Evaluation of the Gow-Gates and Vazirani-Akinosi Techniques in Patients with Symptomatic Irreversible Pulpitis: A Prospective Randomized Study

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Abstract

Introduction: Few studies have evaluated the effectiveness of the Gow-Gates and Vazirani-Akinosi techniques in patients presenting with symptomatic irreversible pulpitis. Therefore, the purpose of this prospective, randomized study was to evaluate the anesthetic efficacy of the Gow-Gates and Vazirani-Akinosi techniques using 3.6 mL 2% lidocaine with 1:100,000 epinephrine in mandibular posterior teeth in patients presenting with symptomatic irreversible pulpitis. Methods: One hundred twenty-five emergency patients diagnosed with symptomatic irreversible pulpitis randomly received either a Gow-Gates or Vazirani-Akinosi injection using 3.6 mL 2% lidocaine with 1:100,000 epinephrine to block the inferior alveolar nerve before endodontic access. Subjective lip numbness was recorded. Pulpal anesthetic success of the injection was defined as no pain or mild pain upon endodontic access and instrumentation as measured on a visual analog scale. Results: Subjective lip numbness was obtained 92% of the time with the Gow-Gates technique and 63% of the time with the Vazirani-Akinosi technique. The difference was statistically significant ($P = .0001$). For the patients achieving lip numbness, successful pulpal anesthesia was obtained 35% of the time with the Gow-Gates technique and 16% of the time with the Vazirani-Akinosi technique. The difference was statistically significant ($P = .0381$). Conclusions: We concluded that for patients who achieved lip numbness neither the Gow-Gates technique nor the Vazirani-Akinosi technique provided adequate pulpal anesthesia for mandibular posterior teeth in patients presenting with symptomatic irreversible pulpitis. Both injections would require supplemental anesthesia. (J Endod 2015;41:16–21)

Key Words
Gow-Gates technique, symptomatic irreversible pulpitis, Vazirani-Akinosi technique

Gow-Gates (1) introduced a new technique for mandibular anesthesia in 1973. The extraoral injection landmarks are the lower border of the tragus of the ear and the corner of the mouth, and the intraoral target site is the neck of the mandibular condyle. Some studies have reported a higher success rate than a conventional inferior alveolar nerve block (2–6), whereas other studies have failed to show this technique is superior (7–11).

Akinosi (12) introduced his technique for mandibular anesthesia in 1977. However, Vazirani (13) also described a similar technique in 1960 so the name was changed to the Vazirani-Akinosi technique (14). The injection is a closed-mouth technique with the landmark for needle insertion on a horizontal line with the mucogingival junction of the maxillary second molar. This technique is indicated when there is a limited mandibular opening (eg, trismus) that precludes the use of the inferior alveolar nerve block or the Gow-Gates techniques. The technique has not been found to be superior to the inferior alveolar nerve block (7, 11, 15–18).

Only 2 studies have evaluated the Gow-Gates and Vazirani-Akinosi techniques in patients with irreversible pulpitis (19, 20). Sherman et al (19) compared 1.7 mL 4% articaine with 1:100,000 epinephrine (10 subjects) to 1.8 mL 2% lidocaine with 1:100,000 epinephrine (11 subjects) using the Gow-Gates technique in patients presenting with irreversible pulpitis. They found no difference between the 2 anesthetic formulations and a 73%–90% success rate (none or mild pain upon endodontic access). Aggarwal et al (20) studied the anesthetic efficacy of the Gow-Gates (25 patients), Vazirani-Akinosi (24 patients), and conventional inferior alveolar nerve block (22 patients) techniques using 2.2 mL 4% articaine with 1:100,000 epinephrine in patients presenting with irreversible pulpitis. They found the success rate (none or mild pain upon endodontic access) for the Gow-Gates technique was 52, the Vazirani-Akinosi success rate was 41%, and the inferior alveolar nerve block success rate was 36%.

Further study of the Gow-Gates and Vazirani-Akinosi techniques are needed in patients presenting with symptomatic irreversible pulpitis to ensure their appropriate clinical use. Therefore, the purpose of this prospective, randomized study was to evaluate the anesthetic efficacy of the Gow-Gates and Vazirani-Akinosi techniques using 3.6 mL 2% lidocaine with 1:100,000 epinephrine in mandibular posterior teeth in patients...
presenting with symptomatic irreversible pulpitis. The pain of the injections was also assessed.

**Materials and Methods**

One hundred twenty-seven adult patients participated in this study. All were emergency patients of the College of Dentistry and 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, patients with a history of significant medical problems, patients who had taken central nervous system depressants or any analgescic medication within the last 6 hours, pregnant women, and subjects who 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.

To qualify for the study, each patient had a vital mandibular posterior tooth (molar or premolar), was actively experiencing moderate to severe pain at the emergency visit, and had a prolonged response to cold testing with Green Endo-Ice (1,1,1,2 tetrafluoroethane; Hygenic Corp, Akron, OH). Patients showing no response to cold testing, exhibiting periradicular pathosis (other than a widened periodontal ligament), or presenting with no vital coronal pulpal tissue on access were excluded from the study. Two patients of 127 were found to have necrotic coronal pulpal tissue upon access and were excluded from the study (Supplemental Figure S1). Therefore, each patient had a tooth that fulfilled the criteria for a clinical diagnosis of symptomatic irreversible pulpitis.

Patients completed a Corah Dental Anxiety Scale (21) to rate their level of anxiety. Each patient also rated his or her initial pain on a Heft-Parker visual analog scale (VAS) (22). The VAS was divided into 4 categories. No pain corresponded to 0 mm. Mild pain was defined as >0 mm and ≤54 mm. Mild pain included the descriptors of faint, weak, and mild pain. A score >54 mm and <114 mm indicated moderate pain and included the descriptor of moderate pain. Severe pain was defined as ≥114 mm. Severe pain included the descriptors of strong, intense, and maximum possible. The VAS was also used to measure the 3 phases of injection pain (needle insertion, needle placement, and solution deposition) of the Gow-Gates and Vazirani-Akinosi nerve blocks.

The patients randomly received either a Gow-Gates or Vazirani-Akinosi nerve block. A list of 6-digit numbers corresponding to each potential study patient was randomly assigned to the Gow-Gates and Vazirani-Akinosi techniques. The senior author (V.C.) randomly administered the injection associated with the patient’s generated 6-digit number.

Using aseptic technique, a total of 3.6 mL 2% lidocaine with 1:100,000 epinephrine (Xylocaine; AstraZeneca LP, Dentsply, York, PA) was expressed into a sterile 5-mL Luer-Lok syringe (Becton, Dickinson and Co, Rutherford, NJ) using standard anesthetic cartridges. The cartridges were checked to ensure that the anesthetic solutions were not expired. The needle used for all injections was a 27-G 38.1-mm needle (Monoject; Sherwood Medical, St Louis, MO). Topical anesthetic gel (20% benzocaine; Patterson Dental Supply, Inc, St Paul, MN) was passively placed at all injection sites for 60 seconds using a cotton tip applicator.

The Gow-Gates nerve block was administered in the manner described by Gow-Gates (1). The patient was placed in the supine position, with the neck extended and the mouth open as wide as possible. A finger was placed on the lower border of the external auditory meatus on the side of the injection to identify this extraoral landmark. The cheek was retracted laterally at the corner of the mouth. The injection site was just distal to the maxillary second molar at a height established by the mesiolingual cusp of that tooth. The syringe was directed from the corner of the mouth on the contralateral side toward the ipsilateral ear. The needle was situated in a plane extending from the ear to the corner of the mouth on the ipsilateral side and was parallel to the angle created by the ear and the side of the face. The needle penetrated the mucosa (needle insertion) and was then advanced slowly (needle placement) until anterolateral contact was made with the neck of the condyle or until a depth of penetration of approximately 25 mm was reached. A concerted effort was made to contact the neck of the condyle. The needle was withdrawn 1 mm, aspiration was performed, and the anesthetic solution was deposited over a period of 2 minutes (solution deposition). After the injection, the subject was asked to keep his or her mouth wide open for 60 seconds.

The Vazirani-Akinosi nerve block was administered as described by Akinosi (12), Vazirani (13), and Gustainis and Peterson (23). Subjects were placed in a supine position and asked to bring their teeth into occlusion or the rest position, with the muscles of mastication relaxed. A cotton roll was placed under the ipsilateral upper lip in order to facilitate visualization of the insertion site. The cheek was retracted laterally with a dental mirror, allowing the edge of the mirror to rest on the anterior border of the ramus. The injection site was the soft tissue overlying the medial surface of the ramus adjacent to the maxillary tuberosity at a height established by the mucogingival junction in the area of the maxillary second molar. The landmark for needle insertion was on a horizontal line parallel with the mucogingival junction of the maxillary second molar and occlusal plane. The needle was bent 45° medially (toward the needle bevel) at approximately 3 mm from its hub to facilitate the placement of the needle tip as close as possible to the inferior alveolar nerve within the pterygomandibular space on the medial aspect of the mandibular ramus. The needle penetrated the mucosa at the injection site (needle insertion) and was directed posterolaterally until the barrel of the syringe was positioned parallel to the ipsilateral maxillary alveolus (placement). The Vazirani-Akinosi needle insertion depths were 30–35 mm. Aspiration was performed, and the anesthetic solution was deposited over a period of 2 minutes (solution deposition). All injections were administered by the senior author (V.C.). The senior author used the 2 injection techniques (Gow-Gates and Vazirani-Akinosi) in a series of injections under the supervision of a dental anesthesiologist and endodontists and in a clinical setting for 2 months before initiation of the study.

For both injection techniques, a separate buccal nerve block was administered using a standard syringe and 0.9 mL 2% lidocaine with 1:100,000 epinephrine.

Because previous studies have shown an increased failure of attaining lip numbness with the Vazirani-Akinosi technique (11, 16, 17) and a slower onset of pulpal anesthesia with both techniques (11), the patient was questioned at 10 and 20 minutes postinjection whether his or her lip was numb and again at 25 minutes if lip numbness was not achieved at 20 minutes. If profound lip numbness was not recorded at 25 minutes, the block was considered missed, and the patient was eliminated from this portion of the study. Emergency endodontic treatment was still completed by giving inferior alveolar nerve blocks and supplemental injections.

After achieving lip numbness, the tooth was isolated with a rubber dam, and endodontic access was performed. Patients were instructed to definitively rate any pain felt during the endodontic procedure. If the patient felt pain, the treatment was immediately stopped, and the patient rated his or her discomfort using the Heft-Parker VAS. If the pain rating was mild, treatment continued. If the pain rating was moderate or greater (55 mm or higher on the
VAS), supplemental anesthesia was administered. The extent of endodontic access achieved when the patient felt pain was recorded. For supplemental anesthesia, the rubber dam was removed, and a 1-cartridge volume of 4% articaine with 1:100,000 epinephrine was given as a buccal infiltration over 1 minute at the site of the emergency tooth’s approximated root apices. After 5 minutes elapsed to allow for sufficient anesthesia (24, 25), the rubber dam was replaced and endodontic treatment resumed. If the patient felt no pain or mild pain, treatment continued. If the patient felt moderate to severe pain, treatment was again stopped, and an intraosseous injection, intraligamentary injection, or intrapulpal injection was administered. The success of the Gow-Gates and Vazirani-Akinosi techniques and buccal infiltration was defined as the ability to access and instrument the tooth with no or mild pain (VAS score of 0 or ≤54 mm, respectively).

Patients rated the degree of satisfaction they experienced during the endodontic treatment on a 100-mm VAS. The VAS was divided into 4 categories. Not satisfied corresponded to 0 mm, somewhat satisfied was defined as >0 mm and ≤33 mm, moderately satisfied was defined as >33 mm and ≤66 mm, and completely satisfied was defined as >66 mm. The principal investigator explained the use of the VAS and then left the operatory. The patient completed the VAS, enclosed it in an envelope, and turned it in to a designated provider not involved in the study.

The data from this study were collected and statistically analyzed. Comparisons between the Gow-Gates and Vazirani-Akinosi techniques for lip numbness, anesthetic success, tooth type, and infiltration success were made using the chi-square test or, if the expected frequencies were <5, the Fisher exact test. Differences between the 2 techniques.

Discussion

There were no statistically significant differences for the effect of age, initial pain, Corah Dental Anxiety Scale ratings, sex, and tooth type so these variables would be minimized between the 2 groups. The mean initial pain ratings of 117–119 mm for both groups (Table 1) indicate severe pain on the VAS. This pain is representative of patients with symptomatic irreversible pulpitis (26–30) who present for emergency endodontic treatment. We sampled a middle-aged population (mean age, 33–34 years). Therefore, the results of this study may not apply to the elderly or children. The Corah Dental Anxiety Scale rating averaged 9 and 10.5, which would indicate moderate anxiety (Table 1) (21). Because the current study evaluated emergency patients in pain, the occurrence of moderate anxiety would be expected. Previous studies of patients with symptomatic irreversible pulpitis (26–30) found similar anxiety scores.

Subjective lip numbness statistically occurred in fewer patients with the Vazirani-Akinosi technique than the Gow-Gates technique.

Results

One hundred twenty-seven patients were recruited for the study. Two were eliminated because of a necrotic pulp chamber (Supplemental Figure S1). Sixty-five patients were enrolled in the Gow-Gates technique and 60 in the Vazirani-Akinosi technique. Sixty patients in the Gow-Gates technique achieved lip numbness (Table 2). Thirty-eight patients achieved lip numbness in the Vazirani-Akinosi technique.

For the Gow-Gates technique, 43 women and 17 men ranging in age from 18–58 years with a mean age of 33 years participated in this study. For the Vazirani-Akinosi technique, 21 women and 17 men ranging in age from 20–64 with a mean age of 34 years participated. There was no significant difference between the 2 techniques regarding sex or age.

Presenting initial pain, Corah Dental Anxiety Scale ratings, and tooth type are presented in Table 1. There were no significant differences between the 2 techniques.

Subjective lip numbness, anesthetic success, and infiltration success are presented in Table 2. There was a significant difference (P = .0001) for lip numbness between the 2 techniques. For the 22 patients not achieving lip numbness (failed block) with the Vazirani-Akinosi technique and 5 subjects with failed blocks with the Gow-Gates technique, all achieved lip numbness with the conventional inferior alveolar nerve block. Regarding anesthetic success, the Gow-Gates technique was statistically more successful than the Vazirani-Akinosi technique (P = .0381). For buccal infiltration success, there was no significant difference in success (P = .2455). Discomfort ratings for patients experiencing anesthetic failure (moderate to severe pain) upon initial access or instrumentation showed that the majority of failures occurred in dentin (43%–79%).

Discomfort ratings of the injections for the 2 techniques are presented in Table 3. There was no significant difference between the 2 techniques. Table 4 presents the mean satisfaction ratings for the 2 techniques. There was no significant difference between the 2 techniques.

Discussion

There were no statistically significant differences for the effect of age, initial pain, Corah Dental Anxiety Scale ratings, sex, and tooth type so these variables would be minimized between the 2 groups. The mean initial pain ratings of 117–119 mm for both groups (Table 1) indicate severe pain on the VAS. This pain is representative of patients with symptomatic irreversible pulpitis (26–30) who present for emergency endodontic treatment. We sampled a middle-aged population (mean age, 33–34 years). Therefore, the results of this study may not apply to the elderly or children. The Corah Dental Anxiety Scale rating averaged 9 and 10.5, which would indicate moderate anxiety (Table 1) (21). Because the current study evaluated emergency patients in pain, the occurrence of moderate anxiety would be expected. Previous studies of patients with symptomatic irreversible pulpitis (26–30) found similar anxiety scores.

Subjective lip numbness statistically occurred in fewer patients with the Vazirani-Akinosi technique than the Gow-Gates technique.
In previous studies of endodontic patients with symptomatic irreversible pulpitis, success rates for the inferior alveolar nerve block have ranged from 15%–57% (32). Kohler et al (33) showed a higher success rate for the Gow-Gates technique when the anesthetic volume was increased from 1.8 to 3.6 mL (18% vs 82%). Using a 2-cartridge volume of 2% lidocaine with 1:100,000 epinephrine in the current study, the success rate with the Gow-Gates technique of 35% was similar to the 24%–35% success rates of the inferior alveolar nerve block in patients presenting with symptomatic irreversible pulpitis recorded by Matthews et al (31), Oleson et al (27), Simpson et al (28), Stanley et al (29), and Fullmer et al (30) but lower from the 57% success rate recorded by Lindemann et al (26). Our success rate of 35% was much lower than the 73% success rate found by Sherman et al (19) and the 52% success rate recorded by Aggarwal et al (20) for the Gow-Gates technique. Both studies used smaller volumes of anesthetic solutions (1.8 mL–2.2 mL of a lidocaine formulation) for their injections. The success rate of 16% for the Vazirani-Akinosi technique was much lower than the 41% found by Aggarwal et al (20) even when using a 2-cartridge volume. Perhaps, the increased number of patients in the current study or variation in patient populations accounted for the differences among studies.

The supplemental buccal injection of a cartridge of 4% articaine with 1:100,000 epinephrine resulted in a success rate of 51% for the Gow-Gates patients and 38% for the Vazirani-Akinosi patients (Table 2). Previous studies of failed inferior alveolar nerve blocks in patients with symptomatic irreversible pulpitis found success rates ranging from 24%–62% (27–31, 34). Therefore, a buccal infiltration of a cartridge of articaine after a failed Gow-Gates or Vazirani-Akinosi block would provide only modest success rates in patients with symptomatic irreversible pulpitis.

Discomfort ratings for patients experiencing anesthetic failure upon access showed that 43%–79% of the patients experienced moderate to severe pain in dentin. Previous studies of the inferior alveolar nerve block in patients with symptomatic irreversible pulpitis have reported an incidence of moderate to severe pain upon access in dentin of 32%–71% (26, 27, 29, 30). Obviously, the clinician would have

**CONSORT Randomized Clinical Trial**

**TABLE 3. Pain Ratings for Each Injection Phase for the Gow-Gates and Vazirani-Akinosi Techniques**

<table>
<thead>
<tr>
<th>Injection phase</th>
<th>None (%, n)</th>
<th>Mild (%, n)</th>
<th>Moderate (%, n)</th>
<th>Severe (%, n)</th>
<th>Mean ± SD (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needle insertion*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gow-Gates</td>
<td>13 (3/59)</td>
<td>58 (34/59)</td>
<td>36 (21/59)</td>
<td>2 (1/59)</td>
<td>44 ± 31</td>
</tr>
<tr>
<td>Vazirani-Akinosi</td>
<td>11 (4/38)</td>
<td>55 (21/38)</td>
<td>29 (11/38)</td>
<td>5 (2/38)</td>
<td>47 ± 37</td>
</tr>
<tr>
<td>Needle placement*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gow-Gates</td>
<td>0 (0/59)</td>
<td>42 (25/59)</td>
<td>53 (31/59)</td>
<td>5 (3/59)</td>
<td>63 ± 31</td>
</tr>
<tr>
<td>Vazirani-Akinosi</td>
<td>11 (4/38)</td>
<td>37 (14/38)</td>
<td>39 (15/38)</td>
<td>13 (5/38)</td>
<td>56 ± 41</td>
</tr>
<tr>
<td>Solution deposition*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gow-Gates</td>
<td>2 (1/60)</td>
<td>33 (20/60)</td>
<td>57 (34/60)</td>
<td>8 (5/60)</td>
<td>67 ± 36</td>
</tr>
<tr>
<td>Vazirani-Akinosi</td>
<td>0 (0/38)</td>
<td>37 (14/38)</td>
<td>53 (20/38)</td>
<td>11 (4/38)</td>
<td>65 ± 38</td>
</tr>
</tbody>
</table>

a = 60 for the Gow-Gates technique (1 patient had unreported needle insertion and placement ratings) and 38 for the Vazirani-Akinosi technique.

In previous studies (11, 16, 17) of the Vazirani-Akinosi technique using extraction models or subjects with asymptomatic vital teeth have also reported a lower incidence of lip numbness with this technique when compared with the Gow-Gates or inferior alveolar nerve block. Aggarwal et al (20) found only 2 subjects in the Gow-Gates group and 1 in the Vazirani-Akinosi group did not have profound lip numbness. In previous studies evaluating the conventional inferior alveolar nerve block injection in patients with irreversible pulpitis, lip numbness occurred 90%–100% of the time (26–31), which is similar to the incidence for the Gow-Gates technique (92%) in the current study (Table 2). Therefore, the Vazirani-Akinosi technique appears clinically inferior to the Gow-Gates and inferior alveolar nerve block techniques regarding lip numbness. Of interest is the finding that the 22 patients not achieving lip numbness (failed block) with the Vazirani-Akinosi technique and the 5 with failed blocks in the Gow-Gates technique achieved lip numbness with the conventional inferior alveolar nerve block.

The Vazirani-Akinosi technique lacks bony landmarks, and the only indications of correct target placement are the initial needle orientation and the depth of insertion. It is conceivable that the placement of a 2-cartridge volume of anesthetic solution into the pterygomandibular space is difficult despite consistent operator technique. It seems unlikely that operator error was involved given that the operator spent 2 months calibrating herself to the technique. It may be that this technique is difficult to master clinically.

Although the current study shows that the Vazirani-Akinosi technique may not be indicated for routine endodontic treatment, it certainly has a useful indication clinically. If a patient experiencing trismus is in need of endodontic treatment, the Vazirani-Akinosi injection may be a valuable primary anesthetic technique. Because the muscles of mastication protectively guard painful tissue. Once an increased opening is achieved, a conventional inferior alveolar nerve block may be administered to the trismus patient if needed.

**TABLE 4. Post-treatment Satisfaction Ratings for the Gow-Gates and Vazirani-Akinosi Techniques**

<table>
<thead>
<tr>
<th>Group</th>
<th>Not satisfied (%) , n</th>
<th>Somewhat satisfied (%) , n</th>
<th>Moderately satisfied (%) , n</th>
<th>Completely satisfied (%) , n</th>
<th>Mean ± SD (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gow-Gates*</td>
<td>0 (0/60)</td>
<td>0 (0/60)</td>
<td>5 (3/60)</td>
<td>95 (57/60)</td>
<td>94 ± 12</td>
</tr>
<tr>
<td>Vazirani-Akinosi</td>
<td>3 (1/37)</td>
<td>0 (0/37)</td>
<td>3 (1/37)</td>
<td>94 (35/37)</td>
<td>91 ± 19</td>
</tr>
</tbody>
</table>

a = 60 for the Gow-Gates technique and 37 for the Vazirani-Akinosi (1 patient did not fill out the form).

*There was no significant difference (P = .4721) between the 2 anesthetic techniques.
difficulty entering the pulp to give an intrapulpal injection. Therefore, after lip numbness, practitioners should consider supplemental techniques, such as intraosseous or intraligamentary injections, to achieve pulpal anesthesia when a Gow-Gates, Vazirani-Akinosi, or inferior alveolar nerve block fails to provide pulpal anesthesia for patients with symptomatic irreversible pulps (27–31).

For both techniques, needle insertion resulted in 29%–36% of the patients reporting moderate pain, and 2%–5% reporting severe pain (Table 3). For needle placement, 59%–53% reported moderate pain, and 5%–13% reported severe pain. Anesthetic solution deposition resulted in an incidence of 53%–57% moderate pain and 8%–11% severe pain. None of the differences between the means were significant (Table 3). McCartney et al (35) studied the pain of the inferior alveolar nerve block in patients with symptomatic irreversible pulps. They reported 55%–59% of the patients rated the pain of needle insertion as moderate, with 2%–9% rating the pain as severe. For needle placement, 35%–70% reported moderate pain, and 10%–35% reported severe pain. Anesthetic solution deposition resulted in an incidence of moderate pain 52% of the time, with 14%–21% of the patients reporting severe pain. The values were lower in the current study for the Gow-Gates and Vazirani-Akinosi techniques, but moderate to severe pain was still experienced. It seems all 3 techniques have the potential to be painful.

Despite the findings of the current study that most patients experienced moderate to severe pain during endodontic treatment regardless of the technique, the majority of patients in both groups were moderately to completely satisfied with their experience (Table 4). Patient satisfaction may be related to the chairside manner of the dentist or satisfaction with the emergency procedure in the hope that their discomfort will be resolved. Other studies have shown that patients were moderately or completely satisfied with endodontic treatment for symptomatic irreversible pulps even though moderate to severe pain was experienced (26, 29, 30). The significance of a high satisfaction rating with treatment is clinically important. It affirms that patients will accept this level of pain if they feel they are being treated well and attended to with compassion.

In conclusion, for patients who achieved lip numbness, neither the Gow-Gates technique nor the Vazirani-Akinosi technique provided adequate pulpal anesthesia for mandibular posterior teeth in patients presenting with symptomatic irreversible pulps. Both injections would require supplemental anesthesia.

Acknowledgments

Vivian Click completed this study for a master’s of science degree. The other authors contributed to the study design, institutional review board submission, and statistical analysis and were actively involved in the execution of the study, financial funding, and served on the master’s examination committee.

The authors deny any conflicts of interest related to this study.

Supplementary Material

Supplementary material associated with this article can be found in the online version at www.jendodn.com (http://dx.doi.org/10.1016/j.joen.2014.09.010).

References


