

Transfer of the Posterior Tibialis on the Lateral Cuneiform in Paralysis of the Elevator Muscles of the Foot

Coulibaly Kalifa^{1*}, Traoré S¹, Sanogo CO¹, Diallo A¹, Djiré I¹, Keïta G¹, Diallo S², Tambassi S¹ and Berthé M¹

¹Orthopaedic Traumatology Department of Kati University Hospital, Koulikoro/Mali

²Mopti Regional Hospital

*Corresponding Author: Coulibaly Kalifa, Orthopaedic Traumatology Department of Kati University Hospital, Koulikoro/Mali.

Received: May 27, 2022; Published: June 01, 2022

Abstract

The paralysis of the foot elevators is a common condition with a variety of etiologies. The transfer of the posterior tibialis on the lateral cuneiform constitutes the surgical gesture of reference to compensate for the deficit of the elevators of the foot.

Objective

The aim of this work was to evaluate the result of the transfer of the posterior tibialis on the lateral cuneiform.

Patients and Method

This was a descriptive retrospective study from January 2006 to December 2021. During the study period, we operated on 07 patients with paralysis of the foot elevators at the Regional Hospital of Kayes and at the University Hospital of Kati. The results were assessed according to the raising and maintenance of the plantigrade position of the foot.

Results

The use of the aforementioned judgment criteria allowed us to classify our Patients into four very good results, two good results and one poor result. The only bad result was hind foot varus with posterior tibialis side 4.

Conclusion

The transfer of the posterior tibialis on the lateral cuneiform ensures the effective raising of the foot. Postoperative rehabilitation is an integral part of the therapeutic protocol to restore the transferred muscle to its initial strength.

Keywords: paralysis; foot elevators; Surgery; posterior tibialis

Introduction

Paralysis of the foot lifters is a common condition with a diverse etiology. It is frequently seen as a result of intra-gluteal injections of neurotoxic products by damage to the external popliteal sciatic nerve that innervates the lifting muscles of the foot. Isolated paralysis of PES during poliomyelitis and trauma are not negligible too. After six months of follow-up, the chance of neurological recovery is very low, hence the use of the transfer of the posterior tibial to the lateral cuneiform to ensure the dorsal flexion of the foot. The transfer of the posterior tibial muscle by interosseous route, described for the first time by Mayer [1], is the reference surgical procedure to compensate for the deficit of the foot lifters. Since the scripting of WATKINS in 1954, this technique has experienced a lot of growth [2]. This transfer gives a satisfactory result with complete disappearance of the steppage only if the muscle is rated at least 4 before the operation [3]. It is an effective technique that can significantly improve gait in patients with paralysis of the foot lifters. The aim of this work was to evaluate the result of the transfer of the posterior tibial to the lateral cuneiform.

Patients and Method

Patients

This was a descriptive retrospective study from January 2006 to December 2021. During the study period, we operated on 07 patients with paralysis of the foot lifters at Kaye s Regional Hospital and Kati University Hospital. The data carrier was the individual clinical follow-up sheet and the operative protocol register. Only patients whose posterior tibial was rated at least 4 and who were able to benefit from a minimum postoperative follow-up of 6 months were included in this study. The characteristics of the population and the associated surgical procedures are summarized in (Table 1).

Patients	Age (years)	Sex	Side	Etiology	Posterior tibial muscle strength before surgery	Time since surgery (months)	Associated gestures
1	46	Male	gauche	Trauma	5	66	None
2	26	Male	gauche	Intra-gluteal injection of quinine salt	5	66	Postero-internal release and double arthrodesis
3	39	Male	right	Intra-gluteal injection of quinine salt	5	48	Postero-internal release and double arthrodesis
4	17	Female	gauche	Intra-gluteal injection of quinine salt	5	48	Postero-internal release and double arthrodesis
5	07	Female	gauche	Intra-gluteal injection of quinine salt	4	48	Postero-internal release
6	25	Male	right	Injection intra-fessière	4	9	None
7	22	Male	gauche	Intra-gluteal injection of quinine salt	4	6	Postero-internal release and double arthrodesis
Total	26,0 (AM)	5 H (71,4%)	5 G (71,4%)	6 Injections (85,7%)	4,6 FM moyenne	41,6 mois (DM)	

Table 1: Characteristics of the population and associated surgical procedures.

Method

Therapeutic protocol

The surgeries were performed under loco regional anesthesia. The installation was done in supine position; a cushion under the opposite buttock to burp sufficiently outside the limb to operate during the postero-internal incision. After this time the cushion was removed for the rest of the procedure. A pneumatic tourniquet was placed at the root of the limb to be operated. The operator is first placed inside, then outside the limb to be operated. Three incisions were made successively:

Postero-internal incision of the leg

A 12 cm long vertical incision starting behind the inner malleolus and running along the postero-inner edge of the tibia was made. The tendon of the posterior tibial muscle was located behind the medial malleolus to the cradle tu of the scaphoid where it was disintegrated. Its lacing was done with resorbable mooring wire (slow resorption). The muscular body of the posterior hamstring that engages under the arch of the common flexor of the toes was discovered. In haut the posterior hamstring was disinserted from the common flexor of the toes by protecting the posterior vasculo-nervous bundle. The interosseous partition was discovered.



Figure 1: Posterior internal leg incision.

Anterior incision of the leg

A 10 cm incision was made through one hand over the ankle and two finger crosses outside the tibia crest. The leg fascia was opened protecting the musculocutaneous nerve outside. The common anterior hamstring-extender gap was identified. The anterior vascular-nervous bundle was discovered just in contact with the interosseous membrane. The anterior hamstring was lifted, thus releasing the interosseous septum. A wide window was made in the interosseous membrane; as high as the skin incision allows by taking care of the anterior tibial package. The posterior tibial muscle had passed through this window and recovered from the anterior incision.



Figure 2: Anterior leg incision to recover the posterior tibialis tendon.

Incision on the dorsal side of the foot

A 4 cm vertical incision was made on the back of the foot in the axis of the third metatarsal. It begins backwards on a transverse line passing through the tuber of the scaphoid. We freed the dorsal side of the lateral cuneiform by pushing the common extender out and taking care of the musculocutaneous nave. At the square tip, we made a vertically descending path to the sole of the foot through the lateral cuneiform. The upper part of the route was widened to facilitate the passage of the transfer. The tendon of the posterior hamstring was passé in the subcutaneous.



Attachment of the tendon to the sole of the foot

Using a straight needle we brought the lacing wires to the sole of the foot by exerting traction on the transfer and carrying the ankle at right angles. The tendon mooring wires were tightened to the plant on a quilted shirt button. The tendon was attached to the capsulo-periosteal flap at the point of penetration on the lateral cuneiform. Hemostasis was carried out after the withers were released. The incisions were closed plan by plane on a suction drain. The latter was placed in the postero-internal wound.



Associated gestures

The associated gestures were the postero-internal Liberation and double arthrodesis of the hind foot in the inveterate equine varus feet and the postero-internal Liberation in the equine feet. These different gestures and the transfer of the posterior tibial were made at the same time operative. Limb immobilization was prolonged when foot arthrodesis was associated.

Postoperative care

A boot plastered for six weeks was put in place, the ankle at right angles in slight valgus of the back foot. The suction drain was re-

moved later at the 72nd hour. A large window was made next to each pile after drying the plaster for the dressings. The suture threads were removed on the 12th day of the procedure. The resumption of walking was allowed with rehabilitation as soon as the plaster was removed.

Rehabilitation

Rehabilitation is an integral part of the therapeutic protocol. It begins the day after the procedure with isometric contractions of the muscles of the leg and foot. After the removal of the cast and because of the amyotrophy of the transferred muscle, the muscle strength of the latter is decreased. Rehabilitation is immediately started just after the removal of the cast by active and passive movements in the foot. Rehabilitation is spread over six months to restore the transferred muscle to its initial strength.

Evaluation method

The results were assessed according to the raising of the foot and the maintenance of the plantigrade position of the foot. We considered as a result:

- *Very good*: plantigrade position of the foot, posterior tibial rated at 5 with total disappearance of the steppage and possibility of walking on the heel.
- *Good*: plantigrade position of the foot, posterior tibial rated at 4, disappearance of the steppage but without possibility of walking on the heel.
- *Bad*: Clubfoot varus with or without equinism, Posterior Tibial rated at 3 at most, important steppage.

Results

No intraoperative complications were observed. In late postoperative, a significant deformity in varus was observed 3 years later in a child who had paralysis of the foot lifters following intra-gluteal injection. The posterior tibial was sided to 5 in 4 cases and to 4 in 3 cases. The protrusion of the transferred tendon was more exaggerated in two cases. Heel walking was possible in 6 out of 7 patients (Fig.5). Stepping has completely disappeared in all our patients. The use of the above outcomes allowed us to classify our Patients into four very good outcomes, two good outcomes and one poor outcome. The only bad result was the varus of the rear foot avec tibial posterior side to 4. It required a poster medial release of the hind foot 2 years after the transfer of the posterior tibial.



Figure 5: The result of the transfer after 2 months of the intervention in the 2nd patient: possibility of dorsiflexion and walking on the heel after transfer of the JP.

Discussion

The transfer of the tibial stationary to the lateral cuneiform ensures the effective lifting of the foot. The risk of secondary valgus flat feet in cerebral palsy children has been described [4]. The transfer of the posterior tibial to the tendon of the anterior tibial has also been described with encouraging results [5]. The transfer of the posterior tibial to the intermediate cuneiform and to the cuboid has also been described [6]. The double tendon transfer through the crural interosseous membrane, using the posterior tibial and the long flexor of the toes that are sutured upstream of the retinaculum of the extensors, respectively to the anterior tibial and the long extensors of the hallux and toes has also been described [6]. The transosseous fixation of the transferred tendon can also be ensured by an interference screw, a Blount staple or by transosseous points [7]. We preferred the fixation of the tendon transferred to the sole of the foot on a quilted shirt button. We also attached the tendon to the capsuloperiosteal flap at the point of penetration of the lateral cuneiform. The systematic lengthening of the Achilles tendon has been proposed by some authors [3]. For them, it makes it easy to achieve the recommended 20 degrees of dorsal bending at the time of transfer [8]. These authors find that this greatly improves the subsequent functional result. This attitude was not systematic in our patients. It is essential beforehand to correct the deformations when they exist [2]. But this transfer gives a satisfactory result with complete disappearance of the steppage only if the muscle is rated at least 4 before the operation [2]. If the muscular strength of the posterior tibial is low (less than 4), preoperative rehabilitation is necessary. Our results were satisfactory in 6 cases and unsatisfactory in one case. Very good and good results were reported by Sidibé S. [3], Smonka JA. [9] and Synder M [10]. They had satisfactory results of 9/12, 2/2 and 12/15 respectively.

Conclusion

The transfer of the posterior tibial to the lateral cuneiform ensures the effective lifting of the foot. It is essential beforehand to correct the deformations when they exist. This transfer gives a satisfactory result only if the muscle is rated at least 4 before the operation. Postoperative rehabilitation is an integral part of the therapeutic protocol to restore the transferred muscle to its initial strength.

References

1. Mayer L. "The Physiological Method of Tendon Transplantation in the Treatment of Paralytic Drop-Foot". *J Bone Joint Surg* 1.19 (1937): 389-394.
2. Watkins MB., et al. "Transplantation of the posterior tibial tendon". *Journal of bone and joint surgery* 36A (1954): 1181-1189.
3. S Sidibe., et al. "TOURE Results of surgical treatment of paralysis of foot lifters". *Médecine d'Afrique Noire* 46.5 (1999): 276-279.
4. D Gasq., et al. "Tendon transfer of the posterior tibial according to the Watkins technique in spastic adults: results and long-term tolerance". *Annals of Physical Medicine and Rehabilitation* 55.1 (2012): 179-180.
5. Tomeno B, Anract P and Vinh TS. "Transfer of the posterior tibial muscle to the back of the foot: an original method of fixing the transplant". *Rev Chir Orthop Repaireur Appar Mot* 84.2 (1998): 194-6.
6. MY Grauwlin., et al. "Double tendon transfer for drooping foot". *Orthop Traumatol Surg Res* 101.1 (2015): 115-8.
7. BS Souna., et al. "Posterior Hamstring Muscle Tendon Transfer: about 24 patients with an average setback of 42 months". *African Journal of Surgery and Specialty*.
8. Richard BM. "Interosseous transfer of tibialis posterior for common peroneal nerve palsy". *Journal of bone and joint surgery - British* 71.5 (1989): 834-837.
9. Simonka JA. "Management of a foot deformity caused by paralysis of the tibial nerve by transfer of the tendon of the posterior tibial muscle". *Journal Magyar - Traumatologia orthopedia Es Helyreallito sebeszet* 34.3 (1991): 230-232.
10. Synder M, Jay Kumar S and Stecyk MB. "Split tibialis posterior tendon transfer and tendon Achilles lengthening for spastic equinovarus feet". *Journal of Pediatric Orthopedics* 13.1 (1993): 20-23.

Volume 2 Issue 6 June 2022

© All rights are reserved by Coulibaly Kalifa., et al.