

# Progressive dysarthria and ataxia

Lynsey McAlpine<sup>a</sup>, Fiona Cran<sup>b</sup>, Eluzai Hakim<sup>c</sup>

a FY1 Stroke and Rehabilitation Medicine, St Mary's Hospital, Isle of Wight.

b GPVST Stroke and Rehabilitation Medicine, St Mary's Hospital, Isle of Wight.

c Consultant Physician Stroke and Rehabilitation Medicine, St Mary's Hospital, Isle of Wight

Correspondence: [lynseymcalpine@gmail.com](mailto:lynseymcalpine@gmail.com)

## Introduction

'Guillain-Barre syndrome' (GBS) is a broad term used to describe a collection of clinical syndromes which manifest as acute immune-mediated demyelinating diseases or more rarely axonal diseases of the peripheral nervous system. The most commonly recognised form is 'acute inflammatory demyelinating polyradiculoneuropathy' (AIDP), which classically presents as a proximal and distal weakness with diminished reflexes, often involving the cranial nerves and muscles of respiration [1]. It is a neurological emergency as these patients are at risk of developing respiratory failure; one third will require admission to the Intensive Care Unit (ICU) for ventilatory support, and mortality rates of 3-10% have been reported [2].

Many clinical variants of Guillain-Barre syndrome have been described in the medical literature, and it is increasingly recognised that there is a wide spectrum of disease with considerable overlap between different subtypes [3]. This case illustrates an interesting and atypical presentation of the condition, and highlights some of the potential challenges in making a correct diagnosis.

## Clinical Presentation

This case concerns a 67 year old retired GP with a history of hypertension and a partial right nephrectomy for oncocytoma ten years previously. He described himself as generally being in good health, apart from an episode of diarrhoea two weeks earlier which he had attributed to laxative use.

He initially presented to the Emergency Department (ED) with a three-hour history of acute right sided facial droop and slurred speech. Clinical examination confirmed mild dysarthria and a right sided weakness affecting the facial muscles with apparent sparing of the forehead. There were no other clinical findings of note and CT brain demonstrated no evidence of infarct or haemorrhage, although some underlying small vessel disease was identified. A mild hyponatraemia (Na 128) was noted, but blood results were otherwise unremarkable. A diagnosis of probable stroke or transient ischaemic attack (TIA) was made on clinical grounds; the patient was prescribed

high-dose aspirin and was discharged from the ED with an appointment to attend a rapid-access TIA clinic.

In TIA clinic the following day he continued to present with dysarthria and facial weakness, although on examination it was found that his facial weakness also included the forehead. A slight unsteadiness of gait was also recorded. His hypertension remained poorly controlled with a systolic blood pressure of 180, but no other cardiovascular risk factors were identified. He was diagnosed as having had a stroke on the basis of the persisting neurological deficit; an MRI head and carotid doppler scan were requested. Antihypertensive medication was increased and he was discharged from the clinic with the provision of daily support from the Community Stroke Team.

Over the following eight days there was a progressive deterioration in his clinical condition. Community stroke nurses raised concerns over his marked dysarthria and severely unsteady gait; they found that he was unable to walk independently and was having recurrent falls. They also described an unusual upwards rolling of his eyes on attempted eye closure. The patient reported increasing difficulty in swallowing. These features appeared to increase in severity until it was felt that he was no longer safe at home. Urgent hospital admission was arranged.

On admission he was found to have bilateral facial weakness, with the right side affected more than the



Figure 1. Non-enhanced CT of the brain demonstrating small vessel disease.

left. He was unable to close either eye or raise his eyebrows. There was no nystagmus but an upwards and lateral movement of the eye occurred on attempted eye closure (Bell's phenomenon). Power was reduced in all limbs and the patient was areflexic except for a very weak left bicep jerk. Marked impairment of co-ordination was noted on upper limb examination but was difficult to assess in the lower limbs due to weakness. The patient showed no sensory deficits to light touch, pin prick or proprioception. Gait could not be safely assessed as the patient was unable to walk without assistance.

Peak flow was assessed at this time and was found to be remarkably low, however the patient had a respiratory rate of 18/minute and oxygen saturations of 98% on room air. The low peak flow was attributed to his inability to use his lips to form a complete seal around the peak flow meter rather than a weakness of respiratory muscles.

### Investigations

Results from admission blood tests are shown in Box 1. The most significant result here is a marked hyponatraemia: serum sodium concentration had dropped by 16 mmol/l in the twelve days since first presentation.

Brain MRI confirmed the CT findings of mild small vessel disease. Carotid dopplers did not demonstrate any significant stenosis.

### Differential Diagnosis

A broad differential diagnosis based on the initial presentation is given in Box 2.

The initial diagnosis of stroke was not unreasonable on the basis of the patient's initial presentation with a unilateral facial weakness which appeared to be due to an upper motor neuron lesion. Cerebrovascular events are relatively common in this age group, and the patient's uncontrolled hypertension was certainly a further risk factor. The absence of any significant CT findings did not preclude a cerebrovascular event as ischaemic changes are not always evident on these scans.

In light of the subsequent symptom progression this diagnosis became a less convincing explanation for the presentation and differential diagnoses had to be explored. Haemorrhagic transformation of an ischaemic stroke could have accounted for this gentleman's deterioration, but repeat CT and MRI refuted this.

The other important feature to be considered was the significant drop in serum sodium between initial

#### Box 1. Admission investigations

WCC	7.3
Hb	152
MCV	71
Plt	233
CRP	5.7
Bil	23
Alk phos	113
Total protein	69
Albumin	37
ALT	42
Urea	3.1
Na	112
K	3.1
Creatinine	47
eGFR	>90
Mg	0.84
Plasma osmolality	235
Urine osmolality	192

#### Box 2: A broad differential diagnosis based on the initial presentation

##### Brainstem pathology

- Cerebrovascular
- Demyelination
- Brainstem encephalitis

##### Neuropathy

- GBS
- Lyme disease
- Sarcoidosis
- Toxic
- Vasculitis
- Porphyria

##### Disorders of the neuromuscular junction

- Myaesthesia Gravis
- Lambert-Eaton syndrome
- Botulism

##### Bilateral Bell's palsy

#### Box 3. CSF analysis

Appearance:	clear yellow fluid
WBCs:	1 cell per cm <sup>3</sup>
RBCs:	43 cells per cm <sup>3</sup>
Protein:	2.36
Glucose:	2.4
Lactate:	2.28
Culture:	no growth

presentation and admission; weakness and ataxia are recognised complications of hyponatraemia. The potential causes of his hyponatraemia needed to be investigated further.

On re-admission it became evident that the weakness was lower rather than upper motor neuron in nature; the salient features in this patient were bilateral facial weakness, ataxia and areflexia. Our new differential had to encompass causes of an acute onset, progressive lower motor neuron disturbance.

The clinical features and disease progression led us to suspect an acute inflammatory demyelinating polyradiculopathy. This was supported by the presence of other clinical features: firstly, hyponatraemia is a recognised feature of GBS. Furthermore, the antecedent diarrhoeal illness may have been infective rather than secondary to laxative use, which raises the suspicion of an infective precipitant such as campylobacter. Based on the clinical presentation, we suspected that this gentleman was suffering from a variant of Guillain-Barre syndrome.

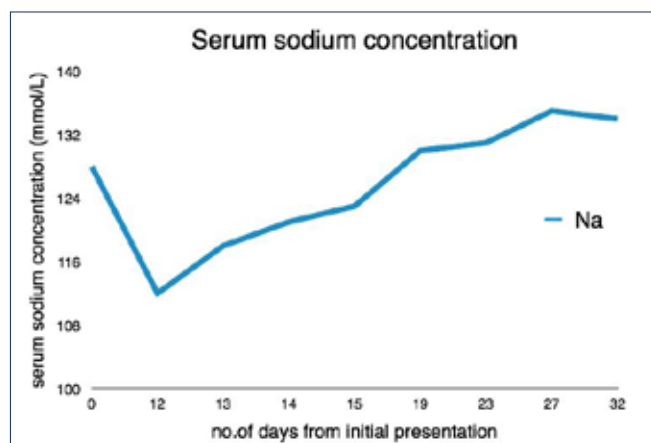


Figure 2. Serum sodium concentration over the course of the illness. (normal range 133-146 mmol/L)

### Treatment and Progress

The immediate management of this patient was to carefully correct his hyponatraemia by suspending diuretics, restricting fluid intake to <800ml/day and supplementing sodium orally. Regular monitoring was initiated including ECGs to detect autonomic dysrhythmias, and oxygen saturations and peak flow to detect any decline in respiratory function. Bowel and bladder function was also monitored, and prophylactic enoxaparin was prescribed.

Urgent neurological review agreed that this was likely to be GBS, and lumbar puncture was subsequently performed: results are displayed in Box 3. This pattern of results, with grossly elevated protein count, supported our clinical diagnosis of GBS.

GBS can be managed definitively either with intravenous immunoglobulin (IVIg) or plasma exchange; IVIg is preferred for ease of administration although the two treatments have similar efficacy. Limited evidence exists on the value of such definitive management in Miller Fisher variants, and on discussion it was felt that IVIg was not immediately necessary since the patient was stable with unimpaired respiratory function. A plan was made to give supportive therapy, continue correcting the hyponatraemia, and to have a low threshold for administering IVIg if there was any deterioration.

GQ1b ganglioside immunoglobulin G antibody titres were requested; these were negative. Stool samples were also sent for culture but did not yield any significant results.

Further evidence to support the diagnosis might have included nerve conduction studies and electromyography, which demonstrate demyelination abnormalities, although it should be noted that nerve conduction studies are often normal in the first few weeks after symptom onset.

Facilities for testing were not available in our hospital and the patient declined transfer to another hospital for testing as he wished to concentrate on recovery and rehabilitation.

Over the course of his admission there was a gradual but sustained improvement in this patient's symptoms. He became progressively less dysarthric and, with physiotherapy input, was able to mobilise safely on the ward.

Once serum sodium improvement was shown to be sustained, antihypertensive medications were reviewed and optimised. After a four week admission he was no longer dysarthric, weakness had completely resolved and there was only a mild degree of ataxia. He was discharged home, with further input from community physiotherapy to further improve mobilisation.

### Discussion

Guillain-Barre syndrome has an incidence of 2 per 100 000. [4] A number of infective triggers (usually respiratory or GI tract) have been identified. Pathophysiologically there is a post infectious immune-mediated process caused by production of autoantibodies which cross react with antigens specific to myelin in the peripheral nervous system [3].

Clinical presentation is highly variable: weakness can also present as ophthalmoplegia, facial weakness, dysphagia or respiratory failure. Patients may demonstrate Bell's phenomenon, an upwards and lateral deviation of the eye while attempting eye closure; this phenomenon occurs in facial palsy of any cause.

Loss of autonomic function can present as orthostatic hypotension or cardiac arrhythmias, and sensory loss can manifest as complete loss of deep tendon reflexes. Patients are also at risk of developing severe hyponatraemia due to inappropriate secretion of ADH [5].

Miller Fisher Syndrome is a rare variant of GBS characterised by a triad of ataxia, areflexia and ophthalmoplegia; GQ1b autoantibodies are identified in 95% of cases [6].

The diagnosis of GBS is primarily a clinical one, made on the basis of clinical history and examination [3,4]. CSF analysis is used to support the diagnosis, and characteristically demonstrates albuminocytologic dissociation, an elevated protein count without an associated rise in white cell count; this represents widespread inflammation of the nerve roots. Electromyography and nerve conduction studies can be valuable in supporting the diagnosis. Although a number of autoantibodies have been identified, serum

autoantibody testing is not routinely used for diagnosis, although it may be of value in cases where the diagnosis is uncertain.

The immediate management of suspected GBS is urgent hospital admission and monitoring of respiratory function, as symptoms can deteriorate rapidly and seemingly well patients can quickly develop respiratory failure or have cardiac arrhythmias secondary to autonomic dysfunction. Approximately a third of all GBS cases will require ICU admission, although stable patients can be managed on a general medical ward. Medical management is with immunomodulatory therapy [7]: intravenous immunoglobulins (IVIg) and plasma exchange have been shown to be equally efficacious, although IVIg is often preferred due to ease of implementation [8,9]. Once stable, patients with GBS often require extensive rehabilitation. To date there have been no specific studies on rehabilitation of GBS, but active rehab with physiotherapy is advised on the basis of experience with other neurological conditions [10].

Despite advances in treatment, GBS has a mortality rate of up to 10%. Relapse is uncommon but many patients will be left with residual deficits: motor sequelae are particularly common, affecting 20%. Persistent fatigue is widely reported, and a number of studies have highlighted the longstanding changes in psychosocial function, which can be severe but do not correlate with the severity of residual neurological deficits [11].

This case raised a number of diagnostic challenges. One of the most significant issues was that the initial clinical features mimicked those of a stroke; GBS was not considered in the original differential because the presentation was atypical. The focus on the presumed diagnosis of stroke meant that suggestive features in the patient's history, such as the recent diarrhoeal illness and hyponatraemia, were dismissed as incidental. Furthermore, the significance of early progression with forehead involvement and development of gait instability were neglected.

Sudden onset neurological deficits are a common presentation in acute medicine; the most common cause in older patients is cardiovascular events. A variety of less common conditions can present in similar ways, and it is important for clinicians to consider the broader differential before reaching conclusions about diagnosis. This case highlighted the importance of a thorough neurological exam to discern between upper and lower motor neuron symptoms. It also emphasised that symptom progression over time should be considered when making a neurological diagnosis.

### Learning points

- Acute neurological deficit is not always a cerebrovascular accident.
- Careful history-taking, discerning neurological examination and an understanding of symptom progression are all vital to making accurate neurological diagnoses.
- Diagnosis of GBS is supported by an elevated protein count and normal white cell count in the CSF.
- Patients with GBS are at risk of becoming hyponatraemic; serum sodium should be closely monitored.
- GBS always warrants hospital admission (even when symptoms are mild) because these patients are at risk of rapid deterioration with ventilatory failure requiring ICU admission.

### References

1. Koski CL. Guillain-Barre syndrome. *Neurol Clin.* 2(2): 1984. 355-66.
2. Mori M et al. Clinical features and prognosis of Miller Fisher syndrome. *Neurology* 2001. 58(8):1106.
3. Andary MT et al. Guillain-Barre syndrome. <http://emedicine.medscape.com/article/315632-overview> (Accessed: 10th July 2014).
4. van Doorn PA. Diagnosis, treatment and prognosis of Guillain-Barre syndrome (GBS). *Presse Med.* 2013. 42(6):193-201.
5. Colls BM. Guillain-Barre syndrome and hyponatraemia. *Intern Med J.* 2003. 33(1): 5-9.
6. Chiba A et al. Serum antiGQ1b IgG antibody is associated with ophthalmoplegia in Miller Fisher syndrome and Guillain-Barre syndrome: clinical and immunohistochemical studies. *Neurology.* 1993. 43(10): 1911-7.
7. Shahar E. Current therapeutic options in severe Guillain-Barre syndrome. *Clin Neuropharmacol.* 2006. 29(1): 45-51.
8. Fergusson D et al. Use of intravenous immunoglobulin for treatment of neurologic conditions: a systematic review. *Transfusion.* 2005. 45(10):1640-57.
9. Raphael JC et al. Plasma exchange for Guillain-Barre syndrome. *Cochrane Database of Systematic Reviews* 2012, issue 2. Art no: CD001798. doi: 10.1002/14651858.pub2.
10. Mullings KR et al. Rehabilitation of Guillain-Barre syndrome. *Dis Mon.* 2010. 56(5) :288-92.
11. Bersano A et al. Long term disability and social status change after Guillain-Barre syndrome. *J Neurol.* 2006. 253(2): 214-8.