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Research Article

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Mandibular Nerve Block Guided By Ctin Patients with Trigeminal Neuralgia

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Abstract

Background: *Trigeminal neuralgia (TN) is a well-known facial pain syndrome characterized by excruciating paroxysmal shock pain attacks located in somatosensensory distribution of trigeminal nerve. Mandibularaffection is a common presentation of TN.*

Objectives: *Injection of mandibular nerve with neurolytic solutions in trigeminal neuralgia that was unresponsive to pharmacotherapy.*

Determination of patients and Method: *This prospective study included 21 patients treated for mandibular neuralgia by percutaneous injection of absolute alcohol under guidance of CT image. Their ages ranged from 18-60 years and male to female was 3:4; All patients suffered from moderate to severe TN and did not respond to medical treatment. Entry and trajectory of needle was planned by CT and after local anesthesia. Alcohol was injected at the exit of mandibular nerve from foramen ovale.*

Results: *85.7% of patients improved: 71.4% became pain free, who became 61.9% after two years of follow up.*

Conclusion: *CT guided mandibular nerve block by neurolytic agent as absolute alcohol and showing its effectiveness as minimal invasive treatment option for intractable trigeminal neuralgia. CT guidance provided a clear view to secure the safety, accuracy and selectivity of nerve block.*

Keywords: Trigeminal Neuralgia, Computed Tomography Guided, Nerve Block

Abbreviation

BNI-ps= Barrow Neurological Institute Pain Scale
CT= Computed Tomography,
HIV= Human Immunodeficiency Virus,
MRI= Magnetic Resonant Image,
TN= Trigeminal Neuralgia,
VAS= Visual Analogue Scale.

Introduction

Trigeminal neuralgia (ticdouloureux) is a paroxysmallancinating pain lasting a few seconds, often triggered by sensory stimuli confined to the distribution of one or more branchesoftrigeminal nerve on one side of the face with no neurological deficit [1].

Historical review of facial pain has attempted to describe this sever pain over the past 2.5 millennia the ancient Greek physicians Hippocrates, Aretaeus and Gallen, described cephalgia but their accounts were vague and didn't clearly correspond with what we know term TN [2].

The first adequate description of TN was given in 1671, followed by a fuller description by Jom Locke in 1677. Andre described convulsive like condition in 1756 and named it tic douloureux. In 1779 John Hunter more clearly characterized the entity form of "nervous disorder" with reference to pain of the teeth gums or tongue where the disease doesn't reside [2].

Percutaneousapproaches used worldwide now day was first reported 1914 by Hartal. During first half of last century, alcohol was the most injected substance through this route. Nerve blocks are an optional method for relief of severe pain. although analgesic may reduce the pain, nerve block can completely stop pain. In general, two types of nerve blocks are used, local anesthetic injection and neurodestructive method. Because of short duration of action of local anesthetic agents, it can be used to protect against acute incidental pain and for diagnostic tests. Neuerodestrctive blocks using neurolytic agents as alcohol, phenol, and glycerol or radiofrequency thermocoagulaton for intractable pain [3].

Trigeminal neurolytic blocks should be guided by radiological imaging as X-ray fluoroscopy or CT. X-ray fluoroscopy is the most commonly used form of image guidance in interventional pain therapy, it gives wide field of view around target region and continuous real time view when needed, in addition the apparatus is not excessively expensive. The limitation to fluoroscopy, however is that it shows only bones. therefore, it is suitable only for target nerve with a dependable relationship to bony landmark, also it gives only two-dimension picture and its quality is not accurate as it with CT, CT provide clear view vessels that should be avoided by needle

in addition to avoiding inadvertent puncture of vital structure, it allows accurate placement needle tip before injection of neurolytic agent with clear view of muscle and soft tissues [4].

Patients and Methods

This study was completed at Al-Zahraa University Hospital between 2012 and 2013 after the approval of the hospital local health committee and written informed consent were obtained, twenty one patients of different age groups ranging from 35-60 years, suffering from TN, mandibular distribution (V3). All patients were evaluated, regarding history, pain localization which was confirmed to mandibular nerve, severity of pain evaluated by visual analogue scale (VAS where 0 = no pain and 10 = the worst pain imaginable). Our patient ranged from moderate to severe pain. All of them didn't respond to medical treatment. Pain chronicity and frequency varied from 3 per day to 10 per hours. Pain triggers and zone which is present in one half of the patients and often lie near the nose or mouth. Chewing, talking, smiling and drinking cold or fluid may initiate the pain of TN. Assessment of muscle of mastication is important (which supplied by mandibular nerve). Examination of reflexes supplied by trigeminal nerve (absent corneal reflex is the earliest sign of TN when ophthalmic branch is affected).

All patients underwent to MRI brain to exclude organic cause of TN. Laboratory investigations as complete blood count, bleeding time, coagulation profile, hepatitis markers and HIV antibodies were done for all patients.

Inclusion criteria

1. Age 18-60 years old.
2. Males and non-pregnant or lactating females.
3. Subjects have mean attacks frequency of at least 3episodes per day and VAS ≥ 5.
4. Diagnosis of classical TN using international classification of headache disorders (ICHD-2).
5. Subjects on stable dose of concomitant preventive medication for treatment of TN for at least four weeks prior to intervention.
6. Subjects who required "rescue" analgesic medication during study were allowed to use their current (pre-study) opioid and/or non-opioid analgesic as clinically indicated (e.g. NSAID, topical analgesics).
7. Subjects were prohibited, willing and able to abstain from initiating and alternative therapy (e.g. acupuncture, massage or physical therapy) for pain relief during the study.

Exclusion criteria

1. Symptomatic TN.
2. Serious hepatic, respiratory, hematologic, cardiovascular or renal conditions.
3. Neurologic pain other than TN except for occasional migraine or tension headache (<4 headaches per month).
4. Psychiatric or medical condition that might compromise participation in study as determined by investigator.
5. Administration of any interventional drug within month prior to screening.
6. Substance abuse or alcoholism.

Technique

All patients were monitored with continuous electrocardiogram, pulse monitoring and intermittent noninvasive blood pressure. An intravenous line was inserted. 1 to 5 mg I.V. midazolam, 25-50 mg fentanyl was given to produce slight sedation and analgesia during the procedure. The block was performed with the patient in supine position on CT table, skin disinfection was done by betadine (bovidone iodine) solution. Under local anesthesia 2-3 ml of 1% lidocaine, using the standard anatomical landmark and under CT guidance, 22 gauge, 3.5 inch, 0.7 × 90 mm pd spinal needle was inserted to reach the foramen ovale at the base of skull. We should be sure the needle tip at the target position by clear CT image and confirmed by injection of 0.5 ml of 10% diluted iodine contrast material, we used Iopamidol (Io-pamiro 300, 300mg of iodine/ml; Bracoo Diagnostic Princeion, Newjersy, USA). Also, mandibular paresthesia can be elicited by injection of 0.2-0.3 ml of lidocaine 1%. A seriesof CT scan slides were done immediately to confirm the needle tip position. The needle tip was then walked carefully into the foramen ovale, another series of CT scan slides (Figure 1), a negative test for CSF and blood aspiration was proved,a 0.1 to 0.2 ml increment of dehydrated absolute ethanol were injected every 30 seconds up to 1 ml.

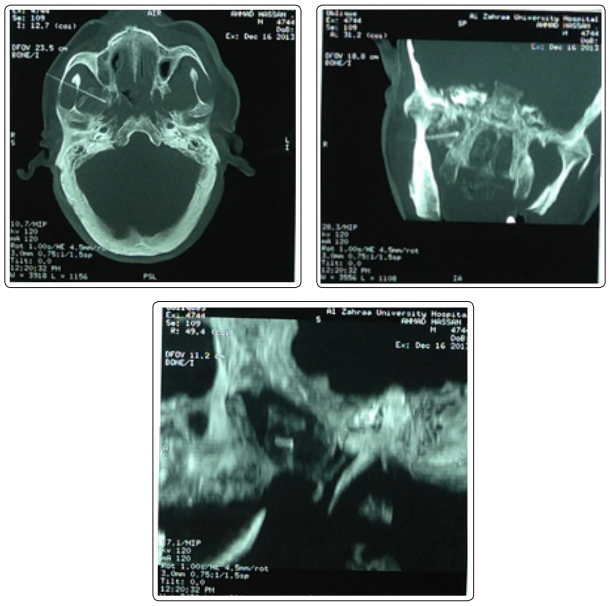

Figure 1: CT guided percutaneous mandibular nerve injection at its exit from foramen ovale

Patient reported outcome scales (PRO)

The visual analogue scale (VAS) and Barrow Neurological Institute pain (BNI-ps) are the 2 PRO measures used in this study. VAS provide an estimate of pain intensity on a continuous scale, with a score 0 representing no pain and a score 10 representing worst pain (Figure 2).

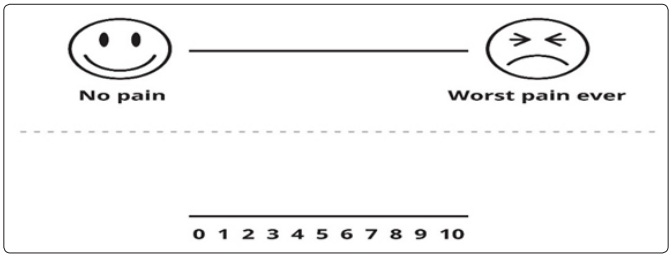

Figure 2: Visual analogue scale

The BNI-ps rates pain on a scale of 1 to 5, incorporating degree of dependence on medication (Table 1)

Table1: Barrow Neurological Institute pain scale

Pain score	Description
1	No pain, no medication.
2	Occasional pain, no medication required.
3	Some pain adequately controlled with medication.
4	Some pain, not adequately controlled with medication.
5	Sever pain or no pain relief.

After the procedure, patient was observed in recovery roam or short stay unit for 1-2 hours depending on the patient condition. All patients were clinically evaluated before injection and after it at 1 to 3 days, 2 weeks and 6 months by using VAS and BNI-ps. Trigeminal sensory function was evaluated on the pain side and contra laterally by testing for light touch and pin prick. The response was ranked according to four grade scale (normal, slightly decreased, severely decreased and totally impaired). In pain free patients, a further follow up was conducted by telephone and in pain persistent patients, repeated injection was done or referral to other option of management in more resistant cases. A pain free condition was defined as, the patient being completely free from trigeminal pain without medication.

Statistical analysis

Kaplan-Meier analysis with long rank tests were performed to evaluate the long-term effect of percutaneous nerve block patients were censored when free of pain at the last follows up. The sensimetric data were analyzed with Wilcox on singed ranks test. Other side effects were with Fisher exact test. Values of $P < 0.05$ were considered significant.

Results

Twenty one patients who fulfilled inclusion criteria were studied, adequate pain relief obtained in eighteen of them and they stopped or decreased (fourteen stopped and four decreased) their pain medications. Three patients didn't improve and still complaining of pain as pre-procedure. Repeated injection was done, two of them had a good response but the third didn't respond to block and developed V2 anesthesia dolorosa (Table 2).

Table 2: Descriptive statistics for the studied patient's demography and neurolysis

		No.	%
Age	Mean±SD	45.8±9.51	
	Range	35 - 60	
Sex	Females	12	57.1%
	Males	9	42.9%
Pain before	No pain	0	0.0%
	Mild	0	0.0%
	Moderate	7	33.3%
	Severe	14	66.7%
Pain after	No pain	15	71.4%
	Mild	3	14.3%
	Moderate	2	9.5%
	Severe	1	4.8%

According to outcome results, many patients had significant improvement (table 3) and (figure 2).

Table 3: Comparison between the level of pain before and after injection

Parameters / Pain level	Pain before		Pain-after		Chi-square test	
	No.	%	No.	%	X^2	P-value
No pain	0	0.0%	15	71.4%	32.04	0.00001
Mild	0	0.0%	3	14.3%		
Moderate	7	33.3%	2	9.5%		
Severe	14	66.4%	1	4.8%		

The previous table shows that there was highly statistically significant decrease in the level of pain after injection than before injection. Regarding adverse effects peripheral nerve blocks were invariably associated with swelling and discomfort lasting several days. Anesthesia dolorosa developed in one case after repeated blocks.

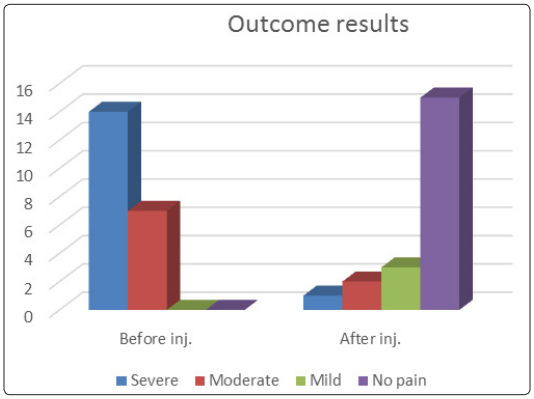

Figure 2: Comparison between the level of pain before and after injection

Discussion

TN is a debilitating syndrome consisting mainly of unilateral short bursts of lancinating pain in one or more branches of trigeminal nerve. According to the ICHD-3 criteria (International Classification of Headache Disorders), classic TN is the most common idiopathic disorder characterized by brief electric shock like pain, abrupt in onset and termination, limited to distribution of one or more division of trigeminal nerve [5].

The technique of administrating peripheral trigeminal nerve injection usually using absolute alcohol has been well described in standard neurosurgical texts, but isn't widely used as other percutaneous procedures or micro vascular decompression because it provides limited pain relief and the repeated blocks have a lower success rate and higher morbidity including neuritis [6,7]. Therefore, we evaluated the efficacy of alcohol block on the mandibular division of trigeminal nerve (V3) for treatment of TN. Alcohol causes sclerosis of the nerve tissues by its dehydrating action and typical Wallerian degenerating occurs following injection [8].

Han and Kim proved that, pain relief duration observed in their study of mandibular nerve block with alcohol in comparable with that reported for alternative techniques such as radiofrequency, thermo coagulation, the rates of complete pain relief at 1, 2, 5 years after

procedures were 70%-90%, 62%-65%, 51%-56% respectively [7].

In this study, significant pain relief demonstrated by decreased VAS (decreased severity of pain) and decreased BNI-ps (decreased analgesic consumption), 2 weeks after injection and continued throughout follow up period. VAS was 7.6±2 before injection as against 0-3 in 90% of patients after injection.

Pain relived after 1 and 2 years in studied patients are 71.4% and 61.9% compared with Han and Kim study 70%and 62% after the same durations. As regarding to complication, anesthesia dolorosa occurred in one patient 4.8% but no other significant complication, Fardy and Patton had significant complication in their study as avascular necrosis ophthalmoplegia resemble 3.6% of cases [9].

Conclusion

Neurolytic mandibular nerve block offers a simple, office-based neurosurgical option for treating intractable and pharmacologically unresponsive TN. The advantage of CT over plain X-ray fluoroscopy is the proper visualization of the foramen ovale facilitating the injection of neurolytic substance properly, reducing the incidence of side effects.

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