

LOWER-EXTREMITY PERIPHERAL NERVE INJURIES: A LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER LITERATURE REVIEW WITH COMPARISON OF THE OPERATIVE OUTCOMES OF 806 LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER SCIATIC, COMMON PERONEAL, AND TIBIAL NERVE LESIONS

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OBJECTIVE: With the use of data from 3 Louisiana State University Health Sciences Center (LSUHSC) publications, various parameters for buttock/thigh-level sciatic nerve and tibial and common peroneal divisions/nerve injuries were summarized, and outcomes were compared.

METHODS: Data from 806 buttock/thigh-level sciatic nerve and tibial and common peroneal division/nerve injury repairs were summarized. Lesion types, repair techniques, and outcomes were compared.

RESULTS: Acute lacerations undergoing suture repair were best for the thigh-then-buttock-level tibial (93%/73%) and then same-level common peroneal divisions (69%/30%); at the knee level, tibial outcomes (100%) were better than those for the common peroneal nerve (CPN) (84%). Secondary graft repairs for lacerations had good outcomes for the thigh-then-buttock-level tibial (80%/62%), followed by common peroneal divisions at the same levels (45%/24%). The knee/leg-level tibial nerve (94%) did better than the CPN (40%) here. In-contiguity lesions with positive intraoperative nerve action potentials underwent neurolysis with better results for the thigh-then-buttock-level tibial division (95%/86%) than for same-level CPN (78%/69%). The knee/leg-level tibial nerve did better than the CPN (95%/93%).

CONCLUSION: Better recovery of buttock- and thigh-level tibial division/nerve occurs because: 1) the CPN is lateral and thus vulnerable to a more severe injury; 2) the tibial nerve is more elastic at impact owing to its singular-fixation site (the CPN has a dual fixation); 3) the tibial nerve has a better blood supply and regeneration; 4) the tibial nerve has a higher force-absorbing fascicle/connective tissue count than the CPN; and 5) the tibial nerve-innervated gastrocnemius soleus requires less reinnervation for functional contraction than deep peroneal branches, which innervate long, thin extensor muscles at multiple sites and require coordinated nerve input for effective contraction.

KEY WORDS: Common peroneal nerve, Sciatic nerve, Tibial nerve

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Lower-extremity (LE) peripheral nerve repair outcomes have been analyzed sporadically in the English literature. Clawson and Seddon (1) presented a large study of

119 suture repairs of the tibial and peroneal nerves. They found that 79% of 47 tibial nerve repairs showed useful motor recovery, and of 72 common peroneal nerve (CPN)

ABBREVIATIONS: CPN, common peroneal nerve; GSW, gunshot wound; LE, lower-extremity; LSUHSC, Louisiana State University Health Sciences Center; NAP, nerve action potential; UE, upper-extremity

repairs, only 36% showed similar recoveries. When functional outcomes have been evaluated, the results have not been consistently compared with regard to level of injury. Roganović and Pavličević (16), however, documented better motor recovery in tibial versus peroneal graft repairs at high (22/12 [55%] versus 29/4 [14%]), intermediate (36/23 [64%] versus 46/7 [15%]), and low levels (11/11 [100%] versus 21/16 [76%]). Roganović (15) presented a series in which he analyzed outcomes at various levels of 157 missile-caused lesions of the peroneal division and nerve. Successful outcomes were found in 11% of high-level, 31% of intermediate-level, and 57% of low-level repairs.

Documentation of the collective outcomes for upper-extremity (UE) nerves versus those of the LE were carried out by Kretschmer et al. (10). These authors found “very good” and “good” outcomes for 33 of 43 (77%) UE and 28 of 38 (74%) LE iatrogenic nerve injury repairs using neurolysis, end-to-end anastomosis, and graft repairs; however, the results for each of the UE versus LE types of repairs were not compared. Matejčík (12) presented 39 of 45 UE peripheral nerve graft repairs (87%) versus 4 of 14 similar LE repairs (29%) with very good to excellent results (i.e., UE reconstructions did better than LE repairs).

The present study evaluates the outcomes of 806 sciatic nerve, CPN, and tibial nerve repairs performed over an average of 32 years at the Louisiana State University Health Sciences Center (LSUHSC) under Dr. David Kline’s direction. Three published papers from LSUHSC with Dr. Kline as senior author are reviewed for each of the above nerves’ injury mechanisms and types of lesions. Operative techniques and outcomes of these 806 lesions are summarized and compared for each individual mentioned LE nerve and level of repair. The collective UE nerve results, presented in a companion article (14), are compared with those of the LEs.

PATIENTS AND METHODS

Publications concerning LSUHSC LE nerve lesion repairs for the sciatic nerve, CPN, and tibial nerves were reviewed (5–7). The Ovid Medline search engine was used to perform a literature search from the prior 5 years using the search term “peripheral nerve.” All nerve operations were performed during an average of 32 years (range, 31–32 years) at LSUHSC. The mean follow-up times were 1.5 to 3 years for the sciatic nerve lesions and 2.2 years each for the tibial nerve and CPN lesions. The patients’ average age range was 7 to 83 years for all 3 nerves. Patients with CPN and tibial nerve injuries had a mean age of 28 and 38 years, respectively. With the use of data summarized from the above LSUHSC publications, injury mechanisms, types of lesions (i.e., in-continuity and not-in-continuity lesions), and outcomes were compared for the sciatic nerve, CPN, and tibial nerve. Sciatic nerve lesions were evaluated at the buttock and thigh-levels. CPN injuries were evaluated at the knee level. Tibial nerve lesions were evaluated at the knee and leg levels and at the ankle level. Nerve repair techniques included external neurolysis, primary or secondary anastomotic end-to-end suture, and secondary graft repairs. Good outcomes represented those patients with grade 3 or better outcomes, as determined by the LSUHSC grading system, which was outlined in each published article. Compression/entrapment repair outcomes were evaluated separately for each nerve.

Outcome comparisons were made for the sciatic nerve, CPN, and tibial nerve, which were not-in-continuity and undergoing primary and secondary suture and graft repairs and in-continuity with positive nerve action potentials (NAPs) and undergoing neurolysis.

RESULTS

Injury Mechanisms and Outcomes for Sciatic Nerve, CPN, and Tibial Nerve

Sciatic Nerve Lesions

Sciatic nerve injuries at various levels, managed at LSUHSC between 1968 and 1999, were evaluated by Kim et al. (5). Analyses included injury mechanisms, resulting lesions’ repair techniques, and outcomes.

Mechanisms of Injury. Kim et al. (5) analyzed the frequency of mechanisms of injury for the buttock- and thigh-level sciatic nerve managed at LSUHSC. Such mechanisms included injection (64 and 0; total, 64), fracture/dislocation (26 and 34; total, 60), contusion (22 and 28; total, 50), compression (19 and 12; total, 31), gunshot wound (GSW) (17 and 62; total, 79), hip arthroplasty/iatrogenic (15 and 10; total, 25), and laceration (12 and 32; total, 44) (5). It should be noted that buttock-level compression injury was attributable to: 1) sciatic nerve pressure from the patient falling asleep in a sitting position; 2) surgery under general anesthesia while the patient was in a lithotomy position; or 3) piriform muscle entrapment, etc. (5).

Surgical Techniques and Outcomes. Not-in-continuity sciatic nerve injuries attributable to sharp laceration and undergoing primary end-to-end anastomotic suture repair within 72 hours were documented by Kim et al. (5) to have good outcomes at the buttock (tibial and peroneal divisions) and thigh levels (tibial and peroneal divisions), as follows: buttock, 11/8 (73%) and 10/3 (30%); and thigh, 29/27 (93%) and 29/20 (69%) (Table 1). Good outcomes for graft repairs at similar levels were: buttock, 34/21 (62%) and 37/9 (24%); and thigh, 54/43 (80%) and 49/22 (45%) (5).

In-continuity sciatic nerve lesion results were also analyzed by Kim et al. (5). For these contusion/stretch injuries with positive intraoperative NAPs and undergoing neurolysis, the following good outcomes at the buttock (tibial and peroneal divisions) and thigh levels (tibial and peroneal divisions) were: buttock, 105/90 (86%) and 100/69 (69%); and thigh, 83/79 (95%) and 83/65 (78%). For compression/entrapment repairs at similar levels, the outcomes were: buttock, 19/18 (95%) and 19/15 (79%); and thigh, 12/12 (100%) and 12/10 (83%) (5).

Tibial Nerve Lesions

Tibial nerve lesions and their operative management and outcomes were summarized in a second article by Kim et al. (7). One hundred thirty-five cases underwent operations between 1967 and 1999 at LSUHSC (7).

Mechanisms of Injury. Knee- and leg- and ankle-level tibial nerve injury incidence in descending frequency included: contusion with fracture, (10 and 19; total, 29) and laceration (ankle level) (12 and 3; total, 15) (7). Other injury mechanisms were stretch/contusion or crush injury without fracture (7 and 8;

TABLE 1. Percentage of good recoveries for lower-extremity nerves^a

Lesion category/repair	Sciatic nerve								Tibial nerve				CPN	
	Buttock level				Thigh level				Knee and leg		Ankle		Knee	
	Tibial division		Peroneal division		Tibial division		Peroneal division		No.	(%)	No.	(%)	No.	(%)
	No.	(%)	No.	(%)	No.	(%)	No.	(%)						
Not-in-continuity														
Primary suture	11/8	(73%)	10/3	(30%)	29/27	(93%)	29/20	(69%)	2/2	(100%)			19/16	(84%)
Secondary graft	34/21	(62%)	37/9	(24%)	54/43	(80%)	49/22	(45%)	16/15	(94%)	11/7	(64%)	129/51	(40%)
In-continuity														
+ NAP														
External neurolysis	105/90	(86%)	100/69	(69%)	83/79	(95%)	83/65	(78%)	20/19	(95%)	15/11	(73%)	70/65	(93%)
Internal neurolysis											4/3	(75%)		
- NAP														
Suture														
Graft														
Total	150		147		166		161		38		30		218	

^a CPN, common peroneal nerve; NAP, nerve action potential.

TABLE 2. Percentage of good recoveries for lower-extremity compression/entrapment repairs^a

Lesion category/repair	Sciatic nerve								Tibial nerve				CPN (knee)	
	Buttock level (n = 175)				Thigh level (n = 178)				Knee/leg		Ankle ^b		No.	(%)
	Tibial division		Peroneal division		Tibial division		Peroneal division		No.	(%)	No.	(%)	No.	(%)
	No.	(%)	No.	(%)	No.	(%)	No.	(%)						
+ NAP														
External neurolysis	19/18	(95%)	19/15	(79%)	12/12	(100%)	12/10	(83%)			34/26	(76%)	51/42	(82%)
Internal neurolysis											5/2	(40%)		
Resection											7/4	(57%)		
- NAP														
Suture														
Secondary Graft													9/6	(67%)
Total	19		19		12		12				46		60	

^a CPN, common peroneal nerve; NAP, nerve action potential.

^b Significant sensory recovery is parameter-followed for this subgroup.

total, 15), iatrogenic injury (6 and 1; total, 7), and GSW (3 and 2; total, 5) (7). Forty-six tarsal tunnel entrapment occurred.

Surgical Techniques and Outcomes. Tibial nerve injuries involved the knee and leg levels and the ankle level (Table 1). Entrapment injuries are shown in Table 2.

With regard to not-in-continuity lesions, per Kim et al. (7), good outcomes after end-to-end anastomotic suture repair for sharp laceration injuries of the knee- and leg-level tibial nerve occurred in 2/2 (100%). When graft repair was necessary, good outcomes included 16/15 (94%) at the knee- and leg-level tibial nerve and 11/7 (64%) for the ankle level (7).

In-continuity lesion results were analyzed by Kim et al. (7). If the lesion was attributable to stretch/contusion injury and had positive intraoperative NAPs, external neurolysis was performed with the following good outcomes: 20/19 (95%) for knee- and leg-level lesions and 15/11 (73%) for ankle-level lesions. For ankle-level lesions undergoing internal neurolysis, the outcomes were 4/3 (75%).

For tarsal tunnel syndrome repairs, for which external and internal neurolysis were performed, the outcomes were 34/26 (76%) and 5/2 (40%), respectively. Resection was carried out in 7 patients for tarsal tunnel syndrome, and 4 (57%) had signifi-

cant reduction in pain, which was the primary parameter followed in this subgroup (7).

CPN Lesions

A review of CPN lesions was carried out in another study by Kim et al. (6) Three hundred eighteen patients with CPN injuries underwent operations between 1967 and 1999 at LSUHSC (6).

Mechanisms of Injury. Kim et al. (6) found mechanisms of injury for the CPN, in descending frequency of occurrence, to be: stretch/contusion without fracture/dislocation (141), laceration (39), entrapment (30) stretch/contusion (22), compression (21), iatrogenic (13), and GSW (12) (6).

Surgical Techniques and Outcomes. The same categories and types of surgery used for the sciatic nerve were also used for the CPN.

Kim et al. (6) published outcomes for not-in-continuity CPN lesions, which were primarily repaired using end-to-end anastomotic suture repairs at the knee level. Good outcomes were found in 19/16 (84%) (Table 1). Good outcomes for graft repairs were 138/57 (41%) overall (including entrapments and compressions) and were found to occur more frequently when grafts were less than 6 cm in length, i.e., in 36/27 cases (75%). When grafts were 6 to 12 cm in length, this outcome occurred in 64/24 cases (38%), and grafts that were 13 to 24 cm in length had 38/6 good results (16%) (6).

In-continuity CPN lesion results were analyzed by Kim et al. (6). This lesion was attributable to mainly stretch/contusion, and if intraoperative NAPs were positive, neurolysis was carried out with good outcomes in 70/65 knee-level lesions (93%). Entrapment lesions had good outcomes in 51/42 external neurolysis repairs (82%) (6).

Outcome Comparisons for Sciatic Nerve, Tibial Nerve, and CPN

Outcomes of not-in-continuity lesions having primary suture and graft repairs and in-continuity lesions undergoing neurolysis, suture, and graft repairs were compared for the sciatic nerve, CPN, and tibial nerve.

Not-in-Continuity Lesions

Primary suture repairs were evaluated for good results after combining all levels for which data were equally available for the sciatic nerve, CPN, and tibial nerve (Table 1). Good outcomes in primary suture repairs occurred more frequently for tibial (8 of 11 cases, 73%) and (27 of 29, 93%) than for peroneal nerve divisions (3 of 10 cases, 30%) and (20 of 29, 69%) for both buttock- and thigh-level sciatic nerve, respectively. Thigh-level lesions for both divisions had better outcomes than those at the buttock level. Thus, good outcomes were obtained in 27 of 29 thigh-level tibial divisions (93%) and 8 of 11 buttock-level tibial divisions (73%), and in 20 of 29 thigh-level peroneal divisions (69%) and 3 of 10 buttock-level peroneal divisions (30%) (5). The tibial nerve at the knee and leg level (2 of 2 cases, 100%) did better than the CPN (16 of 19 cases, 84%). There were no lesion repairs in this category for the ankle-level tibial nerve (6, 7).

Secondary graft repairs for sciatic nerve lesions that were not-in-continuity and unable to be approximated to obtain suture repair had the best outcomes in 43 of 54 thigh-level tibial divisions (80%) and 21 of 34 buttock-level tibial divisions (62%), followed by 22 of 49 thigh-level peroneal divisions (45%) and 9 of 37 buttock-level peroneal divisions (24%) (5). The tibial nerve at the knee and leg level (15 of 16 cases [94%]) did better than the CPN (51 of 129 cases [40%]) at that level (6, 7).

In-Continuity Lesions

Neurolysis for in-continuity lesions with positive intraoperative NAPs achieved a higher number of good results in tibial division repairs after "repair" 90 of 105 (86%) and 79 of 83 (95%) than in peroneal repairs after "repairs" 69 of 100 (69%) and 65 of 83 (78%) at both the sciatic buttock and thigh levels, respectively. Thigh-level lesions for both divisions had better outcomes than those at the buttock level. Thus, good results were obtained in the tibial division in 79 of 83 cases (95%) at the thigh-level and in 90 of 105 cases (86%) at the buttock-level and in the peroneal division in 65 of 83 cases (78%) at the thigh-level and in 69 of 100 (69%) at the buttocks (5). The knee- and leg-level tibial nerve neurolysis repairs had good outcomes in 19 of 20 cases (95%) and did better than the CPN (65 of 70 cases, 93%) (6, 7).

DISCUSSION

In the present study, the sciatic nerve, CPN, and tibial nerve all had similar injury mechanisms. The most common mechanism for each nerve included injection and GSW for the buttock- and thigh-level sciatic nerve, respectively, stretch/contusion without fracture/dislocation for the CPN, and laceration and contusion with fracture for the knee- and ankle-level tibial nerve, respectively. Other mechanisms included laceration, stretch/contusion, and fracture compression/entrapment in varying numbers, depending on the nerve. As with UE nerve injuries, the most important factor was that, regardless of mechanism, resulting injuries were uniformly managed with consistent surgical techniques for each lesion. This enabled outcome comparisons of the 3 nerves.

Tibial nerve recovery at the knee and leg level was better overall than that of the sciatic nerve's tibial and peroneal divisions and the CPN after primary suture, graft repairs, and neurolysis. The best result for the tibial nerve was after suture, after which 100% attained a good outcome. The buttock-level peroneal division had the fewest good outcomes for any repair.

The overall better recovery of the knee- and leg-level tibial nerve is most likely attributable to the following: 1) this nerve usually sustains less severe injuries than does the CPN, since the latter lies lateral to the tibial nerve and thus is in a more prominent, superficial position relative to a lesioning force (27); 2) the tibial nerve has more elasticity at impact, since it is fixed only at the sciatic notch, whereas the CPN is fixed both at that location and at the peroneus longus muscle as the CPN passes over and around the surgical neck of the fibula (5, 19); 3) the tibial nerve has a better blood supply than that of the

CPN, which may result in the former's better regeneration; 4) the tibial nerve has more fascicles and connective tissue than does the CPN, which may allow for more injury force to be absorbed by these structures (3, 9, 20, 23, 24, 26, 27); and 5) the tibial nerve innervates the bulky gastrocnemius soleus muscle, which requires only a small degree of reinnervation to result in functional contraction. Deep peroneal branches, on the other hand, innervate the long, thin extensor muscles at multiple sites and require a coordinated nerve input for successful and effective muscle contraction. Uncoordinated input from disordered reinnervation may thus be insufficient to generate enough force to permit useful dorsiflexion of the foot and/or toes in the CPN (8).

Regarding injury level, when all repair types are evaluated collectively, the best outcomes were found for the knee- and leg-level tibial nerve, with 95% collectively having good results. Ninety percent of the thigh-level tibial division repairs had good outcomes, followed by 79% of tibial division repairs at the proximal buttock level. The thigh-level common peroneal division did better (66% had good outcomes) than the CPN at the knee level (61%), followed by the common peroneal division at the buttock level (55%).

A 5-year literature review, documented the following large series: in addition to Roganović's review (15) of 157 missile-caused peroneal division and nerve lesions, in which successful outcomes were found in 11% of high-level, 31% of intermediate-level, and 57% of low-level repairs, Clawson and Seddon (1) analyzed 145 suture repairs of the tibial and peroneal nerves and found that 79% of 47 tibial nerve repairs attained useful motor recovery, but, of 72 CPN repairs, only 36% showed similar outcomes. The LSUHSC results were more favorable for this repair for these nerves, i.e., 100% and 84% for the tibial and peroneal nerves, respectively; however, Clawson and Seddon's study (1) dates from 1960, when operations were carried out without the benefits of present-day microsurgical repair.

Roganović et al. (17) presented 119 missile-induced tibial nerve lesions for which successful outcomes were obtained in 30%, 50%, and 86% of high-, intermediate-, and low-level repairs, respectively. Neurolysis, graft repair, and end-to-end suture repair were performed. Roganović and Pavličević (16) also documented good motor recoveries after graft repairs of the tibial and peroneal nerves, and these good outcomes were more frequent in 69 tibial versus 96 peroneal graft repairs at high (22/12 [55%] versus 29/4 [14%]) intermediate (36/23 [64%] versus 46/7 [15%]), and low levels (11/11 [100%] versus 21/16 [76%]). The latter graft repair results for the tibial and peroneal nerves agree with those found in the LSUHSC series. Thus, at LSUHSC, tibial nerve graft repairs did better than those for the CPN, i.e., 94% of tibial nerve repairs at the knee and leg levels had good results versus a 41% good result for CPN repairs at the knee level. Ankle-level tibial nerve graft repairs (64% good outcomes) at LSUHSC, however, did worse than tibial repairs at the knee and leg levels (94% good outcomes). The latter discrepancy in satisfactory results may be attributable to the fact that stretch or contusion injuries with

fracture predominated at the ankle level in the tibial nerve and resulted in lesions in continuity over a significant length of nerve. This necessitated long grafts with fewer successful outcomes.

Smaller series included Stancić et al. (22), who analyzed 49 interfascicular graft repairs and found useful functional recovery in 5 of 9 sciatic nerve repairs (56%), 4 of 7 peroneal nerve repairs (57%), and 2 of 2 tibial nerve repairs (100%). Thus, their evaluation was focused only on graft repairs of each nerve. A better recovery for the tibial nerve than for the CPN was found in this study, as well, as in the above-reviewed publications.

Samardžić et al. (18) analyzed 45 sciatic nerve missile injuries. Useful functional recovery was found in 87% of repairs of the tibial division, 53% of repairs of the peroneal division, and 87% of repairs of the sciatic nerve complex. Millesi (13) presented 44 peroneal nerve injuries. Thirteen cases underwent neurolysis, all with "good recoveries." End-to-end suture was performed in 2 cases, with poor results in each. Twenty-nine patients underwent nerve grafting, with functional recovery in 16 cases. Matejčík (11) found that, in 40 peroneal nerve injuries, good recovery was achieved in 18 of 20 neurolyses (90%), 6 of 8 end-to-end sutures (75%), and 3 of 12 nerve graft procedures (25%). The graft length varied from 4 to 20 cm, however. The work of Kretschmer et al. (10) documented "very good" and "good" outcomes for 33 of 45 (77%) UE and 28 of 38 (74%) LE iatrogenic nerve injury repairs using neurolysis and end-to-end anastomosis and graft repairs; however, the results for the UE versus LE repairs were not compared. Taha and Taha (25) repaired 23 missile-caused sciatic nerve injuries and found useful motor recovery in 83% of tibial suture repairs and in only 39% of such peroneal nerve repairs. They also found better results after suture of nerves at the thigh level (71%) versus buttock level (31%) and after end-to-end anastomosis (74%) than after graft repairs (39%). Delaria et al. (2) used neurolysis in 13 of 22 sciatic nerve repairs and graft repair in 9 cases: ankle flexor recovery was obtained in 18 cases and dorsiflexion in 13 cases. Hou et al. (4, 9) also presented a series of 22 sciatic nerve injuries. Thirteen cases underwent neurolysis or split repair, and 9 cases had nerve repair. An excellent or good result was achieved in 12 cases. Korompilias et al. (9) treated 12 peroneal nerve injury cases. Eight patients treated with neurolysis had functional recovery in all cases, and patients who underwent end-to-end suture repair had a favorable outcome in 1 of 2 cases, as did those who underwent nerve graft repairs. Ferraresi et al. (3) reported 6 CPN patients who underwent graft repair alone; only 1 patient had a recovery that was graded as fair, while the other 5 were "poor".

Results of UE nerves were presented in the companion article (14) of this series. LE repair outcomes were not as favorable as those of UE repairs. This may be attributable to the longer reinnervation pathway of the LE muscles (21) and the other reasons outlined in the Discussion of that article. Also, with repair of the peroneal nerve, useful foot extension is difficult to attain, since irreversible fibrosis of the denervated muscle usually occurs before reinnervation has been completed (15).

CONCLUSIONS

For not-in-continuity lesions repaired using primary end-to-end suture anastomosis, the tibial division at both the buttock and thigh levels had better outcomes (i.e., 73% and 93%, respectively) than did the peroneal division at the same levels (30% and 69%, respectively). This outcome trend continued for the tibial nerve at the knee and leg levels, with 100% good outcomes for 2 laceration repairs, whereas the knee-level CPN had an 84% good outcome result. Secondary graft repairs for not-in-continuity lesions had the best outcomes, again for the tibial division at both the buttock and thigh levels (62% and 80%, respectively), whereas good outcomes at the peroneal division at similar levels occurred in 24% and 45%, respectively.

For in-continuity lesions with positive NAPs, neurolysis achieved good results in 86% of tibial division lesion repairs at the buttock level and 95% of tibial division lesion repairs at the thigh level but in only 69% and 78% of repairs, respectively, for lesions of the peroneal division at similar levels.

Again, reasons for the overall better recovery of the tibial nerve are most likely attributable to the following factors: 1) the peroneal nerve is in a lateral location relative to the tibial nerve, placing the peroneal nerve in a more vulnerable position for sustaining an injury; 2) the tibial nerve has more elasticity at impact, since the tibial nerve is fixed at only 1 location, whereas the peroneal nerve is fixed at both the sciatic notch and the peroneus longus muscle, as the CPN passes over and around the fibular surgical neck; 3) the tibial nerve has a better blood supply than that of the CPN, allowing for a better regenerative potential; 4) the tibial nerve has more fascicles and more connective tissue than the CPN, allowing more force to be absorbed by these structures; and 5) the tibial nerve innervates the gastrocnemius soleus muscle, which requires only a small degree of reinnervation to result in functional contraction. This is in contrast to the deep peroneal branches, which innervate the long, thin extensor muscles at multiple sites and require a coordinated nerve input for successful effective muscle contraction.

Disclosure

The authors have no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

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