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Intranasal Lidocaine Spray for Trigeminal Autonomic Cephalgia, Simple and Effective Treatment Modality: A Case Series of Five Patients

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Background: Sphenopalatine ganglion block (SPGB) is a potential treatment option for trigeminal autonomic cephalgia (TAC) performed fluoroscopically or endoscopically. We explored the role of noninvasive SPGB via intranasal application of lidocaine (INL) in hemicrania continua (HC) and probable TAC.

Case Report: In 4 patients of HC, INL spray decreased baseline acute attacks from Numeric Rating Scale (NRS-11) 8-10/10 to nil acute attacks and baseline continuous NRS-11 from 2-6/10 to 0-2/10 in 3 months. In patient of probable TAC, multiple acute attacks a day of NRS-11 10/10 decreased to NRS-11 1-2/10 in 3 months follow-up, with acute attacks of 1-2 in a day.

Conclusions: Ten percent INL spray may be used as noninvasive treatment modality for HC and probable TAC, both for acute attacks and decreasing basal continuous pain.

Key words: Trigeminal autonomic cephalgia, sphenopalatine ganglion block, lidocaine spray

BACKGROUND

International Classification of Headache Disorders 3 categorizes trigeminal autonomic cephalgia (TAC) into 5 subtypes: cluster headache (CH); paroxysmal hemicrania (PH); short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) and short-lasting unilateral neuralgiform headache attacks with cranial autonomic symptoms (SUNA); hemicrania continua (HC); and probable TAC (1). TAC is characterized by intense, highly disabling pain localized to the trigeminal nerve's first branch, accompanied by cranial autonomic symptoms, such as conjunctival injection and tearing, nasal congestion, and other symptoms.

Treatment for TAC presents challenges, and oral medications often prove insufficient. In an effort to alleviate patient suffering, sphenopalatine ganglion block (SPGB) has demonstrated efficacy in all subtypes of TAC (2). SPGB is typically performed either fluoroscopically or endoscopically, making these invasive procedures reserved for later treatment options (2).

Recently, noninvasive blockade of SPGB via intranasal application of local anesthetic lidocaine has been explored in CH and yielded promising results (2-4).

We present the efficacy of noninvasive intranasal spray in a series of 5 patients with TAC, excluding CH, and provide a detailed discussion of these patients.

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CASE 1

A 35-year-old male patient (weight: 75 kg, height: 165 cm) was referred from the Ear, Nose and Throat department to Pain Clinic Outpatient department (OPD) for pain in left periorbital and temporal area for the last one year. Pain was continuous in nature, with Numeric Rating Scale (NRS-11) 2-3/10 with intermittent exacerbations rated as NRS-11 9/10 3-4 times a day, lasting 10 minutes, associated with lacrimation and nasal congestion on left side. Paranasal sinus computed tomography (CT) scan and nasal endoscopy were insignificant. Oral medications of propranolol 20 mg once a day and carbamazepine 200 mg once a day were ineffective. Presently, the patient reported with acute pain, NRS-11 9-10/10. Suspecting HC subtype of TAC, oral indomethacin 25 mg 3 times a day was prescribed. To abort the present acute attack, noninvasive SPGB was planned with an oral swab dipped in 0.375% ropivacaine and inserted intranasally for 10 minutes. The patient reported 100% pain relief following the block. He was thereafter advised oral indomethacin 25 mg 3 times a day and, for acute episodes, 10% intranasal lidocaine (INL) spray 2 puffs (20 mg) was advised. Self-administration technique of spray was detailed to the patient. After a week, the patient reported reduction in the intensity of continuous pain to NRS-11 0-1/10 and decreased intensity and frequency of acute episodes to NRS-11 7/10, with acute attacks of 2 times a day. Patient had discontinued tablet indomethacin by himself due to gastric symptoms. For the next 3 weeks, INL spray 2 puffs were advised 2 times a day. He was advised to continue the same treatment for the next 3 weeks. On 4-week follow-up, the patient reported reduced NRS-11 (0-1/10) of continuous pain with decreased intensity and frequency of acute episodes to NRS-11 5/10 with acute attacks of once a day. Patient was advised INL and oral indomethacin on an as-needed basis. On 3 months follow-up, the patient has reported significant pain relief of NRS-11 0-1/10 with no acute episodes (Table 1).

CASE 2

A 64-year-old female patient (weight: 80 kg, height: 155 cm) was referred from the Emergency Medicine department to pain clinic OPD with complaints of pain in left maxillary, ocular, and temporal areas for the last 3 years. Pain was described as continuous (few hours to entire day, NRS-11 4-6/10) with 10-12 acute episodes per day (NRS-11 8-10/10) associated with nasal congestion and lacrimation on the left side of the face, along with ptosis and miosis. Magnetic resonance imaging (MRI) brain and cervical spine were insignificant. Pain did not respond to multiple oral medications of pregabalin 75 mg 2 times a day, carbamazepine 200 mg 3 times a day, duloxetine 20 mg once a day, amitriptyline 10 mg at bedtime, propranolol 40 mg once a day, and tramadol 100 mg 2 times a day. The patient also underwent left maxillary nerve radiofrequency ablation and balloon compression rhizoplasty with no relief. Multiple visits to different OPDs were made where oral medications of escitalopram 10 mg at bedtime, olanzapine 2.5 mg once a day, venlafaxine 50 mg once a day, sertraline 50 mg once a day, and clonazepam 0.25 mg at bedtime were prescribed for her somatic symptom disorder and nonresponding left-side facial pain associated with agitation or restlessness, which bought mild relief in her symptoms, but no significant relief in facial pain. On reporting to the pain OPD, TAC (HC) was suspected, and oral indomethacin 25 mg 3 times a day was prescribed. For acute pain, diagnostic SPGB was given in the OPD with a swab dipped in 0.375% ropivacaine, kept intranasal for 10 minutes. Patient reported 80% pain relief postblock. Hence, to abort acute episodes, 10% INL spray 2 puffs (20 mg) was prescribed. Self-administration technique of spray was detailed to the patient. On one-week follow-up, the patient reported continuous pain NRS-11 2-3/10 and decreased intensity and frequency of acute episodes to NRS-11 4-5/10 with 5 acute episodes per day. Patient was noncompliant for the oral medication because of severe gastritis and used 10% INL spray 2-3 times a day, which relieved the pain within 10 minutes of using the spray. For the next 3 weeks, the patient was prescribed with 10% INL spray 2 puffs 2 times a day with tablet indomethacin on an as-needed basis. On 4-week follow-up, the patient reported continuous pain NRS-11 1-2/10 and acute episodes of 1-2 episodes per day. Thereafter, he was prescribed 10% INL spray and oral indomethacin 25 mg only on an as-needed basis. On 3 months follow-up, the patient has reported significant pain relief with NRS-11 0-1/10 with no acute episodes (Table 1).

CASE 3

A 65-year-old female patient (weight: 57 kg, height: 150 cm), referred from the Geriatric department, presented to pain clinic OPD with right periorbital pain for the last 6 months. Pain presented as acute exacerbations with NRS-11 of 10/10 multiple attacks (roughly 10 times a day) for the last 48 hours, lasting one second each,

triggered by touching and wetting face associated with lacrimation and nasal congestion. There was no background continuous pain. Patient in the past was prescribed oral carbamazepine with multiple supraorbital nerve (SON blocks with report of about 50% relief with the nerve blocks. Presently on reporting to pain OPD, repeat SON block was given, which resulted in 30% pain relief only in supraorbital area. Probability of TAC was explored, and diagnostic SPGB was given in the OPD with a swab dipped in 0.375% ropivacaine, kept intranasal for 10 minutes. Patient reported 100% pain relief postblock. Diagnosis of probable TAC was made and patient was prescribed oral indomethacin 25 mg 3 times a day along with carbamazepine 50 mg 3 times a day with 10% INL spray 2 puffs (20 mg) each time for acute attacks. Self-administration technique of spray was detailed to the patient. One week later, she reported decreased intensity and frequency of acute episodes (4-5 episodes per day with NRS-11 4/10). Patient reported use of INL spray 2 times a day for acute attacks with pain relief within 10 minutes of using the spray. Patient discontinued oral indomethacin by herself due to nausea and gastritis. For the next 3 weeks, oral carbamazepine 50 mg 3 times a day with 10% INL spray 2 puffs 2 times a day was prescribed. On 4-week follow-up, the patient reported significant pain relief with only 1-2 acute episodes per day (NRS-11 2/10). Patient has reported that she can wash her face presently, which does not trigger the pain anymore, with resolving of autonomic symptoms. Patient was prescribed oral carbamazepine 50 mg 3 times a day with an as-needed 10% INL spray. On 3 months follow-up, the patient has reported significant pain relief of NRS-11 0-1/10 with no acute episodes (Table 1).

Table 1. Clinical details of each patient.

Case 1 (HC)	Baseline	Wk 1	Wk 4	3 Mo
Background Continuous NRS-11	2-3/10	0-1/10	0-1/10	0-1/10
Acute Attack NRS-11	9/10	7/10	5/10	0-1/10
Frequency of Acute Attacks	3-4 times/d	2 times/d	1 time/d	Nil
Case 2 (HC)	Baseline	Wk 1	Wk 4	3 Mo
Background Continuous NRS-11	4-6/10	2-3/10	1-2/10	0-1/10
Acute Attack NRS-11	8-10/10	4-5/10	3-4/10	0-1/10
Frequency of Acute Attacks	10-12 times/d	5 times/d	1-2 times/d	Nil
Case 3 (Probable TAC)	Baseline	Wk 1	Wk 4	3 Mo
Background Continuous NRS-11	Nil	Nil	Nil	Nil
Acute Attack NRS-11	10/10	4/10	2/10	0-1/10
Frequency of Acute Attacks	10 times/d	4-5 times/d	1-2 times/d	Nil
Case 4 (HC)	Baseline	Wk 1	Wk 4	3 Mo
Background Continuous NRS-11	6/10	3/10	1-2/10	0-1/10
Acute Attack NRS-11	8-9/10	4-5/10	3-4/10	Nil
Frequency of Acute Attacks	8 times/d	3-4 times/d	1 time/d	Nil
Case 5 (HC)	Baseline	Wk 1	Wk 4	3 Mo
Background Continuous NRS-11	4-5/10	2-3/10	1-2/10	-
Acute Attack NRS-11	10/10	4/10	2-3/10	-
Frequency of Acute Attacks	10 times/d	4-5 times/d	1-2 times/d	-

Abbreviations: NRS-11: Numeric Rating Scale; TAC: trigeminal autonomic cephalgia; HC: hemicrania continua; d: day; wk: week; mo: month.

CASE 4

A 65-year-old male patient (weight: 60 kg, height: 155 cm) referred from the department of Otorhinology, presented to pain clinic OPD with right periorbital, maxillary area pain for 9 months. He rated his continuous pain NRS-11 as 6/10, with intermittent exacerbations rated as 8-9/10 approximately 8 times a day, lasting 2 minutes each, associated with lacrimation, nasal congestion, and facial flushing on right side. In treatment history, the patient previously had taken oral carbamazepine 200 mg 3 times a day with right-sided gasserian ganglion radiofrequency ablation done 3 months back, which brought 20% to 30% relief only in maxillary area. Right SON block with lidocaine was given one month back with minimal relief. Suspecting TAC (HC), tablet indomethacin 25 mg 3 times a day was prescribed. For immediate pain relief, diagnostic SPGB was given with a swab dipped in 0.375% ropivacaine, kept intranasal for 10 minutes. Patient reported 100% pain relief postblock. Patient was prescribed 10% INL spray 2 puffs (20 mg) for acute episodes with oral indomethacin 25 mg 3 times a day, after explaining the self-administration technique of spray to the patient. On one-week follow-up, the patient described use of INL spray 2-3 times a day. The reported

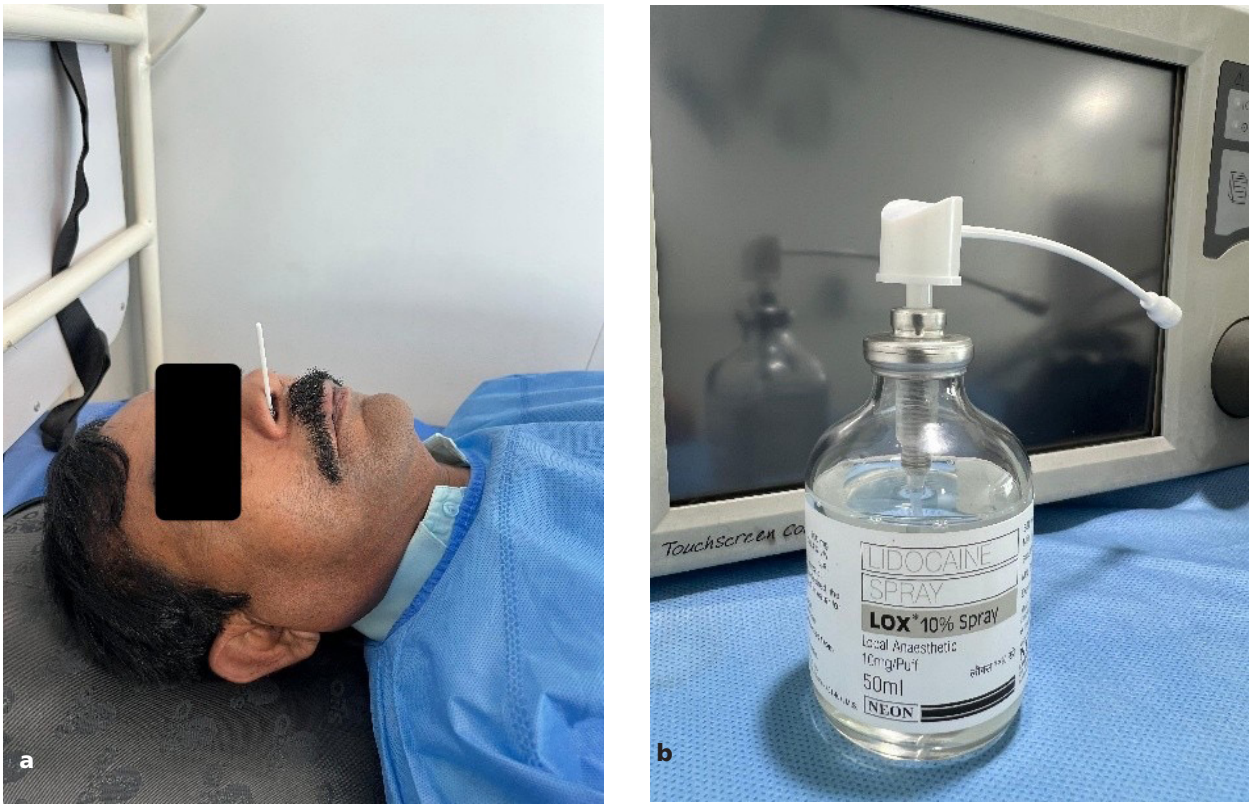

Fig. 1 (a). Patient with swab dipped in local anesthetic solution. (b) Ten percent lidocaine spray.

continuous pain NRS-11 was 3/10 with decreased intensity and frequency of acute episodes of 3-4 episodes per day. Patient also reported that he took tablet indomethacin only once in the whole week due to good pain relief within 5-10 minutes of 10% INL spray and gastritis with oral indomethacin. Patient was prescribed 10% INL spray 2 puffs 2 times a day and tablet indomethacin only on an as-needed basis. On 4-week follow-up visit, the patient reported significant pain relief with continuous pain NRS-11 1-2/10 and 1 acute episode per day. Thereafter, the patient was prescribed 10% INL spray 2 puffs and oral indomethacin 25 mg on an as-needed basis. On 3 months follow-up, the patient has reported significant pain relief of NRS-11 0-1/10 with no acute episodes (Table 1).

CASE 5

A 54-year-old male patient (weight: 50 kg, height: 155 cm) referred from the Neurology department, presented to pain clinic OPD with right-face temporal, periorbital, maxillary area pain, and left-sided facial twitching for 10 years. He rated his continuous pain as 4-5/10 on the NRS-11, with intermittent exacerbations rated as 10/10 approximately 10 times a day, lasting 10-15 minutes each, associated with lacrimation and nasal congestion on right side. MRI brain was done by the Neurology department which was found to be normal. He reported to pain clinic 4 years back, where he was treated with right-side multiple blocks of SON, infraorbital nerve, and greater occipital nerve with ropivacine, botulinum toxin type A, and pulse radiofrequency ablation, which resulted in pain relief of 25-30 days. Patient requested for longer-lasting treatment due to a physical inability of attendance to the pain clinic OPD. Suspecting role of SPG and probable diagnosis of TAC (HC) due to long-standing history of trigeminal neuralgias, diagnostic right SPGB was given with a swab dipped in 0.375% ropivacaine, kept intranasal for 10 minutes. Patient reported 100% pain relief postblock. He had a known case of hypertension with history of coronary artery disease and percutaneous transluminal coronary angioplasty 2 times in the last one year, for which multiple medications of oral ecosprin-atorvastatin once a day, Ticagrelor 90 mg once a day, nitroglycerin 2.5 mg once a day, metoprolol 25 mg once a day,

telmisartan 40 mg once a day, and esomeprazole 40 mg once a day, were prescribed. Due to a history of cardiovascular events and gastritis, oral indomethacin was not prescribed. Use of 10% INL spray 2 puffs was detailed for acute episodes with prescription of oral Ultracet as needed and baclofen 10 mg at bedtime. Self-administration technique of spray was detailed to the patient. At one week, the patient reported reduced continuous pain (NRS-11 2-3/10) and acute pain intensity and frequency (4-5 episodes per day with NRS-11 4/10) with the use of 10% INL spray 2 times a day. Patient also described pain relief within 5 minutes of using the spray. For the next 3 weeks, the patient was advised to use the INL spray 2 times a day. On 4-week follow-up, he reported significant pain relief with continuous pain NRS-11 1-2/10 and 1-2 acute episodes per day. Patient is presently prescribed only 10% INL spray as needed and is under pain clinic follow-up (Table 1).

All patients have consented for this publication.

DISCUSSION

TAC is an intensely painful and highly disabling headache characterized by unilateral pain, localized in the area of distribution of the first branch of the trigeminal nerve, associated with cranial autonomic symptoms, such as rhinorrhea, nasal congestion, conjunctival injection, and lacrimation on the ipsilateral side to the pain. In addition, patients may report edema of the eyelid, miosis, ptosis, redness of the face, and sweating of the forehead and face. TAC includes CH, PH, SUNCT or SUNA, HC, and probable TAC. All of them present clinically with acute exacerbations of pain lasting for a certain duration, except HC, which presents with a continuous background mild to moderate pain along with the acute exacerbations of pain for 3 months. The most important feature to differentiate between these entities is the duration of the headache attack, with CH 15-180 minutes, PH 2-30 minutes, SUNCT/SUNA 1-600 seconds, and HC ranging from a few seconds to 2 weeks. In SUNA, autonomic features other than conjunctival injection or tearing are more prominent, otherwise SUNA and SUNCT are very similar. The term probable TAC is used when a patient's symptoms are highly suggestive of TAC, but do not meet all the specific diagnostic criteria. TACs can occur in an episodic or chronic form. Treatment also differs among all these subgroups (Table 2) (1,2).

Conventional pharmacological therapy may be successful in majority of TAC patients. Most CH attacks respond to 100% oxygen inhalation or 6 mg subcutaneous sumatriptan. For second choice, nasal spray of sumatriptan (20 mg) or zolmitriptan (5 mg), oral and intravenous corticosteroids, verapamil, lithium carbonate, methylergonovine, and topiramate may be tried. PH and HC respond to preventive treatment with indomethacin (75-150 mg per day). For SUNCT, lamotrigine is the preventive drug of choice (Table 2) (2,4).

Patients with PH/HC respond well to indomethacin. In fact, response to the medicine is often taken as a confirmatory diagnosis (2). However, long-term ingestion of indomethacin places the patients at risk of developing peptic ulcers and other gastrointestinal disorders, despite taking proton pump inhibitors, which is a huge limiting factor (2). In the present series, all patients were prescribed oral indomethacin; however, they complained of severe gastrointestinal symptoms, and many discontinued the medicine on their own, especially because of relief with INL spray. In the fifth patient, indomethacin was contraindicated because of prior history of hypertension with coronary artery disease and severe preexisting gastritis. In conditions where indomethacin is not tolerated by patients or is contraindicated, SPGB is highly useful as a treatment modality, which was also seen in the present series.

SPG is a parasympathetic ganglion with autonomic, sensory, and motor roots, and it is traversed by the second division of the trigeminal nerve. SPG contains sensory nerve fibers from the trigeminal nerve, as well as parasympathetic nerve fibers, which innervate the cerebellar arteries. It mediates stimulation of the trigeminal ganglion, causing cerebral vasodilation, which depends on nitric oxide synthase in SPG cells. Since pathogenesis of TAC is believed to involve facilitation of the trigeminal autonomic reflex causing an increased cranial parasympathetic outflow through SPG, it has been hypothesized that blocking the SPG may be effective in the treatment of various TACs by decreasing acute pain intensity and frequency of further attacks (5-7).

Conventionally, SPGB has been given using fluoroscopy or CT guided with infrazygomatic approach where a needle is advanced under C-arm guidance from just below the zygomatic arch toward the pterygopalatine fossa. For longer-lasting effects, radiofrequency ablation of SPGB has also been explored (8). Invasive SPGBs have previously been used for all types of TAC (2,8). This procedure is technically challenging, is invasive, and various side effects are reported, like paresthesia or hypoesthesia of upper gums or cheeks, epistaxis, cheek hematomas, and infection (8).

Table 2. Brief description of subtypes of TAC.

	CH	PH	SUNCT/SUNA	HC
CLINICAL PRESENTATION				
Acute Attack Duration	15-180 min	2-30 min	1-600 s	Few seconds to 2 wk
Autonomic Symptoms	Present	Present	Present	Present
Background Pain	Absent	Absent	Absent	Present
TREATMENT				
Abortive	100% O_2 Sumatriptan (s/c) Zolmitriptan nasal spray	Nil	Nil	Nil
Preventive (1st line/2nd line)	Verapamil / Lithium	Indomethacin / Topiramate	Lamotrigine/ Topiramate	Indomethacin/Topiramate
Other Options	Vagus nerve stimulation	Verapamil Vagus nerve stimulation	Carbamazepine IV Lidocaine	Neurostimulation Melatonin Vagus nerve stimulation
Invasive Management (2,4,8)	SPGB ON block	SPGB ON block	SPGB ON block SON/ION block MVD	SPGB ON block SON block

Abbreviations: TAC: trigeminal autonomic cephalgia; CH: cluster headache: PH: paroxysmal hemicrania; SUNCT: short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing; SUNA: short-lasting unilateral neuraligiform headache attacks with cranial autonomic symptoms; HC: hemicrania continua; O_2: oxygen; s/c: subcutaneous; IV: intravenous; SPGB: sphenopalatine ganglin block; ON: occipital nerve; SON: supraorbital nerve; ION: infraoorbital nerve; MVD: microvascular decompression; s: second; min: minute; wk: week.

Location of SPG is superficial (at a depth of 1-9 mm) in the pterygopalatine fossa, posterior to the middle nasal turbinate, and anterior to the pterygoid canal. It is about 5 mm in size and a 1-1.5 mm-thick layer of connective tissue and mucous membrane covers the ganglion, which can facilitate the spread and penetration of the drug by topical applications with cotton-tip applicator, Tx360® device (Tian Medical Inc., Lombard, IL), or nasal spray applied through the transnasal approach. This noninvasive technique is simpler, is devoid of radiation hazards of fluoroscopic methods, and has minimal side effects (5,6,8).

Various local anesthetic agents have been used for SPGB with most common being lidocaine and bupivacaine (8). Use of 4% lidocaine-soaked cotton-tip applicator through the nares for SPGB was first described for the management of acute episodes of trigeminal neuralgia (9). INL spray for SPGB has previously also been used for migraine, postdural puncture headache, and head and neck cancer pain both in the Emergency Medicine department and in outpatient setting (10-13). Among TAC, use of INL (1 mL, 4% to 10%) is described frequently in CH (4). In a single previous report of HC, the patient underwent a total of 12 SPGBs with the Tx360VR® device (Tian Medical Inc., Lombard, IL) of 0.5% bupivacaine (0.6 mL) for 6 weeks (2 times per week) on the symptomatic side, followed by maintenance treatment every 4-5 weeks. The procedure was done on an OPD basis with use of bupivacaine spray 2 times a week, irrespective of the acute attacks (3). As bupivacaine is a long-acting local anesthetic agent, it might not be useful for immediate relief, especially in TAC of short durations, like SUNCT and SUNA, and in acute attacks of TAC.

In the present series, 4 of the patients reported in acute attacks of HC. In these patients, 0.375% ropivacaine dipped in cotton swabs was inserted intranasally for SPGB, which resulted in 80% to 100% pain relief within 10 minutes. Though the patients reported in acute attacks, ropivacaine swabs rather than INL spray was used initially, mainly for 2 reasons. First, all our patients reported from far-off areas and expressed their inability to report physically again for at least a month. Thus, if found effective, ropivacaine swabs would act both as diagnostic and therapeutic blocks. Second, ropivacaine sprays are not available in our region, and thus INL sprays were supplied to the patients for acute attacks. Use of ropivacaine swab by layman patients was

also not deemed suitable. All patients who responded to ropivacaine swabs were advised to use the INL spray at home for acute attacks and then were telephonically followed up at one week. In the 4 patients of HC, when they reported baseline acute attack NRS-11 was 8-10/10 with baseline continuous NRS-11 of 2-6/10. After 10 minutes, all patients reported 80% to 100% NRS-11 relief in acute attack. In the first week, all patients used INL spray 2-3 times at their homes. This reduced the baseline acute attack NRS-11 to 4-7/10 with baseline continuous NRS-11 of 0-3/10. For the next 3 weeks, all patients were advised to use the INL spray 2 times a day irrespective of the acute attacks. This further reduced the baseline acute attack NRS-11 to 2-5/10 with baseline continuous NRS-11 of 0-2/10. At 3 months follow-up, all patients have reported no acute attacks with baseline continuous pain NRS-11 of 0-2/10. All patients were satisfied with their treatment and have been presently asked to use the INL spray only in acute attacks.

In the fifth patient with probable TAC, the patient had multiple acute attacks a day (roughly 10 times a day) lasting for one second each with NRS-11 10/10, aggravated by touching the periorbital area with associated lacrimation and nasal congestion. She did not have any continuous background pain NRS-11. When she reported she was having multiple attacks for the last 48 hours, 0.375% ropivacaine swab resulted in 100% pain relief within 10 minutes. Patient in the first week used INL about 2 times in a day, which decreased her NRS-11 acute attack to 4/10. She was prescribed INL spray for the next 3 weeks, for 2 times a day. This decreased her NRS-11 to 2/10. Presently, she has been advised to take INL spray on an as-needed basis. Lidocaine works by blocking voltage-gated sodium channels, reducing the excitability of neurons, and thus preventing or decreasing the sensation of pain. Hence, lidocaine provides local anesthesia by blocking SPG transmission. The INL spray causes sensory blockade and parasympathetic nerve blockade, resulting in inhibition of vasodilation and compression of the trigeminal root. Also, there is no reported serious side effects, toxicity, and tachyphylaxis in the literature (14,15).

All the patients in the present case series reported decrease in acute attack pain NRS-11 within 5-10 minutes of using INL spray. The immediate relief with INL spray is also previously reported, wherein relief was achieved within a minute and lasted for 29 minutes in the Emergency Medicine department presentation of headaches (10).

The present case series suggests the role of 10% INL spray both in acute attacks and continuous background pain NRS-11 in TAC, especially HC. It is particularly effective in decreasing both frequency and intensity of TAC attacks. INL spray has various advantages, like rapid relief, easy portability, no serious side effects, noninvasive, and ease of self-administration. Hence, it can be used as a treatment modality of TAC rather than invasive SPG, especially when conventional pharmacotherapy is not tolerated or contraindicated.

CONCLUSIONS

Ten percent INL spray may be used as a noninvasive treatment modality for HC and probable TAC, both for acute attacks and decreasing basal continuous pain. Further studies are needed to prove efficacy of noninvasive SPGB with 10% INL spray in other subtypes of TACs.

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