



Clinical Reasoning: A 49-year-old man with fever and proximal weakness of his arms

Corinna Seliger, MD
Wilhelm Schulte-Mattler,
MD
Ulrich Bogdahn, MD
Martin Uhl, MD

Correspondence to
Dr. Uhl:
martin.uhl@klinik.uni-
regensburg.de

SECTION 1

A 49-year-old man with no significant medical history was seen by a neurologic consultant in eastern Bavaria, Germany, after he developed weakness of both arms. A few days earlier he had been referred to the internal medicine department with flu-like symptoms lasting for 2 weeks, which improved only transiently with trimethoprim/sulfamethoxazole for suspected urinary tract infection. The neurologic examination revealed an alert and oriented patient who was febrile (39.8°C, 103.6°F) but without meningeal signs or headache. He had normal cranial

nerves and weakness of the shoulder girdle and both proximal arms. He had no sensory deficits, was hyporeflexic, and had flexor plantar responses. Gait was unsteady. Bladder function was reportedly normal. The patient was a passionate mushroom hunter and had no sick contacts.

Questions for consideration:

1. Where is the most likely clinical localization of the patient's symptoms?
2. What additional testing would you recommend at this point?

[GO TO SECTION 2](#)

SECTION 2

The patient presented with bilateral shoulder girdle and proximal upper extremity paresis without sensory impairment and with normal cranial nerves, resembling the so-called man-in-the-barrel-syndrome.¹ This syndrome can be mimicked by a bilateral upper or lower motor neuron process or by a process intrinsic to the muscle. A cortical lesion was unlikely considering the clinical presentation of the patient (hyporeflexic with normal plantar responses and without a history of severe systemic hypotension to cause bilateral watershed infarcts between the middle and anterior cerebral artery territories).

The differential diagnosis of lower motor neuron disorders causing bilateral shoulder girdle weakness includes vascular, neoplastic, and inflammatory diseases. An ischemic event of the anterior spinal artery can cause bilateral anterior horn cell dysfunction but was unlikely without dissociated sensory loss to pain or temperature. In the setting of unexplained fever, an infectious cause such as myelitis, polyneuritis, or

myositis had to be considered. Poliomyelitis was ruled out by the patient's childhood vaccination. Blood and urine analyses, MRI of the cervical spinal cord (figure 1), and lumbar puncture were performed.

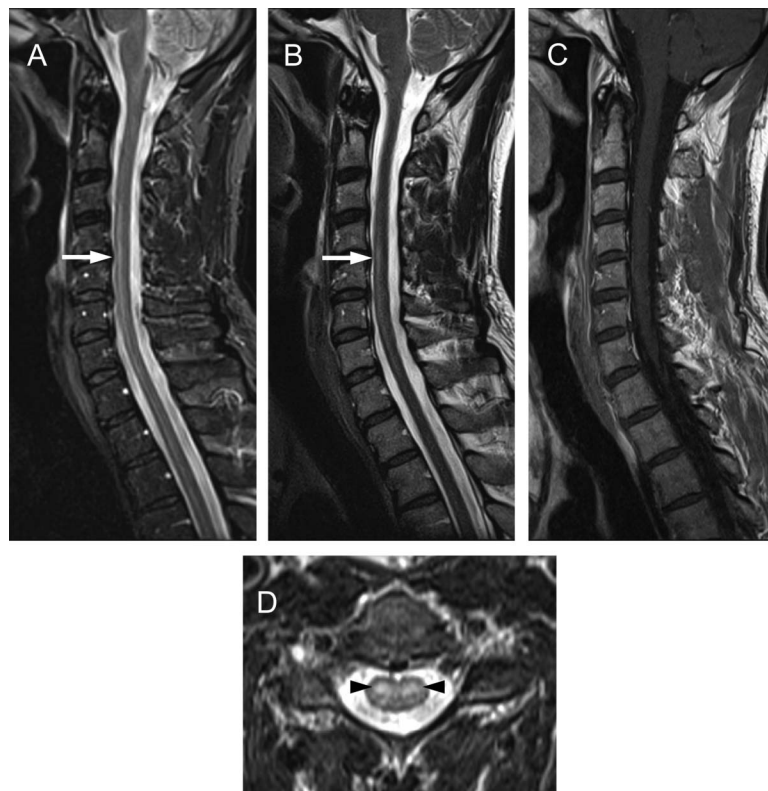
Analysis of the CSF revealed 291 cells/ μ L with 67% lymphocytes. Albumin was elevated to 131 mg/dL with an albumin quotient (CSF/serum) of 41.9, and lactate was increased to 32 mg/dL. Glucose was normal at 57 mg/dL. Oligoclonal bands were not present. Gram stain was negative, and PCR was negative for cytomegalovirus, Epstein-Barr virus, herpes simplex viruses 1 and 2, and varicella-zoster virus.

Questions for consideration:

1. How do the CSF analysis and MRI narrow your differential diagnosis?
2. Does the patient's history of being a passionate mushroom hunter in eastern Bavaria (an area with many ticks) influence your choice of further testing, and if so, why?

[GO TO SECTION 3](#)

Figure 1 MRI of the cervical spine



(A) T2 and (B) T2 short tau inversion recovery with signal alterations in the ventral part of the spinal cord (arrows). (C) T1 with gadolinium shows no pathologic enhancement. (D) T2 signal is restricted to the anterior horn of the spinal cord (arrowheads), showing a snake-eye appearance.

SECTION 3

CSF analysis was compatible with viral meningoencephalitis. The symmetrical, round, T2-hyperintense signal alterations of the anterior horns of the cervical spinal cord (figure 1), also referred to as snake eyes,² explained the proximal weakness of the shoulder girdle. Because the patient was outdoors in an endemic area of tick-associated diseases, antibodies for *Borrelia burgdorferi* and tick-borne encephalitis (TBE) virus were screened, even though the patient did not recall a tick bite. An elevated specific antibody index (CSF/serum) with positive immunoglobulin M antibodies eventually confirmed the diagnosis of acute TBE. With symptomatic treatment, the patient stabilized and was discharged for

rehabilitation of unchanged paresis of the shoulder girdle and proximal arms. Ten days later, he presented with a painless inability to close both eyes, as shown in figure 2. The patient denied hyperacusis, altered taste, or impaired lacrimation, and the neurologic examination revealed no additional symptoms referable to the brainstem.

Questions for consideration:

1. What is the most likely explanation for new facial weakness?
2. With a positive test for TBE virus, are there other comorbidities that should be considered?
3. How can you differentiate between central and peripheral bilateral facial palsy?

[GO TO SECTION 4](#)

Figure 2 The patient returned with new facial weakness 10 days after hospital discharge



(A) Looking up and (B) attempting to close his eyes.

SECTION 4

Facial palsy is a rare but typical complication of TBE that occurs late in the disease and has a good prognosis compared to the other symptoms caused by encephalitis.³ It must be discriminated from a parallel infection with *Borrelia burgdorferi* or an ascending myelitis affecting the nucleus of the seventh cranial nerve. Given the history of a recent influenza-like illness, Guillain-Barré or Miller Fisher syndrome should also be considered.

Bilateral facial palsy makes it more difficult to clinically differentiate central and peripheral facial palsies because sparing of the forehead, as is the case in upper motor neuron lesions, cannot be observed when there is no unaffected hemisphere to compensate. In the absence of other brainstem findings, however, a central cause of bilateral facial palsy is less likely than a peripheral one. An additional test to discriminate between central and peripheral origin of facial palsy is canalicular magnetic stimulation.⁴ For this method, a rapidly changing magnetic field is used to painlessly

stimulate the facial nerve within the facial canal. The evoked compound muscle action potentials (CMAPs) are compared with the CMAPs upon electrical facial nerve stimulation distal to the canal. Done within the first few days after the onset of paresis, namely before the onset of wallerian degeneration, this technique helps localize a facial nerve lesion. In our patient, absent canalicular responses together with normal extracanalicular responses indicate lesions in the canalicular parts of the facial nerves (figure 3).

DISCUSSION

This case illustrates an uncommon but typical presentation of TBE with isolated myelitis complicated by bilateral facial palsy.

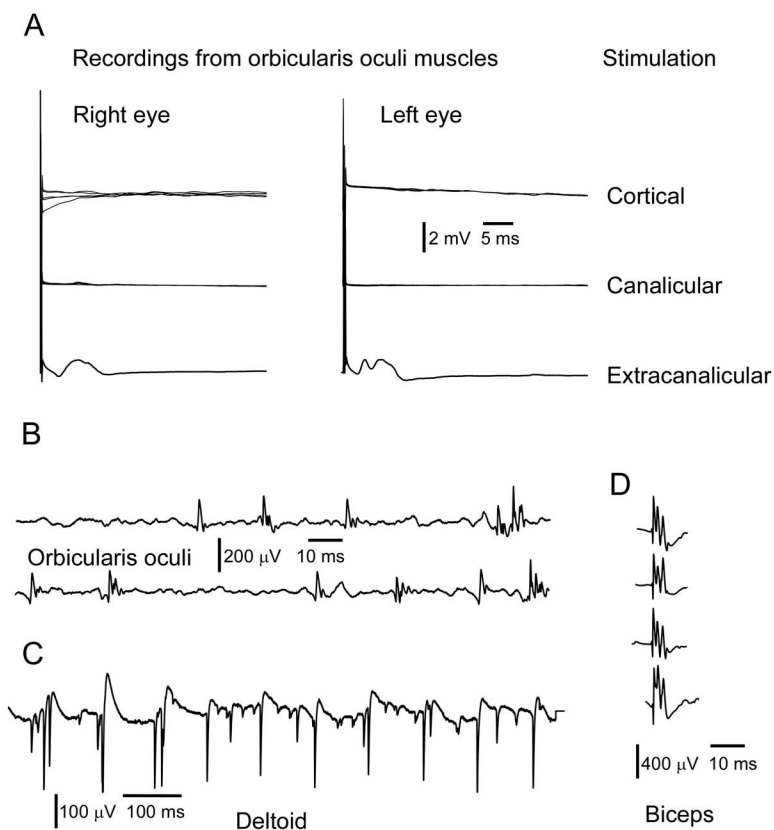
TBE is caused by the TBE virus (TBEV), a member of the flavivirus family, which includes viruses responsible for mosquito-borne yellow fever, dengue fever, Japanese encephalitis, and West Nile fever. TBEV has 3 subtypes, with the vector for the European subtype being *Ixodes ricinus*, found in most parts of Europe, Turkey, Iran, and the Caucasus. The transmission of TBEV in tick saliva occurs within minutes after the bite. There are, depending on temperature and humidity, endemic foci of TBEV, with 1%–5% of all ticks being infected. Seasonal activity peaks in July and early August.⁵ Environmental changes seem to have extended the geographic area and seasonal time frame of tick activity, and expanded leisure outdoor activities have increased the population size at risk.⁶

After an incubation period of around 8 days, TBE typically presents with a biphasic fever, fatigue, general malaise, and head and body pain, followed by neurologic symptoms ranging from mild meningitis to severe encephalitis. Up to 10% of patients with encephalitis show signs of myelitis with spinal paralysis, and only in isolated cases does myelitis present without encephalitis, as shown here.⁵ MRI changes can be observed in 20% of patients with encephalitis, typically with bilateral involvement of the thalamus, caudate nucleus, brainstem, and cerebellum on T2 and fluid-attenuated inversion recovery images.⁷ The earliest time point a serologic diagnosis can be made with positive immunoglobulin M and immunoglobulin G is when the patient first shows neurologic signs. As there is no specific treatment available after infection, and as up to 12% of patients with encephalitis need intensive care treatment and 5% need assisted ventilation, the prophylactic vaccination of people in endemic regions is important but was neglected by our patient.⁸

AUTHOR CONTRIBUTIONS

Dr. Seliger wrote the paper. Dr. Schulte-Mattler drafted and revised the manuscript for intellectual content. Dr. Bogdahn revised the manuscript for intellectual content. Dr. Uhl wrote the paper.

Figure 3 Neurophysiologic studies



(A) Cortical and canalicular magnetic stimulation and extracanalicular electrical stimulation of the seventh cranial nerves, recordings from orbicularis oculi muscles on the first day of symptom onset. (B) EMG follow-up 2 months later showed pathologic spontaneous activity (not shown) and polyphasic motor unit potentials confirming axonal damage of the seventh cranial nerves. (C) Pathologic spontaneous activity of deltoid muscle and (D) polyphasic motor unit potentials in biceps muscle confirmed lower motor neuron involvement.

ACKNOWLEDGMENT

The authors thank the patient, Dr. G. Schuierer for providing the MRI, and Dr. L. Walter for comments on the manuscript.

STUDY FUNDING

No targeted funding reported.

DISCLOSURE

C. Seliger reports no disclosures. W. Schulte-Mattler receives honoraria for symposium lectures from Merz Pharmaceuticals, Ipsen Pharma, Natus, and Neurophysiologische Fortbildungsakademie, and received an honorarium for consulting from Merz Pharmaceuticals. U. Bogdahn serves on scientific advisory boards for Antisense Pharma and Roche Pharmaceuticals. Dr. Bogdahn received license fee payments from Roche Pharmaceuticals. M. Uhl receives institutional support from the Department of Neurology, University of Regensburg, for cancer research and receives research support from the Medical School of the University of Regensburg for cancer research. Go to Neurology.org for full disclosures.

REFERENCES

1. Sage JI, Van Uitert RL. Man-in-the-barrel syndrome. *Neurology* 1986;36:1102–1103.

2. Mizuno J, Nakagawa H, Inoue T, Hashizume Y. Clinicopathological study of “snake-eye appearance” in compressive myelopathy of the cervical spinal cord. *J Neurosurg* 2003; 99:162–168.
3. Lotric-Furlan S, Strle F. Peripheral facial palsy in patients with tick-borne encephalitis. *Clin Microbiol Infect* 2012; 18:1027–1032.
4. Roesler KM, Magistris MR, Glocker FX, et al. Electrophysiological characteristics of lesions in facial palsies of different etiologies: a study using electrical and magnetic stimulation techniques. *Electroencephalogr Clin Neurophysiol* 1995; 97:355–368.
5. Lindquist L, Vapalahti O. Tick-borne encephalitis. *Lancet* 2008;371:1861–1871.
6. Lindgren E, Gustafson R. Tick-borne encephalitis in Sweden and climate change. *Lancet* 2001;358:16–18.
7. Lorenzl S, Pfister HW, Padovan C, Yousry T. MRI abnormalities in tick-borne encephalitis. *Lancet* 1996;347: 698–699.
8. Kaiser R. The clinical and epidemiological profile of tick-borne encephalitis in southern Germany 1994–98: a prospective study of 656 patients. *Brain* 1999;122:2067–2078.

Neurology®

Clinical Reasoning: A 49-year-old man with fever and proximal weakness of his arms

Corinna Seliger, Wilhelm Schulte-Mattler, Ulrich Bogdahn, et al.

Neurology 2014;82:e65-e69

DOI 10.1212/WNL.000000000000138

This information is current as of February 24, 2014

Updated Information & Services	including high resolution figures, can be found at: http://n.neurology.org/content/82/8/e65.full
References	This article cites 8 articles, 1 of which you can access for free at: http://n.neurology.org/content/82/8/e65.full#ref-list-1
Subspecialty Collections	This article, along with others on similar topics, appears in the following collection(s): All Clinical Neurology http://n.neurology.org/cgi/collection/all_clinical_neurology Encephalitis http://n.neurology.org/cgi/collection/encephalitis Meningitis http://n.neurology.org/cgi/collection/meningitis Spinal cord infection http://n.neurology.org/cgi/collection/spinal_cord_infection Viral infections http://n.neurology.org/cgi/collection/viral_infections
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.neurology.org/about/about_the_journal#permissions
Reprints	Information about ordering reprints can be found online: http://n.neurology.org/subscribers/advertise

Neurology® is the official journal of the American Academy of Neurology. Published continuously since 1951, it is now a weekly with 48 issues per year. Copyright © 2014 American Academy of Neurology. All rights reserved. Print ISSN: 0028-3878. Online ISSN: 1526-632X.

