Extensor Thrust in Stance Phase Part 2

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Case #1 – Thank you Sara!

- Here amazing patient is 66-years YOUNG and was diagnosed with acquired benign monomelic amyotrophy of RLE – early 2000's
  - http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0004-282X2000000500003
- Has done PT in the past but not since 2010
- Very active
- Prefers anterior shelf AFO – can do five mile hikes using that AFO

Right LE MMT

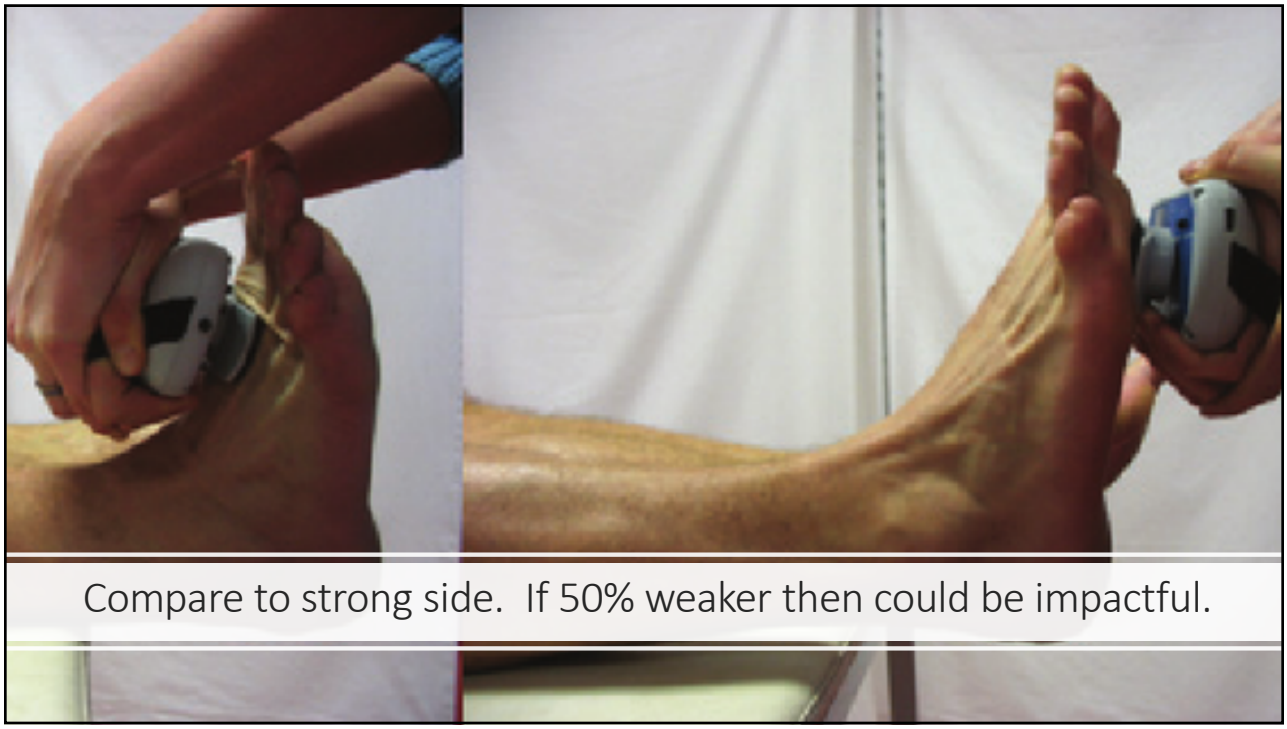
- Primarily have been working on control knee position in standing with static/dynamic movements against resistance in all directions, SLS, strengthening/stretching, pelvic control & stabilization, and balance activities.

Muscle(s)	MMT
Hip abd	3+/5
Hip ext	4/5
Knee flex/ext	4/5
Ankle DF	3+/5
PF	2/5
Eversion	2+/5
Inversion	3/5

General Thoughts

- I wholeheartedly agree with all of the great stance phase activities you are doing.
- You told me “she's able to control it when consciously thinking about it, but then reverts to the thrust at higher speeds.”
- The hard part is continuing to find more challenge.
- Find a part range of an activity that works and Increase speed of the muscle training (power). Add cognitive challenges during that activity to make it more automatic.

Strength of PF



Compare to strong side. If 50% weaker then could be impactful.

PlantarFlexion Strengthening

Closed Chain strengthening incorporated into wiping down parallel bars, reaching for the floor and wiping off mat tables.

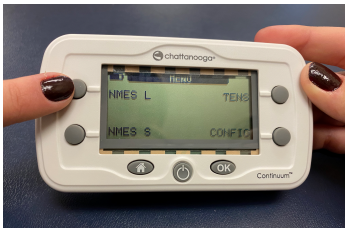
Check on her hip rotator strength –
she seems unstable in transverse plan

E-stim for the plantarflexors

2.

3.

1.



1. NMES L
2. Custom
3. Time
4. OK – time will start
5. Current – keep trigger on while increasing

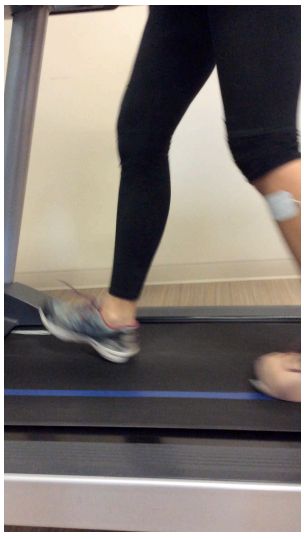
5.

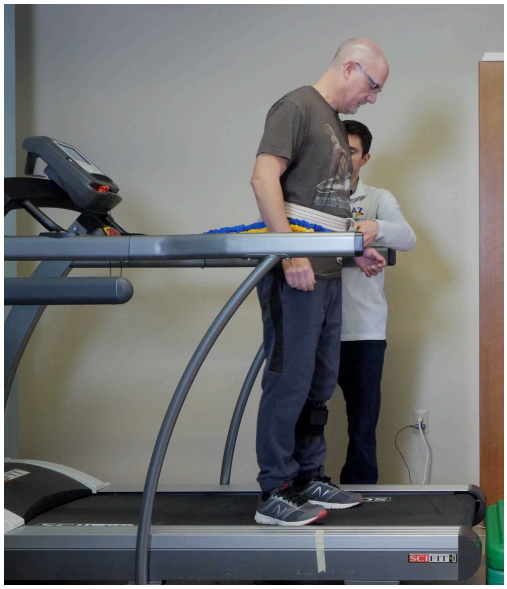
4.

ADD weight to the top of her foot (I have a one pound from a weighted vest cobranded to the top of her foot).

Stim PFs and DFs OR try one and the other and see which is better.

ADD resistance to the waist AND ADD dual tasking





Pushing and Walking – Activate proximal strength and get her to maintain flexion of her knee

Dalal KK, Joshua AM, Nayak A, Mithra P, Misri Z, Unnikrishnan B. Effectiveness of prowling with proprioceptive training on knee hyperextension among stroke subjects using videographic observation-a randomised controlled trial. Gait & posture. 2018 Mar 1;61:232-7.

- WALK in a prowl/bent knee position – WATCH for gluts
- ADD this to the pushing in walking

- Conclusion: Prowling along with proprioceptive training is effective in reducing knee hyperextension, increasing dorsiflexion range and improving spatio-temporal gait parameters.

Add theraband wrap to assess if it improves with more sensory input and joint compression.

Overall Thoughts

Look at the strength in her rotators of the hip

Work on her pushing you while walking and trying to increase activation of musculature throughout.

When strengthening PFs work in closed chain

Do lots of prep work to increase activation of lower extremity musculature before working on walking

Try a variety of different challenges and the two of you decide which is optimal and then add dual tasking to those activities.

Case #2 – Thank you Susan!

- Cognitive dysfunction so I am constantly having to provide verbal and tactile cueing.
- Having Falls
- Any knowledge of the strength in his gluts and knee extensors??

Note the alignment of his pelvis

- He has an extensor thrust at initial contact.
- Note how his trunk is flexed and he is not activating his gluts at all.
- This backward/posterior position of his pelvis puts the ground reaction force anterior to the knee which can result in an extensor thrust.
- Key information to test
  - Quad strength
  - Glut max and med strength
  - Assess how does he walk without the walker – hand held assist.

Retraining the Motion

Intervention Plan

- Glut strengthening and trying to get him to activate gluts BEFORE initial contact.
- Due to cognitive deficits keep it simple
  - EMPHASIZE sit to stand
    - Make sure to cue to squeeze gluts when in full standing.
    - Perform in stride with left leg back
    - Work on power in sit to stand (fast up and slow down) BUT keep an eye on the gluts and that he is FULLY squeezing when fully upright.
    - Do incline sit to stand and try and keep knees slightly bent (put leg behind) but squeeze gluts
    - Resisted sit to stand

PRIME his system and increase his sensory input by increasing challenge and glut activation **BEFORE** working on walking.

Overall Thoughts Case #2

- Work on glut strengthening with functional activities.
- Due to cognitive deficits keep activities functionally focused, challenging to increase sensory input and to force activation of gluts (ie. stairs) and lots of repetition.
- Do lots of sit to stands in a variety of ways to activate lower extremity muscles.
- THEN perform walking towards the end of the session and cue them to squeeze gluts before initial contact, stay upright and strut. Focus on quality.
  - Could rest leaning back against wall to increase concept of standing upright.

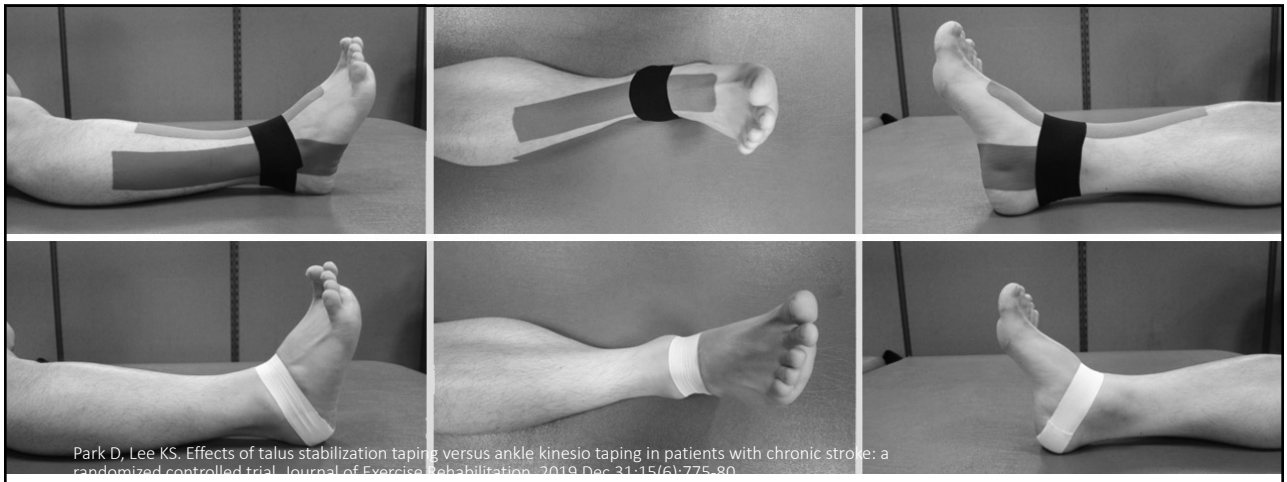
Case #3 – Thank you Michelle!

- 3/3/19 had right basal ganglia CVA
- Admitted to acute care hospital x3 days, transferred to ARU for 22 days, discharged home with home health PT/OT
- Started outpatient PT 4/17/19, discharged 10/17/19
- **OBJECTIVE**
  - **Range of Motion**
    - Left dorsiflexion to neutral with knee extended, 5 deg dorsiflexion with knee flexed; left hip extension lacks 5 deg from neutral
  - **Strength**
    - 5/5 left quad, unable to perform left unilateral heel raise, unable to perform isolated left hip flexion against gravity
  - **Functional Gait Assessment**
    - 4/17/19: 6/30
    - 10/17/19: 15/30 (used SPC to step over box)
  - **Timed Up and Go**
    - 4/17/19: 54 sec using LBQC and left AFO
    - 10/17/19: 11 sec with SPC and left AFO

Use mobilization belt to stretch ankle and then facilitate knee flexion in movement

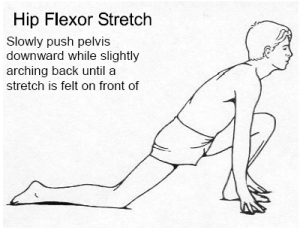
Park D, Cynn HS, Yi C, Choi WJ, Shim JH, Oh DW. Four-week training involving self-ankle mobilization with movement versus calf muscle stretching in patients with chronic stroke: a randomized controlled study. Topics in stroke rehabilitation. 2019 Nov 17:1-9.

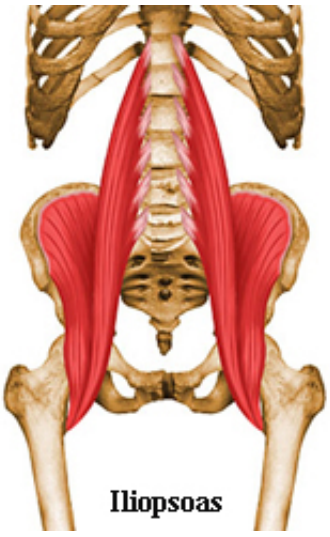
- This study shows that S-MWM (Self- mobilization with movement) training combined with conventional physiotherapy improved ankle DF-PROM, gait parameters, and fall risk in patients with chronic stroke.
- They used a non-elastic strap approximately 40 cm long and the strap was placed around the anterior aspect of the talus, positioned just posteroinferior to the medial and lateral malleoli of the affected ankle on the stool, and the back of the strap was placed around the medial region of the opposite foot.

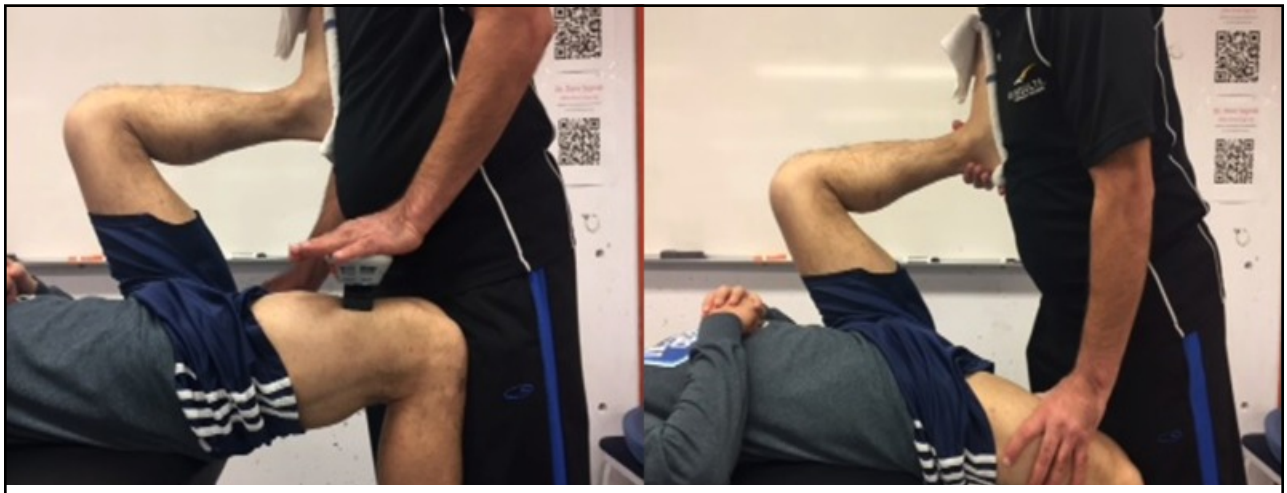


Park D, Lee KS. Effects of talus stabilization taping versus ankle kinesio taping in patients with chronic stroke: a randomized controlled trial. Journal of Exercise Rehabilitation. 2019 Dec 31;15(6):775-80.

- The results indicated that the TST (Talus stabilization taping) group demonstrated significant improvements in all of the measured parameters in comparison with baseline values while the KT (kinesiotaping) group demonstrated significant improvement only in the TUG test result.





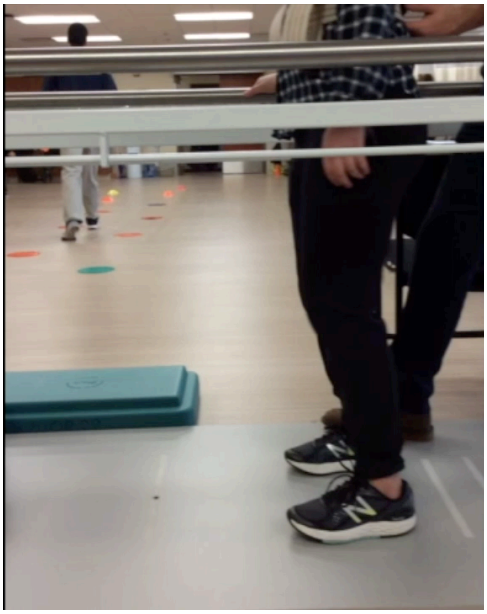


Hold-relax proprioceptive neuromuscular facilitation (HR-PNF) stretching technique used for stretching hip flexor muscles.

Aslan HI, Buddhadev HH, Suprak DN, San Juan JG. ACUTE EFFECTS OF TWO HIP FLEXOR STRETCHING TECHNIQUES ON KNEE JOINT POSITION SENSE AND BALANCE. International journal of sports physical therapy. 2018 Aug;13(5):846.

Go with high level challenge with you including jumping – even part task.

May need to provide more proximal stability first so for home program give abdominal and hip strengthening for a home program.



Functional activity – Part task

Overall Thoughts Case #3

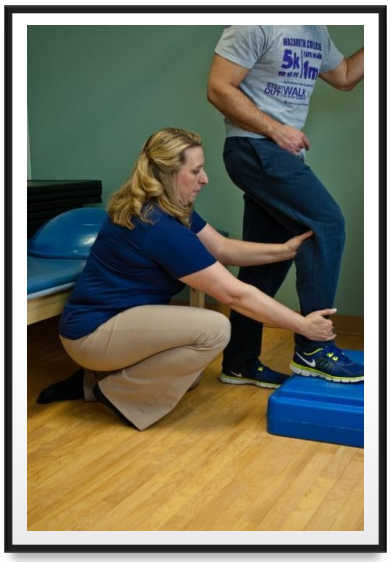
- A top priority is ankle PROM with knee extended. Need to get length to get strength.
- Prep every activity with stretching first – contract/relax would be optimal
- Work on glut strengthening with functional activities.
- Without the AFO you start to see an increase in spasticity- increased extensor presentation (utilizing quads for stability). Work on proximal strengthening.

OTHER Considerations

Quad Strength

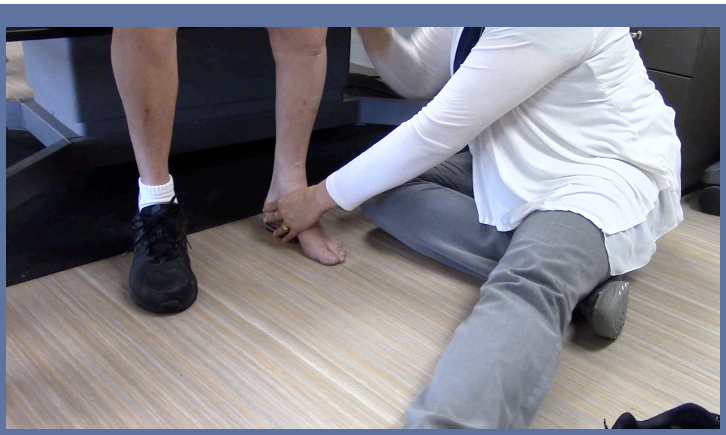
Assess strength and compare sides

- Focus on Power training of the quads
  - Sit to stand as fast as possible and stand to sit slowly for eccentric control
- Decreased power is directly related to diminished ability to perform ADLs, increased risk for falling and predictor of functional dependency

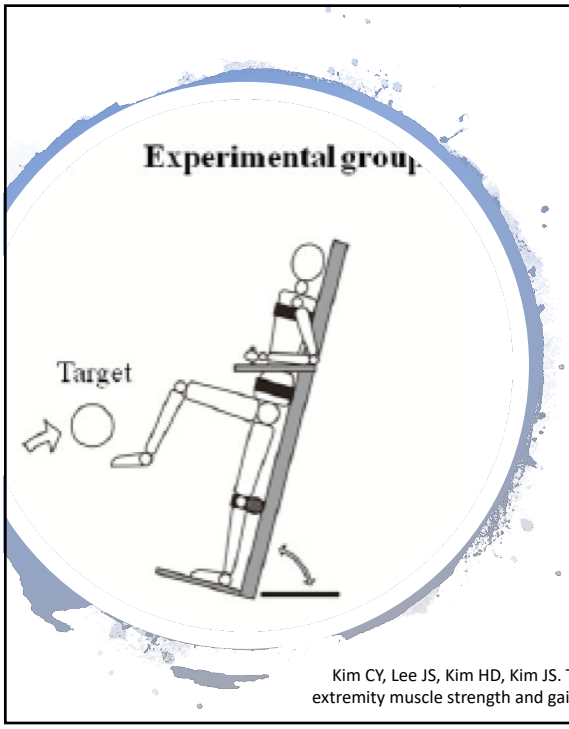


PROM of Ankle DF

Ankle Mobilizations



- Make sure to keep the foot flat by building up the heel wedge.
- Make sure they are not on the metatarsal heads.



The Tilt Table can allow ways to increase quad strength while providing quad strengthening and activation of PF.

- Passive stretch of ankles, trunk alignment, hip stretch, extensor activation with legs straight, abdominals
- Increased Weightbearing through impaired lower extremity

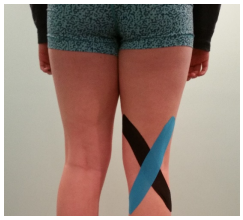
Kim CY, Lee JS, Kim HD, Kim JS. The effect of progressive task-oriented training on a supplementary tilt table on lower extremity muscle strength and gait recovery in patients with hemiplegic stroke. Gait & posture. 2015 Feb 28;41(2):425-30.

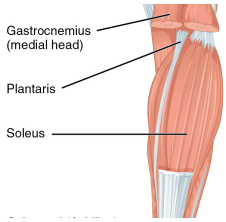
Spasticity of PF

Jumping hurdles

Motor Learning

Motor Planning Issue





- Motor planning issue (habit)– use a Swedish knee cage or taping to prevent the knee from extending back

AFOs that allow ankle joint motion and prevent hyperextension can support strengthening

- Research suggests AFOs did not decrease muscle activity and allowed eccentric activation. (McCain et al 2012)
- Supports the impact of weak PF on knee hyperextension
- Multiple studies have presented EMG data indicating no clear evidence that use of orthotic devices muscles activation or cause long term to detriment to muscle activity. (Cooper etal 2012)

Shout out to JFK rehabilitation therapists who showed me their orthotists design to trial different options/way to set an AFO.


QUESTIONS