

# Continuous radiofrequency thermocoagulation under CT-guidance for glossopharyngeal neuralgia

## Two case reports

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### Abstract

**Rationale:** Glossopharyngeal neuralgia (GPN) is a painful syndrome characterized by paroxysmal neuropathic pain in the pharynx, tonsil, posterior base of tongue, inner ear, and mandibular angle. The traditional therapies of GPN, including medication and surgical operation, are not always effective in pain controlling. Radiofrequency therapy is a minimally interventional technique to provide analgesia in chronic pain.

**Patient concerns:** Two patients who were refractory to medical treatment were hospitalized for primary GPN.

**Diagnoses:** Two patients were diagnosed by symptoms, physical signs and imaging examination.

**Interventions:** The first patient underwent pulsed radiofrequency of the glossopharyngeal nerve under CT-guidance as a preferred method. The pulsed radiofrequency (PRF) was performed at 42°C for 10 minutes with a pulsed frequency of 2 Hz and a pulse width 20 ms. There is no symptom improvement after PRF procedure. Three days later, continuous radiofrequency (CRF) thermocoagulation was performed. The pain disappeared after CRF within 36 months followed-up. CRF thermocoagulation under CT-guidance was accepted by the second patient as the first choice.

**Outcomes:** An overall reduction of pain was reported after the procedure and telephone consult for 24-months follow-up confirmed the persistence of the pain relief.

**Lessons:** The CRF thermocoagulation produced no complications or side effects in the two cases, and was proved effective in the treatment of GPN.

**Abbreviations:** CRF = continuous radiofrequency, GPN = glossopharyngeal neuralgia, PRF = pulsed radiofrequency.

**Keywords:** CT-guidance, glossopharyngeal neuralgia, neuropathic pain, radiofrequency, thermocoagulation

## 1. Introduction

Glossopharyngeal neuralgia (GPN), representing only 0.2% to 1.3% of facial pain syndromes,<sup>[1]</sup> is an uncommon cause of craniofacial pain, with a crude incidence rate estimated to be 0.2 cases per 100,000 habitants.<sup>[2]</sup> The character and distribution of pain is often diagnostic. The pain is a sudden onset of lancinating

acute pain, lasting seconds to minutes, and is felt in the pharynx, tongue, tonsillar fossa, internal ear, and mandible angle. GPN is usually idiopathic, but can be rarely associated with oropharyngeal tumors, arachnoiditis, stylohyoid ligament ossification, vascular malformations, etc.<sup>[3]</sup> The therapy of GPN is divided into pharmacological, interventional, and surgical techniques. Medical treatment, such as carbamazepine, gabapentin, pregabalin, and tramadol, is the preferred choice for majority of the patients, but not always effective in pain controlling. Surgical operations are considered more successfully, but carries far higher risks.<sup>[4,5]</sup>

Radiofrequency therapy is a minimally interventional technique that can be applied to a peripheral nerve or ganglion to provide analgesia in chronic pain.<sup>[6,7]</sup> We report 2 cases of primary GPN with successful continuous radiofrequency (CRF) under computed tomography (CT)-guidance.

## 2. Case report

### 2.1. Case 1

The first patient was a 47-year-old woman who presented with a 2-year history of severe shooting pain from the right oropharynx, jaw, base of tongue to the inner ear without obvious cause. The patient was referred to our department on September 24, 2014. The paroxysms were usually spontaneous and also could be triggered by chewing and swallowing. The visual analogue scale scores were 8 to 10/10. A magnetic resonance imaging (MRI) of

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the head was requested and no significant pathological changes were seen. CT scan of the neck showed a normal sized styloid process in both sides. She was diagnosed with primary GNP. Medications, such as carbamazepine, gabapentin, pregabalin, and tramadol, have been tried without much efficacy. First choice offered pulsed radiofrequency (PRF) therapy. The PRF was performed for 10 min at a constant temperature of 42°C. The pulse frequency was 2 Hz and the pulse width was 20 ms. The patient had no pain relief. She complained the symptom became even worse and she could hardly eat and drink. As she was unwilling to accept any repeated PRF procedure, CRF thermo-coagulation of glossopharyngeal nerve was performed 3 days later. The patient reported that the pain had disappeared after CRF. She had no dysphonia, dysphagia, vocal cord paralysis, and only felt numbness at the back of the tongue. At 6-, 12-, 24-, and 36-month follow-up, the patient has been completely pain-free and had not required any additional pain medications. The numbness of the tongue was also recovered at 3 months.

## 2.2. Case 2

The second patient was a 62-year-old woman who described her stablign pain at the back of her left throat and tongue and radiated to the inner ear for at least 3 years. The pain attacked 3 to 5 times or more a day spontaneously and could be triggered by chewing and swallowing. The MRI of the head and neck indicated no significant pathological changes. She was diagnosed with primary GNP and treated with carbamazepine with initial efficacy. But with the increase of drug dosages, the adverse effect, including dizziness, nausea, and vomiting, occurred in patient and cannot be tolerated. She had never undergone any procedures for her pain and was hospitalized on December 12, 2015. CRF was performed the next day. An overall reduction of pain and the slight numbness at the back of the tongue was reported after the procedure. Telephone consult for 6-, 12-, and 24-month follow-up confirmed the persistence of the pain relief. The numbness of the tongue for second patient was recovered at 2 months.

## 2.3. Techniques

The puncture methods between PRF and CRF were similar. Informed consent was obtained before the procedures. The ethics committee of the Affiliated Ganzhou Hospital of Nanchang University approved the study. The patient was placed supine with intravenous access obtained and vital signs monitored. The landmark was the midpoint of the line drawn from the ipsilateral mastoid process to the angle of the mandible. The skin was draped and infiltrated with local anesthetic. A 22G, 50 mm length, 4 mm active tip radiofrequency needle was introduced in a plane perpendicular to the skin under CT-guidance, to make contact with the styloid process bone (Fig. 1). The needle was then withdrawn, walked off the styloid process posteriorly and advanced another 5 mm carefully (Fig. 2). The advance of the needle was stopped immediately when a provoked concordant pain was reported, and the electrophysiological stimulation was carried out. The impedance was 210  $\Omega$  and sensory stimulation up to 1 V at a frequency of 50 Hz reproduced concordant pain. Then, the tip of the cannula was slightly adjusted until the sensory stimulation at 0.2 mV and even below could still reproduce concordant pain. Motor stimulation was performed subsequently at 2.5 V at 2 Hz and the patient only felt slightly contractions of tongue. Contractions of the muscles innervated by the phrenic and spinal accessory nerves were absent. Aspiration was negative

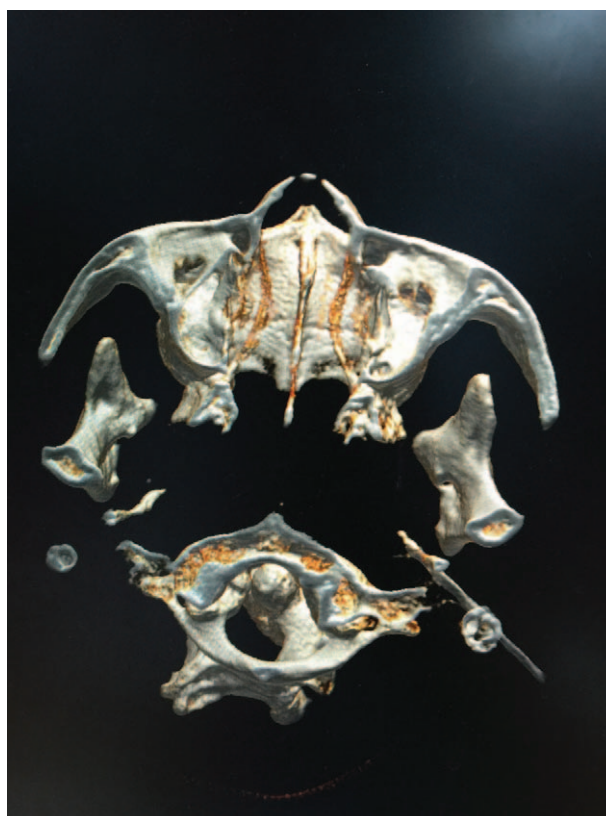


**Figure 1.** Computed tomography image of radiofrequency cannula that reached the styloid process.

for blood and fluid, and then 1 mL 2% lidocaine was injected. The patient remained hemodynamically stable without any episodes of bradycardia or hypotension. The CRF lesion was operated at 60°C for 60 s and 80°C for 120 s.

## 3. Discussion

PRF has been growing popularly used for the treatment of chronic neuropathic pain.<sup>[8,9]</sup> Given that PRF does not cause



**Figure 2.** Computed tomography image after cannula is walked off the styloid process posteriorly.

irreversible damage to neuronal and surrounding tissues, PRF can be considered to be a neuromodulatory technique. Compared with PRF, CRF, which is a destructive method, was regarded as carrying the risks of neuritis, deafferented pain, and neurovascular injury.<sup>[10]</sup> In recent years, the PRF is inclined to replace CRF in the treatment of neuropathic pain. However, the clinical efficacy of PRF still remains controversial. A tough problem of the efficacy of PRF is relatively lack of randomized controlled studies. PRF has relatively poor outcomes in pain management and the pain relief always lasted only a short period.<sup>[11]</sup> Actually, a majority of patients have to accept the PRF procedures several times for the pain controlling in pain clinic. CRF has been proved effective on chronic neuropathic pain.<sup>[11,12]</sup> In the first case, PRF was firstly adopted, but had a negative outcome. So the following CRF was successfully performed on the patient.

There are several topics that should be discussed. First, the PRF was selected as preferred method in the first patient because of its nondestruction, safety and effectiveness in the GPN therapy.<sup>[13–15]</sup> We cannot rule out if other PRF parameters could still work because the patient was unwilling to try another PRF operation. Second, the technique of CRF requires accurate placement of the electrode onto the target nerve. Along with the vagus nerve and accessory nerve, the glossopharyngeal nerve passes through the jugular foramen and then extends in its passage between the internal jugular vein and internal carotid artery. So the nerves and blood vessels are easily damaged during the operation process. In our study, 3 localization methods were used to ensure the success and safety of the procedure. The first method is CT-guidance. The treatment was performed under CT-guidance, which can provide more clear, accurate, and intuitive image compared with C-arm tomography.<sup>[13–15]</sup> The second method is electrophysiological stimulation. In the procedure, the sensory stimulation at 0.2mV and even below could still reproduce concordant pain and motor stimulation could not cause the contractions of facial and neck muscles. The third method is the local anesthetic test; 1 mL lidocaine 2% was administrated and the patient had a pain relief and did not show bradycardia, hypotension, or other episodes. This further verified that the needle tip was very closer to the glossopharyngeal nerve and far away from other nerves, veins, and arteries.

In our study, the CRF thermocoagulation produced no complications or side effects, and was proved effective in the treatment of GPN.

## Author contributions

**Data curation:** Rui Chen.

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**Resources:** Cuihua Jiang, Baolin Zhong.

**Writing – original draft:** Qing Zhu, Shulan Wang.

**Writing – review and editing:** Tao Sun.

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