

Management of Trigeminal Neuralgia with Four Simple Treatment Modalities

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Abstract

Background Trigeminal neuralgia is a mainly unilateral facial pain, defined as electric shock aggravated by light touch. It is sharp pain in nature with repeated onset in one or more branches of the trigeminal nerve. The condition affected the most women on 40-75 years old. This study aimed to compare the outcome of four modalities in the treatment of the peripheral trigeminal neuralgia. **Materials and methods** seventy-seven patients complained from peripheral trigeminal nerve neuralgia were involved in this study. Patients with TN were separated into four groups according to the method of treatment of TN which is either pharmacologically using Carbamazepine (Tegretol®) (first group), local injection of 0.5ml -1 ml of 99.9% Ethanol alcohol (second group), local injection of 0.5ml -1ml glycerol (third group), or by peripheral nerve neurectomy procedure (fourth group). **Results** All the patients treated with Tegretol responded to the drug for the first time but pain reoccurred in a number of patients and the dose increased within time. Ten patients (43.4%) treated with local injection of 0.5-1 ml of 99.9% ethanol alcohol had a recurrence of periodic pain after one year of alcohol injection, also 10 patients (45.4%) who were treated with local injection of glycerol had pain recurrence after one year. All patients treated with peripheral nerve neurectomy had pain relief for 24-36 months. After this period, pain reoccurred in 10 patients (83.35%) for which another neurectomy procedure was required.

Conclusions it seems there is no ideal long term treatment method for all patients of TN. Each method had advantages and disadvantages.

Keywords: Trigeminal neuralgia, pain, tegretol, ethanol alcohol, glycerol, neurectomy.

Introduction

Trigeminal neuralgia (TN) is a mainly unilateral facial pain (97%) as electric shock aggravated by light touch. Its pain is sharp or lancinating in nature with repeated onset in one or more branches of the trigeminal nerve (Merskey and Bogduk 1994; Maarbjerg et al, 2014). The condition affects the middle or older individuals aged 40-75 years and most women (El-Tallawy et al, 2013). At the first time, it was sometimes mistaken with a toothache due to its feel in the lower two branches of the trigemi-

nal nerve through unnecessary dental treatment and even extracts many teeth at the affected side before the condition is diagnosed (Zakrzewska, 1991; Zakrzewska, Linskey, 2015). There is usually a trigger zone, which if we touch it severe attack of shock pain will occur. In very severe cases, TN may considerably decrease the worth of life with noticeable depression and anxiety (Zakrzewska and Linskey, 2014). The true treatment of TN is an extensive confront in spite of many present existing treatment methods (Lee et al, 2017). Anticonvulsants are represented as the most efficient drugs in treating TN. Carbamazepine (Tegretol) is considered as the most effective and primary drug for treating the disease. It is recommended that in the elderly patients the elevators of the free carbamazepine concentration in the serum caused by reduced non-glycated albumin levels induces increases in the sensitivity of the pharmacologic actions of carbamazepine and the risk of drug interactions (Nurmikko and Eldridge 2001; Subashree, 2013). Local injection of chemical agents like Alcohol and Glycerol has been considered in the treatment of TM. It has found to have some value in the treatment TN (Sohail, 2006; Bennetto, 2007). Neurectomy is a simple peripheral surgical procedure. It includes sectioning and removal of the terminal branch of the trigeminal nerve. The redevelopment of terminal fibers is stopped by successive blocking of the canal. Surgical approach to the maxillary and mandibular divisions is by the intra-oral approach to prevent avoiding postoperative facial scars (Ziccardi, 1994). Other surgical intra cranial trigeminal nerve destructive procedures by controlled damage to the root of the Trigeminal Nerve with intend of pain relief. These procedures include «glycerol rhizolysis, radiofrequency lesioning, stereotactic radiosurgery, Rhizotomy Gasserian, ganglion balloon compression Rhizotomy and microvascular decompression (MVD)». These destructive palliative procedures have a rate recurrence about 50% after 3 to 5 years. In comparison, microvascular decompression (MVD) surgery has been found to be associated with an about 80% chance of pain relieve (Miller et al, 2009).

Materials and methods

This study extended from January 2015 to October 2018. Seventy-seven patients with peripheral trigeminal nerve neuralgia were involved in this study. The diagnosis of TM based on the history of the patient's complaint and clinical examination. The branch of Trigeminal nerve involved was recognized according to the position of pain and established with diagnostic local anesthetic injection at the identified site. Orthopantomograph (OPG) was taken for each patient to exclude any local pathology. Patients with TN were separated into four groups according to the method of treatment of TN. All patients were aware and familiar with all the four treatment modalities of TN. However, the selection of the treatment method for each patient depended on the following criteria:

a. Any patient was either previously treated with carbamazepine and did not respond to this drugs or did not tolerable its side effects was treated by one of the other three methods b. Local injection of alcohol or glycerol was selected whenever the general medical condition of the patient did not allow the use of local nerve neurectomy procedure. c. local nerve neurectomy was done for patients who refused the injection by any chemical material that may lead to soft tissue ulcer and or damage the motor nerve supply to the area. The first group was 20 patients and pharmacologically treated with carbamazepine (Tegretol®). The treatment started with 100 mg in the morning. The patient took supplementary 100 mg if pain attack re-occurred. The dose

was incremented up to 600-800 mg daily until the patients, pain relieved. The second group (23 patients) was treated by peripheral alcohol injections. The affected branch of the nerve was identified and anesthetized with local anesthesia (2% lidocaine with 1:100,000 Adrenaline). After ensuring the effective anaesthesia of the area, 0.5-1 ml of 96% Ethyl alcohol was injected to the nerve after aspiration to avoid injecting the solution into adjacent blood vessels. Patients were reexamined after 24 hours, 7 days, 14 days, 30 days, 90 days, six months and one year. At each follow-up visit, the primary investigator asked the patient about the pain relief (Figure 1, 2). Assessment of pain intensity was done by the Visual Analog Scale (VAS). This instrument consists of a 10-cm line with verbal anchors at each end (no pain or worst pain). The third group (22 patients) was treated by distal applied block injection of 0.5-1 ml Anhydrous Glycerol. This procedure was preceded by intra-oral local anaesthetic infiltration technique with (2% lidocaine with 1:100,000 Adrenaline). The patient was followed up to evaluate the effect of the glycerol injection as same as done in alcohol injection. The fourth group consisted of 12 patients treated by peripheral nerve neurectomy, which was performed by sectioning and complete removal of the terminal branch of the Trigeminal Nerve. The redevelopment of sectioned terminal fibers was prevented by subsequent abolition of the canal. Surgical approach to the second and third divisions was through the intra-oral approach to prevent postoperative facial scar (Figure 3, 4).

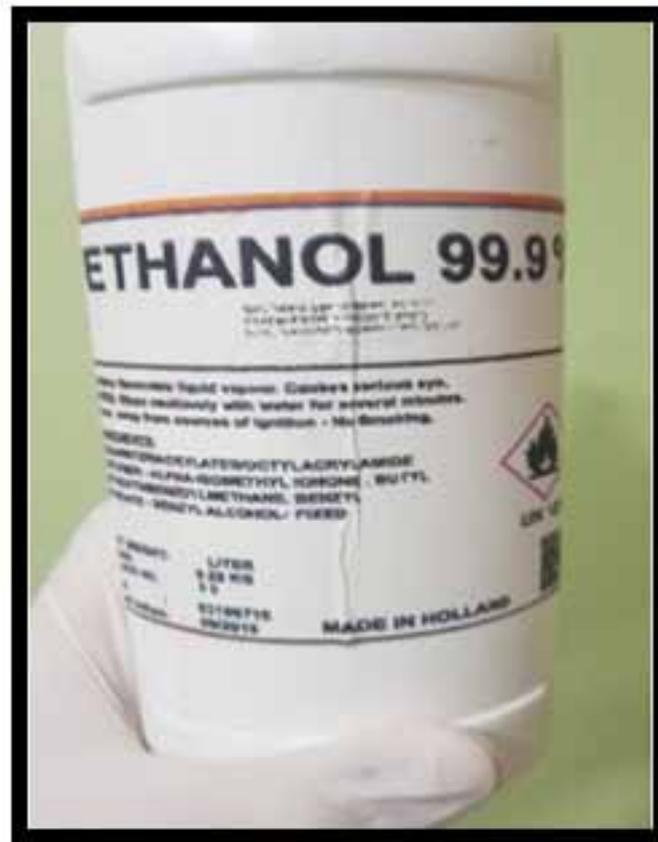


Figure (1): 99.9% Ethanol Alcohol used as local injection.



Figure (2): Local alcohol injection 0.5mm-1 mm to the left mental nerve.



Figure (3): Surgical exposure of the left mental nerve.



Figure (4): Neurectomy of the left mental nerve.

Results

Out of 77 patients involved in this study, 57 were females and 20 were males with age range between 43-72 years. Sixty-nine patients were diagnosed with idiopathic neuralgia; seven patients had a history of local trauma during tooth extraction and endodontic surgery. Only one patient had bilateral mental nerve neuralgia due to an intracranial big cyst in the posterior pontine angle (posterior cranial fosse). The anatomical distribution of TN: twenty-three cases of left mental nerves; nineteen cases of right mental nerves; twenty cases with left infraorbital nerve; eleven cases of right infraorbital nerves; two cases of long buccal nerve; one case of greater palatine nerve; and one case of bilateral mental nerve. The first group of 20 patients (25.9%) included 16 females (80%) and 4 males (20%). This group was treated with carbamazepine (Tegretol). Pain relief in the acute stage was achieved in all patients treated with 50-100 mg in the morning. After 2 months, pain reoccurred in about 13 patients (65%). This required the increase of the dose to 200-400 mg daily. After 6-9 months, pain re-occurred in seven patients (35%) leading to increase the dose up to 600- 800 mg daily as shown in table (1). This gradual increase in the dose has been associated with the increase of dizziness, drowsiness, weakness, and ataxia. The second group involved 23 patients (29.8%). They were treated with peripheral alcohol injection. All those patients were followed up for 2 months, 4 months and 6 months postoperatively to assess pain relief during these periods. Pain relief lasted for about one year. The pain recurs in 10 patients (43.5%) after one year. There was a decrease in the period of pain remission with subsequent injections as shown in table (2). 13 patients (56.5 %) presented with non-neuralgic pain, inflammation, burning sensation, trismus, dysesthesia, discomfort, infection, and numbness in the branch involved in TN. The third group included 22 (28.5%) patients whom were treated with 1 ml peripheral injection of Glycerol. The pain was relieved for four months in all the treated patients. After six months, only four patients (18.8%) had pain recurrence. The pain reoccurred in ten

patients (45.4%) after one year as shown in table (3). However, the pain was relieved after taking a low dose of Tegretol (100 mg). All patients after Glycerol injection reported with swelling and pain that subsided after 2-3 day. Analgesic was given to reduce the pain. Antibiotic also was given to prevent secondary infection. Five patients reported postoperative numbness at the injection site and the numbness disappeared within 3 months in three patients but remained for one year in the other patients. No other troublesome side effects were noted. Concerning the fourth group, which included 12 patients (15.5%) whom were treated by peripheral nerve neurectomy, all those patients (100%) became free of pain after the first neurectomy for about 24-36 months. After this period of pain remission, about 10 patients (83.3%) felt pain again. Another neurectomy procedure was needed for those patients. Pain relief after the second neurectomy lasted for 12-18 months, which means the remission period was decreased as shown in table (4).

Table (1): Patient's response to Tegretol

No. of patients	Daily Dose	Duration of response	Patients' response
20	100 - 200 mg	Immediately	All patients in acute stage responded
	Increase the dose to 200-400 mg	2 months	13 (65%) patients in whom pain re-occurred
	Increase the dose to 600 - 800 mg	6-8 months	7 (35%) patients in whom pain re-occurred

Table (2). Patient's response to alcohol injection.

Duration	No. of patient with pain	No. of patient free of pain
2 months	0	23 (100%)
4 months	0	23 (100%)
6 months	0	23 (100%)
12 months	10 (43.5%) patients	13 (56.5%)

Table (3). Patient's response to glycerol injection.

Duration	No. of patient with Pain	No. of patient free of pain
2 months	0	22 (100%) patients
4 months	0	22 (100%) patients
6 months	4 patients (18.2%)	18 (81.8%) patients
12 months	10 patients (45.5%)	12 (54.5%) patients

Table (4). Patient's response to peripheral neurectomy.

No. of the patients	No. of the neurectomy procedure needed	Period of pain remission
12	First neurectomy	24-36 months
10 (83.35%)	Second neurectomy	12-16 months

Discussion

Trigeminal neuralgia is exclusive among the chronic pain syndromes for its impressive and strong symptoms. As the exact cause of trigeminal neuralgia is a matter of debate, there no treatment can bring out complete recovery (Zakrzewska, 1991; Di Stefano, 2014). The authors recommend pharmacological treatments for trigeminal neuralgia, as carbamazepine still the drug of choice and 300 – 800 mg/day divided into two to three daily doses considered effective in about 80% of the study sample. However, higher doses were often required over time in order to maintain efficiency. Peripheral surgical treatment for TN included peripheral injections of chemical agents and neurectomy. Those procedures mostly cut the pain pathway from the trigger zones in order to stop the stimulus of afferent pathway transmission (Niall and Patton, 2007). These peripheral surgical treatments, despite their inconclusive results, are feasible, affordable and easy to perform and well tolerated with few annoying side effects. However, they had a limited duration of action and patients needed repeated procedures. The effectiveness of Alcohol peripheral block injection with less morbidity associated with this procedure made this procedure preferable for the treatment of TN (Khandeparker et al, 2015). Alcohol injection procedure has the advantage of rapidity of the procedure and accuracy. Most authors reported high percentage of pain relief with patient's preference to repeat the procedure when the pain returns (Gallagher, 2005). Disadvantages of this procedure include a temporary burning sensation

on injection and decrease efficiency with repeat administration because there is thick fibrotic tissue around the nerve region, which lead to the decrease of fluid infiltration (Fardy and Patton, 1994). It is suggested that Glycerol acts mostly on partly demyelinated nerve fibers, which are unstipulated to be involved in the trigger mechanism (Shah, 2011). Glycerol was found to be more hard to inject because of its viscosity, but not painful as pure alcohol (Santosh, 2016). Peripheral nerve neurectomy, as peripheral surgical procedure, has the advantage of the avoidance of injecting any irritant chemical agent that may produce soft tissue ulceration or damage to any branch of the facial nerve. Complete anesthesia in the nerve division site was the usual complication of this procedure. Recurrence of pain was predictable because some of the nerve regeneration could occur with the time especially when the foramina were not obliterated well postoperatively. Hence, second neurectomy procedure would be needed. However, it is more challenging due to the presence of scar tissue after raising the surgical flap and recognition of the nerve increasingly more difficult. Treatment of Trigeminal Neuralgia is controversial issue, but the author found that Glycerol offered a rapid, safe, reliable, and relatively inexpensive treatment modality for TN. Alcohol injections, on the other hand, led to ulceration and sometimes other local complications, especially in debilitating patients. Peripheral surgical techniques are usually contraindicated in medically compromised patients and patients with bleeding tendency whether acquired or congenital (Ziccardi et al, 1994). The presence of local infection around nerves, also, represents a relative contraindication to peripheral surgical interventions. The study has its limitations, which is the small sample size for the four groups. This limitation affected predicting accurately which method the best, despite the reasonable period of follow was up.

Conclusions

It seems there is no ideal long term treatment method for all patients of TN. Each method had advantages and disadvantages.

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