

Original Research

Evaluating Treatment Modalities for Endo-Perio Lesions: A Comparative Clinical Study

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ABSTRACT:

Background: Pulpal infection has the potential to discharge through the periodontal ligament space, simulating periodontal damage. The current study was undertaken to compare two treatment approaches for Endo-Perio lesions. **Methods:** The research took place in the Endodontics department and involved 104 cases of Endo-Perio lesions, encompassing both genders. The participants were divided into two groups of 52 each. Group I received root canal treatment exclusively, whereas Group II underwent root canal treatment in conjunction with periodontal flap surgery. Various parameters, including the gingival index, plaque index, gingival bleeding index, probing depth, and radiographic bone level, were assessed at intervals of 0-1 month and 1-4 months. **Results:** In Group I, the mean gingival index was 0.40 mm, compared to 0.46 mm in Group II. The plaque index in Group I was 0.45 mm, while in Group II, it measured 0.38 mm. Group I had a gingival bleeding index of 19.2 mm, whereas Group II had 27.4 mm. The probing depth was 2.3 mm in Group I and 1.4 mm in Group II. The radiographic bone level was 2.2 mm in Group I and 1.5 mm in Group II. **Conclusion:** Both treatment approaches demonstrated a noteworthy improvement in the reduction of probing depth and attachment level postoperatively.

Keywords: Endo- Perio, gingival index, Probing depth

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INTRODUCTION

The dental pulp and the surrounding periodontal tissues maintain a close and intricate relationship within the structure of a tooth. Originating from different developmental components, the dental pulp arises from the dental papilla, a specialized group of cells within the early tooth bud, while the periodontal ligament has its genesis in the dental follicle.¹ Hertwig's epithelial root sheath serves as the demarcating boundary between these two structures during tooth development. As the tooth undergoes maturation and the roots take form, three primary avenues for the exchange of infectious elements and other irritants between the dental pulp and the periodontal tissues become established. Firstly, dentinal tubules, microscopic channels traversing the hard dentin tissue, create pathways connecting the pulp chamber with the outer surface of the tooth. Through these tubules, infectious agents or irritants may potentially travel, influencing both the dental pulp and the surrounding periodontal

tissues. Additionally, lateral and accessory canals along the length of the tooth roots provide alternative routes for communication between the dental pulp and the periodontal ligament. These canals, often present in varying numbers, offer additional channels through which substances can flow between the two compartments. Furthermore, the apical foramen, a small opening located at the tip of the tooth root, represents a crucial point of connection between the dental pulp and the periodontal ligament.² This tiny aperture serves as a gateway for substances and elements to pass between the dental pulp and the surrounding periodontal tissues. Understanding these intricate anatomical connections is essential in the context of dental health and pathology. Infections or irritants affecting one compartment have the potential to impact the other, giving rise to conditions such as pulpitis, apical periodontitis, or other dental diseases. This complex interplay underscores the importance of comprehensive dental care to address issues affecting both the dental pulp and the surrounding periodontal

tissues, ensuring the overall health and integrity of the tooth.

The intricate relationship between the dental pulp and the periodontium has been a subject of extensive research, yet certain aspects related to the diagnosis, prognosis, and treatment of conditions involving these dental structures continue to evoke inquiries and discussions within the dental community. One area of particular interest and debate centers around the pathways for the spread of bacteria between the pulpal and periodontal tissues. Pulpal infections have the potential to drain through the periodontal ligament space, leading to an observable manifestation of periodontal destruction.³ This phenomenon is referred to as retrograde periodontitis, signifying the retrograde progression of infection from the pulp towards the surrounding periodontal tissues. The diagnostic challenges posed by retrograde periodontitis and the nuanced treatment approaches contribute to the ongoing discourse within the dental field. Similarly, the coexistence of pulpal and periodontal infections within the same tooth gives rise to what is termed combined lesions. In such scenarios, the treatment strategy is contingent upon the extent of involvement of both the dental pulp and the periodontal tissues. Managing combined lesions becomes a complex task, demanding simultaneous attention to both endodontic and periodontal aspects of the disease. Crucially, it is recognized that both endodontic and periodontal diseases share a commonality in their etiological factors, primarily being caused by mixed anaerobic infections. The microbial flora associated with these conditions often involves a diverse combination of bacterial species thriving in environments with limited oxygen supply. This shared microbial landscape underscores the interconnected nature of endodontic and periodontal diseases, influencing their pathogenesis and clinical manifestations. As researchers and clinicians delve deeper into the intricacies of these relationships, the ongoing exploration of diagnostic nuances and evolving treatment strategies underscores the dynamic nature of dental research. This commitment to advancing our understanding aims to enhance clinical outcomes and provide more effective management for patients grappling with the complex interplay of dental pulp and periodontal issues.

The healing of primary endodontic lesions typically occurs following root canal therapy, a procedure aimed at eliminating microorganisms within the root canal system.⁴ The success of this therapy is significantly influenced by the presence or absence of microorganisms, and achieving effective control of infection is paramount for a positive prognosis. Root canal therapy, when executed with a focus on infection management, generally results in favorable outcomes, contributing to the overall success of the treatment. Conversely, primary periodontal lesions necessitate a distinct therapeutic approach, primarily through periodontal therapy. The prognosis for these

lesions is contingent on several factors, including the severity of the underlying periodontal disease, the efficacy of the periodontal therapy administered, and the individual response of the patient to the treatment. Periodontal therapy aims to address issues related to the supporting structures of the tooth, such as the gums and bone, promoting the restoration of periodontal health. The focus of the present study is to compare two treatment modalities for lesions that involve both endodontic and periodontal components, commonly referred to as Endo-Perio lesions. This dual pathology requires a comprehensive approach that considers both endodontic and periodontal aspects.⁵ The study likely aims to assess the effectiveness of different treatment strategies in managing these complex lesions, taking into account factors such as healing outcomes, patient response, and overall treatment success. By comparing treatment modalities, the study seeks to contribute valuable insights into optimizing the management of Endo-Perio lesions, potentially offering guidance for clinicians in tailoring treatment plans based on the specific characteristics of each case. This research endeavor aligns with the broader goal of advancing evidence-based practices in dentistry and enhancing the overall prognosis and success rates of therapeutic interventions for patients with complex dental pathologies.

MATERIALS AND METHODS

Conducted within the Department of Endodontics, this study undertook a comprehensive examination of 104 cases characterized by Endo-Perio lesions, involving individuals of both genders. In adherence to ethical standards, rigorous informed consent procedures were followed, and ethical clearance was duly obtained from the institutional ethical committee, ensuring the ethical integrity of the research. Patient-specific details, encompassing information such as names, ages, and genders, were systematically recorded for all participants. The cohort was thoughtfully stratified into two groups, each comprising 52 individuals. Group I underwent exclusive root canal treatment, while Group II underwent a combined intervention involving root canal treatment and periodontal flap surgery. Throughout the study's duration, a meticulous assessment of various parameters was conducted to elucidate the outcomes associated with the diverse treatment modalities employed. These parameters encompassed the gingival index, plaque index, gingival bleeding index, probing depth, and radiographic bone level. Measurements were taken at two critical time intervals: 0-1 month and 1-4 months following the initiation of the respective treatments. The amassed data were intricately tabulated, and a robust statistical analysis was applied to derive meaningful insights. The predetermined significance level was set at a P value less than 0.05, ensuring a rigorous evaluation of the statistical significance of the findings. This approach is pivotal

in discerning the comparative effectiveness of root canal treatment alone in contrast to the combined approach with periodontal flap surgery in managing Endo-Perio lesions. This methodologically sound research design seeks to make a substantial contribution to the field of Endodontics. The

anticipated results hold the promise of providing nuanced insights into the optimal treatment strategies for individuals presenting with Endo-Perio lesions, thereby aiding clinicians in making informed and evidence-based decisions in the complex realm of dental care.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Procedure	RCT only	RCT & Periodontal flap surgery
Number	52	52

Figure I Distribution of patients

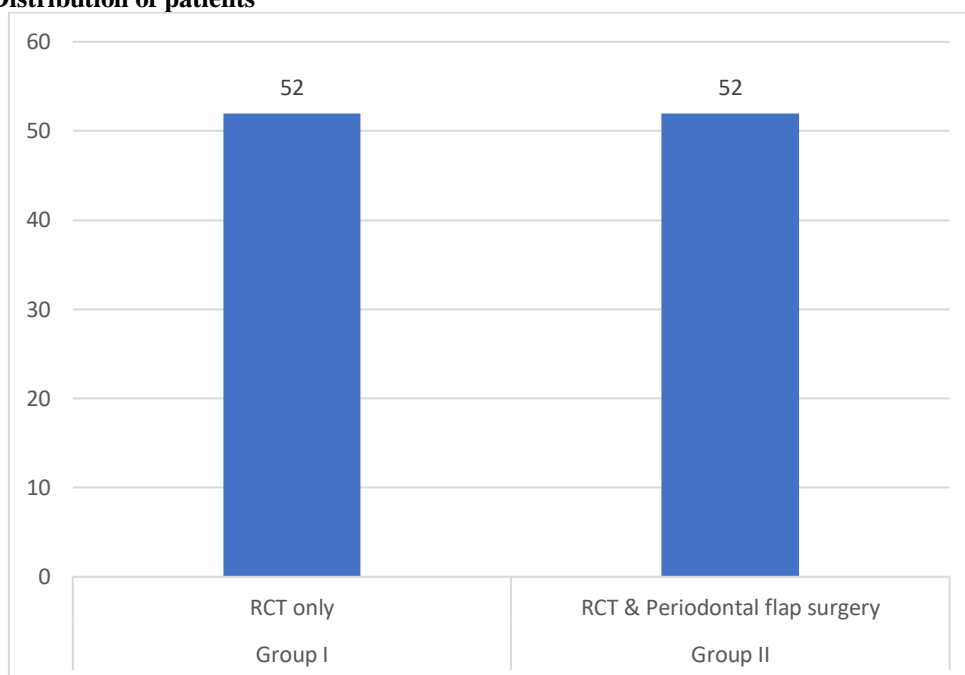
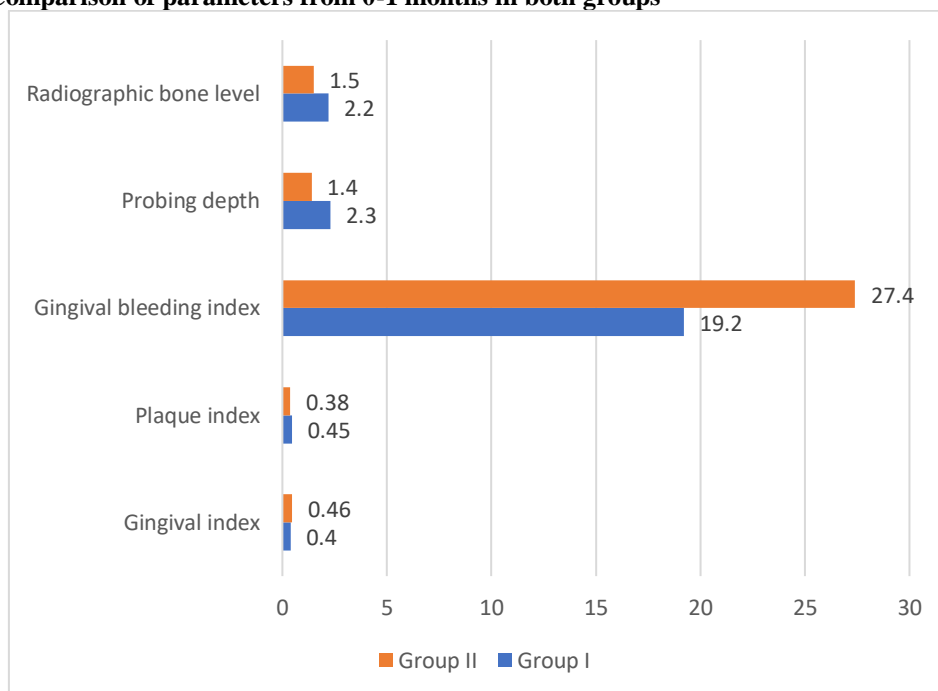


Table I provides a clear distinction between the two treatment modalities employed in the study. In Group I, a total of 52 patients underwent root canal treatment exclusively. In contrast, Group II comprised 52 patients who underwent a combined therapeutic approach involving root canal treatment along with periodontal flap surgery. This systematic division ensured a balanced representation of cases in each

group, facilitating a comparative analysis of the outcomes associated with the distinct interventions. The allocation of an equal number of patients to each group contributes to the robustness of the study design, allowing for meaningful comparisons between the exclusive endodontic intervention and the combined endodontic-periodontal approach in the context of Endo-Perio lesions.

Table II Comparison of parameters from 0-1 months in both groups

Parameters (Mean)	Group I	Group II	P value
Gingival index	0.40	0.46	0.01
Plaque index	0.45	0.38	0.04
Gingival bleeding index	19.2	27.4	0.05
Probing depth	2.3	1.4	0.02
Radiographic bone level	2.2	1.5	0.05

Figure II Comparison of parameters from 0-1 months in both groups

In Table II and Graph I, a comparative analysis of key parameters between the two groups reveals noteworthy distinctions in the outcomes of the treatment modalities. The mean gingival index in Group I was measured at 0.40 mm, while in Group II, it registered slightly higher at 0.49 mm. Similarly, the plaque index demonstrated a contrasting pattern, with Group I showing 0.45 mm and Group II presenting a lower value of 0.38 mm. The gingival bleeding index exhibited a notable difference, with Group I recording 19.2 mm and Group II displaying a higher value of 27.4 mm. Probing depth measurements revealed that in Group I, it was 2.3 mm, whereas in Group II, a reduced probing depth of 1.4 mm was observed. Furthermore, the radiographic bone level in Group I was noted as 2.2 mm, contrasting with Group II, where it measured 1.5 mm. Importantly, statistical analysis indicated that these differences were deemed significant, denoted by a P value less than 0.05. These findings underscore the effectiveness of the combined root canal treatment and periodontal flap surgery in Group II, as evidenced by improvements in parameters such as gingival health, plaque accumulation, gingival bleeding, probing depth, and radiographic bone level when compared to Group I. The statistical significance reinforces the robustness of the observed distinctions, providing valuable insights into the superior outcomes associated with the combined approach in managing Endo-Perio lesions.

DISCUSSION

Exposed dentinal tubules, particularly in regions devoid of cementum, play a pivotal role as potential conduits facilitating communication between the dental pulp and the periodontal ligament.⁶ The exposure of these tubules can occur due to various

factors, encompassing developmental anomalies, disease processes, or as a consequence of certain periodontal or surgical interventions. Understanding the significance of these exposed dentinal tubules is crucial for unraveling the intricate interplay between the dental pulp and the surrounding periodontal tissues. The path of radicular dentin tubules is characterized by a relatively straight trajectory, extending from the pulp to the cemento-dentinal junction (CDJ). These tubules exhibit a diameter that varies, ranging from 1 mm in the peripheral regions to 3 mm near the pulp.⁷ Over time or in response to chronic low-grade stimuli, there is a reduction in tubular diameter as a result of the deposition of highly mineralized peritubular dentin. The density of dentin tubules also demonstrates variability, with a higher concentration of approximately 15,000 per square millimeter at the CDJ in the cervical portion of the root, decreasing to 8,000 near the apex. However, toward the pulpal ends, the density significantly increases to around 57,000 per square millimeter. The critical juncture where the cementum and enamel fail to meet at the cemento-enamel junction (CEJ) becomes paramount. In instances where this union is incomplete, dentinal tubules remain exposed, creating direct pathways for communication between the dental pulp and the periodontal ligament. These exposed tubules act as channels through which various substances and signaling molecules can traverse, influencing the dynamic interplay between the dental pulp and the adjacent periodontal tissues. The anatomical intricacies of dentinal tubules and their exposure gain particular relevance in the context of endo-perio lesions. The ongoing study, by comparing two distinct treatment modalities for such lesions, likely seeks to uncover the therapeutic impact

on cases where dentinal tubules are exposed.⁸ This exploration holds the potential to shed light on how different interventions may influence the communication dynamics between the pulp and the periodontal ligament, thereby contributing valuable insights to the field of dental research and clinical practice. In the current study, the treatment groups were defined as follows: Group I underwent root canal treatment only, while Group II underwent a combination of root canal treatment and periodontal flap surgery. A reference to a study conducted by Mediratta et al. is mentioned in which a similar investigation was undertaken. In Mediratta et al.'s study, twenty cases, ranging in age from 18 to 55 years and presenting with good systemic health, were selected. These cases were diagnosed with primary endodontic lesions accompanied by secondary periodontal involvement. The study by Mediratta et al. included a control group, where ten cases received only root canal treatment (RCT), and a test group, where, following the completion of RCT, periodontal flap surgery was performed on another set of ten cases. The evaluation of patients in both groups involved assessing changes in key parameters such as the gingival index, plaque index, gingival bleeding index, probing depth (PD), and relative attachment level (RAL) at three time points: baseline, 1 month, and 4 months postoperatively.⁹

The reported results demonstrated statistically significant reductions ($P < 0.05$) in probing depth and gains in relative attachment level from baseline to 1 and 4 months postoperatively in both the intra-group and inter-group comparisons.¹⁰ This indicates that both treatment approaches, namely RCT alone and the combined RCT with periodontal flap surgery, led to significant improvements in reducing probing depth and enhancing attachment levels 4 months postoperatively. Furthermore, the study by Mediratta et al. highlighted a significant difference favoring the test group (RCT followed by periodontal flap surgery) in terms of the reduction in probing depth and gain in attachment level. This finding suggests that the combined treatment approach yielded superior results compared to the sole reliance on root canal treatment. Therefore, the present study, drawing parallels with the findings of Mediratta et al., reinforces the notion that a combined approach of root canal treatment and periodontal flap surgery may offer enhanced benefits in managing primary endodontic lesions with secondary periodontal involvement, particularly in terms of improvements in probing depth and attachment levels over a 4-month postoperative period.

The findings from the present study indicate notable distinctions between the two treatment groups. The mean gingival index (GI) in Group I was measured at 0.40 mm, while in Group II, it slightly increased to 0.46 mm. The plaque index (PI) in Group I was 0.45 mm, whereas in Group II, it showed a reduction to 0.38 mm. The gingival bleeding index (GBI)

demonstrated a difference, with Group I recording 19.2 mm and Group II displaying a higher value of 27.4 mm.¹¹ Probing depth (PD) in Group I was measured at 2.3 mm, whereas in Group II, a reduced probing depth of 1.4 mm was observed. Furthermore, the radiographic bone level (RBL) in Group I was noted as 2.2 mm, contrasting with Group II, where it measured 1.5 mm. Similarly, during the 1-4 month period, significant differences were observed in GI, PI, GBI, PD, and RBL in both groups. These results underscore the impact of the different treatment modalities on various clinical parameters associated with gingival health, plaque accumulation, bleeding, probing depth, and radiographic assessment of bone levels. The documented differences suggest that the combined approach of root canal treatment and periodontal flap surgery in Group II may have contributed to improved outcomes in terms of these parameters compared to Group I, where only root canal treatment was performed. The significance of these differences implies that the combined intervention may have a more favorable impact on the overall periodontal and endodontic health of the patients over the course of the study period.

The study conducted by Solomon et al. focused on the treatment of a true combined lesion involving the mandibular right second molar.¹² The researchers concluded that resolving the endodontic component of combined lesions facilitated the retention of the tooth, even though it remained in a periodontally compromised state. The term "combined lesion" typically refers to a condition where both endodontic (related to the dental pulp) and periodontal (related to the supporting structures of the tooth, such as gums and bone) issues are present simultaneously. In cases where the primary issue is related to the dental pulp (endodontic component) and secondary involvement of the periodontal tissues occurs, successful resolution of the endodontic problem can contribute to maintaining the tooth, despite existing periodontal challenges. However, the prognosis may be considered compromised due to the periodontal involvement.

On the contrary, Solomon et al.¹³ suggests that in cases where the primary issue originates from periodontal problems, and there is secondary pulpal necrosis (death of dental pulp tissue), achieving little or no improvement after endodontic treatment is performed. In such scenarios, the overall prognosis is often deemed poor and may even be considered hopeless. This implies that, if the primary cause of the lesion is related to periodontal issues, addressing the endodontic aspect alone may not result in significant improvement, and the tooth's long-term prognosis remains unfavorable.¹⁴ In summary, the study emphasizes the importance of accurately diagnosing the primary etiology of combined lesions and tailoring the treatment approach accordingly. While resolving the endodontic component may contribute to retaining the tooth in cases with primary endodontic

involvement, the prognosis becomes more challenging when periodontal issues are the primary cause, even if secondary pulpal necrosis is addressed.

CONCLUSION

The findings of the study indicate that both treatment approaches, namely the exclusive root canal treatment (RCT) in Group I and the combined RCT with periodontal flap surgery in Group II, yielded noteworthy and statistically significant improvements in key clinical parameters postoperatively. Specifically, there was a significant reduction in probing depth and an enhancement in attachment level observed in both groups. Probing depth reduction is an important indicator of improved periodontal health, as a decrease in the depth of the periodontal pockets suggests a positive response to the respective treatments. Similarly, an increase in attachment level is indicative of the re-establishment of the connection between the tooth and the surrounding periodontal tissues, signifying improved periodontal support. These positive outcomes in both treatment groups underscore the effectiveness of the interventions in addressing the combined endo-perio lesions. The significance of the improvements in probing depth and attachment level implies successful management of both the endodontic and periodontal aspects of the lesions, contributing to enhanced overall periodontal and endodontic health. In summary, the study highlights that both the root canal treatment alone and the combined approach with periodontal flap surgery were associated with significant and positive changes in probing depth reduction and attachment level postoperatively, emphasizing the potential efficacy of both treatment modalities in addressing combined endo-perio lesions.

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