

# Sciatic nerve entrapment in the upper thigh caused by an injury sustained during World War II at the Battle of Anzio

## Case report

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✓ The authors present an unusual case of sciatic nerve entrapment due to a World War II shrapnel injury to the left thigh suffered during the battle of Anzio in 1943. The patient presented for evaluation of left lower-extremity pain in the sciatic nerve distribution. Magnetic resonance imaging of the lumbosacral spine revealed a disc bulge at L5–S1 that would not explain severe sciatica. A positive Tinel sign was present in the posterior aspect of the upper thigh at the site of a scar resulting from a World War II shrapnel injury. The patient underwent exploratory external neurolysis of the area, and the sciatic nerve was released from fibrous adhesive entrapment. The patient improved dramatically following surgery. During a 3-year follow-up period, no recurrence of symptoms was noted.

**KEY WORDS** • sciatic nerve entrapment • external neurolysis

**T**he tighter the cicatrix, the more laborious is the work and the more imperfect is the success.

Lehmann, 1936<sup>10</sup>

Involvement of peripheral nerves in surrounding fibrous tissue is well described in the neurosurgical literature. In 1781 Fontana<sup>5</sup> was the first to describe cross striations or spirals on the peripheral nerves.<sup>2</sup> The indirect or undulating course of the nerve fibers allows the nerve to accommodate the longitudinal excursion from flexion to extension and vice versa. In 1907 Babcock<sup>1</sup> asserted that it would be valuable to open the thickened nerve sheath in a compressed nerve to permit the escape of fluid, thereby reducing the internal pressure within the nerve.<sup>3</sup> There has been no report of an excellent functional recovery of the sciatic nerve after external neurolysis in patients with a 55-year history of progressive chronic entrapment. In our case, a cicatrix due to an injury sustained in World War II, involving the sciatic nerve in the upper thigh, presented as sciatica, and a full history and careful clinical examination led us to the correct diagnosis and, ultimately, toward selection of an appropriate procedure.

### Case Report

*History and Presentation.* This 82-year-old man present-

ed in 1998 with a history of shrapnel wound to his left buttock and proximal thigh sustained in Italy at Anzio in 1943 during World War II. He complained of left buttock pain. He had a history of symptoms since the injury and described moderately severe pain. Sitting for longer than 30 minutes, prolonged standing, or walking more than one block caused the pain to worsen and radiate to the left foot. His symptoms had gradually and progressively worsened since the injury. In 1960 he underwent left-sided L-4 and L-5 laminectomies, but the pain was not relieved. Of note, over the past decade he has undergone transcutaneous electric nerve stimulation therapy and also received nerve and epidural blocks, all without respite from his symptoms. He had been treated with narcotic pain medicines for several years. During a 2-year period the symptoms became disabling.

*Examination.* On physical examination, the patient exhibited moderate discomfort while seated in a wheelchair. We observed a well-healed midline surgical incision at the lumbar spine. Examination of his left buttock and posterior proximal thigh was remarkable for the appearance of an approximately 8-cm well-healed scar at the lateral aspect of the gluteal fold without exuberant palpable scar. Motor examination was notable for Grade 4/5 strength of the following muscles on the left side: hamstrings, tibialis anterior, gastrocnemius, soleus, long extensor of the great toe, and long flexor of the great toe. Grade 5/5 motor strength of the left iliopsoas and quadriceps muscles as well as throughout the right lower-extremity region was observed.

Abbreviation used in this paper: MR = magnetic resonance.

Findings on sensory examination were unremarkable. Of note, a positive Tinel sign was demonstrated over the shrapnel scar at the junction of the buttock and thigh. The straight-leg raise test was negative and the remainder of the physical examination findings were normal.

Two previously obtained MR imaging studies (one of the lumbar spine, the other of the left hip and thigh) were available for review. The lumbar MR imaging study demonstrated the prior laminectomies, multilevel degenerative lumbar changes, a small left L3–4 disc herniation, moderate left L4–5 lateral recess stenosis without obvious neural impingement, and L5–S1 facet joint arthropathy with bilateral neural foraminal narrowing and moderate displacement of the left S-1 nerve root. The MR imaging study of the left buttock and thigh revealed metallic foreign bodies at the mid-thigh level, but no foreign body or fibrous compression near the sciatic nerve was noted. The patient underwent electromyography monitoring, which showed chronic injury to both sciatic and femoral motor groups with normal gluteal motor units.

**Operation.** Suspecting involvement of the sciatic nerve in the shrapnel's fibrous tract, the patient underwent a surgical exploration and neurolysis of the left sciatic nerve 1 month after presentation. The posterior approach was performed through the intermuscular plane of the biceps femoris and semitendinosus, also laterally at level of the gluteal fold to the interval between the posterior border of the iliotibial band and the insertion of the gluteus maximus. The posterior femoral nerve was identified and protected. Because the peroneal nerve branched from the sciatic nerve fairly proximally, both the tibial and peroneal nerve branches from the sciatic nerve were identified distally in an area of normal anatomy and dissected free, distal to proximal. We observed scar tissue encompassing both branches of the sciatic nerve, beginning just deep to the biceps femoris muscle belly, and this was carefully released circumferentially from around the tibial and peroneal nerves. Motor branches to the hamstring were identified and protected, and the dissection was taken proximally. At the level of the gluteal fold, deep to the healed wound on the patient's buttock, the scar tissue was found to track through the inferior muscle belly of the gluteus maximus, and surrounding and compressing the sciatic nerve proximal to its main division. These adhesions too were taken down until the nerve was clear of all scar tissue. The sciatic nerve itself was not found to be in continuity with a neuroma, but it did exhibit noticeable flattening at the area of the dense scarring. A small fibrous band just proximal to this area was also released. The nerve was tracked proximally deep to the gluteus maximus at the level of the ischial spine where it entered the pelvis proximal to the piriformis. No other disease was noted, and the piriformis was left intact.

**Postoperative Course.** The patient reported marked improvement of his pain on the 1st postoperative day. His postoperative course was otherwise unremarkable, and he was discharged home on postoperative Day 3. At 5 years, he continues to be virtually symptom free.

## Discussion

It has been postulated that the peroneal portion of the

sciatic nerve is more vulnerable to injury than the tibial portion, possibly because it has fewer nerve bundles and less abundant vascular supply from the inferior gluteal artery. Injury to the adult sciatic nerve can be caused by tumors, penetrating injuries, gluteal muscle trauma, orthopedic procedures for femoral neck fractures or hip dislocation, pressure palsies, and, to a lesser extent, injection injuries and asthenia.

In 1950, Matson<sup>6</sup> reported on two patients who sustained drug injection injuries. In the first case, surgically treated in 1948, an external neurolysis of the sciatic nerve was conducted. The patient recovered partially. The second patient underwent internal neurolysis that yielded a better outcome. Omer<sup>7,8</sup> reported 917 war-related injuries to upper-extremity nerves; external neurolysis was performed in 59 cases in which the injured nerve was found in continuity but bound in fibrous scar. Neurolysis was successful in 60% of the cases that were adequately followed.

The decision to proceed with internal neurolysis or internal splitting of the nerve into groups of smaller fascicles, allowing the maintenance of nerve integrity, might be warranted if there is lesion in continuity; if it conducts a nerve action potential but the patient suffers severe pain; or if there is a partial nerve lesion with or without regeneration, as demonstrated on pre- and intraoperative electrical studies. There are two views in favor of internal neurolysis. In the first the efficacy of this procedure is attributed to reversal of localized conduction block by releasing individual fascicles. In the second internal neurolysis of complete lesions is believed to aid the axonotomically injured fascicles in regenerating more readily. The risk of further reduction in nerve function exists after internal neurolysis. External neurolysis performed in a 360° fashion is usually the initial step in most peripheral nerve dissections. Splitting of the perineurium is not currently considered part of an internal neurolysis. Thorough removal of a scar at the perineural or subperineural level may be indicated, however, for a lesion that transmits a nerve action potential and is associated with neuritic pain.<sup>4,9,11</sup>

In our patient, preoperative radicular neuritic pain in the sciatic nerve distribution raised the issue of whether to undertake internal or external neurolysis. Our approach of favoring external neurolysis combined with splitting of the perineurium was based on the preoperative lack of motor impairment and the intraoperative involvement of the sciatic nerve and the cicatrix formed by the adhesions from the adductor magnus muscle anteriorly and the biceps femoris and semitendinosus muscles posteriorly. In addition to careful release of adhesions, intraoperative nerve action potential verified nerve integrity and supported our original preoperative plan that was limited to aggressive external neurolysis.

The decision to undertake surgical exploration was based on the following reasons: the patient suffered worsening symptoms over the 2 years prior to surgery while the pain was virtually confined to the upper thigh with some radiation distally, a Tinel sign was present over the injury site, and the pain was disabling and affected his quality of life.

The remote war-related injury, which was sustained in 1943 in the region of the sciatic nerve, together with lessening in protective body fat in an elderly man who had been active and gainfully employed throughout most of

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his life led to the decision to offer surgical exploration of the sciatic nerve. Although entrapment was suspected, it was not a foregone conclusion, and the patient was so informed.

This excellent result may not occur in all patients with long-term entrapment due to many factors including chronic changes within the nerve itself. It appears, however, that exploration of the involved nerve with appropriate neurolysis should be considered in selected patients despite the remoteness of the injury.

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