Original Article

Incidence of postoperative flare-ups after single-visit and multiple-visit endodontic therapy in permanent teeth

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ABSTRACT

Aim: Single- and multiple-visit root canal treatment has been the subject of long-standing debate in the endodontic community, so the purpose of this study was to determine the incidence of postoperative flare-up after single- and multiple-visit endodontic therapy in permanent teeth. **Materials and Methods:** A total of 65 children aged >10 years who underwent root canal treatment were randomly categorized equally into two treatment groups: the first group underwent single-visit treatment, and the other group underwent multiple-visit therapy. The visual analog scale was employed to evaluate pain preoperatively and postoperatively after obturation. Recall visits were carried out after 1 week, 1 and 3, 6 and 9 months. The Statistical Package for the Social Sciences version 15.0 was employed for statistical analysis. **Results:** Except at the baseline, at all the other time intervals, the mean pain score in the multiple-visit group was higher as compared to that of the single-visit group; statistically no significant difference was found. **Conclusion:** The mean pain score in the single-visit group was lower as compared to that of the multiple-visit group; however, the difference between the two groups was statistically significant ($P > 0.05$).

KEYWORDS: Flare-ups, multiple sitting, pain, postobturation, RCT, single sitting

Introduction

With the evolution of newer techniques, instruments, materials, and better understanding of the canal anatomy, the face of endodontics has totally changed. Historically root canal treatment was performed in multiple visits mainly to ensure the sterility of root canal system prior to obturation.

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As complete sterilization was not possible with biomechanical preparation and irrigation, intracanal medicaments were used to ensure the complete eradication of bacteria. It has been known for 40 years that microorganisms play an indispensable role in the pathogenesis of periradicular disease.[1]

Depending on a variety of factors, the dentin-pulp complex is an exquisitely responsive sensory system that is significant for the diagnosis of the dental pulp. Some studies have suggested that the use of different

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medications in between visits can contribute to the elimination of all bacteria. In contrast, others have emphasized the need to seal the endodontic space in a single visit, as temporary cements are unreliable in maintaining a good coronal seal during the time between visits.[2]

A flare-up can be defined as pain and/or swelling of the facial soft tissues and the oral mucosa in the area of the endodontically treated tooth that occurs within a few hours or a few days following the root canal treatment when clinical symptoms (tooth pain when biting, chewing, or by itself) are strongly expressed, and the patient visits a health-care institution sooner than scheduled.[3,4] The origin of the postendodontic flare-up is etiological; mechanical, chemical, and microbial factors influence its development. However, the main determining factor in the success of the root canal was proved to be the quality of the root-canal filling in this study rather than the quality of the coronal restoration. Nevertheless, an impervious seal at the coronal area is vital for a successful prognosis of an endodontically treated tooth.[5] Many studies have found a direct relationship between root canal infection and the level of pain after endodontic treatment. Thus, endodontic treatment is primarily focused on the utmost elimination of these bacteria.[6]

Despite the desire, they present for treatment late only after the onset of pain. Furthermore, some patient does not come back to complete the treatment after the first appointment at which pain is relieved. Hence, more dentists are embracing the single-visit procedure. Therefore, the aims of the present study was to evaluate the 9-month flare-ups following the single and multiple-visit endodontic treatment procedures, to establish the relationship between preoperative and post-obturation pain, and to find the incidence and degree of pain at the 1 week, 1 ,3, 6 and 9 months post-obturation days.

Materials and Methods

The present clinical study was carried out in the department of pediatric and preventive dentistry, Bihar, with the main aim to evaluate the postobturation flare-ups following single- and multiple-visit endodontic treatment procedures in permanent teeth.

Criteria for case selection

A proper case history of the children was taken followed by proper clinical and radiographic examination. The affected tooth/teeth were confirmed of any pathological changes.

Patient consent

The parents and guardians were explained about the importance of treatment required and requested for their participation and cooperation. A detailed plan was also explained to them.

Inclusion criteria: Clinical

1. Children in the age group >10 years with deep caries approximating pulp and indicated for a root canal treatment
2. Proper bone support
3. No evidence of severe mobility/discharge of frank pus
4. Radiographic criteria
5. Permanent first molars with periapical radiolucency not exceeding 3 mm × 3 mm in size
6. Complete root formation.

Exclusion criteria

1. Tooth/teeth with extensive periodontal pathology/periapical radiolucency
2. Teeth with evidence of internal or external root resorption involving more than one-third of the root length
3. Children with facial cellulitis or significant extraoral swelling.

These were randomized into two equal groups:

- Group I: Single-visit treatment group
- Group II: Multiple-visit treatment group.

Clinical procedures

A total of 64 patients were included in the study, 32 in each group, once the above-said eligibility criteria were confirmed and fulfilled. Patients were randomly assigned to either single- or multiple-visit treatment by biased coin randomization, a dynamic randomization method which was specially designed to get the same number in every group, and the sequence, tossing coin and allocation were operated by a graduate student who was blind to the nature of the study.

First visit steps involved

- Administration of local anesthesia
- Rubber dam application
- Preparation of access cavity
- Extirpation of the pulp
- Cleaning and shaping of the canal
- Obturation on the same day
- Radiographs were taken after 3 and 9 months.

For multiple visits, steps involved were the same as those for the single visit, except for the fact that close dressing was placed on the first visit, and obturation was done after 1 week (2nd visits).

Group I: Single visit

Access cavity preparation was carried out. The negotiation of the canals was done with #15 K-file and a diagnostic radiograph was taken for working length determination. Following above the initial procedure, and after negotiating the canal with K-file cleaning and shaping of the canals was done. Files were used sequentially using the stepback technique, the preparation was commenced at the apex with small

instruments, following the reduction of periapically extruded necrotic debris and minimization of root canal straightening and enlarging the canal starting with #15 H-File up to a maximum of 45 size, respectively. Irrigation with 3% sodium hypochlorite and normal saline were continuously done throughout the instrumentation. All instrumentation was kept 0.5 mm short of the apex. The canals were then dried using paper points and were obturated by gutta-percha with sealer on the first visit.

A thicker mix of zinc oxide eugenol (dry putty-like consistency) was placed in the pulp chamber as a temporary sealing material.

Then, the postoperative radiograph was taken. The cavity was sealed with posterior composite or amalgam after obturation.

Group II: Multiple visit

The same protocol was followed, after negotiating the canal with K-file then cleaning and shaping of the canals was done, and closed dressing was given to promote periradicular healing by removing necrotic pulp. In the second appointment, patients were recalled after 7 days, the interappointment dressing was removed, and canals were thoroughly irrigated with 3% sodium hypochlorite and normal saline. The files were used sequentially in a pullback direction enlarging the canal starting with #15 H-File up to a maximum of 45 size, respectively. Irrigation was continuously done throughout the instrumentation. All instrumentations were kept 0.5 mm short of the apex. The canals were then dried using paper points and were obturated by gutta-percha with sealer, using postoperative radiograph was taken. The cavity was sealed with posterior composite or amalgam after obturation.

Evaluation of clinical parameters was done at 24, 48, 72 h, 1 week, 1, 3, 6, and 9 months.

- Pain assessed by the visual analog scale [Figure 1]
- Tenderness to percussion
- Presence of mobility.

A follow-up evaluation was made of the radiographic and clinical data. During this follow-up period, the coronal restorations were found to be of good quality. The data were analyzed statistically using Statistical Package for the Social Sciences (SPSS) version 15.0 (IBM, Armonk, NY, USA) statistical analysis software. The values were represented in number (%) and mean ± standard deviation.

Results

The results are presented in terms of age- and gender-wise distribution of patients [Figure 2].

The evaluations for permanent teeth were carried out at 24 h, 48 h, 72 h, 1 week, 1, 3, 6, and 9 months intervals.

The parameters recorded were pain, discomfort, gingival swelling, tenderness to percussion, mobility, periapical changes, root resorption, and reduction of the previous rarefaction.

Mean pain score in the multiple-visit group and single-visit group [Figure 3].

Throughout the study, mean pain, discomfort, gingival swelling, tenderness to percussion, score in the single-visit group were lower as compared to that of the multiple-visit group; however, the difference between two groups was statistically significant ($P > 0.05$).

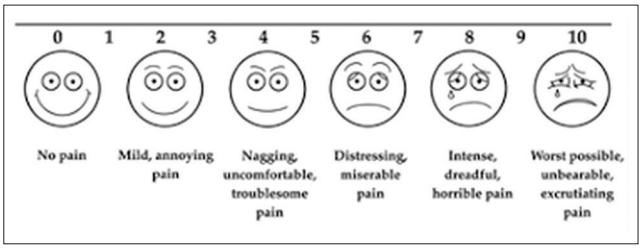

Figure 1: Pain assessed by the visual analog scale

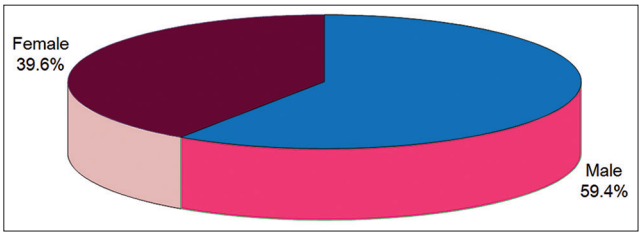

Figure 2: Age- and gender-wise distribution of patients

Variable	Statistic
Mean age±SD (range) in years	9.17±2.99 (4-13)
Gender (%)	
Male	38 (59.4)
Female	26 (39.6)

SD=Standard deviation

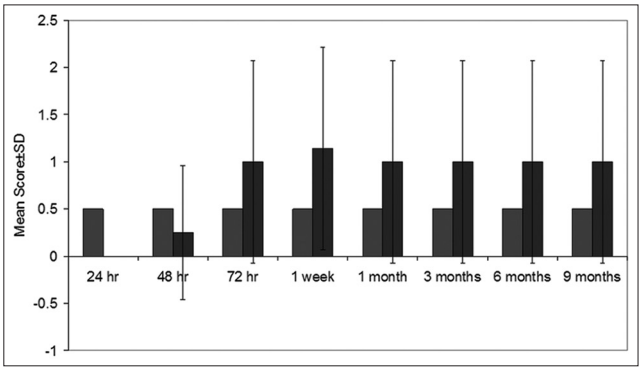

Figure 3: Mean pain score in multiple-visit group and single-visit group. Except at 24 h and 48 h intervals, at all the time intervals, mean flare-ups score was higher in multiple group as compared to single group, but the difference between two groups was statistically insignificant ($P > 0.05$)

In the single-visit group, the mean score remained unchanged at 0.38 ± 0.81 throughout the study. In the multiple-visit group, the mean pain score was 0 till 6 months; however, at 9 months, the mean pain score was 0.13 ± 0.34. At none of the time intervals, the difference between two groups was statistically significant ($P > 0.05$).

No periapical change was noticed in either of two groups up to 1-month period. At 6 months, nine cases in the single-visit group and eight cases in the multiple-visit group showed periapical changes. Statistically, this difference was insignificant ($P = 0.723$).

Discussion

In recent decades, the discussion on single- or multiple-visit root canal treatment has gained attention; however, no consensus has been reached.[6-8] This might be explained by the inconsistencies in the design, participant's intervention, and outcome measures and small sample sizes among studies. In the Northern part of India, most of the studies comparing the success rate of endodontic therapy performed in one or more sessions have not been appropriately structured. Therefore, this randomized clinical study aimed to compare the outcomes of single- versus multiple-visit root canal treatment. In both groups, 32 cases were treated by the single-visit procedure, and the rest 32 cases were treated by the multiple-visit procedure. The sample size is critically dependent on the purpose of the outcome measure and how it is summarized, the proposed effect size, and the method of calculating the test statistic.[9]

On the contrary, Ether *et al*.[10] and in the same year, Soltanoff and Montclair[11] examined the incidence of pain while comparing the single- and multiple-visit endodontic procedures and concluded a significantly higher number of patients with no pain in the group that had the multiple-visit procedure than in the single-visit group, whereas in the present study, 75% of success rate was seen in the healing rate of the periapical radiolucencies in the single-visit procedure, whereas 37.5% of success rate was reported in the multiple-visit procedure. The overall success rate was statistically nonsignificant ($P = 0.723$), with the result being comparatively the same for both groups.

Not many studies in the literature advocate the use of single-visit endodontics with periapical radiolucency and those documented have shown conflicting results.

Outcome and complications are the most important factors to be considered when making treatment plans.[12] Numerous studies evaluating the effectiveness and posttreatment pain of single-versus multiple-appointment root canal treatment have been published, which reported no significant differences in effectiveness (healing rates) and postoperative pain between these two treatment regimens.[13,14] However, most of the previous literature focused primarily on comparing procedures without considering the pretreatment pulpal status.

From the above-discussed literature, it is clear that although results of some studies are in the favor of single-visit root canal treatment in terms of pain incidence and others favor multi-visit procedures, but the majority of literature published on the comparison between single- and multi-visit root canal treatment deny any significant difference in the level of postobturation pain between the two.[15,16] In this *in vivo* study, no statistically significant differences were found in the incidence of pain between single- and multi-visit procedures.

Conclusion

A generation ago, dentists were taught to disinfect the canals before obturating them, and the idea of single-visit endodontics was unheard of. Multiple medicaments and intracanal antibiotics were the generally accepted standard of therapy.[17]

The single-visit endodontic treatment regimen, which does not deviate from multiple-visit endodontic therapy in achieving the basic objective of the therapy, has become the choice of treatment for today's fast-paced society.

As far as previous literature is concerned, no study comparing the success rate of single- and multiple-visit endodontic therapy in permanent molars has been carried out in the Northern part of India.

The parameters assessed for permanent dentition were age, gender, pain, discomfort, gingival swelling, mobility, periapical changes, and reduction in the level of rarefaction at 12 h, 48 h, 1 week, 1, 3, and 6 months for permanent dentition. Statistical analysis was done using the Statistical Package for the Social Sciences version 15.0 statistical analysis software. Chi-square and Mann–Whitney U-test were done.

Therefore, it was concluded that within the limit of the present study, though the clinical outcome was statistically insignificant, single-visit endodontic therapy showed encouraging results in teeth with or without periapical radiolucency and is definitely a promising treatment option in the routine endodontic therapy.

It is important to note that there is no shortcut to success; single-visit endodontics does not mean skipping of any step, rather all the steps must be systematically performed to achieve a successful outcome. One must bear in mind that irrespective of the number of visits, a good quality of endodontic treatment must be provided.

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Nil.

Conflicts of interest
There are no conflicts of interest.

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