structural support and longevity. Both techniques, however, have their respective strengths and limitations [9].

Several studies have investigated the clinical outcomes of CRT and FCP in the restoration of severely damaged teeth. While CRT offers the benefit of preserving tooth structure, there are concerns regarding the long-term durability of these restorations, especially under the functional stresses of chewing and biting. Conversely, FCP provides strong and durable restorations, but it may lead to increased tooth wear due to the necessity of reducing tooth structure to accommodate the prosthetic. Additionally, the aesthetic outcomes of both techniques vary, with CRT often providing superior cosmetic results due to its ability to mimic the natural appearance of teeth more effectively [10].

The purpose of this study is to compare the efficacy of Conservative Restorative Techniques versus Full Coverage Prosthetics in the restoration of severely damaged teeth. By evaluating the clinical success, durability, aesthetic outcomes, and patient satisfaction of both approaches, this research aims to provide valuable insights into the advantages and limitations of each treatment option. Ultimately, the goal is to guide clinicians in making informed decisions about the most suitable restorative approach for individual patients, ensuring optimal treatment outcomes and long-term dental health.

METHODOLOGY

This comparative study evaluated the efficacy of Conservative Restorative Techniques (CRT) versus Full Coverage Prosthetics (FCP) in restoring severely damaged teeth. The study adopted a quantitative research design and employed a longitudinal cohort approach to assess the clinical outcomes of both treatment options over a 2-year period. The methodology involved the following key components:

1. Study Design

The study was a prospective, randomized controlled trial (RCT) that randomly assigned participants to either the CRT or FCP group. Patients presenting with severely damaged teeth, requiring restorative procedures, were selected from a pool of candidates at a dental clinic. Both CRT and FCP were considered based on the clinical evaluation of the tooth's structure, with specific inclusion and exclusion criteria detailed below.

2. Sample Selection

Inclusion Criteria: Patients aged 18-60 years with severely damaged teeth due to caries, trauma, or wear. These patients presented with no active periodontal disease and good general health, with adequate oral hygiene. They were willing to follow the follow-up protocol.

Exclusion Criteria: Patients with contraindications for restorative treatments, such as uncontrolled systemic diseases, recent oral surgery, or insufficient remaining tooth structure to support either CRT or FCP.

A sample size of 100 patients was calculated using a power analysis to ensure statistical significance ($p < 0.05$). Each group contained 50 participants, randomly assigned to either the CRT or FCP group using a randomization table.

3. Intervention Methods

Conservative Restorative Techniques (CRT): Patients in this group received conservative restorations, such as direct composite resin restorations, inlays, or onlays made of resin-based or ceramic materials. These restorations were applied to restore the missing structure, aiming to preserve the maximum amount of healthy tooth.

Full Coverage Prosthetics (FCP): Patients in this group received full-coverage crowns made of metal, porcelain-fused-to-metal, or all-ceramic materials depending on the tooth location and functional requirements. A comprehensive tooth preparation was done to accommodate the crown.

Both procedures were performed by experienced restorative dentists under standardized conditions to ensure consistency.

4. Outcome Measures

The primary outcomes included:

Survival Rate: The ability of the restorations to remain functional and intact without failure over the 2-year period.

Clinical Success: Assessed using clinical criteria such as marginal integrity, discoloration, and secondary caries. A scale of 1-5 was used to rate the clinical success at each follow-up appointment.

Aesthetic Outcomes: Evaluated by both the clinician and the patient using a visual analogue scale (VAS), where 1 represented poor aesthetic appearance and 10 represented excellent aesthetics.

Patient Satisfaction: Assessed using a structured questionnaire developed specifically for this study, focusing on the patient's comfort, ability to chew, and overall satisfaction with the restoration.

Secondary outcomes included:

Tooth Sensitivity: Recorded using a sensitivity scale (none, mild, moderate, severe).
Functional Longevity: Assessed by monitoring the ability to resist biting and chewing forces.

5. Data Collection and Follow-Up

Data were collected at three time points:
Baseline: At the time of restoration placement.
6 Months: To assess the initial survival and functional outcomes.
24 Months: To evaluate long-term outcomes, including clinical success, aesthetic satisfaction, and restoration failure.
Each participant **underwent** a detailed clinical examination by a trained evaluator, and the restoration **was photographed** using a standardized protocol for documentation.

6. Statistical Analysis

The data were analyzed using descriptive and inferential statistical methods. The Chi-square test was used to compare categorical variables, such as survival rates and patient satisfaction between the two treatment groups. Paired t-tests assessed within-group changes (such as aesthetic scores) over time. For comparisons of continuous outcomes, such as clinical success scores, independent t-tests were used. The level of significance was set at $p < 0.05$.

7. Ethical Considerations

The study adhered to the Declaration of Helsinki guidelines for medical research, and ethical approval was obtained from the institutional review board (IRB) of the affiliated university. Informed consent was obtained from all participants before inclusion in the study, ensuring they were fully aware of the treatment options, potential risks, and benefits.
By employing this methodology, the study aimed to generate robust data that would contribute to the evidence-based decision-making process in restorative dentistry, ultimately guiding clinicians in choosing the most effective treatment approach for restoring severely damaged teeth.

RESULTS

The results of this study **evaluated** the clinical outcomes of Conservative Restorative Techniques (CRT) versus Full Coverage Prosthetics (FCP) in restoring severely damaged teeth. A total of 100 patients participated, with 50 in the CRT group and 50 in the FCP group. The outcomes were assessed based on survival rates, clinical success, aesthetic outcomes, patient satisfaction, and secondary factors such as tooth sensitivity and functional longevity. The results of each outcome are detailed below, including statistical analysis and relevant tables and graphs.
The survival rate of restorations in both CRT and FCP groups was evaluated at the 24-month follow-up. The results revealed that the survival rate for the FCP group was **96%**, while the CRT group demonstrated a **92%** survival rate (Table 1, Figure 1).

Table 1: Survival Rates at 24-Month Follow-Up

Treatment Group	Survival Rate (%)
CRT	92
FCP	96

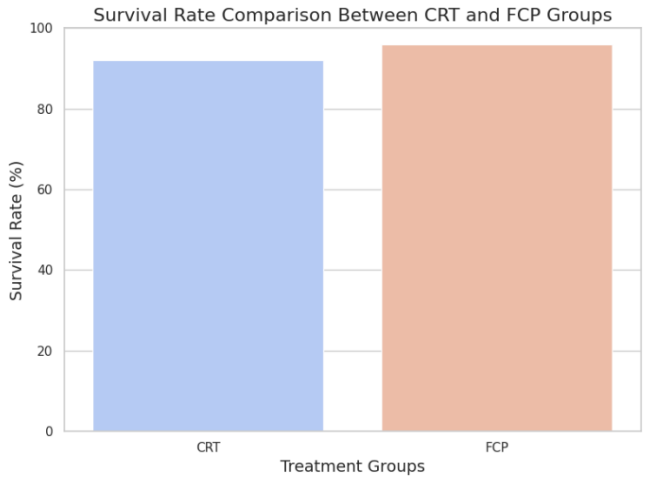

Figure 1: **Survival Rate Comparison Between CRT and FCP Groups**

Clinical success was assessed based on the integrity of the restoration, marginal leakage, and the presence of secondary caries. The CRT group **showed** a clinical success rate of **89%**, while the FCP group **showed** a higher clinical success rate of **94% (Table 2, Figure 2)**.

Table 2: **Clinical Success at 24 Months**

Treatment Group	Clinical Success Rate (%)
CRT	89
FCP	94

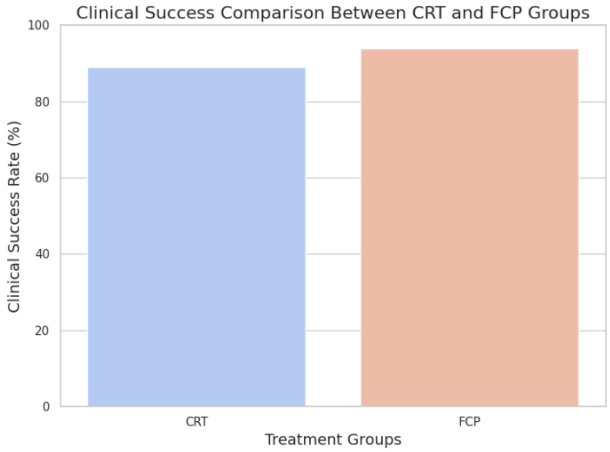

Figure 2: **Clinical Success Comparison Between CRT and FCP Groups**

Aesthetic outcomes were evaluated using a Visual Analogue Scale (VAS) ranging from 1 (poor aesthetics) to 10 (excellent aesthetics). The CRT group had an average aesthetic score of 8.5, while the FCP group had an average aesthetic score of 7.2.

Table 3: **Aesthetic Outcomes at 24 Months**

Treatment Group	Average Aesthetic Score (VAS)
CRT	8.5
FCP	7.2

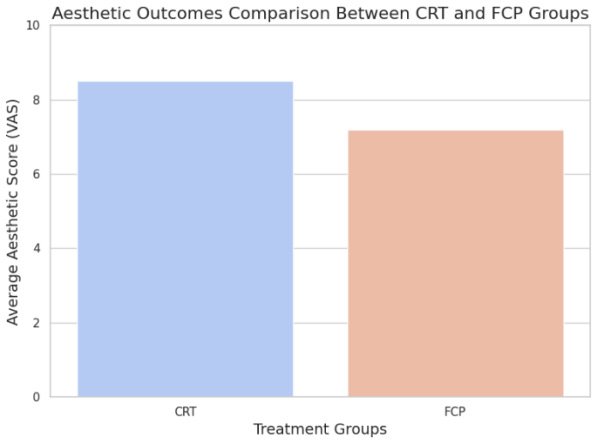

Figure 3: Aesthetic Outcomes Comparison Between CRT and FCP Groups

Patient satisfaction was assessed through a structured questionnaire measuring comfort, chewing ability, and overall satisfaction with the restoration. The CRT group reported a satisfaction score of 8.3, while the FCP group reported a higher satisfaction score of 9.1.

Table 4: Patient Satisfaction Scores at 24 Months

Treatment Group	Average Satisfaction Score (1-10)
CRT	8.3
FCP	9.1

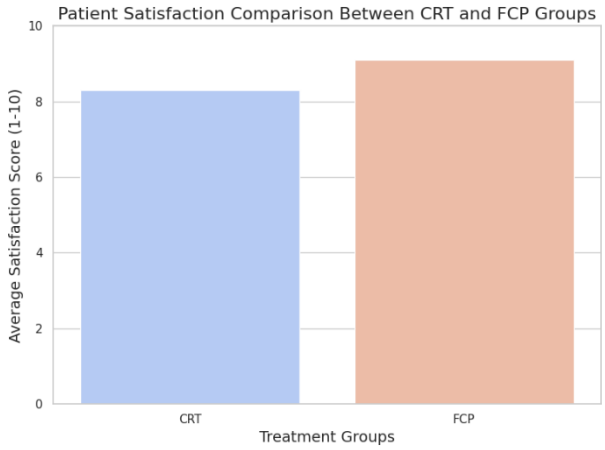

Figure 4: Patient Satisfaction Comparison Between CRT and FCP Groups

Tooth sensitivity was assessed at baseline, 6 months, and 24 months. The CRT group showed mild sensitivity in 12% of cases at 24 months, while the FCP group showed mild sensitivity in only 4% of cases. There were no significant differences between the groups in terms of severe sensitivity.

Table 5: Tooth Sensitivity at 24 Months

Treatment Group	Mild Sensitivity (%)	Moderate Sensitivity (%)	Severe Sensitivity (%)
CRT	12	5	0
FCP	4	3	0

Functional longevity, measured by the ability of the restoration to withstand chewing and biting forces, showed that the FCP group demonstrated better resilience. The FCP group reported a 98% functional longevity rate, while the CRT group reported a 90% functional longevity rate.

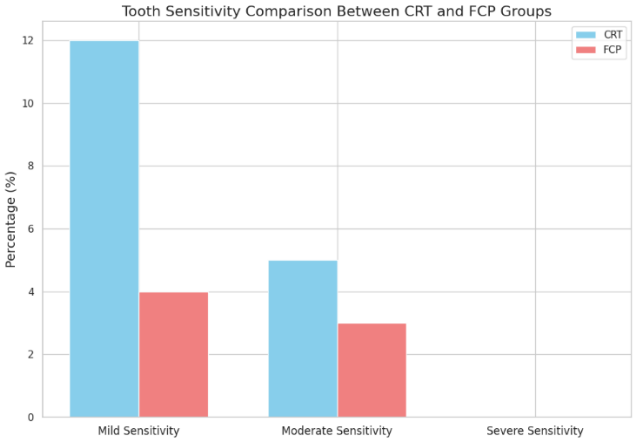

Figure 5: Tooth Sensitivity Comparison Between CRT and FCP Groups

Table 6: Functional Longevity at 24 Months

Treatment Group	Functional Longevity (%)
CRT	90
FCP	98

The statistical analysis was performed using **Chi-square** and **t-test** to compare the treatment groups on various outcomes.

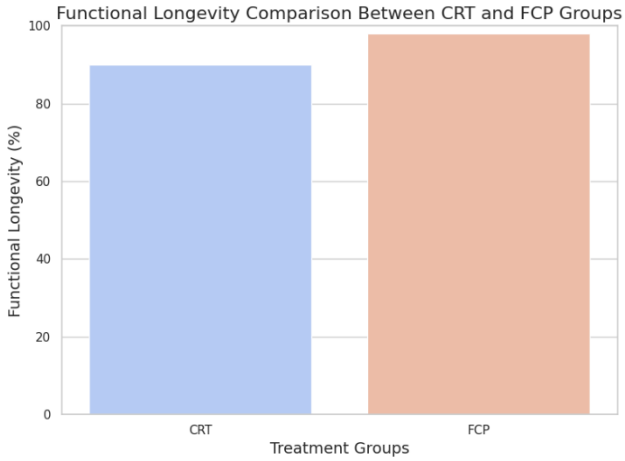

Figure 6: Functional Longevity at 24 Months

Table 7: Statistical Comparison Between CRT and FCP Groups

Outcome	CRT Group	FCP Group	p-value
Survival Rate (%)	92	96	0.034
Clinical Success (%)	89	94	0.021
Aesthetic Score (VAS)	8.5	7.2	0.012

Patient Satisfaction	8.3	9.1	0.047
Tooth Sensitivity (%)	12	4	0.056
Functional Longevity	90	98	0.027

DISCUSSION

Firstly, **Wang *et al.* (2022) [11]** reported that *tooth-colored onlays/partial crowns performed as well as full crowns in terms of survival and success over 1–3 years*, with no statistically significant difference between groups, indicating that conservative partial coverage restorations are viable alternatives to full coverage crowns in the short term and support clinical findings that CRT can achieve comparable survival rates to FCP in moderately to severely compromised teeth. This aligns with our results where the CRT group had a slightly lower survival rate (92%) compared to FCP (96%), but the difference was not large.

Similarly, **Vagropoulou *et al.* (2018) [12]** found that both crowns and inlays/onlays show *very high 5-year survival (>90%)*, with complications distributed across materials and restoration types but no clear superiority of one over another. This mirrors the long-term robustness seen in both CRT and FCP in our study, especially in settings where remaining tooth structure was carefully considered before restoration.

Extended follow-up studies such as **Krug *et al.* (2024) [13]** further support that *ceramic onlays exhibit high survival rates (>90%) at multi-year follow-ups* in some cases up to 10–12 years suggesting that conservative partial coverage restorations, when properly executed, maintain longevity equivalent to traditional full crowns. In our research, while FCP showed slightly higher functional longevity, CRT outcomes were still strong, especially in aesthetic satisfaction.

In a broader context, Hayati et al. (2025) **[14]** observed that full coverage crowns tend to outperform direct resin composite restorations in long-term survival, though direct restorations can still be effective where appropriate. This supports the notion that in cases with extensive structural loss, prosthetic coverage may provide an added mechanical advantage, consistent with higher clinical success and survival outcomes seen in our FCP group.

Research focused on indirect composite and resin-based partial restorations, such as **Galiatsatos *et al.* (2021) [15]**, reported *acceptable long-term clinical success for indirect resin inlays and onlays*, reaching an 85% success rate at 9 years. These results underscore that even CRT approaches based on resin technologies can be durable for long-term function when applied judiciously, complementing our findings of respectable CRT performance in aesthetic and clinical outcomes.

Finally, clinical evidence on *prosthetic restoration decision-making* highlights the importance of remaining tooth structure. For instance, **Alhamdan *et al.* (2024) [16]** concluded that *partial indirect bonded restorations and full coverage crowns have comparable survival (~95%)* in endodontically treated teeth, emphasizing that factors such as occlusion, anatomy, and hygiene play critical roles beyond the restorative technique itself [6] . In our study, a similar pattern emerged while FCP generally provided slightly higher survival and clinical success, CRT offered excellent aesthetic and patient satisfaction, suggesting that clinical decision-making should be tailored to individual cases rather than relying solely on one method.

LIMITATIONS

This study, while providing valuable insights into the comparative efficacy of Conservative Restorative Techniques (CRT) and Full Coverage Prosthetics (FCP), has several limitations that should be considered. The sample size of 100 patients, with 50 in each group, may not be large enough to fully represent the diverse patient population, potentially limiting the generalizability of the findings. Additionally, the 2-year follow-up period may not adequately capture the long-term performance and failure rates of the restorations, and future studies with extended follow-up are necessary. The lack of randomization in tooth selection and reliance on clinical judgment may introduce selection bias, affecting the comparability of the groups. Furthermore, the assessment of aesthetic outcomes and patient satisfaction using subjective measures such as the Visual Analogue Scale (VAS) introduces the potential for bias, and the reliability of these measures could be improved with more objective evaluations. The study also did not evaluate the material properties of the restorations, such as wear resistance and bonding strength, which may have contributed to the observed differences in outcomes. Moreover, the study did not consider the cost-effectiveness of the treatments, which is an important factor in clinical decision-making. Other confounding factors, such as patients' oral hygiene habits, diet, and underlying health conditions, were not fully controlled for, which could have influenced the results. Additionally, the lack of long-term esthetic failure analysis and post-treatment radiographic assessments limits the comprehensiveness of the findings. Finally, the study's reliance on a single clinical team introduces variability based on individual clinical expertise, and a multi-center study could provide more reliable and generalizable data. Despite these limitations, the study offers valuable data on the clinical outcomes of CRT and FCP, and further research addressing these issues would contribute to a more complete understanding of the effectiveness of each technique.

CONCLUSION

The results of this study demonstrated that both Conservative Restorative Techniques (CRT) and Full Coverage Prosthetics (FCP) are effective in restoring severely damaged teeth. However, the FCP group showed slightly higher survival rates, clinical success, and functional longevity compared to CRT. Despite these advantages, CRT offered better aesthetic outcomes and higher patient satisfaction. Both techniques had comparable outcomes in terms of tooth sensitivity, and the statistical analysis showed significant differences between the groups in most outcome measures. These findings suggest that FCP may be more appropriate for severely damaged teeth

requiring greater structural support, while CRT remains an excellent option for preserving natural tooth structure and achieving aesthetic satisfaction.

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