

Foot drop

Textbooks of neurology are just like cookery or gardening books. It is all so easy on paper. With a good working knowledge of neurological anatomy, it seems, almost any problem can be precisely localised. A couple of hours yomping through a busy out patients leads to a rapid re-evaluation of that view. Foot drop, however, is a common neurological problem that is particularly amenable to an anatomical approach, so this month I will briefly outline the anatomy of peroneal nerve and discuss the clinical and neurophysiological approach to foot drop.

The common peroneal nerve is a branch of the sciatic nerve. The sciatic nerve is formed in the pelvis by fibres from the lumbosacral trunk (L4,5) and by fibres from S1,2,3. The nerve immediately leaves the pelvis through the greater sciatic notch, below the piriformis muscle. The nerve may divide immediately, or may pass either above or through the piriformis. In the gluteal region the nerve lies deep to gluteus maximus, between the greater trochanter and the ischial tuberosity. The nerve then passes down the back of the thigh to the apex of the popliteal fossa. In the thigh the nerve divides into lateral common peroneal and medial tibial divisions. The common peroneal division supplies fibres to the short head of biceps femoris.

The common peroneal nerve leaves the popliteal fossa between the tendon of biceps femoris and the lateral head of gastrocnemius. It crosses behind the head of the fibula and passes laterally around the neck of the fibula, where it is particularly vulnerable to compression or blunt trauma. The nerve gives off the sural communicating branch to the sural nerve, and the lateral cutaneous nerve of the calf. The nerve pierces the peroneus longus muscle to divide into deep and superficial branches. The deep peroneal nerve supplies the muscles of the anterior compartment (table 1). The superficial peroneal nerve supplies the muscles in the lateral compartment (table 1) and the skin over the anterior lower leg and dorsum of the foot.

Clinical Evaluation of Foot Drop

The manner in which the common peroneal nerve snakes around the fibular head exposes it to injury and external compression and this can sometimes occur in bizarre and quite unexpected ways (table 2). Common peroneal neuropathy presents with foot drop; foot drop is due to weakness of the muscles in the anterior and lateral compartments of the leg. Since it is these compartments that work against gravity, pathology in the spinal chord, lumbar

roots (L4 and L5), plexus, sciatic nerve, peroneal nerve and severe generalised neuropathies can all present in this way (Table 2). The first step in clinical evaluation is to exclude cord or other CNS pathology and examine for other peripheral nervous system involvement. In sciatic neuropathy there may also be weakness in a tibial nerve distribution also, however it is possible to have selective involvement of the common peroneal fascicles only. In L5 radiculopathy both ankle dorsiflexion and inversion/eversion will be affected while in a pure common peroneal neuropathy inversion will be spared. There is a slight caveat however. If the foot is tested in the dropped position inversion may appear to be weak so inversion should be tested in a passively dorsiflexed position. In an isolated superficial peroneal neuropathy eversion will be weak and dorsiflexion spared while in an isolated deep peroneal neuropathy there will be weakness of dorsiflexion with sparing of eversion. In a common peroneal neuropathy sensation over the lateral foot (sural territory), sole of foot (plantar nerves) and medial calf and foot will be spared. Finally ankle jerks will be spared in a pure common peroneal neuropathy.

Neurophysiological Evaluation

The neurophysiological evaluation of foot drop nicely illustrates the old maxim that electrophysiology is an extension of clinical assessment. The first step is to determine if the pathology is restricted to the common peroneal nerve only, so where possible it is worth studying- doing the works in both lower limbs (Bilateral peroneal and tibial motor studies, bilateral superficial peroneal and sural sensory studies). If a common peroneal mono-neuropathy is confirmed, the next objective is to determine any site of injury or compression and give an estimate of severity. This can be achieved with a combination of nerve conduction studies and EMG. Segmental conduction studies around the fibular head should be performed- focal slowing or conduction block is a sign of compression or neuropraxia and also in an isolated deep peroneal neuropathy superficial peroneal sensory studies will be normal. EMG should be performed in one L4/L5 muscle not innervated by the common peroneal nerve (tibialis posterior is often used), one deep peroneal muscle (Tibialis anterior) and one superficial (peroneus longus). The degree of denervation and the presence or absence of voluntary activity will give pointers as to severity of the neuropathy.



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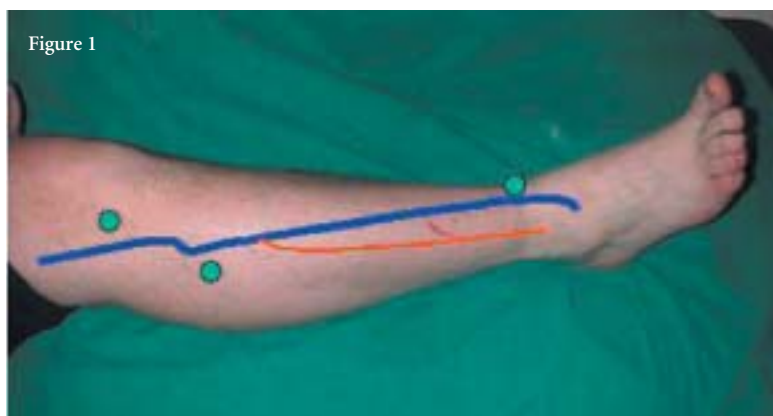


Figure 1: Course of the common, deep (blue) and superficial peroneal nerve, sites of stimulation for motor nerve conduction studies are shown by green discs.

Table 1: Muscles supplied by the two divisions of the common peroneal nerve.

Deep peroneal	Superficial Peroneal
Tibialis Anterior	Peroneus Longus
Extensor Digitorum Longus	Peroneus Brevis
Extensor Digitorum Brevis	
Peroneus Tertius	

Table 2: Some peripheral causes of foot drop	
Generalised Neuropathy	Motor Neuronopathy
	Motor Neuropathy
	Motor and Sensory Polyneuropathy
	HMSN
Localised Neuropathy	Mononeuritis Multiplex
	L4/L5 Radiculopathy
	Lumbosacral Plexopathy
Common Peroneal Neuropathy	Sciatic Neuropathy eg. Buttock injection
	Trauma at fibular head
	Forcible stretch
	External Compression eg. Casts stockings etc.
	Prolonged immobility eg. During anaesthesia
	Occupational eg. gardening
	Habitual Leg crossing
Weight loss	

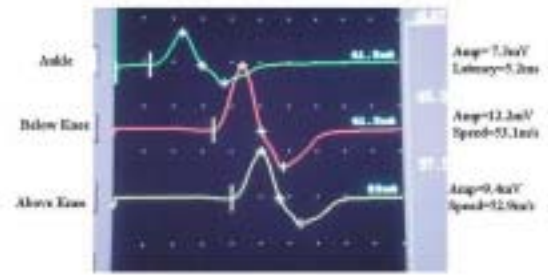


Figure 2: Normal peroneal motor study, note there is no slowing of conduction across the fibular head.

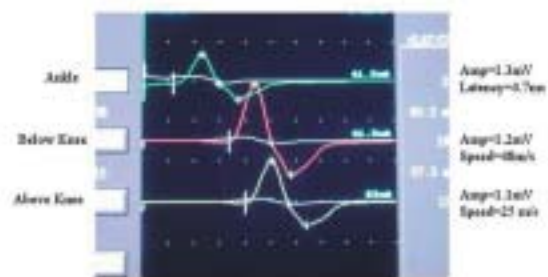


Figure 3: The same normal study superimposed on abnormal study (opposite leg). This study was taken from a patient who developed foot drop after having his leg in a plaster of Paris cast for 9 weeks, note the reduced amplitude and slowing across the fibular head.

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