International Journal of Research in Medical Sciences
Serrano EB et al. Int J Res Med Sci. 2024 Oct;12(10):3851-3853
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20242668

Case Report

Neurorrhaphy of the sciatic nerve with autologous sural nerve graft in a gunshot wound: a case report

Erik B. Serrano[1]*, Beatriz R. Serrano[1], Amador J. Leyva[2], Julio C. A. Vaca[2]

[1]Department of Reconstructive Plastic Surgery, ISSSTE Regional Hospital, León, Guanajuato, México
[2]Department of Reconstructive Plastic Surgery, Hospital Regional "Lic. Adolfo Lopez Mateos" ISSSTE, Cd. México, México

Received: 20 August 2024
Revised: 03 September 2024
Accepted: 04 September 2024

***Correspondence:**
Dr. Erik B. Serrano,
E-mail: erik_27-01-94@hotmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Motor and sensory nerve injuries in the lower limb have been on the rise due to the increase in traffic accidents, injuries caused by third parties, injuries caused by sharp weapons or firearm projectiles, causing severe impairment of the functionality of the limb by affecting sensitivity, motor skills or both. In our manuscript we describe the case of a 37-year-old female patient with severe injury to the right greater sciatic nerve of the axonotmesis type secondary to a gunshot wound, presenting total loss of sensitivity and motor skills of the right lower extremity, undergoing neurorrhaphy of the sciatic nerve with autologous graft of the sural nerve with motor and sensory recovery of almost 50% in a short period. When considering surgical treatment for nerve injury, various factors related to the surgical technique as well as the patient's clinical condition must be considered. Autologous nerve grafting is the gold standard for nerve repair. The sural nerve is a common candidate and is considered the workhorse graft.

Keywords: Neurorrhaphy, Sciatic nerve, Sural nerve graft

INTRODUCTION

Motor and sensory nerve injuries in the lower limb have been on the rise due to the increase in traffic accidents, injuries caused by third parties, injuries caused by sharp weapons or firearm projectiles, causing severe impairment of the functionality of the limb by affecting sensitivity, motor skills or both.[1]

In Latin America there are no statistical studies that demonstrate the incidence of this type of injury. In Europe it has been reported that 2% of severe traumas of the lower limbs have associated nerve injury. Currently there are different techniques for nerve repair, including: end-to-end neurorrhaphy, nerve transfer, autologous nerve grafts and allografts, tunneling, neurolysis and nerve transposition.[1,2]

In this case report we used autologous sural nerve graft for neurorrhaphy of a 2.5 cm long sciatic nerve injury caused by firearm.

CASE REPORT

A 37-year-old female patient was referred to our medical unit due to a gunshot wound to the right thigh, with impact on the medial region of the thigh, presenting total loss of sensitivity and motor skills of the entire right lower extremity. Assessed by the Reconstructive Plastic Surgery Service of the ISSSTE León Regional Hospital; an electromyography was requested and performed, reporting: abnormal study of the lower limbs suggestive of severe injury to the right greater sciatic nerve, type axonotmesis, with no data on current recovery.

He was scheduled for exploration and neurorrhaphy of the sciatic nerve with sural nerve graft three weeks after the injury. The following were described as intra-surgical findings: sciatic nerve in the lower portion with loss of morphology, purplish color, indurated, without response to electrostimulation.

A resection of the affected area at the level of the sciatic nerve bifurcation of 2.5 cm in length was performed (Figure 1) and subsequently a graft was taken from the sural nerve by performing a double neurorrhaphy in the external branch and one in the internal branch, finally applying tissucol to protect the neurorrhaphy and prevent fibrosis (Figure 2).

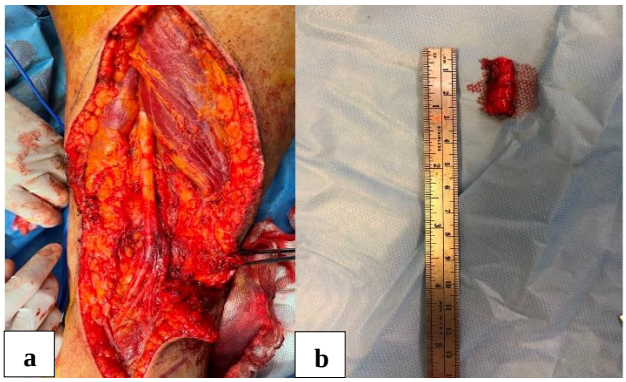

Figure 1 (a and b): Sciatic nerve injured in its lower portion and resection of 2.5 cm of the injured area.

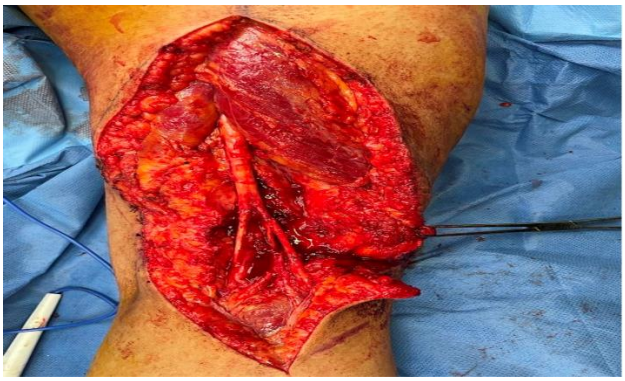

Figure 2: Sciatic nerve neurorrhaphy with autologous sural nerve graft already in place.

Currently, the patient continues in rehabilitation, with 6 months of post-surgical evolution, undergoing control electromyography reporting: severe right sciatic nerve neuropathy, with subacute denervation data and with severe axonotmesis-type condition.

Despite this, there was motor and sensory recovery of more than 50% of the right lower limb in a short period. Clinically, the patient is walking with the aid of a rigid ankle splint, presenting full mobility of the knee, plantar flexion movements, abduction and adduction of the foot, although there is no dorsiflexion or extension movement of the toes; as regards sensitivity, there is sensitivity in the posterior tibial region and sole of the foot, although there is no sensitivity in the dorsal region of the foot. Currently, he remains under surveillance and management by the reconstructive plastic surgery service.

DISCUSSION

Peripheral nerve injuries most frequently reported in the world literature are in the upper limbs in up to 70% of cases, with the most frequent injury being the radial nerve, and of the nerve injuries in the lower limbs, the most common is the sciatic nerve followed by the peroneal nerve.[3,4] In our country, the epidemiology of this type of injury is poorly documented, however, in a study conducted by Telich et al, where they reported nerve injuries of the lower extremity in 21 patients, the most common cause being the wound by a firearm projectile, with greater involvement of the sciatic nerve.[5]

Neurological examination is the most important method that shows any damage to peripheral nerves after trauma. Electromyography is currently the most common method of diagnosis in peripheral nerve injuries, revealing the denervation that occurs in the muscle innervated by the affected nerve. There are other complementary diagnostic studies such as magnetic resonance imaging, useful to reveal the accompanying hematoma secondary to a trauma or for injuries such as the neuroma that develops weeks or months after the trauma.[6]

Peripheral nerve injuries are classified according to the two most popular systems: the Seddon and Sunderland classifications.[4,7] According to Seddon, they are divided into three degrees of severity. The first degree is neurapraxia, which is the mildest injury to a nerve, caused by compression or transient stretching. The second degree is the axonotmesis, the axons are damaged; however, most of the connective tissues that cover them and that form the endoneurium, perineurium and epineurium are still partially or totally intact. And the third degree is neurotmesis, where the nerve is completely severed. The second degree is the axonotmesis, the axons are damaged; however, most of the connective tissues that cover them and that form the endoneurium, perineurium and epineurium are still partially or totally intact. And the third degree is neurotmesis, where the nerve is completely severed.

Thus, dividing into five degrees of nerve injury: the first corresponds to neuropraxia; the second and third degree corresponds to the axonotmesis, which Sunderland subdivides focusing on the potential for recovery where a second-degree injury will recover normal function and a third-degree injury will have a partial recovery (here the endoneurium is affected). Finally, fourth- and fifth-degree Sunderland (neurotmesis); in the fourth degree, there is perineural injury and as a result, there is fascicular structural damage, while in the fifth degree, there is an epineurial interruption and the nerve can be severed.[7,8]

In the case of our patient, electromyography reported severe injury to the right major sciatic nerve of the axonotmesis type, classified in grade three according to the Sunderlan classification. In this degree, an exploration and surgical intervention of the damaged nerve is usually necessary, as incomplete recovery often occurs.[2,8]

When considering the surgical treatment of nerve injury, different factors related to the surgical technique to be chosen, as well as the clinical condition of the patient, must be assessed. The nerve involved, the patient's age, the time elapsed since the injury (denervation time), the level or location of the lesion (proximal or distal in the nerve path), the type and length of the lesion, the patient's cormobilities, and concomitant tissue contamination are all related to the prognosis of recovery.[3,8] All this with the aim of restoring the function of the distal target organs to their original level, both in the sensory and motor aspects. Currently, foreign and domestic research on peripheral nerve injury is mainly focused on methods of nerve repair, promotion of axonal growth, and functional remodeling parallel to anatomical restoration.[9]

As mentioned above, there are a variety of surgical treatments for peripheral nerve repair: end-to-end neurorrhaphy, nerve grafts, vacularized nerve grafting, nerve transfers, nerve tubulization.[2,5,10]

Direct end-to-end epineural suturing (neurorhaphy) is the gold standard if tension-free nerve repair is possible. When there is too much stress for direct end-to-end repair, or in the presence of a significant gap (>2-3 cm) between the proximal and distal nerve ends, nerve grafting or tubulization is generally considered, with autologous nerve grafting being considered the gold standard for these situations, which consists of joining both nerve strands by interposing a segment of healthy donor nerve between them.[2,9,10] The sural nerve being a common candidate and considered as the workhorse graft, as was performed with our patient, where the length of the lesion was 2.5 cm and this surgical technique was chosen, performing double neurorrhaphy towards the external and internal branch, with the aim of restoring sensory and motor function obtaining a recovery of almost 50% in a short period of time.[10]

CONCLUSION

Peripheral nerve reconstruction has favorable results if the appropriate surgical technique is performed, depending on the type and degree of injury that the nerve may have. Autologous free sural nerve grafting is a suitable option for sciatic nerve reconstruction, with favorable short-term results.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Rojas L, Lacouture C, Íñigo F, Cárdenas A. Multicenter experience in nerve reconstruction of the lower limb. Cir Plást Iberolatinoam. 2019;45(4):413-26.
2. Bravo Aguilera C, Carpintero Lluch R, Delgado Martínez A. Current techniques in peripheral nerve repair. Rev S And Traum y Ort. 2016;33(3/4):21-8.
3. Roh SG, Chun JY, Lee NH, Shin JY, Kim JL. Reconstruction of the sciatic nerve using bilateral vascularized sural nerve grafts: a case report. Arch Han Microsurg. 2022;27(1):99-104.
4. Beris A, Gkiatas I, Gelalis I, Papadopoulos D, Kostas-Agnantis I. Current concepts in peripheral nerve surgery. Eur J Orthop Surg Traumatol. 2019;29(2):263-9.
5. Telich-Tarriba JE, Maza-Krzeptowsky LC, Cárdenas-Mejía A. Lower extremity nerve injuries and their management at a referral center in Mexico City. Cir Cir. 2021;89(2): 200-5.
6. Pripotnev S, Bucelli RC, Patterson JMM, Yee A, Pet MA, Mackinnon S. Interpreting Electrodiagnostic Studies for the Management of Nerve Injury. J Hand Surg Am. 2022;47(9):881-9.
7. Temiz Ç, Yaşar S, Kırık A. Surgical treatment of peripheral nerve injuries: Better outcomes with intraoperative NAP recordings. Ulus Travma Acil Cerrahi Derg. 2021;27(5):510-5.
8. Ferrante MA. The Assessment and Management of Peripheral Nerve Trauma. Curr Treat Options Neurol. 2018;20(7):25.
9. Jiang BG, Han N, Rao F, Wang YL, Kou YH, Zhang PX. Advance of Peripheral Nerve Injury Repair and Reconstruction. Chin Med J (Engl). 2017;130(24):2996-8.
10. Panagopoulos GN, Megaloikonomos PD, Mavrogenis AF. The Present and Future for Peripheral Nerve Regeneration. Orthopedics. 2017;40(1):e141-56.

Cite this article as: Serrano EB, Serrano BR, Leyva AJ, Vaca JCA. Neurorrhaphy of the sciatic nerve with autologous sural nerve graft in a gunshot wound: a case report. Int J Res Med Sci 2024;12:3851-3.