# Efficacy of Ibuprofen and Ibuprofen/Acetaminophen on Postoperative Pain in Symptomatic Patients with a Pulpal Diagnosis of Necrosis

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## Abstract

**Introduction:** The purpose of this prospective, randomized, double-blind study was to determine ibuprofen versus ibuprofen/acetaminophen use for postoperative endodontic pain in symptomatic patients with a pulpal diagnosis of necrosis and an associated periapical radiolucency who were experiencing moderate to severe preoperative pain. We also recorded escape medication use. **Methods:** Seventy-one adult patients presenting for emergency endodontic treatment with a symptomatic maxillary or mandibular tooth with a pulpal diagnosis of necrosis, periapical radiolucent area, and moderate to severe pain participated in this study. The patients were randomly divided into 2 groups by random assignment and numeric coding. An emergency debridement of the tooth was completed with hand and rotary instrumentation. At the end of the appointment, the patients randomly received capsules of either 600 mg ibuprofen or 600 mg ibuprofen combined with 1000 mg acetaminophen (blinded to both operator and patient). Patients also received a 6-day diary to be completed after anesthesia wore off and every morning for 5 days. Patients were asked to record pain, symptoms, and the number of capsules taken. Patients received escape medication (Vicodin) if the study medication did not control their pain. Postoperative data were analyzed by randomization test and step-down Bonferroni method of Holm. **Results and Conclusions:** There were decreases in pain levels and analgesic use over time for the ibuprofen and ibuprofen/acetaminophen groups. There was no statistically significant difference between the 2 groups for analgesic use or escape medication use. Approximately 20% of patients in both groups required escape medication to control pain. *(J Endod 2011;37:1608–1612)*

## Key Words

Acetaminophen, ibuprofen, necrosis, postoperative pain

Symptomatic teeth with a pulpal diagnosis of necrosis are frequently treated in an endodontic practice. Removal of bacteria and necrotic debris by way of thorough canal debridement should reduce post-treatment discomfort by reducing bacteria and inflammatory mediators. Unfortunately, moderate to severe postoperative symptoms might persist after canal debridement, requiring the use of pain medication (nonsteroidal and narcotic medications) to help reduce postoperative pain (1–4).

Although there are a number of studies (1–21) of postoperative pain after endodontic treatment, they are not uniform in the assessment of pain. Some studies have evaluated the occurrence of interappointment emergencies (7, 8, 10, 14–16), intracanal medicament pain (11, 13, 21, 22), use of analgesics (17–20, 23), and effect of drainage on postoperative pain (4). Unfortunately, many of these studies have not separated the diagnosis of pulpal conditions (vital versus necrotic) and have only evaluated postoperative pain during short time intervals. Menhinick et al (12), Menke et al (19), and Mickel et al (23) have stressed the need for more studies of postoperative pain in endodontics that address medication use specific to the pulpal diagnosis and preoperative level of patients' pain.

Menhinick et al (12) found that a combination of acetaminophen and ibuprofen was more effective than ibuprofen alone in managing postoperative pain. However, their investigation included numerous pulpal conditions that might have differing postoperative courses.

Therefore, the purpose of this study was to determine ibuprofen versus ibuprofen/acetaminophen use for postoperative endodontic pain in symptomatic patients diagnosed with pulpal necrosis and associated periapical radiolucency who were experiencing moderate to severe preoperative pain.

## Materials and Methods

Seventy-one adult patients participated in this study. All patients were in good health as determined by a health history and oral questioning. Exclusion criteria were as follows: subjects who were younger than 18 years; unable to take ibuprofen, acetaminophen, or hydrocodone; were allergic to local anesthetics or sulfites; were pregnant or nursing; were taking antibiotics; had a history of significant medical conditions (American Society of Anesthesiologists class II or higher); or were unable to give informed consent. The Ohio State University Human Subjects Review Committee approved the study, and written informed consent was obtained from each patient.

Patients included in this study had a clinical diagnosis of a symptomatic tooth with a pulpal diagnosis of necrosis and moderate to severe pain at the time of treatment. Each

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tooth tested negative to an electric pulp tester (Analytic Technology Corp, Redmond, WA) and to Endo-Ice (Hygenic Corp, Akron, OH) and had a periapical radiolucency of at least 2 mm by 2 mm on radiographic exam. All patients had no or very mild clinical swelling. No patients had a draining sinus tract.

Each patient rated his or her preoperative pain on a Heft-Parker visual analogue scale (VAS). The VAS was divided into 4 categories. No pain corresponded to 0 mm. Mild pain was defined as greater than 0 mm and less than or equal to 54 mm. Mild pain included the descriptors of faint, weak, and mild pain. Moderate pain was defined as greater than 54 mm and less than 114 mm. Severe pain was defined as equal to or greater than 114 mm. Severe pain included the descriptors of strong, intense, and maximum possible. To qualify for the study, patients presented with moderate to severe pain as rated on the VAS.

The patients received 1.8–5.4 mL of 2% lidocaine with 1:100,000 epinephrine (Xylocaine; AstraZeneca LP, Dentsply, York, PA) by infiltration or inferior alveolar nerve block. After local anesthesia was achieved, a rubber dam was placed, and an access opening was made. The working length was determined at 1 mm from the radiographic apex. The canals were prepared with hand and rotary instrumentation, and irrigation used 3% NaOCl. Each canal was filed to a size #20 file; then a crown-down technique was used to enlarge the coronal portion of the canal, then mid-root, and finally the apical third with rotary files (ProFile GTs 20/.12 through 20/.04; Denstply Maillefer, Ballaigues, Switzerland). The taper was stopped in each canal according to the original canal curvature and size, and then apical enlargement was completed in increasing sizes with K-type hand files until the canal was determined to be adequately cleaned and shaped. Each canal was irrigated with 2 mL of 3% NaOCl after the use of every third hand and rotary file by using a 25-gauge 5/8-inch needle with a Luer-Lok (Becton Dickinson, Franklin Lakes, NJ) attachment that was connected to a 20-mL disposable plastic Luer-Lok syringe. The canals were dried with sterile paper points, and $Ca(OH)_2$ (Multi-Cal; Pulpdent Corp, Watertown, MA) was placed as an intracanal medicament. The teeth were temporized with Cavit (Cavit G; 3M ESPE, Seefeld, Germany), and the patients were scheduled for root canal completion. No occlusal adjustments were done. The senior author (L.K.W.) provided all endodontic treatment.

After endodontic treatment, each patient was randomly assigned a medication bottle that contained the study medications and was labeled with a random number blinded to both the patient and the operator. A registered pharmacist compounded identical-appearing capsules of the ibuprofen/acetaminophen combination and ibuprofen (opaque purple size "0" capsules). The ibuprofen capsules were identical to the combination capsules, but they lacked the acetaminophen. All medications were placed in identical bottles so that they were indistinguishable to the investigator. A copy of the master list of 6-digit random numbers was supplied by the compounding pharmacist solely to the lead researcher (M.D.) and was not made available to anyone else during the data collection period.

The patients received a bottle containing either 80 capsules of 150 mg ibuprofen or 80 capsules of 150 mg ibuprofen/250 mg acetaminophen. The patients were then instructed to take 4 capsules every 6 hours as needed for pain.

If the medication given to the patient (ibuprofen or ibuprofen/acetaminophen) did not control their pain, the patients were instructed to call an assigned pager number that was carried by the investigator. The patients were instructed to not take any other pain medications during the investigation and that they could call the pager anytime. After speaking with the investigator, if an escape medication was needed, Vicodin 5/500 (hydrocodone/acetaminophen) was prescribed for the patient, and they were told to discontinue the study medications once they started the Vicodin to avoid taking multiple doses of acetaminophen (if they had received the acetaminophen medication). If the patient had significant swelling or fever, they were seen clinically, and proper management was rendered at that time. Antibiotics were prescribed as indicated.

Patients received a VAS, as described earlier, to record pain after anesthesia wore off. Resolution of anesthesia was determined by the patient through the loss of soft tissue numbness and/or the initiation of pain from the treated tooth. Patients recorded the time they perceived the anesthesia wore off and marked any pain that they were having on the VAS and any study medications they had taken. Patients also received a 5-day diary to record their experiences. On waking each morning, the patients recorded the date, time, any pain experienced, and the number and type (study or escape) of medication taken within each 24-hour period. There were sections for patient comments on the diary, and patients were required to return all unused medications on completion of the study to verify diary results.

The data from this study were collected and statistically analyzed. Comparisons between the combination ibuprofen/acetaminophen and ibuprofen groups for gender, jaw, and tooth type were analyzed by using the $\chi^2$ test, and comparisons by age and initial pain were analyzed by using the randomization test. Differences in postoperative pain and medication usage were analyzed by using multiple randomization tests with *P* values adjusted by using step-down Bonferroni method of Holm. With a nondirectional alpha risk of 0.05, a sample size of 35 subjects per group was required to demonstrate a difference in the escape drug usage rate of $\pm 30$ percentage points with a power of 0.80. Comparisons were considered significant if $P < .05$.

## Results

Seventy-one subjects completed this study. Table 1 shows the preoperative variables. There were no statistically significant differences

**TABLE 1.** Preoperative Statistics for Ibuprofen and Ibuprofen/Acetaminophen Groups

| | Ibuprofen group | Ibuprofen/acetaminophen group | *P* value |
|---|---|---|---|
| Subjects analyzed | 36 | 35 | |
| Gender | Female, 19/36 (53%)<br>Male, 17/36 (47%) | Female, 15/35 (43%)<br>Male, 20/35 (57%) | .4028 |
| Age (mean ± SD), y | 34.3 ± 14.0 | 37.3 ± 14.7 | .3872 |
| Initial pain* (mean ± SD), mm | 130.1 ± 23.8 | 118.3 ± 22.3 | .0377 |
| Jaw | Maxillary, 20/36 (56%)<br>Mandibular, 16/36 (44%) | Maxillary, 16/35 (46%)<br>Mandibular, 19/35 (54%) | .4070 |
| Tooth type | Anterior, 5 (14%)<br>Molar, 25 (69%)<br>Premolar, 6 (17%) | Anterior, 5 (14%)<br>Molar, 21 (60%)<br>Premolar, 9 (26%) | .6269 |

SD, standard deviation.

*There was a significant difference between the 2 groups.