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CASE REPORT

FALLEN FOOT CORRECTION: AN EXPERIENCE REPORT

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ABSTRACT

Objectives: To expose a case of correction of fallen foot, due to fibular nerve paralysis, by transferring the posterior tibial tendon to the dorsum of the foot via the interosseous membrane and to analyze the clinical result with the proposed treatment. Materials and Methods: Case report with bibliographic review. Results: Patient, 17 years old, male, victim of a motorcycle accident, without fractures caused by trauma. It evolved with a non-actively reducing horse foot. Using a suropodalic orthosis for 6 months, there was no clinical return of function or electroneuromyographic activity of the common fibular nerve. Surgical treatment was chosen. The stitches were removed at three weeks and suropodalic immobilization was maintained for six weeks. After this period, physiotherapy was started and walking was allowed, initially with a 90 ° PVC orthosis daily for four weeks and nightly for three additional hours. In 12 weeks, the patient had improved gait and returned to his work activities. Conclusions: It is possible to obtain a good functional result, improved gait, abandoning the orthosis and improving the quality of life of patients with foot drop due to traumatic foot injury. Fibular nerve after the surgical procedure for transferring the posterior tibial tendon via the interosseous membrane.

KEYWORDS: FIBULAR NERVE INJURY, DROOPING FOOT, ORTHOPEDICS, TENDON TRANSFER, PARALYSIS.

INTRODUCTION

The dorsiflexor muscles of the foot act as agonists in the swing phase of the gait cycle, having the function of not letting the forefoot touch the ground, thus a dysfunction of these muscles will result in a gait with the foot down. In patients with dysfunction of the dorsal flexor muscles, the action of the plantar flexors in the swing phase will predominate and the forefoot will tend to be stuck to the ground. In this condition, the patient uses an increased hip and knee flexion to perform the gait in this phase.[1]

Complications of the fallen foot in the patient's quality of life are varied, such as frequent falls, walking with difficulty, social embarrassment.± The fibular nerve can be injured due to leg fractures, superficial knee injuries, knee adduction dislocations and , also, inadvertently, during knee surgery or by the use of tourniquets in the vicinity of the nerve[2]. Although the most common cause of foot drop is traumatic injury to the common fibular nerve at the height of the proximal fibula, other causes, such as injury to the anterior horn of the spinal cord, injury to the lumbar plexus, radiculopathy in L5, partial injury to the sciatic nerve and some neuromuscular disorders, such as Guillain-Barré syndrome and peripheral neuropathies, can lead to deformity[3].

The conservative treatment of the fallen foot consists of the use of orthoses and functional electrostimulation of the fibular nerve. Surgical treatment includes dynamic and static techniques. Dynamic techniques are performed by means of tendon and muscle transfers or, by changing bone insertions, resulting in restoring function and movement of the foot. Static techniques are generally used when dynamic techniques fail or are contraindicated. In this case, arthrodesis, osteotomy and tenodesis are chosen[4].

Some studies have shown an improvement in the quality of life of patients with fallen feet, due to fibular nerve damage, by transferring the posterior tibial tendon to the dorsal region of the foot. Improvement in gait, return to physical and daily activities and the use of any type of footwear are among the main ben-

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efits acquired by patients undergoing this technique[2]. Prerequisites for this procedure are the presence of a fallen foot, with the tibialis posterior presenting grade IV or V strength according to Lysholm and Gillquist[5], tibiotarsal joint with good range of motion and fibular nerve injury without clinical return of nerve function after a period of at least least six months.

CASE REPORT

Patient, I.G.N.R, 17 years old, male, victim of a motorcycle accident, without fractures caused by trauma. It evolved with a non-actively reducing clubfoot. Using a suropodalic orthosis for 6 months, there was no clinical return of the function or electroneuromyographic activity of the common fibular nerve. Surgical treatment was then chosen.

The procedure was performed with the patient in horizontal supine position, under regional spinal anesthesia, with the placement of a tourniquet on the thigh. With a medial incision in the topography of the navicular tuberosity, the posterior tibial tendon was disinserted, with the aid of an osteotome, attached to a small osteoperiosteal fragment. (FIGURE 1)

Figure 1- Disinsertion of the posterior tibial tendon in the navicular
Source: Photographed by the authors

The end of the tendon was secured with a resistant multiflament thread of the Ethibond 2 type and pulled in such a way as to allow the release of adhesions within the sheath. Then, the tendon was moved proximally through a second incision on the medial side of the leg, 8 cm above the medial malleolus, along the posterior edge of the tibia. (FIGURE 2)

Figure 2 - Medial access
Source: Photographed by the authors.

A third incision was made on the lateral face of the distal region of the leg at the same height as the medial incision. After deeply locating the interosseous membrane, a wide opening was performed, with the aid of a Kelly-type forceps, to allow easy excursion of the muscular belly in a direct traction line, without changing the course, to the posterior tibial tendon. The repair sutures were placed on the posterior tibial tendon and then passed with curved forceps bordering the posterior edge of the tibia through the interosseous membrane. The posterior tibial tendon was safely pulled to the anterior leg compartment. (FIGURE 3)

Figure 3 - Transposition of the posterior tibial tendon to the anterior compartment.
Source: Photographed by the authors.

A fourth incision on the dorsum of the foot at the level of the lateral cuneiform was made and the posterior tibial tendon repair suture was pierced with forceps under the extensor retinaculum in the midfoot incision. (Figure 4)

Figure 4 - Transposition from the posterior Tibial tendon to the midfoot. Source: Photographed by the authors.

A bone tunnel was made, wide enough to accommodate the posterior tibial tendon together with the osteperiosteal fragment, from the dorsal region to the plantar region, in the lateral cuneiform, with the aid of drills and curettes. With a perforated steel wire, the repair suture was passed to the plantar region, through the bone tunnel. The repair suture is pulled until the tendon lodges in the bone tunnel under the desired tension, leaving the foot in the neutral position or 10 ° of dorsiflexion. The posterior tibial tendon was fixed with a 4.5 mm anchor that was inserted in the dorsal region of the lateral cuneiform. (Figure 5)

Figure 5 - Fixation of the posterior tibial tendon with anchor in the lateral wedge. Source: Photographed by the authors.

The posterior tibial tendon repair suture was fixed to the plantar surface with a sterile button properly protected and accommodated with gauze to prevent skin lesions, providing additional fixation, considering that the fixation performed only by the button could be insufficient and potentially damaging to the soft parts. Incisions were sutured with non-absorbable Nylon 3.0 monofilament threads. A sterile dressing was performed and a plastered suropodalic immobilization of the plantigrade type or with a slight dorsiflexion was made.

The stitches were removed at three weeks and suropodalic immobilization was maintained for six weeks. After that period, the button was removed, physiotherapy was started with passive and active mobility exercises of the ankle and the gait was allowed, initially with a 90 ° PVC orthosis daily for four weeks and at night for three additional ones. In 12 weeks, the patient had improved gait, returned to his work activities and used different shoes.

DISCUSSION

The presence of the fallen foot, caused by injury to the fibular nerve, significantly impairs the quality of life of a patient by limiting most of the simple activities of daily life. The transfer of the posterior tibial tendon via the interosseous membrane was described, for the first time,

in 1954 by Watkins, for the treatment of paralytic foot in patients affected by polio[6]. The use of the path via the interosseous membrane prevents the occurrence of inversion deformity reported in several studies that used the circumferential path[7]. In this study, we used the path via the interosseous membrane, passing the posterior tibial tendon under the extensor retinaculum.

Prahinski et al.[8] performed the transfer of the posterior tibial tendon via the interosseous membrane in ten patients and none of them required the use of orthosis for walking after the rehabilitation period. However, over the follow-up period, which was from one to six years, four of the ten patients needed to return to using an orthosis. One of the patients had a stroke, two had sudden loss of dorsiflexion due to loosening of the tendon from its place of origin and one patient had progressive loss of dorsiflexion, possibly due to tendon laxity. In this study, after 1 year of follow-up, the patient remains free from using orthosis for walking.

Of the ten patients studied by Prahinski et al.[8], five initially returned to physical activity, such as running, but only two managed to maintain this activity in the long term. In this study, the patient has been performing physical activities routinely.

Pinzur et al.[9] used electroneuromyography in nine patients to compare the electrical activity of the posterior tibial tendon in the pre and postoperative period during gait. The authors observed restoration of the electrical activity of the posterior tibial tendon in the final phase of the gait balance, recovering the normal pattern of the same in the postoperative period in seven patients. In this study, electroneuromyography was used before and after the surgical procedure, being verified the damage to the fibular nerve in the first and normal in the last, twelve months after the surgery.

Carayon et al.[10], with a sample of 31 patients in their study, based their results according to the range of motion acquired by the patient in the postoperative period. Only five patients had unsatisfactory results. The patient in this study reported a high degree of satisfaction with the result presented.

CONCLUSION

It is possible to obtain a good functional result, improvement in gait, abandonment of the orthosis and improvement in the quality of life of patients with fallen foot by traumatic injury to the fibular nerve after the surgical procedure of transferring the posterior tibial tendon via the interosseous membrane.

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