Effect of Ibuprofen on Masking Endodontic Diagnosis

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Abstract

Introduction: An accurate diagnosis is of upmost importance before initiating endodontic treatment; yet, there are occasions when the practitioner cannot reproduce the patient's chief complaint because the patient has become asymptomatic. Ibuprofen taken beforehand may "mask" or eliminate the patient's symptoms. In fact, 64%–83% of patients with dental pain take analgesics before seeing a dentist. The purpose of this study was to examine the possible "masking" effect of ibuprofen on endodontic diagnostic tests. **Methods:** Forty-two patients with endodontic pain underwent testing (cold, percussion, palpation, and bite force measurement) and then received either placebo or 800 mg ibuprofen. Both patients and operators were blinded to the medication received. One hour later, diagnostic testing was repeated and compared with pretreatment testing. **Results:** Ibuprofen affected testing values for vital teeth by masking palpation 40%, percussion 25%, and cold 25% on affected teeth with symptomatic irreversible pulpitis and symptomatic apical periodontitis. There was no observed masking effect in the placebo group on palpation, percussion, or cold values. When nonvital teeth were included, the masking effect of ibuprofen was decreased. However, little masking occurred with the bite force measurement differences. **Conclusions:** Analgesics taken before the dental appointment can affect endodontic diagnostic testing results. Bite force measurements can assist in identifying the offending tooth in cases in which analgesics "mask" the endodontic diagnosis *(J Endod 2014;40:1058–1062)*

Key Words

Analgesic, apical periodontitis, bite force transducer irreversible, pulpitis

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0099-2399/$ - see front matter

http://dx.doi.org/10.1016/j.joen.2014.05.004

Before initiating endodontic treatment, an accurate diagnosis is required that reproduces the patient's dental complaint. This requires the consideration of multiple variables and may involve testing methods using palpation, percussion, cold, heat, and/or an electric pulp test (EPT) (1, 2). However, there are occasions when the practitioner cannot reproduce the patient's chief complaint because the patient is no longer symptomatic upon examination. In this case, with no positive radiographic or testing indications, most clinicians will opt to defer treatment and send the patient home with instructions to return to the dental office once the symptoms have returned. One hypothesis for this situation is that medication taken preoperatively, such as ibuprofen, could "mask" or decrease the patient's symptoms. The effect of analgesics on endodontic diagnostic testing and the impact of these drugs on common endodontic testing methods are not well understood. As early as 1963, Mumford (3) suggested dental EPT as a means of comparing pain-relieving drugs. He also noted that painful pulpal inflammation alters mechanical and thermal pain thresholds; yet, EPT thresholds were not different during pulpal inflammation (4). A later prospective double-blind study evaluating the intraosseous injection of glucocorticoid for tooth pain reduction showed these patients reported less pain and less percussion pain (5).

A study looking at lay management strategies for coping with tooth pain showed that 84% of patients had tried some form of self-care strategy before seeking the care of a professional (6). Of the different strategies attempted, 64% of patients attempted to relieve their odontalgia with over-the-counter analgesics. However, this strategy only resulted in temporary relief or reduced pain intensity for half of these patients. Another study concluded that 81%–83% of emergency patients with moderate to severe pain will have taken some type of medication(s) to help control their pain, and more women than men with irreversible pulpitis will take an analgesic (7). Of the patients who did take preoperative medication, relief occurred 62%–65% of the time. This suggests that most patients presenting to the dental clinic with acute dental pain will have taken analgesics before their dental visit. The remaining patients often will be instructed by clinicians to take ibuprofen to relieve their tooth pain. In fact, the majority of endodontists will recommend 600 mg ibuprofen 4 times a day for patients in pain and not allergic to nonsteroidal anti-inflammatory drugs (NSAIDs), regardless of the patient's pain level, endodontic diagnosis, or treatment provided (8). Dental clinicians should have a flexible analgesic strategy that begins with ibuprofen if the patient health history permits. Often, this will be sufficient for mild to moderate pain of odontogenic origin (9, 10). The maximum dose of ibuprofen is 3.2 g over 24 hours, and this drug is recommended for the management of both preoperative and postoperative pain in dentistry where inflammation is involved (11). Unlike opioids, NSAIDs do not impair consciousness and are available over-the-counter, which makes them more accessible and less costly than prescription alternatives. A recent Cochrane systematic review found good evidence to support ibuprofen as an effective and safe analgesic in adults with minimal adverse effects. The 2007 league table of analgesic efficacy states that 600–800 mg ibuprofen is very effective in the management of acute pain (12).

The diagnosis of pulpal and apical conditions can be very complicated and inaccurate. Previous studies have shown that some patients have a reduction in mechanical pain thresholds (mechanical allodynia), which is manifested as sensitivity to percussion, biting, or pressure (13). Most practitioners will use a mirror handle to test for sensitivity to percussion, or they will have the patient bite on a device such as a Tooth Slooth (Professional Results, Inc, Laguna Niguel, CA) (2). Unfortunately, these tests do not provide quantitative data and can yield variable results. Moreover, these tests can be subjective and produce a large margin for error (14).

Recently, a diagnostic instrument for the measurement of mechanical allodynia was tested to measure mechanical pain thresholds on normal healthy patients (14). The results of this study indicated that this bite force transducer has substantial test-retest reliability and fair to substantial inter-rater reliability. This bite force transducer has potential for repeated clinical measurements when subjects are followed over time. The fair to substantial inter-rater reliability suggests that clinical trial designs should include only 1 examiner to collect the mechanical threshold values.

The purpose of this randomized double-blind placebo-controlled clinical trial was to quantitatively measure the effect of ibuprofen on mechanical allodynia in patients with odontalgia caused by symptomatic apical periodontitis (15) and to measure the effect of ibuprofen on endodontic diagnostic tests.

Materials and Methods

The protocol for this study was approved by the university institutional review board. Patients presenting to the School of Dentistry Graduate Endodontics Clinic seeking treatment for the relief of pain of odontogenic origin were screened for possible inclusion. It was determined that a sample size of 20 in each group would have 80% power to detect a difference in means of 0.91 standard deviation using a paired *t* test with a 0.05 2-sided significance level. Patients included in the study provided informed consent and information about all medications taken in the previous 24 hours. Inclusion criteria included patients having a premolar or molar with a clinical diagnosis of symptomatic apical periodontitis. Exclusion criteria included the following: American Society of Anesthesiologists physical status of >3, periodontal pocketing >6 mm, absence of the contralateral tooth, sensitivity to percussion in the contralateral tooth, persistent use of medication such as steroids and antidepressants (which could alter the pain report), use of NSAIDs in the previous 12 hours, and NSAID allergy.

Once enrolled in the study, patients were asked to rate their present odontogenic pain and maximum pain using a verbal numeric rating scale (VNRS) (16). Buccal and lingual gingivae were palpated over both the contralateral and affected teeth to assess sensitivity to palpation. Both the contralateral tooth and the affected tooth were percussed with a mirror handle to determine percussion sensitivity. Then, the contralateral and affected teeth were tested using Endo Ice (Hygenic Corp, Akron, OH). A large cotton pellet was sprayed for 3–5 seconds, which was similar to the procedure described by Jones (17). The contralateral uninflamed tooth, the affected tooth, and the patient's contralateral and affected adjacent 2 teeth were percussed, palpated, cold tested, and examined for mobility.

The contralateral, unaffected tooth's bite force (mechanical pain threshold) and the affected tooth's bite force were measured using the bite force transducer (GM10 Occlusal Force-Meter; Nagaro Keiki, Tokyo, Japan). The bite force transducer was modified by attaching the head of a Tooth Slooth to the end of the biting tab using acrylic resin (Fig. 1) (14). The bite force transducer was placed on the subject's contralateral (control) tooth, and the subject was instructed to bite down on the bite force transducer with instructions (Fig. 1). This procedure was repeated 4 more times for a total of 5 mechanical pain threshold measurements recorded for the contralateral tooth. In addition, the examiner obtained 2 more readings and recorded the mechanical pain thresholds of the inflamed, affected tooth using this same procedure. The method in this study is similar to previous studies for measuring mechanical allodynia (14, 18). Randomization was determined by a random digit table using even-odd numbers by a separate investigator not involved with patient treatment, with packets sequentially numbered based on randomization coding. Both the treating dentist and patient were unaware of treatment allocation, and the treating dentist enrolled participants into randomized drug allocation. After baseline measurements were gathered, the examiner administered either 800 mg ibuprofen or placebo to the patient (randomized, double blind). One hour later, endodontic diagnostic testing (cold, percussion, and palpation) and mechanical pain threshold measurements for the contralateral control tooth (5 mechanical threshold measurements) and the affected tooth (2 mechanical pain threshold measurements) were repeated as described previously.

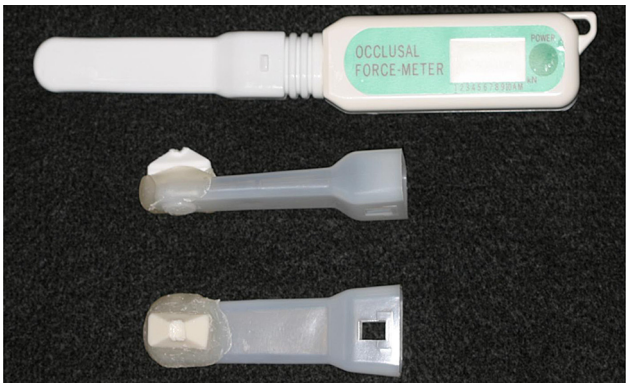

Figure 1. Bite force transducer modified by attaching the head of a Tooth Slooth to the detachable plastic sleeve. The patient was given the following instructions: "This device measures how hard you can bite down. It is similar to a scale. If you jump or move on a scale, then you will not receive a consistent reading. The same is true for this device. This device requires constant pressure to produce an accurate measurement. Therefore, I would like you to gently close until your upper and lower teeth first contact the device. When I say 'begin,' bite down as hard as you can with constant pressure until you hear a beep. Once you hear a beep, the device has produced a measurement. The beep usually takes 3 to 5 seconds. I will do this 5 times on the side that does not hurt and only 2 times on the side that hurts."

Data and the assignment of the test group (ibuprofen or placebo) were uncovered by the statistician and tabulated to summarize the averages of pre– and post–bite force measurements. Descriptive statistics were used to summarize the demographics, patient characteristics, and outcome measures. Two group *t* tests were used to compare the mean change in the outcomes from pretreatment to post-treatment between the groups. *P* values <.05 were considered statistically significant. SAS V9.1.3 (SAS Institute Inc, Cary, NC) was used for the analysis. Pearson and Spearman rho correlations were calculated to determine the comparison of mechanical pain thresholds (bite force) to percussion and palpation and to compare the association of palpation to percussion preoperatively. In addition, a Wilcoxon signed rank test was used to compare the before and after measurements of cold tests (response or no response), palpation (sensitive or not sensitive), and percussion (sensitive or not sensitive) that were assigned ordinal values.

Results

Forty-two subjects were enrolled; however, 3 subjects were unable to complete this study. One subject had an upper complete denture and was unable to bite down on the bite force transducer without dislodging his upper denture. The other 2 subjects could not bite down hard enough on the bite force transducer to produce a measurement. Therefore, they were excluded from the study, and 39 subjects were included for analysis.

Of the 39 subjects, there were 21 women and 18 men. Nineteen subjects received ibuprofen, and 20 subjects received placebo. The