

Gait biomechanics in patients with leprosy and drop foot: preoperative and postsurgical correction analysis with tendon transposition using the posterior tibialis

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Introduction: The neurological lesion involving the common peroneal nerve caused by leprosy can lead to drop foot. Surgical correction with tendon transposition can reestablish dorsiflexion and improve gait in these patients; no study using three-dimensional analysis has reported the spatiotemporal, kinematic, and dynamic parameters preoperatively and/or postoperatively. The objective is to describe the biomechanical changes in gait in patients with leprosy and unilateral drooping foot, and to demonstrate the changes after transposition of the posterior tibialis.

Methods: Twelve patients with leprosy and drop foot were evaluated in the gait laboratory. A control group of 15 healthy subjects, matched for weight and height, was used.

Results: The affected limb showed increased plantar flexion in the initial contact ($-16.8^\circ \pm 8.3$), terminal support ($-29.1^\circ \pm 11.5$), and balance ($-12.4^\circ \pm 6.2$) compared to the unaffected limb ($-6.6^\circ \pm 10.3$; $-14.6^\circ \pm 11.6$; $2.4^\circ \pm 7.6$) and to the control group ($-5.4^\circ \pm 2.5$; $-18.8^\circ \pm 5.8$; $-1.4^\circ \pm 3.9$) ($p < 0.05$). The second peak ground reaction force ($98.6 \pm 5.2\%$ body weight), ankle moment (0.99 ± 0.33 Nm/kg) and total ankle work during stance (-0.03 ± 5.4 J/kg) were reduced in the affected limb compared to the control group ($104.1 \pm 5.5\%$ body weight; 1.24 ± 0.4 Nm/kg; -4.58 ± 5.19 J/kg; $p < 0.05$). An increase in gait speed was observed after surgical correction compared to the preoperative period (0.86 ± 0.2 ; 0.96 ± 0.2 ; $p < 0.001$). The affected limb demonstrated improvement in ankle position at initial contact (-12.8 ± 3.0 ; -1.5 ± 3.5), reduction in plantar flexion peak during support (-25.1 ± 7.3 ; -12.7 ± 5.2), and increase in mean dorsiflexion in the swing (-16.4 ± 2.0 ; -8.7 ± 5.1 ; $p < 0.001$).

Conclusion: Patients with leprosy and drop foot presented gait changes in the affected limb. After surgical correction, improvements were observed in spatiotemporal parameters and ankle kinematics.

Keywords: Leprosy; Dropped foot; Tendon transfer.

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