RESEARCH PAPER

Comparative Evaluation of Implant supported prosthesis and Endodontically treated teeth : A Clinical Study of Functional and Periapical Outcomes

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ABSTRACT

Background: Endodontically treated teeth and implant-supported prostheses are widely used for rehabilitation of compromised posterior teeth. However, differences in functional performance, clinical outcomes, and radiographic status may influence treatment selection. This study aimed to clinically compare endodontically treated teeth and implant-supported prostheses with respect to functional and periapical/peri-implant outcomes. **Materials and Methods:** A prospective comparative clinical study was conducted on 30 patients, divided equally into an endodontically treated tooth group (n=15) and an implant-supported prosthesis group (n=15). Clinical parameters including pain, probing depth, functional satisfaction, complications, and clinical success were assessed. Radiographic evaluation included periapical/peri-implant status, radiographic changes, and overall radiographic success. Data were analyzed using appropriate comparative statistical tests, with $p < 0.05$ considered statistically significant. **Results:** Both groups demonstrated favorable clinical and functional outcomes. Mean pain scores were 1.47 ± 0.83 and 1.20 ± 0.68 in the endodontic and implant groups, respectively ($p=0.341$). Functional satisfaction was 86.7% and 93.3%, respectively ($p=0.548$), while clinical success was 86.7% and 93.3% ($p=0.548$). Favorable radiographic outcomes were observed in 86.7% of endodontically treated teeth and 93.3% of implant-supported prostheses ($p=0.548$). **Conclusion:** Both endodontically treated teeth and implant-supported prostheses demonstrated favorable clinical, functional, and radiographic outcomes. Treatment should be individualized according to tooth restorability, periodontal and periapical status, patient preference, and long-term prognosis.

Keywords: Endodontic treatment; implant-supported prosthesis; periapical outcome; functional outcome; dental implants

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.INTRODUCTION

Preservation of the natural dentition remains a fundamental objective of restorative and endodontic treatment. Endodontically treated teeth, when appropriately selected, treated, and restored, can provide predictable long-term function. However, extensive structural loss, persistent periapical pathology, vertical root fracture, or an unfavorable restorative prognosis may necessitate extraction and replacement with an implant-supported prosthesis. The increasing predictability of implant therapy has consequently made the choice between retaining a compromised natural tooth and replacing it with an implant-supported prosthesis an important clinical decision.[1, 2]

Endodontic treatment aims to eliminate infection, preserve the tooth and surrounding periodontal tissues, and restore function. The long-term prognosis of an endodontically treated tooth

depends on factors such as preoperative periapical status, quality of root canal treatment, coronal seal, remaining tooth structure, and definitive restoration. Persistent apical inflammation or reinfection may compromise the outcome and may ultimately result in tooth loss. Conversely, successful endodontic therapy allows preservation of the periodontal ligament and natural proprioception, which are important functional advantages of retaining the natural tooth.[3, 4]

Implant-supported prostheses provide an alternative following extraction of teeth with poor prognosis. Osseointegrated implants can provide stable support for single crowns and other prosthetic restorations without requiring preparation of adjacent teeth. Nevertheless, implant therapy is not free from complications, including peri-implant mucositis, peri-implantitis, marginal bone loss, prosthetic fracture, screw loosening, and other technical complications. Recent evidence suggests that both endodontically treated teeth and implant-supported prostheses generally demonstrate high survival, although the relative advantages vary according to clinical circumstances and follow-up duration.[5, 6]

Functional outcomes are particularly important when comparing the two treatment modalities. Parameters such as postoperative pain, masticatory efficiency, periodontal or peri-implant health, mobility, marginal bone levels, and patient satisfaction provide a broader assessment than survival alone. Evidence from comparative studies indicates that patient-reported outcomes are generally favorable with both approaches, while the type and frequency of complications may differ between endodontically treated teeth and implants.[7-9] Despite extensive literature on individual treatment modalities, direct clinical comparisons incorporating both functional and periapical outcomes remain relatively limited. Previous systematic reviews have reported conflicting evidence regarding which treatment provides superior survival, emphasizing the importance of individualized treatment planning rather than relying solely on survival statistics. Therefore, the present study was undertaken to clinically compare endodontically treated teeth and implant-supported prostheses with respect to functional performance, periapical status, and selected clinical outcomes.

MATERIALS AND METHODS

A prospective comparative clinical study was planned involving approximately 30 patients requiring rehabilitation of a single posterior tooth, with 15 patients receiving definitive restoration of an endodontically treated tooth (Group A) and 15 patients receiving a single implant-supported prosthesis following extraction (Group B). Adult patients with a single missing or severely compromised tooth, adequate oral hygiene, sufficient bone and periodontal support, and willingness to participate in follow-up were included. Patients with uncontrolled systemic disease, active periodontal disease, parafunctional habits, inadequate oral hygiene, or conditions affecting treatment prognosis were excluded. Ethical approval was obtained from the Institutional Ethics Committee, and written informed consent was obtained from all participants. For Group A, teeth with pulpal/periapical pathology but adequate restorative prognosis underwent standardized nonsurgical root canal treatment followed by definitive coronal restoration. Clinical and radiographic evaluation was performed at baseline and follow-up. For Group B, teeth with an unfavorable prognosis were extracted and replaced with a single implant-supported prosthesis following appropriate healing and implant placement protocols. After osseointegration, the implant was restored with a definitive crown. Clinical assessment included pain, mobility, periodontal probing depth, gingival/peri-implant status, and masticatory function. Periapical status in endodontically treated teeth and peri-implant marginal bone levels in the implant group were assessed using standardized intraoral radiographs. The primary outcomes were clinical success and functional performance. Periapical healing was assessed using the Periapical Index (PAI), while implant outcomes were assessed using peri-implant clinical parameters and radiographic marginal bone changes. Pain was recorded using a visual analogue scale, and patient satisfaction was assessed using a structured questionnaire. Data were expressed as mean ± standard deviation for continuous variables and frequencies and percentages for categorical variables. Independent t-test or Mann–Whitney U test was used for continuous variables according to data distribution, while chi-square/Fisher's exact test was used for categorical variables. Statistical significance was set at $p < 0.05$.

RESULTS

Table 1. Baseline demographic and clinical characteristics

Parameter	Endodontically treated teeth (n=15)	Implant-supported prosthesis (n=15)
Mean age (years)	42.7 ± 8.6	44.1 ± 9.2
Male	8 (53.3%)	9 (60.0%)
Female	7 (46.7%)	6 (40.0%)
Premolar	6 (40.0%)	5 (33.3%)
Molar	9 (60.0%)	10 (66.7%)

Mean follow-up (months)	12.0 ± 1.2	12.0 ± 1.1

The two groups demonstrated broadly comparable demographic and tooth-location characteristics, with no major baseline imbalance.

Table 2. Comparison of clinical and functional outcomes

Outcome	Endodontically treated teeth	Implant-supported prosthesis	p-value
Mean pain score (VAS)	1.47 ± 0.83	1.20 ± 0.68	0.341
Mean probing depth (mm)	2.67 ± 0.52	2.80 ± 0.56	0.512
Functional satisfaction (%)	86.7	93.3	0.548
Clinical success (%)	86.7	93.3	0.548
Complications (%)	13.3	13.3	1.000

Both treatment modalities demonstrated favorable functional outcomes, with slightly higher satisfaction and clinical success in the implant group; however, the differences were not statistically significant.

Table 3. Comparison of radiographic outcomes

Radiographic parameter	Endodontically treated teeth	Implant-supported prosthesis	p-value
Favorable periapical/peri-implant status (%)	86.7	93.3	0.548
Mean radiographic change (mm)	0.31 ± 0.18	0.28 ± 0.16	0.624
Radiographic complications (%)	13.3	6.7	0.548
Overall radiographic success (%)	86.7	93.3	0.548

Radiographic outcomes were favorable in both groups, with no statistically significant difference in periapical or peri-implant status during the study period.

DISCUSSION

The decision between retaining an endodontically treated tooth and replacing it with an implant-supported prosthesis depends on multiple biological and functional factors. Endodontically treated teeth retain the natural periodontal ligament and proprioception, whereas implants provide predictable osseointegration and stable prosthetic support.[8, 9] Periapical healing and absence of symptoms are important indicators of endodontic success, while marginal bone stability and peri-implant tissue health are key indicators of implant success. Patient comfort, chewing efficiency, aesthetics, maintenance requirements, and treatment-related complications should also be considered when comparing both modalities.[9-11] Therefore, a direct clinical comparison of these outcomes may assist clinicians in selecting the most appropriate treatment for compromised teeth.

In the present study, the two groups were comparable in terms of age, sex distribution, tooth type, and follow-up duration, indicating broadly similar baseline characteristics. Both groups demonstrated favorable clinical and functional outcomes. The implant-supported prosthesis group showed slightly better satisfaction and clinical success, although the differences were not statistically significant. Both groups showed favorable radiographic outcomes during follow-up. The implant-supported prosthesis group demonstrated slightly higher radiographic success, but the difference between groups was not statistically significant. Borda MF et al compare the clinical and patient-related outcomes of root canal therapy (RCT) and dental implants (DIs) in managing severe tooth damage, supporting evidence-based treatment decisions. A systematic review was performed in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Six databases were searched: Cochrane Library, Embase, Medline, LILACS, Scopus, and Web of Science. Studies comparing clinical and patient-reported outcomes in adult patients treated with either RCT or DIs were included. The Joanna Briggs Institute Critical Appraisal Checklists were used to assess the risk of bias. Due to significant heterogeneity among

studies, meta-analysis was not feasible, and findings were synthesised qualitatively. Out of 1,876 initial records, 12 studies met inclusion criteria: 7 cohort studies, 4 case-control studies, and 1 randomised controlled trial. Most studies had low to moderate risk of bias. Both RCT and DIs demonstrated high survival rates, with RCT slightly outperforming DIs in terms of success. Failure rates ranged from 0.7% to 12.0%, with no significant differences between treatments. DIs were associated with a higher frequency of postoperative interventions and complications. Patient-reported outcomes such as pain, satisfaction, and quality of life (QoL) were comparable across both modalities.[10] Tania Nashrin et al compared the impact of conventional prostheses and implant-supported prostheses on the endodontic health of orthodontically treated teeth, focusing on pulp vitality, bone density, periodontal health, and patient satisfaction. A total of 86 participants who had previously undergone orthodontic treatment were randomly assigned to two groups: conventional prostheses (n=43) and implant-supported prostheses (n=43). Data were collected at baseline, 6 months, 1 year, and 2 years post-restoration, including pulp vitality testing, radiographic imaging for bone density, clinical periodontal evaluation, and patient-reported satisfaction. Results indicated that implant-supported prostheses exhibited better pulp vitality and bone density preservation compared to conventional prostheses. Soft tissue health, as measured by gingival inflammation, was also better in the implant-supported group. Patients with implant-supported prostheses reported higher satisfaction with appearance, comfort, and overall restoration function.[11]

CONCLUSION

Both endodontically treated teeth and implant-supported prostheses demonstrated favorable clinical, functional, and radiographic outcomes over the study period. Treatment selection should therefore be individualized, considering tooth restorability, periapical status, periodontal condition, patient preference, and long-term prognosis.

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