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Case Series: Management of Foot Drop

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Authors' contributions

This work was carried out in collaboration among all authors. Authors IOA and SAA designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors AOD and SUE managed the literature searches. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Aim: To highlight the functional outcome of surgical management of foot drop in patients with Hansen disease.
Case Presentation: We present three cases of foot drop following Hansen's disease that were managed surgically by Tibialis posterior transfer. The patients had preoperative physiotherapy for ten days and postoperative physiotherapy for four weeks. Their post-operative periods were uneventful and the corrections were satisfactory.
Discussion: Involvement of common peroneal nerve in Hansen's disease usually results in paralysis of the anterior tibial and/or peroneal muscles. Hansen's disease patients with foot-drop walk with a 'high-stepping gait', lifting the leg high as if climbing steps even while walking on level ground. When the paralysis has been present for more than six months to one year without recovery, the best option of treatment at this stage is corrective surgery and the main aim of the corrective surgery is to restore active dorsiflexion of the foot so that the gait becomes normal. This is achieved by re-routing the tendon of Tibialis posterior muscle, brings that

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tendon to lie in front of the ankle and is anchored distally. If the tendo-achillis tendon is found to be tight, it should be lengthened as the first step of the Tibialis posterior transfer operation.
Conclusion: Surgical correction of foot drop usually leads to restoration of active dorsiflexion of the foot thereby preventing development of secondary deformities and ulceration. Our patients were able to dorsiflex their feet after the surgical correction.

Keywords: Hansen disease; foot drop; tibialis posterior; tendo-achillis.

1. INTRODUCTION

Hansen's disease patients develop foot-drop because of damage to the lateral popliteal (the common peroneal) nerve. Leprosy caused the Mycobacterium leprae is the most common treatable cause of neuropathy. Foot drop is a fairly common disability with an overall incidence of 2.5 percent due to damage to the lateral popliteal (the common peroneal) nerve and the resultant paralysis of the muscles supplied by the lateral popliteal nerve [1]. Hansen's disease patients with foot-drop walk with a 'high-stepping gait', lifting the leg high as if climbing steps even while walking on level ground. When these patients sit on a high stool or couch with the leg hanging down free, they will not be able to lift the affected foot or toe [1,2]. If the foot drop is left untreated it may result into contracture formation and development of secondary deformities and ulceration. Patient may end up having below knee amputation because of the secondary deformities and recurrent ulceration if the foot drop is not corrected on time [3,4].

When the paralysis has been present for more than six months to one year without recovery and when the paralysed anterior and lateral group of leg muscles are severely atrophied, the paralysis is taken as irreversible [1]. The best option of treatment at this stage is corrective surgery [5]. The main aim of the corrective surgery is to restore active dorsiflexion of the foot so that the gait becomes normal. This is achieved by re-routing the tendon of Tabialis posterior muscle to run in front of the ankle with lengthening of tendo-achillis. This muscle then functions as a dorsiflexor of the foot. The procedure is known as 'Tibialis posterior transfer' with lengthening of tendo-achillis [3,6]. We present three cases of foot drops who were managed surgically. The patients had preoperative physiotherapy for ten days and postoperative physiotherapy for four weeks. Their post-operative periods were uneventful and the corrections were satisfactory.

1.1 Procedure

The operation is usually done under spinal or general anaesthesia. A small incision is made over the tuberosity of the navicular bone to identify the tendon of tibialis posterior. The tendon is then detached and withdrawn proximally above the ankle through a 8 cm curved incision on the medial side of the lower leg. The lowest muscle fibres inserting into tibialis posterior tendon are shaved off from the tendon in order to get a better length of the tendon. The tendon is then split longitudinally into two "tails" up to the point where it will cross the tibia proximally. A closed Z-plasty is then done to increase the length of the achillis tendon. Through a transverse incision on the dorsum of the foot the extensor hallucis longus and extensor digitorum longus is identified. A tendon tunneller (Andersen's tunneller) is passed from the wounds in the dorsum to the wound in the leg. Two separate subcutaneous tunnels are made and the two "tails" of motor slips are pulled through to run in front of the ankle. The motor slips are pulled through. One is implanted in the tendon of extensor hallucis longus and the other in the tendons of extensor digitorum longus. During this stage the knee is held in flexion of about 30 degrees and the ankle in dorsiflexion of at least 10 degrees. The motor tendons are kept in moderate tension. After operation a below-knee plaster is applied, with the foot further dorsiflexed to release any tension on the tendon sutures during healing. The plaster is bivalved after four weeks, stitches are removed and re-educative exercises are commenced [3,7].

2. CASE PRESENTATION

2.1 Case 1

A 10-year old girl presented with right foot drop of 2-year duration. She was the second child of her mother who also had Hansen's disease. She was separated from her mother when she was 2 years old and was living with one of her mother's relatives. She was returned back to her mother when they noticed that she could no longer walk

properly. She stopped schooling on account of this deformity. Her mother took her to a leprosy center for medical care. She was examined at the center and found to have Hansen disease with right foot drop. She was treated with MDT for 1 year and was later referred to our centre for correction of the foot drop. She had pre-operative physiotherapy for 10 days to strengthen the Tibialis Posterior tendon [8]. Transfer of Tibialis Posterior with closed tenotomy was done and short leg cast was applied for four weeks. The cast was removed at the end of 4th week and sutures were also removed. She had post-operative physiotherapy for another four weeks after which she regained the ability to dorsiflex the right foot.

(a)

(b)

(c)

(d)

Fig. 1. (a) Pre-operative (Foot at rest); (b) Post-operative (Foot at rest); (c) Pre-operative (Dorsiflexion); (d) Post-operative (Dorsiflexion)

(a)

(b)

(c)

(d)

Fig. 2. (a) Pre-operative (Foor at rest); (b) Post-operative (Foot at rest); (c) Pre-operative (dorsiflexion); (d) Post-operative (Dorsiflexion)

2.2 Case 2

A 38-year old Imam presented with 17-year history of left foot drop. He noticed that his left leg was becoming weak and sometimes slippers fell off his foot without him knowing. He had visited many hospitals without any significant improvement in his condition. His father eventually took him to a leprosy center where diagnosis of Hansen disease with left foot drop was made and he was treated for a year with MDT. He later discovered that his father had similar illness and he was treated without the knowledge of his family members. He had two wives and five children and none of them has Hansen disease. Whenever his friends asked about the cause of his limping, he usually lied to them that he was involved in road traffic accident. He dropped out of school after secondary school and became an Imam because of his health condition. He was referred to our center for foot drop correction. He had pre-operative physiotherapy for 10 days to strengthen the Tibialis Posterior tendon. Transfer of Tibialis Posterior with closed tenotomy was done and short leg cast was applied for four weeks. The cast was removed at the end of 4th week and sutures were also removed. The post-operative period was uneventful and he had post-operative physiotherapy for another four weeks after which he regained the ability to dorsiflex the left foot.

(a)

(b)

(c)

(d)

Fig. 3. (a) Pre-operative (foot at rest); (b) Post-operative (foot at rest); (c) Pre-operative (dorsiflexion); (d) Post-operative (Dorsiflexion)

2.3 Case 3

A 38-year old driver presented with history of weakness of left foot of 2 year duration. He claimed that he stepped on a charm at a motor park two years earlier. He believed that the weakness was as a result of the charm that he stepped on. There was no history of Leprosy in his family. He had not been able to continue with his job because of this weakness. He was advised by one of his friends who suspected that what he had was leprosy to visit our center for medical care. He was examined in our center and he was found to have left foot-drop. Skin slit smear for M. leprae was done and was positive. He was treated with MDT for a year. After the completion of the treatment, he had pre-operative physiotherapy for 10 days to strengthen the Tibialis Posterior tendon. Transfer of Tibialis Posterior with closed tenotomy was done and short leg cast was applied for four weeks. The cast was removed at the end of 4th week and sutures were also removed. The post-operative period was uneventful and he had post-operative physiotherapy for another four weeks after which he regained the ability to dorsiflex the left foot.

3. DISCUSSION

Foot drop is a sign of an underlying problem rather than a condition itself. Foot drop is caused by nerve function impairment (NFI) of the deep branch of the lateral popliteal (common peroneal) nerve. The tibialis anterior, extensor hallucis longus, extensor digitorum longus, and peroneus tertius muscles are Paralysed. Superficial branch involvement leads to paralysis of peroneus longus and brevis, leading to loss of ankle dorsiflexion, foot eversion, and toe extension. Foot drop deformity is result of inability to dorsiflex the foot [4,9].

The site where common peroneal nerve involvement usually occur is at the head of the fibula and it is at this site the common peroneal nerve divides into its two branches. Depending on the extent of damage therefore, the patient may present with a complete foot drop in which both branches are affected or an incomplete/irregular footdrop, usually paralysis of the anterior tibial muscles with sparing of the evertors [1,10].

Initially, the paralysis is temporary and recovery is possible if detected early and treated with steroids, physiotherapy and electrical stimulation of the muscles [10]. If the muscles do not recover by three months after initiation of steroid and physiotherapy, it is quite likely that recovery may not occur. All the three cases presented in our series did not recover from the paralysis. All patients whose muscles failed to recover will benefit from surgical management. Review of literature shows description of non-operative management that includes use of an ankle-foot orthosis. The outcome of this is less satisfactory when compared with surgical management. It is only advocated where the patient or the foot is not fit for surgery or where the surgical service is not available [1].

Surgical correction of foot drop is relatively easy, compared to tendon transfer surgery procedures in the hand. Re-education is also less demanding and chances for postoperative complications are less. It is a procedure that is very rewarding and it will help in reducing stress on the anterior/lateral side of the foot, the site of the foot

where patients are likely to develop ulcers if they have concomitant paralysis of the posterior tibial nerve [5,11]. The three patients had preoperative physiotherapy for ten days and postoperative physiotherapy for four weeks. Their post-operative periods were uneventful and the corrections were satisfactory.

4. CONCLUSION

Surgical correction of foot drop usually leads to restoration of active dorsiflexion of the foot thereby preventing development of secondary deformities and ulceration. Patient may end up having below knee amputation because of the secondary deformities and recurrent ulceration if the foot drop is not corrected on time [4].

CONSENT

We declare that 'written informed consent was obtained from the patients for publication of this case series.

ETHICAL APPROVAL

We hereby declare that the study has been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Srinivasan H, Palande DD. Essential surgery in leprosy technique for district hospitals. World Health Organization. 1997;68-78.
2. Aydin A, Topal M, Tuncer K, Canbek U, Yildiz V, Kose M. Extramembranous transfer of the tibialis posterior tendon for the treatment of drop foot deformity in children. Arch Iran Med. 2013;16(11):647–651.
3. Schwarz R, Brandsma W. Surgical reconstruction & rehabilitation in leprosy and other neuropathies. Nepal. Ekta books distribution pvt. Ltd. 2004;176-190.
4. Qian JG, Yan LB, Li WZ, Zhang GC. Posterior tibialis transfer for foot-drop due to leprosy: a case with 40 years follow up. The British Association of Plastic Surgeon. 2004;57:450-2.
5. Hesham ES, Nabil A, Amr FK. Tendon transfer for foot drop: A simple procedure with effective outcome local experience. Open Journal of Modern Neurosurgery. 2019;9:258-268.
6. Indrajeet K, Alok R, Laljee C. Postoperative functional results of posterior tibial tendon transfer for foot drop as a consequence of nerve palsy in leprosy. Annals of International Medical and Dental Research. 2016; 2(3):118-202.
7. Srinivasan H, Mukherjee SM, Subramaniam RR. Two-tailed transfer of tibialis posterior for correction of drop-foot in leprosy. The Journal of Bone and Joint Surgery. 1968;50 (3):623–8.
8. Chaurasia RK. The role of tibialis posterior tendon transfer in foot drop by circumtibial route and evaluation of the results according to criteria. Int Surg J. 2019; 6(8):2880-4.
9. Andersen JG. Foot drop in leprosy and its surgical correction. ACTA Orthopaedica Scandinavica, 1963;33:1-4:151-171. DOI: 10.3109/17453676308999843
10. Sridhar K, Mohamed I. Tendon transfers in foot drop. Indian J Plast Surg. 2019;52(1): 100–8.
11. Warren AG. The correction of foot drops in leprosy. The Journal of Bone and Joint Surgery. 1968;50(3):629-634.

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