SCIENTIFIC ARTICLE

Sphenopalatine ganglion pulsed radiofrequency treatment in patients suffering from chronic face and head pain

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Abstract

Purpose: There are various facial pain syndromes including trigeminal neuralgia, trigeminal neuropathic pain and atypical facial pain syndromes. Effectiveness of the pulsed radiofrequency in managing various pain syndromes has been clearly demonstrated. There are a limited number of studies on the pulsed radiofrequency treatment for sphenopalatine ganglion in patients suffering from face and head pain. The purpose of this study is to evaluate the satisfaction of pulsed radiofrequency treatment at our patients retrospectively.

Methods: Infrayzomatic approach was used for the pulsed radiofrequency of the sphenopalatine ganglion under fluoroscopic guidance. After the tip of the needle reached the target point, 0.25–0.5 ms pulse width was applied for sensory stimulation at frequencies from 50 Hz to 1 V. Paraesthesias were exposed at the roof of the nose at 0.5–0.7 V. To rule out trigeminal contact that led to rhythmic mandibular contraction, motor stimulation at a frequency of 2 Hz was applied. Then, four cycles of pulsed radiofrequency lesioning were performed for 120 s at a temperature of 42 °C.

Results: Pain relief could not be achieved in 23% of the patients (unacceptable), whereas pain was completely relieved in 35% of the patients (excellent) and mild to moderate pain relief could be achieved in 42% of the patients (good) through sphenopalatine ganglion-pulsed radiofrequency treatment.

Conclusion: Pulsed radiofrequency of the sphenopalatine ganglion is effective in treating the patients suffering from intractable chronic facial and head pain as shown by our findings. There is a need for prospective, randomized, controlled trials in order to confirm the efficacy and safety of this new treatment modality in chronic head and face pain.

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Tratamento com radiofrequência pulsada para gânglio esfenopalatino em pacientes com dor crônica de face e cabeça

Resumo
Objetivo: Existem várias síndromes de dor facial, incluindo neuralgia trigeminal, dor neuropática trigeminal e síndromes atípicas de dor facial. A eficácia da radiofrequência pulsada (RFP) para o manejo de várias síndromes de dor foi claramente demonstrada. Há um número limitado de estudos sobre o tratamento com RFP para gânglio esfenopalatino (GEP) em pacientes que sofrem de dor facial e de cabeça. O objetivo deste estudo foi avaliar a satisfação do tratamento com PRF em nossos pacientes, retrospectivamente.

Métodos: A abordagem infrазigomática foi usada para a RFP do GEP sob orientação fluoroscópica. Depois de a ponta da agulha atingir o ponto alvo, pulsos de 0,25 a 0,5 ms foram aplicados para a estimulação sensorial em frequências de 50 Hz a 1 V. Parestesias foram expostas no teto do nariz em 0,5 a 0,7 V. Para excluir o contato trigeminal que levou à contração mandibular rítmica, a estimulação motoria foi aplicada na frequência de 2 Hz. Em seguida, quatro ciclos de RFP foram realizados durante 120 segundos a uma temperatura de 42 °C.

Resultados: O alívio da dor não foi obtido em 23% dos pacientes (incerteza); enquanto a dor foi totalmente aliviada em 35% dos pacientes (excelente) e o alívio de leve a moderado da dor foi obtido em 42% dos pacientes (bom), com o tratamento RFP-GEP.

Conclusão: RFP para GEP é eficaz no tratamento de pacientes que sofrem de dor crônica intratável, facial e de cabeça, como mostrado por nossas descobertas. Estudos prospectivos, randômicos e controlados são necessários para confirmar a eficácia e segurança dessa nova modalidade de tratamento para dor crônica facial e de cabeça.

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Figure 1 Patient demographics (sex) undergoing sphenopalatine ganglion pulsed radiofrequency treatment.

Patients and methods

27 patients suffering from head and face pain (9 male and 18 female) were evaluated underwent PRF treatment for SPG from January 2010 to December 2011 (Fig. 1). The study protocol was approved by the medical ethics committee of our hospital and a written informed consent was obtained from each patient. PRF was performed for the patients to manage chronic head and face pain caused by various etiologies such as atypical facial pain, SPG neuralgia due to Zona Zoster, atypical TN that did not respond to prior treatments and unilateral migraine headaches. All patients responded positively to diagnostic infrazygomatic local anesthetic and steroid block. The same pain management physician examined all patients and reviewed the imaging studies before the injection. We used the patient records retrospectively and clinical follow-up visits prospectively to collect data at the University Faculty of Medicine, Department of Anesthesiology, Division of Algology.

The age of our patients ranged from 27 to 78 years, with a mean age of 56 (Fig. 2). Symptoms were present for 3 months to 30 years. Infrazygomatic approach was used for the PRF of the SPG under fluoroscopic guidance (Fig. 3A). Patients were positioned in the supine position on the fluoroscopy table. Lateral view was obtained at mandibular level followed by the rotation of the head under continuous fluoroscopy to superimpose the two rami of the mandible. The angle of the C-arm was adjusted toward the head to see the pterygopalatine fossa in the shape of an "inverted vase". Local anesthesia was administered to the skin and underlying tissue at the anterior ramus of the ipsilateral mandible below the zygoma. To facilitate the penetration of the 20-gauge PRF needle, a 16-gauge angiocath was inserted through the previously established skin entry point. Then, advancement of a 10-cm curved, blunt needle with a 10-mm active tip was realized under fluoroscopy. As described by Raj et al., the needle was positioned medially, cephalad and slightly posteriorly toward the pterygopalatine fossa (Fig. 3B). The anterior–posterior fluoroscopic imaging confirmed that the needle lied adjacent to the lateral nasal mucosa at the superior-medial angle of the maxillary sinus. After the tip of the needle reached the target point, 0.25–0.5 ms pulse width was applied for sensory stimulation at frequencies

Figure 2 Patient demographics (age) undergoing sphenopalatine ganglion pulsed radiofrequency treatment.

Figure 3 (A) Sphenopalatine ganglion pulsed radiofrequency treatment in pterygopalatine nerve. (B) Sphenopalatine ganglion pulsed radiofrequency treatment: lateral fluoroscopic imaging of the pterygopalatine fossa as an inverted vase.
Paraesthesias were exposed at the roof of the nose at 0.5–0.7 V. To rule out trigeminal contact that led to rhythmic mandibular contraction, motor stimulation at a frequency of 2 Hz was applied. Then, four cycles of PRF lesioning were performed for 120 s at a temperature of 42 °C.

A nurse who was not involved in the procedures asked the patients to rate their pain on Verbal Numerical Rating Scale (VNRS, 0–10) in 3 months after the procedure.

A subjective 3-point scale that was designed specifically for the culture of each patient was used to measure and understand the satisfaction of patients about the pain control procedure (unacceptable, good, excellent) (Table 1).

### Results

The procedure was performed on the left side in sixty percent of the patients whereas it was performed on the right side in 29% and bilaterally in 11%.

Pain relief could not be achieved in 23% of the patients (unacceptable) (VNRS 7–10), whereas pain was completely relieved in 35% of the patients (excellent) (VNRS 0–2) and mild to moderate pain relief could be achieved in 42% of the patients (good) (VNRS 3–6) through SPG-PRF treatment (Fig. 1). Neither infection, epistaxis, hematoma, dysesthesia, numbness of the palate, maxilla or pharynx nor bradycardia were observed.

Mean and standard deviations in anthropometric and demographic data were given. Friedman test was applied for VNRS comparisons. Wilcoxon signed rank test was performed with Bonferroni correction. Significance was considered as 0.05.

### Discussion

Chronic face-head pain imposes limitations for the patients and affects all family members. Patients present with anger and despair when they visit the pain clinic. Therefore, such pain should be managed immediately without any delay.

Percutaneous SPG-PRF treatment of head and facial pain was demonstrated to be surprisingly lengthy in this study. In Shah study, SPG-pulsed radiofrequency lesioning was performed on the patients for 19 months to relieve pain. 3 cycles of PRF was performed in that study while we performed 3 cycles. We had to repeat the procedure on the involved site in only 35% of our patients. No adverse effects including infection, epistaxis, hematoma, dysesthesia, numbness of palate, maxilla or pharynx or bradycardia were observed in our study. However, unexpected adverse effects were reported only in a few cases during RFTC of the SPG for headache.11,12

The principle of radiofrequency (RF) is that it is in the form of alternating electrical current and the heat is generated around the tip of the electrode. Cell culture studies have shown that exposure creates a biological effect due to the induction of early gene expression in the dorsal horn. RFTC has been used to destroy the tissue in TN, ablate tumor metastasis, perform lateral cordotomy in unilateral malignant pain, destroy dorsal root ganglion in spinal pain and treat discogenic back pain. But RF has a signal output which is typically a continuous wave of RF voltage, whereas PRF has a RF wave that is broken into short bursts of signal output. Between such bursts, there are some time periods with no signal. There is often no need to increase the average target tissue temperature above 42 °C for the PRF to be effective.14

Trigeminal radiosurgery has been recently claimed to be an alternative surgical procedure to treat chronic cluster headache.15,16 However, it does not help relieving the pain in a long-term and has an association with a high rate of toxicity.17,18

Combination of sphenopalatine and trigeminal neurolytic block was reported to be successful in a case study to relieve facial pain due to a tumor that caused an enlarged middle facial defect. Sphenopalatine blocks have been successfully used to treat cluster headaches that typically occur in the peri-orbital region as described by the patient.20

PRF of the SPG is effective in treating the patients suffering from intractable chronic facial and head pain as shown by our findings. But we must remember that there is a scarcity of studies about the PRF application of the SPG and more studies need to be performed. The incidence of adverse events may be reduced because the needle is inserted precisely to the target point under the real-time fluoroscopy and electrical stimulation before radiofrequency lesioning.

### Conflicts of interest

The authors declare no conflicts of interest.

### References