

Asymmetric Acute Motor Axonal Neuropathy With Unilateral Tongue Swelling Mimicking Stroke

Man Sum Chi, MBBS, Shi Hon Ng, MBBS, and Lok Yiu Chan, MBBS

Abstract: A 60-year-old man presented with acute onset of left hemiparesis and left hypoglossal nerve palsy with ipsilateral tongue swelling. He then progressed to tetraparesis in a few days. Cerebrospinal fluid showed cell protein dissociation. A nerve conduction study showed motor axonal neuropathy with sensory sparing. A subsequent blood test revealed anti-GD1b IgG antibody positivity. He was diagnosed to have acute motor axonal neuropathy (AMAN) and treated with a course of intravenous immunoglobulin with slow improvement. This is probably the first AMAN with asymmetrical presentation mimicking stroke reported in the literature in detail. The anti-GD1b IgG antibody is also not commonly associated with AMAN.

Key Words: acute motor axonal neuropathy, asymmetrical presentation, antiganglioside antibody

(*The Neurologist* 2016;21:106–108)

Acute motor axonal neuropathy (AMAN) is a variant of Guillain-Barre syndrome (GBS).¹ It presents with symmetrical ascending tetraparesis and is usually associated with anti-GM1 or anti-GD1a antibody.¹ It is characterized with motor axonal neuropathy instead of demyelinating neuropathy as shown in nerve conduction studies. There is also normal sensory action potential.^{2,3} We present a case of asymmetric AMAN with anti-GD1b IgG antibody, which is usually associated with acute sensory ataxic neuropathy,¹ another variant of GBS. He also had ipsilateral tongue swelling due to acute hypoglossal nerve palsy, a not so commonly recognized phenomenon by attending physicians.

CASE REPORT

A 60-year-old man with good past health presented to our acute stroke unit with acute onset of left hemiparesis and left hypoglossal nerve palsy. He was a nonsmoker and nondrinker. He denied any preceding diarrhea or any infection. He had not received any vaccinations in the months before the weakness. There was no recent drug use. There was mild right leg ache 1 day before the weakness. He also complained of tongue discomfort with a swollen sensation. On admission, physical examinations revealed only mild weakness with Medical Research Council grade 4/5 over the left upper and lower limbs and the tongue was swollen at the left side and deviated to the left, indicating left XII palsy. Deep tendon reflexes of the 4 limbs were normal. There were no cerebellar signs. Sensations were normal. Physical examinations of other systems were unremarkable. Computed tomography of the brain performed on admission showed no abnormalities. However, his condition continued to progress with increased

From the Department of Medicine and Geriatrics, Tuen Mun Hospital, Tuen Mun, NT, Hong Kong.

The authors declare no conflict of interest.

Reprints: Man Sum Chi, MBBS, Department of Medicine and Geriatrics, Tuen Mun Hospital, 23 Tsing Chung Koon Road, Tuen Mun, NT, Hong Kong. E-mail: chimansum@yahoo.com.hk.

Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

ISSN: 1074-7931/16/2106-0106

DOI: 10.1097/NRL.0000000000000106



FIGURE 1. Magnetic resonance imaging-T1 contrast axial cut over the head and neck region showing left tongue swelling.

weakness and right-side involvement in the next 3 to 4 days. Deep tendon reflexes of the 4 limbs became areflexic. The involvement was asymmetric, with a left upper-limb power of Medical Research Council grade 3/5 and lower-limb power of grade 1/5, but a right upper-limb power of grade 1/5 and lower-limb power of grade 2/5. There was acute retention of urine. All along, there was no sensory or bulbar complaint and extraocular movements remained full.

Routine blood tests including complete blood counts, liver, and renal functions tests were within normal limit. Magnetic resonance imaging of the brain and cervical spine were unremarkable except for the left tongue swelling, which signified acute left hypoglossal nerve palsy (Fig. 1). Magnetic resonance imaging of the lumbosacral spine with contrast showed nerve roots contrast enhancement. Cerebrospinal fluid showed white blood cell counts of $7/\text{mm}^3$ and protein of 0.76 g/L. Bacterial and fungal cultures were negative. A nerve conduction study

TABLE 1. Different Subtypes of Guillain-Barre Syndrome

Guillain-Barre syndrome
Paraparetic variant
Pharyngeal-cervical-brachial weakness
Acute pharyngeal weakness
Bifacial weakness with paresthesias
Miller Fisher syndrome
Acute ataxic neuropathy
Acute ophthalmoparesis
Acute ptosis
Acute mydriasis
Bickerstaff's brainstem encephalitis
Acute ataxic hypersomnolence

TABLE 2. Association of Antibody Types With Types of GBS

GBS Subtype	Clinical Features	Nerve Conduction Study Findings	Antibodies
Acute inflammatory demyelinating polyneuropathy	Sensorimotor GBS, cranial nerve deficits, autonomic dysfunction	Demyelinating polyneuropathy	Various
Acute motor axonal neuropathy (AMAN)	Pure motor GBS	Axonal polyneuropathy, normal sensory response	GM1a, GM1b, GD1a, GaINAc-GD1a
Acute motor sensory axonal neuropathy	Resembles severe AMAN, sensory also affected	Axonal polyneuropathy, sensory also affected	GM1, GD1a
Pharyngeal-cervical-brachial variant	Oropharyngeal, facial, neck, and shoulder muscles weakness	Usually normal	GT1a>GQ1b>GD1a
Miller Fisher syndrome	Ataxia, ophthalmoplegia, areflexia	Usually normal	GQ1b, GT1a

GBS indicates Guillain-Barre syndrome.

12 days after symptom onset showed diffuse motor axonal neuropathy with a low compound motor action potential amplitude in bilateral median nerves and the absence of compound motor action potential response in bilateral ulnar, tibial, and peroneal nerves. However, all the sensory results were within normal limits. Electromyogram at 3 weeks after symptom onset showed no spontaneous activity with reduced recruitment and occasional polyphasic motor unit potential. Further blood test revealed IgG anti-GD1b antibody positivity. IgM anti-GD1b was negative. IgG/IgM anti-GM1 and GQ1b antibodies were negative. The antinuclear antibody titer was 360. Antiacetylcholine receptor antibody was negative. The erythrocyte sedimentation rate and C-reactive protein level were normal. Stool culture was unremarkable.

The diagnosis of AMAN was made. He was treated with a course of intravenous immunoglobulin (IVIG) (0.4 g/kg daily for 5 d). There was slight improvement in the limb power, but with slow progress. He was still unable to stand on his own 1 month after treatment. A follow-up lumbar puncture and nerve conduction study and electromyogram were performed 6 weeks after symptom onset. The cerebrospinal fluid showed white blood cell counts of <1/mm³ and protein of 1.6 g/L, and the nerve conduction study showed similar motor axonal neuropathy with sensory sparing and electromyogram showed fibrillation and fasciculation over both upper and lower-limb muscles, with evidence of reinnervation with satellite units over the motor unit potential of the anterior tibialis muscle.

DISCUSSION

Our patient presented with acute onset of left-sided weakness on admission mimicking stroke, which is not typical for AMAN reported in the literature. Furthermore, the deep tendon reflexes were intact initially, making the diagnosis difficult especially without recent infection or vaccination. As the patient progressed to areflexia, a nerve conduction study was performed, which showing motor axonal neuropathy and therefore AMAN was suspected and antiganglioside antibodies were checked and subsequently IgG anti-GD1b was found to be positive, confirming the diagnosis. There have been reports finding intact reflexes or even hyperreflexia in patients with acute motor axonopathy⁴ as well as asymmetrical presentation initially, but which become symmetrical within 1 week.⁵ There was only 1 case report reporting asymmetrical cranial nerve palsy.⁶ We report this case as a similar case has not been reported in the Chinese literature.⁷ Through this paper, we hope to remind our colleagues that asymmetric presentation and preserved tendon reflex cannot rule out AMAN or other type of GBS (Table 1).⁸

The most common antiganglioside antibodies reported to be associated with AMAN are IgG anti-GM1 and IgG anti-GD1a antibodies.^{1,9} The antiganglioside antibodies play a pathogenic role in the development of GBS. Yuki¹ proposed that IgG anti-GM1/anti-GD1a antibodies are produced after infection of *Campylobacter jejuni* bearing GM1/GD1a-like

lipo-oligosaccharides, and the antibodies then bind to the GM1/GD1a at the node of Ranvier and induce local complement activation and formation of membrane attack complex, which will disrupt the voltage-gated sodium channel, subsequently causing axonal degeneration. However, in our patient, IgG anti-GD1b was found to be positive. It is usually reported to be associated with ataxic GBS or acute sensory ataxic neuropathy.^{1,10} In an animal study, injection of IgG monoclonal anti-GD1b antibody was found to cause complement-mediated nodal disruption predominantly in the sensory nerve.¹ There was no sensory complaint by our patient, and the nerve conduction study both at the acute phase and at 6 weeks after symptom onset showed normal sensory response. Our patient's presentation does not fit with the previous understanding of the association between the manifestations of the types of GBS (Table 2)¹¹ with the causative subtypes of antiganglioside antibodies. Such associations might be modified with more future observation of AMAN cases due to anti-GD1b IgG.

The mainstay of treatment is IVIG or plasmapheresis. Recovery was shown to be better with IVIG than plasmapheresis for AMAN with anti-GM1 antibody,¹² but it is unclear in our case with anti-GD1b antibody. IVIG has been shown to prevent axonal degeneration in motor nerve. It does not affect the production or catabolism of antiganglioside antibody, but it may inhibit the complement activation in situ, leading to reduction in membrane attack complex-mediated damage.¹ The prognosis of AMAN is usually good. However, the recovery may be slow and may take up to 12 months.¹³ Anti-GD1a, anti-GD1b, and anti-GM1 antibodies are associated with more severe disease and a slower recovery,^{12,14,15} which may be due to the fact that these antibodies are associated with axonal neuropathy with Wallerian degeneration,¹⁵ which is different from the usual type of demyelinating of GBS. Our patient showed a slow clinical recovery, and follow-up will be required to observe his clinical progress.

Finally, in this case, we also encountered acute tongue swelling due to acute hypoglossal nerve denervation, a not so commonly recognized phenomenon by attending physicians. It is thought to be due to acute denervation edema.¹⁶

REFERENCES

- Yuki N. Guillain Barre syndrome and antiganglioside antibodies: a clinician-scientist's journey. *Proc J Acad Ser B.* 2012;88:299-326.
- McKhann GM, Cornblath DR, Ho T, et al. Clinical and electrophysiological aspects of acute paralytic disease of children and young adults in northern China. *Lancet.* 1991;338:593-597.

3. McKhann GM, Cornblath DR, Griffin JW, et al. Acute motor axonal neuropathy: a frequent cause of acute flaccid paralysis in China. *Ann Neurol*. 1993;33:333–342.
4. Kuwabara S, Ogawara K, Koga M, et al. Hyperreflexia in Guillain-Barré syndrome: relation with acute motor axonal neuropathy and anti-GM1 antibody. *J Neurol Neurosurg Psychiatry*. 1999;67:180–184.
5. Fokke C, van den Berg B, Drenthen J, et al. Diagnosis of Guillain-Barré syndrome and validation of Brighton criteria. *Brain*. 2014;137:33–43.
6. Sakakibara Y, Mori M, Kuwabara S, et al. Unilateral cranial and phrenic nerve involvement in axonal Guillain-Barré syndrome. *Muscle Nerve*. 2002;25:297–299.
7. Kwok K, Tsui K, Wong D, et al. Variants, clinical characteristics and prognostic factors of Guillain Barré syndrome in Chinese. *Neurology*. 2013;80(Meeting Abstracts 1):P01.135.
8. Wakerley BR, Yuki N. Mimics and chameleons in Guillain-Barré and Miller Fisher syndromes. *Pract Neurol*. 2015;15:90–99.
9. Yuki N, Ho TW, Tagawa Y, et al. Autoantibodies to GM1b and GaNAc-GD1a: relationship to *Campylobacter jejuni* infection and acute motor axonal neuropathy in China. *J Neurol Sci*. 1999;164:134–138.
10. Pan CL, Yuki N, Koga M, et al. Acute sensory ataxic neuropathy associated with monospecific anti-GD1b IgG antibody. *Neurology*. 2001;57:1316–1318.
11. Van den Berg B, Walgaard C, Drenthen J, et al. Guillain-Barré syndrome: pathogenesis, diagnosis, treatment and prognosis. *Nat Rev Neurol*. 2014;10:469–482.
12. Jacobs BC, van Doorn PA, Schmitz PI, et al. *Campylobacter jejuni* infections and anti-GM1 antibodies in Guillain-Barré syndrome. *Ann Neurol*. 1996;40:181–187.
13. Tamura N, Kuwabara S, Misawa S, et al. Time course of axonal regeneration in acute motor axonal neuropathy. *Muscle Nerve*. 2007;35:793–795.
14. Yuki N, Yamada M, Sato S, et al. Association of IgG anti-GD1a antibody with severe Guillain-Barré syndrome. *Muscle Nerve*. 1993;16:642–647.
15. Kuwabara S, Ogawara K, Mizobuchi K, et al. Isolated absence of F waves and proximal axonal dysfunction in Guillain-Barré syndrome with antiganglioside antibodies. *J Neurol Neurosurg Psychiatry*. 2000;68:191–195.
16. Learned KO, Thaler ER, O’Malley BW Jr, et al. Hypoglossal nerve palsy missed and misinterpreted: the hidden skull base. *J Comput Assist Tomogr*. 2012;36:718–724.