



## CASE REPORT

# Posterior Tibial Tendon Transfer in Bilateral Foot Drop: Case Report

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### Abstract

Drop foot is characterized by presenting gait alterations due to the inability to dorsiflex the ankle. Neurological and muscular etiology can cause foot drop. Tendon transfer surgery represents the gold standard of surgical treatment.

**Clinical case:** 15-year-old female patient with a history of congenital common peroneal nerve paralysis. The first surgical stage is performed on the left foot, tendon transfer is performed with the classic Barr's technique, the posterior tibial tendon is disinserted by crossing the interosseous membrane and inserting in a lateral cuneiform. The second surgical procedure was performed 9 months after the first surgery with tendon transfer of the right foot, the procedure began with the classic Barrs technique, with insertion of the posterior tibial tendon in the medial cuneiform of the right foot and fixation with the use of a biotenesis screw.

**Discussion:** Drop foot is a pathology characterized by alterations in the anterior tibial tendon. The causes of drop foot are described as neurological and muscular causes. Management with transfer of the posterior tibial tendon is the surgical management of choice, it should be considered when conservative management fails.

### Keywords

Foot drop, Posterior tibial tendon

## Introduction

Drop foot is characterized by gait disturbances due to the inability to dorsiflex the ankle [1], leading to functional deficits and devastating consequences such as the inability to walk normally, functional limitation of activities, dependence on orthoses and foot deformity

[2]. Neurological and muscular etiology can cause foot drop.

The common peroneal nerve is a motor and sensory nerve. Motor function consists of dorsiflexion of the foot and toe through the deep peroneal branch and eversion of the ankle through the superficial branch. The sensory component of the superficial peroneal nerve innervates the dorsum of the foot [3].

Tendon transfer surgery is frequently required in foot and ankle surgery and represents the gold standard of surgical treatment. One of the important principles when performing a tendon transfer is placing the tendon directly on the bone.

## Clinical Case

15-year-old female patient, with a history of congenital common peroneal nerve paralysis, documented with electromyography of the lower extremities. The father referred to neurological management and physical rehabilitation with emphasis on gait education. At the age of 4, she was sent to orthopedics in her locality, continuing with management based on physical rehabilitation without showing improvement in gait. She later referred to difficulty in follow-up, due to lack of an orthopedist in her locality. In November 2022, at the age of 14, she presented to an outpatient clinic for evaluations, referred for alterations in gait and equinus foot deformity.



**Citation:** Carreon-Cerda C, Lezama-Peniche M, Alayon-Vazquez V, Chan-Cisneros A, Ortiz-Mendez A, et al. (2024) Posterior Tibial Tendon Transfer in Bilateral Foot Drop: Case Report. Int Arch Orthop Surg 7:042. doi.org/10.23937/2643-4016/1710042

**Accepted:** November 08, 2024; **Published:** November 10, 2024

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During his evaluation, a deformity in the adductus and equinus of both feet was observed with the use of Ankle foot Orthosis (AFO) splints in both feet, with inability to perform dorsiflexion of the ankles, observing the characteristic steppage gait. The patient presented with an electromyography study of the lower extremities with a report of chronic axonal motor neuropathy of the common peroneal nerve. Discuss with parents the proposed surgical management with bilateral tendon transfer to be performed in 2 stages, allowing a time of at least 6 months for physical rehabilitation.

In the first surgical stage on the left foot, a tendon transfer was carried out using the classic Barr technique. The posterior tibial tendon was detached and passed through the interosseous membrane, followed by its insertion into the third cuneiform bone using a biotenodesis screw and secured with a button on the plantar surface. Postoperatively, immobilization was chosen with a below-knee splint for 4 weeks, followed by an additional 6 weeks in a non-weight-bearing Walker boot. At 10 weeks post-surgery, physical therapy was initiated, focusing on muscle strengthening and

gait training. During follow-up assessments at 2 and 4 weeks, the patient presented no complications while immobilized. At the 3<sup>rd</sup> and 6<sup>th</sup> postoperative months, active dorsiflexion of the left ankle was observed, with muscle strength graded as 4 on the Daniels scale.

The second surgical intervention was performed 9 months after the initial procedure, involving tendon transfer on the right foot. The surgery commenced using the classic Barr technique, with insertion of the posterior tibial tendon into the medial cuneiform of the right foot and fixation using a biotenodesis screw, this time without employing a plantar button for additional fixation. Postoperatively, the patient was immobilized with a below-knee splint for 3 weeks, followed by 3 more weeks in a Walker boot. Physical therapy was initiated 6 weeks after surgery. During follow-up visits, no primary or secondary complications were observed (Figure 1).

At this point, the patient has 1 year and 2 months of follow-up on her left foot, demonstrating adequate muscle strength of 5 on the Daniels scale, with no sensory deficits and no abnormalities during toe or plantar



**Figure 1:** Posterior tibial tendon transfer involving a transmembranous route through an interosseous window, stabilized with biotenodesis screws.

gait. On the right side, she is 6 months postoperative, showing satisfactory clinical progress with no issues in plantar or toe gait, no sensory disturbances, and a full range of motion with muscle strength rated 5 on the Daniels scale. Clinical outcomes were measured using the AOFAS scale, scoring 47 points preoperatively and 81 points at 6 months post-surgery.

In the case of the patient presented, the surgical management of bilateral foot drop due to common peroneal nerve injury and resulting steppage gait is discussed. At her initial evaluation in our clinic, a two-stage surgical approach was recommended, starting with the left foot, which exhibited more severe deformity. Physical therapy was initiated with the goal of achieving at least a score of 4 on the Daniels scale before considering the next surgical step, with no complications observed.

The timing of the second surgery on the right foot was determined accordingly. The same surgical technique was used for both procedures, with the only variation being the type of fixation for the posterior tibial tenodesis. This adjustment influenced the postoperative protocol, particularly in determining the duration of immobilization.

## Discussion

Drop foot is a pathology characterized by alterations in the anterior tibial tendon. It has been reported that paralysis of the common peroneal nerve is the most common peripheral nerve paralysis of the lower extremities [2]. Şükran Güzel reported the most frequent site of compression of the common peroneal nerve at the level of the head of the fibula due to its superficial route [4].

Muhammed, et al., described causes of foot drop as neurological and muscular causes. Of these, isolated injury to the peroneal nerve represents the most common cause of foot drop due to susceptibility due to its anatomical location [5].

Emilio Wagner, et al. performed a biomechanical analysis study comparing the tendon transfer technique, reporting that surgical management should be considered when conservative management fails, operative options include arthrodesis, tenodesis and tendon transfers. In addition, they mentioned as requirements for tendon transfer, flexible ankle joint, no range of motion of the ankle, absence of arthritis of the ankle joint, strength of the posterior tibial tendon M4 to M5 and a viable leg. If these requirements are not met, an ankle arthrodesis should be considered [6,7].

Daniel Marsland, et al. [8] published a Systematic review of tendon transfers in the foot and ankle using interference screw fixation, results in significant improvements in function, with high satisfaction rates, and low complication rates.

Purushotham, et al. [2] in his study he considered surgical management as the gold standard in patients with foot drop. Management with transfer of the posterior tibial tendon is the surgical management of choice. In cases of patients with neurological injury to the common peroneal nerve, the route through the interosseous membrane and insertion of the tendon in the second metatarsal is the choice for restoration of dorsiflexion, presenting favorable long-term functional results compared to the insertion in the anterior tibial tendon [5]. Tibialis posterior transfer for foot drop gives good results in terms of normal gait, high patients' satisfaction with minimal donor site morbidity and low complication rate [9].

Karl M, et al. [10] stated tendon transfer generally includes a posterior splint for 2 weeks followed by a short leg walking cast. By 6 weeks, adequate healing has occurred to allow full mobilization and initiation of formal physical therapy for tendon retraining. A night splint can be used for 3 months to prevent recurrent equinus contracture and protect the tendon transfer [7].

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