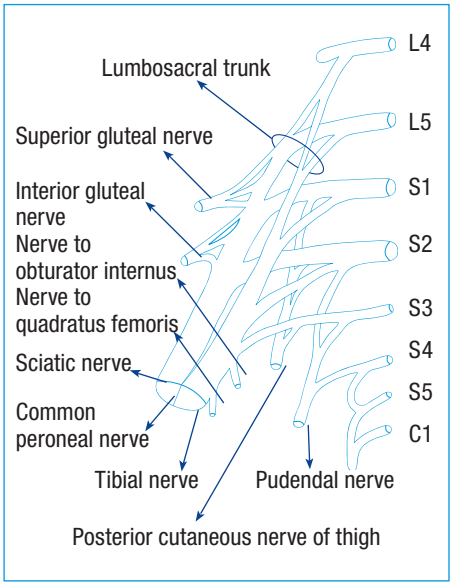
Sciatica

Sciatica is a common medical complaint that is associated with significant personal morbidity and economic burden. It refers to radiating pain in the buttock or leg along the course of the sciatic nerve, and may be associated with radicular sensory, motor or tendon reflex abnormalities. However, the term is often misused to describe non-specific leg and back symptoms. Synonyms available in the literature, such as lumbosacral radicular syndrome and sciatic neuralgia, are better descriptions of the disease, but are infrequently used.

Figure 1. Anatomy of the lumbosacral plexus.



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Several causes of sciatica exist, although lumbosacral disc herniation with nerve root compression is by far the most common, accounting for approximately 90% of cases (Koes et al, 2007). Investigation and management of the disease varies considerably, likely a reflection of variation in health-care systems and a lack of clear clinical guidelines, but the majority of cases can be managed in the primary care setting.

Anatomy of the sciatic nerve

The sciatic nerve is the largest nerve in the body. It arises from the fourth and fifth lumbar and first three sacral nerve roots, which join in the lumbosacral plexus to form the peroneal and tibial nerves (*Figure 1*). These leave the pelvis through the greater sciatic foramen, ensheathed as a single trunk, travelling distally in the posterior compartment of the thigh. The sciatic nerve provides sensory innervation to the skin of the foot and leg, and motor innervation to the posterior compartment of the thigh and all the compartments of the leg (*Figure 2*).

What causes sciatica?

Sciatica can result from irritation of the sciatic nerve anywhere along its length and may have underlying spinal or non-spinal causes (*Table 1*). Most commonly, sciatica is caused by compression of a nerve root by a herniated lumbosacral disc, usually at the L4–L5 or L5–S1 levels (*Figure 3*). Degenerative spinal disease causing spondylolisthesis (*Figure 4*) or lumbar stenosis, infection and tumours are other

Figure 2. Sciatic nerve innervation.

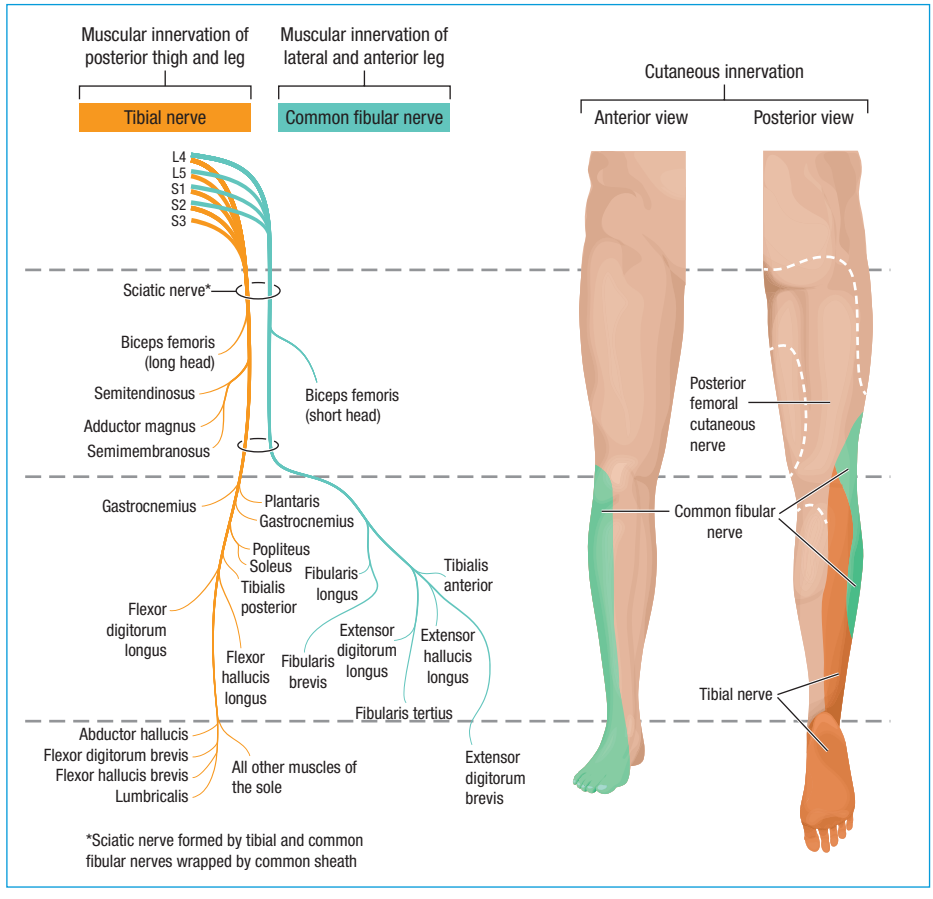


Table 1. Causes of sciatica	
Spinal causes	Herniated lumbosacral intervertebral disc
	Degenerative spinal disease (foraminal or central stenosis)
	Spondylolisthesis (degenerative or traumatic)
	Tumour and infection
	Spinal cysts
Non-spinal causes	Pelvic tumour
	Pregnancy and delivery
	Piriformis syndrome
	Iatrogenic injury
	Primary nerve tumours

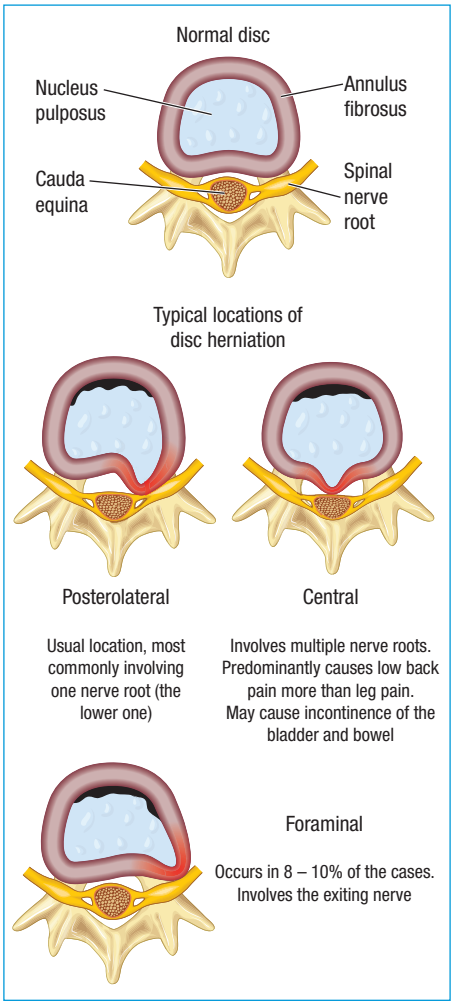
possible causes of root compression. Non-spinal sciatica can result from disturbance to the nerve in the pelvic cavity, buttock, gluteal region or posterior thigh. Lesions in the course of the nerve such as schwannoma, neurofibroma and ganglion are uncommon but should be considered, particularly if imaging of the lumbar spine is unhelpful. The symptomatology of sciatic pain is complex, and thought to result from a combination of both direct nerve root compression and also local inflammatory effects (Andrade et al, 2011).

Who gets sciatica and what are the risk factors?

The reported prevalence of sciatica varies greatly. A systematic review of epidemiological studies and prevalence estimates provide figures of between 1.6% and 43% for a selection of lifetime, period and point prevalence (Konstantinou and Dunn, 2008), reflecting differences in the definition of sciatica, method of diagnosis and the populations studied.

Sciatica can present at any age but is most common in the fourth and fifth decades (Konstantinou and Dunn, 2008). Evidence for an association between sex and prevalence of sciatica is conflicting. There is some quality developing evidence that disc degeneration has a largely genetic basis but this has not yet been defined for herniated nucleous pulposus producing radicular pain. Modifiable risk factors including occupation, prolonged exposure to vibration, mental stress and smoking have been identified to be associated with sciatica, although the causal role for some is questionable (Koes et al, 2007).

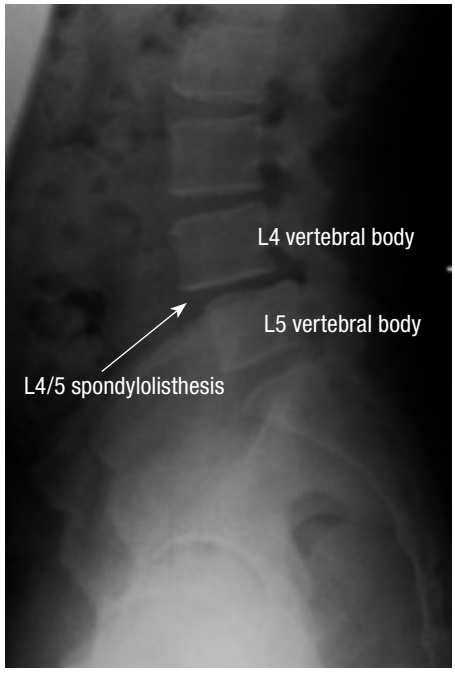
Figure 3. Different types of disc herniation.



What are the symptoms and signs?

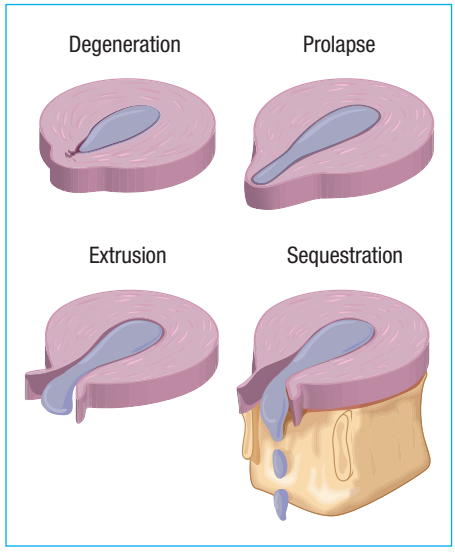
Sciatica has various modes of presentation from an acute onset of symptoms to a more indolent course, and this may reflect disc morphology of a subligamentous, extruded or sequestered material (*Figure 5*). History and physical examination, primarily through neurological testing, are central to diagnosis. Pain may be reported to have aching and sharp components. It is the distribution, which radiates to the leg in a radicular pattern in keeping with the affected spinal nerve root, that increases the likelihood of diagnosis of nerve pain. Typically, sciatic pain is unilateral, reflecting the most common underlying pathology of posterolateral disc herniation (*Figure 3*). Bilateral sciatica can occur with central disc herniation, lumbar stenosis or spondylolisthesis. A history of bilateral symptoms should stimulate further enquiry into possible symptoms of cauda equina syndrome, in particular any disturbance in bowel and bladder sphincter function or perianal sensation.

Figure 4. Lateral plain radiograph showing a L4/L5 spondylolisthesis. Forward displacement of one vertebral body on another has the potential to 'pinch' the exiting nerve roots. However, this can be asymptomatic, being a coincidental finding on imaging.



Pain may be accompanied by disturbance in sensory or motor function. Dermatomal paraesthesia or numbness may be reported

Figure 5. Morphology of different types of disc herniation.



but is not a prominent feature while motor weakness is present in less than 50% of cases. Reflexes may be altered, with reduction or loss of ankle jerk reflex with S1 root compression, or knee jerk reflex with L4 root compression. Thorough neurological examination, although often unremarkable, is therefore vital. Rapid assessment of motor power of the primary anti-gravity muscle groups through ability to heel walk, tip-toe walk and knee dip is of particular importance, as a deficit in these actions may result in long-term functional disability, and may therefore alter the management plan.

The straight-leg-raise (Lasègue's) test is the most common special test performed in the assessment of a patient with sciatica, and helps determine if the pain is caused by disc compression of a nerve root. In a positive test, pain is reproduced on passive elevation of the extended leg as the nerve root is stretched further over the herniated disc. It has high sensitivity of 92% but is non-specific (van der Windt et al, 2010), with a positive test frequently elicited as a result of gluteal or hamstring tightness. Simultaneous dorsiflexion of the foot or hallux intensifies the symptoms, and also increases sensitivity. Crossed straight-leg-raise testing, where the non-symptomatic leg is elevated, eliciting pain in the affected leg when positive, is more specific (90% pooled specificity) but far less sensitive (28%) (van der Windt et al, 2010). A variant of these, the slump test, has also been shown to have high sensitivity (84%) and specificity (83%) for lumbar disc herniation (Majlesi et al, 2008). It involves progressive spinal and hip flexion while in a seated position in order to apply traction to the nerve roots, reproducing symptoms of pain in a positive test.

How is sciatica investigated?

In typical cases, a thorough history and examination in the primary care setting forms the basis of the diagnosis. Imaging and/or specialty spinal review is not indicated as an emergency unless there is progressive neurology or red flags suggestive of serious spine pathology (*Table 2*). Investigation may also be required in patients with severe symptoms that are bothersome and have failed to follow the usual favourable natural history after 6–8 weeks, when invasive interventions may start to be considered. In these cases imaging is used to determine the local neuroanatomy to confirm concordance of clinical and radiological findings. This is particularly important as there is a high prevalence of false-positive findings detected on imaging in asymptomatic individuals (Jensen et al, 1994).

Radiographs have limited value but do permit an assessment of bone anatomy. They may show evidence of spondylolisthesis, infection or tumour but lack sensitivity and specificity, so are not routinely performed. Computed tomography and magnetic resonance imaging have similar sensitivities and specificities for diagnosis of herniated intervertebral discs, but magnetic resonance imaging provides better visualization of soft tissues and is also more sensitive for infection and malignancy (Jarvik and Deyo, 2002), and is the modality of choice unless contraindicated.

What are the management options?

The natural history of sciatica is generally favourable; symptoms resolve with conservative measures within 2 weeks in one third of patients, and within 3 months in three quarters of patients (Vroomen et al, 2002). Early good quality pain control and reassurance regarding the favourable natural history should therefore be provided. A period of observation and review is recommended in the first 6 weeks, assuming no red flag symptoms are present.

Table 2. Red flag symptoms for urgent imaging investigation

Suspected spinal cord neurology
Impending cauda equina syndrome
Major motor radiculopathy
Suspected spinal infection
Past history of cancer
Recent unexplained weight loss
Objectively unwell with spinal pain
Raised inflammatory markers
Possible immunosuppression with new spinal pain
Prolonged steroid use
Known osteoporosis, with new severe spinal pain
Age <15 years or >60 years

From NHS England National Pathfinder Projects (2014)

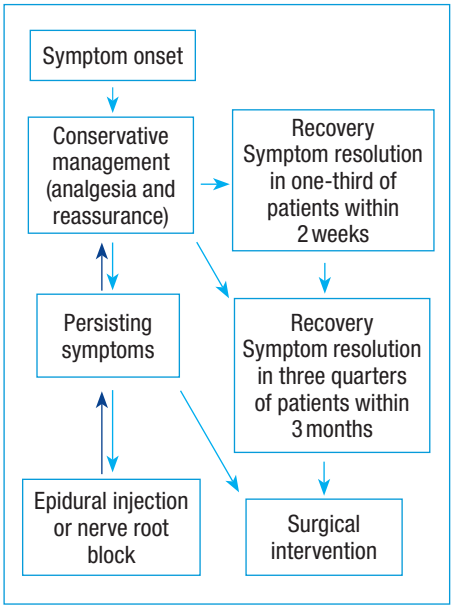
However, evidence increasingly suggests that patient subgroups with different prognostic profiles exist, and therapy may therefore become increasingly targeted. Sciatica with co-existent disabling lower back pain (el Barzouhi et al, 2014) and female gender are associated with poorer outcome at 1 year, while the latter is also associated with slower symptom recovery (Peul et al, 2008a). Psychological factors are also thought to be important in recovery.

Early treatment of sciatica focuses on reduction of pain symptoms through analgesia and physical therapy, although the precise role of both is unclear. Multi-modal therapy with anti-inflammatories, simple analgesics and neuropathic pain medication may be more effective than single modality treatment. Evidence is often confounded by combining investigations for treatment of lower back pain with that of sciatica. Activity is often limited by discomfort, but there is no significant difference in symptoms or function in patients who rest or remain active, and the latter is therefore recommended where possible (Hagen et al, 2005). Various exercise regimens have been trialled but currently there is no evidence for superiority of one over another (Longo et al, 2015). Perhaps of greatest importance is timely and comprehensive patient counselling with cognitive and affirmative reassurance regarding the favourable clinical course with spontaneous resolution of symptoms (Koes et al, 2007).

Patients who fail to improve with conservative measures may receive an epidural injection or a nerve root block, sometimes called a transforaminal epidural. Systematic review evidence for this treatment is conflicting. Short-term benefit of improved pain symptoms may be gained by infiltration of local anaesthetic and steroid around the affected nerve root. However, there is no evidence for long-term improvement compared with placebo and it does not reduce the need for future surgical intervention (Luijsterburg et al, 2007). Surgical management of discogenic sciatica focuses on decompression of the affected nerve root and removal of the herniated disc material with the aim of relief of leg pain and recovery of any altered neurological function.

Patients with concurrent back pain should be counselled that surgery is not performed to alleviate these symptoms. Various techniques have been developed

Figure 6. Flowchart of natural history of sciatica.



to decompress the nerve roots, but an in-depth description is beyond the scope of this article. Complications including dural tear with CSF leak, nerve root damage, infection and epidural haematoma are uncommon but significant, and patients must be made aware of these during discussion of management options. Surgical treatment of non-discogenic sciatica likewise focuses on treatment of the underlying cause. *Figure 6* presents a flow chart of the possible natural history and management pathway of patients with sciatica.

The evidence for surgery in the treatment of sciatica remains ambiguous. Peul et al (2008b) compared early surgery with an intended period of 6 months of conservative management in 283 patients with a 6–12-week history of sciatica. Early surgery was shown to be of benefit by providing more immediate relief of pain symptoms (P=0.05). Many (62 of 142) of the conservatively managed cohort subsequently went on to have surgery. However, no significant difference in pain or disability was found at 1 and 2 years follow up. Early surgical treatment also has the benefit of restoring function more quickly, allowing an earlier return to work and reducing associated costs (van den Hout et al, 2008). Surgery is performed on an elective basis; the only absolute indication for immediate surgery is cauda equina syndrome, with the aim of preservation of bowel and bladder sphincter function.

Symptom recovery

Following discectomy for sciatica, pain relief occurs first, followed by recovery in motor function and finally by improvement in sensation. Persistent minor dermatomal dysfunction after surgical treatment is not uncommon.

About 75% of patients with mild to moderate motor weakness will recover function within the first year following surgery. However, failure of recovery has not been shown to have any detrimental effect on function or quality of life. **BJHM**

Conflict of interest: none.

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Further reading

European Seventh Framework Programme Research Project on Intervertebral Disc Degeneration and Back Pain – Genodisc. www.physiol.ox.ac.uk/genodisc/index.html (accessed 19 July 2015)

KEY POINTS

- Sciatica refers to radiating pain in the buttock or leg, usually below the knee.
- It may be associated with radicular sensory, motor or tendon reflex abnormalities.
- It is most commonly caused by compression of a nerve root by a herniated lumbosacral disc.
- The investigation of choice is magnetic resonance imaging.
- The natural history of the disease is one of spontaneous resolution, with 75% of patients having full resolution of symptoms by 3 months.
- Initial management involves reassurance and good quality multi-modal pain control.
- Referral to a spine specialist is indicated for patients with bothersome or intrusive persistent symptoms of more than 6 weeks' duration.
- Following surgery, leg pain improves first, followed by recovery in motor function and finally by improvement in sensation.
- Emergency surgery is only indicated in cases of cauda equina syndrome.