

# Pé Pendente Bilateral Após Uso de Meias de Compressão

## *Bilateral Foot Drop Following Compression Stockings Use*

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### Resumo

As meias de compressão elástica constituem uma medida profilática da trombose venosa profunda no período pós-operatório, estando a sua eficácia bem documentada na literatura científica. A paralisia do nervo peroneal é a principal neuropatia compressiva do membro inferior e pode ter múltiplas etiologias sendo que a principal corresponde à compressão externa direta a nível do colo do perónio. Os autores relatam o caso de uma doente de 20 anos de idade, submetida a transplante hepático, com necessidade de permanência na Unidade de Cuidados Intensivos durante 25 dias, período após o qual se retiraram as meias de compressão de coxa, à data, enroladas até ao nível dos joelhos. Constatou-se lesão por pressão a nível do joelho e pé pendente bilateral. O estudo electrofisiológico foi compatível com polineuropatia sensitivo-motora grave. O presente artigo tem por objetivo reforçar a importância do reconhecimento precoce dos sintomas de lesão nervosa periférica, principalmente no doente crítico com múltiplas comorbilidades, cujo risco de lesão neurológica grave é muito superior.

**Palavras-chave:** Meias de Compressão; Transtornos Neurológicos da Marcha; Tromboembolia.

### Abstract

Compression stockings are commonly used for prophylaxis of deep venous thromboembolism after surgery and its effectiveness is well established. Peroneal nerve palsy is the most common entrapment neuropathy of the lower extremity. It can result from multiple causes but direct external compression of fibula head seems to be the main one. The authors report a 20-year-old female patient, who was submitted to a liver transplantation and after 25 days on Intensive Care Unit, rolled-down compression stockings were removed, and a linear impression mark below knee with bilateral foot drop was observed. The electrodiagnostic

testing confirmed the diagnosis of a severe sensory-motor polyneuropathy. The aim of this report was to emphasize the importance of early recognition of the symptoms of peripheral nerve injury, especially in critical ill patients with multiple risk factors, who might have a worst outcome and permanent damage.

**Keywords:** Gait Disorders, Neurologic; Stockings, Compression; Thromboembolism

### Introduction

Deep venous thromboembolism (DVT) is the most common potentially avoidable cause of in-hospital morbidity and mortality.<sup>1,2</sup> Its incidence in surgical patients is approximately 29% with further increase if there are additional risk factors.<sup>3-5</sup> Major abdominal and pelvic surgeries are at higher risk, particularly if the surgery is in the context of neoplastic disease (4 to 6 times more). Without an optimal thromboprophylaxis strategy, it can be as high as 40%.<sup>4</sup> In these cases, meta-analyses and evidence-based guidelines strongly recommend the combined use of physical, pharmacological and mechanical prophylaxis methods, which have resulted in a 60% – 70% risk reduction.<sup>1,3,4</sup> Pharmacological measures more often include low molecular weight heparins (effective as other anticoagulant therapies, preferred due to its cost); mechanical thromboprophylaxis embrace compression stockings (static) and pneumatic compression devices (dynamic); and physical prophylaxis including early mobilization of lower limbs and ankle exercises that have a positive effect in the prevention of postoperative venous thrombosis. Although graduated compression stockings have been proven to be highly effective as an isolated thromboprophylaxis agent (11% versus 9%), most of the time they are used as an adjunct with pharmacological thromboprophylaxis because together the rate of DVT is further reduced.<sup>2,3,5,6</sup> In the

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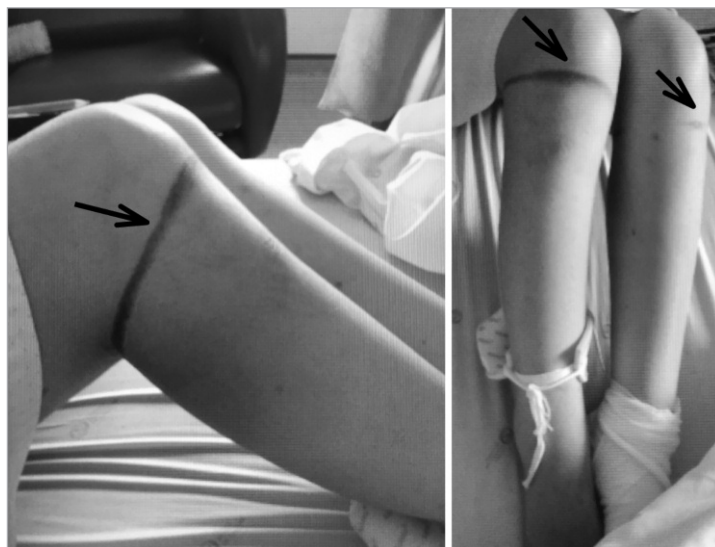
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majority of studies, there are no recommendations concerning the degrees of pressure (low, moderate or high) or size (knee-length, thigh-length).<sup>4,7</sup> A Cochrane review<sup>2</sup> found no statistically significant difference in clinical effectiveness between the two stocking lengths in terms of reducing the incidence of DVT. The authors concluded that there was insufficient high quality evidence to determine whether thigh length (TL) or knee length stockings differ in effectiveness of reducing the incidence of DVT in hospital inpatients. However, direct and indirect meta-analysis had suggested that TL stockings might be more effective than knee length, although the results were not statistically significant.<sup>2,3</sup> TL stockings provide decrescent graduated compression along the length of lower limb, improve the venous outflow, reduce venous stasis and subsequently prevent formation of thrombus; however its use is more likely to be associated with pain, discomfort, pressure necrosis, skin lesions and pressure injuries.<sup>3</sup> Knee length stockings exert graduated compression only to knee level and also prevent thrombus formation. The first may be more effective in surgical patients; however, much of the available research evidence is of uncertain quality. Patients may encounter problems during its use. The most frequent problem is the rolling down,<sup>1,2,4,8</sup> observed in about half of the patients. If applied incorrectly or if is not tolerated by the patient, the upper end can roll down (or be pulled down) to below knee level being responsible for pressure injuries, as compression of peroneal nerve. According to The National Pressure Ulcer Advisory Panel, a pressure injury is a “localized injury to the skin and/or underlying tissue usually over a bony prominence or related to medical device”; medical device-related pressure injuries result from the use of devices designed and applied for diagnostic or therapeutic purposes. The resultant pressure injury generally conforms to the pattern or shape of the device and should be staged using the same staging system.<sup>6,9</sup> Some studies have established a link between pressure injury development and risk factors. Critically ill patients, in Intensive Care Units, are highly predisposed to pressure injuries due to long-term debility; other risk factors include increased duration and complexity of surgery, no ambulatory status, poor wound healing, mechanical ventilation and decreased peripheral perfusion.<sup>1,6,10</sup>

The authors report a bilateral foot drop that occurred after TL compression stockings use in a patient who underwent major abdominal surgery.

## Case Report

A 20-year-old female (weight: 60 kg, height: 158 cm) with personal history of systemic lupus erythematosus and antiphospholipid antibody syndrome both diagnosed 2 years before, under therapy with hydroxychloroquine and warfarin. The patient was submitted to an emergent liver transplantation due to acute liver failure in the context of herpes simplex hepatic necrosis (*Herpes simplex 2*) with multiorgan failure. Postoperative period, in the Intensive Care Unit, complicated by convulsive tonic-clonic seizures, upper digestive tract ulcers (complicated of hemorrhage), sepsis, multifactorial acute renal failure, supraventricular tachycardia and mechanical ventilation need. She was transferred to the Transplantation Unit on her 25<sup>th</sup> postoperative day after getting stable. At this time it was requested an observation by the Physical Medicine and Rehabilitation specialty because of a bilateral foot drop and pressure injury verified after TL compression stockings removal that were rolled-down until below knee level. There was no history of trauma or neurological deficits prior to surgical intervention. The patient's examination revealed a circular deep tissue lesion in both knees near the proximal end of the fibula, presence of pressure injury in the calcaneus (grade 3 on the left and grade 1 on the right), bilateral equinus deformity, absence of feet and ankle motor function (0/5) and sensory loss of the legs and feet. Needle electromyography (EMG), performed on 38<sup>th</sup> day after surgery, (on the right side only, due to the existence of occlusive patches in the lower left limb) illustrated absence of motor potential of the right peroneal and tibial nerve, and findings demonstrating a classical picture of axonal sensory-motor polyneuropathy with an important involvement of the lower limbs. During the hospital stay, she fulfilled a rehabilitation program 1 hour per day consisting of kinesiologic techniques aimed to reduce the equinism; initiated balance training in orthostatic position and gait training with crutches after healing of the left calcaneal ulcer, presenting a *steppage* gait pattern type bilaterally. Two foot-up orthosis were prescribed. At the time of discharge (2 months later) there was no sensory or motor improvement but she was independent in all activities of daily living and walked without crutches. In addition to foot orthosis, a home exercise program was prescribed. Clinical follow-up after discharge was not possible because the patient returned to her homeland (Brazil).



**Figure 1, 2** - Linear pressure injuries secondary to rolled-down thigh length compression stockings.

## Discussion

Antiphospholipid syndrome is a condition which is well known to be associated with thrombotic events and adverse pregnancy outcome. It can be isolated or associated with other autoimmune diseases, in particular systemic lupus erythematosus (20% - 40%), where these events have been demonstrated to occur more frequently, therefore constituting an additional important risk factor for DVT in surgical patients.<sup>11,12</sup> For this reason, in this case TL compression stockings were used as part of thromboprophylaxis to prevent venous thromboembolic events in the postoperative period after the liver transplantation.

Peroneal nerve palsy is the most common entrapment neuropathy of the lower extremity. Injuries may be compressive, embolic, thrombotic, torsional or due to stretching of the nerve. Among those, direct external compression of fibula head is the most frequent cause. The typical presentation is an acute complete or partial foot drop with numbness in the lateral calf and dorsum of foot. Patients benefit from nonsurgical measures, including activity modification, bracing and physical therapy.<sup>14-16</sup> Posterior tibial nerve injuries are usually recognized by the inability to plantar-flex and the absence of sensation on the plantar aspect of the foot. Entrapment has been described in association with an acute compartment syndrome of the leg, Baker cyst, popliteal artery aneurysm, nerve sheath tumor or other mass lesions, and direct trauma. Delays in detection of compression may lead to irreversible axonal injury.<sup>17,18</sup> In this case, rolled-down stockings at fibula level caused an increasing pressure within a contained area of

tissue to a level high enough to damage the structures within that space. The peroneal nerve is particularly sensitive to prolonged pressure. If missed or untreated, it can lead to late effects like deformities including ankle *equinus*, *equinovarus*, *cavus* foot, and claw or hammertoes. The involvement of the superficial posterior compartment results in *equinovarus* deformity.<sup>19</sup> The EMG study was compatible with the diagnosis of axonal sensory-motor polyneuropathy with an important involvement of the lower limbs. In systemic lupus erythematosus, prevalence of peripheral nervous system involvement is estimated to be between 5% - 27% with mixed sensory-motor polyneuropathy being the most frequent type detected in EMG. The pathogenesis is unclear, although it has been linked to vascular disease of the small arteries that supply the affected nerves.<sup>13</sup> The presence of polyneuropathy does not allow inferring the presence of additional neuropathies of the nerves of the lower limbs, especially of the peroneal nerves.

Early recognition of the symptoms of peripheral nerve entrapment or injury leads to timely treatment and avoids the cost of unnecessary studies. Sedated patients might have a worst outcome because they would not report any symptoms, so it might cause permanent damage. Compression stockings should be used with meticulous caution in this population. An effective strategy for early detection of complications would require, among other measures, clinicians to take into account the potential side effects, especially in critical ill patients with multiple risk factors. This includes patient, family and staff education, monitoring of correct use, skin integrity control and selection of the proper size on the basis of patients' individual characteristics.<sup>3,14</sup>

Conflitos de interesse: Os autores declaram não possuir conflitos de interesse. Suporte financeiro: O presente trabalho não foi suportado por nenhum subsídio ou bolsa. Proteção de pessoas e animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial. Confidencialidade dos dados: Os autores declaram ter seguido os protocolos do seu centro de trabalho acerca da publicação dos dados de doentes.

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