Effect of trephination on postoperative pain and swelling in symptomatic necrotic teeth

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Objective. The purpose of this prospective, randomized, blinded study was to determine the effect of trephination on postoperative pain and swelling in symptomatic necrotic teeth.
Study design. Fifty emergency patients participated, and each had a clinical diagnosis of a symptomatic necrotic tooth with associated periapical radiolucency. After endodontic treatment, patients randomly received either a trephination or mock trephination procedure. The trephination procedure used an intraosseous perforator to provide an initial opening in the cortical bone that was enlarged with files (No. 25 through No. 70) and an endodontic spoon. After surgery, each patient received ibuprofen; acetaminophen with codeine (30 mg); and a 7-day diary to record pain, percussion pain, swelling, and number and type of pain medication taken.
Results. The majority of patients with symptomatic necrotic teeth had significant postoperative pain and required analgesics to manage this pain. The use of a trephination procedure with an intraosseous perforator, files, and a spoon excavator did not significantly reduce pain, percussion pain, swelling, or the number of analgesic medications taken in symptomatic necrotic teeth with periapical radiolucencies ($P > .05$).
Conclusion. We cannot recommend the routine use of a trephination procedure, as used in this study, for relief of pain in symptomatic necrotic teeth with radiolucencies. **(Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2000;90:507-13)**

Emergency endodontic treatment of a symptomatic, necrotic tooth is a frequent occurrence in endodontic practice. Postoperatively, moderate to severe symptoms may occur after this treatment despite thorough debridement of the root canal system.[1-7]

Various studies[8-10] have evaluated the effectiveness of a conventional trephination procedure (mucoperiosteal incision and penetration of the apical cortical bone) to relieve postoperative pain. Chestner et al[8] described an apical trephination procedure and reported pain resolution in most of the 50 patients studied. Peters[9] used a conventional trephination procedure and found no cases of severe pain in any of his patients who were prophylactically trephinated. Peters[9] also reported that patients with severe pain had pain relief after trephination. Recently, Moos et al[10] demonstrated that a conventional trephination procedure resulted in greater pain intensity, unpleasantness, and less pain relief throughout the 96-hour postoperative period. However, the only statistical difference occurred at 4 hours when compared with the nontrephinated group.

Elliot and Holcomb[11] evaluated a minimally traumatic trephination procedure in asymptomatic, necrotic teeth. The authors used a No. 3 endodontic spreader to penetrate the alveolar mucosa, periosteum, and cortical plate of alveolar bone. Although their study was limited to anterior and maxillary premolar teeth, they reported that no pain occurred in the teeth that were prophylactically trephinated, whereas 25% of those not trephinated had moderate to severe pain.

The conventional trephination procedure requires a surgical procedure, and the minimally traumatic procedure (use of the No. 3 spreader) cannot be used in molar teeth. A safe, quick, and effective trephination procedure that would decrease pain and the need for analgesic medication in symptomatic necrotic teeth would help many endodontic patients.

A number of studies have evaluated the Stabident (Fairfax Dental Inc, Miami, Fla) intraosseous technique for delivering local anesthetic solution to the cancellous bone.[12-15] The advantages of the Stabident technique are the ease with which the perforator (a solid 27-gauge wire with a beveled end) penetrates

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cortical bone and the fact that the perforation can be made in all teeth, including molar teeth. With the perforator opening serving as a pilot hole, enlargement with files and a spoon excavator can quickly and easily be made to trephinate cortical bone.

The purpose of this prospective, randomized blinded study was to evaluate postoperative pain and swelling after performing a trephination procedure in symtomatic necrotic teeth with radiolucencies.

MATERIALS AND METHODS

Fifty adult patients presenting for emergency treatment participated in this study. All patients were in good health as determined by a written health history and oral questioning. The study was approved by The Ohio State University Human Subjects Committee, and written consent was obtained from each patient.

Patients included in this study had a clinical diagnosis of a symptomatic necrotic tooth and currently had spontaneous pain. Each tooth had to test negative to Endo Ice (Hygenic Corporation, Akron, Ohio), an electric pulp tester (Analytic Technology Corp, Redmond, Wash), and had to have a periapical radiolucency.

The preoperative parameters of age, sex, weight, and tooth type were recorded for each patient. An estimate of the radiographic lesion area was calculated by averaging the smallest and largest measurements and dividing this number by 2. This number served as a proxy for the lesion's radius if it had been round. Lesion area was then estimated by the following formula: area = $\pi \times \text{radius}^2$. No patient had clinical swelling or the presence of a sinus tract. One of the teeth was a retreatment case. Patients were asked to rate their pain on a scale from 0 to 3. Zero indicated no pain. One indicated mild pain, pain that was recognizable but not discomforting. Two indicated moderate pain, pain that was discomforting but bearable. Three indicated severe pain, pain that caused considerable discomfort and was difficult to bear. Patients were asked to rate percussion pain by using the same scale.

Conventional endodontic treatment was performed by senior endodontic graduate students. After local anesthetic administration, standard access openings were performed. The working length was determined to be approximately 1 mm from the radiographic apex. The canals were prepared with a step-back preparation and K-type files (LD Caulk Inc, Milford, Del). The canals were irrigated with 2.62% sodium hypochlorite initially and after every other file was placed to working length. Complete biomechanical preparation of all canals was accomplished. The canals were dried and a sterile cotton pellet was placed over the canal orifices and the access opening was sealed with Cavit (Espa, Siefeld, Germany). The occlusion was not adjusted.

Patients randomly received either a trephination procedure or a mock trephination procedure. Before the experiment, patient groups (trephination or mock) were randomly assigned by using 4-digit numbers from a random number table. Only the random numbers were recorded on the data collection and postoperative diary sheets to blind the experiment.

The trephination procedure was accomplished as follows. The site of the trephination was anesthetized with 0.1 mL of 2% lidocaine with 1:100,000 epinephrine. The initial opening was made with a Stabident perforator. The area of perforation was determined by the horizontal line of the buccal gingival margins of the adjacent teeth and a vertical line that passed though the interdental papilla. Twenty-one of the trephination sites were mesial and 4 were distal to the experimental tooth. A point approximately 2 mm below the intersection of these lines was selected as the perforation site. The perforator was placed through the gingiva and the handpiece was activated in a series of short bursts until a break-through feeling was observed. This opening was enlarged by inserting successively larger K-type endodontic files (No. 25 through No. 70) to an approximate length of 9 mm. An endodontic spoon excavator was placed through the opening and was used to curette the cancellous bone and enlarge the interior opening.

The mock trephination procedure mimicked the actual trephination procedure except that the perforator only penetrated gingival tissue (not bone) and the file handles (No. 25 through No. 70) were placed on the gingival tissue and turned to mimic the trephination procedure. The spoon excavator was placed through the gingival perforation and moved across bone in a scraping motion. All instruments were used in the same sequence and for the same time period as during the actual trephination. For both the trephination and mock trephination procedure, patients rated the pain of the Stabident perforation, pain of file use, and pain during curettage with the spoon excavator, by using the pain scale already outlined.

After endodontic treatment and trephination, each patient received a labeled bottle of 400 mg tablets of ibuprofen (Advil, Whitehall Laboratories, New York, NY) along with verbal and written instructions on how to take the medication. They were instructed to take 1 tablet every 4 to 6 hours as needed for pain and to take the ibuprofen first if an analgesic was required. Each patient also received a labeled bottle of acetaminophen with 30 milligrams of codeine (Tylenol No. 3, MacNeil Consumer Products, Fort Washington, Pa) along with verbal and written instructions. They were instructed to take the acetaminophen with codeine (1 or 2 tablets every 4 hours as needed for pain) only if the ibuprofen tablets did not relieve their discomfort. Each patient

Table I. Distribution of tooth type for trephination and mock trephination groups

Tooth type	*Number*	*Percent*	*Tooth type*	*Number*	*Percent*
	Maxillary teeth			*Mandibular teeth*	
First molar			First molar		
Trephination	6	12%		7	14%
Mock	1	2%		5	10%
Second molar			Second molar		
Trephination	2	4%		4	8%
Mock	0	0%		5	10%
First premolar			First premolar		
Trephination	1	2%		1	2%
Mock	1	2%		2	4%
Second premolar			Second premolar		
Trephination	0	0%		1	2%
Mock	0	0%		0	0%
Anteriors			Anteriors		
Trephination	4	8%		2	4%
Mock	3	6%		5	10%

n = 25 trephination, 25 mock trephination.

received twenty-eight 500 mg tablets of penicillin VK (Biocraft Laboratories, Inc, Elmwood Park, NJ) to be taken every 6 hours. One patient received erythromycin because of an allergy to penicillin. An antibiotic was administered because many patients were taking penicillin when they presented for emergency treatment, and placing patients on antibiotics standardized this variable. Based on previous studies,[6,16] penicillin would not affect the outcome of this study.

Each patient received a 7-day diary to record postoperative symptoms. The symptoms were recorded each day for 7 days, when the patient arose. The data recorded were pain, percussion pain (the patient was asked to tap on the tooth), swelling, and amount and type of pain medication taken (ibuprofen or acetaminophen with codeine). Pain and percussion pain rating scales were the same as outlined previously. Swelling was rated on a scale from 0 to 3. Zero indicated no swelling. One indicated mild swelling, mild puffiness of the face that was not bothersome. Two indicated moderate swelling, swelling that caused facial distortion and was bothersome. Three indicated severe swelling, swelling that caused serious facial distortion and was very bothersome. At the scheduled obturation appointment, the patient returned the diary and all unused medications to verify the amount of pills taken.

Data were collected and statistically analyzed. Analyses for differences between the trephination procedure and mock trephination procedure were completed as follows. Age and weight were analyzed with the independent *t* test. The chi-square test was used to evaluate differences in sex. Tooth type (anterior, premolar, molar) was analyzed with the Fisher exact test. Between-group differences in estimated lesion area, number of analgesic medications taken, pain, percussion pain, swelling, sum pain intensity differences, sum swelling intensity differences, sum pain percussion intensity differences, baseline pain, baseline percussion, and pain during the trephination procedure were assessed with the Mann-Whitney-Wilcoxon test. Differences were considered significant at $P < .05$.

Table II. Preoperative parameters for trephination and mock trephination groups

Variable	*Trephination*	*Mock*	*P value*
Age*	30 ± 10.0	32 ± 10.5	.602
Sex	11 Women 14 Men	8 Women 17 Men	.382
Weight*	165 ± 42.1	177 ± 44.3	.334
Estimated lesion area*	16.8 ± 20.5	15.4 ± 11.3	.8603
Tooth type*			.916
Initial pain†	2.00 ± 1.00	3.00 ± 1.00	.697
Initial percussion pain†	2.00 ± 1.00	1.00 ± 1.00	.1100

*Mean ± SD.
†Median ± interquartile range.

RESULTS

The trephination group and the mock trephination group each consisted of 25 patients. The distribution of tooth type is found in Table I.

Table II shows the preoperative variables of age, sex, weight, estimated lesion area, tooth type, initial pain, and initial percussion pain for the 2 groups. There was no statistically significant difference ($P > .05$) between the trephination group and the mock trephination group for any of the preoperative parameters. This analysis confirms that the 2 groups were from the same population.

Table III. Pain, percussion pain, and swelling ratings for baseline and each postoperative day for trephination and mock trephination groups

	Pain ratings				*Percussion Pain Ratings*				*Swelling ratings*			
Day	*None*	*Mild*	*Moderate*	*Severe*	*None*	*Mild*	*Moderate*	*Severe*	*None*	*Mild*	*Moderate*	*Severe*
Baseline												
Trephination	0 (00%)	5 (20%)	6 (24%)	14 (56%)	0 (00%)	6 (24%)	12 (48%)	7 (28%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mock	0 (00%)	4 (16%)	10 (40%)	11 (44%)	2 (8%)	11 (44%)	6 (24%)	6 (24%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Day 1												
Trephination	2 (8%)	8 (32%)	10 (40%)	5 (20%)	1 (4%)	13 (52%)	8 (32%)	3 (12%)	8 (32%)	11 (44%)	6 (24%)	0 (0%)
Mock	3 (12%)	8 (32%)	13 (52%)	1 (4%)	6 (24%)	12 (48%)	5 (20%)	2 (8%)	11 (44%)	7 (28%)	7 (28%)	0 (0%)
Day 2												
Trephination	4 (16%)	12 (48%)	7 (28%)	2 (8%)	4 (16%)	15 (60%)	4 (16%)	2 (8%)	7 (28%)	12 (48%)	5 (20%)	1 (4%)
Mock	5 (20%)	15 (60%)	5 (20%)	0 (0%)	8 (32%)	12 (48%)	5 (20%)	0 (0%)	16 (64%)	4 (16%)	5 (20%)	0 (0%)
Day 3												
Trephination	8 (32%)	11 (44%)	5 (20%)	1 (4%)	9 (36%)	12 (48%)	3 (12%)	1 (4%)	14 (56%)	7 (28%)	3 (12%)	1 (4%)
Mock	11 (44%)	10 (40%)	4 (16%)	0 (0%)	12 (48%)	12 (48%)	0 (0%)	1 (4%)	18 (72%)	5 (20%)	2 (8%)	0 (0%)
Day 4												
Trephination	17 (68%)	6 (24%)	2 (8%)	0 (0%)	11 (44%)	12 (48%)	2 (8%)	0 (0%)	16 (64%)	5 (20%)	4 (16%)	0 (0%)
Mock	16 (64%)	8 (32%)	0 (0%)	1 (4%)	13 (52%)	10 (40%)	1 (4%)	1 (4%)	19 (76%)	4 (16%)	1 (4%)	1 (4%)
Day 5												
Trephination	19 (76%)	4 (16%)	2 (8%)	0 (0%)	14 (56%)	9 (36%)	2 (8%)	0 (0%)	18 (72%)	4 (16%)	3 (12%)	0 (0%)
Mock	20 (80%)	4 (16%)	0 (0%)	1 (4%)	16 (64%)	7 (28%)	2 (8%)	0 (0%)	19 (76%)	5 (20%)	0 (0%)	1 (4%)
Day 6												
Trephination	18 (72%)	5 (20%)	1 (4%)	1 (4%)	13 (52%)	11 (44%)	0 (0%)	1 (4%)	18 (72%)	5 (20%)	1 (4%)	1 (4%)
Mock	22 (88%)	3 (12%)	0 (0%)	0 (0%)	18 (72%)	6 (24%)	1 (4%)	0 (0%)	22 (88%)	3 (12%)	0 (0%)	0 (0%)
Day 7												
Trephination	19 (76%)	5 (20%)	1 (4%)	0 (0%)	15 (60%)	10 (40%)	0 (0%)	0 (0%)	20 (80%)	4 (16%)	1 (4%)	0 (0%)
Mock	20 (80%)	4 (16%)	0 (0%)	0 (0%)	23 (92%)	1 (4%)	1 (4%)	0 (0%)	23 (92%)	2 (8%)	0 (0%)	0 (0%)

n = 25 trephination, 25 mock trephination.

Table IV. Postoperative parameters for trephination and mock trephination groups

Variable	*Trephination*	*Mock*	*P value*
Sum pain intensity difference*	9.0 ± 12.0	11.0 ± 7.0	.3312
Sum percussion pain intensity difference*	7.0 ± 7.0	7.0 ± 11.0	.5022
Sum swelling intensity difference*	–3.0 ± 6.0	–1.0 ± 4.0	.1268
Total number ibuprofen†	12.2 ± 8.67	9.26 ± 9.46	.1366
Total number acetaminophen with codeine†	5.72 ± 5.72	6.18 ± 8.18	.6797

*Median ± interquartile range.
†Mean ± SD.

The postoperative pain ratings are summarized in Table III. The "sum pain intensity difference" was not statistically significant (Table IV, $P = .3312$). As shown in Table III, the mean postoperative pain ratings generally decreased over the 7-day observation period for both groups.

The postoperative percussion pain ratings are summarized in Table III. The "sum percussion pain intensity difference" was not statistically significant (Table IV, $P = .5022$). As shown in Table III, the mean postoperative percussion pain ratings generally decreased over the 7-day observation period for both groups.

The postoperative swelling ratings are summarized in Table III. The "sum swelling intensity difference" was not statistically significant (Table IV, $P = .1268$). As shown in Table III, the mean postoperative swelling ratings generally decreased over the 7-day observation period for both groups.

Table V illustrates the number, percentage, and average use and nonuse of ibuprofen and acetaminophen with codeine during the 7 postoperative days. There was no statistically significant difference in the mean total number of ibuprofen ($P = .1366$) and acetaminophen with codeine ($P = .6797$) tablets taken over the 7-day postoperative observation period between the trephination and mock trephination groups (Table IV).

Table VI summarizes the pain ratings of the trephination and mock trephination procedures. Generally, the pain ratings were low. There were no significant differences between the 2 groups.

DISCUSSION

The trephination procedure with a Stabident perforator, files, and a spoon excavator did not significantly reduce pain, percussion pain, swelling, or the number of analgesic medications taken for symptomatic necrotic teeth with periapical radiolucencies. Other

Table V. Postoperative pain medications for trephination and mock trephination groups

Day	*Number who took ibuprofen*	*Number who took acetaminophen with codeine*	*Number who took no acetaminophen with codeine or ibuprofen*
Day 1			
Trephination	24 (96%)	17 (68%)	0 (0%)
No. of tablets	82	36	
Mock	19 (76%)	16 (64%)	3 (12%)
No. of tablets	44	39	
Day 2			
Trephination	22 (88%)	17 (68%)	2 (8%)
No. of tablets	78	40	
Mock	18 (72%)	13 (52%)	4 (16%)
No. of tablets	60	42	
Day 3			
Trephination	16 (64%)	11 (44%)	6 (24%)
No. of tablets	46	22	
Mock	16 (64%)	10 (40%)	9 (36%)
No. of tablets	35	25	
Day 4			
Trephination	13 (52%)	8 (32%)	10 (40%)
No. of tablets	37	15	
Mock	8 (32%)	7 (28%)	15 (60%)
No. of tablets	22	21	
Day 5			
Trephination	13 (52%)	7 (28%)	11 (44%)
No. of tablets	30	12	
Mock	7 (28%)	6 (24%)	15 (60%)
No. of tablets	18	14	
Day 6			
Trephination	11 (44%)	5 (20%)	13 (52%)
No. of tablets	26	12	
Mock	6 (24%)	5 (20%)	17 (68%)
No. of tablets	14	13	
Day 7			
Trephination	5 (20%)	4 (16%)	17 (68%)
No. of tablets	15	7	
Mock	6 (24%)	3 (12%)	20 (80%)
No. of tablets	19	5	

n = 25 trephination, 25 mock trephination.

Table VI. Pain ratings for trephination and mock trephination groups

Procedure	*Pain ratings*			
	None	*Mild*	*Moderate*	*Severe*
Perforation*				
Trephination	19 (76%)	2 (8%)	3 (12%)	1 (4%)
Mock	23 (92%)	2 (8%)	0 (0%)	0 (0%)
File placement*				
Trephination	16 (64%)	8 (32%)	0 (0%)	0 (0%)
Mock	23 (92%)	2 (8%)	0 (0%)	0 (0%)
Spoon curettage*				
Trephination	22 (88%)	2 (8%)	0 (0%)	1 (4%)
Mock	25 (100%)	0 (0%)	0 (0%)	0 (0%)

n = 25 trephination, 25 mock trephination.
*No significant differences ($P > .05$) between the 2 groups.

studies on trephination have reported success with the procedure.[9,11] The design of these studies was different from that of our study. Elliot and Holcomb[11] performed trephination only on asymptomatic teeth; therefore, comparison to our study is difficult because the majority of our patients were experiencing moderate to severe pain. Peters[9] did not consider preoperative pain levels (group 1) and trephinated only those teeth that had severe pain after obturation (group 2). An exact comparison of his study to our study is not possible because it is not known how many teeth in Peter's study were symptomatic at the treatment appointment. Although the study done by Moos et al[10] used symptomatic necrotic teeth, they reported that their trephination group had greater pain intensity, more unpleasantness, and less pain relief throughout the 96-hour postoperative period. The only statistical difference occurred at 4 hours when compared with the nontrephinated group.

Why did trephination not reduce the severity of the postoperative symptoms? What exactly is the rationale for a trephination procedure? The first rationale involves establishment of drainage. The trephination procedure allows for immediate drainage (only 1 patient in our study had purulent drainage, and the site drained for 6 seconds) or drainage at some future time when the infection becomes more localized. The basic problem is we do not know the exact condition of the periapical tissue in symptomatic necrotic teeth with radiolucencies. Pain does not indicate the histologic condition in inflamed tissue.[17] Therefore, we may be dealing with a variety of periapical responses: acute inflammation, chronic inflammation, abscess formation, a spreading infection, or an inflammatory lesion. Additionally, there may be a mix of conditions with isolated abscess formation in regions not accessible to drainage by trephination. Therefore, if the condition periapically has not localized or is not accessible, the trephination procedure is not immediately productive and we must wait for localization, drainage, and relief of pain. However, it is unknown how long this process takes or if it occurs at all.

Another theory is that trephination could act as a valve to equilibrate the pressure periapically. Mohorn et al,[18] in 1971, evaluated pressures exerted by periapical lesions in dogs. They found periapical pressures fluctuated considerably and felt the variations in pressures were dependent on the factors contributing to edema. However, if there are actual pressure differences clinically, it is not known how much pressure would be required for the lesion to vent through the trephination site. Moos et al[10] discussed the possibility that pressure may not be the primary cause of patients'

pain with symptomatic necrotic teeth; chemical mediators (eg, prostaglandins, leukotrienes, kinins, histamine) would also contribute to periapical pain.

Trephination is not a popular procedure. Dorn et al,[19] in 1977, found 16% of diplomates would perform a trephination procedure for necrotic teeth. Gatewood et al[20] found the use of trephination by diplomates dropped to 8% in 1990. Trephination may be unpopular because of the time required for the procedure or because of its ineffective pain relief.

The trephination site in our study was in the attached gingiva at the location of a conventional intraosseous injection.[12-15] The coronal location of the trephination site was made for a safe and easy perforation and cortical bone enlargement. The complete trephination procedure took less than 5 minutes and was basically not painful; only a few patients reported moderate or severe pain (Table VI). We made no attempt to penetrate the periapical lesion; rather, we felt that drainage or relief of pressure would occur through the cancellous bone once this was accessible through the trephination site.

The initial (baseline) pain and percussion pain (Table III) are representative of the pain patients experience with symptomatic necrotic teeth without swellings. Eighty percent to 84% presented with moderate to severe pain ratings and 48% to 76% presented with moderate to severe percussion ratings (Table III). The moderate to severe pain and percussion ratings decreased over the first 3 days with 4% to 8% of the patients continuing to experience moderate to severe pain through day 7 (Table III). Previous authors have reported that patients who have preoperative pain will have a significantly higher incidence of postoperative pain.[3,6,16] Our results concur with these authors' findings. Fouad et al[6] reported rapid resolution of pain in their 3-day evaluation period of the localized acute apical abscess. Henry et al,[16] in a study of the effect of penicillin on postoperative endodontic pain in symptomatic necrotic teeth, reported a decreasing number of moderate to severe pain ratings over the first 3 days with 4% to 26% of the patients continuing to experience moderate to severe pain through day 7. Moos et al[10] also recorded a decrease in pain over the 96-hour postoperative period regardless of whether a trephination procedure was done. Henry et al,[16] Fouad et al,[6] Moos et al,[10] and our study demonstrated that moderate to severe postoperative pain and percussion pain did decrease, in the majority of patients, after 3 days. This reduction in pain may be related to a natural recovery period[21-23]; that is, once the tooth initially becomes symptomatic, the periapical inflammation or infection continues on its own course until it finally resolves naturally.

Because postoperative pain scores would be affected by analgesic use, we recorded the number of medications taken over the 7 days (Table V). Generally, the use of ibuprofen and acetaminophen with codeine followed the pain ratings (Table III), with the highest use initially and through day 3, followed by a decrease over the 7 days. However, more than 20% of the patients continued to require analgesic medications through day 7 (Table V). Clinically, the practitioner should administer appropriate pain medications to help reduce postoperative pain in patients presenting with symptomatic necrotic teeth with radiolucencies.

No patients had clinical swellings when they presented for endodontic treatment (Table III). Thirteen patients (6 trephination and 7 mock trephination) reported moderate swelling on day 1, and 10 patients reported moderate swelling on day 2, with decreasing moderate swelling ratings over the 7 days (Table III). Two patients (one trephination and one mock trephination) reported severe postoperative swellings (Table III). We would expect some patients to have swelling after endodontic treatment; however, trephination did not statistically affect postoperative swelling.

In conclusion, a trephination procedure with a Stabident perforator, files, and a spoon excavator did not significantly reduce postoperative pain, percussion pain, swelling, or the number of analgesic medications taken in symptomatic necrotic teeth with radiolucencies. The majority of patients with symptomatic necrotic teeth had significant postoperative pain and needed analgesics to manage this pain.

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