A swollen calf

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A 36-year-old greengrocer was referred to the rheumatology clinic in July, 2001, with a 2-year history of a swollen right calf. A deep vein thrombosis had been ruled out as a cause of the swelling and he had had an MRI of his right calf which showed diffuse swelling of the calf muscles but no tumour (figure). He had a past medical history of back pain and sciatica which had started a few months before the calf swelling appeared and lumbosacral MRI had shown prolapse of the L5–S1 intervertebral disc causing compression of the S1 nerve root. This prolapse had been managed conservatively. He took no regular medications and was otherwise fit and well. On examination the right calf was 6 cm bigger in circumference than the left but was not tender or weak. The rest of the clinical examination was normal.

Blood tests showed raised creatine kinase; 3240 IU/L (1–200 IU/L) but full blood count, renal function, liver function, inflammatory markers and full autoantibody screen (including anti-nuclear antibody, extractable nuclear antigens, double-stranded DNA antibody and perinuclear and cytoplasmic antineutrophil cytoplasmic antibodies) were normal. Chest radiograph and lung function tests were also normal. Electromyography (EMG) of the right gastrocnemius showed profuse high-frequency discharges on a background of small polyphasic units, interpreted as representing active denervation on a myopathic background.

Muscle biopsy of the right gastrocnemius showed a necrotising myopathy with great variability in fibre diameters, many hypertrophic and atrophic fibres, fibre splitting, internal nucleation, and several clusters of inflammatory cells. There was an increase in endomysial connective tissue. Immunocytochemistry and western blotting (for dystrophin, dysferlin, sarcoglycans, calpain, and merosin) were normal. There was no evidence to suggest a congenital neuromuscular disorder. The patient was referred to a neurologist and the diagnosis of an S1 radiculopathy/calf hypertrophy syndrome was made. By August, 2002, the calf swelling had begun to resolve and the serum creatine kinase level had returned to normal so the decision was made not to decompress the S1 nerve root. In February, 2004, the right calf had returned to a normal size. Creatine kinase remained within the normal range, and the patient reported only minor discomfort in the calf with no sciatica.

Unilateral calf swelling can be caused by a variety of conditions such as deep vein thrombosis, ruptured popliteal cyst, tumours, or trauma. Although neurogenic disorders typically cause muscle atrophy, S1 radiculopathy is a rare cause of unilateral calf swelling. Histological correlates of this swelling include muscle hypertrophy,[1,2,3] pseudohypertrophy,[3,4] or focal myositis.[5]

Figure: **MRI showing a swollen right calf**

Swelling may be caused by compensatory work-hypertrophy of non-denervated fibres[1] and our patient's biopsy did show hypertrophic as well as atrophic fibres.

The biopsy also showed increased interstitial connective tissue, consistent with the suggestion of pseudohypertrophy[3] as the cause of the calf swelling.

Finally, there were features suggesting a form of myositis with elevation of the serum creatine kinase and inflammatory infiltrates in the muscle biopsy. There is no clear evidence as to whether decompression of the S1 nerve root has any benefit in this condition as there are reports of the calf swelling improving both with and without surgery.[1] Clinicians should remember that S1 radiculopathy can be a cause of calf swelling, even in the absence of a clear history of sciatica or leg pain.

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References

1 Swartz KR, Fee DB, Trost GR, et al. Unilateral calf hypertrophy seen in lumbosacral stenosis. *Spine* 2002; **18:** E406–09.

2 Ricker K, Rohkamm R, Moxley RT 3rd. Hypertrophy of the calf with S1 radiculopathy. *Arch Neurol* 1988; **45:** 660–64.

3 De Beuckeleer L, Vanhoenacker F, De Shepper A Jr, et al. Hypertrophy and pseudohypertrophy of the lower leg following chronic radiculopathy and neuropathy: image findings in two patients. *Skeletal Radiol* 1999; **28:** 229–32.

4 Donato G, Valentino P, Santucci M, et al. Calf pseudohypertrophy in a patient with double neurogenic pathology. *Clin Neuropathol* 2000; **19:** 142–44.

5 Gobbele R, Schoen SW, Schroder JM, et al. S1 radiculopathy as a possible predisposing factor in focal myositis with unilateral hypertrophy of the calf muscles. *J Neurol Sci* 1999; **170:** 64–68.