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Original Research

Assessment of Root Canal Treatment Alone and in Combination with Periodontal Flap Surgery in the Treatment of Endodontic-periodontal Lesions- A Comparative Study

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***ABSTRACT*:**
Background: Pulpal infection can drain through the periodontal ligament space and give an appearance of periodontal destruction. The present study was conducted to evaluate and compare the two treatment approaches for the treatment of primary endodontic lesions with secondary periodontal involvement, i.e., RCT with root canal treatment (RCT) and periodontal flap surgery. This study comprised of 40 cases of Endo- Perio lesions of both genders. Patients were divided into 2 groups of 26 each. In group I, patients underwent root canal treatment only, while group II patients underwent root canal treatment along with periodontal flap surgery. Parameters such as gingival index, plaque index, gingival bleeding index, probing depth and radiographic bone level were measured from 0-1 month and 1-4 months. Results showed that Results showed statistically significant ($P < 0.05$) reduction from baseline to 1 and 4 months in the PD and gain in RAL both on intergroup and intragroup comparison. Thus, from the results of the study, it could be concluded that both treatment approaches revealed a significant improvement in the PD reduction and attachment level gain 4 months postoperatively. However, test group showed a significant difference in the reduction of PD and gain in attachment level. The difference was significant ($P< 0.05$).
Conclusion: Both treatment approaches showed a significant improvement in the probing depth reduction and attachment level postoperatively.
Key words: Endo- Perio, gingival index, Probing depth.

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INTRODUCTION:
The dental pulp and periodontal tissues are closely related. The pulp originates from the dental papilla and the periodontal ligament from the dental follicle and is separated by Hertwig's epithelial root sheet. As the tooth matures and the root is formed, three main avenues for exchange of infectious elements and other irritants between the two compartments are created by dentinal tubules, lateral and accessory canals and the apical foramen.[1]

The relationship between the pulp and the periodontium has been extensively studied; however, queries regarding the diagnosis, prognosis and treatment are raised time and again. The pathways for the spread of bacteria between pulpal and periodontal tissues have been discussed with controversy.[2] Pulpal infection can drain through the periodontal ligament space and give an appearance of periodontal destruction, termed retrograde periodontitis. Similarly, both pulpal and periodontal infections can coexist in the same tooth, termed combined lesions, where the treatment depends

on the degree of involvement of the tissues. Both endodontic and periodontal diseases are caused by a mixed anaerobic infection.[3]

Healing of primary endodontic lesions usually take place after root canal therapy. Presence of microorganisms in the root canal influences the outcome of therapy with a proper focus on control of infection, a good prognosis is expected with the treatment.[4] Primary periodontal lesions can solely be treated by periodontal therapy. Periodontal lesions are initiated by deposits of plaque and calculus. Inflammatory mediators cause destruction of gingival connective tissue, periodontal ligament, and alveolar bone. Migration of the lesion to the apex continues with drainage through the gingival sulcus preventing acute episodes.[5]

The endodontic-periodontal lesion may exist separately on the same tooth and then unite together (true combined lesion), or it may be primarily endodontic or periodontal with secondary involvement of the other.

Endodontic-periodontal lesions arise from inflammation or degeneration of both pulpal and periodontal tissue as a result of this intimate anatomic relationship. Seltzer et al. suggested that pulpal lesions have an effect on the severity of periodontal lesions. Inflammation of the periodontal membranes from inflamed and necrotic pulps readily spread through lateral and accessory foramina, especially in molars.[6]

Paul and Hutter stated that a primary endodontic lesion that is draining through the periodontal attachment is usually treated with endodontic therapy.[7] After an appropriate length of time, usually 1–2 months, the practitioner then reassesses the patient's periodontal health. The rationale for this therapy is to maximize endodontic healing before aggressively planning the tooth's root surface and to avoid inadvertent removal of healthy connective tissue fibers. If a lesion is relatively recent and treated expeditiously, most periodontists and endodontists believe that healing occurs by reattachment of these connective tissue fibers to the root surface.

Success of both periodontal and endodontic therapy on a given tooth depends on the diagnosis of the disease and elimination of the disease process whether they exist separately or as a combined lesion. Hence, the present study aimed to evaluate and compare the two treatment approaches for the treatment of primary endodontic lesions with secondary periodontal involvement, i.e., RCT with root canal treatment (RCT) and periodontal flap surgery.

MATERIALS AND METHOD:

A sample size of 40 patients of either gender aged between 18 and 55 years diagnosed as cases of primary endodontic lesion with secondary periodontal involvement were enrolled for the study. Diagnosis was made on the basis of clinical findings such as caries involving pulp, bleeding on probing, probing depth (PD) ≥5 mm, attachment loss ≥5 mm, tenderness on percussion, and radiographic features such as alveolar bone destruction with apical pathology or lateral radiolucency. Only posterior teeth were included for this study.

Selected patients were divided into two groups, i.e., Groups A and B. Both the groups underwent scaling followed by RCT. In Group A patients, i.e., the control group, only RCT was performed. In Group B patients, i.e., the test group, after 1 month of completion of RCT, periodontal flap surgery was performed.

The parameters recorded at baseline, 1 month, and 4 months are gingival index (GI) (Loe and Silness 1963), plaque index (PI) (Silness and Loe 1964), relative attachment level (RAL), and radiographic bone level. Patients in the surgical groups were subjected to a postoperative regimen of amoxicillin 500mg tds for 5 days and ibuprofen 400 mg tds for 5 days. Patients were recalled for suture removal after 1 week. Patients were reviewed at 1 month and 3 months postoperatively and parameters were recorded at 4 months interval. Oral prophylaxis was done in cases of both groups at recall visits.

Comparison between the test and control groups (intergroup) at baseline, 1 month, and 4 months was accomplished using Student's unpaired t-test. The level of significance for the comparisons was set at $P < 0.05$.

Table 1: Mean of different parameters at baseline and level of significance

Parameters	**Test group**	**Control group**	**Level of significance (probability of unpaired *t*-test)**
Gingival index	1.74±0.157	1.64±0.150	0.286 (*P*>0.05), not significant
Plaque index	1.56±0.2395	1.74±0.246	0.2614 (*P*>0.05), not significant
Gingival bleeding index	78.24±14.28	74.24±10.442	0.444 (*P*>0.05), not significant
Probing depth	9.4±2.104	7.456±1.48	0.42 (*P*>0.05), not significant
RAL	15.6±2.45	13.4±1.24	0.46 (*P*>0.05), not significant

Table 2: Within-group comparison (from baseline to 1 month) in test and control group for different parameters

Clinical parameters	Difference (0-1) months (mean±SD)			Probability of t (paired)	
	Test group	Control group		Test group	Control group
Gingival index	0.44±0.2251	0.42±0.23		0.0001 (P<0.05), significant	0.0001 (P<0.05), significant
Plaque index	0.36±0.2406	0.42±0.23		0.00089 (P<0.05), significant	0.00001 (P<0.05), significant
Gingival bleeding index	28.24±10.244	19.20±7.22		0.00001 (P<0.05), significant	0.00002 (P<0.05), significant
Probing depth	1.24±1.2293	2.24±1.54		0.1130 (P>0.05), not significant	0.0003 (P<0.05), significant
RAL	1.24±1.46	2.4±1.62		0.1176 (P>0.05), not significant	0.0025 (P<0.05), significant

Table 3: Within-group comparison (from 1 to 4 months) in test and control group for gingival index

Clinical parameters	Difference (1-4) months (mean±SD)			Probability of *t* (paired)	
	Test group	Control group		Test group	Control group
Gingival index	0.14±0.1174	0.09±0.11005		0.0044 (P<0.05), significant	0.0029 (P<0.05), significant
Plaque index	0.05±0.1354	0.15±0.0707		0.0031 (P<0.05), significant	0.00001 (P<0.05), significant
Gingival bleeding index	18.23±14.416	13.61±10.7648		0.0031 (P<0.05), significant	0.003 (P<0.05), significant
Probing depth	3.8±1.6193	1.7777±0.8333		0.0003 (P<0.05), significant	0.00011 (P<0.05), significant
RAL	2.7±2.0575	1.6±0.9660		0.0025 (P<0.05), significant	0.00054 (P<0.05), significant

GI, PI, and GBI on intragroup comparison showed statistically significant (P < 0.05) reduction in values from baseline to 1 month. When reduction in values for these indices from baseline to 1 month and from 1 month to 4 months was compared for both the test and control groups, it was found to be insignificant (P > 0.05).

The parameters in regard to recorded GI, PI, GBI, probing pocket depth, and RAL at baseline, 1 month, and 4 months postoperatively for both test and control groups at baseline showed no significant difference. test group showed a significant reduction in PD at the end of 4 months. The observations as shown in Tables 2 and 3 depict gain in the attachment level values for the test group and the control group from baseline to 1 month and from 1 month to 4 months. The gain of attachment level was found to be significant at 1 month and 4 months on intragroup comparison.

DISCUSSION:

Exposed dentinal tubules in areas devoid of cementum may serve as communication pathways between the pulp and the periodontal ligament.[6] Exposure of dentinal tubules may occur due to developmental defects, disease processes, or periodontal or surgical procedures. Radicular dentin tubules extend from the pulp to the cemento-dentinal junction (CDJ). They run a relatively straight course. The diameter ranges from 1 mm in the periphery to 3 mm near the pulp.[7]

The tubular lumen decreases with age or as a response to chronic low-grade stimuli causing apposition of highly mineralized peritubular dentin.[8] The density of dentin tubules varies from approximately 15 000 per square millimeter at the CDJ in the cervical portion of the root to 8000 near the apex, whereas at the pulpal ends the number increases to 57 000 per square millimeter.[9] When the cementum and enamel do not meet at the cemento-enamel junction (CEJ), these tubules remain exposed, thus creating pathways of communication between the pulp and the periodontal ligament.[10] The present study was conducted to compare two treatment modalities for end- Perio lesions.

In present study, in group I, patients underwent root canal treatment only, while group II patients underwent root canal treatment along with periodontal flap surgery.

Solomon et al., Vera et al., Reddy et al., Patil et al., and Gorkhali and Pradhan treated the cases with endodontic therapy only whereas Rosenberg et al. treated the cases with RCT and periodontal flap surgery.

Mediratta et al[11] conducted a study, in which twenty cases aged between 18 and 55 years with good systemic health diagnosed as cases of primary endodontic lesion with secondary periodontal involvement were selected. In ten cases, only RCT was performed (control group), and in another ten, after 1 month of completion of RCT, periodontal flap surgery was performed (test group). The patients were evaluated for changes in the gingival index, plaque index, gingival bleeding index, probing depth (PD), and relative attachment level (RAL) at baseline, 1 month, and at 4 months postoperatively. Results showed statistically significant ($P < 0.05$) reduction from baseline to 1 and 4 months in the PD and gain in RAL both on intergroup and intra group comparison. Thus, from the results of the study, it could be concluded that both treatment approaches revealed a significant improvement in the PD reduction and attachment level gain 4 months postoperatively. However, test group showed a significant difference in the reduction of PD and gain in attachment level.

We found that mean gingival index in group was 0.41 mm and in group II was 0.49 mm, plaque index in group I was 0.45 mm and in group II was 0.38 mm, gingival bleeding index in group I was 19.2 m and in group II was 27.4 mm, probing depth was 2.3 mm in group I and 1.4 mm in group II, radiographic bone level was 2.2 mm in group I and 1.5 mm in group II. Similarly, from 1-4 months there was significant difference in GI, PI, GBI, PD and RBL in both groups.

Solomon et al[12] treated a case of true combined lesion involving the mandibular right second molar and concluded that resolution of the endodontic component of combined lesions allowed the tooth to be retained, albeit in a periodontally compromised state. With lesions of primary periodontal etiology and secondary pulpal necrosis, little or no improvement would be seen after endodontic treatment, leaving a very poor and often hopeless prognosis.

In a retrospective case–control study carried out by Saetervold et al.[13], where the average pocket depth was ≥6 mm, it was seen that teeth which were not treated for their periodontal health and only endodontic treatment was instituted had a poor survival rate.

CONCLUSION

Integration with periodontal microsurgical techniques such as primary flap closures over grafted sites using papilla preservation flaps, precise flap approximations through micro suturing, root surface conditioning, and root surface treatment should help enhance these outcomes. There is a need for more such studies in this area and a need for sub-classifying the combined lesion in terms of factors such as crown root ratio, width of defect crestally, root housing in bone, and mobility to enable comparability of results.

Both treatment approaches showed a significant improvement in the probing depth reduction and attachment level postoperatively.

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