



Sciatic Nerve Intercommunications: New Finding

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■ **OBJECTIVE:** Communicating branches between the tibial and common fibular divisions of the sciatic nerve have not been previously described. The aim of our study was to examine such neural connections.

■ **MATERIALS AND METHODS:** Twenty unembalmed adult cadavers underwent dissection of the sciatic nerve. Observations were made for interneural communications between the tibial and common fibular divisions of this nerve. When present, these were measured and classified.

■ **RESULTS:** The majority of sides (75%) had neural communications between the parts of the sciatic nerve in the gluteal/posterior thigh regions before the normal bifurcation of the nerve just above the knee. These connections were always within 20 cm of the greater sciatic notch. Most connections were represented by Testut intercommunicating branches types A (14 sides), F (8 sides), and D (2 sides). Most sides were found to have 1 location for sciatic nerve intercommunications. However, 4 sides (13%) had multiple locations (up to 3) for these intercommunications. The mean length of the communications was 4.1 cm, and the mean diameter was 2.4 mm. No statistically significant difference was found between sides or sexes.

■ **CONCLUSIONS:** To our knowledge, neural interconnections between the divisions of the sciatic nerve in the posterior thigh have not been described in the extant literature. Such data might help explain unusual neurologic examinations and alert the surgeon as to the potential for encountering such connections at operation.

INTRODUCTION

The sciatic nerve is composed of L4-S3 spinal nerve contributions and is the thickest nerve in the body.^{1,2} Its width is 2 cm at its origin, ranging across its length from 1.5–2.0 cm.^{1,3} It comprises 2 nerves, the common fibular and tibial nerves, which are encased in a common epineurial sheath.⁴⁻⁶ The tibial nerve comprises the ventral branches of the ventral rami of L4-S3 while the common fibular nerve comprises the dorsal branches of the ventral rami of L4-S2.^{1,3} The 2 nerves/divisions are separated within the nerve sheath by the Compton-Cruveilhier septum, which is composed of connective and adipose tissues.⁷ These 2 components of the sciatic nerve are mixed nerves supplying the posterior thigh muscles, the ischial aspect of the adductor magnus, and most structures inferior to the knee except for the sensory distribution of the saphenous nerve on the medial aspect of the leg and foot.^{1,2} The sciatic nerve also sends articular branches to the hip, knee, and ankle joints.^{1,2}

As the sciatic nerve, the 2 encased tibial and common fibular divisions exit through the greater sciatic foramen and inferior to the piriformis muscle.³ Anatomic variations of the sciatic nerve involving the piriformis muscle are well documented, with particular debt to the early work of Beaton and Anson.^{4,8-11} More rarely, the common fibular component of the sciatic nerve innervates the gluteus maximus, as demonstrated in a case reported by Sumalatha et al.¹² The sciatic nerve continues to descend deep to the gluteus maximus muscle and along the posterior aspect of the acetabulum.^{2,3} It courses over the obturator internus, quadratus femoris, and superior and inferior gemelli muscles,^{2,3} continuing inferiorly between the greater trochanter and the ischial tuberosity; halfway between these bony features is the surface marking of the nerve.^{1,3} Through the posterior compartment of the thigh, the sciatic nerve courses along the posterior aspect of the adductor magnus.² It separates into the tibial and common fibular nerves proximal to the knee as it is crossed by the long head of the biceps femoris muscle and enters the apex

Key words

- Anatomy
- Interneural connections
- Nerve action potential
- Neurosurgery
- Posterior thigh

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Citation: *World Neurosurg.* (2017) 98:176-181.
<http://dx.doi.org/10.1016/j.wneu.2016.10.118>

Journal homepage: www.WORLDNEUROSURGERY.org

Available online: www.sciencedirect.com

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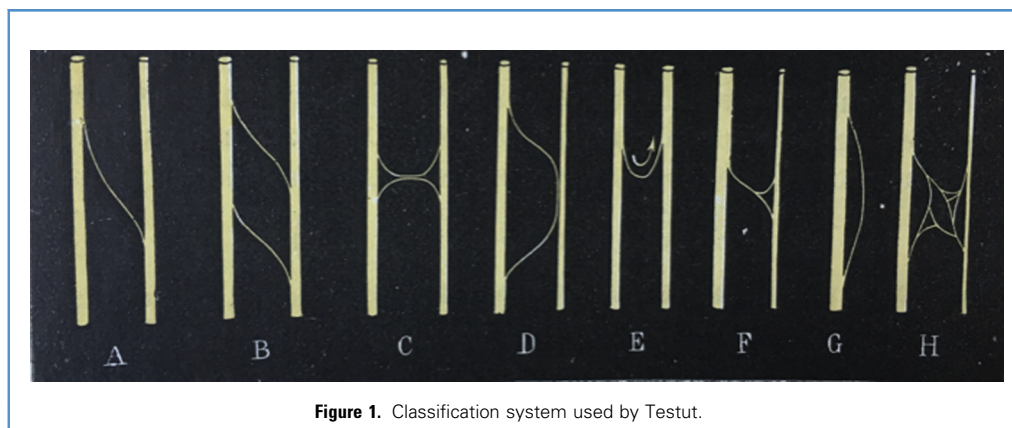


Figure 1. Classification system used by Testut.

of the popliteal fossa, but the location of the bifurcation is highly variable.^{1,2,11,13-15}

The aim of the present study was to identify communicating branches between the common fibular and tibial components of the sciatic nerve.

MATERIALS AND METHODS

Twenty unembalmed adult cadavers (40 sides) underwent dissection of the sciatic nerve from its exit from the greater sciatic foramen to its division into common fibular and tibial components above the knee. The cadavers were aged 46–97 years (mean 77 years) at death. Twelve specimens were male, and eight were female. With the specimen in the prone position, a linear skin incision was made from the top of the iliac crest to the popliteal fossa. The fascia lata was then identified and opened in a cranial to caudal direction. The overlying gluteus muscle was transected, and retractors were placed. The sciatic nerve was identified inferior to the piriformis muscle and followed distally to the popliteal fossa. The outer layer of connective tissue uniting the common fibular and tibial components of the sciatic nerve was dissected with scissors using a spreading motion in a caudal to cranial direction. No specimen showed evidence of prior surgery or trauma to the areas studied. Calipers and a ruler were used for measurements. Random nerve communication samples (15) were sent for routine histologic analysis to prove their neural nature. The classification developed by Testut¹⁶ (Figure 1) was used to describe the various nerve communications when any were present. Statistica for Windows was used for statistical analysis, with significance set at $P < 0.05$.

RESULTS

Thirty of the 40 sides (75%) had communications between the parts of the sciatic nerve in the gluteal/posterior thigh regions before the normal bifurcation of the nerve just above the knee (Figures 2–7). All neural connections were located in the gluteal region or proximal thigh. This was always within 20 cm of the greater sciatic notch with the majority of these interconnections occurring in the proximal superior half of the thigh. Most connections were represented by Testut intercommunicating branches

types A (14 sides), F (8 sides), and D (2 sides). Two sides had a configuration similar to a Testut type H intercommunication. One side was similar to Testut's type B but was more complex by having an additional crisscrossing branch traveling in the opposite direction from the 2 parallel nerves. This side was classified as a type B₂ intercommunication. Three sides were not represented by

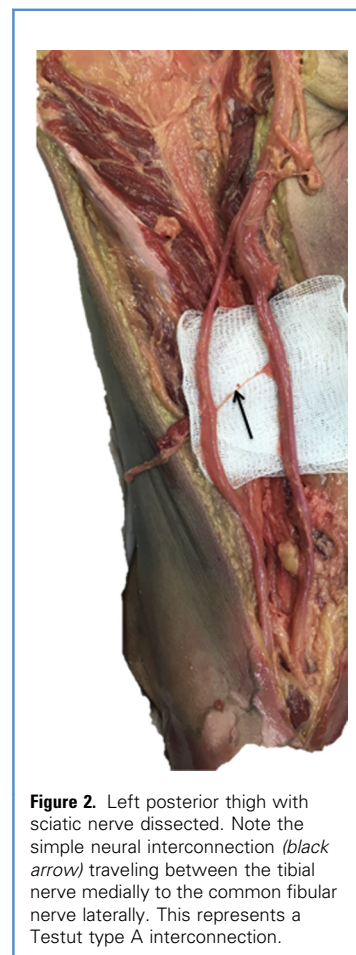


Figure 2. Left posterior thigh with sciatic nerve dissected. Note the simple neural interconnection (black arrow) traveling between the tibial nerve medially to the common fibular nerve laterally. This represents a Testut type A interconnection.

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