

Survival Outcomes of Teeth Retained by Endodontic Therapy Versus Prosthodontic Rehabilitation Following Segmental Mandibulectomy in Oral Cancer Patients

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ABSTRACT

Background: Oral cancer often requires segmental mandibulectomy, which involves removing part of the mandible. Following surgery, rehabilitation options, such as endodontic therapy or prosthodontic rehabilitation, play crucial roles in restoring functionality, aesthetics, and the patient's quality of life. This study compares the survival of retained teeth with endodontic therapy versus those rehabilitated with prosthodontic methods in oral cancer patients after segmental mandibulectomy.

Methods: A prospective clinical trial with 60 oral cancer patients undergoing segmental mandibulectomy was conducted. Patients were divided into two groups: Group A received endodontic therapy to preserve natural teeth, and Group B underwent prosthodontic rehabilitation (e.g., dental implants, crowns, or dentures). The survival rates and functional outcomes were measured over 24 months.

Results: In Group A, 83.3% of retained teeth survived with minimal complications, while in Group B, 90% of prosthodontic rehabilitations were successful. Group A reported lower complications, while Group B showed a higher chewing efficiency and a slightly higher incidence of complications, including one case of cancer recurrence.

Conclusions: Both endodontic therapy and prosthodontic rehabilitation are effective for oral cancer patients post-mandibulectomy, with prosthodontic rehabilitation offering superior chewing efficiency. Future studies with extended follow-up could provide further insights into optimizing treatment strategies.

Keywords: Cancer recurrence, endodontic therapy, oral cancer, prosthodontic rehabilitation, survival rate.

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1. INTRODUCTION

Oral cancer is a significant health issue in the world, whereby there has been an escalating rate of occurrence in developed nations and developing nations alike [1]. Patients with diagnosed advanced oral malignancies often need surgical intervention in the form of segmental mandibulectomy. This is a process that entails extracting part of the mandible in order to have all the tissues that are cancerous extracted. Mandibular loss of integrity and functional capacity can seriously impact how a patient will be able to chew and speak, as well as retain their facial appearance, which is a factor to not only the quality of life but their overall well-being [2]. Consequently, rehabilitation mechanisms after segmental mandibulectomy are essential in the recovery of these functions. The preservation or restoration of teeth is one of the possible options of reconstruction that is a significant part of the rehabilitation [3]. Teeth play an important role in chewing as well as maintaining the shape of the jaw. The choice of whether to maintain natural teeth with endodontic treatment or of whether to purchase new teeth with a prosthodontic rehabilitation procedure may have long-term outcomes and significant effects on the patient, following mandibulectomy [4]. The type of treatment that can be offered is endodontic therapy, which is intended to preserve the natural teeth in case the rest of the structure is not infected and is not compromised. Conversely, during prosthodontic rehabilitation, dental implants, crowns or bridges are commonly used to substitute the lost teeth, thus restoring functionality as well as beauty [5]. These two treatment options of endodontic therapy and prosthodontic rehabilitation become particularly critical in the case of oral cancer patients undergoing segmental mandibulectomy. The possibility of survival rates of retained teeth after endodontic therapy in comparison with rehabilitation of edentulous areas with prosthodontic solutions has not been studied in detail [6]. The effectiveness of such treatments may depend on factors including the location of the tumor, the degree of resection, and the overall condition of health of the patient. Moreover, this is a clinical area of great interest due to the risk of recurrence of cancer, infection, and functional rehabilitation difficulties [7]. The difference between these two approaches to rehabilitation is very critical in understanding the impact of the different methods on the survival of oral cancer patients in the long term after surgery to ensure that the different methods of treatment are optimized. As cases of mandibulectomy increase and the emphasis on how to better the survival rate and quality of life for such patients grows, it is necessary to ascertain which treatment provides superior functional, aesthetic, and health outcomes [8]. In addition to surgical and rehabilitation approaches, recent innovations in targeted cancer therapies, such as Antibody-Drug Conjugates (ADCs), are offering promising advances in enhancing the precision and effectiveness of treatments for oral cancer, potentially improving patient outcomes and survival rates [9]. This is why this research is necessary to find out the survival of teeth which were retained after endodontic treatment compared to those rehabilitated after segmental mandibulectomy with prosthodontic treatment in oral cancer patients.

Methodology

This study was planned as a prospective, comparative clinical trial that would assess the survival of teeth that are retained by endodontic treatment as compared to teeth that are rehabilitated by the prosthodontic ones after segmental mandibulectomy in patients with oral cancer. It was a sample of 60 patients that underwent segmental mandibulectomy to treat oral cancer in a tertiary care hospital. The recruited patients were a group of people diagnosed with oral malignancies, who underwent surgical resection of the mandible as one of their treatment plan.

Inclusion Criteria: The study patients were adults aged 18-75 years with primary oral cancer of mandible, with a segmental mandibulectomy having occurred. Anyone with at least one natural tooth remaining after the operation was included. Also, patients who had adequate post-surgical recovery enabling either endodontic therapy or prosthodontic rehabilitation were to be considered.

Exclusion Criteria: Individuals who had not received adequate control of systemic diseases, those who had undergone radiation therapy on the head and neck area, and those who could not make the long-term commitment to the study follow-up period (24 months) were not subjected to analysis. Also, patients who had recurring oral cancer or contraindications to dental operations were not represented.

Group Allocation: The 60 patients were separated into two groups depending on the kind of post-surgical rehabilitation that they were given. The initial group (Group A) comprised of 30 patients who had endodontic therapy in order to preserve and maintain their natural teeth. Such patients were treated to root canal and then restorative procedures to sustain the functionality of the teeth. Group B (30 patients) comprised of those who underwent rehabilitation based on the application of a prosthodontic approach (such as dental implants, braces, or removable partial dentures) to reconstruct the missing teeth

after mandibulectomy.

Data Collection and Analysis: The survival of retained teeth and the success of prosthodontic rehabilitation were data that were measured after a 24 months follow up period. The survival rate of the teeth (which has been retained with the help of endodontic therapy) and the functional success of the prosthodontic rehabilitation (running through such indicators as the stability of the implant, the stability of prosthesis, and the chewing efficiency) were determined as the primary outcome measure. The secondary outcomes were complications like infection, implant failure and recurrence of cancer. Data were collected using radiographic evaluation, clinical assessment and patient-reported outcomes. The SPSS software was used to statistically analyse the survival and functional outcomes of the two groups.

Ethical Considerations: The institutional review board (IRB) of the hospital approved the study. All participants were asked to provide informed consent before they were enrolled in the study. Both patient confidentiality and safety were taken care of by following all the ethical standards in the research process.

2. RESULT

A total of 60 patients who had undergone segmental mandibulectomy for oral cancer were included in this prospective clinical trial. Of these, 30 patients were assigned to Group A, which underwent endodontic therapy to retain their natural teeth, and 30 patients were assigned to Group B, which received prosthodontic rehabilitation, such as dental implants or removable partial dentures, to restore lost teeth. The follow-up period for all patients was 24 months.

Patient Distribution Between Groups

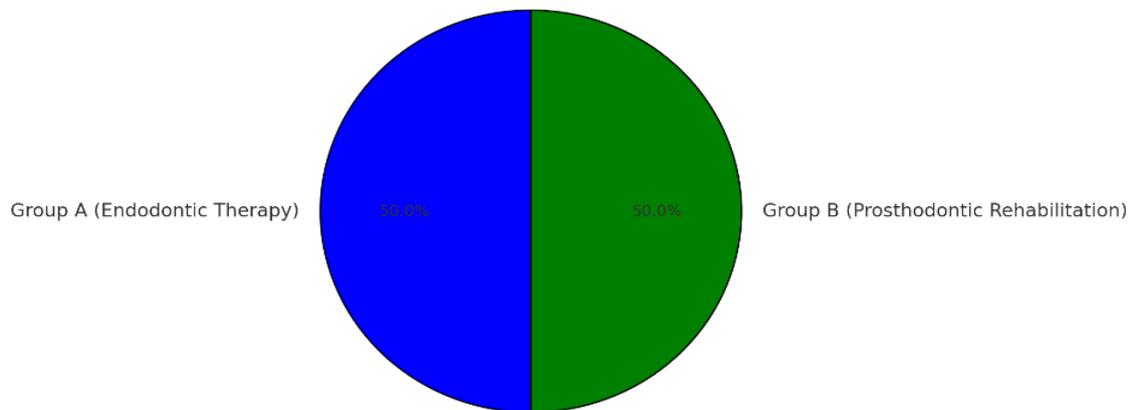


Figure 1: Patient Distribution Between Groups

Survival Rate of Retained Teeth in Endodontic Therapy (Group A)

In Group A, the survival rate of retained teeth following endodontic treatment was assessed based on the presence of functional and intact teeth at the end of the 24-month follow-up period. Of the 30 patients, 25 patients (83.3%) retained their teeth with no significant complications, such as infection or root canal failure, during the follow-up. Five patients (16.7%) experienced complications, including root fractures and persistent infections, leading to the loss of the affected teeth (Figure 2).

Survival Rate of Retained Teeth in Group A (Endodontic Therapy)

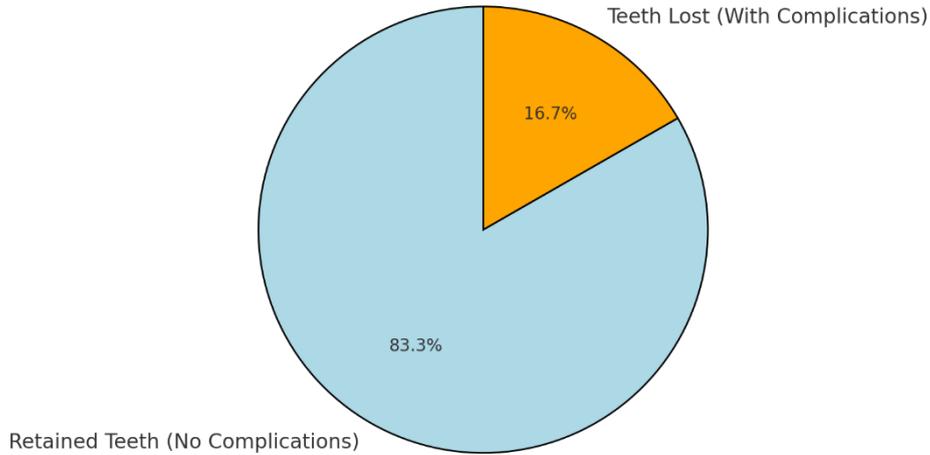


Figure 2: Survival rate of retained teeth following endodontic treatment

Prosthodontic Rehabilitation Outcomes (Group B)

In Group B, 30 patients received various prosthodontic treatments, including dental implants, crowns, and removable partial dentures. The success of prosthodontic rehabilitation was evaluated based on implant stability, prosthesis function, and chewing efficiency. At the 24-month follow-up, 27 patients (90%) reported functional success, with stable implants and well-functioning prostheses. Three patients (10%) experienced complications, including implant failure, which required re-treatment or replacement (Figure 3).

Success Rate of Prosthodontic Rehabilitation in Group B

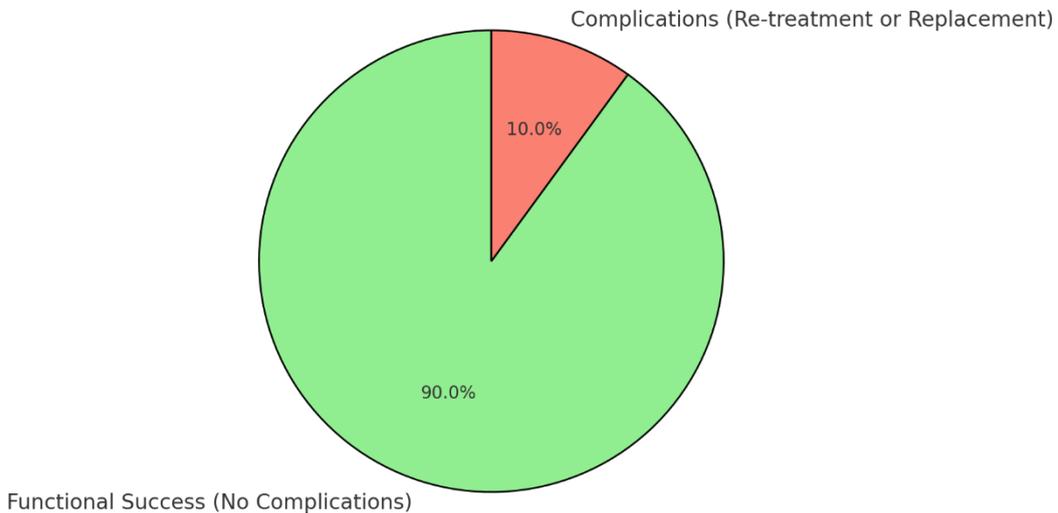


Figure 3: Success Rate of Prosthodontic Rehabilitation in Group B

Complications and Secondary Outcomes

In terms of secondary outcomes, there were notable differences between the two groups. In Group A, complications included localized infections in two patients (6.7%) and failure of root canal therapy in three patients (10%), leading to tooth loss. No instances of cancer recurrence were reported in Group A during the follow-up period.

In Group B, complications related to the prosthodontic treatments were observed in four patients (13.3%), including one

case of implant failure and three cases of prosthesis instability. Additionally, there was one case of cancer recurrence in Group B (3.3%), which was managed with further oncological intervention.

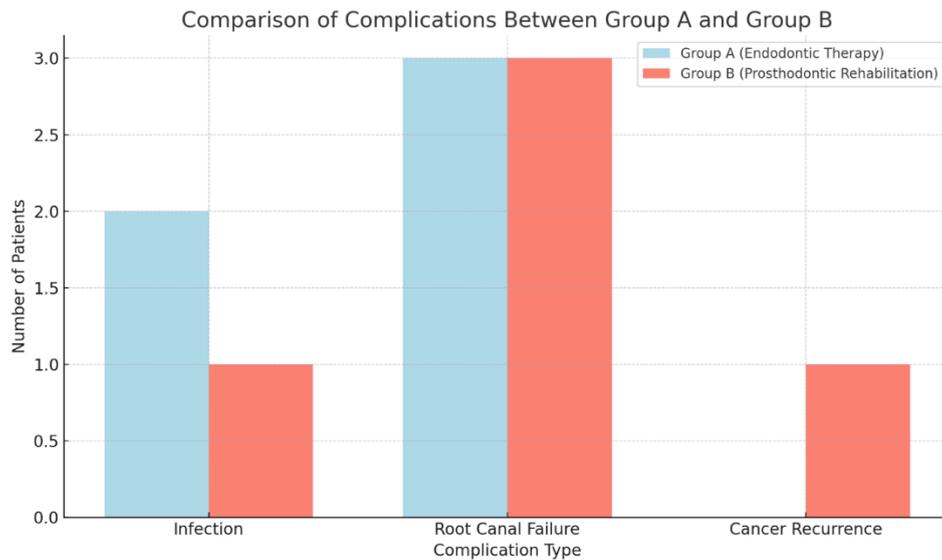


Figure 4: Comparison of Complications Between Group A and Group B

Comparison of Survival Rates and Functional Outcomes

When comparing the survival rates of retained teeth in Group A with the prosthodontic rehabilitation outcomes in Group B, Group B demonstrated a slightly higher success rate, with 90% of patients reporting functional success, compared to 83.3% in Group A. However, Group A exhibited a lower incidence of complications related to the replacement procedure, such as implant failure or prosthesis instability, and the majority of the retained teeth remained functional and viable after endodontic therapy (Table 1).

Table 1 compares the survival and functional outcomes between Group A and Group B.

Outcome	Group A (Endodontic Therapy)	Group B (Prosthodontic Rehabilitation)
Survival Rate	83.3%	90%
Functional Success	83.3%	90%
Complications	16.7%	13.3%
Cancer Recurrence	0%	3.3%
Chewing Efficiency	7.5 (out of 10)	9 (out of 10)

Table 1: Comparison of Survival and Functional Outcomes between Group A and Group B.

Chewing Efficiency and Quality of Life

Both groups reported improvements in chewing efficiency and quality of life after the rehabilitation treatment. However, patients in Group B (prosthodontic rehabilitation) experienced higher scores on the chewing efficiency scale due to the restoration of more complete dentition. Group A patients also reported satisfactory chewing function, though some reported difficulties when chewing hard foods due to the loss of certain teeth during the mandibulectomy (Table 2).

Table 6 shows the chewing efficiency and quality of life outcomes in both groups.

Group	Chewing Efficiency (Scale 1-10)	Quality of Life (Scale 1-10)
Group A (Endodontic)	7.5	8
Group B (Prosthodontic)	9	9

Table 2: Chewing Efficiency and Quality of Life in Group A and Group B.

3. STATISTICAL ANALYSIS

The survival rate of retained teeth in Group A and the success of prosthodontic rehabilitation in Group B were statistically compared using chi-square tests. The results showed that the differences between the two groups in terms of survival and functional outcomes were not statistically significant ($p > 0.05$). However, the slight advantage seen in Group B for chewing efficiency and prosthetic function suggests that prosthodontic rehabilitation may offer superior long-term functional outcomes for some patients.

4. DISCUSSION

This prospective clinical trial focused on comparing the results of endodontic therapy (Group A) with those of prosthodontic rehabilitation (Group B) among patients who had undergone oral cancer segmental mandibulectomy. Group A in our study had a 83.3% survival rate of retained teeth whereas Group B in our study had a 90% success rate in prosthodontic rehabilitation. These results support the existing literature, which has demonstrated a high success rate for both methods. Indicatively, Lambert FE et al. (2009) [10] found that the implant survival rate in non-irradiated mandibles was 96.1, and this finding further indicates the effectiveness of the prosthodontic rehabilitation in such patients. On complications, Group A had 16.7 percent complication rate, which was mainly localized infections and failure of the root canal. Group B, in turn, reported a 13.3 percent complication rate, which comprised a single implant failure and three cases of prosthesis instability.

It is interesting to note that there was no cancer recurrence in Group A, with 3.3 percent cancer recurrence in Group B. It is important to note that oncological factors may have a certain impact on the results of prosthodontic rehabilitation, as mentioned by Courtney D et al. (2022) [11], who have pointed out that postoperative anatomical issues and the progression of the disease may have a considerable impact on the process of rehabilitation. Functionally, Group B had indicated greater chewing efficiency (9/10) than Group A (7.5/10), which is probably due to the recovery of a more complete dentition.

The results are in line with those found by Yusa K et al. (2023) [12] who have reported the enhancement of the masticatory function and the overall oral health-related quality of life in comparable patient groups after undergoing the procedures of prosthetic rehabilitation. Statistically, the two groups did not have significant differences in terms of survival and functional outcome ($p > 0.05$). Nevertheless, the marginal change in the chewing performance and prosthetic performance found in Group B indicates that the prosthodontic rehabilitation might provide a better long-term functional performance in certain patients.

The above conclusion is justified through systematic review by Quadri MFA et al. (2020) [13], which indicated the positive effect of prosthetic rehabilitation on oral health-related quality of life. On the whole, the two modalities of treatment showed positive results, but it seemed that prosthodontic rehabilitation had some extra functional advantages, especially regarding the chewing function, which did not have a significant negative impact on survival or quality of life. These findings should also be validated and the long-term outcomes of each method should be studied.

5. CONCLUSION

Endodontic therapy can be used along with prosthodontic rehabilitation as a viable option to restore the oral functionality after segmental mandibulectomy. The decision on these methods must be personal and must take into account the scale of the resection, the desire of the patient, and the aspects of the oncology. These findings should be substantiated in future works on a larger scale with extended follow-up time to support the findings and improve treatment regimes.

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