Common Peroneal Nerve Palsy Following Inversion Ankle Injury

A Report of Two Cases

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Ankle sprains are one of the most common injuries to the lower leg treated by physicians, trainers, and physical therapists. Inversion sprains of the ankle most frequently involve injury to one of the lateral collateral ligaments; however, peroneal nerve injury may occur simultaneously. Eleven such cases of nerve injury have been reported in the literature. Omer and Spinner reported that an inversion twist can pull the elongated nerve against the fibrous edge of the peroneus longus muscle, which initiates a neuropathy. Liveson and Spielholz also cite the possibility of a peroneal nerve injury with ankle sprains.

The exact mechanisms contributing to nerve lesions, however, have not been clearly identified. An important factor to be considered is that nerve paralysis is often delayed. Hyslop reported three cases in which only one patient developed paralysis immediately following the injury. In the second case, the patient developed weakness one day after injury, and in the third case, the patient developed the peroneal nerve palsy one week after injury. Hyslop postulated that the major factor contributing to the nerve lesion was direct damage to the peroneal nerve caused by the fibers being stretched. Noble, in a report of two cases, claimed that, "...it [the nerve lesion] would seem more likely, in the cases in which the onset of paralysis was delayed, to have been the result of a gradually expanding hematoma within the nerve sheath consequent to rupture of a nutrient vessel." Meals found that numbness and paralysis were first reported in the peroneal nerve distribution seven days after inversion sprain in two cases. These cases of latent peroneal nerve palsy may support the theory of hematoma expansion in the popliteal fossa, whereas immediate nerve injury symptoms suggest involvement of the traction mechanism at the fibular head.

The following two cases demonstrate the importance of performing basic neurological examinations, including manual muscle testing and sensory testing of the common peroneal nerve, following inversion ankle sprain. These evaluation procedures should be performed during follow-up visits as well as immediately following the injury because the onset of a peroneal nerve palsy may be delayed. The nerve injury may contribute to weakness in ankle musculature which is evident during rehabilitation and is often attributed to soft tissue trauma. Electromyography may be used in evaluating the location and severity of the nerve lesion.

PATIENT DATA

Case 1

A 28-year-old man sustained an inversion injury to the right ankle. The patient was examined the following day and was found to have swelling and pain distal to the lateral malleolus and a loss of motor power in the muscles of the lateral and anterior compartments of the lower leg. A Tinel's sign was present at the fibular head, and roentgenograms were normal. A polypropylene ankle-foot orthosis was fitted for the patient. Two weeks after the injury, improvement in ankle dorsiflexion was noted, and the tibialis anterior and the peroneal muscles were graded as Good. Complete recovery of function occurred 12 weeks after injury.

Case 2

A 42-year-old man sustained an inversion injury to his right ankle when the ladder he was standing on collapsed. Swelling over the lateral ankle was treated with a home program of ice, elevation, and a figure-
of-eight bandage for support. Roentgenograms of the ankle were normal. The patient returned five weeks after the accident with severe weakness of the muscles innervated by the peroneal nerve and with a Tinel's sign at the fibular head. Manual muscle testing was performed two days after this visit, and the muscles were graded as follows: the extensor hallucis longus and the tibialis anterior, Zero; the peroneus longus, Poor; the extensor digitorum longus, Fair; and the gastrocnemius, Normal. Sensation to pin prick was diminished in the areas innervated by the deep and superficial branches of the peroneal nerve.

Electromyographic examination with monopolar needle electrode technique revealed positive sharp waves and fibrillation potentials in the tibialis anterior, the extensor digitorum longus, and the extensor digitorum brevis muscles. The peroneus longus muscle produced grossly polyphasic motor units and a decreased interference pattern; but no fibrillations, fasciculations, or positive sharp waves were seen at rest. The medial head of the gastrocnemius muscle was normal. A motor nerve conduction study of the right peroneal nerve revealed a conduction velocity of 28 m/sec in the fibular head to ankle segment and 34 m/sec in the popliteal fossa to fibular head segment. The distal latency was normal. This patient also required the use of a polypropylene ankle-foot orthosis but declined physical therapy treatments so that he could continue his full-time employment.

A follow-up evaluation six months after the accident showed improving strength grades of Good plus for the tibialis anterior and the extensor digitorum longus muscles, Fair plus for the peroneus longus muscle, and Fair for the extensor hallucis longus muscle. Electromyographic testing showed reinnervation of the anterior compartment musculature and reduced numbers of fibrillation potentials and positive sharp waves. The peroneal nerve motor conduction velocities also improved when compared with the study performed five weeks after the accident. The fibular head to ankle segment conduction velocity was 37 m/sec, and the popliteal fossa to fibular head segment increased to 44 m/sec.

**SUMMARY**

Function of the peroneal nerve should be evaluated in all patients with a history of inversion ankle sprain. Two cases were presented that demonstrated significant involvement of the common peroneal nerve following ankle injury. Manual muscle testing and sensory exams identified the involvement of the peroneal nerve, and electrophysiological testing localized the lesion and provided indications of the severity of the trauma. The importance of routinely performing neurological testing on patients with ankle sprains as part of initial and follow-up evaluations has been demonstrated and is supported in the literature.

**REFERENCES**