PHYSIOTHERAPY MANAGEMENT FOR DROP FOOT: A CASE REPORT

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Abstract

Introduction: Drop Foot is a gait disorder that drops the foot forward due to weakness, irritation or damage to peroneal nerve, and paralysis of the muscles in the back of the foot. This is usually a symptom of a bigger problem, not the disease itself. It is characterized by inability or impairment to raise the toes or lift the foot from ankle. Based on data quoted from the Agency for Healthcare Research and Quality (AHRQ), throughout 2009 in the United States there were 1.787 patients who experienced drop foot in hospitals. In the UK, there are 126.699 patients will experience unilateral and bilateral foot drop.
Case Presentation: A 26-year-old man was involved in a traffic accident on 1 years ago when he worked in a mine located at East Kalimantan, Samarinda. One day he was going to work form home had a traffic accident with fracture arm and with a deep open wound at medial leg. He was unconscious for 3 days after the accident. After 4 months of being treated in Samarinda, the patient moved to Surabaya because he followed his wife worked. He was treated at UNAIR Hospital for 4 months. Thus, he moved to Klaten and stayed at his family's place and started doing treatment at Klaten Islamic Hospital.
Management and Outcome: Functional Electrical Stimulation (FES), Ankle and Foot Orthoses (AFO), Exercise can increase muscle strength and functional activity that measured by Manual Muscle Test (MMT) and Foot and Ankle Disability Index (FADI)
Discussion: FES was able increase muscle strength. Its mechanism is based the depolarization of axons by an electric field. A bidirectional action potensial, activating the motor unit direct depolarization of muscle can used to stimulate the general peroneal nerve, activating the dorsiflexor muscles of the foot during the swing phase of the gait. The AFO improved subtalar joint motion, while also providing stability anterior-posterior and medial-lateral. AFO has beneficial effects in term of improving functional mobility, gait quality and decreased fall rates in these subjects. Therapeutic exercise was a systematic and planned performance intended body movement, posture, or physical activity to provide patients/clients with the means to fix or prevent impairment, repairing, restoring or improving physical function, prevent or reduce health-related risk factors, optimize your health status, fitness, or overall sense of wellbeing.
Conclusion*:* The treatment of Functional Electrical Stimulation (FES), Exercise, and Ankle Foot Orthoses (AFO) in this case is to be useful for patients with foot drop cases caused by nerve damage after a traffic accident, increase muscle strength and increase functional activity
Keyword: drop foot, peroneal nerve lesion, FES, AFO

Introduction

Drop Foot is a gait disorder that drops the foot forward due to weakness, irritation or damage to peroneal nerve, and paralysis of the muscles in the back of the foot. This is usualy a symptom of a bigger problem, not the disease itself. It is characterized by inability or impairment to raise the toes or lift the foot from ankle (1). There are many factors cause drop foot. There are some people who sometimes recognize the cause of drop foot due to spinal cord injury, amytrophic, multiple sclerosis, stroke, Parkinson's. Drop foot can also be caused by hip replacement surgery or other injuries such as accidents, joint dislocations or fractures (2). Tibialis anterior is the muscle used for dorsiflexion which is innervated by the peroneal nerve from the brach of the sciatic nerve. The tibialis anterior muscle will shrink as a result of the foot drop and make the muscle in the calf spasm (3). Based on data quoted from the Agency for Healthcare Research and Quality (AHRQ), throughout 2009 in the United States there were 1.787 patients who experienced foot drop in hospitals. In the UK there are about 126.699 patients will experience unilateral and bilateral foot drop.(4).

Case Presentation

A 26-year-old man came with the complaint that his ankle could not be lifted, the gastrocnemius muscle and sole of the foot muscle was tight. The pain and numbness felt by the patient in the ankle. The numbness experienced occuring in the dorsalis pedis region. The patient described the general pain as moderate by Foot and Ankle Disability Index (FADI) his problem began to develop 1 year ago when he worked in a mine located at East Kalimantan, Samarinda. One day he was going to work form home, thus had a traffic accident with fracture arm and with a deep open wound at medial leg. He was unconscious for 3 days after the accident. After 4 months of being treated in Samarinda, the patient moved to Surabaya because he followed the city where his wife worked. He was treated at UNAIR Hospital for 4 months. Then, he moved to Klaten and started doing the treatment at Klaten Islamic Hospital. The pain seemed worse with long walks. Otherwise the patient clarified with good health condition generally. The physical examination perfomed when the patient came, the walking phase was lost, as stance and swing phase. The ranges of motion of ankle joint actively could not be performed especially for dorsiflexion. When palpated, muscle shortening was found in the gastrocnemius, soleus and in the sole of the foot causing high arcus. The sciatic nerve

examination was not normal because he felt numbness at region dorsum pedis.

Management and Outcome

Management

Functional Electrical Stimulation (FES)

FES was used at a frequency of 40 hz, pulse 7 to 365us, 6s ramping, intensity 20-80mA, time 15 minutes with electrodes placed over the common peroneal nerve and anterior tibial motor points (5). Function of FES can stimulate voluntary muscle activity, reduce foot drop, reduces spasticity, and causes long-term sensorimotor (6).

Exercise

Strengthening muscle for motion dorsiflexion and stretching for the gastrocnemius and soleus muscles with a frequency of 2 times a week, intensity of 8 repetitions 3 sets, type active-assisted, time 10-20 minutes, the procedure is to position the patient sitting and knee extended then the patient dorsiflexion to a limited position the push it toward plantar flexion while holding it for 10 second then stretch (7). The type of exercises is Contract Relax Stretching which functions to inhibitor facilitate muscle activation and to increase the likelihood that muscle will be extended while remaining as relaxed as possible when stretched (8).

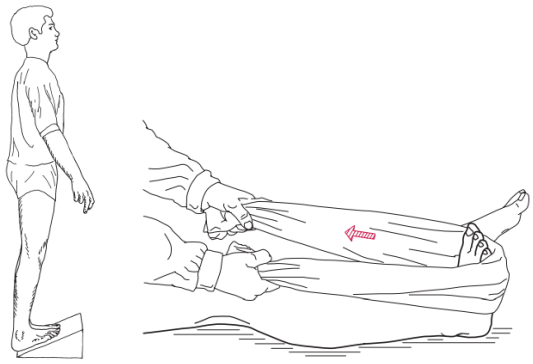


Figure 1 Exercise gastrocnemius with stand and stting

Ankle Foot Orthoses (AFO)

The AFO can be used as an educational tool to increase the amount of dorsiflexion when walking and can prevent falls because the feet not drag the floor. A solid ankle-foot orthoses (AFO) or foot-up splint can be used to keep the foot in 90° position (2)

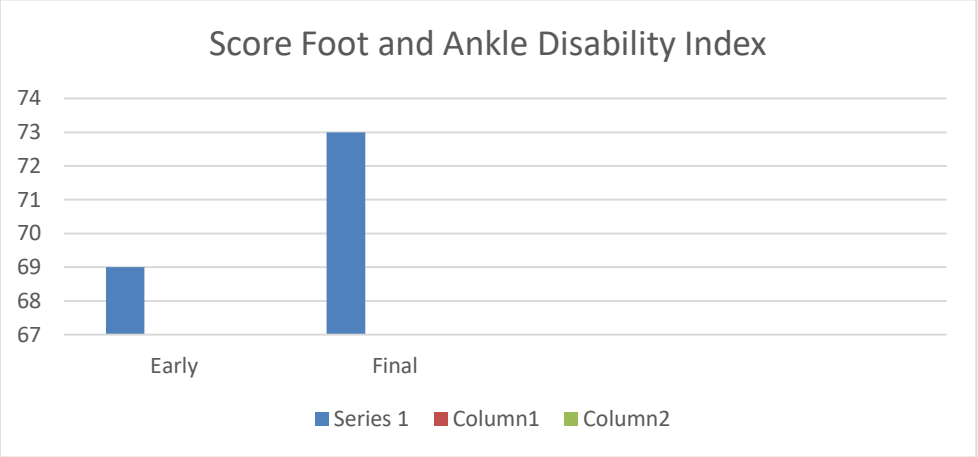
Outcome

The examination of muscle strength used the Manual Muscle Test (MMT) with a value of 0-5, (0) no contraction, (1) contraction without movement, (2) movement unable to fight gravity, (3) movement and able to fight gravity, (4) means that the movement is capable of with minimal resistance and (5) means that the movement is capable of maximum resistance (9). The MMT can help diagnose many problems but need to be considered of the technique used to ensure valid and reproducible results (10). The reliability declaired by Elizabeth et al., 2010, examined 60 people with spinal cord injury and had tetraplegia resulted ICC: 0.96 on the wrist extensor and ICC: 0.94 on the elbow flexor (11). Other study by Cilbuka et al., 2013 (12) assessed the trapezius muscle revealed high reliability with ICC: 0.8. A Literature review study by Cutchbert & Goodheart, 2007 (13) reported 100 studies related to MMT with analysis found there was a good evidence of reliability and validity of MMT for patients with neuromusculoskeletal dysfunction. The MMT of this study describes in table1. After treatment for 4 times showed an increase in muscle strength especially in dorsiflexion muscle.

Muscle	Function	Early	Final.
M. peroneus longus	eversion and supporting dorsiflexion	0	1
M Tibialis anterior	dorsiflexion	0	1
M.peroneus brevis	eversion and supporting dorsiflexion	0	1

Tabel 1. Examination Manual Muscle Test

The examination of functional activity ability used the Foot and Ankle Disability Index (FADI) with 26 items and a 104 of total points. The graphic 1 shows an increase of functional activities. The FADI is designed to assess functional limitations related to foot and ankle conditions. FADI is a region-spesific self-function report with 2 components: activity daily living and pain. A previous study by Hale et al., 2005 conformed FADI has a moderate validity with r= 0.64 and reliability after 1 week resulted the ICC: 0.89 and after 6 weeks with ICC: 0.93 in chronic ankle disability(14)



Graphic 1. The FADI score

Discussion

Based on the table 1 there is an increase of muscle strength and functional activities increased as showed in graphic 1 after 4 times treatments. In the first week, there was increasing pain by FADI, however the muscle strength showed the significant change after second treatment. Unfortunetly, feeling numbness was still appearing. The FES treatment was able to increase muscle strength, cause the depolarization of axons by an electric field. A bidirectional action potensial, activating the motor unit (15). Direct depolarization of muscle can used to stimulate the general peroneal nerve, activated the dorsiflexor muscles of the foot during the swing phase (16). The stimulus waveform used for FES was a Biphasic current because the biphasic waveform rapid change in stimulus polarity and it appropiated reducing skin irritation and increased comfortability of patient (17). Ankle Foot Orthosis (AFO) could improve subtalar joint motion, like wise provided the stability anterior-posterior and medial-lateral. AFO has beneficial effects in term of improving functional mobility, gait quality and decreasing fall rates in these subjects (5,18). Ankle kinematic was success full increased dorsiflexion at initial foot contact and increased peak ankle dorsiflexion during standing and swing phase with AFO (19). Therapeutic exercise is a systematic and planned performance intended body. Movement, posture, or physical activity providing patients/clients with the means to fix or preventing impairment, repairing, restoring or improving physical function, prevent or reduce health-

related risk factors, optimize your health status, fitness, or overall sense of wellbeing (20). The mechanisms

underlying of the longer-induced stretch in ROM include biomechanical and neural changes in the contractile and noncontractile elements of the muscle-tendon unit these changes are thought to be the result of increased muscle extensibility and length or decreased muscle rigidity (passive muscle-tendon tension) (21). The weakness of this study was the outcomes not yet specific for the condition of foot drop and the advantages of this study are that 3 collaborative treatments such as electrical stimulation, exercise and orthoses. This study could be a reference for clinicians or physiotherapist to manage patients with drop foot. As well can develop the research by involving some patients and generalized result.

Conclusion

A strategy treatments of physiotherapy as Functional Electrical Stimulation (FES), exercise, and Ankle Foot Orthoses (AFO) were useful for patients with foot drop caused by nerve damage after a traffic accident. Notably there were increasing in muscle strength and functional activity of patient.

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