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The Adjunctive Effect of Topical Application of Metronidazole 15% Gel to Manage of Moderate Distal Pocket on Mandibular Wisdom Teeth Being Treated for Endodontic-periodontal Lesions

Anas Abdullah Q. Khawshhal[1], Mohammed MA. Abdullah Al-Abdaly[1*] and Bassam Abdullah Qasem Khoshhal[2]

[1]College of Dentistry, King Khalid University, Abha, Saudi Arabia.
[2]College of Pharmacy, Taibah University, Saudi Arabia.

Authors' contributions

This work was carried out in collaboration between all authors. Authors MMAAA, AAQK and BAQK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MMAAA and AAQK managed the analyses of the study. Authors BAQK and MMAAA managed the literature searches. Author MMAAA critically revised the manuscript. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Aim: This study aims to evaluate the adjunctive effect of topical application of metronidazole 15% gel to manage of moderate distal pocket on mandibular wisdom teeth being treated for endodontic-periodontal lesions.
Materials and Methods: This study included thirty mandibular wisdom teeth with endodontic-periodontal lesions and moderate distal periodontal pockets in three equal groups (n=10) selected from the outpatient clinics, college of dentistry, King Khalid University. Endodontic periodontal treatment finished in the first visit (1st) of all patients. The group I was considered as a control group (endodontic and periodontal treatment only). The study groups consisted of endodontic and

**Corresponding author: E-mail: malabdaly20@gmail.com;*

periodontal treatment plus irrigation with normal saline (0.90% w/v of NaCl, 308 mOsm/L) as placebo therapy in group II and the endodontic and periodontal treatment plus metronidazole 15% gel topical application in group III. Plaque index (PLI), gingival index (GI) and periodontal pocket depth (PPD) were recorded at baseline as first (1st) visit, 4weeks as a second (2nd) visit and 6 weeks as third (3rd) visit. All data collected and analyzed by Friedman test, the comparisons between the groups of the present study was carried out.

Results: There was decreased in PLI among the patients of group III compared to PLI of group I and II in the 2nd and 3rd visit moreover; there was reduced in GI among the patients of group II and III compared to group I in the 3rd visit only. Concerning PPD, there was decreased in PPD among the patients of group II and III in the 2nd visit only compared to 1st visit.

Conclusion: In the end of the study there were no significant differences in the comparison of all clinical parameters between the patients in the present study at all the study intervals except PPD also there were no significant differences in clinical findings in the comparison of the present study groups in 2nd and 3rd visit of distal pocket therapy except PLI of group II and III.

Keywords: Endondontic-periodontal lesions; distal pocket; metronidazole 15% gel.

ABBREVIATIONS

SPR : Scaling and root planing
PLI : Plaque index
GI : Gingival index
1st : First visit at baseline
2nd : Second visit at 4 weeks
3rd : Third visit at 6 weeks

1. INTRODUCTION

Combined endodontic-periodontal lesions involve more than 50% of the causes of early missing teeth. The relation between supporting periodontal tissues and pulp tissues are close, intimate this is attributed to the embryological development of periodontal and pulp tissues where are originate from the mesodermal cells plus the connection between them by canals, in agreement with the results of Langel and colleagues' study who revealed that spread of inflammation from the periodontium to the root canal and causes pulp tissue damage and vice versa may be due to these canals [1-5].

It is noteworthy that the pulpal necrosis or irreversible pulpitis was not found in all teeth, but the abnormal changes in the pulp may occur when the bacterial plaque arrives to apical foramina in the advanced stage of periodontitis [6]. So the differential diagnoses and treatment of endodontic-periodontal lesions based on the assessment of the pulp vitality [7]. In periodontal lesion if there is tooth mobility, furcation involvement, bone loss in the alveolar crest and in perapical areas that contribute in the differential diagnosis of endodontic-periodontal lesions because the destruction associated with periodontal tissues break down endangers supporting apparatus facilitating the onset of periodontal disease in contrast in cases of endodontic lesion there is little mobility so tooth mobility will identify the origin of the lesion [8,9].

On the other hand, there are other connection routes which are considered as facilitators of spread infection to periodontal tissue from endodontic source and include root and tooth fractures, lingual grooves, trauma-induced root resorption, and root anomalies [10]. Furthermore, different studies revealed that combined endodontic periodontal treatment is fundamental to complete healing of these lesions and either periodontal or endodontic therapy alone would not lead to satisfying prognosis [11-13].

As we know, the conventional periodontal therapy with scaling and root planning (SRP), has a limited effect especially with deep pockets or furcations areas that may stay untreated, so the topical applications of antimicrobial agents as adjunctive therapy of SRP was used [14-16].

Metronidazole is considered the most common antimicrobial agents; it is used as systemic or topical application antimicrobial agent as adjunctive therapy in the management of periodontal disease due to its effect on periodontal pathogens as bactericidal effects in deep periodontal structures [17-19]. So the present study was designed to evaluate the adjunctive effect of topical application of metronidazole 15% gel to manage moderate distal pocket on mandibular wisdom teeth being treated for endodontic-periodontal lesions.

2. MATERIALS AND METHODS

The samples of the current clinical study were 30 moderate distal pockets on mandibular wisdom

teeth being treated for endodontic-periodontal lesions aged between 30 – 55 years old they were obtained from patients who came to the outpatient clinics, college of dentistry, King Khalid University to looking for treatment of moderate distal pocket on mandibular wisdom teeth and being treated for endodontic-periodontal lesions based on the following inclusions ; the distal pocket depth at least 6 mm associated with irreversible pulpitis , the patients without systemic disease and were not subjected to periodontal therapy or were treated with antimicrobial agents during the latter 3 months. The combined endodontic–periodontal lesions were identified by radiographic examination, diagnostic probing, and vitality testing [20]. The consent of participants patients in our study was taken according to the protocol of the scientific research committee, college of dentistry, king Khalid University.

Endodontic treatment (root canal filling) was carried out at first in all cases of the present study, then periodontal treatment. As scaling and root planning (SRP). Radiographic evaluation was done with a series of periapical radiographs for all patients in the present study before and after the treatment of endodontic-periodontal lesions (Figs. 1 and 2).

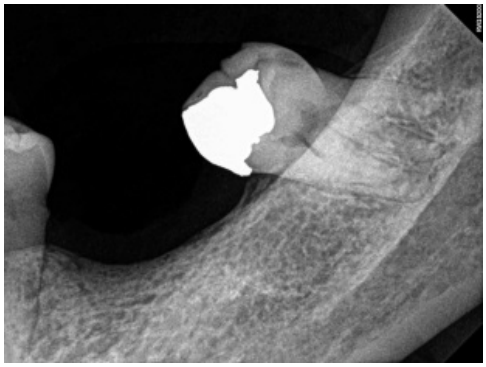

Fig. 1. Periapical radiographs before endodontic periodontal treatment

The irrigation with normal saline (0.90% w/v of NaCl, 308 mOsm/L) as placebo therapy was done in distal pockets of the mandibular wisdom teeth of group II, while the local antibiotics (metronidazole 15% gel) was applied at distal pockets of the mandibular wisdom teeth of group III (Figs. 3 and 4).

The samples were divided according to endodontic and periodontal treatment into three equal groups (n=10), where the group I included the wisdom teeth that were treated by endodontic and periodontal treatments (control group), and group II included the wisdom teeth that were managed by endodontic and periodontal treatment plus irrigation with normal saline (0.90% w/v of NaCl, 308 mOsm/L) as placebo therapy. Moreover, the wisdom teeth that were managed by endodontic and periodontal treatment plus topical application of metronidazole 15% gel in the distal pocket in group III.

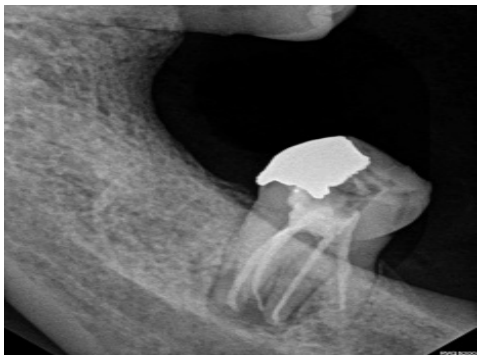

Fig. 2. Periapical radiographs after endodontic periodontal treatment

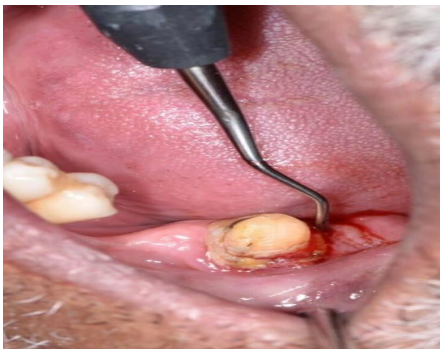

Fig. 3. Clinical view of scaling and root planning

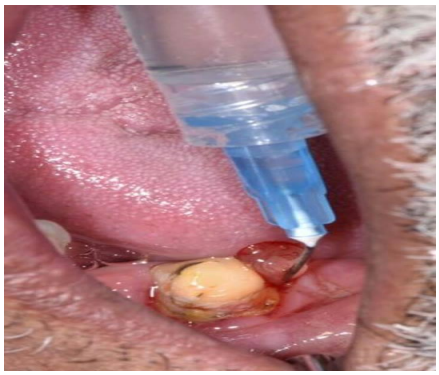

Fig. 4. Clinical view of metronidazole 15% gel topical application

The intraoral examination was done and included evaluation of plaque index (PLI), [21] gingival index (GI) [22] and probing pocket depth (PPD). The probing pocket depth was measured by using the William's periodontal probe. All periodontal clinical parameters were obtained at baseline as 1st visit, 4 weeks as 2nd visit and at 6 weeks as 3rd visit. The data were collected and statistically analyzed. The descriptive statistical analyses were done and the differences in the clinical parameters of the patients in the present study groups between 1st visit, 2nd visit and 3rd visit were assessed by Friedman test. The standard of significance was identified when the p-value at 0.05.

3. RESULTS

Table 1 and Fig. 5 demonstrate the mean of age and its distribution in the current clinical study. The mean and standard deviation (±SD) of the patients age was 33±0.81 years in group I and 42±0.33 in group II whereas in group III it was 51±0.62 years whereas Table 2 and Fig. 6 show the level of oral hygiene status and plaque accumulation in group I, II and III in all visits of the currents study intervals.

Table 1. The mean of age and its distribution

	Age	Mean ±SD
GI	30 –35	33±0.81
GII	36-45	42±0.33
GIII	46-55	51±0.62

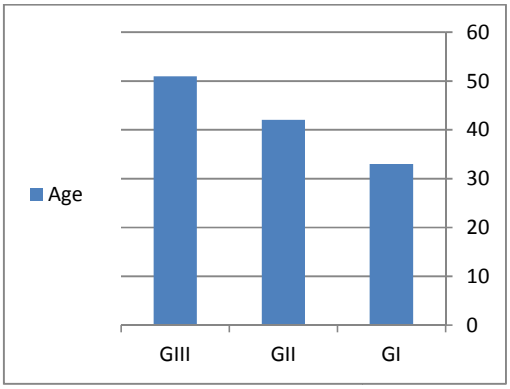

Fig. 5. The mean of age and its distribution

Table 2. Clinical evaluation of dental plaque and oral hygiene status

		PLI			Friedman test (P-value)
		Baseline	After 4ws	After 6ws	
Group I	Mean	1.667	1.333	1.333	0.368
	SD	0.577	0.577	0.577	
Group II	Mean	1.667	1.333	1.333	0.717
	SD	0.577	0.577	0.577	
Group III	Mean	1.667	1.000	1.000	0.135
	SD	0.577	0.000	0.000	

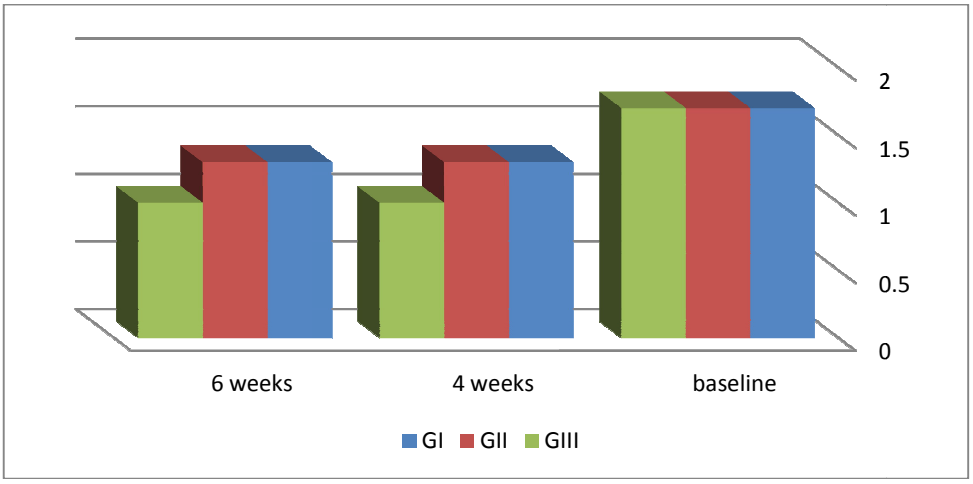

Fig. 6. Clinical evaluation of dental plaque and oral hygiene status

There were a reduction in PLI in the 3rd visit compared to the 2nd and the 1st visit but these differences without statistical significance according to Friedman Test. The oral hygiene status of the patients was not changed in all the study intervals of group I and group II, but there were improvement in oral hygiene among the patients of group III in the 3rd visit compared to the 2nd and the 1st visit.

Moreover, regarding to GI, there were differences in severity of gingival inflammation among the patients of group I, II and III in all visits but the differences without statistical significance. In that respect Table 3 and Fig. 7 summarize the clinical findings of the GI assessment in the present study. There was decreased in GI in the 3rd visit compared to the 1st and the 2nd visit of all groups except group III. There were not differences in the comparison between GI in the 3rdvisit and in the 2ndvisit but there was decreased in GI in the 2nd and 3rd visit compared to the 1st visit.

On the other hand, there were significance differences of PPD assessment when compared in the 1st,the 2ndand the 3rdvisit of all the study groups (p<0. 05) where there was a reduction of PPD in the 2ndand 3rdvisit compared to the 1stvisit in all groups also there was a difference in PPD when compared in group I, II and III at all intervals but without statistical significances differences (Table 4 and Fig. 8).

Table 3. Clinical evaluation of gingival inflammation

		GI			Friedman test (P-value)
		Baseline	After 4ws	After 6ws	
Group I	Mean	1.667	1.667	1.4	0.368
	SD	0.577	0.577	0.000	
Group II	Mean	1.667	1.667	1.4	1.000
	SD	0.577	0.577	0.577	
Group III	Mean	2.000	1.667	1.667	0.368
	SD	0.000	0.577	0.577	

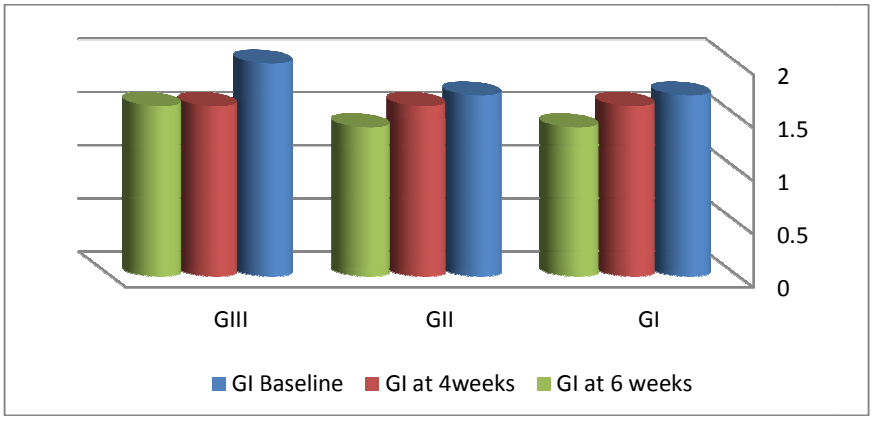

Fig. 7. Clinical evaluation of gingival inflammation

Table 4. Clinical assessment of periodontal pocket depth

		PPD			Friedman test (P-value)
		Baseline	After 4ws	After 6ws	
Group I	Mean	5.667	3.667	2.000	0.048*
	SD	0.577	1.155	1.000	
Group II	Mean	5.667	4.000	2.000	0.050*
	SD	0.577	1.000	1.000	
Group III	Mean	5.667	4.000	2.000	0.050*
	SD	0.577	1.000	1.000	

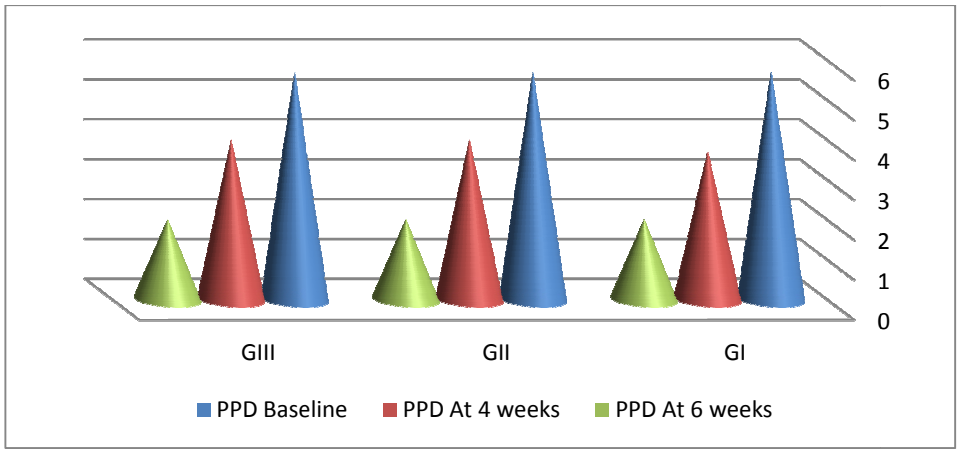

Fig. 8. Clinical assessment of periodontal pocket depth

Consequently, in the end of the study there were no significant differences in the comparison of all clinical parameters between the patients in the present study at all the study intervals visits except PPD also there were no significance differences in clinical findings in the comparison of the present study groups in the 2nd and the 3rd visit of distal pocket therapy except PLI of group II and III where there was decreased in PLI among the patients of group III compared to PLI of group I and II in the 2nd and 3rd visit moreover, there was decreased in GI among the patients of group II and III compared to group I in the 3rd visit only. With regard to PPD there was decreased in PPD among the patients of group II and III in the 2nd visit only compared to the 1st visit.

4. DISCUSSION

Endodontic and periodontal therapy should be done in management of combined endodontic-periodontal lesions for preserving of supporting tissues and removal of both pathological changes accordingly, there were several studies display that both endodontic and periodontal treatment is necessary for a complete healthy of a periodontal-endodontic lesion. Consequently, periodontal or endodontic therapy alone would not produce favorable results [12,13].

According to the study of Hiatt and Amen, the periodontal disease may occur following the effective endodontic treatment so most researchers agree that both types of treatments should be done for the final healing of combined lesions [23]. This study has demonstrated that the effectiveness of topical application of metronidazole 15% gel in the management of moderate distal periodontal pocket on mandibular wisdom teeth being treated for endodontic-periodontal lesions.

It should be noted that Simring and Goldberg revealed that the completion of endodontic therapy before periodontal therapy is more effective on periodontal healing for management of true combined lesions [24]. In other previous experimental studies on endodontic-periodontal cases, treatment of monkeys, there were significance differences in PLI, GI and PPD in the infected root canal systems that were treated compared to the teeth with reversible pulpitis [24-27] which agree the clinical findings of Jansson et al. studies which revealed that there were the mean pocket depth pretreatment was 3.9 mm and the pocket depth post-treatment ranged from 2.9-33 mm in the end of their studies [28].

In the study that was done by Anand PS et al. at 2015 on A case Series, there was amelioration in all periodontal parameters where there was an improvement of oral hygiene and reduction in gingival inflammation and PPD [29]. Moreover, in the study of Alfawaz Y there was a positive effect of endodontic therapy on periodontal status after 2 years [30]. There is a fair agreement with the results of the present study where there was reduction of PLI, GI and PPD were found in some follow-up visits of our study groups.

In the current study there were differences in PLI and GI among the patients in group I in the 3rd visit compared to the 1st and the 2nd visit but without statistical significance also in group II, but there were statistical significance differences in PPD in the 3rd visit compared to the 2nd and

the 1st among the patients of group I and group II (p>0.05).

The purpose of the antimicrobial agents in endodontic-periodontal lesions therapy was to inhibit the bacterial effect and enhance the equilibrium between bacteria and host reaction to facilitate healing of the combined lesions that was demonstrated by Vakalis and collaborators where there were amelioration in PLI, GI and PPD in the treatment of endodontic-periodontal lesions by RCT followed by nonsurgical periodontal treatment and topical applications of many antimicrobial agents [31].

In the current study, we found that there were differences without statistical significance in PLI and GI at the 3rd visit compared to the 1st, the 2nd visit among the patients of group III but there were statistical significance differences in PPD in the 3rd visit compared to the 2nd and 1st visit among the patients in this group study (p>0.05). These clinical findings were consistent with the clinical findings of Ciurba A et al. study that was done by topical application of metronidazole gel associated with SRP where there was improvement in clinical parameters compared to SRP alone [32].

5. CONCLUSION

Despite the limitations of the present study, we concluded that the necessary of understanding that the endodontic therapy is essential of management of endodontic-periodontal lesions moreover the complete healing of these combined lesions is dependent on the accomplishment of periodontal therapy. The conjunction between non-surgical periodontal therapy and topical application of metronidazole 15% gel produced reduction in distal pocket depth on mandibular wisdom teeth among the patients being treated for endodontic-periodontal lesions.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical permission has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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