

Discussion

Acute pain is a symptom of acute pulpitis, management of the pain alone doesn't cure the problem⁽¹³¹⁻¹³²⁾. Comparing the effect of pulpotec and calcium hydroxide intra-coronal dressing on inter-appointment pain relief for symptomatic posterior teeth diagnosed as acute pulpitis with apical periodontitis is the purpose from this study. This was by maintaining the pulp vitality with Pulpotomy^(30,31,40) and follow up after therapy for 6 months. Vital pulp treatment by pulpotomy of permanent teeth in adults presented as an alternative treatment to root canal treatment⁽⁵²⁾ as it provided removal of the inflamed part of the pulp tissue and relief the pain⁽⁵³⁾.

This study was subjected to double-blinded⁽¹¹⁷⁾ randomization study to minimize allocation bias^(11,115,116), balancing both known and unknown prognostic factors. This trial design methodology conforms to the Consolidated Standards of Reporting Trials (CONSORT) 2010⁽¹⁷⁾ statement which is: an international consensus guide and checklist to improve reports on randomized controlled trials.

Each participant has a known probability of receiving each intervention before one is assigned with the random allocation⁽¹¹⁶⁾. The basic benefits of randomization are eliminating the selection bias, balances the groups with respect to many known and unknown confounding or prognostic variables, forms the basis for statistical tests, and a basis for an assumption of free statistical test of the equality of treatments^(113,114,133).

Evaluation of the patient extra and intra oral condition preoperatively to achieve correct and definite diagnosis ^(134,135) was performed by collecting the patient data and recording his chief complain in his own words ^(109,110). Radiographic X-Ray was obtained to assess the teeth surrounded peridontium using Bisecting angle technique pre-operatively and in follow up. Regarding to **Forsberg J and Halse A** ⁽¹³⁶⁾.

The second test performed is the mobility test to determine tooth stability ⁽¹³⁵⁾. Sensitivity tests using Electrical and thermal pulp testing were applied to assure the diagnosis ⁽¹³⁷⁻¹³⁹⁾.

The selection of affected patients' posterior teeth with exception of patient with allergy ⁽¹⁴⁰⁾, systemic diseases like hypertension ⁽¹⁴¹⁾, cardiac diseases and cardiac artery diseases ⁽¹⁴¹⁾, diabetes ⁽¹⁴²⁾, excessive bleeding ⁽¹⁴³⁻¹⁴⁴⁾, intra oral fistula, symptoms of chronic infection, medically compromised, bad oral hygiene, psychological disturbance ⁽¹⁴⁵⁾ and the patient who uptakes analgesics in the previous 12 hours.

Evaluation and measurement of the pain one of the problems which was overcome by using the Visual Analogue Scale (VAS), it offers a potential quick and simple measurement as a numerical measure of change in pain helps objectively to evaluate the efficacy of pain relief, and the degree of pain that various treatments or procedures may cause ^(146,147). (VAS) used in this study to measure pain scores at different intervals periods of 8, 12, 24 and 48 hours after complete treatment with both dressing materials, every patient filled his VAS chart according to his pain level at the intervals time and after a call confirm.

Pulpotomy procedure begun by using Mepicane-L (4 cases needed 2 carpules) local anesthesia, a high speed round bur was used to remove the caries and gain access to the pulp chamber then applying rubber dam to isolate the affected tooth.

All the coronal pulp removed then haemostasis of the cavity was achieved by irrigation using sodium hypochlorite ^(119,120) and was dried gently with cotton pellets until the hemorrhage controlled. Using of 5% sodium hypochlorite to reduce the bacterial population as Sodium hypochlorite has a wide range activity against both Gram-positive, Gram-negative bacteria and strongest antifungal agent among root canal irrigations and medications and removes the debris and it can control the bleeding as it effectively dissolves pulpal remnants and collagen ^(118,149).

The dressing material was mixed and placed according to the patient group as a ball of thick putty consistency of pulpotec ⁽⁹⁶⁾ or creamy mix in case of hard setting calcium hydroxide (dycal) ⁽¹⁵⁰⁾, selection of dycal depended on the findings of the histologic and radiographic analysis of the treated pulps with pure Ca(OH)₂ that a zone of necrosis at the treated pulp region was found at some distance from the capping material but In Dycal-treated pulps, the barriers were formed at the Dycal-pulp interface ⁽⁷⁹⁾, at the other hand the additives enhanced the physical and chemical properties ^(53,151).

Zinc phosphate was mixed as base after application of the dressing ^(121,122) then the cavity sealed with amalgam ^(152,153) for maximal sealing ability as it affect the long-term maintenance of pulp vitality and sustained normal function of the pulp-capped or pulpotomized tooth ⁽³³⁾. The literature indicates that the healing of dental pulp after treatment is related particularly to the capacity of sealing materials to prevent leakage and bacterial invasion. Using restorative materials with hermetic sealing ability a prerequisite to a successful vital pulp therapy ^(117,122).

Patients were instructed to fill his VAS chart and not to use any antibiotics or analgesics during the 1st 48 hrs from the procedure in order not to affect the pain intensity ⁽¹⁵⁴⁾.

Patient recalling and the radiographic follow up are the best ways to measure the success and the failure rate of pulpotomy ^(88, 89,155). Nevertheless, one of the complications is that pain relieving seldom affected the patient contact, on the other hand, it was easier to contact the patient in failure or if the patient faced any symptoms ⁽¹⁵⁶⁾. 6-months dental screening was done to detect dental disease or a predisposition to it in order to institute treatment, which will have a favorable effect upon the caries diseases ^(157,158).

The outcome of this study showed that using of Ca(OH)_2 as an intra-coronal dressing material after 8 hours resulted in 6 cases with mild pain and 16 cases with moderate pain while in contrast to that, pulpotec group showed 8 cases with mild pain and 14 with moderate pain.

After 12 hours, no significant difference between the two groups but Ca(OH)_2 showed statistically significantly higher prevalence of mild pain than pulpotec group which showed higher prevalence of no pain after 24 hours by 10 cases with no pain and 12 with mild pain in the Ca(OH)_2 group in comparison to pulpotec group which showed 19 cases with no pain, only 3 with mild pain.

After 48 hours of following up of the cases, there was no significant difference between the two groups as they showed no pain in all the cases where it had been reconnect to the missed patient.

These results for Ca(OH)_2 might be due to the pulpotomy procedure itself as it provided removal of the most inflamed part of the pulp ⁽⁵³⁾ in the 1st 12 hours, then by time with increasing primary sealing ability the induced dentin barrier and high alkalinity caused antibacterial effect ⁽¹⁵⁹⁾.

For Pulpotec, pain relieving might be contributed to the quick hardening of the paste after mixing of ingredients that prevented isolation of volatile fractions, provided optimal conditions for depositing of the cavity liner and decreasing the time for treatment radically which enhance the evaporation of the effective ingredients in addition to inhibition of production of multiple cells or factors that were important in the production of inflammatory response⁽¹⁰²⁻¹⁰⁵⁾. On the other hand, one of the main components of pulpotec is the dexamethasone Acetate which has anti-inflammatory action and ability in pain relieving^(106, 160).

Dexamethasone is Glucocorticoids which inhibits the inflammatory response by its effect on gene transcription that results in a decrease the release of vaso-active and chemo-attractive factors like bradykinin and certain cytokines that occur during periapical inflammation⁽¹⁶¹⁻¹⁶⁶⁾.

The other ingredients of pulpotec is Iodoform which composed of some powder with bright hexagonal crystals of lemon yellow color, with penetrating and persistent smell, Compounds that contain iodine are well known for infection control in Dentistry. Iodine action gives them a high reactivity by precipitating proteins and oxidizing essential enzymes⁽¹⁶⁷⁾. Phenol is also one of pulpotec components it has many biological effects as antibacterial, antiviral, antifungal, and antioxidant⁽¹⁶⁸⁾.

After 1 month Ca(OH)_2 showed statistically significant higher prevalence of pain on percussion, severe pain to hot and cold with periapical radiolucency in 3 cases by (13.6%) and all the cases needed pulp exterbation and root canal treatment but in the opposite side pulpotec group showed no pain in all the cases. These results might be regarded to the control of pulpal bleeding after coronal pulp amputation as it was difficult to achieve⁽¹⁶⁹⁾. Several experiments reported presence of pulp necrosis and tunnel defect within the dentin bridge which lead to

bacterial leakage and pulp recontamination after Ca(OH)_2 pulp capping or pulpotomy because it disintegrated and dissolved over time leaving voids ⁽¹⁷⁰⁻¹⁷³⁾. It also may be contributed to its high solubility and low strength of the material ⁽¹⁷⁴⁾.

Finally , this study presented a high clinically and radiographically success rate to the pulpotec as an intra-coronal dressing in comparison with calcium hydroxide over 6 months follow up period but it is limited to the pain so we need more researches upon its the other clinical and histological effect .

Summary

The aim of this study was to compare the effect of pulpotec and calcium hydroxide intracoronal dressing on interappointment pain relief for symptomatic posterior teeth with acute pulpitis with apical periodontitis.

The trial design of this study was double blinded randomized controlled trial which people were allocated randomly to receive one of several clinical interventions.

Forty-four patients of Carious Posterior teeth with acute pulpitis with apical periodontitis clinically and radiographically diagnosed with no bone loss, mobility or periapical destruction included in the study.

The trial design followed the CONSORT 2010 flow diagram; the participants in this research were assigned into two groups, 22 patients in each group, randomly divided into 2 equal groups:

GROUP A: will receive **Calcium Hydroxide** dressing

GROUP B: will receive **Pulpotec** dressing

All selected participant subjected to Pulpotomy mechanically by removal of the irritant from the pulp chamber with leaving intact vital radicular pulp then chemically by using one of the comparable medicaments according to the allocated group followed by zinc phosphate base and restored finally with amalgam for all the teeth.

The primary outcome that was the degree of pain relieving after the procedure by 8, 12, 24, 48 hours was measured using the Visual Analogue Scale (VAS). Secondary outcome that was follow up visits to determine the intervention results by time on pain using the visual analogue pain scale and to evaluate its effect clinically and radiographically after 1month, 3months and 6months.

The study resulted in after 8 hours and 12 hours, there was no statistically significant difference between the two groups. After 24 hours, Group B showed statistically significantly higher prevalence of no pain. Group A showed higher prevalence of mild pain. After 48 hours, all cases had no pain. The secondary outcome after 1 month, Group B showed statistically significantly higher prevalence of no pain. Group A showed higher prevalence of severe pain.