J Cancer Allied Spec 2022;8(1):5

Case Report

Secondary Trigeminal Neuralgia: A Case Report and Literature Review of Red Flags

Khawaja Shehryar Nasir[1], Muhammad Atif Naveed[2]

[1]Department of Internal Medicine, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan, [2]Department of Radiology, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan

Received: 19 December 2021/Accepted: 29 December 2021

Correspondence:
Khawaja Shehryar Nasir, 7A Block R-3, Phase 2, M.A. Johar Town, Lahore, Punjab, Pakistan, 54782.
E-mail: shehryarnasir@skm.org.pk

Citation: Nasir KS, Naveed MA. Secondary Trigeminal Neuralgia: A Case Report and Literature Review of Red Flags. J Cancer Allied Spec [Internet]. 2022 Dec 29;8(1):1-5.e1002957. https://doi.org/10.37029/jcas.v8i1.455

Funding: The authors received no financial support for the research, authors

Competing interest: Nil.

Abstract

Introduction: Trigeminal neuralgia (TN) is characterised by recurrent paroxysmal brief episodes of electric shock-like pain along the trigeminal nerve distribution. Based on the underlying cause, the current classification systems have classified TN into idiopathic, classical and secondary TN. This manuscript presents a case report of a patient seen in the clinic with features of TN secondary to an intracranial lesion. **Case Description:** A 39-year-old female presented to the clinic with a 15-month history of severe, intermittent, short-lasting episodes of pain affecting the left lower teeth, jaw, nose and temporal region. The patient reported familiar shock-like pain during the physical examination when the skin of the left ala of the nose was lightly touched. The rest of the clinical examination was non-significant. The magnetic resonance imaging (MRI) of the brain showed an approximately 20 mm wide lesion at the level of the left cerebellopontine angle. After subsequent tests, the lesion was diagnosed as meningioma, and the patient was treated with stereotactic radiation therapy. **Practical Implications:** In up to 10% of TN cases, the underlying cause can be due to a brain tumour. Although persistent pain, sensory or motor nerve dysfunction, gait disturbances and other neurological signs may concurrently exist, raising a red flag for intracranial pathology, patients often present with pain alone as the heralding symptom of a brain tumour. Due to this, it is imperative that all patients suspected of having TN undergo an MRI of the brain as part of the diagnostic work-up.

Key words: Facial pain, meningioma, neuralgia, stereotactic radiation therapy, trigeminal neuralgia

Introduction

Trigeminal neuralgia (TN) is characterised by recurrent episodes of unilateral brief electric shock-like shooting pain that are paroxysmal in onset and termination. These episodes are localised to the distribution of at least one of the trigeminal nerve divisions and innocuous stimuli trigger pain. In some cases, the paroxysmal pain may occur in concurrence with a background continuous or near-continuous pain within the distribution of the affected divisions of the trigeminal nerve.[1,2]

Based on the underlying cause, the International Classification of Orofacial Pain (ICOP) and the International Classification of Headache Disorders,

3rd Edition (ICHD-3) have classified TN into three main categories: A classical type, which is associated with nerve damage from neurovascular compression; a secondary type, which is caused by an underlying disease such as a tumour, arteriovenous malformation or demyelinating disease and an idiopathic type that has no identifiable underlying pathology.[3,4]

This paper presents a case report of a patient seen in the clinic with features of TN secondary to an intracranial lesion. Consent for publication was taken from the patient, and the hospital Institutional Review Board approved the proposal for publication for this case report.

Case Description

A 39-year-old female presented to the clinic with a 15-month history of pain affecting the left lower teeth, jaw, nose and temporal region. The pain was paroxysmal in onset and described as electric and shooting in nature. On a verbal pain rating scale, in which 0 represents no pain and 10 is defined as the worst pain possible, the intensity of pain episodes was rated as 10 out of 10. The pain episodes were preceded by a non-painful tingling sensation in the lower teeth, which would persist for a few seconds and then be followed by a painful jolt across the left side lower and upper teeth and infraorbital region for up to 15 minutes. Occasionally, the pain may radiate toward the ipsilateral ear and temporal area. The frequency of episodes varied and was dependent on the provoking factors. Nonetheless, it presented at least 10 times a day. The pain was provoked by light touching or washing of the face over the left nostril or if a cold breeze felt against the face. There were no reports of numbness, resting pain or tingling sensation, regional muscle weakness or additional sensory, motor or autonomic symptoms.

At the time of onset of her symptoms, the patient first visited her local dentist. She was diagnosed with reversible pulpitis of the mandibular left second and third molars. The dentist restored the teeth, but this did not resolve the pain. The teeth were subsequently extracted. When the symptoms did not resolve, the patient was referred to a neurologist. The neurologist performed an extensive assessment and ordered magnetic resonance imaging (MRI) study of the brain without contrast. The results of the MRI were suggestive of an intracranial lesion on the left cerebellopontine angle. The patient was prescribed carbamazepine 200 mg 3 times a day and referred to a tertiary care cancer centre for further management.

The rest of the medical history of the patient was non-contributory. At the time of her visit to the cancer centre, the patient had discontinued carbamazepine 200 mg because she had developed a generalised rash over her face and arms using the medication.

On physical examination, no gross head-and-neck asymmetry, discolourations, lesions or masses were observed in the head-and-neck region. The mandibular and cervical ranges of motions were within normal limits and without any pain or discomfort. The patient did not report any pain with palpation of masticatory and cervical muscles or temporomandibular joints. The patient reported familiar shock-like pain when the skin overlying the left ala of the nose was lightly touched. The episode of pain persisted for nearly 1 minute. The cranial nerves (II-XII) and the spinal nerves (C2-T1) function were intact. The left side mandibular second and third molars were missing, and the overlying alveolar mucosa was pink and normal in appearance. There was no tenderness or pain provoked on palpation of this area. The rest of the dentition was sound. The rest of the examination was within normal physiological limits.

Diagnosis and Management

Based on the medical history, examination and the initial MRI brain study report, the patient was preliminary diagnosed with secondary TN attributed to space-occupying lesion. The patient did not have previous MRI brain study films, and based on the report alone, the pathophysiology of the lesion could not be established.

On recommendation of the neurologist, the patient underwent a repeat MRI brain, and three-dimensional (3D) T2-weighted images and 3D T1 post-contrast images were obtained. They were significant for a 2.2 cm × 1.7 cm circumscribed lesion in the left cerebellopontine angle cistern, which was hypointense on the T2-weighted images [Figure 1]. It was causing a mild mass effect on the left pons. The lesion was not extending into the left cavernous sinus. The neuroradiologist concluded that the differential diagnosis included aneurysm, meningioma and schwannoma and recommended an angiogram for further evaluation.

A computed tomography (CT) brain angiogram was performed. This was significant for a partially calcified extra-axial meningioma along the upper end of the clivus and the posterior aspect of the left petrous ridge apex. This extended along with the left tentorial leaflet, with a mass effect on the adjacent brainstem and cerebellar pontine angle. A relatively homogeneous post-contrast enhancement was seen within this lesion which measured up to 2 cm. This was in close approximation with the posterior margin of the cavernous sinus. Adjacent vessels were outlined normally. No evidence of intracranial aneurysm or arteriovenous malformation was noted [Figure 2].

Based on the MRI brain study and CT angiogram findings, this lesion was definitively diagnosed as a meningioma. The case was discussed in a multidisciplinary tumour board, and it was decided that she would be treated using stereotactic radiosurgery. The patient underwent 25 grey units of radiation in five fractions.

Following radiation therapy, the patient developed intermittent burning pain over the left side of the face and head. The pain presented for hours in association with episodes of facial twitching, paraesthesia, ipsilateral lacrimation, rhinorrhoea and conjunctival injection. She underwent a repeat MRI brain study after 1.5 months of radiation therapy, and the study suggested no change in size, signal or any other imaging characteristic of the lesion. For her persistent symptoms of pain

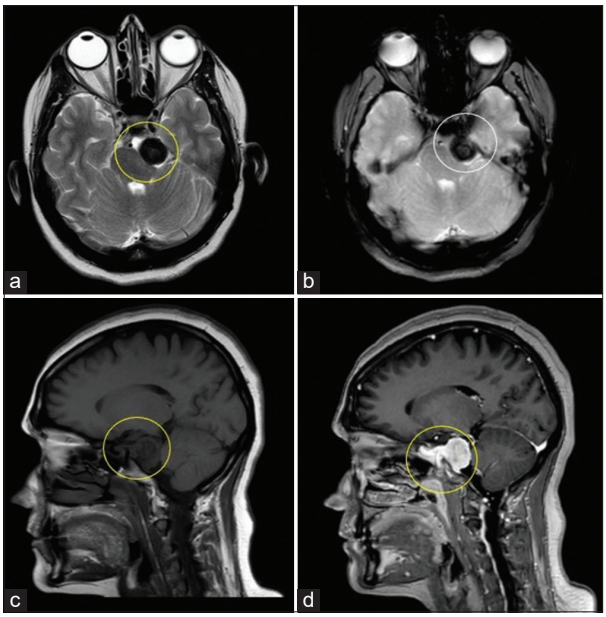

Figure 1: (a) Axial T2-weighted, (b) gradient recalled echo (GRE), (c) sagittal T1-weighted and (d) sagittal T1-weighted post-gadolinium magnetic resonance images of the brain at the level of cerebellopontine angle cistern show a circumscribed enhancing mass at the left cerebellopontine angle cistern which is hypointense on the T1- and T2-weighted images (yellow rings) and '*blooms*' on the GRE sequence, indicating internal calcification (white ring)

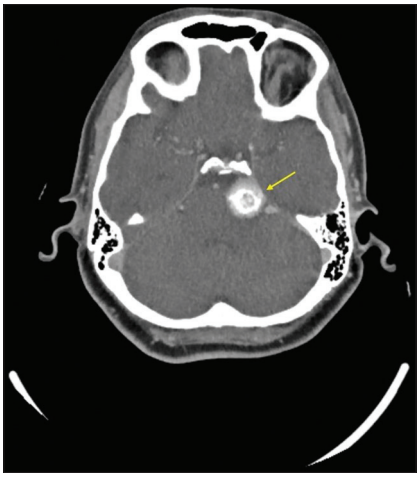

Figure 2: Axial computed tomography angiogram image of the brain at the level of cerebellopontine angle cistern is revealing a circumscribed mass at the left cerebellopontine angle cistern with central internal calcifications and mild peripheral contrast enhancement (yellow arrowhead). No direct communication with the major artery such as the left posterior cerebral artery is noted

related to secondary TN, the patient was prescribed lamotrigine 25 mg 3 times a day and pregabalin 50 mg 3 times a day, which helped obtain optimal pain control. The episodes of facial twitching, ipsilateral lacrimation, rhinorrhoea and conjunctival injection resolved after 3 months. However, she continued to have regional paraesthesia.

Discussion

The ICOP and the ICHD-3 diagnostic criteria for secondary TN consist of severe, recurrent paroxysms of unilateral electric shock-like, shooting, stabbing or sharp pain, lasting for up to 2 minute, precipitated by innocuous stimuli within the affected trigeminal distribution, with or without concomitant continuous or near-continuous pain, in the presence of an underlying disease that is known to be able to cause the neuralgia.[3,4] Furthermore, the classification systems have explained uncommon variations and definitions in the sub-notes. For example, in a minority of patients, pain may last for longer than 2 minute. MRI is the best modality to detect the underlying cause for secondary TN, and the recognised causes for secondary TN are tumours in the cerebellopontine angle, arteriovenous malformations and multiple sclerosis.[3,4] Thus, the case described in the present study met the diagnostic criteria for secondary TN.

Up to 10% of TN cases have been reported to be secondary to brain tumours.[5] Meningioma, acoustic neuroma, epidermoid tumour, pituitary tumour, glioma, lymphoma, arachnoid cyst and schwannoma are the most frequent tumours associated with the secondary TN.[1,5] The pathophysiology of the secondary TN is similar to that of idiopathic or classical TN.[6] Histological studies have suggested that the tumour can cause partial trigeminal nerve injury or ganglion. This can cause the formation of focal areas of axonal demyelination, dysmyelination or remyelination, which may regenerate spontaneous action potentials or cause abnormal coupling between primary afferents (ephaptic transmission).[1,6,7] Rarely, TN may result from contralateral tumours of the posterior fossa.[8-10] It is hypothesised that a contralateral tumour may result in distortion and displacement of the brain stem and subsequently compression of the contralateral Meckel's cave.[9,10]

In addition to classical features of TN, patients with secondary TN usually present with sensory nerve dysfunction (numbness, dysesthesia or paraesthesia), motor nerve weakness (complete or partial paralysis), persistent pain, bilateral pain distribution and gait disturbances. However, the onset of pain often proceeds the development of neurological deficits by years.[5,11] In a retrospective review of nearly 3000 TN cases, no differences were observed in sex and pain characteristics between the primary (classical or idiopathic) TN and secondary TN. However, the patients presenting with TN secondary to tumours were younger.[5] Despite that, there was a significant overlap in the ages of the patients from the two groups, which shows that this variable alone has poor sensitivity.[2,5,6,12] Similarly, investigations studying the diagnostic accuracy of other clinical characteristics for distinguishing primary from secondary TN have been unable to find any clinical feature that may have a high sensitivity for identifying secondary TN.[6,12,13] Because of this, in the recent guidelines by the European Academy of Neurology on TN, a strong recommendation for MRI has been made as part of the workup in TN patients. If MRI is unavailable or contraindicated, a CT scan with contrast should be considered to rule out tumours.[2]

Meningiomas are the most common primary tumor of the brain. Gross total resection is the preferred treatment.[14,15] However, radiation therapy is the treatment of choice if surgery is unachievable with minimal morbidity. Stereotactic radiotherapy (SRS) has an excellent 5-year tumour control rate of greater than 90%.[15] Pain relief after SRS typically occurs after a delay for up to 3 weeks. However, this modality can result in significant pain relief in up to 82% of the cases.[16,17] Sensory dysfunction such as numbness, paraesthesia or dysesthesia is frequent complications of SRS.[17] Similar findings were observed in the present case. The patient had

a delay of nearly 10 weeks before she felt significant relief in the paroxysmal pain episodes, and she developed multiple sensory disturbances during the recovery period.

Up to 10% of TN cases have been reported to be secondary to an underlying brain tumour. Although sensory or motor nerve dysfunction, gait disturbances and other neurological signs may concurrently exist and raise a red flag for intracranial pathology, patients may often present with pain alone as the heralding sign of an underlying brain tumour. Due to this, all patients suspected of having TN must undergo an MRI of the brain as part of the diagnostic work-up.

References

1. Bajwa ZH, Smith SS, Khawaja SN, Scrivani SJ. Cranial neuralgias. Oral Maxillofac Surg Clin North Am 2016;28:351-70.
2. Bendtsen L, Zakrzewska JM, Abbott J, Braschinsky M, di Stefano G, Donnet A, *et al*. European academy of neurology guideline on trigeminal neuralgia. Eur J Neurol 2019;26:831-49.
3. International classification of orofacial pain, 1st edition (ICOP). Cephalalgia 2020;40:129-221.
4. Headache classification committee of the international headache society (IHS) the international classification of headache disorders, 3rd edition. Cephalalgia 2018;38:1-211.
5. Cheng TM, Cascino TL, Onofrio BM. Comprehensive study of diagnosis and treatment of trigeminal neuralgia secondary to tumors. Neurology 1993;43:2298.
6. Bendtsen L, Zakrzewska JM, Heinskou TB, Hodaie M, Leal PRL, Nurmikko T, *et al*. Advances in diagnosis, classification, pathophysiology, and management of trigeminal neuralgia. Lancet Neurol 2020;19:784-96.
7. Devor M, Amir R, Rappaport ZH. Pathophysiology of trigeminal neuralgia: The ignition hypothesis. Clin J Pain 2002;18:4-13.
8. Haddad FS, Taha JM. An unusual cause for trigeminal neuralgia: Contralateral meningioma of the posterior fossa. Neurosurgery 1990;26:1033-8.
9. Cheng WC, Chang CN. Trigeminal neuralgia caused by contralateral supratentorial meningioma. J Clin Neurosci 2008;15:1162-3.
10. Florensa R, Llovet J, Pou A, Galitó E, Vilato J, Colet S. Contralateral trigeminal neuralgia as a false localizing sign in intracranial tumors. Neurosurgery 1987;20:1-3.
11. Puca A, Meglio M. Typical trigeminal neuralgia associated with posterior cranial fossa tumors. Ital J Neurol Sci 1993;14:549-52.
12. Liu P, Liao C, Zhong W, Yang M, Li S, Zhang W. Symptomatic trigeminal neuralgia caused by cerebellopontine angle tumors. J Craniofac Surg 2017;28:e256-8.
13. Nomura T, Ikezaki K, Matsushima T, Fukui M. Trigeminal neuralgia: Differentiation between intracranial mass lesions and ordinary vascular compression as causative lesions. Neurosurg Rev 1994;17:51-7.
14. Lobato RD, Gonzaáez P, Alday R, Ramos A, Lagares A, Alen JF, *et al*. Meningiomas of the basal posterior fossa. Surgical experience in 80 cases. Neurocirugia (Astur) 2004;15:525-42.
15. Elia AE, Shih HA, Loeffler JS. Stereotactic radiation treatment for benign meningiomas. Neurosurg Focus 2007;23:E5.
16. Young RF, Vermeulen SS, Grimm P, Blasko J, Posewitz A. Gamma knife radiosurgery for treatment of trigeminal neuralgia: Idiopathic and tumor related. Neurology 1997;48:608-14.
17. Sheehan J, Pan HC, Stroila M, Steiner L. Gamma knife surgery for trigeminal neuralgia: Outcomes and prognostic factors. J Neurosurg 2005;102:434-41.

Authors' Contributions

Conceived and designed the analysis: KSN and MAN. Collected the data: KSN and MAN. Contributed data or analysis tools: KSN and MAN. Performed the analysis: Not applicable. Wrote the paper: KSN and MAN.