Efficacy of sphenopalatine ganglion blockade in 66 patients suffering from cluster headache: a 12- to 70-month follow-up evaluation

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This study was conducted to evaluate the efficacy, based on 12- to 70-month follow-up data, of radiofrequency (RF) lesions of the sphenopalatine ganglion made in patients suffering from cluster headache. Sixty-six patients suffering from either episodic (Group A, 56 patients) or chronic (Group B, 10 patients) cluster headache who were not responsive to pharmacological management were treated by RF lesioning in the sphenopalatine ganglion.

Complete relief of pain was achieved in 34 (60.7%) of 56 patients in Group A and in three (30%) of 10 patients in Group B. No relief was found in eight patients (14.3%) in Group A and in four (40%) in Group B. The mean time of follow up was 29.1 ± 10.6 months in Group A and 24 ± 9.7 months in Group B, ranging from 12 to 70 months. With regard to side effects and complications, temporary postoperative epistaxis was observed in eight patients and a cheek hematoma in 11 patients; a partial RF lesion of the maxillary nerve was inadvertently made in four patients. Nine patients complained of hypesthesia of the palate, which disappeared in all cases within 3 months.

The authors conclude that RF lesioning in the sphenopalatine ganglion via the infrazygomatic approach may be performed in patients suffering from cluster headache that does not respond to pharmacological therapy.

KEY WORDS • cluster headache • radiofrequency lesion • sphenopalatine ganglion blockade
patients, pharmacological treatment had proved to be insufficient and/or had resulted in unacceptable side effects or complications.

Procedure and Follow-Up Evaluation

After a meticulous neurological examination performed by a neurologist to exclude other pathological conditions, RF lesioning was performed in the SPG. In patients suffering from episodic CH, the procedure was performed within 10 days after the onset of the first symptoms. Patients suffering from episodic or chronic CH were treated a maximum of three times within an interval of 1 month if the initial results of the blockade were unsatisfactory. After they underwent percutaneous RF lesioning, the patients were evaluated monthly for 3 months, after which they were evaluated yearly to ascertain the amount of pain relief and/or changes in the frequency of the CHs, the occurrence of sensory disorders of the skin and/or palate, and medication requirements.

The result of the RF lesioning was considered to be complete relief if patients experienced no pain due to CHs, resulting in total withdrawal of pharmacological treatment. Partial pain relief was defined as a decrease in the number of CH attacks following the procedure, resulting in reduced need (<50% of preoperative requirement) for pharmacological treatment. No pain relief was defined as no difference in pain pattern. The results were also evaluated in relation to complications and side effects.

Statistical Analysis

Statistical analysis was performed using the paired and unpaired Student’s t-test. A probability value of less than 0.05 was considered significant.

Radiofrequency Lesioning Protocol

The patient is placed supine on the operating table with the head immobilized by a strip of adhesive bandage. The pterygopalatine fissure is localized during transverse fluoroscopy and a line is drawn using a marker and a metal ruler over the skin in this position (Fig. 1). The intersection of this line with the inferior edge of the zygomatic arch (infrazygomatic approach) is the entry point. Using this entry point, inadvertent puncture of the buccal mucosa is avoided. After subcutaneous injection of 2 ml of 2% lidocaine, a 10-cm-long 22-gauge needle with a stylet and a 5-mm uninsulated tip is inserted and advanced with the aid of lateral fluoroscopy through the pterygopalatine fissure to where the SPG is situated in the sphenopalatine foramen. As soon as the maxillary nerve is touched by the tip of the electrode, the patient will report a sharp, shooting pain (Fig. 2 left).

The C-arm of the image intensifier is then placed in the anteroposterior position. The cannula is advanced farther until it is in line with the lateral aspect of the nose (anatomical localization, Fig. 2 right).

The stylet is removed and replaced by a temperature-sensitive RF electrode. The definitive position of the electrode is subsequently verified by an electrical stimulus of 0.2 to 1 V performed at 50 Hz; this should result in paresthesias in the nose. Paresthesias occurring at the outside of the cheek and/or upper lip indicate stimulation of the maxillary nerve. If the patient reports paresthesias in the
palate, the cannula is advanced a few millimeters (physiological localization). After the definitive position is reached, three RF lesions (at 70°C for 60 seconds) are made by passing a high-frequency current through the temperature-sensitive RF electrode. The electrode is advanced 1 to 2 mm medially after each lesion, until it enters the sphenopalatine foramen. The procedures are performed while the patient’s electrocardiographic signals and blood pressure are being monitored.

Results

Blockade of the SPG was performed in 56 patients suffering from episodic CH (Group A) and 10 patients suffering from chronic CH (Group B).

In addition to pharmacological treatment, the following medical interventions had previously been performed without effect on the CH pain: correction of visual refraction errors (10 patients), irrigation of sinuses (14 patients), straightening of the nasal septum (20 patients), tooth extractions (11 patients), and invasive procedures aimed at the trigeminal nerve (RF lesioning of the gasserian ganglion [five patients] and sectioning of a peripheral branch [three patients]).

The mean age and sex of the patients, the duration of symptoms, mean duration and number of clusters, and mean duration and number of attacks in Groups A and B are shown in Table 2. The follow-up duration ranged from 12 to 70 months.

In Group A (episodic CH), 27 patients underwent one, 19 patients two, and 10 patients three blockades of the SPG; in Group B (chronic CH) these figures were four, three, and three, respectively. The mean follow-up period and the efficacy of pain relief after RF lesioning of the SPG are listed in Table 3.

Complete relief of CH was achieved in 34 (60.7%) of 56 patients in Group A and in three (30%) of 10 patients in Group B; however, a paroxysmal, slight, deep-seated, troublesome sensation in the orbitotemporal region, combined with parasympathetic symptoms, remained in some cases. The mean specific improvements in patients with partial pain relief are shown in Table 4. The improvements attained by the SPG blockade in Groups A and B were significant: $p < 0.01$ and $p < 0.05$, respectively.

Three patients in Group A and five patients in Group B had undergone previous invasive interventions, particularly specific innervation. No improvement was observed in these patients except for one patient in Group A who achieved partial pain relief.

With regard to side effects and complications, eight patients experienced temporary postoperative epistaxis and 11 patients exhibited cheek hematomas. A partial RF lesion of the maxillary nerve was inadvertently made in four patients. Nine patients complained of hypesthesia of the palate; this disappeared in all patients within 3 months.

Discussion

In attempts to alleviate the excruciating pain of CH that is not responsive to pharmacological treatment, various invasive methods have been applied. Initially, surgical removal of the greater superficial petrosal nerve and intermediat nerve was performed. Subsequently, procedures focused on the trigeminal nerve, which has been interrupted by alcohol or glycerol injection. Surgical treatment consisted of sectioning the root of the trigeminal nerve.

A successful effort to relieve CH by administering cocaine to the SPG via a percutaneous needle has been reported by Alajouanine and Thurel. Treatment with alcohol has been proposed by Brown and by Devoghel because application of cocaine has to be repeated too often. However, alcohol may spread to the maxillary nerve, resulting in neuritis. Meyer and Ericsson and Ray have proposed complete surgical removal of the SPG, a major procedure. Meyer and Ericsson have recommended

![Fig. 2. Left: Lateral fluoroscopic view of the skull showing placement of the electrode through the pterygopalatine fissure into the sphenopalatine foramen. Right: Anteroposterior fluoroscopic view of the skull showing the correct placement of the electrode.](image-url)
Cluster headache and radiofrequency lesion

<table>
<thead>
<tr>
<th>TABLE 4</th>
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<tr>
<td><strong>Efficacy of RF lesioning in 17 patients with CH who achieved partial pain relief</strong></td>
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<tr>
<th>Factor</th>
<th>Before RF Lesion</th>
<th>After RF Lesion</th>
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<tr>
<td>Group A (14 patients)</td>
<td></td>
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<tr>
<td>duration of clusters (wks)</td>
<td>9.0 ± 1.9</td>
<td>6.3 ± 2.5</td>
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<td>no. of clusters (per yr)</td>
<td>2.0 ± 0.5</td>
<td>1.7 ± 0.6</td>
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<td>attack duration (hrs)</td>
<td>1.2 ± 0.4</td>
<td>0.7 ± 0.3</td>
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<td>no. of attacks (per 24 hrs)</td>
<td>4.1 ± 0.7</td>
<td>1.9 ± 0.5</td>
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<td>Group B (3 patients)</td>
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<tr>
<td>attack duration (hrs)</td>
<td>1.1 ± 0.4</td>
<td>0.6 ± 0.1</td>
</tr>
<tr>
<td>no. of attacks (per 24 hrs)</td>
<td>3.3 ± 1.5</td>
<td>2.3 ± 0.6</td>
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* Values are expressed as mean ± standard deviation.

not be explained by the waxing and waning effects that occur during the variable natural course of CH. Moreover, all patients who underwent SPG blockade in our study had undergone previous treatments; the SPG blockade was not performed as the initial procedure. Consequently, a randomized, blinded study designed primarily to compare the efficacy of pharmacological and invasive therapy is justified. Of the eight patients in our study who had previously undergone an invasive procedure, only one achieved any pain relief after SPG blockade. Any explanation of this finding would be speculative. Because of the small number of patients in our study who suffered from chronic CH we will not make conclusive remarks concerning the efficacy of treatment in this subpopulation.

With regard to safety, maxillary hyperpathia was the major complication in 6.1% of the patients in our study. Hyperpathia may be the consequence of a partial peripheral lesion of the maxillary nerve and should be considered deafferentation pain. The meticulous placement of the electrode combined with the full cooperation of the patient may decrease the incidence of this complication. Based on our results, we conclude that RF lesioning of the SPG in patients suffering from episodic CH that is nonresponsive to pharmacological therapy is a safe and efficacious procedure.

References

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