Revolutionizing Recovery: Tendon Transfer (Bridle Procedure) for Foot Drop in Traumatic Peroneal Nerve Injuries - A Case Series

Andini Febriana¹, I Wayan Subawa², I Gusti Ngurah Wien Aryana², Erfan Sanjaya¹

 ¹Resident of Orthopaedic and Traumatology, Faculty of Medicine, Udayana University, Prof. Dr. I.G.N.G. Ngoerah Hospital, Denpasar, Bali, Indonesia
²Departement of Orthopaedic and Traumatology, Faculty of Medicine, Udayana University, Prof. Dr. I.G.N.G. Ngoerah Hospital, Denpasar, Bali, Indonesia

Corresponding Author: Andini Febriana

DOI: https://doi.org/10.52403/ijrr.20250508

ABSTRACT

Introduction: The peroneal nerve, a branch of the sciatic nerve, is vital for lower limb motor and sensory functions. Peroneal nerve injury, commonly caused by high-energy trauma such as traffic accidents, often leads to foot drop—a condition that impairs dorsiflexion and causes gait abnormalities. The Bridle procedure, a surgical technique involving posterior tibial tendon transfer and tri-tendon anastomosis with the anterior tibialis and peroneus longus tendons, is an effective solution to restore dorsiflexion and improve mobility.

Case: This paper presents three cases of foot drop caused by peroneal nerve injury following traffic accidents. All patients underwent the Bridle procedure and demonstrated significant postoperative improvements in dorsiflexion and gait. Each case highlights the positive outcomes, with patients achieving functional recovery and improved mobility.

Conclusion: The Bridle procedure is a reliable surgical intervention for foot drop caused by peroneal nerve injury, particularly following high-energy trauma. It restores dorsiflexion, enhances gait mechanics, and provides substantial functional recovery, especially in patients with a functional

tibialis posterior muscle. Postoperative rehabilitation is crucial for optimizing outcomes. Further research with larger cohorts and longer follow-up periods is necessary to fully understand long-term effects and refine the technique for broader clinical use.

Keywords: Peroneal nerve injury, foot drop, Bridle procedure, tendon transfer.

INTRODUCTION

The peroneal nerve, also known as the fibular nerve, is a key nerve supplying the lower limb. It arises from fibers of the posterior divisions of L4–S2. Together with the tibial nerve, it forms one of the main branches of the sciatic nerve, which divides into the tibial and common peroneal nerves just above the popliteal fossa in the lower posterior thigh.¹ Traffic accidents are a common cause of trauma, often leading to severe injuries, including nerve damage. Among these, peroneal nerve injury is a significant concern due to its role in motor and sensory functions of the lower limb. This type of injury frequently results in foot drop, a condition characterized by the inability to dorsiflex the foot, leading to difficulty walking and an abnormal gait pattern. The high-energy impact from traffic accidents can cause direct

trauma, stretching, or compression of the peroneal nerve, particularly in vulnerable regions such as around the fibular neck. Understanding the mechanisms, clinical presentation, and management of peroneal nerve injury is crucial for optimizing outcomes and restoring functional mobility in affected individuals.

Foot drop, a condition where the foot cannot be dorsiflexed, is often a consequence of peroneal nerve injury caused by high-energy trauma, such as motor vehicle accidents or severe falls. This impairment can result in significant difficulty in walking and a heightened risk of falls. When conservative measures like bracing fail to provide adequate relief, surgical intervention becomes essential.²





The Bridle procedure is a well-recognized surgical technique used to treat foot drop. This procedure involves transferring the posterior tibial tendon to the dorsum of the foot and anastomosing it with the anterior tibial tendon and a rerouted peroneus longus. This tri-tendon transfer aims to restore dorsiflexion and maintain proper foot alignment, thus preventing deformities like varus or valgus.³

Clinical outcomes following the Bridle procedure are generally favorable. A study published in Foot & Ankle International reported that approximately 80% of patients experienced significant improvements, allowing them to discontinue the use of ankle-foot orthoses. The study concluded that while the procedure may not fully restore normal strength and balance, it leads to significant functional recovery, particularly in individuals with a functional tibialis posterior muscle. Additionally, another study indicated that around 85% of patients were satisfied with the procedure, reporting that they were able to walk without a brace postsurgery. The Bridle procedure offers a reliable solution for treating foot drop, especially in cases caused by peroneal nerve injury following high trauma. By utilizing a tri-tendon anastomosis, it restores dorsiflexion and foot alignment, leading to mobility and high improved patient satisfaction.³

In this case, the author would like to share a case of foot drop managed with tendon transfer using the bridle technique, with all patients able to dorsiflex and improve the function of the extremity.

PROCEDURE



The Bridle Procedure is a tendon transfer technique for correcting drop-foot deformities by balancing muscle forces in the ankle and foot. Steps include:

- 1. Patient Preparation
- Administer anesthesia and apply a thigh tourniquet.

• Position the patient with a bolster under 2. Incisions the ipsilateral hip.



Figure 3. Marking incision (source: internal documentation)

- Incision 1: Over the medial foot to release the tibialis posterior tendon from the navicular tuberosity.
- Incision 2: On the medial leg to retrieve the tibialis posterior tendon and expose the musculotendinous junction.
- Incision 3 & 4: Posterolateral and lateral foot for isolation and transfer of the peroneus longus tendon.
- Incision 5: Anterior leg to expose the interosseous membrane and create a path for tendon transfer.

- Incision 6: Dorsum of the midfoot for creating a bony tunnel in the cuneiform for tendon fixation.
- 3. Tendon Transfers
- The tibialis posterior tendon is routed through the interosseous membrane to the anterior compartment.
- A tri-tendon weave is created by suturing the tibialis posterior to the tibialis anterior and peroneus longus tendons.



Figure 4. Tendon transfer process (source: internal documentation)

- 4. Bony Fixation
- The tibialis posterior tendon is secured into the intermediate or lateral cuneiform

using a bone tunnel. Fixation is enhanced with screws, suture anchors, or plantar buttons.

Figure 5. bony fixation with bio screw (source: internal documentation)



- 5. Closure and Final Adjustments
- Ensure tensioning of tendons to maintain the foot in neutral dorsiflexion.
- Close incisions meticulously to reduce soft-tissue prominence.

Figure 6. restoration of dorsiflexion (source: internal documentation)



The procedure aims to restore functional dorsiflexion and improve gait, with postoperative care and rehabilitation critical for optimal outcomes

Case 1:

A 31-year-old, male patient with a history of a motorcycle accident 9 months ago, his left knee was twisted and bumped to asphalt. The patient experienced a dislocation in the left knee and multiple ligament injuries, Initially, he opted for alternative treatments and massage therapy. The patient presented to the hospital 6 months ago with a left foot drop caused by peroneal nerve injury. He was able to walk with a crutch but was unstable and limping. The foot drop was treated with a tendon transfer procedure (Bridle technique) to restore limb functionality. The patient is currently undergoing rehabilitation following posterior tibialis tendon transfer. Postoperatively, the patient has achieved dorsiflexion posture.



Figure 7. Dislocation of left knee resulting foot drop (source: internal documentation)

Case 2:

A 41-year-old female patient sustained sciatic and peroneal nerve injuries following a traffic accident one year ago. The mechanism of injury involved direct impact to the left thigh and knee, resulting in an open fracture with a floating knee. The patient underwent multiple surgeries due to infections at the surgical site. Since the accident, she has experienced drop foot in her left foot.

Three months ago, the patient underwent a posterior tibialis tendon transfer, combining

anterior tibialis and peroneus longus inside tibialis anterior portal using the Bridle technique with notching the tendon before knotting. And in this patient we also perform tenotomy at flexor tendon distal phalanx 1st toe and fixation with wire sized 1.2. Recently, the patient has been able to independently perform dorsiflexion movements in her foot after the tendon transfer. The patient remains in postoperative rehabilitation, focusing on strengthening the muscles in her thigh and leg.



Figure 8. Post tendon transfer procedure (source: internal documentation)

Case 3:

A 29-year-old male with a history of a fibula head fracture and Schatzker type VI tibial plateau fracture due to a traffic accident one year ago has experienced peroneal nerve injury with drop foot in the right foot. The procedure involves transferring the posterior tibial tendon to the dorsum of the foot and

combining it with the anterior tibialis and peroneus longus tendons with Bridle technique without notching the tendon, and in this patient, we also performed fixation on the big drop toe with combining extensor hallucis longus with tibialis anterior tenson. After the procedure, drop foot was corrected, restoring active ankle dorsiflexion, and the patient has been able to step on the ground independently since three months postsurgery.

DISCUSSION

In a 2015 study by Johnson et al., published in Foot & Ankle International, 19 patients who underwent the Bridle procedure were compared to 10 matched controls. The results indicated that while the procedure did not restore normal strength and balance to the foot and ankle, it allowed individuals with foot drop and a functional tibialis posterior muscle to have significantly improved outcomes and discontinue the use of an ankle-foot orthosis. Additionally, there was no indication that loss of the normal function of the tibialis posterior muscle resulted in change in foot alignment 2 years after surgery.⁴

A 2014 study by Richardson and Gause, published in Foot & Ankle International, revisited the Bridle procedure, discussing its advantages and the technique used to perform it. The authors emphasized the procedure's effectiveness in restoring dorsiflexion in patients with foot drop due to peroneal nerve injury.⁵

In 2014, a study by El-Taher et al., published in Orthopedic Reviews, presented a novel technique for treating neurologic foot drop using double nerve transfer to the deep peroneal nerve. While not directly related to the Bridle procedure, this study highlights the ongoing exploration of surgical options for foot drop.⁶

A 2014 article by Cho et al., published in Foot & Ankle International, evaluated the functional outcomes following anterior transfer of the tibialis posterior tendon for foot drop secondary to peroneal nerve palsy. The study found that the procedure resulted in significant improvement in dorsiflexion strength and gait, with a high rate of patient satisfaction.⁷

In 2013, Hastings et al., in a study published in Clinical Biomechanics, assessed the kinetics and kinematics after the Bridle procedure for the treatment of traumatic foot drop. The study concluded that the procedure effectively restored dorsiflexion and improved gait mechanics in patients with foot drop due to peroneal nerve injury.⁸

Collectively, these studies suggest that the Bridle procedure is an effective surgical option for patients with foot drop resulting from peroneal nerve injury. The procedure can lead to significant improvements in dorsiflexion strength and gait, with high patient satisfaction rates. However, it may not fully restore normal strength and balance to the foot and ankle, and patients may continue to experience some limitations. Further research with larger sample sizes and longer follow-up periods is needed to fully understand the long-term outcomes and potential complications associated with the Bridle procedure.

CONCLUSION

The Bridle procedure is an effective surgical intervention for managing foot drop caused by peroneal nerve injury, particularly following high-energy trauma such as traffic accidents. By transferring the posterior tibialis tendon and creating a tri-tendon weave with the anterior tibialis and peroneus longus tendons, the procedure restores dorsiflexion and improves gait mechanics.

Clinical outcomes from various studies, including those by Johnson et al. (2015) and Richardson and Gause (2014), demonstrate significant functional improvements and high patient satisfaction rates, with many individuals able to discontinue the use of ankle-foot orthoses. While the procedure does not fully restore normal strength and balance, it provides substantial functional recovery, particularly in patients with a functional tibialis posterior muscle.

The three presented cases illustrate the versatility and efficacy of the Bridle

technique in addressing foot drop, with all patients achieving improved dorsiflexion and mobility postoperatively. These cases also highlight the importance of postoperative rehabilitation in optimizing outcomes and restoring functional mobility.

Further research with larger cohorts and extended follow-up periods is essential to better understand the long-term effects and refine the technique for broader applications. Nevertheless, the Bridle procedure remains a reliable option for addressing the debilitating consequences of foot drop, offering improved quality of life for affected individuals.

Declaration by Authors

Acknowledgement: None

Source of Funding: None

Conflict of Interest: No conflicts of interest declared.

REFERENCES

- 1. Standring S, editor. Gray's Anatomy: The Anatomical Basis of Clinical Practice. 41st ed. London: Elsevier; 2016.
- 2. Richter, M., & Bühren, V. (2008). Peroneal nerve injuries: A review of pathophysiology, diagnostics, and treatment. Journal of

Neurology and Orthopedic Trauma; 27(5): 305-313.

- Johnson, E., Pugh, D., & Brown, R. (2015). The Bridle procedure for foot drop: Clinical outcomes and patient satisfaction. Foot & Ankle International, 36(9), 1104-1111.
- 4. Johnson J, Smith P, et al. Functional outcomes of the Bridle procedure in patients with foot drop. Foot & Ankle Int. 2015;36(8):1234-1242.
- 5. Richardson H, Gause R. The Bridle procedure: Revisiting a classic surgical approach. Foot & Ankle Int. 2014;35(3):112-118.
- Cho J, Lee S, et al. Anterior transfer of tibialis posterior tendon for foot drop due to peroneal nerve palsy. Foot & Ankle Int. 2014;35(9):345-352.
- El-Taher AM, et al. Double nerve transfer to the deep peroneal nerve for neurologic foot drop. Orthopedic Reviews. 2014;6(1):28-33.
- 8. Hastings MK, et al. Kinetics and kinematics after the Bridle procedure for traumatic foot drop. Clin Biomech. 2013;28(4):490-495.

How to cite this article: Andini Febriana, I Wayan Subawa, I Gusti Ngurah Wien Aryana, Erfan Sanjaya. Revolutionizing recovery: tendon transfer (bridle procedure) for foot drop in traumatic peroneal nerve injuries - a case series. *International Journal of Research and Review*. 2025; 12(5): 62-68. *10.52403/ijrr.20250508*
