

Effects of Maintaining Apical Patency on Post-Operative Pain in Molars with Necrotic Pulp and Apical Periodontitis

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ABSTRACT

Objective: To determine the effect of maintaining apical patency on post-operative pain in molars with necrotic pulp and apical periodontitis. **Place of Study:** This RCT was conducted in dental section of Faisalabad Medical University, Faisalabad. **Period:** 14 months from September-2016 to November-2017. **Methods:** Patients having molar teeth with necrotic pulp along with apical periodontitis were included for analysis. We included 200 teeth in this study. In group one (n=100), AP was maintained while in group two (n=100) AP was not maintained. Post-op pain was noted at 12 hours, 24 hours, 2nd day to 7th day after surgery daily. VAS pain score with value from 0 to 10 was used to calculate pain score. Data analysis was done using SPSS software (v21). After checking normality of data using Shapiro–Wilk test, independent sample t-test was used to determine significant difference in mean pain scores between the groups. **Results:** There was female sex predominance in both groups; 57% in AP group and 59% in non-AP group. Regarding type of teeth mandibular molar were in higher number; 66% in AP group and 67% in non-AP group. There was significant difference in VAS pain scores upto 4th day after surgery after that pain score was no statistically different between the AP and non-AP group. **Conclusion:** Maintaining apical patency is associated with significantly less post-operative pain severity score in molars with necrotic pulp and apical periodontitis.

Keywords: Molars, root canal treatment, apical patency, post-op endodontic pain.

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INTRODUCTION

Management of apical part of root canals is very perplexing for dentists. Mechanical preparation or pulpal debris can cause block of apical third resulting in errors in apical transportations and ledge formation.¹ Maintaining apical patency can help to prevent blockage of apical canal. Maintaining patency also helps to remove bacterial biofilms from the surroundings of apical foramen.²

In apical patency (AP) technique, apical portion of canal is made free from debris using a recapitulation by using a small flexible file from the side to side approach of apical foramen. In AP technique, length of the patency file is set 1 mm longer than absolute working length (WL), and by moving the file through the apical narrowing at a width of 0.5– 1 mm without enlarging the constriction.³

Regarding the treatment of apical portion of root canals, post-operative pain is one of major morbidities after root canal treatment and is always a major concern for operative surgeons with incidence rate of 3% to 58% in different studies.^{4,5} Studies have found some association of maintaining AP with reductions in post-operative pain. However, these results are very conflicting in published literature. Even in USA some institutions follow maintenance of AP patency while some contradict its usage.^{6,7} These authors suggest that AP can cause disruption of debris and can infuriate the periodontal ligaments and having no effects on post-operative pain. In present study, we

determined the effect of maintaining apical patency on post-operative pain in molars with necrotic pulp and apical periodontitis.

METHODOLOGY

Place of Study: This RCT was conducted in dental section of Faisalabad Medical University

Period: 14 months from September-2016 to November-2017.

Method:

After completing physical and the radiographic analysis, patients having molar teeth with necrotic pulp along with apical periodontitis were included for analysis. We included 200 teeth in this study. Only one teeth were selected from a single patient. Patients diagnosed of having systemic infections, who took any antibiotic treatment in the last 30 days and those having pre-op pain were excluded from analysis.

The included teeth were categorized into two groups according to the type of treatment. In group one, AP was maintained while in group two AP was not maintained. The operating surgeon was not blinded to the treatment procedures while the dentist who noted the post-operative pain was blinded to the study intervention groups. The patients was also unaware regarding the procedural protocol.

All procedures were done under local anesthesia using lidocaine and epinephrine mixture. After removing caries, tooth was separated using rubber band. Preparation of the access

cavity was performed using round bur (Mani Inc., Japan). Canal negotiation was done using a #10 K file. Electronic apex locator was used to determine the working length (WL). Crown-down cleaning technique was used for cleaning and shaping the canal. After completing the procedure, teeth was washed using normal saline solution. After that x-rays was done again to confirm the WL.

Post-op pain was noted at 12 hours, 24 hours, 2nd day to 7th day after surgery daily. VAS pain score with value from 0 to 10 was used to calculate pain score (10 score indicating maximum pain and 0 score no pain). Data analysis was done using SPSS software (v21). After checking normality of data using Shapiro–Wilk test, independent sample t-test was used to determine significant difference in mean pain scores between the groups.

RESULTS

Demographic variables of patients were similar in AP and Non-AP group. There was female sex predominance in both groups; 57% in AP group and 59% in non-AP group. Regarding type of teeth mandibular molar were in higher number; 66% in AP group and 67% in non-AP group (Table 1).

Post-operative pain score was determined after 2 hours of surgery, and from 1st day 7th days after surgery. There was significant difference in VAS pain scores upto 4th day after surgery after that pain score was no statistically different between the AP and non-AP group. Mean pain score gradually reduced from 4.23 at 2 hours after surgery to 1.21 at 7th day of surgery in AP group. While in non-AP group, mean pain score after 2 hours of surgery was 6.31 and it reduced to 1.20 at 7th day of surgery (Table 2).

Table 1: Baseline Variables

	AP Group	Non-AP Group	P-value
Age	33.3±6.1	32.7±6.4	0.49
Sex			
Male Sex	43	41	0.77
Female Sex	57	59	
Type of Teeth			
Mandibular Molar	63	66	0.65
Maxillary Molar	37	34	

Table 2: Comparison of VAS pain score between the AP and Non-AP groups.

	AP Group	Non-AP Group	P-value
2 hours	4.23±2.1	6.31±2.3	<0.0001
1 st day	3.78±1.2	5.40±1.9	<0.0001
2 nd day	3.41±0.80	4.61±1.1	<0.0001
3 rd day	2.96±0.42	3.21±0.92	0.01
4 th day	2.58±0.35	2.69±0.43	0.04
5 th day	2.25±0.29	2.31±0.33	0.17
6 th day	1.81±0.10	1.83±0.09	0.13
7 th day	1.21±0.06	1.20±0.07	0.27

DISCUSSION

Buchanan in 1989 first time gave the concept of maintaining apical patency (AP) using a small k-file which can easily pass through the apical constricture without widening the constricture.⁸ Since that concept many techniques as well as instruments have been developed for AP. Maintaining AP was a part of teaching in many dental institutions even in USA till 1997 (10). Huge volume of researches has been conducted to determine AP effects on various different parameters.⁹⁻¹¹ In this study, we tried to test the hypothesis that maintaining AP has a good influence on post-operative pain. We included only maxillary and mandibular molar in this study having no pre-op pain history as pre-op pain can have influence on post-op pain severity and can create biasedness in study outcomes. We found that AP is associated with less post-operative pain in the early period after surgery and we found significant difference in severity of post-operative pain in AP maintaining group upto 4th post-op day.

For maintaining AP, the usual file size varies from #10 to 20 and all these are easily available. We used #10 file in our study, as some studies have suggested that larger file size can cause apical injury or widening of constricture and can increase the severity of pain after the procedure.¹² Other factors that can have influence on post-operative pain are; pre-op pain, pulp status, presence of some bacteria in root canals and radiolucency of periapical part.^{13,14}

Yaylali et al.¹⁵ in a RCT found that maintaining AP significantly reduces the severity of post-op pain in early period after surgery. These authors used 1-100 score VAS for measurement of pain while we used 0-10 score VAS. In this study, pain score in AP group was lower as compared to Non-AP group upto 5th post-operative day. However in our study, this difference was upto 4th post-operative day.

Aries et al.¹⁶ also conducted a similar study and found less pain in AP group patients and concluded that maintaining AP reduces the severity and did not increases the incidence of pain. These authors also used #10 K file for maintenance of AP.

However, results of the study of Arora et al.¹⁷ are contrary to our study and upper mentioned studies. These authors did not reported any significant difference in pain score in AP versus non-AP group. However, pain score was lower in AP group but without significant values. These authors also used very small sample size for study and included only 34 patients in AP and 34 in non-AP group. Garg et al. also found contrary results and concluded that maintaining AP has no effect of post-op pain, its only pre-op pain status of patients that effect pain outcomes after root canal treatment.⁷

We included 100 patients in each group and this sample size is enough to determine the significant effects. The person who calculated the pain score in post-op period was also blinded to the group assigned to the participants that helped to minimize biasedness in results. Furthermore prospective nature of our study also strengthens the reliability of study results.

CONCLUSION

Maintaining apical patency is associated with significantly less post-operative pain severity score in molars with necrotic pulp and apical periodontitis.

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