Effects of Radiofrequency Thermocoagulation of the Sphenopalatine Ganglion on Headache and Facial Pain: Correlation with Diagnosis

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Aims: *To study the effect of radiofrequency thermocoagulation (RFT) of the sphenopalatine ganglion (SPG) on headache and facial pain conditions following critical reevaluation of the original diagnosis.* ***Methods:*** *This was a retrospective study of clinical records gathered over 4 consecutive years of all 15 facial pain or headache patients who underwent RFT of the SPG at a tertiary pain clinic; diagnoses were reevaluated, after which the effect of RFT on facial pain was assessed.* ***Results:*** *After application of new criteria for Sluder's neuralgia (SN) and strict criteria for cluster headache (CH), seven patients out of the 15 turned out to have been diagnosed correctly. Nine of the 15 patients showed considerable pain relief after RFT of the SPG. Positive results were most frequent among patients with Sluder's neuropathy, atypical facial pain, and CH. However, repeated RFT procedures were needed in most patients.* ***Conclusion:*** *Correct headache and facial pain diagnosis is vital to assess the outcome of different treatment strategies. Even in a tertiary center, headache and facial pain can be misdiagnosed. RFT of the SPG may be effective in patients with facial pain, but repeated procedures are often needed.* J OROFAC PAIN 2012;26:59–64

Key words: atypical facial pain, classification, cluster headache, facial pain, radiofrequency thermocoagulation, Sluder's neuralgia

Headache and facial pain conditions are an international public health problem with a worldwide lifetime prevalence greater than 90%.[1] Facial pain conditions can be incapacitating and require surgical treatment. In a wide range of facial pain patients, radiofrequency thermocoagulation (RFT) of the sphenopalatine ganglion (SPG) is performed.

The SPG is involved in several pain syndromes such as cluster headache (CH), Sluder's neuralgia (SN), and so-called atypical facial pain (AFP).[2–10] Previous studies have demonstrated that in management of syndromes such as CH and SN, RFT of the SPG might be effective, with success rates ranging from 61% to 65%.[11–14] A study by Salar et al showed that percutaneous RFT was effective in relieving pain in SN patients without significant side effects,[15] although a slight troublesome sensation persisted in all treated patients. Pain relief through RFT is often only temporary, and repeated RFT procedures can be needed to establish long-lasting pain relief.

For assessment of treatment effect, correct classification of facial pain is important.

Table 1 Characteristics of CH According to the IHS Classification of Headache Disorders (ICHD-II 3.1)

Characteristics	CH
Pain intensity	Severe or very severe
Site	Unilateral orbital, supraorbital, and/or temporal
Frequency	At least five attacks; attacks last 15 to 180 min if untreated, and have a frequency of 1 every other day to 8/day
Associated signs and symptoms	At least one of the following: 1. Ipsilateral conjunctival injection and/or lacrimation 2. Ipsilateral nasal congestion and/or rhinorrhea 3. Ipsilateral eyelid edema 4. Ipsilateral forehead and facial sweating 5. Ipsilateral miosis and/or ptosis 6. A sense of restlessness or agitation

Table 2 Characteristics of SN According to Newly Defined Criteria

Characteristics	SN
Pain quality and intensity	Moderately severe or severe, boring, burning, or nagging pain
Site	Unilateral but possibly bilateral, located peri- or intraorbitally or at the root or lateral side of the nose, radiating to at least one of the following: 1. Maxillary region or cheek and/or associated teeth 2. Mastoidal and/or occipital area 3. Neck, shoulder, or arm
Frequency	One of the following: 1. Episodic with attacks lasting hour(s) to days 2. Continuous for several weeks with or without exacerbations
Associated signs and symptoms	At least one of the following: 1. Ipsilateral lacrimation and/or conjunctival injection 2. Ipsilateral nasal congestion and/or rhinorrhea 3. Hyp- or hyperesthesia in maxillary distribution of trigeminal nerve or 4. Ipsilateral sore throat 5. Ipsilateral delayed taste perception or parageusia 6. Ipsilateral elevated palatine arch or contralaterally deflected uvula
Treatment	Pain can be blocked by cocainization or infiltration anesthesia of the SPG
Characteristics	SNPT
	As above, except headache develops in relation to trauma in the area innervated by the second division of the trigeminal nerve

Criteria for CH are clear and well-defined (Table 1), but patients can be wrongly diagnosed because of inappropriate handling of these criteria.[16] New criteria for SN were recently defined[17] and might be helpful in discriminating between SN and CH (Table 2). A new term was introduced for symptoms of SN developing in relation to trauma in the area innervated by the second division of the trigeminal nerve: Sluder's neuropathy (SNPT).[17] AFP is a syndrome encompassing a wide variety of facial pain problems, and may be difficult to recognize as the diagnosis is often made through a process of elimination, which renders assessment of effects of invasive treatments for this specific group difficult. AFP is currently classified as persistent idiopathic facial pain (International Classification of Headache Disorders, ICHD-II, 13.18.4)[18] and is characterized by a persistent pain that does not have the characteristics of the cranial neuralgias and is not attributed to another disorder. The pain is present daily and persistent for all or most of the day. At onset, the pain is confined to a limited area on one side of the face and is deep and poorly localized. It may be initiated by surgery or injury to the face, teeth, or gums. RFT of the SPG has been used in patients with AFP, but its effectiveness may be limited and vary with AFP definition.[19]

The aim of this study was to assess the effect of RFT of the SPG on headache and facial pain conditions following critical reevaluation of the initial diagnosis.

Materials and Methods

Study Design

Clinical records gathered during 4 consecutive years of all patients (n = 15) who underwent RFT of the SPG at the Pain Clinic of the University Medical Center in Utrecht were retrospectively studied. The previous diagnosis had been established either by a neurologist prior to the patient visiting the pain clinic, or by the anesthesiologist treating the patient.

Patient files were retrospectively studied for headache characteristics, which were interpreted according to the ICHD-II and new criteria for SN.[17] Two doctors, not involved with the treated patients, studied the patient files simultaneously and agreed on all diagnoses.

The effectiveness of RFT was retrospectively assessed based on patient record information, following reevaluation of diagnoses. Visual analog scale (VAS) scores had been noted pre- and postoperatively in the patients' records and were retrospectively compared in order to assess the effectiveness of RFT.

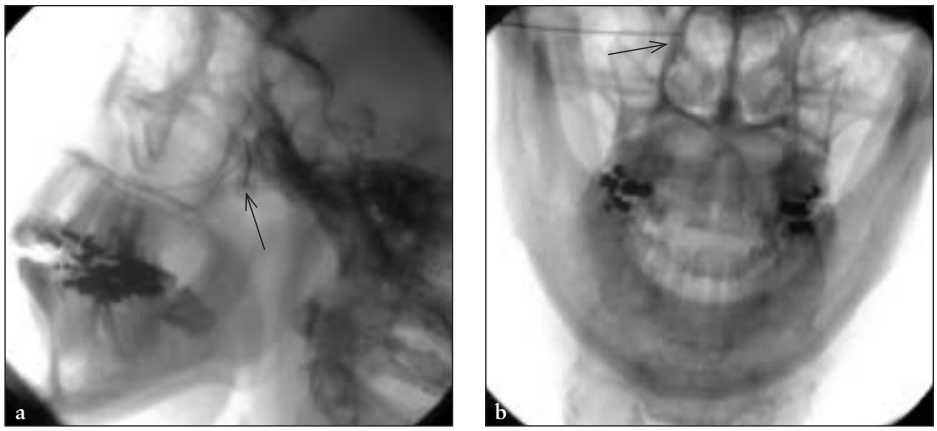

Fig 1a RFT of the SPG *(arrow)* under x-ray; lateral projection.

Fig 1b RFT of the SPG *(arrow)* under x-ray; anteroposterior projection.

(Figures 1a and 1b courtesy of Dr R. Stellema, Pain Clinic, UMC Utrecht, The Netherlands.)

Pain relief was only semi-quantitatively analyzed, solely based on VAS scores. Pain reduction with a VAS endpoint of 3 was termed "adequate," a VAS endpoint of 1 to 3 was termed "almost complete," a VAS endpoint of 0 was termed "complete," and no change in VAS score was termed "none."

Outcome of patient diagnosis after retrospective evaluation and the effects of RFT are given in percentages, and confidence intervals (CI) are given for these percentages.

RFT Procedure

The following RFT procedure had been used in the 15 patients. The patient was placed supine on the operating table. The pterygomaxillary fissure was localized using lateral view fluoroscopy with the C-arm. A line was drawn on the skin along this fissure. Local anesthesia of the area was performed with subcutaneous injection of lidocaine 2%. A 10-cm long, 22-gauge short beveled cannula with 5-mm active tip was inserted infrazygomatically in the direction of the sphenopalatine foramen. Correct position of the cannula was verified under fluoroscopy in two planes. Subsequently, cannula position was physiologically verified by electrostimulation (50 Hz) of the cannula tip which resulted in paresthesia in the nose and not in the area of the maxillary nerve. After verification of correct position, 1 mL lidocaine 2% was injected and a RF lesion was performed at 80°C during 60 seconds. After this, the electrode was advanced 1 or 2 mm and the procedure was repeated (Fig 1).

During the follow-up period, patients visited the clinic approximately every 3 months. The follow-up duration differed between patients; most patients were followed up for 1 year (patients 1, 5–8, 11–15), but some patients were followed up for shorter periods of 9 months (patients 2 and 9) and 6 months (patients 3 and 10).

Results

Basic patient demographics, initial diagnosis, new classification according to study doctors, and effects of RFT are presented in Table 3.

Retrospective Reevaluation of Facial Pain Diagnosis

All 15 patients had been suffering from facial pain or headache for 5 to 10 years prior to visiting the department.

Of the 15 patients, 10 had previously been diagnosed with AFP, 3 were diagnosed with CH, one had an unsure diagnosis of either trigeminal neuralgia or CH, and one was diagnosed with postherpetic neuralgia. These figures changed after strict application of the International Headache Society (IHS) criteria for CH and new criteria for SN.

After reevaluation, two patients, initially diagnosed with AFP, could be diagnosed with SN according to the new SN criteria. Three patients, one initially diagnosed with CH and two diagnosed with AFP, could be diagnosed with SNPT. One patient, previously diagnosed with AFP, could be diagnosed with CH according to the IHS criteria. Six patients, four initially diagnosed with AFP and two with CH, kept their diagnosis after reevaluation. The patient with an unsure diagnosis of either trigeminal neuralgia or CH could be classified as having short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) (ICHD-II). One patient initially diagnosed with AFP was diagnosed with posttraumatic neuropathy of the infraorbital nerve. The patient with postherpetic neuralgia kept this diagnosis.

After strict application of the IHS criteria for CH (ICHD-II) and new SN criteria, only seven out of the total group of 15 patients (47% [95% CI: 22.3–72.6])kept their initial diagnosis.

Table 3 Effect of RFT on Studied Patients

Patient (sex)	Age (y)	Previous diagnosis	Diagnosis after reevaluation	No. of procedures	Pain reduction
1 (F)	63	AFP	AFP	1	Almost complete
2 (F)	41	AFP	Posttraumatic neuropathy of infraorbital nerve	1	Adequate
3 (M)	78	Postherpetic neuralgia	Postherpetic neuralgia	1	None
4 (F)	67	CH	SNPT	2	Almost complete
5 (M)	61	CH	CH	4R 1L	Complete
6 (F)	63	AFP	CH	1	Almost complete
7 (M)	59	AFP	AFP of traumatic (iatrogenic or postinfectious) origin	1	None
8 (F)	67	AFP	SNPT	4	Complete
9 (M)	64	CH or trigeminal neuralgia	SUNCT	1	None
10 (M)	68	AFP	AFP	2	Adequate secondary to infection
11 (F)	33	AFP	AFP	1	Almost complete
12 (M)	62	AFP	SN	1	Almost complete ≤ 3 wk
13 (F)	39	AFP	SN	1	None
14 (M)	40	CH	CH	1	None
15 (F)	60	AFP	SNPT	4	Complete

R = right; L = left.

Out of the subgroup of 10 patients initially diagnosed with AFP, four patients (40% [95% CI: 13.7–72.6]) had been diagnosed correctly. Of the three patients diagnosed with CH, one patient (33% [95% CI: 1.8–87.5]) had been diagnosed correctly. Thus, in the study group, the two most frequent diagnoses, AFP and CH, were also most frequently incorrect.

Outcome After RFT

Of the 15 patients, nine (60% [95%CI: 32.9–82.5]) showed considerable pain relief (≥ 90%) after single or repeated RFT procedures (Table 3). Six patients (40% [95% CI: 17.5–67.1]) experienced no pain relief or temporary pain relief (≤ 3 weeks).

A positive effect of RFT was shown in all three patients (100% [95% CI: 31–96.8]) diagnosed with SNPT according to the new criteria. However, all patients needed repeated (two, four, and four, respectively) procedures for a lasting effect. Time periods between RFT repeats were approximately 3 months. A positive effect of RFT was shown in three of the four patients (75% [95% CI: 21.9–98.7]) diagnosed with AFP; one patient needed two RFT procedures with a time period of approximately 3 months between them. A positive effect of RFT was shown in two of the three (67% [95% CI: 12.5–98.2]) patients with CH; one patient needed repeated (four right-sided, one left-sided) procedures with a time period of 2 to 3 months between them. A positive effect of RFT was shown in the one patient diagnosed with posttraumatic neuropathy of the infraorbital nerve without a need for repeated procedures. Neither SN patient demonstrated a positive effect of RFT, although one experienced short-term pain relief after RFT (duration of pain relief ≤ 3 weeks). The patient diagnosed with SUNCT and the patient with postherpetic neuralgia showed no pain relief after RFT.

No side effects of RFT were recorded.

Effects of RFT on cranial autonomic features were only noted in five patients. In CH patients 5 and 6 and SN patient 12, a complete recovery of all cranial autonomic symptoms (lacrimation and conjunctival injection) was reported at the 1-year follow-up. In CH patient 14 and SN patient 13 with lacrimation and nasal congestion, respectively, RFT did not produce any effect on these symptoms.

Patients who needed repeated procedures for longer-lasting pain relief demonstrated almost complete pain relief initially, with a relapse in 6 to 8 weeks, after which they were scheduled for a new RFT procedure.

Success rates of RFT before and after reevaluation of diagnosis were compared for the two most frequent diagnoses, AFP and CH (see also Table 3). The subgroup of patients originally diagnosed with

AFP showed a success rate of 70% (seven out of 10). After reevaluation of diagnosis, this subgroup showed a success rate of 75% (three out of four). The subgroup of patients originally diagnosed with CH showed a success rate of 50% (two out of four, if patient 9 is considered as a CH patient). After reevaluation of the diagnosis, the success rate of RFT increased to 67% (two out of three).

Discussion

In this population of pain patients in a tertiary care center, facial pain was frequently misdiagnosed. In the study population, RFT seemed effective in patients with AFP, CH, and SNPT, but did not seem effective in SN patients.

In considering the results of this study, some of its limitations should be noted. First of all, the study comprised a group of patients selected for RFT and treated in a tertiary care center. Therefore, the patient domain does not seem representative for headache or facial pain patients in the general population.

A second limitation was the small number of patients, which leads to larger CIs. Furthermore, the small number of patients makes it difficult to draw conclusions on the effectiveness of RFT. However, most of the results in this small study group correspond to those in previous studies.[11–14]

Third, follow-up periods were relatively short, with a main follow-up period of 1 year. Furthermore, effects on cranial autonomic symptoms were scarcely noted.

Fourth, at initial diagnosis, the recently developed criteria for SN did not yet exist, which explains why none of the patients were initially diagnosed with SN. However, when applying the IHS criteria in a correct manner, two patients were still diagnosed incorrectly.

Fifth, an important limitation was that the effect of RFT on pain relief could not be statistically analyzed because the pain relief data were based on semi-quantitative measurements at the time of study, which makes it difficult to draw firm conclusions about pain relief.

Previous studies have shown a need for repeated RFT procedures in headache patients.[11–15] In a study of seven SN patients who underwent RFT of the SPG, all patients experienced almost complete pain reduction after several days.[15] Patients were followed 6 to 34 months postoperatively. Three patients needed repeated (two or three) procedures. A slight troublesome but not painful sensation persisted in all cases. Characteristics of these patients correspond with those in the present study group, ie, mean age, duration of symptoms, and previous treatment. However, both SN patients in the present study did not experience pain relief after RFT.

Classification of headache influences the success rate of treatment. Correlation of diagnosis and treatment effect also applies to the results in this study and influences its outcome. For example, diagnosis of patient 14 of the study group was difficult. There was discussion on whether diagnosis SN or CH would be more appropriate. Finally the authors agreed on a diagnosis of CH because of the severity of pain and the particular sense of restlessness. Patient 14 was the only CH patient who did not demonstrate a positive effect of RFT, leading to a success rate of 67% in the CH group. Had patient 14 been diagnosed with SN, success rate in the CH group would have been 100%. This example illustrates the importance of correct diagnosis in evaluating the effect of surgical therapies for headache patients.

Diagnosing headache and facial pain patients can be difficult for various reasons. Different forms of facial pain may seem to represent ends of one spectrum.[20] For instance, trigeminal autonomic cephalalgias (TACs) such as CH and SUNCT are clinically very similar, which suggests a considerable shared pathophysiology.[21] Furthermore, CH and SN are often regarded as parts of the same clinical entity,[22] and it has been suggested that SN could even be a TAC with a longer attack duration than CH.[17] Other diagnostic challenges stem from the fact that some facial pain patients do not meet all criteria for a specific syndrome. However, a recent study showed that patients who fail one of the criteria still can be diagnosed with CH.[16] The ICHD-II has a separate classification for attacks fulfilling all but one of the specific criteria for CH; this classification is termed probable CH (ICHD-II 3.4.1). As diagnosis is difficult, patients are often at risk of being classified as having AFP. However, this can only be done if they do not meet the criteria for CH, SN, or other facial pain syndromes. Facial pain syndromes can be incapacitating, and correct classification is important for choice of treatment strategies.

Conclusions

The findings show that headache and facial pain patients may frequently be misdiagnosed, even in a tertiary care center. In the study population, effects of RFT of the SPG varied with pain diagnosis; RFT seemed effective in paitents with AFP, CH, and SNPT, but did not appear to be effective in SN patients.

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