

Stroke Rehabilitation - Facilitation of Dorsiflexion in Gait using Theraband and Functional Electrical Stimulation (F.E.S): A Case Study

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ABSTRACT

Stroke is most common cause of disability impermanence in developing Countries; as stated by W.H.O. Every year approximately 1.8 million people suffering from stroke, which is the second most common cause of death after Coronary Artery Disease (C.A.D). Stroke is a dominant cause of deep-rooted disability which includes impairment of motor, Sensory or Cognitive function deficits.

Partial loss of muscle function can be functioned in a controlled manner by functional electrical stimulation restore or abet the fictional movement disorientation after stroke.

Hence, in this case study we have included gait training with TheraBand and functional electrical stimulation (F.E.S) to improve dorsiflexion in stance phase and correct Hyperextension of the knee in functional gait pattern.

Case presentation: The subject of this study was a 52-year-old male with no previous history of cerebrovascular disease, he was far from the medical emergency hospital took 4hr to reach nearby center. Medical evaluation indicated Cerebrovascular accident in 2013 left hemiplegia, MRI brain shows chronic lacunar infarct right thalamic and corona radiata.

Spasticity: M.A.S scale grade: 2 in upper limb spastic thumb in palm deformity spastic muscles: FPL, adductor pollicis, thenar muscles. Lower limb hammer toe, equinus (foot), Genu recurvatum (knee joint). The therapy was conducted for 4-6 weeks 4 sessions in a week each session included 10 min of treadmill walking with TheraBand along with F.E.S, 10 min of waking on the cushion TheraBand along with F.E.S, 10 min of stretching of tendinoachills, hipflexor and 10 min wobble board balance training 10 min strengthening quadriceps muscles and dorsiflexor strengthening. Therapy was conducted at Institute of Neurosciences, Kolkata. In Department of Neurorehabilitation and it result in significant reduction in hyperextension and complete recovery in dorsiflexion in stance phase.

Improved Candance as well.

Conclusion: Thera- band with Functional Electrical Stimulation improved gait pattern in stroke patient can be used for speed recovery.

Keywords: Thera-band, Functional Electrical Stimulation (F.E.S), Stroke.

INTRODUCTION

Stroke is most common cause of disability impermanence in developing countries; as stated by W.H.O¹. Every year approximately 1.8 million people suffering from stroke, which is the second most common cause of death after Coronary Artery Disease (C.A.D).²Stroke is a dominant cause of deep-rooted disability

which includes impairment of motor, Sensory or Cognitive function deficits.

Partial loss of muscle function can be functioned in a controlled manner by functional electrical stimulation restore or abet the fictional movement disorientation after stroke³.

It is a high achieving task to physically assist dorsiflexion in a gait cycle

especially it is impossible to do it in the swing phase Henceforth there are vivid techniques to solve dropping of the foot during Swing Phase of Gait⁴. One of the techniques is resistance band training elastic-assistance gait training in stroke patients. Usage of F.E.S combination of fast treadmill training stimulates the ankle muscles in patients of post stroke⁵. Decreased knee flexion^{6,7}; exaggerated hip circumduction and hip hiking during swing phase are the customary dysfunction in people with stroke⁸. Physical assistance during gait training is mandatory to properly line-up the trunk and guide the lower extremity through normal gait course, There are devices like Hip Flexion orthosis⁹, Elastic band orthosis, tubing assistive device for walking, AFO tubes to correct ankle dorsiflexion^{10,11,12} flexion contracture of the hip and knee either in weight bearing or non- weight bearing positions, Gait training with Thera-Band has increase the mobility, speed, balance and reduced pain decreased hyperextension^{13,14,15} of the knee combination of F.E.S and Thera-band have showed significant results in gait correction and reducing hyperextension of the knee in this study.

CASE PRESENTATION

The subject of this study was a 52-year-old male with no previous history of cerebrovascular disease, he was far from the medical emergency hospital took 4hr to reach nearby center. Medical evaluation indicated Cerebrovascular accident in 2013 left hemiplegia; MRI brain shows chronic lacunar infarct right thalamic and corona radiata. Spasticity: M.A.S scale grade: 2 in upper limb spastic thumb in palm deformity spastic muscles: FPL, adductor pollicis, thenar muscles. Lower limb hammer toe, equinus (foot), Genu recurvatum (knee joint).

TREATMENT: The therapy was conducted for 4-6 weeks 4 sessions in a week each session included 10 min of treadmill walking with TheraBand along with F.E.S, 10 min of waking on the cushion TheraBand along with F.E.S, 10 min of stretching of tendinoachilles, hip flexor and 10 min wobble board balance training 10 min strengthening quadriceps muscles and dorsiflexor strengthening. Therapy was conducted at Institute of Neurosciences, Kolkata. In Department of Neurorehabilitation and it result in significant reduction in hyperextension and complete recovery in dorsiflexion in stance phase. Improved Candance as well.



FIGURE 1

FIGURE 2

STEP 1: Wrap around the big toe red Thera-Band resistive band double the pull of

the resistive band towards eversion by wrapping the band twice around the lateral

border of the foot. Cross the band over the top of the ankle. Figure 2.

STEP 2: bring the band up around the back of the lower leg, bring the ends of the band around the back of the knee and in front of the thigh. F.E.S is placed on the tibialis anterior motor points.

Functionally helps in 1) swing phase of the gait ; 2)foot placement stance phase; 3) dorsiflexion and eversion. Henceforth this modification with facilitation of

dorsiflexion in swing phase normalizes the gait pattern in stroke patients

STEP 1. MEASURE CANDANCE AND WALKING SPEED AND ANGLE OF HYPEREXTENSION OF KNEE.

STEP 2. TRAIN THE GAIT WITH THERABAND ALONG WITH THE F.E.S.

STEP 3. COMPARE THE RESULTS BEFORE AND AFTER.

BEFORE THE TREATMENT:



AFTER THE TREATMENT:



DISCUSSION

Post-stroke individual signify improvement in speed in gait, and these improvements was speeded the process by delivering F.E.S and Thera-band resistive band at fast walking speed. As hypothesized combination of F.E.S and Thera-band resistive band produced good results in swing phase knee flexion compared to F.E.S with Thera-band Plantar flexor weakness decreases swing phase knee flexion therefore results in decreased forward propulsion in terminal stance⁶.By using the hypothesis approach we, demonstrated immediate improvement in post stroke gait impairment across multiple phases and multiple phases of the gait cycle⁷. This results support the need for future studies investigating the effectiveness and generalizability of combination of therapy as a gait rehabilitation intervention.

CONCLUSION

Thera-band with Functional Electrical Stimulation improved gait pattern in stroke patient can be used for speed recovery.

Limitation: The study should be conducted in larger sample size.

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How to cite this article: Gummadi Ashish, Mathew Paul. Stroke rehabilitation - facilitation of dorsiflexion in gait using theraband and functional electrical stimulation (F.E.S): a case study. Int J Health Sci Res. 2020; 10(12):130-133.
