

CLINICAL IMAGE

PEER REVIEWED | OPEN ACCESS

Involvement of cranial nerve V (trigeminal nerve) in multiple sclerosis

Kapil Chaudhary, Sepehr Zekavaty, Kathleen Xu,
Sunny Mahesh, Atul Eppurath, Ritu Bordia

CASE REPORT

Here we present a case report of cranial nerve (CN) V (trigeminal nerve) involvement in multiple sclerosis (MS) at initial presentation. A 53-year-old African American male who initially sought medical assistance due to episodes of intermittent left facial pain. The discomfort, characterized by a burning, throbbing sensation in the cheek that occasionally spread to the forehead and neck, prevented him from adopting a flat sleeping position. His painful episodes, recurring up to 10 times daily, would typically last between 30 and 45 seconds. There was no history of facial trauma, and his initial physical examination and blood work were negative for any significant abnormality. Given symptoms localized to the trigeminal nerve distribution, trigeminal neuralgia (TN) was the primary concern. Subsequent magnetic resonance imaging (MRI) and a cerebrospinal fluid (CSF) analysis revealed abnormalities confirming multiple sclerosis (MS). No external compression to the left-sided facial or trigeminal nerve or vascular abnormality such as vascular loops involving trigeminal nerve was identified on contrast-enhanced MRI brain.

Magnetic resonance imaging demonstrated several T2/fluid attenuated inversion recovery sequence (FLAIR)

hyperintense supra and infratentorial demyelinating plaques in bilateral periventricular and subcortical white matter, callosal interface (Figure 1A and B), and cervicothoracic spinal cord (not shown). None of these lesions demonstrated abnormal enhancement. However, abnormal enhancement and restricted diffusion was noted at the root entry zone (REZ) and cisternal segment of trigeminal nerve extending to the Meckel's cave (Gasserian ganglion) (Figure 2A and B). These findings were consistent with active inflammation of the left trigeminal nerve, presumed secondary to MS.

The patient's therapeutic regimen began with Avonex (interferon beta-1a), transitioning to Gilenya (sphingosine 1-phosphate receptor modulator), and finally to Aubagio (Teriflunomide, a pyrimidine synthesis inhibitor). Unfortunately, persistent facial pain proved resistant to previous treatments, which included intravenous (IV) methylprednisolone, Lyrica (Pregabalin), Gabapentin, Amitriptyline, and Vimpat (Lacosamide). Carbamazepine demonstrated efficacy but was discontinued due to side effects like skin rashes and fever. Nine years into his disease, the patient underwent CyberKnife treatment for left-sided TN, resulting in a marked improvement in his facial pain and insomnia.

Kapil Chaudhary¹, Sepehr Zekavaty², Kathleen Xu², Sunny Mahesh², Atul Eppurath¹, Ritu Bordia³

Affiliation: ¹PhD, Resident physician, Department of Radiology, SSM Health Academic Division, Saint Louis University, St. Louis, Missouri, USA; ²Medical Student, Saint Louis University, St. Louis, Missouri, USA; ³MD, MPH, Department of Radiology, Indiana University School of Medicine, Indianapolis, Indiana, USA.

Corresponding Author: Kapil Chaudhary, MD, PhD, Department of Radiology, SSM Health Academic Division, Saint Louis University, 3691 Rutger Street, St. Louis, MO 63110, USA; Email: drkapil.chaudhary@gmail.com

Received: 05 September 2023

Accepted: 19 October 2023

Published: 16 November 2023

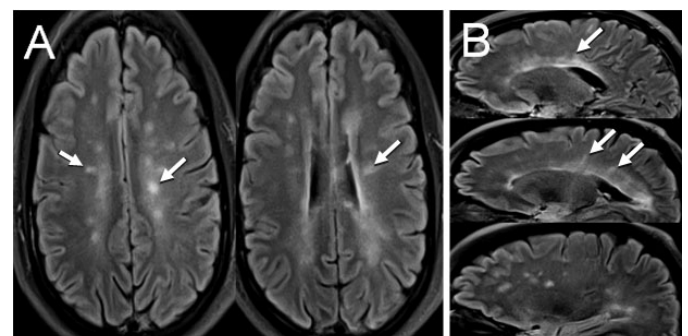


Figure 1: (A) Brain MRI axial images of T2/FLAIR sequence demonstrating several hyperintense lesions in the periventricular and subcortical white matter of bilateral frontal and parietal lobes. (B) Brain MRI sagittal images of T2/FLAIR sequence demonstrating several demyelination plaques in the corpus callosum (Dawson's fingers, see arrows), bilateral cingulate gyri as well as in the subcortical white matter of bilateral frontal and parietal lobes.

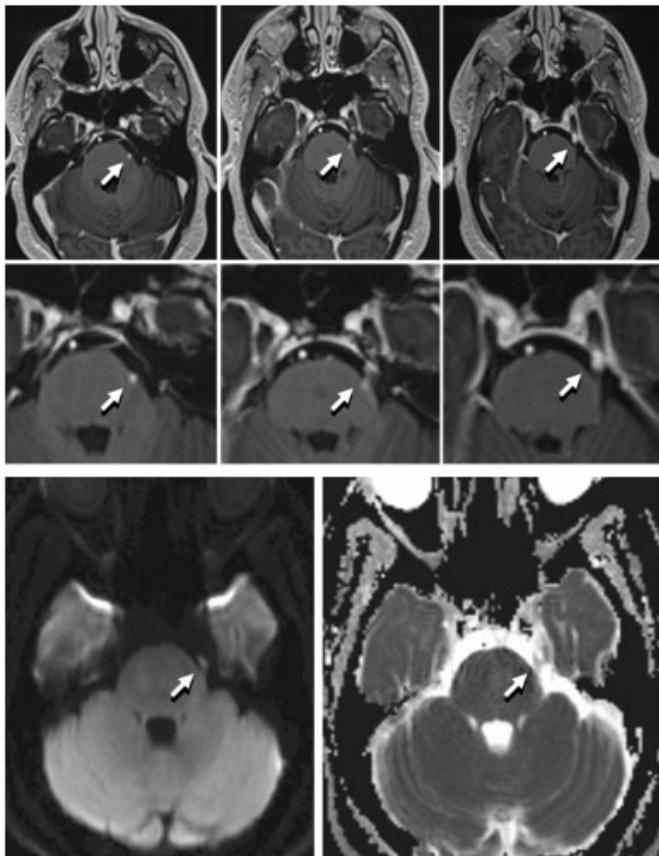


Figure 2: Upper panel—Postcontrast axial brain MRI images demonstrating abnormal increased enhancement of left trigeminal nerve at root entry zone (REZ), cisternal segment and extension of the abnormal enhancement to the Gasserian ganglion. The lower panel demonstrated the same in 5× magnification. Bottom row—Diffusion weighted imaging (DWI) and apparent diffusion coefficient (ADC) map axial brain MRI images demonstrating abnormal increased enhancement of left trigeminal nerve at root entry zone (REZ), cisternal segment, and extension of the abnormal enhancement to the Gasserian ganglion. The lower row demonstrated the same in 5× magnification.

Following several years after the initial diagnosis, the patient experienced various MS-related symptoms in a relapsing and remitting pattern. These symptoms included left shoulder pain, gait imbalance, internuclear ophthalmoplegia, and bladder spasticity typical for MS flare and remittance. Despite the variety of symptoms, MRI scans demonstrated stable persistent enhancement of left trigeminal nerve and stable burden of demyelinating plaques.

DISCUSSION

In MS, initial presentation, severity, and progression of disease can vary among individuals. Magnetic resonance imaging (MRI) is the primary imaging modality used to evaluate MS. Isolated CN involvement is a less common

phenomenon and reported in 10.4% of MS patients within a 5-year period, with 7.3% of these patients presenting this involvement as their initial symptom [1, 2]. However, it is important to note that not all individuals with MS experience TN. The prevalence of TN in MS ranges from 1.1% to 4.5% [1, 2]. Signal abnormality in trigeminal nerve has been reported to 3–6% of patients [3, 4]. Involvement of intrapontine fasciculi, principal, sensory spinal, and motor nuclei, and the trigeminal nerve itself has been reported [5].

Here, we presented a case report of trigeminal nerve involvement as an initial presentation of MS. Radiologists must carefully analyze brain MRI scans to identify signal changes in areas associated with CNs to rule out involvement with MS [1, 6]. Dedicated imaging including axial T2, FLAIR, and contrast-enhanced T1 sequences for MS evaluation and dual excitation acquisitions, such as constructive interference of steady state (CISS) and T2-weighted turbo-spin-echo techniques, such as sampling perfection with application optimized contrasts (SPACE) [4] should be performed to visualize specific CNs, such as CN II, V, VII, and VIII. Radiologists must also consider and differentiate MS from other conditions that may mimic CN involvement, such as tumors, infections, or other inflammatory conditions [6]. In such difficult cases with atypical clinical and radiological presentation diagnosis of MS is uncertain, McDonald criteria serve as valuable tool by providing standardize framework for evaluating clinical, radiological, and laboratory evidence.

CONCLUSION

Trigeminal nerve involvement is rare but potential initial presentation in MS. Therefore, patients presenting with isolated CN lesions should be thoroughly evaluated for early detection, effective treatment, and improved prognosis of MS. Radiologists must work closely with neurologists to correlate imaging findings with the clinical presentation to ensures accurate interpretation and assessment of CN involvement in the context of MS.

Keywords: Multiple sclerosis, Trigeminal nerve (Cranial nerve V), Trigeminal neuralgia

How to cite this article

Chaudhary K, Zekavaty S, Xu K, Mahesh S, Eppurath A, Bordia R. Involvement of cranial nerve V (trigeminal nerve) in multiple sclerosis. *Int J Case Rep Images* 2023;14(2):134–137.

Article ID: 101426Z01KC2023

doi: 10.5348/101426Z01KC2023CI

REFERENCES

1. Zakrzewska JM, Linskey ME. Trigeminal neuralgia in multiple sclerosis: A systematic review and meta-analysis. *Mult Scler Relat Disord* 2015;4(6):622–7.
2. Alroughani R, Ahmed SF, Behbehani R, Khan R, Thussu A. Cranial nerve involvement in multiple sclerosis: A systematic review and meta-analysis. *Mult Scler Relat Disord* 2019;28:166–73.
3. Nakashima I, Fujihara K, Kimpara T, Okita N, Takase S, Itoyama Y. Linear pontine trigeminal root lesions in multiple sclerosis: Clinical and magnetic resonance imaging studies in 5 cases. *Arch Neurol* 2001;58(1):101–4.
4. van der Meijs AHC, Tan IL, Barkhof F. Incidence of enhancement of the trigeminal nerve on MRI in patients with multiple sclerosis. *Mult Scler* 2002;8(1):64–7.
5. da Silva CJ, da Rocha AJ, Mendes MF, Maia ACM Jr, Braga FT, Tilbery CP. Trigeminal involvement in multiple sclerosis: Magnetic resonance imaging findings with clinical correlation in a series of patients. *Mult Scler* 2005;11(3):282–5.
6. Geraldes R, Ciccarelli O, Barkhof F, et al. The current role of MRI in differentiating multiple sclerosis from its imaging mimics. *Nat Rev Neurol* 2018;14(4):199–213.
7. O'Connor LM, Skehan K, Goodwin J, Kumar M. MRI sequence optimisation methods to identify cranial nerve course for radiotherapy planning. *J Med Radiat Sci* 2023.

Author Contributions

Kapil Chaudhary – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Sepehr Zekavaty – Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Kathleen Xu – Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for

all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Sunny Mahesh – Acquisition of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Atul Eppurath – Acquisition of data, Analysis of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Ritu Bordia – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None.

Consent Statement

Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

Copyright

© 2023 Kapil Chaudhary et al. This article is distributed under the terms of Creative Commons Attribution License which permits unrestricted use, distribution and reproduction in any medium provided the original author(s) and original publisher are properly credited. Please see the copyright policy on the journal website for more information.

Access full text article on
other devices



Access PDF of article on
other devices





INTERNATIONAL JOURNAL OF
CASE REPORTS AND IMAGES



VIDEO JOURNAL OF
CLINICAL RESEARCH



VIDEO JOURNAL OF
BIOMEDICAL SCIENCE



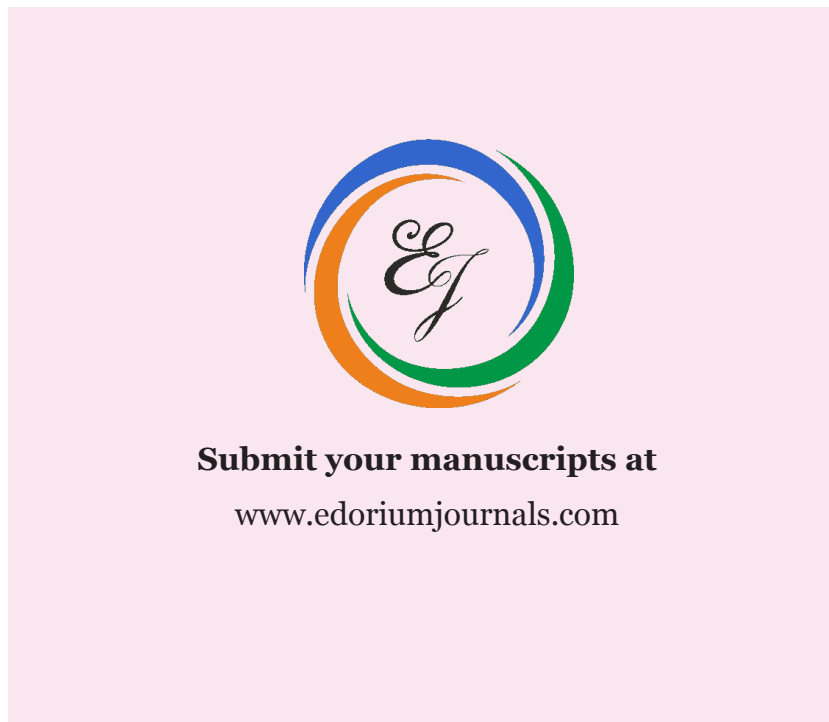
INTERNATIONAL JOURNAL OF
HEPATOBIILIARY AND
PANCREATIC DISEASES



INTERNATIONAL JOURNAL OF
BLOOD TRANSFUSION AND
IMMUNOHEMATOLOGY



EDORIUM JOURNAL OF
OPHTHALMOLOGY



Submit your manuscripts at
www.edoriumjournals.com



EDORIUM JOURNAL OF
MEDICINE



EDORIUM JOURNAL OF
CARDIOTHORACIC AND
VASCULAR SURGERY



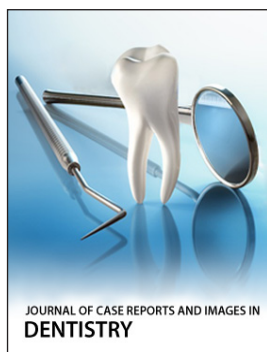
JOURNAL OF CASE REPORTS
AND IMAGES IN ORTHOPEDICS
AND RHEUMATOLOGY



EDORIUM JOURNAL OF
PSYCHOLOGY



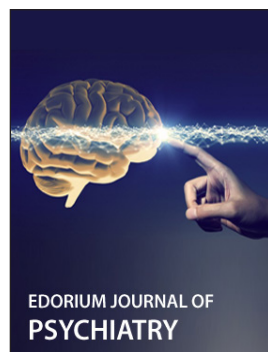
EDORIUM JOURNAL OF
CELL BIOLOGY



JOURNAL OF CASE REPORTS AND IMAGES IN
DENTISTRY



EDORIUM JOURNAL OF
CANCER



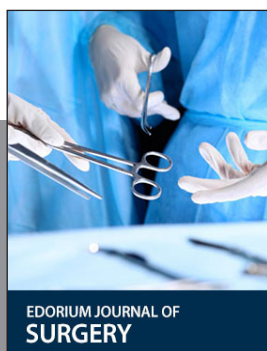
EDORIUM JOURNAL OF
PSYCHIATRY



JOURNAL OF CASE REPORTS AND
IMAGES IN INFECTIOUS DISEASES



EDORIUM JOURNAL OF
ANATOMY AND EMBRYOLOGY



EDORIUM JOURNAL OF
SURGERY



JOURNAL OF CASE REPORTS
AND IMAGES IN PATHOLOGY



EDORIUM JOURNAL OF
ANESTHESIA