

CONCURRENT ISCHEMIC STROKES FROM OCCLUSION OF CAROTID AND VERTEBRAL ARTERIES FOLLOWING A WASP STING IN THE TONGUE

Vekoslav Mitrović¹  Snežana Lazić²  Bratislav Lazić²  Radojica Stolić³ 

¹University of East Sarajevo, Faculty of Medicine Foča, Republic of Srpska, Bosnia and Herzegovina ²University of Pristina temporarily seated in Kosovska Mitrovica, Faculty of Medicine, Kosovska Mitrovica, Serbia ³Department of Internal Medicine, University of Kragujevac, Faculty of Medical Sciences, Kragujevac, Serbia

There are no specific risk factors for stroke after bee or wasp stings; however, several researchers have cited multiple stings in the head and neck region as a significant factor in the occurrence of these serious complications. We present a case of a previously healthy man with multiple acute cerebral infarctions in the subcortical and borderline part of the cerebral media artery, resulting from total bilateral thrombosis of the internal carotid artery and right vertebral artery, triggered by a single axial puncture in the tongue, with complete neurological recovery.

We present the case of a male, aged 57 years, right-handed, with a history of arterial hypertension, hyperlipoproteinemia, smoking, and a positive family history of cardiovascular disease. He was hospitalized due to speech disorders, left-sided weakness, and altered behaviour. Magnetic resonance imaging of the brain showed multiple infarcts in the border and subcortical area of the cerebral media artery. Computed tomographic angiography of the blood vessels of the head and neck confirmed total bilateral occlusion of the carotid artery of the internal carotid artery and thrombosis of the right vertebral artery. Complete neurological recovery followed during hospitalization.

Non-specific clinical picture and neurological findings, characteristic of infarction in border zones, especially bilateral localization, can confuse the emergency physician, and massive thrombosis of blood vessels in the neck may be incorrectly predicted.

Keywords: wasp sting, stroke, border-zone infarction

Submitted: May 13, 2024 **Accepted:** August 25, 2025

Published online: October 31, 2025

Copyright: © 2025, V. Mitrović et al. This is an open access article published under the terms of the Creative Commons Attribution 4.0 International License. (<http://creativecommons.org/licenses/by/4.0/>).

Correspondence to:

Vekoslav Mitrović
University of East Sarajevo, Faculty of Medicine Foča
Studentska 5 Foča, Republic of Srpska
Bosnia and Herzegovina
E-mail: radojica.stolic@med.pr.ac.rs

INTRODUCTION

It is known that doctors around the world who practice emergency medicine encounter a large number of Hymenoptera stings (1). These are predominantly local reactions lasting only a few hours (2), while neurological and vascular manifestations, including ischemic stroke, are very rare after wasp stings (3). In numerous reports, multiple wasp stings in the head and neck region are predominantly re-sponsible for acute stroke and neck blood vessel thrombosis (4, 5). Stroke after a wasp sting is the consequence of toxins containing vasoactive peptides, such as thromboxane, leukotriene, serotonin, and histamine (6, 7). According to the literature, cerebral infarctions following wasp stings are territorial (4, 5) and mainly localized in the vascular territory of the middle cerebral artery (MCA), whereas watershed infarctions are rare or only seldom described.

We present a previously healthy man who, after one wasp sting in the tongue, developed multiple cerebral infarctions, total bilateral occlusion of the internal carotid artery and the right vertebral artery, followed by complete neurological recovery.

CASE REPORT

The paper reports a 57-year-old right-handed male farmer with a history of arterial hypertension, hyperlipoproteinemia, smoking, and a positive family history of cardiovascular disease. He was admitted to the Department of Neurology for speech impairment, left-sided weakness, and altered behaviour. The patient reported the absence of previous illnesses and hospitalizations and allergic reactions to insect stings. The problems coincide with the wasp sting on the tongue, after which he felt severe, excruciating pain at the tongue tip, lips, and upper and lower jaws. Ten minutes after the wasp sting, the patient collapsed and was taken to the local infirmary 10 km away from the residence, where corticosteroids, antihistamines, and symptomatic therapy were administered. After being stabilized, the patient returned home.

The next day, the patient became drowsy, had no spatial awareness, collided with walls and doors while walking, did not recognize his family members, and could not perform simple actions. On the third day, he developed arm and leg weakness on the left side. He was drowsy most of the time.

Initially performed computed tomography of the brain (CTM) did not indicate pathological changes. Due to potentially significant neurological symptomatology, the patient was referred to the Neurology Clinic on the seventh day after the accident.

On admission, he was conscious, with complete amnesia, between the loss of consciousness and his return home from the local infirmary. The neurological findings included the signs of left-sided hemiparesis, 3/5 arm strength, and 4/5 leg strength, with hemihypoesthesia and partial right-sided hemianopia. His speech was fluent with verbal paraphasia, with good repetition ability, but with difficulty understanding. His blood pressure (BP) was 160/90 mmHg; findings across all organ systems were within normal limits.

Magnetic resonance imaging (MRI), including T1-weighted, T2-weighted, T2-FLAIR, and diffusion-weighted images, was performed on the sixth day after the sting. It showed multiple acute infarcts in the subcortical and border zones of vascularization of the right middle cerebral artery (MCA) and anterior cerebral artery (ACA), as well as a cortical infarct at the border between the left middle cerebral artery (MCA) and posterior cerebral artery (PCA) (Figure 1. a, b, c). Colour Doppler sonography (CDS) and computed tomographic angiography (CTA) of the neck and head vessels showed the complete bilateral occlusion of the carotid arteries and the right vertebral artery (Figure 2. a, b, c). An electro-cardiogram (ECG) was in sinus rhythm, and a two-dimensional echocardiogram was normal with pro-per left ventricular systolic function. The lipid profile was pathological (cholesterol 6.4 mmol/L, LDL cholesterol 4.1 mmol/L, HDL cholesterol 0.90 mmol/L, triglycerides 2.4 mmol/L), while the parameters of renal, hepatic, and thyroid functions, as well as the parameters of immune and coagulation status, were within the reference values. On the thirteenth day after the incident, the patient was fully neurologically recovered and discharged home. He was treated with antiedema treatment, aspirin, and low molecular weight heparin.

One month after complete neurological recovery, the patient was subsequently treated with dual antithrombotic therapy (acetylsalicylic acid–ASA 100 mg/day, clopidogrel 75 mg/day) and HMG-CoA reductase inhibitor (atorvastatin 40 mg/day) under the treatment protocol. At follow-up examinations over 12 months, our patient was neurologically stable.

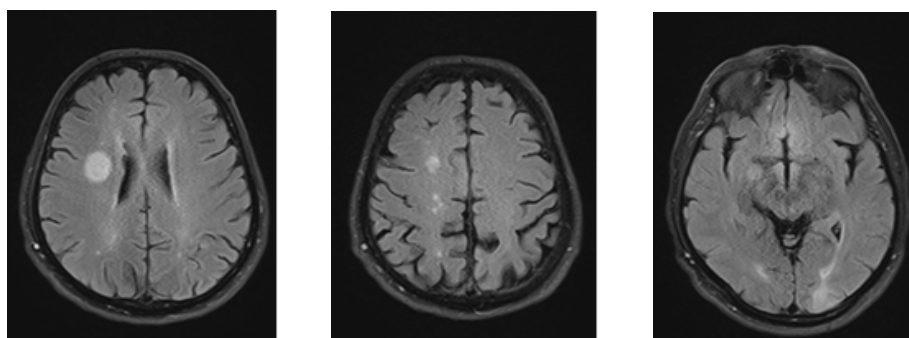


Figure 1. Magnetic resonance imaging (MRI) T2 FLAIR image: (a) axial tomography–acute subcortical infarct on the right, T2 FLAIR image; (b) axial tomography–borderline multiple acute subcortical infarcts between the right MCA and ACA (rosary-like pattern), T2 FLAIR image; (c)–axial tomography–borderline cortical infarct between the left MCA and PCA

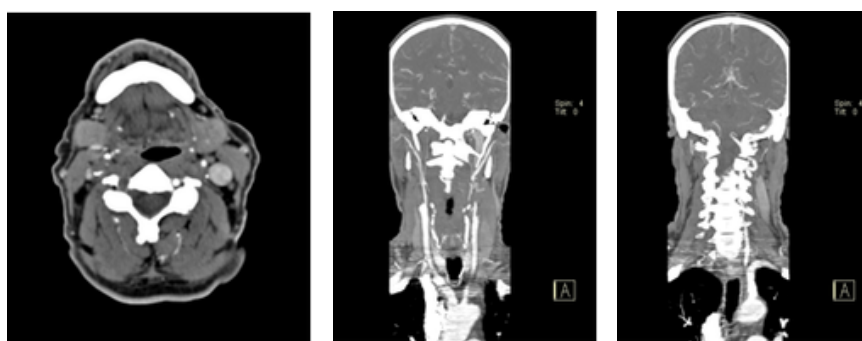


Figure 2. Computed tomographic angiography (CTA)–axial projection: (a) bilateral internal carotid artery and right vertebral artery without contrast coronal MIP reconstruction (b) complete bilateral ICA occlusion, coronal MIP reconstruction; (c) right vertebral artery occlusion

DISCUSSION

Hymenoptera bites are common during summer. The sting response can be local or systemic (2). Neurological complications such as cerebral infarction and thrombosis of blood vessels of the neck and head are very rare but often with significant complications (8), especially if a large number of wasps sting in a short time (4, 5).

Riggs and associates reported the case of a man who experienced multiple wasp stings on the shoulders and left half-face. Two days later, the left internal carotid artery occluded, and an ischemic stroke followed (8). The mechanism of ischemic stroke in this patient was supported by a neuropharmacological model emphasizing sympathetic sensitization of the terminal part of the internal carotid artery by stimulating the upper cervical ganglion, suggesting multiple wasp stings as a risk factor for the ipsilateral carotid artery thrombosis.

In our case, occlusive lesions of the blood vessels are far more extensive. Total and symmetrical thrombosis spreads

to carotid arteries up to their intracranial terminal segment and the right vertebral artery in its extracranial and intracranial segment, as reported in the pathophysiological model (9).

The difference between our case and other case reports (10–13) in the first instance suggested multiple wasp stings as a risk factor for brain stroke and/or vascular spasm and thrombosis, while in our case, there was a single wasp sting. Multi-day drowsiness, focal neurological symptoms, intraluminal occlusion of vessels in the neck, and multiple acute brain infarcts in specific vascular distribution suggested the development of occlusion after the accident (Figure 1 and 2).

Payeman et al. (5) determined that the time interval between a Hymenoptera insect sting and stroke varied from 15 minutes to 4 days, with a median of 16 hours, while in our patient, it was between 12 hours and three days. Initially, the clinical picture indicated transcortical sensory aphasia and right-sided anosmia, as a result of a cortical infarction in the border zone of vascularization on the left between the

middle cerebral artery (MCA) and the posterior cerebral artery (PCA). A day later, a left-sided sensorimotor deficit appeared, caused by a subcortical infarction in the border zone of vascularization on the right between the middle cerebral artery (MCA) and the anterior cerebral artery (ACA). The findings of the affected areas in the systematic review are not consistent with our patients' vascular areas. Our case deals with the brain infarct of border vascular distribution, and, to our knowledge, this is the first case indicating that a wasp sting localized as described above can be an etiological factor in the genesis of a stroke.

In addition to the hemodynamic mechanism responsible for multiple brain infarctions in the border area, we must not ignore a possible additional impact of the vasospasm of peripheral branches in the middle cerebral artery. This is mainly related to the infarction lesion localized in the subcortical segment that alternatively supports the pathogenic mechanism proposed by Kulhari et al. (4).

Non-specific clinical picture and neurological findings that characterize patients with infarction of border zones, especially bilateral localizations, can confuse emergency physicians; therefore, massive thrombosis of blood vessels of the neck is overlooked.

Occlusion of the blood vessels of the neck, caused by a wasp sting in the region of the head or neck, imposes an urgent need for doctors who take care of these patients to conduct timely diagnostic processing, among others colour Doppler sonography of the blood vessels of the neck, especially in middle-aged and elderly population.

Acknowledgement

This study was not supported by any sponsor or funder.

Competing Interest

The authors declared no relevant conflicts of interest.

Statement of Ethics

Complete written informed consent was obtained from the involved patient for the publication of the study and accompanying images.

Publisher's Note: The statements, opinions, and data contained in AFMN Biomedicine articles are solely those of the individual author(s) and contributor(s) and do not necessarily represent the views of the publisher or the editor(s). The publisher and editor(s) disclaim responsibility for any harm or damage caused by the use of information or products mentioned in the publication.

REFERENCES

1. Sundaramoorthy K, Vishwanathan S, Arulneyam J. Wasp stings related cerebral infarction in a toddy tapper with multiple previous stings. *Eur J Neurol* 2011;18:1-3.
2. Wan PW. ABC of allergies: Venom allergy. *BMJ* 1998; 316:1365-8.
<https://doi.org/10.1136/bmj.316.7141.1365>
3. Crawley F, Schon F, Brown MM. Cerebral infarction: a rare complication of wasp sting. *J Neurol Neurosurg Psychiatry* 1999; 66(4):550-1.
<https://doi.org/10.1136/jnnp.66.4.550>
4. Kulhari A, Rogers A, Wang H, et al. Ischemic stroke after wasp sting. *J Emerg Med* 2016;51(4):405-10.
<https://doi.org/10.1016/j.jemermed.2016.06.016>
5. Moein P, Zand R. Cerebral Infarction as a Rare Complication of Wasp Sting. *J Vasc Interv Neurol* 2017;9(4):13-6.
6. Gok S, Ulker S, Huseyinov A, et al. Role of leucotrienes on coronary vasoconstriction in isolated hearts of arthritic rats: effect of in vivo treatment with CI-986, a dual inhibitor of cyclooxygenase and lipooxygenase. *Pharmacology* 2000; 60(1):41-6.
<https://doi.org/10.1159/000028345>

7. Vidhate M, Sharma P, Verma R, et al. Bilateral cavernous sinus syndrome and bilateral cerebral infarcts: a rare combination after wasp sting. *J Neurol Sci* 2011; 301(1):104-6. <https://doi.org/10.1016/j.jns.2010.10.020>
8. Riggs JE, Ketonen LM, Bodensteiner JB, Benesch CG. Wasp sting-associated cerebral infarction: a role for cerebrovascular sympathetic innervation. *Clin Neuropharmacol* 1993; 16(4):362-5. <https://doi.org/10.1097/00002826-199308000-00009>
9. Romano JT, Riggs JE, Bodensteiner JB, Gutmann L. Wasp sting-associated occlusion of the supraclinoid internal carotid artery: Implications regarding the pathogenesis of Moyamoya syndrome. *Arch Neurol* 1989; 46(6):607-8. <https://doi.org/10.1001/archneur.1989.00520420025018>
10. Rajendiran C, Puvanalingam A, Thangam D, et al. Stroke after multiple bee sting. *J Assoc Physicians India* 2012; 60:122-4.
11. Viswanathan S, Muthu V, Singh AP, et al. Middle cerebral artery infarct following multiple bee stings. *J Stroke Cerebrovasc Dis* 2012; 21(2):148-50. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2010.06.003>
12. Temizoz O, Celik Y, Asil T, et al. Stroke due to bee sting. *Neurologist* 2009;15(1):42-3. <https://doi.org/10.1097/NRL.0b013e31818c7251>
13. Chen DM, Lee PT, Chou KJ, et al. Descending aortic thrombosis and cerebral infarction after massive wasp stings. *Am J Med* 2004; 116(8):567-9. <https://doi.org/10.1016/j.amjmed.2003.08.036>