Percutaneous retrogasserian glycerol injection in the management of trigeminal neuralgia: long-term follow-up results

TAKAMITSU FUJIMAKI, M.D., TAKANORI FUKUSHIMA, M.D., D.M.Sc., AND SHINICHIRO MIYAZAKI, M.D.

Department of Neurosurgery, Mitsui Memorial Hospital, Tokyo, Japan

The results in 122 patients with trigeminal neuralgia who underwent percutaneous retrogasserian glycerol injection are presented. Eighty patients were followed from 38 to 54 months. The recurrence rate at 54 months was 72% (Kaplan-Meier analysis), and the median pain-free interval was 32 months. Complications associated with the procedure were significantly high: 63% of the patients had definite hypesthesia of the face and 29% had unpleasant dysesthesias, including two cases of anesthesia dolorosa. Sensory disturbances were most frequent in patients who had received a previous alcohol block procedure. Among the patients without previous peripheral procedures, 50% developed sensory disturbances. Because of the high rates of recurrence and sensory disturbances, the authors prefer microvascular decompression for the management of trigeminal neuralgia.

KEY WORDS - glycerol □9 rhizotomy □9 trigeminal nerve □9 trigeminal neuralgia

Since its introduction by Håkanson in 1981, percutaneous retrogasserian glycerol injection has become an increasingly popular form of therapy for trigeminal neuralgia. Several authors have reported that this procedure avoids sensory loss and dysesthesia. The role of percutaneous retrogasserian glycerol injection in the treatment of trigeminal neuralgia is, however, still controversial because of the pain recurrence and significant sensory deficit associated with it. This report analyzes our results in 122 patients treated with this method and offers a prolonged follow-up review to explore potential complications such as sensory disturbance and recurrence.

Summary of Cases

Patient Population

Between November, 1982, and February, 1985, 135 patients with trigeminal neuralgia underwent percutaneous retrogasserian glycerol injection at our institution. The procedure was performed successfully in 122 cases; 13 of the 135 patients did not receive the glycerol injection because of failure to visualize the trigeminal cistern. Of the 122 patients with the completed procedure, we followed 108 patients who achieved satisfactory pain relief. Four of these patients died within 4 years after percutaneous retrogasserian glycerol injection from causes not related to the procedure. Of those, three had recurrent pain and these patients were included in this study. Twenty-seven cases were lost to follow-up review, leaving a total of 80 cases (74%) available for analysis. All 80 patients were evaluated for duration of pain relief, the presence of sensory disturbances, and the rate of recurrence.

The patients ranged in age from 41 to 92 years (average 71.7 years). There were 47 women and 33 men. Table 1 shows the trigeminal nerve divisions affected in these patients. Thirty-six patients (45%) had previously undergone one or more alcohol blocks. No patient had a history of peripheral neurotomy.

Operative Technique

Percutaneous retrogasserian glycerol injection was performed in patients suffering from trigeminal neuralgia who were not considered candidates for microvascular decompression because of medical complications or advanced age. All patients underwent high-resolution computerized tomography to exclude the presence of organic lesions. Puncture of the trigeminal cistern was achieved by an anterior percutaneous route via the...
Glycerol injection for trigeminal neuralgia

foramen ovale, as described by Håkanson. Following premedication with atropine, the patient was placed on a radiographic table in the position described by Perl and Ecker. Under local anesthesia, a No. 20 spinal needle was inserted 3 cm lateral to the corner of the mouth and the foramen ovale was punctured under fluoroscopic control. After drainage of cerebrospinal fluid (CSF), the patient was placed in a semi-sitting position. The depth of needle penetration was confirmed by lateral fluoroscopy, then 0.5 ml metrizamide (300 mg/ml) was injected into the trigeminal cistern. After adequate positioning of the needle tip had been verified, 0.3 to 0.5 ml of pure sterile glycerol was injected slowly. The patient was kept in the sitting or semi-sitting position for 3 to 4 hours.

Surgical Results

The initial, early follow-up, and long-term follow-up results are shown in Fig. 1. The final outcome (as of April, 1988) shows that 21 patients (26%) reported long-lasting pain relief (Group A); 13 patients (62%) in this group had slight-to-moderate sensory disturbance. Eleven patients (14%) experienced complete pain relief or improved original pain but painful dysesthesia or anesthesia dolorosa remained (Group B). Forty-eight patients (60%) developed recurrent pain (Group R); 25 (52%) of these subsequently underwent microvascular decompression. The pain-free interval for this series, calculated by the Kaplan-Meier method, is shown in Fig. 2. The median pain-free interval was 32 months and only 28.4% of patients were pain-free at 54 months.

Complications relating to percutaneous retrogasserian glycerol injection were unexpectedly frequent. Of 80 patients followed for 38 to 54 months, 50 patients (63%) had definite hypesthesia and 23 (29%) suffered from unpleasant paresthesia or dysesthesia, including two cases of anesthesia dolorosa. Of the 36 patients who had previously received an alcohol block, 28 patients (77.8%) developed sensory disturbance; of the 44 patients who had not received previous peripheral procedures, 22 patients (50%) developed sensory disturbance (Fig. 3). Patients in Groups B and R were more likely to have undergone previous block procedures (Fig. 3).

Discussion

In his initial description of percutaneous retrogasserian glycerol injection, Håkanson reported a high success rate in relieving trigeminal neuralgia while sparing facial sensory function. He noted a 60% incidence of slight sensory disturbance in the face, but the numbness faded after several weeks and no patient described the altered sensation as unpleasant. Lunsford and coworkers also reported a 37% incidence of mild sensory disturbance and a 7% incidence of annoying paresthesia. Apfelbaum found an 8.2% incidence of

J. Neurosurg. / Volume 73 / August, 1990 213
Recurrence rates and sensory disturbances in published series are shown in Table 2. Although only a few series have been published describing long-term follow-up results of percutaneous retrogasserian glycerol injection, the recurrence rates reported in several studies are quite significant. Saini reported recurrence in 41% of cases in 2 years and 83% in 5 years. Hakanson initially reported an 18% recurrence rate in patients followed from 2 months to 4 years. He subsequently reported 100 patients followed for 1 to 6 years with a 31% recurrence rate. In experimental studies, glycerol has been shown to be a neurolytic agent which produces demyelination and axonolysis. As with any other procedure that produces damage to a nerve root, one would expect a certain incidence of deafferentation pain following trigeminal rhizolysis. From their experimental results, Rengachary, et al., predicted that the recurrence rate might increase with longer follow-up periods. Repeat percutaneous retrogasserian glycerol in-

Substantial sensory loss (Lunsford and Apfelbaum); in contrast, other authors reported a 37% to 52% incidence of sensory disturbance.

In the present series, sensory disturbance was observed in 50 (63%) of the 80 patients studied over the long term. This is higher than the figure in other reports but, when the data were restricted to patients who had received no previous alcohol block (44 patients), the incidence was 50% and comparable to other series.

Annoying sensory disturbance or painful dysesthesia was noted in 29% of the present cases. Saini reported a 4.7% incidence of anesthesia dolorosa (26 patients). In our series, two patients (1.6%) developed anesthesia dolorosa. Rappaport and Gomori also found a 5% incidence of painful dysesthesia after primary injection and a significantly higher (14.3%) incidence after a second procedure. Lunsford and Bennett reported one (5.3%) of 19 patients who developed dysesthesia after a secondary procedure.
Glycerol injection for trigeminal neuralgia

TABLE 2
Summary of percutaneous retrogasserian glycerol injection results reported in the literature

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Initial Results</th>
<th>Recurrence</th>
<th>Sensory Disturbance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Pain Cases</td>
<td>Relief Rate</td>
<td>Period</td>
</tr>
<tr>
<td>Håkanson, 1981</td>
<td>75</td>
<td>100%</td>
<td>18%</td>
</tr>
<tr>
<td>Sweet, et al., 1981</td>
<td>31</td>
<td>64.5%</td>
<td>31%</td>
</tr>
<tr>
<td>Lunsford, 1982</td>
<td>30</td>
<td>90%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Håkanson, 1983</td>
<td>100</td>
<td>96%</td>
<td>7.1%</td>
</tr>
<tr>
<td>Lunsford &amp; Bennett, 1984</td>
<td>112</td>
<td>90%</td>
<td>35%</td>
</tr>
<tr>
<td>Apfelbaum, 1985*</td>
<td>73</td>
<td>86%</td>
<td>23%</td>
</tr>
<tr>
<td>Lunsford, 1985*</td>
<td>225</td>
<td>65%</td>
<td>73%</td>
</tr>
<tr>
<td>Rappaport &amp; Magora, 1985</td>
<td>11</td>
<td>91%</td>
<td>17%</td>
</tr>
<tr>
<td>Waltz, et al., 1985</td>
<td>58</td>
<td>83%</td>
<td>10%</td>
</tr>
<tr>
<td>Arias, 1986</td>
<td>100</td>
<td>95%</td>
<td>37.5%</td>
</tr>
<tr>
<td>Beck, et al., 1986</td>
<td>58</td>
<td>79%</td>
<td>12%</td>
</tr>
<tr>
<td>Rappaport, 1986</td>
<td>43</td>
<td>97%</td>
<td>92%</td>
</tr>
<tr>
<td>Dieckmann, et al., 1987</td>
<td>51</td>
<td>92%</td>
<td>50%</td>
</tr>
<tr>
<td>Saini, 1987</td>
<td>552</td>
<td>59% (2 yrs), 17% (5 yrs)</td>
<td>28%</td>
</tr>
<tr>
<td>Burchiel, 1988</td>
<td>46</td>
<td>80%</td>
<td>72%</td>
</tr>
<tr>
<td>Rappaport &amp; Gomori, 1988</td>
<td>60</td>
<td>90%</td>
<td>18.5%</td>
</tr>
<tr>
<td>Young, 1988</td>
<td>162</td>
<td>90%</td>
<td>72%</td>
</tr>
<tr>
<td>Fujimaki, et al., 1990</td>
<td>122</td>
<td>89%</td>
<td>17%</td>
</tr>
</tbody>
</table>

* Apfelbaum and Lunsford reported their clinical data separately in a joint communication.12

Injection for recurrent trigeminal neuralgia may cause more sensory disturbances. This is also true in patients who have received a previous alcohol block. Injection of glycerol into the trigeminal cistern may lead to narrowing of the cisternal CSF space. A higher incidence of sensory deficit and dysesthetic pain will occur following repeat percutaneous retrogasserian glycerol injection in this setting.30 It appears that this procedure has a high risk of recurrence and of minor and major sensory disturbances. The risk of sensory disturbance is even higher when compared to conventional radiofrequency rhizotomy23,24 in which the lesion can be more accurately controlled.

Both percutaneous retrogasserian glycerol injection and radiofrequency rhizotomy are destructive procedures and do not remove the cause of pain. On the other hand, microvascular decompression surgery9 has been established as the definitive treatment for trigeminal neuralgia. Jannetta10 reported that 90% of patients were pain-free or improved over long follow-up periods. Our experience with microvascular decompression for the past 9 years has also demonstrated excellent pain relief in a majority of patients with trigeminal neuralgia.5,6 Because of the high incidence of pain recurrence and annoying sensory disturbances associated with the percutaneous retrogasserian glycerol injection procedure, we believe that microvascular decompression is the better treatment modality for trigeminal neuralgia.

Acknowledgment

The authors thank Dr. Benjamin Gelber of Lincoln, Nebraska, for his help and advice in editing the manuscript.

References


Manuscript received September 8, 1989.

*Address reprint requests to: Takamitsu Fujimaki, M.D., c/o I. Josh Fidler, D.V.M., Ph.D., Department of Cell Biology, University of Texas, M. D. Anderson Cancer Center, 1515 Holcombe Boulevard, Box 173, Houston, Texas 77030.*