CASE REPORT

Neuromyelitis optica: an elusive cause of dysphagia

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SUMMARY

Neuromyelitis optica spectrum disorder (NMOSD) is a rare neurological condition infrequently associated with dysphagia on initial presentation. We describe the case of a 54-year-old woman who presented multiple times to healthcare professionals with severe vomiting, followed by sudden profound dysphagia. Her diagnosis was elusive, initially attributed to achalasia cardia and subsequently to stroke. A dorsal medullary lesion was revealed on MRI of the brain, which involved and extended beyond the area postrema. The patient required percutaneous gastrostomy, and repeated aspiration pneumonia complicated her clinical course. After aquaporin-4 antibodies returned positive, a diagnosis of NMOSD was made and she improved with immunosuppression. We discuss the process of lesion localisation and aetiology determination, as well as the difficulties that this case presented. Our hope is that this report will facilitate earlier diagnosis in similar cases in the future.

BACKGROUND

Acute dysphagia can be an initial presentation of a neurological disease. Additional neurological features should move clinical suspicion away from a gastroenterological cause, while aiding in the localisation of the pathology. The following case demonstrates the importance of neurological examination in acute dysphagia.

Neurological causes of acute dysphagia include stroke, demyelination and myasthenia gravis.¹ Neuromyelitis optica spectrum disorder (NMOSD) is an uncommon cause of central nervous system demyelination and only very rarely presents with dysphagia. This case therefore exemplifies an uncommon cause of a common presentation.

CASE PRESENTATION

A 54-year-old white woman first presented to the emergency department of a local hospital with a 2-week history of intermittent nausea and a 5-day history of intractable vomiting. Her medical history included hypothyroidism, carpal tunnel syndrome and ovarian cysts. Additionally, she had a 35 pack-year smoking history and consumed approximately 16 units of alcohol a week.

She was discharged with presumed gastroenteritis, but returned a week later complaining of ongoing intermittent vomiting and mild difficulty in swallowing. She was then discharged with a diagnosis of gastritis. One month after symptom onset, she presented for the third time with shortness of breath and a productive cough. She had been

suffering from fluctuating difficulties with swallowing, although her vomiting had much improved. She was discharged with an outpatient gastroscopy referral.

Overnight, however, she returned to the emergency department unable to swallow her own saliva. She had developed a complete dysphagia to solids and liquids, which led to her admission under gastroenterology. A nasogastric tube was inserted and she was commenced on antibiotics for a lower respiratory tract infection.

On this presentation she also reported a 3-day history of frontal headache, blurring of vision and paraesthesia, particularly affecting her extremities. A neurology referral was made and examination revealed minimal bilateral palatal rise and bilateral absent gag reflexes. Other positive findings included upbeat nystagmus.

INVESTIGATIONS

Initial basic blood investigations revealed a raised white cell count of $14.4 \times 10^9/L$, with a normal C reactive protein. Liver function tests and urea and electrolytes were normal. Further blood tests, including B₁₂, folate, thyroid function tests, HIV serology, syphilis serology, lupus anticoagulant, antinuclear antibody, antineutrophil cytoplasmic antibody, creatine kinase, antineuronal antibodies and ganglioside antibodies, returned negative or unremarkable. Gastroscopy was normal and a CT scan of the head revealed no abnormalities.

However, MRI of the brain was reported to demonstrate a T2 hyperintensity with diffusion restriction in the dorsal medulla and the upper cervical cord (figure 1). Magnetic resonance angiogram showed a narrowed right vertebral artery. An acute infarction with vertebral dissection was therefore suggested radiologically.

Figure 1 T2 sagittal (left) and axial (right) MRI sequences demonstrating a large dorsal and caudal medullary lesion with extension into the cervical spine.

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Figure 2 DWI (right) and ADC (left) axial MRI. The DWI hyperintensity without ADC hypointensity is indicative of T2 shine through rather than diffusion restriction. ADC, apparent diffusion coefficient; DWI, diffusion-weighted imaging.

Cerebral spinal fluid examination showed a white cell count of $4/\text{mm}^3$ and protein of 0.32 g/L . Cerebrospinal fluid oligoclonal bands later returned negative.

One month after admission, repeat MRI of the brain showed continued posterior cervical-medullary lesion with T2 hyperintensity. A re-evaluation of the initial images (figure 2) resulted in the identification of a high signal on diffusion-weighted imaging (DWI) but without apparent diffusion coefficient (ADC) low signal. These findings were suggestive of T2 shine through. An MRI of the spine was also performed, which showed no additional lesions. Serial CT chest scans revealed persistent bilateral consolidation.

Several weeks after initial neurology review, the serum aquaporin-4 (AQP-4) antibodies returned positive. Visual evoked potentials later demonstrated bilateral optic nerve slowing.

DIFFERENTIAL DIAGNOSIS

The patient's intermittent dysphagia and vomiting were initially attributed to achalasia cardia. However, the patient's signs on neurological examination were suggestive of a neurological cause, with a differential diagnosis including a medullary lesion of vascular or inflammatory origin, a Guillain-Barré syndrome variant and myasthenia gravis. After MRI of the brain, the most likely aetiology was thought to be stroke or demyelination.

Following the positive result of the AQP-4 antibodies, a diagnosis of neuromyelitis optica presenting with acute brainstem syndrome and area postrema syndrome was made, in accordance with the 2015 diagnostic criteria.²

TREATMENT

The patient was initially managed for brainstem infarction with antiplatelet medication. A percutaneous gastroscopy tube (PEG) was inserted for ongoing swallow impairment and recurrent aspiration pneumonia.

After the final diagnosis, she received a 5-day course of plasma exchange. Treatment then had to be interrupted for several weeks due to a severe pneumonia, after which she was given 3 days of 1 g intravenous methylprednisolone and a slowly tapering course of oral prednisolone starting at 60 mg once a day. Mycophenolate mofetil was added as a steroid-sparing agent.

OUTCOME AND FOLLOW-UP

Within 2 weeks of plasma exchange, the patient's palatal rise normalised and her gag reflex returned to normal. Her nystagmus

also resolved. Unfortunately, she required further 6 weeks of antibiotics for recurrent chest infection. In the future, we aim to remove the PEG tube after further assessment of her swallow.

DISCUSSION

We have presented a diagnostically challenging case of a patient with dysphagia, severe vomiting and upbeat nystagmus who was eventually diagnosed with NMOSD.

Among a case series of 70 patients with NMOSD, the most common initial presentations were transverse myelitis (59%) and optic neuritis (17%).³ Brainstem presentations, such as in the presented case, are less common (14%) and include, most frequently, area postrema syndrome. The area postrema is located in the dorsal medulla, adjacent to the fourth ventricle, and contains chemoreceptors that can trigger vomiting. Area postrema syndrome presents with intractable vomiting, is often accompanied by hiccups and is characteristic of NMOSD.²

In the NMOSD 2015 diagnostic criteria, acute brainstem syndrome is considered separately from area postrema syndrome. In a case series of 14 patients with acute brainstem syndrome and positive AQP-4 antibodies, only 2 patients had dysphagia.⁴ Other symptoms of acute brainstem syndrome identified in this study included dysarthria, diplopia, vertigo, facial weakness, ataxia and quadraparesis.

It is likely that the lesion of the patient presented here extended ventrally from the area postrema to involve the nucleus ambiguus, a structure from which arise the motor nerves that supply the muscles for swallowing. The extension of the lesion would therefore explain the lack of palatal rise and gag reflexes. Upbeat nystagmus is a relatively rare sign and can be localised to several brainstem locations, including the medulla as observed in this case (figure 1). Specifically the nucleus intercalatus within the dorsocaudal medulla has been implicated.⁵

Localisation is a key skill within neurological assessment. The case presented here highlights how a combination of symptoms (dysphagia and intractable vomiting) and signs (absent palatal elevation and upbeat nystagmus) can help localise the lesion. In this instance the lesion was localised to the dorsal medulla.

The next key skill in neurology is ascertaining the aetiology of the lesion. The patient was initially diagnosed with a stroke, as her complete dysphagia had developed rapidly and the imaging was thought to be suggestive of this aetiology. The patient's MRI highlights the concept of T2 shine through. In acute stroke, DWI hyperintensity and ADC hypointensity are usually identified on MRI scan, and these findings are termed diffusion restriction. However, T2 hyperintense lesions, such as those seen in

Learning points

- ▶ Neurological examination is important in patients with acute dysphagia as coexisting neurological signs would make a gastroenterological cause unlikely.
- ▶ While neuromyelitis optica spectrum disorder typically presents with transverse myelitis or optic neuritis, clinicians should be aware of both acute brainstem syndrome and area postrema syndrome.
- ▶ Area postrema syndrome is associated with intractable vomiting and hiccups and a characteristic dorsal medullary T2 hyperintense lesion on MRI.
- ▶ Acute brainstem syndrome has various presentations, including dysphagia and upbeat nystagmus, as demonstrated in this case study.

demyelination, will ‘shine through’ and cause DWI hyperintensity without ADC hypointensity (figure 2). The imaging findings in this case are typical of those found in the area postrema and prompted the AQP-4 antibody test to be undertaken. AQP-4 antibodies are a highly specific (>98%) and sensitive (64%) biomarker, and their discovery has greatly advanced the diagnosis of NMOSD.²

This case is important because it highlights how dysphagia can be caused by an uncommon presentation of NMOSD. By raising awareness of acute brainstem syndrome and area postrema syndrome, as well as the characteristic imaging findings, we hope that earlier diagnosis can be made in similar presentations in the future.

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REFERENCES

- 1 Cook IJ. Oropharyngeal dysphagia. *Gastroenterol Clin North Am* 2009;38:411–31.
- 2 Wingerchuk DM, Banwell B, Bennett JL, *et al*. International consensus diagnostic criteria for neuromyelitis optica spectrum disorders. *Neurology* 2015;85:177–89.
- 3 Huang J, Chaudhry B, McDonald K, *et al*. Typical and atypical initial presentations of neuromyelitis optica: a retrospective study (P4.008). *Neurology 2014 Lippincott Williams & Wilkins Neurology* 2014;82(10 Supplement).
- 4 Cheng C, Jiang Y, Lu X, *et al*. The role of anti-aquaporin 4 antibody in the conversion of acute brainstem syndrome to neuromyelitis optica. *BMC Neurol* 2016;16:203–16.
- 5 Janssen JC, Larner AJ, Morris H, *et al*. Upbeat nystagmus: clinicoanatomical correlation. *J Neurol Neurosurg Psychiatry* 1998;65:380–1.

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