MPJ Multidisciplinary Pain Journal / # 1 / 2021

REVISTA DE LA SOCIEDAD ESPAÑOLA MULTIDISPLINAR DEL DOLOR
JOURNAL OF THE MULTIDISCIPLINARY SPANISH PAIN SOCIETY / SEMDOR

CLINICAL CASE

Pulsed radiofrequency in a patient with postoperative vocal cord's glossopharyngeal neuralgia refractory to conventional treatment

Radiofrecuencia pulsada en un paciente con neuralgia glosofaríngea postoperatoria de las cuerdas vocales refractaria al tratamiento convencional

AUTHORS:

David Abejón González, Eva M. Monzón, Cristina Abad, Alberto Ríos
Unidad de Dolor.
Hospital Universitario Quirónsalud. Madrid
David Abejón González
Hospital Quirónsalud San José. Madrid

CORRESPONDENCE:

David Abejón González
dabejongonzalez@gmail.com

ABSTRACT:

Even though the glossopharyngeal neuralgia (GPN) only represents the 0,2-1,3 % of facial pain, the treatment of the affected patients is a challenge for the physician. The GPN can be idiopathic, or secondary to different conditions such as vascular compression, oropharyngeal tumors, traumatisms, Eagle's syndrome and post tonsillectomy and peritonsillar surgery.

The medical treatment for GPN with neuromodulators (carbamacepine, gabapentine) is usually not effective, being other procedures or instrumental techniques needed to control or alleviate the pain. Alcoholic neurolysis, extracranial or intradural section of the glossopharyngeal nerve and vascular decompression are known options for its treatment with a 90 % efficacy but with possible complications such as dysphagia and coughing episodes, and an intraoperative mortality rate of 5 % in some studies. Less known techniques are conventional radiofrequency at 60-90 ºC with some case studies and even less known is the pulsed radiofrequency (PRF) procedure. PRF has the advantage of being able to be used on peripheric nerves without producing deafferentation signs and the efficacy seems to be similar to that of conventional radiofrequency.

We present a case of GPN after a vocal cord surgery where RFP was used without any complications and was effective in the short and medium term alleviating the patient's pain.

RESUMEN:

La neuralgia del glosofaríngeo representa solamente del 0,2 % al 1,3 % de los casos de dolor facial; aun así, su tratamiento supone un reto médico. Puede ser idiopática o secundaria a diferentes condiciones como compresión vascular, tumores orofaríngeos, traumatismos, síndrome de Eagle o poscirugía amigdalina y periamigdalina.

El tratamiento médico de la neuralgia del glosofaríngeo con neuromoduladores (carbamacepina, gabapentina) habitualmente es poco efectivo, por lo que suelen ser necesarios procedimientos intervencionistas o quirúrgicos para conseguir controlar o aliviar el dolor. Opciones con eficacia del 90 % son la neurólisis con alcohol, la sección extracraneal o intradural del nervio glosofaríngeo y la descompresión vascular, pero presentan posibles complicaciones como disfagia y episodios de tos, y una tasa de mortalidad intraoperatoria hasta del 5 % en algunos estudios.

Otras técnicas menos conocidas son la radiofrecuencia convencional a 60-90°, con algunos casos publicados, y la radiofrecuencia pulsada. Esta última tiene la ventaja de poder utilizarse en nervios periféricos sin el riesgo de producir signos de desaferenciación y con una eficacia similar a la de la radiofrecuencia convencional.

Presentamos un caso clínico de neuralgia del glosofaríngeo tras cirugía de cuerdas vocales donde la radiofrecuencia pulsada fue usada sin ninguna complicación y fue efectiva en el corto y medio plazo aliviando el dolor del paciente.

Introduction

The glossopharyngeal neuralgia (GPN) is a disease that consists in pain and paroxysms along the IX cranial nerve (which includes the pharynx and auricular region) (1). It is an uncommon cause of orofacial pain (0.2-1.3 %), when compared with other causes such as trigeminal neuralgia (2).

The first use of the term glossopharyngeal neuralgia dates of 1921 used by Harris (3) and also later by Doyle in 1923 (4) to describe 4 patients affected by this pathology.

The GPN can be divided into primary (idiopathic) or secondary, if an underlying injury that could explain the disease can be found or not.

The initial therapy of the GPN involves medical treatment, with neuromodulatory drugs (carbamazepine and gabapentin) (5), but most of the patients will require an interventional procedure at some point. Different interventional options can be used: nerve block (6), alcohol neurolysis (7), intracranial or extracranial section of the glossopharyngeal nerve (8) microvascular decompression (9,10), stereotactic radiosurgery through gamma knife (11), and radiofrequency in its two forms: continuous radiofrequency (CRF) (60-90°) (12,13), and pulsed radiofrequency (PRF). While thermocoagulation with CRF is well know, there is an increase in reports of successful cases of patients treated with PRF (14-18).

We present a case of a patient with GPN, secondary to a vocal cord surgery, that was successfully treated with PRF.

Clinical case

Woman 48 years old, not known allergies and a medical history of laryngeal microsurgery in 2017 for the resection of vocal cord polyps. After the surgery, the patient refers pain in the inner side of the pharynx irradiated toward the left ear. The otorhynolaryngologyst prescripts vocal cord rehabilitation which makes the patient improve her pain symptoms.

A year after the vocal cord rehabilitation, associated with an increase in stress, the symptomatology resumes with pain and stinging in the posterior left part of the pharynx and base of the tongue causing her go to the emergency room in several occa-

RECEIVED: 19 / December / 2020

ACCEPTED: 28 / December / 2020

Key words: *Glossopharyngeal neuralgia, chronic pain, pulsed radiofrequency, neuropatic pain.*

Palabras clave: *Neuralgia del glosofaríngeo, dolor crónico, radiofrecuencia pulsada, dolor neuropático.*

sions. The pain was triggered by talking and swallowing. Initially she is diagnosed with bruxism and is treated with muscle relaxants with scarce improvement and subsequently she is treated with botulinic toxin in both masseteric muscles with an improvement of the pain for only a week.

The pain becomes more intense and continuous limiting the swallowing capacity of the patient and associating weight loss. The pain is diagnosed as atypical trigeminal neuralgia and treatment with carbamazepine 400 mg every 8 hours is begun with a great improvement of pain in the patient but with mild secondary effects of dizziness, maintaining discomfort when swallowing and occasional shooting pain towards the auricular pavilion area.

The patient required an increase in carbamazepine through the following months to 400-600-400 and the addition of gabapentin 300 mg every 8 hours and duloxetine 60 mg, being able to control the pain better but producing an increase of the secondary effects with dizziness and drowsiness of the patient.

Due to poor clinical evolution the patient needs hospital admission, and after multidisciplinar reevaluation with neurology, neurosurgery and our pain unit, the pain is diagnosed as glossopharyngeal neuralgia and we proceed to an interventional treatment with pulsed radiofrecuency of the glossopharyngeal nerve with Raj's technique (Figures 1 to 3) with the following parameters, sensorial stimulation at 50 Hz reproduces paresthesia in the amygdaline area at 0,3 V and motor at 2 Hz of 0,6 V, carrying out the treatment for 6 minutes at a safety temperature of 42 °C, with a frecuency of 2 Hz, pulse width 20 ms and voltage of 40-45 V. At the end of the treatment, triamcinolone (Trigon depot®) and bupivacaine 0,125 % are added 3 cc through the radiofrequency needle.

After the procedure the patient presented a clinical improvement that allowed hospital discharge.

The patient is assessed 30 days after the procedure with a subjective improvement of a 100 % in her pain, so a medical treatment de-escalation is initiated. At 3 months gabapentin was reduced completely and carbamazepine was modified with an only dose of eslicarbazepine acetate 400 mg a day. After a year of pain improvement, the patient came to the practice again for exacerbation of her pain and the technique was repeated, this time with a pain improvement of 90 %.

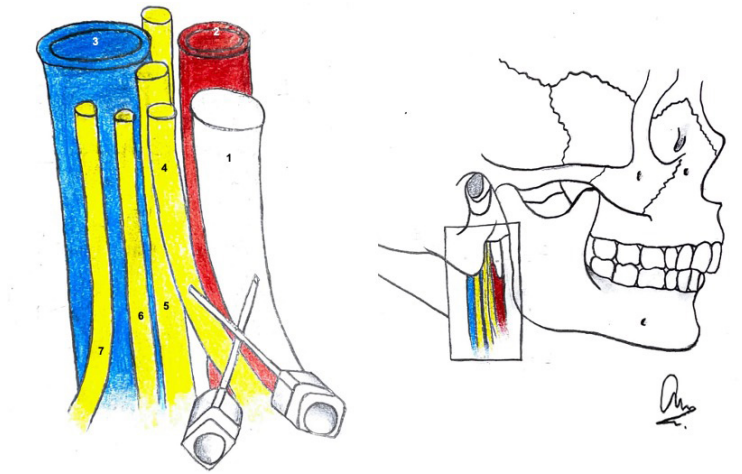

Figure 1.
Anatomical landmarks for the realization of the technique: 1. Styloid process. 2. Internal carotid artery. 3. Internal jugular vein. 4. Glosopharyngeal nerve. 5. Vagus nerve. 6. Accessory nerve. 7. Hypoglossal nerve. The needle is directed to the styloid process and contacts it, then slips behind it so that it can block the glosopharyngeal nerve.

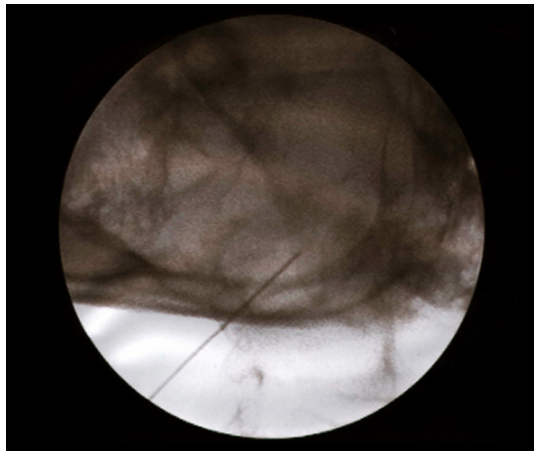

Figure 2.
Performing the technique. Needle contacts the styloid process.

Discussion

The glossopharyngeal nerve or IX cranial pair, is a mixed nerve with sensitive, motor and visceral function. It emerges from the brain stem and becomes peripheric through the jugular foramen with the vagus and accessorial spinal nerves.

It is located posteriomedial to the styloid process (Figures 1 and 4), between the internal jugular vein and the internal carotid artery, from here it reaches the pharynx wall in the external side of the stylopharyngeus muscle for which it provides motor innervation. The main branches of the nerve are the Jacobson nerve (tympanic nerve) and the Hering nerve (visceral information of the carotid sinus). The tympanic nerve stimulates the internal ear, the middle ear and the Eusthaquian tube. The glossopharyngeal nerve and its plexus innervate the posterior third of the tongue, oropharynx, soft palate and palatine tonsils. It carries visceral parasympathetic information from the inferior

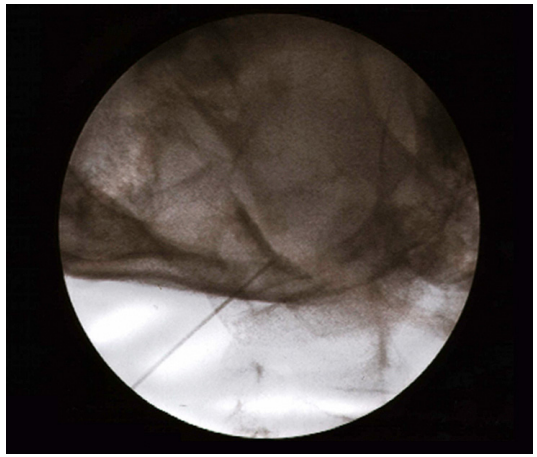

Figure 3.
Performing the technique. The needle go through the styloid process. Note the correct diffusion of contrast.

salivary nuclei that crosses the otic ganglion and reaches the parotid gland (14,19).

This anatomical distribution explains the neuropathic pain arrangement that the patients with this disorder typically present, that include the tonsils area, base of tongue, posterior pharynx with irradiation toward the ear and superior cervical area (2). Among the pain triggers are cough, mandibular opening and chewing. During the episodes of pain increase, due to the connection with the vagus nerve, an stimulation of the autonomous nervous system is produced that can result in severe bradyarrythmias and asystole (20).

Regarding the etiological classification, we divide the GPN in primary (or essential) and secondary (21).

Primary GPN is a pathology with no underlying demonstrable injury, therefore, GPN is associated with the compression of the glossopharyngeal nerve. The compression can be located when it exits the cranium or by a blood vessel (3). What fosters this theory is that microvascular decompression improves the symptomatology in these patients (22,23). Most cases are considered primary.

In secondary GPN an underlying injury can be found. It can be secondary to traumatisms (24), oropharyngeal tumors (tumors in the base of the tongue, hypopharynx and tonsils) (25), infections, vascular malformations, nervous entrapment in scar tissue (26), styloid process growth or calcification of the stylohyoid ligament (Eagle's syndrome) (16,27). It is suspected when there are neurological deficits in the area stimulated by the glossopharyngeal nerve and continuous pain without no pain gaps.

Specifically in the postsurgical causes we can find tonsillectomy, craniotomy, cervical surgery, septum surgery and turbinectomy (18). In our patient's case a neuropathic pain syndrome is developed after a vocal cord surgery, so it would be encompassed in the secondary GPN.

The treatment for GPN can be divided in interventional and non-interventional (medical treatment). In the latter we find the treatment with neuromodulators such as cabamazepine, gabapentin, tryciclic antidepressants (5,28,29) but its results are limited due to secondary effects that they produce or the difficulty GPN patients find in their take. The interventional treatment that have GPN are numerous, being microvascular decompression, described by Laha and Jannetta (30) the most extended one. Even though it has a low morbimortality (morbility rate of 5 % and mortality rate of 0,3 %) it has risks and technique failures (9,31). Other interventional options are neurosurgery, intracranial or extracranial section of the glossopharyngeal nerve (8,22), and radiosurgery (gamma knife) (11).

The use of thermocoagulation with radiofrequency was described by Tew (32) and used by other authors (12,13). Its use in peripheral nerves has a risk of producing neuritis, deafferentiation pain and blood vessel injury (12). In fact, histological studies found not only small fiber destruction but also total loss of myelinated fibers after performing a radiofrequency lesion (33). Thermocoagulation of the glossopharyngeal nerve may produce vagus nerve injury because of its proximity (13), as well as severe bradyarrhythmias with transitory sinoatrial node block.

The use of PRF (production of an electrical field around the tip of the needle that does not produce a thermal injury of the nerve tissue) is based in the development of a technique that is selective of the C fibers of the nerves, not affecting myelinated nerve fibers, therefore avoiding deafferentation pain syndromes (34). In PRF not only the heat application has a clinical effect, but also the production of an electrical field near the tip of the needle. The exposure of the tissue to this electrical field results in a chain of biological effects with an increase of c-fos proto-oncogene expression in lamina I and II of the spinal cord (35). The range of temperature that involves the use of PRF vary between 42 °C and 45 °C, temperatures that would never produce nerve tissue injury, while treatments that rise the temperature over 45 °C may produce irreversible nerve injury (34,35).

PRF is a minimally invasive and safe procedure. There is not a single case of neurological deficiency or other permanent complications in the literature, and if

there are any complications they are minor and temporary. These temporary complications include intraoperative bradycardia, transitory neurapraxia of the facial nerve, dysphagia, and tongue sensitivity or taste alterations. Also, even though PRF has good results, in case of not having them, the technique could be repeated, or we could offer a different interventional procedure after trying it (36).

Figure 4.
Simple lateral cervical skull x-ray. Black arrow pointing to the styloid process.

Conclusions

Pulsed radiofrequency on the glossopharyngeal nerve is a safe and effective technique for pain treatment in patients with glossopharyngeal neuralgia when the medical treatment is not enough or has adverse effects.

Pulsed radiofrequency should be considered first when offering the patient an interventional procedure, because compared with the other options it is the one with the lowest complication rate and in case of having a complication, it is minor and temporary.

REFERENCES

1. International Association for the Study of Pain. Classification of chronic pain. Descriptions of chronic pain syndromes and definitions of pain terms. Pain Suppl. 1986;3:S1-226.
2. Katusic S. Williams DB, Beard CM, Bergstralh EJ, Kurland LT. Epidemiology and clinical features of idiopathic trigeminal and glossopharyngeal neuralgia: similarities and differences, Rocheter, Minesota, 1945-1984. Neuroepidemiology. 1991;10(5-6):276-81. DOI: 10.1159/000110284.
3. Harris W. Persistent pain in lesions of the peripherical and central nervous system. Brain. 1921;44:557-71.
4. Doyle JB. A study of four cases of glossopharyngeal neuralgia. Arch Neurol Psychiatry. 1923;9:34-46.
5. Moretti R, Torre P, Antonello RM, Bava A, Cazzato G. Gabapentin treatment of glossopharyngeal neuralgia: a follow-up of four years of a single case. Eur J Pain. 2002;6(5):403-7. DOI: 10.1016/s1090-3801(02)00026-5.
6. Raj PP, Lou L, Erdine S, Staat P. Glossopharyngeal nerve block. In: Raj PP editor. Radiographic imaging for regional anesthesia and pain management. Philadelphia, PA: Churchill Livingstone; 2002. p. 56-60.
7. Beyaz SG, Sarıtaş A, Ülgen AM, Bayar F. Use of bilateral glossopharyngeal nerve neurolysis in a patient with cancer of the tongue base. Pain Pract. 2016;16(1):E21-2. DOI: 10.1111/papr.12401.
8. Lu VM, Goyal A, Graffeo CS, Perry A, Jonker BP, Link MJ. Glossopharyngeal Neuralgia Treatment Outcomes After Nerve Section, Microvascular Decompression, or Stereotactic Radiosurgery: A Systematic Review and Meta-Analysis. World Neurosurg. 2018;120:572-82.e7. DOI: 10.1016/j.wneu.2018.09.042.
9. Patel A, Kassam A, Horowitz M, Chang Y. Microvascular decompression in the management of glossopharyngeal neuralgia: Analysis of 217 cases. Neurosurgery. 2002;50(4):705-10. DOI: 10.1097/00006123-200204000-00004.
10. Resnick D, Janetta P, Bissonnette D, Jho HD, Lanzino G. Microvascular decompression for glossopharyngeal neuralgia. Neurosurgery. 1995;36(1):64-8. DOI: 10.1227/00006123-199501000-00008.
11. Kano H, Urgosik D, Liscak R, Pollock BE, Cohen-Inbar O, Sheehan JP, et al. Stereotactic radiosurgery for idiopathic glossopharyngeal neuralgia: an international multicenter study. J Neurosurg. 2016;125(Suppl 1):147-53. DOI: 10.3171/2016.7.GKS161523.
12. Arbit E, Krol G. Percutaneous radiofrequency neurolisis guided by computed tomography for the treatment of glossopharyngeal neuralgia. Neurosurgery. 1991;29(4):580-2. DOI: 10.1097/00006123-199110000-00016.
13. Arias M. Percutaneous radiofrequency thermocoagulation with low temperature in the treatment of essential glossopharyngeal neuralgia. Surgical Neurology.1986;25(1):94-6. DOI: 10.1016/0090-3019(86)90124-2.
14. Shah R, Racz GB. Pulsed mode radiofrequency lesioning to treat chronic post-tonsillectomy pain (secondary glossopharyngeal neuralgia. Pain Practice. 2003;3(3):232-7. DOI: 10.1046/j.1533-2500.2003.03028.x.
15. Chua NH, Beems T, Vissers KC. Two cases of glossopharyngeal neuralgia successfully treated with pulsed radiofrequency treatment. Ann Acad Med Singap. 2011;40(8):387-9.
16. Swain BP, Vidhya S, Kumar S. Eagle's syndrome managed successfully by pulsed radiofrequency treatment. Cureus. 2020;12(9):e10574. DOI: 10.7759/cureus.10574.
17. Bharti N, Chattopadhyay S, Singla N, Bala I, Batra YK, Bakshi J. Pulsed radiofrequency ablation for the treatment of glossopharyngeal neuralgia secondary to oropharyngeal carcinoma. Pain Physician. 2018;21(3):295-302.

18. Van Tilburg CWJ. Percutaneous pulsed radiofrequency treatment in a patient with chronic bilateral painful glossopharyngeal neuropathy. Am J Case Rep. 2020;21(3):e920579. DOI: 10.12659/AJCR.920579.
19. Faik Özveren M, Türe U, Memet Özek M, Necmettin Pamir M. Anatomic Landmarks of the Glossopharyngeal Nerve: A Microsurgical Anatomic Study, Neurosurgery. 2003;52(6):1400-10. DOI: 10.1227/01.neu.0000064807.62571.02.
20. García C, Serrano S, Capellades J, Valle V. Síncope secundario a síndrome del espacio parafaríngeo con neuralgia del glosofaríngeo asociada. Med Clin (Barc). 2003;12(19):356. DOI: 10.1016/s0025-7753(03)73945-1.
21. Slavin KV. Glossopharyngeal neuralgia. Sem Neurosurg. 2004;15:71-8.
22. Taha JM, Tew JM. Long-term result of surgical treatment of idiopathic neuralgias of glossopharyngeal and vagal nerves. Neurosurgery. 1995;36(5):926-31. DOI: 10.1227/00006123-199505000-00006.
23. Kondo A. Follow up result of using microvascular decompression for treatment of glossopharyngeal neuralgia. J. Neurosurg. 1998;88(2):221-5. DOI: 10.3171/jns.1998.88.2.0221.
24. Webb CJ, Makura ZG, McCormick MS. Glossopharyngeal neuralgia following foreign body impactation in the neck. J Laryngol Otol. 2000;114(1):70-2. DOI: 10.1258/0022215001903735.
25. Pfendler DF. Glossopharyngeal neuralgia with tongue carcinoma. Arch Otolaryngol Head Neck Surg. 1997;123(6):658. DOI: 10.1001/archotol.1997.01900060110020.
26. Aggarwal A, Suresh V. Radiofrequency ablation and phenol neurolysis in a case of glossopharyngeal neuralgia due to a rare aetiology. Indian J Anaesth. 2020;64(5):437-9. DOI: 10.4103/ija.IJA_9_20.
27. Fini G, Gasparini G, Filipini F, Becelli R, Marcotulio D. The long styliod process or Eagle´s syndrome. J Cranio-Maxilofacial Surg. 2000;28(2):123-7. DOI: 10.1054/jcms.2000.0128.
28. Johnston RT, Redding VJ. Glossopharyngeal neuralgia associated with cardiac syncope: long term treatment with permanent pacing and carbamazepine. Br Heart J. 1990;64(6):403-5. DOI: 10.1136/hrt.64.6.403.
29. Eide PK, Stubhaung A. Relife of glossopharyngeal neuralgia by ketamine-induced N-metil-aspartate receptor blockade. Neurosurgery. 1997;41(2):505-8. DOI: 10.1097/00006123-199708000-00043.
30. Laha RK, Janetta PJ. Glossopharyngeal neuralgia. J Neurosurg. 1977;47(3):316-20. DOI: 10.3171/jns.1977.47.3.0316.
31. Kalkanis SN, Eskandar EN, Carter BS, Barker FG. Microvascular decompression surgery in the United States, 1996 to 2000: mortality rates, morbility rates and the effects of hospital and surgeron volumes. Neurosurgery. 2003;52(6):1251-61. DOI: 10.1227/01.neu.0000065129.25359.ee.
32. Tew JM Jr. Percutaneous rhizotomy in the treatment of intratable facial pain. In: Schmideck HH, Sweet WH, editors. Current techniques in operative neurosurgery. New York: Grune & Stratton; 1977. p. 409-26.
33. Louw JA, Vles HSH, Freling G, Herpers MJ, Arends JW, Van Kleef M. The morphology effects of a radiofrequency lesion adjacent to the dorsal root ganglion (RF-DRG): an experimental study in the goat. Eur J Pain. 2001;5(2):169-74. DOI: 10.1053/eujp.2001.0228.
34. Abejón D, Reig E. Is pulsed radiofrequency a neuromodulation technique? Neuromodulation. 2003;6(1):1-3. DOI: 10.1046/j.1525-1403.2003.03009.x.
35. Sluijter ME. Radiofrequency. Part 1. A review of radiofrequency procedures in lumbar region. Flivopress; 2001.
36. Jia Y, Shrestha N, Wang X, Wang T, Luo F. The long-term outcome of ct-guided pulsed radiofrequency in the treatment of idiopathic glossopharyngeal neuralgia: a retrospective multi-center case series. J Pain Res. 2020;13:2093-102. DOI: 10.2147/JPR.S259994.