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Case report

A transformation of trigeminal neuralgia into SUNCT/SUNA: A case report and literature review

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Abstract

Introduction

Trigeminal neuralgia and Short-lasting Unilateral Neuralgiform Headache with Conjunctival injection and Tearing (SUNCT)/Short-lasting Unilateral Neuralgiform Headache Attacks with Cranial Autonomic Symptoms (SUNA) are characterized by similar clinical manifestations, which may lead to diagnostic confusion. However, the transformation of trigeminal neuralgia into SUNCT/SUNA is a rare phenomenon. This report describes a case of trigeminal neuralgia transformation into SUNCT/SUNA due to neurovascular compression and reviews all previously published cases of trigeminal neuralgia to SUNCT/SUNA transformation in the literature.

Case presentation

A 49-year-old Thai male patient presented with progressive right facial pain for a period of three months. One year prior, he developed trigeminal neuralgia along the maxillary branch of the trigeminal nerve, characterized by electrical shock-like pain in the right upper molar, exacerbated by eating. His symptoms were effectively managed with carbamazepine. Nine months later, he began experiencing recurrent electrical shock-like pain along the ophthalmic division of the right trigeminal nerve, accompanied by lacrimation, which failed to respond to continued treatment with carbamazepine. Three months prior to presentation, his symptoms evolved into SUNCT/SUNA, characterized by electrical shock-like pain in the right periorbital area and conjunctival injection, lacrimation. Neuroimaging revealed high-grade neurovascular compression of the right trigeminal nerve by the right superior cerebellar artery. The patient's symptoms resolved following microvascular decompression.

Conclusion

Clinicians should be aware that patients with longer disease duration of trigeminal neuralgia who develop new neuralgic pain in the ophthalmic branch division with mild autonomic symptoms may be at risk for transformation into SUNCT/SUNA.

Keywords:
SUNCT
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Introduction

Classical trigeminal neuralgia (TN), a craniofacial pain syndrome, is caused by neurovascular compression of the trigeminal nerve. It is characterized by recurrent paroxysmal episodes of unilateral, brief electric shock-like, stabbing, or sharp pain that is limited to the distribution of the trigeminal nerve. These attacks typically last between 1-120 seconds and may occur up to 50 times per day. The attacks with a refractory pattern may be precipitated by mechanical maneuvers at the cutaneous trigger zone in the trigeminal distribution.[1] In some cases of TN, especially involving the ophthalmic branch, cranial autonomic symptoms (CASs) such as conjunctival injection, lacrimation, nasal congestion, eyelid edema, facial sweating, or miosis may be observed. These CASs are typically not prominent and are considered secondary to head pain.[2,3] However, severe CASs may be present in patients with severe and advanced stages of TN. While short-lasting unilateral neuralgiform headache with conjunctival injection and tearing (SUNCT) or Short-lasting unilateral neuralgiform headache attacks with cranial autonomic symptoms (SUNA) syndrome is a headache syndrome characterized by recurrent, paroxysmal episodes of unilateral, brief stabbing, burning, or electrical shock-like sensations in the orbital-periorbital area. These episodes are typically associated with ipsilateral, prominent cranial autonomic symptoms at onset, and can last between 5-250 seconds. They may also be precipitated by cutaneous stimulation within the trigeminal distribution.[1]

The clinical manifestation and management overlap between TN and SUNCT/SUNA are well established.[4-6] These overlapping may support the evidence that these two entities may represent a spectrum of the same disorder. Moreover, the natural history of the transformation of TN to SUNCT/SUNA, a rarely reported phenomenon, will further strengthen a continuum of these maladies. We herein described a case report of the patient who had the earliest transformation of TN to SUNCT/SUNA and reviewed all the published cases of TN - SUNCT/SUNA transformation in the literature. These communications may shed light on a continuum of these two entities and may stimulate further studies on this issue.

Case Presentation

A 49-year-old Thai male construction worker presented to a general neurology clinic with a complaint of worsening right facial pain for a duration of 3 months. One year prior to presentation, he developed electrical shock-like pain in his right upper molars while eating, which prompted him to stop chewing in order to alleviate the pain, which completely resolved within 2 minutes. He had a refractory period during the attacks, characterized by the ability to resume his meal without triggering another immediate pain episode. These symptoms recurred on a frequency of 5-6 times daily. He was subsequently evaluated by a dentist in which dental examination was normal. He was subsequently referred to a neurologist, where a diagnosis of TN was established. He was prescribed carbamazepine 200 mg/day, which completely relieved his symptoms.

Three months after the initial diagnosis and treatment of trigeminal neuralgia, the patient developed a new electrical shock-like pain in the right periorbital region, cheek, nose and forehead. The pain had a duration of 1-2 minutes and occurred 20-25 times per day. Accompanying the severe pain was tearing from the right eye, but no reported redness of the eye was reported. The pain seemed to be aggravated by chewing and gently touching his right cheek and relieved by puffing his cheeks. Despite an increase in the dosage of carbamazepine to 400 mg/day, there was no improvement in the patient's symptoms.

Three months prior to presenting at the clinic, his pain was limited to the right periorbital region and did not involve any other areas. The attacks of pain, characterized by tearing and redness of the right eye, occurred with increased frequency and severity, lasting less than 5 seconds and occurring approximately 40-50 times per day, specifically in relation to eating and speaking. Burning pain frequently followed each electrical shock-like pain episode. Due to the debilitating nature of the pain, the patient was unable to work and sought medical attention at our clinic.

Physical examination conducted during an episode of pain revealed right conjunctival injection, in addition to excessive tearing and ptosis of the right eye. Magnetic resonance imaging (MRI) of the brain revealed high-grade neurovascular compression of the superior aspect of the root entry zone of the right trigeminal nerve by the right superior cerebellar artery loop (Fig.1). The patient underwent microvascular decompression surgery utilizing the standard suboccipital approach. Compression at the root exit zone of the right trigeminal nerve by the right superior cerebellar artery loop was confirmed during the surgery. No evidence of arachnoiditis surrounding the cranial nerves was identified. Microsurgical dissection was performed to separate the affected nerves from the superior cerebellar artery loop, followed by placement of Teflon® as a shock absorber between the nerves and the artery. The patient achieved pain remission with no recurrence of

symptoms during the two-year follow-up period.

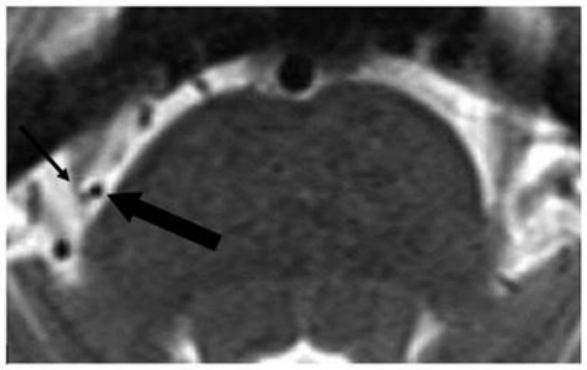

Figure 1. An axial 3D-FIESTA magnetic resonance imaging scan at the level of the pons demonstrated compression of the right trigeminal nerve by the superior cerebellar artery (indicated by a thick arrow), resulting in downward bowing and atrophy of the nerve (indicated by a thin arrow).

Discussion

Co-occurrence of trigeminal autonomic cephalalgia and TN can be recognized especially co-occurrence cluster headache and TN which is called "cluster tic syndrome". Nevertheless, co-occurrence of SUNCT/SUNA and TN was rarely reported and transformed TN to SUNCT/SUNA was extremely rare. We described a case report of transformed TN to SUNCT/SUNA because this case could be divided into phases of this spectrum and each phase is not interphase.

Our patient initially presented with symptoms consistent with classical TN. However, as the course of the pain changed, the characteristics of the pain, including the affected area and associated symptoms, underwent a transformation that was indicative of SUNCT. Through the use of microvascular decompression surgery, the patient's symptoms were effectively abated and did not recur over a two-year follow-up period. This case serves as evidence of the potential for neurovascular compression of the right superior cerebellar artery on the right trigeminal nerve to give rise to a progression of symptoms from TN to SUNCT syndrome.

The clinical manifestations of our patient in the case report can be divided into three stages. In the first stage, his pain fulfilled classical TN along with the maxillary distribution of the trigeminal nerve. In the second stage, the pain developed to the ophthalmic branch of the trigeminal nerve, accompanied by lacrimation that was compatible with TN associated with SUNCT/SUNA. In the last stage, the pain character and autonomic symptoms fulfilled the criteria of SUNCT/SUNA. This progression is similar to that described in the first case report of SUNCT syndrome arising from TN by Bouhasssina et al.[7]

Cases of transformation TN to SUNCT/SUNA have been rarely reported. To our knowledge, our patient is the case that has the shortest period of transformation from TN to SUNCT/SUNA. Searching the MEDLINE database for cases of transformation from TN to SUNCT/SUNA, a total of 6 published cases were identified (Table 1)[7-11]

Table 1. Five published cases of transformed TN into SUNCT/SUNA

Case report	Bouhassira et al.[7]	Benoliel and Sharav[8]	Sesso[9]	Rinaldi et al.[10]	Khan et al.[11]	Our case
Demographic data						
Age/Sex	63/M	57/F	60/M	61/F	54/M	49/M
TN character						
Onset	10 yr. before presentation	17 yr. before presentation	4 yr. before presentation	1 yr. 10 mo. before presentation	10 yr. before presentation	1 yr. before presentation
Location	Right Supraorbital region	Left maxillary region	Left supraorbital region	Right frontal-orbital region	Right side sensory distribution area of trigeminal nerve	Right upper molar region
Character	Electrical shock-like, Stabbing	Electrical shock-like	Electrical shock-like, Pressure-like	Stabbing-throbbing	Sharp	Electrical shock-like
Duration	30-60 s	10-15 s	< 1 s	Seconds	1 s – 3 min.	Within 2 min.
Frequency	3-6 times/day	N/A	Several times/day	20 times/day	4-5 time/day	5-6 times/day
Trigger	Light touch at ipsilateral frontal-orbital area	Light touch at left upper lip, infraorbital area	Light touch on ipsilateral scalp, bridge nose area, talking, swallowing, chewing	Light touch frontal-orbital area	Ipsilateral touch at the skin and hair	Eating
Bout duration	N/A	No	4-10 months	10-20 days	3 weeks	No
Remission period	N/A	No	3-6 months	N/A	2 weeks	No
Drug	CBZ 600 mg/day	CBZ unknown dose	Home remedies	CBZ 600 mg/day, LTG 125 mg/day, PGB 300 mg/day	OXC 900 mg/day	CBZ 200 mg/day

continuation Table1

Outcome	Complete relieved for 1 yr.	Successful but produced severe side effect	N/A	Ineffective	Complete relieved	Complete relieved
Other headache type before developing pure SUNCT/SUNA character						
Type	TN associated with SUNCT/SUNA	N/A	N/A	TN associated with SUNCT/SUNA	TN associated with Cluster headache	TN associated with SUNCT/SUNA
Onset	8 yr. before presentation	N/A	N/A	3 mo. before presentation	1 yr. before presentation	9 mo. before presentation
Location	Right V1 and V2 distribution	N/A	N/A	Right frontal-orbital area and wing of the nose	Right eye	Right periorbital, cheek, nose and forehead
Character	Electrical shock-like, Stabbing	N/A	N/A	Stabbing-throbbing	Sharp	Electrical shock-like
Autonomic symptom	Lacrimation, Ipsilateral conjunctival injection, rhinorrhea	N/A	N/A	Lacrimation and rhinorrhea	Conjunctival injection, rhinorrhea	Lacrimation
Duration	N/A	N/A	N/A	< 5 seconds or 10-15 seconds	60-90 minutes	1-2 minutes
Frequency	N/A	N/A	N/A	N/A	5-6 times/day	20-25 times/day
Trigger	Light touch at ipsilateral supraorbital, ala of the nose and the upper lip, chewing, brushing the teeth, shaving	N/A	N/A	Light touch at supraorbital and cheek, chewing, face washing, routine physical activity	None	Light touching at right cheek, chewing
Treatment	Ergotamine and acupuncture	N/A	N/A	Indomethacin 200 mg/day, LTG 125 mg/day, PGB 300 mg/day, OXC 600 mg/day	Verapamil 720 mg/day	CBZ 400 mg/day
Outcome	Partial relieved	N/A	N/A	Ineffective	Marked improvement	Ineffective
SUNCT/SUNA character						
Onset	6 yr. before presentation	At arrival	At arrival	Follow-up at 7th mo.	At arrival	3 mo. before presentation
Interval transform TN to SUNCT	4 yr.	17 yr.	4 yr.	1 yr. 7 mo.	10 yr.	9 mo.
Location	Right supraorbital, orbital region	Left maxillary region	Left ocular region	Right periorbital region	Right eye region radiating to teeth	Right periorbital region
Character	Electrical shock-like	Electrical shock-like	Excruciating burning or stabbing	Stabbing-throbbing	Stabbing, electrical shock-like	Electrical shock-like, burning
Autonomic symptom	Lacrimation, conjunctival injection, rhinorrhea	Lacrimation, nasal congestion	Lacrimation, conjunctival injection	Lacrimation, rhinorrhea	Lacrimation, conjunctival injection, rhinorrhea, periorbital edema, miosis, facial redness	Lacrimation, conjunctival injection
Duration	<5 or 10-15 s	10-15 s	10 sec. to 1 min.	Few seconds	10-15 min.	< 5 s
Frequency	20-30 times/day	N/A	1-8 times/hour	20 times/days	25 times/day	40-50 times/day
Trigger	Light touch at ipsilateral supraorbital area, ala of the nose and upper lip, eating, head movement mostly backward direction	Light touch at left upper lip	Talking, chewing, swallowing	Light touch at supraorbital and cheek, chewing, face washing	Speaking, eating and tooth brushing	Speaking, eating
Treatment	Amitriptyline 60 mg/day	Local anesthesia at trigger zone, Bacloten 40 mg/day, CBZ 100 mg/day	VPA 1500 mg/day, Prednisolone 40 mg/day, Nortriptyline 25 mg/day	CBZ 600 mg/day	MVD	MVD
Outcome	50% partial relieved	Complete relieved for 2 yr.	Complete relieved for 40 days	Marked improvement	Complete relieved for 4 yr.	Complete relieved for 2 yr.
Investigation						
MRI brain	N/A	Normal	N/A	Neurovascular contact between the right superior cerebellar artery and upper surface of the right trigeminal nerve	Neurovascular compression between basilar artery loop and the right trigeminal nerve	Neurovascular compression between right superior cerebellar artery and superior surface of the root entry zone of the right trigeminal nerve

CBZ:carbamazepine, F: female, LTG: lamotrigine, M: male, MVD: microvascular decompression min: minutes, mo.: months, MRI: magnetic resonance imaging, N/A: not available, OXC: oxcarbamazepine, SUNCT/SUNA: Short-lasting unilateral neuralgiform headache with conjunctival injection and tearing or Short-lasting unilateral neuralgiform headache attacks with cranial autonomic symptoms syndrome, s: seconds, TN: trigeminal neuralgia, yr.: years, PGB: pregabalin, VPA: valproic acid,

The majority of these cases were male (4/6) with a median age of presentation of 68. The median transformation duration from TN to SUNCT/SUNA was 4 years. In terms of the trigeminal neuralgia character, three of the six patients had pain affecting the ophthalmic branch of the trigeminal nerve. Most of the patients (4/6) developed TN associated with SUNCT/SUNA before transitioning to a pure SUNCT/SUNA syndrome. In terms of SUNCT/SUNA characteristics, the majority of patients (5/6) had pain localized to the periorbital/orbital region. Autonomic symptoms of SUNCT/SUNA were primarily lacrimation (6/6), conjunctival injection (4/6), and rhinorrhea (3/6). Three of the six patients had evidence of neurovascular compression on imaging and experienced improvement following microvascular decompression surgery.

Owing the similarity in clinical manifestations between TN and SUNCT/SUNA syndrome, the pain characteristics, attack duration, frequency, quality, and trigger factors are often indistinguishable between the two conditions. However, SUNCT/SUNA was usually located along with ophthalmic distribution, particularly the orbital and supraorbital region, lacks a refractory period, and exhibited more prominent autonomic symptoms, especially lacrimation and conjunctival injection.[4] While TN along the ophthalmic branch may also present with autonomic symptoms, particularly in advanced stages of the disease and during severe and prolonged attacks.[12] Despite these similarities, the pathophysiology of TN and SUNCT/SUNA differ. TN is thought to be caused by a peripheral mechanism of spontaneous impulse generation and ephaptic transmission due to demyelination of the cranial nerve resulting from neurovascular compression of normal vascular structures, particularly the superior cerebellar artery, at the root entry zone of the trigeminal nerve.[13] In contrast, SUNCT/SUNA is thought to be caused by central mechanisms of hypothalamic dysfunction, as evidenced by functional MRI studies showing ipsilateral activation of the hypothalamus in SUNCT/SUNA patients.[14] Nevertheless, the cases of TN transforming into SUNCT/SUNA suggest a relationship between the pathophysiology of these two entities through their natural course.

Based on our case report and literature review, it appears that TN may have a relationship with SUNCT/SUNA. In most cases, patients have pain along the ophthalmic branch of trigeminal nerve with a longer disease duration followed by cranial autonomic symptoms that could be transformed into SUNCT/SUNA. The mechanism behind this transformation may be related to dysfunction within the central nervous system, specifically the autonomic pathway. The constant stimulation of the trigeminal nerve, particularly the ophthalmic branch which has more cranial autonomic fibers, may lead to a central disinhibition of the trigeminal autonomic reflex through hypothalamic activation.[15]

Conclusion

TN and SUNCT/SUNA may not be distinct entities, but rather two diseases on the same continuum. However, the transformation of TN into SUNCT was uncommon. Other reports are required to connect the two clinical syndromes and create a pathogenesis for both.

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