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OUTCOME OF MANDIBULAR NERVE BLOCK WITH DEHYDRATED ALCOHOL FOR TRIGEMINAL NEURALGIA

Anaesthesiology

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ABSTRACT

Background and Objectives: To evaluate the duration of the pain-free period after the first block, mean pain-free period after the first block, baseline VAS score and follow-up VAS score and related complications of a mandibular nerve block (Mnb) with alcohol for trigeminal nerve.

Material and methods: A hospital-based observational descriptive study was conducted in the Department of Anaesthesiology in the pain clinic at the tertiary centre. A total 70 patients were included in this study. 2-3 ml 1% lidocaine (preservative-free) injected locally into the skin, subcutaneous tissue, and muscle for pain-free insertion of the spinal needle. Then 8-10cm, 22-gauge spinal needle was inserted between the zygomatic arch and mandibular notch. After contact with the lateral pterygoid plate, the needle was partially withdrawn and angled slightly superiorly and posteriorly towards the ear and then a 2 ml dehydrated alcohol injection was administered.

Results: Mandibular nerve blocks with dehydrated alcohol were performed in a total of 70 patients. Sixty patients (85.7%) experienced complete pain relief for 1 year after the first mandibular nerve block. Eight patients (11.4%) experienced complete pain relief for 9 months and two patients (2.9%) had complete pain relief for 6 months. Ten patients (14.3%) required a second block for complete pain relief. The complication was found in 4 (5.7%) patients, in which the most common complication was sensory discomfort. The mean duration of pain-free period (95% CI) first after block was 11.44 (6-12) months with a SD of 1.40. In this study, significant pain relief was demonstrated by decreased VAS (decreased severity of pain) after injection and continued throughout the follow-up period.

KEYWORDS

Trigeminal Neuralgia, VAS, Mandibular nerve block, dehydrated alcohol

INTRODUCTION

Trigeminal Neuralgia (TN) is the most widely recognized neuropathic pain of the face and is profoundly distressing to the patient's wellbeing. The International Association for the Study of Pain defines TN as "sudden, usually unilateral, severe, brief stabbing or lancinating, recurrent episodes of pain in one or more branches of the trigeminal nerve". Unfortunately, there is so far no ideal surgical treatment that can relieve a pain attack immediately and completely without any complication or recurrence. Furthermore, studies on the surgical outcomes of percutaneous procedures and MVD (microvascular decompression) for TN have produced disparate results, which appear to depend on study design and the definitions of success and recurrence. Nevertheless, it is generally accepted that MVD provides longer pain relief for TN than any other percutaneous procedure. However, unlike any other percutaneous procedure, mortalities continue to be reported in MVD studies. Radiofrequency thermocoagulation (RF) is believed to offer a higher rate of complete pain relief than any other percutaneous procedure but at a cost of increased complication rates.

Current management of the TN is divided into medical and surgical; Anticonvulsants (Carbamazepine) are the first-line medical treatment. Surgical options are considered when medical treatment fails due to either poor or diminishing response to drugs or due to their unacceptable side effects. Trigeminal nerve block (Tnb) with alcohol was introduced long ago as a treatment method for trigeminal neuralgia (TN). but it is not currently as widely used as other percutaneous procedures or microvascular decompression (MVD). Nevertheless, a small number of authors continue to stress the importance of an alcohol blockade of the trigeminal nerve. The main reason for disinclination to perform an alcohol block of the mandibular nerve for the management of TN, because it provides limited duration pain relief, and lower success, and a higher morbidity rate from repeated blocks due to neuritis.

The mechanism of action of an Mnb with alcohol is that the alcohol prevents painful impulses generation along with a nerve, as a result of dehydration followed by necrosis of the nerve itself. Freedom from pain lasts from 6 to 15 months occurs due to Wallerian degeneration and depends on the regeneration rate of the myelinated nerve.

The peripheral nerve injections of different chemical agents such as chloroform, alcohol, glycerol, and phenols are management of TN other than surgical procedure. Peripheral alcohol injections have also been used, preferably "if the patient is very old, serious medical morbidity who cannot undergo invasive surgical procedures safely may benefit from an injection of alcohol into the painful peripheral trigeminal nerve branch"

METHODS

The study was conducted in the Department of Anaesthesiology in the pain clinic at a tertiary care centre, after obtaining permission from the institutional ethics committee, review board and written-informed consent from the patient. A total 70 number of patients who fulfil inclusion criteria of trigeminal neuralgia were taken for mandibular nerve block. Patients were included who are either sex, ASA Grade 1&2, age group between 20 to 70years and who fulfilled the diagnostic criteria of trigeminal neuralgia as detailed in international classification of headache disorders as follows;

International Headache Society diagnostic criteria for Classical trigeminal neuralgia

A. At least three attacks of unilateral facial pain fulfilling criteria B and C:
B. Occurring in one or more divisions of the trigeminal nerve, with no radiation beyond the trigeminal distribution
C. Pain has at least three of the following four characteristics:
1. Recurring in paroxysmal attacks lasting from a fraction of a second to 2 minutes
2. Severe intensity
3. Electric shock-like, shooting, stabbing, or sharp in quality
4. Precipitated by innocuous stimuli to the affected side of the face
D. No clinically evident neurological deficit
E. Not better accounted for by another ICHD-3 diagnosis

All study patients required pre-anesthetic check-up on the day before the surgery that include: Complete medical and surgical history of the patient including any known drug allergy, General and systemic examination, vital parameters like blood-pressure, pulse, temperature & respiratory rate. The weight of the patient was noted. Investigations including complete hemogram, bleeding time, clotting time, fasting / random blood sugar, blood urea, serum creatinine, liver function test, serum electrolytes, chest X-ray, and electro-cardiogram. Informed written consent was obtained after a complete explanation about the study protocol and the procedure.

After confirming overnight fasting, the patient was taken on the operation table, was connected to monitors, and baseline vitals like was recorded. Appropriate size intravenous (IV) cannula was inserted and lactated Ringer's solution started.

Then 2-3 ml 1% lidocaine (preservative-free) injected locally into the skin, subcutaneous tissue, and muscle for pain-free insertion of the spinal needle. Then 8-10cm, 22-gauge spinal needle was inserted between the zygomatic arch and mandibular notch. After contact with the lateral pterygoid plate, the needle was partially withdrawn and angled slightly superiorly and posteriorly towards the ear and when eliciting paraesthesia in the V3 innervated area then 2 ml dehydrated alcohol injection was administered.

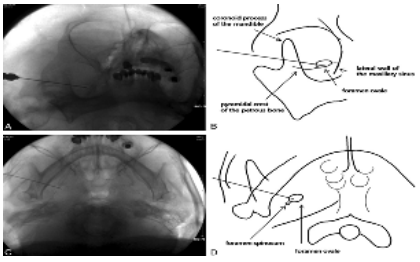

Fig: 1 A needle tip is placed at the mid-portion of the lower rim of the foramen ovale in the anteroposterior oblique view (A and B). At this point, a needle is advanced a few millimeters medially to elicit paraesthesia in the V3 innervated area. When the proper paraesthesia is achieved, a needle tip should be in cross point of the lateral one-third of the perpendicular line and the mid horizontal line of the foramen ovale in the submentomandibular view (C and D)

In the post block period noted followings parameters were noted:
Total number of patients who remained pain-free and total duration of pain-free after the first block, Total no. of cases who required second and third block within one-year,
Total no. of cases who experienced side effect and complications after mandibular block. Statistical significance level was accepted p values of <0.05.

RESULTS

A total of 70 patients with mandibular nerve block with alcohol were performed during the study period. The ratio of male to female patients was 2.3:1, the mean age of study patients was 50.6 years (range, 29-70 years). The mean BMI was 24.850 kg/m^2 with a standard deviation of 2.1253. There was a minimum BMI of 21kg/m^2 and a maximum BMI of 28kg/m^2. The mean baseline intensity of pain was 9.01(VAS; 0 is pain-free and VAS; 10 is the worst imaginable pain).

Total 60 patients (85.7%) out of 70 remained pain-free and had no further treatment after the first block for one-year duration and 8 patients (11.4%) remained pain-free for 9 months and 2 patients (2.9%) remained pain-free for 6 months. A total of 10 patients (14.3%) required a second block. None of the patients in this study required a third block. The mean duration of pain-free period after first block was 11.44 months with SD of 1.40.

The mean baseline VAS score in cases was 9.014. 2 months following the first block the mean VAS score decreased to 6.7. The mean VAS score further decreased to 4.5 at the end of 4 months. At 6 months post block the mean VAS score was found to 2.43 and at 12 months it was 1.41. The difference was found statistically with p-value of 0.001.

In this study, total 4 patients (5.7%) complained of complications, mainly sensory discomfort and mastication difficulty.

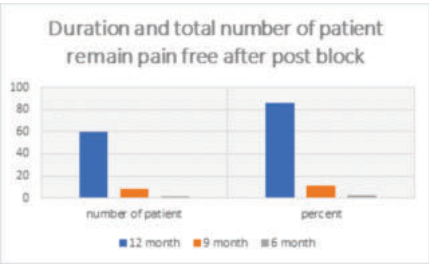

Fig: 2 Number of patients with duration of pain-free after the first block

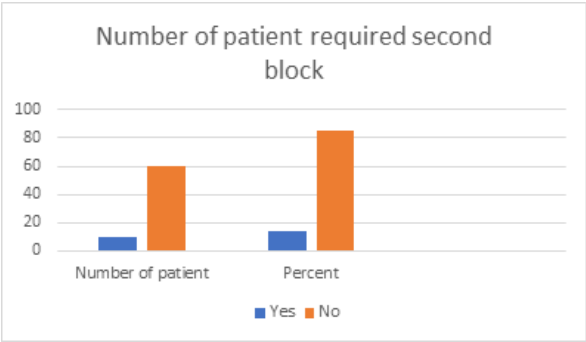

Fig: 3 Number of patients required the second block

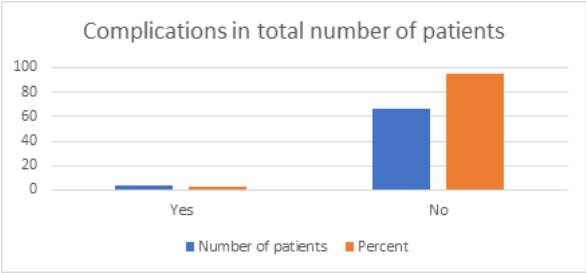

Fig: 4 Number of patients who have complications after block

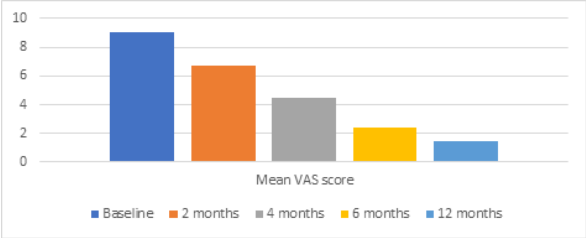

Fig: 5 Distribution according to VAS

DISCUSSION

Trigeminal neuralgia remains a clinical diagnosis depending on a history of sudden lancinating or stabbing pains with pain-free periods between attacks and the absence of clinical findings. Although there is no diagnostic test for TN, alternative diagnoses can usually be excluded by a careful history, clinical examination, and appropriate investigations.

Injection of local anesthetic solutions can be useful in the diagnosis of TN as well as confirming the trigger zone. The use of a long-acting local anesthetic (e.g., bupivacaine) will also provide some pain relief while waiting for other treatments to become effective.

When medical treatment fails due to diminishing response or impermissible side effects of the drugs, then we considered the surgical management of TN. Suitable patients may progress directly to a neurosurgical option, but where immediate pain relief is required, or in patients not suitable for or not wishing to have neurosurgical treatment, a mandibular nerve block may be considered.

Injections of alcohol have been suggested in the management of TN since the early 20th century. Two distinct techniques are described for the peripheral injection of alcohol, and these have been well described by Stookey and Ransohoff. One involves the transcutaneous injection of the nerve at the skull base (foramen ovale or foramen rotundum), and the other its injection is more distal as the nerve passes recognizable landmarks in the facial skeleton (supraorbital notch, infraorbital foramen, inferior dental foramen, or mental foramen). Both techniques involve the injection of the relevant nerve with local anesthetic and, once analgesia is confirmed, injection of 0.5 to 1.0 mL absolute alcohol. Occasionally, specific nerves may be identified and injected, such as the long buccal nerve.

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 microvascular decompression because it provides

limited pain relief and the repeated blocks have a lower success rate and higher morbidity including neuritis. 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.

In the present study, 60 (85.7%) patients have shown one-year pain-free duration, 2 (2.9%) patients have shown six months pain-free duration and 8 (11.4%) patients have shown 9 months of pain-free duration while only 10 (14.3%) patients required the second dose.

Tiwari AK (2019) observed that first-time use of absolute alcohol provides 13–15-month pain relief, but in the second time, the period of pain relief was 11–12 months, but the third time, it was <11 months. The reason for less effectiveness in subsequent injections may be due to fibrosis. The study also observed some complications such as local site ulceration sensory nerve weakness, but all complications were reversible.

Shah et al. reported that the pain-free interval of the repeated block was shorter than the first block, the other previous studies showed repeated Tnb with alcohol did not show effectiveness, even after 14 blocks had been administered in one individual over many years.

It is widely held in the literature that a complication of peripheral alcohol injections is that their effectiveness is reduced with repeated administration. Peet and Schneider report that, in 21 cases where repeated injections were administered, there tended to be a shorter period of relief but that in 9 cases there was a progressively longer period of relief after each

In 2007 McLeod NM and Patton DW explained that the peripheral alcohol injections lasted for a mean of 14.13 ±8.66 months (range 2–56 months). Their effectiveness and complication rates were not affected by age or repeated administration. Their use did not affect, nor was their effectiveness affected by the use of other surgical treatments.

In the present study, Complication was found in 4 (5.7%) patients, in which the more common complication is sensory discomfort.

Few studies have been conducted on Tnb with alcohol or its related complications. Macleod et al. reported that 4% of their patients experienced local symptoms, such as pain, burning, swelling, local infection, and avascular necrosis of the skin**.** Fardy and Patton reported that only 3 (0.73%) of their cases experienced a significant complication after performing 413 peripheral Tnb with alcohol over 20 years. Generally, all neuroablative procedures for TN treatment involve trigeminal nerve disturbances, both sensory and motor, and troublesome dysesthetic disturbances affect approximately 4 to 10% of patients treated with any ablative technique for TN. Furthermore, anesthesia Dolorosa, corneal sensory disturbance can occur after denervation procedure for TN, especially in patients that undergo RF, in whom it occurs at a rate of 0.3-22%. (Zakrzewska JM 1999).

The mean baseline VAS score in cases was 9.014. 2 months following the first block the mean VAS score decreased to 6.7. The mean VAS score further decreased to 4.5 at the end of 4 months. At 6 months post block the mean VAS score was found to 2.43 and at 12 months it was 1.41., in this study, significant pain relief was demonstrated by decreased VAS (decreased severity of pain) after injection and continued throughout the follow-up period.[xviv]

CONCLUSION

The mandibular nerve block (Mnb) with alcohol should be considered as a useful treatment option for medically intractable TN because results indicate that this modality offers a high rate of complete pain relief demonstrated by decreased VAS (decreased severity of pain) after injection and has a long-lasting effect without serious complications.

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