

Diagnosis and management of diabetic amyotrophy

About 50% of patients with diabetes mellitus worldwide suffer from diabetic peripheral neuropathy (DPN). The most common form of DPN is a symmetrical, predominantly sensory, polyneuropathy with distal onset and slow proximal progression. However, some patients with diabetes may present with acute or subacute, progressive, asymmetrical weakness and pain of the muscles of the proximal lower limbs. The condition is commonly known as diabetic amyotrophy. Many other names have also been proposed, including Bruns-Garland syndrome, diabetic lumbosacral plexopathy and diabetic lumbosacral radiculoplexus neuropathies. Here, we review its pathogenesis, diagnosis and management.

Dr Subramaniam Nagsayi* Clinical Fellow in Geriatrics, Withybush General Hospital, Haverfordwest, SA61 2PZ

Dr Chandrashekariah Somasekhar ST3 in Geriatrics, Withybush General Hospital, Haverfordwest, SA61 2PZ

Dr Christopher Mark James Consultant in Geriatrics, Withybush General Hospital, Haverfordwest, SA61 2PZ

*email drkamalsuja@aol.co.uk

The overall prevalence of diabetic amyotrophy¹ (DA) is low and is higher in patients with type-2 diabetes (1.1%) than those with type-1 diabetes (0.3%). In contrast, a large proportion (about 50%) of patients with diabetes mellitus across the world suffer from diabetic peripheral neuropathy (DPN).

The most common form of DPN is a symmetrical, predominantly sensory polyneuropathy with distal onset and slow proximal progression.

A much smaller number of patients with diabetes may present with acute or subacute, progressive, asymmetrical weakness and pain in the muscles of the proximal lower limbs (box 1). Both lower limbs can become affected to similar degrees as diabetic amyotrophy progresses.

The condition runs a monophasic course that can be protracted (up to three years) and often causes significant disability. Recovery of function occurs

without medical treatment but may be slow and incomplete. Some patients may also have associated thoracic radiculopathies or upper limb weakness.

Pathogenesis

Diabetic amyotrophy is caused by a combination of autoimmunity, metabolic derangements, microvascular insufficiency, oxidative and nitrosative stress, and deficiencies in neurohormonal growth factors. Impaired blood flow and endoneurial microvasculopathy play critical roles in its pathogenesis.^{2,3}

Metabolic disturbances in the presence of an underlying genetic predisposition cause reduced nerve perfusion. A recent review concluded that this process is the result of ischaemic damage to nerves from a multifocal immune-mediated microvasculitis.⁴

Classification

Diabetic amyotrophy occurs with a gradual or acute onset, most commonly in patients aged 50 years or older. The symptoms may be the first presentation of diabetes mellitus, and hence a high clinical suspicion is required. The condition begins unilaterally and spreads bilaterally, with pain in the hip, buttock or thigh, sometimes accompanied by weight loss.

Proximal muscle weakness and wasting in quadriceps, hip adductors, and iliopsoas muscles is characteristic. A mild sensory loss is observed due to coexistence with chronic DPN.

The knee-jerk reflex is absent, with ankle jerks commonly preserved; however, ankle jerks also may be absent with underlying distal symmetrical polyneuropathy. In older patients who have diabetes, peripheral neuropathies have detrimental effects on stability, sensorimotor function, gait and activities of daily living (ADL).

Case study

A 69-year-old woman who was otherwise fit and well, was seen by her general practitioner for increasing difficulty with walking. It started as weakness in the right leg, then involved the left leg and thus led to unsteadiness and frequent falls. She lost two stone over six months with considerable wasting of her thighs in spite of a good appetite.

On examination, she had flaccid lower limb weakness with considerable wasting of both quadriceps and calves (more on the right). She had a power of 3/5 in the hip and 2/5 at the knee on the right and a right foot drop. The left hip and knee power was 3/5 but 5/5 at the ankle. She had

absent ankle reflexes bilaterally and an absent knee reflex on the right but a preserved reflex on the left. Plantar flexion was observed bilaterally. Spinothalamic and posterior column sensations were normal in the lower limbs, as was neurological examination of the upper limbs. Perianal sensation and anal tone were normal.

In the clinic, her capillary glucose measurement was 12.8mmol/L and urine showed 3+ glucose (28mmol/L) and 1+ ketones (trace levels).

A diagnosis of bilateral lumbosacral (motor) radiculopathy secondary to new onset type-2 diabetes mellitus was made and later confirmed by nerve conduction studies. Blood investigations were normal apart

from a random blood glucose measurement of 14.5mmol/L and HbA1c of 11.2%. Nerve conduction studies showed bilateral quadriceps denervation with ongoing reinnervation due to axonal sprouting. The foot drop was presumably due to L5/S1 roots involvement. MRI of the lumbar and sacral spine revealed no structural abnormalities.

Management included strict glycaemic control with insulin and intensive physiotherapy. Over the next two months, her HbA1c improved to 6.8%. Eight months later, proximal power had improved to 4/5 bilaterally, she was mobilising independently with the aid of a zimmer frame but the right foot drop remained.

Management

It is important to recognise that the condition can be the presenting feature of diabetes mellitus. Investigations are described in box 3. Early recognition, strict glycaemic control (with insulin at least initially) and aggressive physiotherapy are the mainstays of treatment. Neuropathic pain may co-exist and treatment

may be difficult. Tricyclic antidepressants, antiepileptic drugs and analgesics are often used as first-line drugs in the treatment plan.

It is important to divide proximal syndromes, such as diabetic amyotrophy, into either an axonal or a demyelinating

type (eg, chronic immune demyelinating polyneuropathy [CIDP]; see box 2) because the latter responds dramatically to immunoglobulin, plasmapheresis, steroids and immunosuppressive agents.^{5,6,7,8} An opinion from a neurologist to clarify the above dilemma could

Box 1: Differential diagnosis

- Cauda equina syndrome
- Guillain barré syndrome
- Spinal canal stenosis
- Neoplastic lumbosacral plexopathy
- Chronic demyelinating neuropathy

Box 2: Classification of diabetic neuropathies

1. Focal neuropathies (mononeuropathies and entrapment syndromes)
2. Diffuse neuropathies
 - Axonal (predominantly proximal such as diabetic amyotrophy)
 - Demyelinating (proximal and distal)
3. Generalised symmetric polyneuropathies
 - Acute sensory
 - Autonomic
 - Chronic sensorimotor distal polyneuropathy (large and small fibre) (chronic DPN)

throw light on further treatment options. These conditions should be distinguished from spinal stenosis, which is common in the elderly, because therapy may range from simple physical therapy to surgical decompression.

Conclusion

Diabetes mellitus is the commonest cause for peripheral neuropathy and distal sensory neuropathy predominates. However, as in the case study (p. 328), the presentation of asymmetric paraparesis, with minimal or no sensory involvement, should alert the physician to the possibility of diabetic amyotrophy. Early recognition prevents undue delay in its management, and hence measurement of blood glucose is necessary when investigating any form of peripheral neuropathy.

This article only aims to create awareness of an uncommon but treatable form of

Box 3: Laboratory tests

1. All patients with a suspected peripheral neuropathy should have a random blood glucose test
2. Baseline hematologic studies to rule out vitamin B12/folate deficiency
3. Lumbar puncture if CIDP is suspected
4. Electromyography/nerve conduction studies reveal axonal damage in the classic form of proximal motor neuropathy. If it shows demyelination, a diagnosis of CIDP should be considered
5. Magnetic resonance imaging of lumbosacral spine to rule out structural disorders

diabetic neuropathy. We suggest readers refer to other articles (such as those below) for further details on pathogenesis and management.

I have no conflict of interest

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Key points:

- Diabetic amyotrophy is a symmetrical, predominantly sensory polyneuropathy
- Distal onset and slow proximal progression
- More common with type-2 than type-1 diabetes (1.1% vs 0.3%)
- Both lower limbs can become affected
- Functional recovery possible without medical attention
- The condition begins unilaterally and can spread bilaterally
- Symptoms include pain in the hip, buttock or thigh
- Classify into the axonal or demyelinating type as the latter responds dramatically to certain treatments
- Treatment includes strict glycemic control and aggressive physiotherapy
- Symptoms include pain in the hip, buttock or thigh