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Clinical outcomes and prognostic determinants of endodontic-periodontal lesions: A retrospective study

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Abstract:

Endodontic-periodontal lesions are complex conditions in which both endodontic and periodontal disease coexist, potentially compromising tooth prognosis if not diagnosed and managed properly. Hence, this retrospective study evaluated 100 patients treated between 2020 and 2025 at a tertiary dental care institution to determine treatment success, survival and failure rates, along with prognostic factors. Clinical records and radiographs were analyzed for age, gender, smoking, diabetes, lesion type, pocket depth, mobility, furcation involvement, bone loss, treatment sequence and coronal restoration quality, with outcomes classified after at least 12 months of follow-up. Healing was observed in 61% of cases, survival in 24% and failure in 15%, while better outcomes were associated with mild periodontal destruction, absence of furcation involvement, adequate coronal restoration and early endodontic intervention. Thus, we show that prognosis in endodontic-periodontal lesions is driven mainly by periodontal severity, systemic health and treatment quality, underscoring the value of early diagnosis and multidisciplinary planning.

Keywords: Endodontic-periodontal lesion, prognosis, survival outcome, treatment failure, periodontal disease, root canal therapy, retrospective study

Background:

Endodontic-periodontal lesions are one of the most difficult lesions in dentistry due to the close anatomical and functional relationship between the pulp and periodontal tissues. Communication between the pulp and the periodontium occurs through dentinal tubules, accessory canals and apical foramina and this creates combined lesions that are difficult to diagnose and plan for treatment [1]. Correct diagnosis of primary endodontic lesions, primary periodontal lesions and true combined lesions is important because the prognosis of the lesions is different and depends on their origin and severity [2]. There are numerous local and systemic factors that influence the prognosis of endodontic-periodontal lesions. Periodontal pocket depth, attachment loss, furcation involvement, tooth mobility, extent of bone destruction and pulpal vitality have been found to be important clinical parameters determining treatment success [3]. Also, patient-related factors like smoking, diabetes mellitus, oral hygiene and adherence to supportive periodontal therapy significantly impact healing [4]. With the recent developments in the endodontic and periodontal treatment modalities, the management strategies for these lesions have improved. Clinical

outcomes have improved with the use of modern rotary instrumentation, improved irrigation protocols, bioceramic sealers, regenerative procedures and microsurgical techniques [5]. Despite the advances in technology, however, the treatment of combined endodontic-periodontal lesions still remains unpredictable because of the multifactorial nature of the disease progression and healing [6]. Several studies have shown that primary endodontic lesions with secondary periodontal involvement have a good prognosis for healing after good root canal therapy, while true combined lesions have an unfavourable prognosis [7]. Major negative prognostic factors are furcation involvement and severe periodontal destruction. In addition, failure to treat or seal the coronal part of the root canal system may lead to recurrent infection and reinfection of the root canal system, thus decreasing long-term success rates [8]. In the modern dental practice, the concept of tooth survival has become more and more relevant. Residual periodontal defects are often not considered to be a successful outcome if the teeth remain functional. This difference is clinically important since preservation of natural dentition plays an important role in mastication, aesthetics and patient quality of life [9]. Thus,

success alone does not necessarily measure the effectiveness of treatment in endodontic-periodontal lesions. Retrospective studies are useful for gaining insight into the long-term clinical outcomes and prognostic factors, as they assess treatment in real-life scenarios with long follow-up periods. Previous studies have examined treatment outcomes for endodontic and periodontal therapies separately, but there are only a few studies that have examined prognostic factors that affect treatment outcomes of success, survival and failure in endodontic-periodontal lesions [10]. Therefore, it is of interest to examine the prognostic factors related to the treatment outcome and to evaluate the success, survival and failure rates of the treated endodontic-periodontal lesions after multidisciplinary management.

Materials and Methodology:

This retrospective observational study was conducted in the Department of Conservative Dentistry and Endodontics in collaboration with the Department of Periodontology at a tertiary care dental institution. A total of 100 patients diagnosed and treated for endodontic-periodontal lesions between January 2020 and December 2025 were included in the study. Patient records were retrieved from departmental archives and evaluated. Cases were selected according to predefined inclusion and exclusion criteria.

Inclusion criteria:

- [1] Patients aged between 18 and 65 years
- [2] Teeth diagnosed with endodontic-periodontal lesions
- [3] Teeth treated with both endodontic and periodontal therapy
- [4] Minimum follow-up period of 12 months
- [5] Availability of complete clinical and radiographic records

Exclusion criteria:

- [1] Incomplete patient records
- [2] Teeth with root fractures or perforations
- [3] Previously extracted teeth before follow-up
- [4] Patients with systemic diseases severely affecting healing except controlled diabetes
- [5] Pregnant or lactating females

Detailed demographic data including age, gender, smoking history and diabetic status were recorded. Clinical parameters assessed included probing pocket depth, clinical attachment loss, tooth mobility, furcation involvement, percussion tenderness and sinus tract presence. Radiographic evaluation included extent of periapical radiolucency and alveolar bone loss.

Lesions were classified according to Simon's classification into:

- [1] Primary endodontic lesions
- [2] Primary periodontal lesions
- [3] Primary endodontic with secondary periodontal involvement
- [4] Primary periodontal with secondary endodontic involvement
- [5] True combined lesions

All patients underwent standardized endodontic treatment involving cleaning and shaping using rotary nickel-titanium instruments, irrigation with sodium hypochlorite and EDTA, intracanal medicament placement where necessary and obturation using gutta-percha with resin-based or bioceramic sealers. Periodontal therapy included scaling and root planing, flap surgery, regenerative procedures and supportive periodontal therapy depending upon lesion severity.

Treatment outcomes were categorized as:

- [1] **Success:** Absence of symptoms, reduction in probing depth, radiographic bone healing and normal tooth function
- [2] **Survival:** Tooth retained and functional despite residual periodontal defects or mild symptoms
- [3] **Failure:** Persistent symptoms, progressive bone loss, retreatment requirement, or extraction

Statistical analysis was performed using SPSS version 25.0. Descriptive statistics were used to summarize data. Chi-square test was used to assess associations between prognostic factors and treatment outcomes. A p-value less than 0.05 were considered statistically significant.

Results:

A total of 100 treated endodontic-periodontal lesion cases were evaluated retrospectively. The age of patients ranged from 21 to 64 years with mean age of 42.7 ± 10.6 years. Males constituted 58% of the study population while females accounted for 42% (**Table 1**). The study population predominantly consisted of males (58%). Smoking and diabetes were observed in 32% and 24% of patients respectively. Moderate tooth mobility was the most common clinical finding. Furcation involvement and severe bone loss were present in a considerable proportion of cases, indicating advanced periodontal destruction. Among lesion types, primary endodontic lesions with secondary periodontal involvement constituted the largest category (38%), followed by true combined lesions (31%), primary periodontal lesions (18%) and primary endodontic lesions (13%). At follow-up evaluation, 61% of teeth demonstrated successful healing, 24% survived with residual periodontal compromise and 15% were categorized as failures. Non-smokers showed significantly better healing outcomes compared to smokers ($p=0.003$). Patients without furcation involvement exhibited the highest success rates. Severe bone loss and systemic diseases such as diabetes were significantly associated with survival and failure outcomes. Radiographic analysis demonstrated significant reduction in periapical radiolucency in successful cases. Persistent radiolucency and periodontal defects were more commonly observed in failed cases (**Table 2**). Primary endodontic lesions demonstrated the best prognosis with near complete healing. True combined lesions exhibited the highest failure rates, emphasizing the complexity of these lesions and the importance of early intervention. Logistic regression analysis identified smoking, severe bone loss, Grade III mobility and furcation involvement as independent predictors of treatment failure (**Table 3**).

Table 1: Demographic and clinical characteristics of study population

Parameter	Frequency	Percentage
Male	58	58%
Female	42	42%
Smokers	32	32%
Diabetic patients	24	24%
Grade I mobility	39	39%
Grade II mobility	43	43%
Grade III mobility	18	18%
Furcation involvement present	37	37%
Severe bone loss (>50%)	29	29%

Table 2: Treatment outcomes according to prognostic factors

Prognostic Factor	Success	Survival	Failure	p-value
Non-smokers	48%	15%	5%	0.003*
Smokers	13%	9%	10%	
Controlled diabetes	11%	7%	6%	0.021*
Non-diabetics	50%	17%	9%	
No furcation involvement	46%	12%	5%	<0.001*
Furcation involvement	15%	12%	10%	
Mild bone loss	39%	8%	3%	<0.001*
Severe bone loss	9%	11%	9%	

Table 3: Association between lesion type and treatment outcome

Lesion Type	Success	Survival	Failure	p-value
Primary endodontic lesion	11	2	0	0.001*
Primary periodontal lesion	7	7	4	
Endodontic with secondary periodontal involvement	29	6	3	
Periodontal with secondary endodontic involvement	6	5	4	
True combined lesion	8	4	19	

Discussion:

The complex interdependence of pulpal and periodontal tissues poses a diagnostic and therapeutic challenge for endodontic-periodontal lesions. In the present retrospective study, the authors assessed prognostic factors that influence treatment outcomes and found that the severity of the lesions, periodontal destruction, systemic health and treatment quality all have a significant impact on the healing outcomes. Overall success rate in the present study was 61%, survival rate was 24% and failure rate was 15%. The results are similar to those previously reported with combined endodontic-periodontal therapy (55% to 75%) [3, 11]. The relatively good results achieved could be due to the use of modern endodontic instrumentation techniques and comprehensive periodontal management. In this study, the prognosis for primary endodontic lesions was best. Herrera *et al.* reported similar findings, stating that lesions of endodontic origin usually heal predictably if proper root canal therapy is performed [12]. Intracanal infection can be eliminated and inflammatory periodontal defects resolved by natural healing mechanisms. On the other hand, true combined lesions had significantly higher failure rates due to extensive periodontal destruction and poor regenerative potential. Smoking was found to be a significant predictor of poor prognosis. Smokers had slower healing rates and a higher failure rate for treatment than non-smokers. Recent literature has shown that tobacco has a negative impact on periodontal vascularity, immune response, fibroblast activity and bone metabolism [4, 13]. Smoking has a negative effect on periodontal wound healing and affects the results of regenerative periodontal therapy. Another important factor that was associated with poor healing was diabetes mellitus. Those with uncontrolled or poorly controlled diabetes

had higher failure rates and mortality. Hyperglycemia has been shown to affect neutrophil function, collagen synthesis and angiogenesis, which will delay periodontal healing and make the patient more susceptible to chronic infection [14]. Therefore, good glycemic control prior to and during treatment is crucial for prognosis. In the current study, furcation involvement and severe bone loss were identified as significant local prognosis factors. Significantly better outcomes were seen in teeth with no involvement of the furcation. Furcation defects allow inaccessible areas, which make debridement more difficult and help bacteria to persist [15]. Advanced periodontal destruction also leads to a loss of support and regenerative ability of the tooth, which affects long-term survival. The present study also pointed out the significance of tooth mobility as a prognostic factor. The teeth with Grade III mobility had higher failure rates than the teeth with mild mobility. Advanced attachment loss and occlusal instability are both associated with excessive mobility, which is detrimental to healing. Other researchers have also found that tooth mobility is a key factor that affects long-term success of endodontically treated teeth [6]. An important aspect of this study was differentiation between “success” and “survival.” A number of teeth classified as survival were still functional with some remaining periodontal damage. This separation is clinically important as it may be beneficial for the patient to retain natural dentition for functional and psychological reasons. There is a growing focus in modern dentistry on the preservation of teeth whenever possible [9]. Another important factor influencing outcome was coronal restoration quality. Sealing of the root canal is of critical importance to prevent reinfection of the root canal system and to aid in periapical healing. It has been shown that poor

restorations can allow bacterial leakage, which can adversely affect long-term prognosis despite technically successful root canal treatment [5]. A strength and limitation of the study was its retrospective design. Long-term clinical results are important for prognosis. Retrospective studies, however, rely on the accuracy and completeness of the records. Treatment protocols and operator experience may also vary, affecting outcomes. In the future, prognosis of complex lesions may be better with recent advances in regenerative endodontics and periodontal tissue engineering. Platelet concentrates, enamel matrix derivatives, guided tissue regeneration and bioceramic materials have been reported to have good results in hard and soft tissue healing [7]. Moreover, cone-beam computed tomography allows for more precise diagnosis and tracking of lesion healing. Although advances in technology have occurred, early diagnosis is the key to successful management of endodontic-periodontal lesions. Unfortunately, the damage to the gums may be extensive and regeneration potential is reduced if intervention is delayed. Therefore, it is crucial for endodontists and periodontists to work together in order to obtain the best possible treatment outcome. In conclusion, the results of the present study emphasize the need to take into account systemic and local prognostic factors when planning treatment. Long-term success and survival of teeth with endodontic-periodontal lesions is greatly enhanced by comprehensive management protocols and regular maintenance therapy.

Conclusion:

Primary endodontic lesions showed most favourable outcomes, whereas true combined lesions had high failure rates, influenced by smoking, diabetes, furcation involvement, severe bone loss

and advanced mobility. These findings highlight the need for individualized, multidisciplinary management and comprehensive assessment of local and systemic prognostic factors. Long-term periodontal maintenance remains essential for sustaining treatment success and improving tooth survival.

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