Alexandria Journal of Medicine

ISSN: 2090-5068 (Print) 2090-5076 (Online) Journal homepage: https://www.tandfonline.com/loi/tajm20

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To cite this article: Wael Fouad (2011) Management of trigeminal neuralgia by radiofrequency thermocoagulation, Alexandria Journal of Medicine, 47:1, 79-86, DOI: 10.1016/j.ajme.2011.02.001

To link to this article: https://doi.org/10.1016/j.ajme.2011.02.001

Alexandria Journal of Medicine (2011) **47**, 79–86

Alexandria University Faculty of Medicine

Alexandria Journal of Medicine

www.sciencedirect.com

Management of trigeminal neuralgia by radiofrequency thermocoagulation

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Received 5 December 2010; accepted 1 February 2011
Available online 24 June 2011

KEYWORDS

Trigeminal neuralgia;
Radiofrequency rhizotomy;
Percutaneous radiofrequency thermocoagulation

Abstract *Introduction:* The trigeminal neuralgia (TN) which is resistant to medical treatment has been benefited from many surgical techniques. Opinions differ regarding the best surgical treatment.

Objective: This study was done to evaluate the functional results of percutaneous radiofrequency thermocoagulation of trigeminal nerve in a consecutive series of 312 patients suffering from TN and to compare these results with the results of the other authors reported in the literature.

Methods: This retrospective study included 312 patients (280 with idiopathic TN, 8 with secondary or symptomatic TN, 20 with atypical TN, and 4 with post herpetic neuralgia) who underwent radiofrequency thermocoagulation of trigeminal nerve. This study was done in Alexandria main university hospital over a period of 7 years starting from January 2003 to December 2009. The male to female ratio was 2 to 3 (124 males and 188 females) and their ages ranged from 27 to 100 years with mean age of 48 years. All patients had preoperative MRI brain examination. All cases underwent surgery in the form of radiofrequency thermocoagulation (RFT) of the affected division or divisions of trigeminal nerve under intravenous short acting anesthesia using C-arm radiological guidance. The straight temperature monitoring electrode was used to perform an initial lesion at 60–70 °C for 120 s and the patient awakened for sensory testing, the lesion may be repeated at the same temperature and duration if sensory deficit was not evident. Also forty two patients with recurrence (30 with idiopathic TN, 3 with secondary TN, and 8 with atypical TN, 1 with post herpetic neuralgia) had received another

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Peer review under responsibility of Alexandria University Faculty of Medicine.
doi:10.1016/j.ajme.2011.02.001

Production and hosting by Elsevier

radiofrequency thermocoagulation lesion. Mean postoperative follow up examination period was 36 months.

Results: There was no operative mortality. Postoperatively, all the patients had immediate pain relief but only 86.5% of cases (270 patients) had continuous pain relief (250 with idiopathic TN, 5 with secondary or symptomatic TN, 12 with atypical TN, 3 with post herpetic neuralgia). After a mean postoperative follow up examination period of 1 year pain recurred in forty two patients (13.5%) (30 with idiopathic TN, 3 with secondary TN, and 8 with atypical TN, 1 with post herpetic neuralgia). The operation was repeated in all cases with recurrence but only 30 cases were improved and the rest were shifted to other treatment modalities. Excellent results were obtained in 64% of patients, good results in 25.5% of patients, fair results in 6.5% of patients, and poor results in 4% of patients.

Conclusion: TN was predominant in females and the majority of patients had right V3 distribution. The outcome depends on the type of TN with best results with classical idiopathic type. Also better results occurred with isolated V3 affection. The radiofrequency thermocoagulation of trigeminal nerve is a low risk, highly effective and minimally invasive procedure that should be started with in all cases of TN.

1. Introduction

Trigeminal neuralgia (TN) is a neuropathic pain involving one or more of trigeminal nerve divisions. It is classified into four types according to etiology which are idiopathic, secondary, atypical and post herpetic.[1] Also it is classified into two types according to clinical characteristics of pain which are classical TN (CTN) and mixed TN (MTN).[2]

Idiopathic TN (ITN) is paroxysmal shock like electrical pain restricted to one or more of trigeminal divisions. It is the most common form of TN.[3,4] TN (TN) can also be secondary to a structural pathology such as tumors, vascular malformation, or it can be the result of multiple sclerosis.[3,5] Atypical TN may be idiopathic or secondary and is characterized by constant facial pain combined with the more typical episodic pain of ITN. Post herpetic TN is a complication of herpes zoster viral infection characterized by burning pain at the trigeminal branch involved.[6] The classical type is characterized by a unilateral, episodic, electric shock like pain and it includes all cases of idiopathic etiology and some cases of secondary causes. The mixed type characterized by constant dull, burning pain between paroxysms and includes all cases of atypical TN, post herpetic neuralgia and some cases of secondary TN.[7]

The treatment of TN which is resistant to medical treatment has benefited from many surgical techniques.[8] Opinions differ regarding the best surgical treatment. Some favor the microvascular decompression (MVD) of the trigeminal nerve or partial trigeminal rhizotomy whereas others prefer percutaneous procedures like glycerol rhizolysis, radiofrequency thermocoagulation (RFT), and balloon compression that injure the trigeminal nerve, the Gasserian ganglion or retrogasserian rootless so that peripheral stimuli no longer trigger an attack of TN.[9,10] These procedures have little mortality and morbidity and require little or no general anesthesia.[11] They are therefore useful for the elderly patients, those who do not wish to undergo major intracranial operation. Also they are less time consuming and less costly treatments.[11,12]

1.1. Aim of the work

This study was done to evaluate the functional results of percutaneous radiofrequency thermocoagulation (RFT) of trigeminal nerve in a consecutive series of 312 patients suffering from TN and to compare these results with the results of the other authors reported in the literature.

2. Methods

This retrospective study included 312 patients who underwent radiofrequency thermocoagulation of trigeminal nerve for treatment of TN. These patients were subdivided according to their etiology into four types (280 with idiopathic TN, 8 with secondary or symptomatic TN, 20 with atypical TN, and 4 with post herpetic TN). Also they were subdivided according to clinical characteristics of pain into two groups (282 with CTN, 30 with MTN). This study was done in Alexandria main university hospital over a period of 7 years starting from January 2003 to December 2009. The male to female ratio was 2 to 3 (124 males and 188 females) and their ages ranged from 27 to 100 years with mean age of 48 years. Characteristics of 312 patients with TN who underwent radiofrequency thermocoagulation are given in Table 1.

All patients had preoperative MRI brain examination to diagnose the cases of secondary TN. All the patients had been treated with anticonvulsants and all had taken colanzepam (up to 6 mg per day) and/or carbamazepine (up to 1200 mg per day) for a period of at least 6 months and most patients had never had complete pain relief with drugs (85%), the others (15%) could not tolerate the drugs. Ten patients with ITN had previous failed microvascular decompression operation of trigeminal nerve (MVD).

All cases underwent surgery in the form of radiofrequency thermocoagulation of the affected division or divisions of trigeminal nerve under intravenous short acting anesthesia using C-arm radiological guidance. The site of needle puncture is at the end of nasolabial fold

Table 1 Characteristics of 312 patients with TN who underwent RFT.

0Etiology	No. of cases	Sex		Side		Division of trigeminal nerve affected						
		M	F	Right	Left	Bilateral	V1	V2	V3	V1,V2	V2,V3	V1,V2,V3
Idiopathic TN	280	109	171	147	132	1	7	48	129	2	88	6
Secondary TN	8	4	4	3	5			2	3		3	
Atypical TN	20	9	11	11	8	1	1	3	3	3	4	6
Post-herpetic TN	4	2	2	3	1				2		2	
Total	312	124	188	164	146	2	8	53	137	5	97	12

approximately 3 cm lateral from the oral fissure. After engagement of the needle in the foramen ovale, the stellate is removed and we checked for the free flow of CSF from the needle that means that the needle in the retrogasserian rootlets rather than the ganglion itself.

Under C-arm control lateral view we checked the optimal position of the needle which is petroclival junction and 5 mm anterior to plane of the clivus in V3, at the clivus in V2, and 5 mm posterior to plane of the clivus in V1 (Fig. 1). Also the use of electrophysiological stimulation to check the optimal site of the needle was done. The generator of radiofrequency used was RFG-3C from Radionics. The appreciation of electric like sensations in the trigger area by low voltage stimulation of 0, 1–0, 3 V at 50–75 Hz, for 3 ms duration was a good sign that the electrode was in a good position. The ideal location of electrode was achieved by gently moving the electrode in or out a few millimeters. If the patient had previously been treated and had some residual sensory deficit more than 0.5 V is required. The impedance in the CSF retrogasserian rootlets was between 120 and 350 ohm.

The straight temperature monitoring electrode was used to perform an initial lesion at 60 °C for 120 s and the patient is awakened for sensory testing, the lesion may be repeated at the same temperature and duration if sensory deficit was not evident. In cases with MTN the temperature was higher (65–70 °C) and the time of the lesion was between 4 and 6 min. A flush was usually noted in the face, usually in the area where the lesion is being made (Fig. 2). Loss of corneal reflex could be prevented the eyelash blink reflex during the lesioning. Also the lesion was repeated in forty two patients with recurrence (30 with idiopathic TN, 3 with secondary TN, 8 with atypical TN, one with post herpetic neuralgia).

Postoperative follow up examination period ranged from 1.5 to 5 years with a mean of 3 years.

Figure 2 Facial hyperemia in the distribution of right V2 during RFT.

3. Results

3.1. Technical success

RFT was technically successful (completed) in all cases. If the patients could not localize or quantify the lesion during the procedure, it could be successfully completed on the basis of observation of facial hyperemia in the affected distribution of the trigeminal nerve, electrophysiological monitoring and/or radiological guidance. The overall initial success of the procedure depends on two factors, completion of the procedure and initial pain relief.

3.2. Postoperative morbidity and mortality

There was no operative mortality. Dysesthesia was defined as a disturbing sensation in the face that required medical

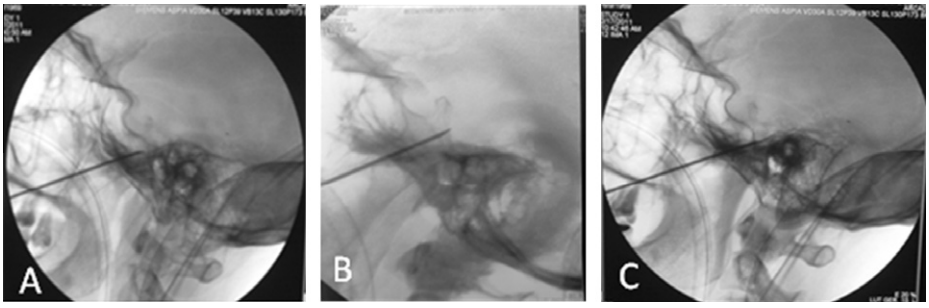

Figure 1 Radiographic control for placement of the needle in foramen ovale. (A) The needle 5 mm anterior to the plane of clivus in V3 division. (B) The needle at the plane of clivus in V2 division. (C) The needle 5 mm posterior to the plane of clivus in V1 division.

Table 2 Results after the first percutaneous RFT.

Etiology	No. of cases	Excellent results		Good results		Fair results		Poor results	
		No.	%	No.	%	No.	%	No.	%
Idiopathic TN	280	190	68	55	19.5	5	2	30	10.5
Secondary TN	8	1	12.5	3	37.5	1	12.5	3	37.5
Atypical TN	20			10	50	2	10	8	40
Post-herpetic TN	4	1	25	2	50			1	25
Total	312	192	61.5	70	22.5	8	2.5	42	13.5

treatment and it occurred in 36% of cases. It was minor dysesthesia in 28% of cases and major in only 8% of cases. Anesthesia dolorosa was defined as a constant burning dysesthesia in the face that did not respond to medical treatment. It did not occur in any case of this study. Mild facial numbness occurred in almost all cases and it was well tolerated by most patients, it usually disappears after one month. Temporary corneal anesthesia occurred in three cases with V1 trigeminal pain. Trigeminal motor dysfunction is usually temporary and subsides in the first 3 months, but it was permanent in five cases. Meningitis occurred in one case that responded well to medical treatment.

3.3. Postoperative pain relief

Scores using visual analog pain scale (VAS) were reported by the patients before and after the operation.

3.4. Initial pain relief

All the patients had immediate pain relief. Follow up of the patients was done at one month, three months, and thereafter each 6 months. The evaluations include pain relief, facial sensitivity deficit, hypoesthesia, neurological deficit, clinical complications and pain recurrence. The patients were classified into four groups according to their results. Group 1: excellent results: pain relief, analgesia, tactile sensitivity deficit at the trigeminal branch affected with no neurological complication. Group 2: good results: pain relief, analgesia, tactile sensitivity deficit at the trigeminal branch affected, with transient neurological complication (e.g. dysesthesia, masticatory muscles paresis), Group 3: Fair results: pain relief with neurological complication, unpleasant dysesthesia, permanent masticatory paralysis or corneal ulcers or keratitis. Group 4: poor results: partial or no improvement of pain. After the first lesion 61.5% had excellent results, 22.5% had good results, 2.5% had fair results and 13.5% had poor results Table 2.

3.5. Pain recurrence

The pain recurrence was defined as pain recurring in the same distribution of the initial trigeminal pain or in the trigeminal division adjacent to the initial pain. Forty two patients (13.5%) experienced pain recurrence (30 cases with idiopathic TN, 3 with secondary TN, 8 with atypical TN, 1 patient with post herpetic neuralgia). The highest rate of pain recurrence was among cases of mixed TN 40% of cases. The pain recurrence usually occurred within the first year of follow up period. Mean period of recurrence was 6 months. Another radiofrequency lesion of the trigeminal nerve was done in all 42 cases with recurrence. 30 patients improved (8 excellent results, 10 good results, 12 fair results). The correlation between the recurrence of TN, the etiology and topography are given in Table 3. After the second radiofrequency lesion, 64% had excellent results, 25.7% had good results, 6.4% had fair results, 3.9% had poor results (Table 4).

Excellent or good results were more common in males 81.5% (101 males out of 124) compared to females which were found in 52.5% (99 females out of 188). Also better excellent or good results were found in single V3 distribution 91% (125 out of 137 patients). Recurrence was most common in cases with V1 distribution that constitutes 50% of cases (4 out of 8). The overall results of 312 cases according to type (pain characteristics) and cause of TN are summarized in Table 5 (Fig. 3).

4. Discussion

TN is the most frequent disorder to affect the fifth cranial nerve. It is relatively uncommon with an estimated incidence four cases per 100,000 persons. The mean age of onset of TN is around 50 years, but it is becoming not so unusual to see cases of TN in younger patients especially mixed type of TN.[13]

The pathogenesis of this pain in cases with CTN remains doubtful despite extensive investigations. Many theories have been provided to explain the possible mechanisms.[14] The peripheral theory supposed compression of the entry zone of the trigeminal nerve by a vascular loop is confirmed by many authors and microvascular decompression had been proved to be effective for treatment of TN.[15,16] However it does not explain why trigger points in one division can cause pain in another or why most trigger zones involve the anterior midline face.[16]

The theory of a central mechanism of trigeminal pain involves the dorsal root reflex.[17] A tactile stimulus evokes a repetitive self-exciting discharge. Neurophysiologic experiments suggest that the nucleus caudalis modulates the transfer of information through the rostral subnuclei of the spinal trigeminal nuclei. These brain stem nuclei then act as gate control system to mediate the sensation of trigeminal pain.[15,17] Also, anticonvulsant drugs depress excitatory transmission in the spinal trigeminal tract and are used successfully to treat TN in some patients. Although the central mechanism undoubtedly affect the perception of pain there is no convincing evidence that it is the primary cause of TN. Lesions involving the spinal trigeminal tract such as lateral medullary infarct, tumor or syringobulbia have never been reported to cause TN-like pain.[18] Another working hypothesis of a peripheral cause and central pathogenesis proposed that

Table 3 Pain recurrence in correlation with etiology and topography.

Etiology	Topography	Patients		Recurrences	
		No.	%	No.	%
Idiopathic TN	V1 →	7	2.3	4	57
	V2 →	48	15.4	8	16.5
	V3 →	129	41.3	9	7
	V1 + V2 →	2	0.7	1	50
	V2 + V3 →	88	28	7	8
	V1 + V2 + V3 →	6	2	1	33.3
Secondary TN	V2 →	2	0.6	0	0
	V3 →	3	1	1	33.3
	V2 + V3 →	3	1	2	66.6
Atypical TN	V1 →	1	0.3	0	0
	V2 →	3	1	1	33.3
	V3 →	3	1	1	33.3
	V1 + V2 →	3	1	1	33.3
	V2 + v3 →	4	1.2	2	50
	V1 + V2 + V3 →	6	2	3	50
Post herpetic TN	V3 →	2	0.6	1	50
	V2 + V3→	2	0.6	0	0
Total		312	100	42	13.5

chronic irritation of trigeminal root results in partial loss of some large myelinated axons which reduces the normal inhibitory influence of these fibers on the nucleus caudalis. The ''gate'' is open to a barrage of afferent impulses and is consciously appreciated as a pain paroxysm. This does not explain why the paroxysms of pain stop. The poorly understood balance of excitation and inhibition is probably involved.[14,19]

But in cases with MTN the underlying mechanisms of the disease remain unknown. Some authors hypothesized that different facial pain syndromes represented sequential stages of the same disease process, but other believed that central sensitization or descending inhibition deficits in the patients is the cause of MTN.[20] In this study, the persistent pain of 1 patient disappeared after the procedure but his ''paroxysmal'' pain remained. This patient was satisfied with the results of the operation because the ''paroxysmal'' pain could be controlled by medication. With another two patients, the paroxysmal pain disappeared, but the persistent pain remained. They were also satisfied with the operation results because their mild persistent pain did not require medication. These patients probably suffered from two different disorders as regards the pathogenesis.

The characteristics of the patients in this series, such as sex, affected side, and affected division, were consistent with those of the previous reports.[18,20,21] In this study patients were predominantly female (male to female ratio was 2 to 3), pain was mainly right sided (right to left ratio was 1.12:1) and the mandibular area was most affected (44%). The mean age of symptom onset was 48 years in the patients with all types of TN. The mean age of symptom onset was younger in the MTN group than in the CTN group (35.7 vs. 52 year). Bilateral symptoms were found in two of the patients, one with atypical TN and another with ITN. Furthermore, in this study 69% of the patients with MTN did not respond well to medications, and 43.4% of them did not respond to RFT very well.

The main object of any treatment for TN is complete and permanent relief of pain without any major disturbance of facial sensibility and without a major operation, which may carry considerable risks of complications, particularly in the elderly.[22] Medical treatment is offered before surgical treatment. Antiseizure medications (colanzepam or carbamazepine) are the drugs of choice. They depress excitatory transmissions in the nucleus caudalis. Unfortunately, up to 30% of patients become refractory to it after 2 years.[23] For patients who fail medical therapy, a wide variety of surgical and percutaneous procedures are available. Percutaneous retrogasserian thermocoagulation and microvascular decompression are the most common surgical options. Thermocoagulation is fairly safe and simple requiring only minimal anesthesia and hospitalization. This technique of radiofrequency lesion was introduced by Sweet and Wepsic in 1974.[24] The method was designed to produce trigeminal sensory loss, but only to pin prick not to light touch. Controlled increment of radiofrequency currents allows preferential destruction of fibers that conduct pain (finely myelinated A delta fibers and unmyelinated C fibers) with some reservation of the heavily myelinated A beta fibers which conduct touch sensation.[25] The procedure can be repeated. Other percutaneous techniques including retrogasserian glycerol rhizolysis and balloon compression have also been used with good results. These are relatively simple and safe but have higher recurrence rates and usually leave the patient with extensive sensory loss.[26] MVD is major neurosurgical procedures that have a low recurrence rate and minimal sensory disturbance but carry a risk of death and significant morbidity. This more aggressive surgical option may be best reserved for younger patients who can tolerate the procedures and benefit most from the better long-term relief of pain or in any patient who is a good surgical candidate and who strongly wishes to avoid the risk of sensory loss.[27]

Postoperative pain relief depends on the technical success of the procedure. A review of the more recent literature[28–30] shows that thermocoagulation of the gasserian ganglion is

Table 4 Results after the second RFT and treatment of the non improved cases.

Etiology	No.	Topography	Results		Treatment of non improved cases
			No. of improved cases	No. of non improved cases and their topography	
Idiopathic TN	30	V1 → 4	22	8	3é V1 → supraorbital neurectomy
		V2 → 8		V1 → 3	2é V2 → infraorbital nerve block + MVD
		V3 → 9			
		V1,V2 → 1		V2 → 2	
		V2 + V3 → 7			3é V2 + V3 → RFT + infraorbital nerve block
		V1,V2,V3 → 1		V2 + V3 → 3	
Secondary TN	3	V2 → 1 V2 + V3 → 2	2	V2 → 1	Radiosurgery
Atypical TN	8	V2 → 1	5	3	1é V1 + V2 → supraorbital neurectomy + infraorbital nerve block
		V3 → 1		V1 + V2 → 1	
		V1 + V2 → 1			2é V1,V2,V3 → medical treatment
		V2 + V3 → 2			
		V1,V2,V3 → 3		V1 + V2 + V3 → 2	
Post herpetic TN	1	V3 → 1	1		
Total	42		30	12	

Table 5 Overall results of 312 cases according to type (pain characteristics) and cause of TN.

Type of TN	Etiology of TN	No. of cases	Excellent results		Good results		Fair results		Poor results	
			No.	%	No.	%	No.	%	No.	%
Classical TN	Idiopathic TN	280	198	70.7	63	22.5	11	4	8	2.8
	Secondary TN	2	1	50	1	50				
	Total	282	199	70.6	64	22.7	11	3.9	8	2.8
Mixed TN	Secondary TN	6			4	66.6	1	16.7	1	16.7
	Atypical TN	20			10	50	7	35	3	15
	Post herpetic TN	4	1	25	2	50	1	25		
	Total	30	1	3.3	16	53.3	9	30	4	13.4
Total		312	200	64	80	25.7	20	6.4	12	3.9

actually performed with a technical success of 98–100%. Immediate pain relief is reported as high as 90–95% in multiple studies.[28,30,31] More recent reports however, indicate that long-term relief is enjoyed by as little as 58% of patients.[18,30]

In this series, 93.3% of the patients with CTN group responded to RFT as indicated by their self reported improvement (VAS). Excellent results were obtained in 70.6% and good results in 22.7% of the patients. These results were comparable to some recently reported findings.[18,19] These data and previous studies suggested that the success of RFT was similar to those of MVD.[7]

In this series, only 56.6% of the patients in the MTN group responded to RFT, with excellent outcomes achieved in only 3.3% of the patients and good outcomes in 53.3%. This suggested that MTN might be an indication of RFT, which supports the notion put forward by Bennetto et al.,[32] that RFT can be used as a diagnostic procedure for atypical disease.

The percutaneous radiofrequency thermo-coagulation had a lower rate of pain recurrence compared with glycerol rhizotomy or balloon compression that is because retrogasserian lesion is controlled better with radiofrequency lesion, and the thermal injury of the trigeminal rootlets is more effective than chemical or mechanical injury.[33] In this work the rate of pain recurrence was 13.5% of the cases. Recurrence of pain as a result of revival of the nerve fibers injured during the RFT was found in both the CTN and MTN groups across a mean follow-up period of up to 3 years. Overall, 30 patients (10.6%) with CTN and 12 patients (40%) with MTN had a pain recurrence during the follow-up period. Among these, 8 patients in the CTN group had recurrence within the first year after the procedure, and 9 in the MTN group did. After one year, the relief of pain stabilized and the recurrence rate in the CTN group was 7.8% (22/282) and the rate in the MTN group was 10% (3/30), showing that the recurrence rates were

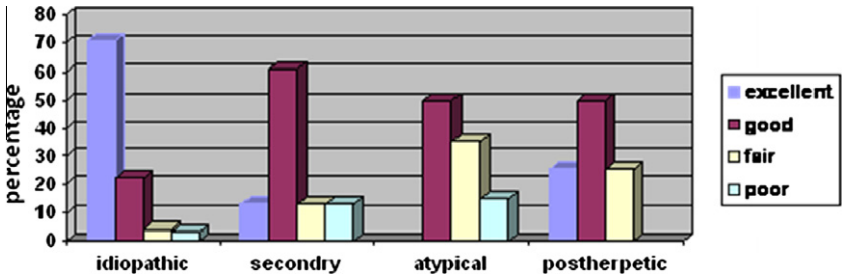

Figure 3 Results of RFT according to etiology of TN.

comparable in the two groups. The longest follow up period in this series lasted 5 years. A recent study, however, demonstrated a recurrence rate of 7.6% over a follow-up period of 8.8 years. In this study, the rate of pain relief remained constant after the second year in both the CTN group (97.2%) and the MTN group (86, 6). This finding indicates that the RFT is relatively reliable with respect to duration of pain relief.

Broggi et al.[34] reported the long-term results and prognostic factors in 1000 patients with TN who underwent RFT after a follow-up period ranged from 3 to 10 years. They reported that 76% of patients are completely pain-free without medication, 5% are pain free with a dosage of drugs lower than in the pre-operative period and 15% require repeated surgery or high dosage of drugs. The outcome in the multiple sclerosis group is much worse, with only 39% of patients completely pain-free without medication at long-term follow-up. Several prognostic factors were tested (patient's age and sex; involved side and branch; duration of symptoms; history of previous trigeminal ablative procedures; kind of neurovascular conflict; post-operative numbness; hypertension) and they observed that only long duration of clinical history (> 84 m) was found to be predictive of a worse outcome. In this study, none of these prognostic factors was found to be predictive of a worse outcome. However, they reported a considerable number of permanent complications with nearly 10% with permanent masseter weakness, corneal anesthesia in 20%. Six patients required surgery for keratitis and 15 had a painful anesthesia and a further 52 required heavy medication for dysesthesia.[34]

Taha and Tew[17] compared the results of 500 radiofrequency rhizotomies performed at the University of Cincinnati with the results of large series reported in the literature[20,21,35] including 6205 radiofrequency rhizotomies, 1217 glycerol rhizotomies, 759 balloon compressions, 1417 MVD and 250 partial trigeminal rhizotomies. They concluded that radiofrequency rhizotomy is the procedure of choice for most patients undergoing first surgical treatment, unless the patient is a healthy subject with isolated pain in the first division and/or he desires no sensory deficit; in these cases MVD is recommended. The results reported in their 500 radiofrequency rhizotomies were the following: initial pain relief 98%, pain recurrence (same distribution of the initial trigeminal pain or in an adjacent trigeminal division) 20%, facial numbness 98%, minor dysesthesia 9%, major dysesthesia 2%, anesthesia dolorosa 0.2%, corneal anesthesia 3%, keratitis 0.6%, trigeminal motor dysfunction 7%, perioperative morbidity 0.6%, perioperative mortality 0%. Importantly, in their procedure the goal was "dense hypoalgesia defined as loss of two-thirds or more of pinprick perception". After comparing their series of radiofrequency rhizotomies with the results of large series of percutaneous procedures and with MVD, they reported a success rate of 79% after balloon compression (mean follow up 4 years), 80% following RFT procedures (mean follow-up 9 years), and 85% after MVD (mean follow-up 5 years). Therefore the authors did not find significant differences in the outcomes among the three therapeutic options.

The RFT caused no deaths in this study, but complications developed in some cases, a total of 112 patients (36%) in both groups experienced dysesthesia after the procedure, which was gradually alleviated over time in some cases. 83 patients with CTN (29.5%) reported dysesthesia of varying degrees in the face, of them only 12 patients (4.3%) complained major dysesthesia. Twenty nine patients with MTN (96.6%) suffered from dysesthesia, of them only 13 patients (43.3%) complained of major dysesthesia. Generally, the dysesthesia was mild and tolerable. However, when the area of dysesthesia was larger than the trigger area, patients tended to complain about the symptom, especially when their pain could not be controlled effectively.[36] Trigeminal motor dysfunction was permanent in five cases. Meningitis occurred in one case that responded well to medical treatment.

5. Conclusion

RFT under radiological guidance is a proven technique. It is immediately effective for CTN and the rate of recurrence is low. It is also effective with MTN, but different strategies should be adopted in MTN treatment. If numbness and dysesthesia can be confined to the trigger area, patients will be greatly satisfied. RFT is the procedure of choice for most patients undergoing first surgical treatment, it is a low risk, highly effective and minimally invasive procedure that should be started with in all cases of TN, unless the patient is a healthy subject with isolated pain in the first division and/or he desires no sensory deficit; in these cases MVD is recommended.

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