

# Lumbar Decompression Surgery: Correction of foot drop

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# Talk Content

- History/clinical examination findings
- Discuss FES setups/clinical reasoning
- Video of walking with FES on and off
- Outcome measures
- Discussion

# Referral Information

(From MSK Physiotherapist)



- 39 yr male
- 3 x surgeries for L4/5 disc prolapse (2005, 2006, 2015)
- Reduced dorsiflexion strength with ongoing foot drop
- MRI – No current nerve root compression
- Ongoing pain at lumbo-sacral junction, aggravated by prolonged standing
- Extensive physiotherapy – foot drop unchanged

# Social History

- Father of 3 young children
- Works in bakery
- Walking
- Cycling
- Attending son's football training



# Past Medical History

- Long standing back pain
- 2 x micro-discectomies for L4/5 disc prolapse (2005, 2006) – Good recovery
- 2015 – Sudden onset of foot drop and sciatic back pain following an accident at work
  - MRI – Degenerative Lx changes and L4/5 recurrent disc prolapse with compression of L5 nerve root
  - Redo L4/5 micro-discectomy

# Subjective History

- Scuffs ~2 x day.
- Falls ~1 x week
- Foot up splint at work – helpful. No walking aid.
- Slow speed to avoid falling
- Max distance 500yds. Becoming more reliant on car.
- Difficulty on uneven surfaces and ↑slopes/stairs
- Lower back pain and cramps in the right leg (~every 10 days)

# Drug History

- Co-codamol PRN (~QDS)
- Nil else

# Patient Goals

- Reduce scuffs /trips/falls
- Improve safety of walking
- Improve ability to walk over grass at son's football training





# Clinical Examination

- Left NAD
- Significant findings right:

Movement	Active range (°)	Passive range (°)	Power (MRC)	Tone (MAS)
Hip flexion	80 (pain limiting)	N/T	4-	0
Hip abduction	20 (pain limiting)	N/T	4	0
Ankle dorsiflexion	-20 to -15	15 ( knee flexed) 5 (knee extended)	3	0
Ankle plantarflexion	From 20 to 30	FULL	4-	0
Eversion	10	10	4	0
Inversion	15	15	4-	0

# Observational Gait Analysis: FES Off

## Coronal plane

- Looking at ground
- Increased lateral trunk excursion
- Wide step width
- External progression of foot
- Inversion through swing
- IC heel, progressing to lateral border

## Sagittal plane

- Delayed heel rise with reduced push off
- Reduced dorsiflexion through swing
- IC (just) heel, progressing onto lateral border
- Forward trunk lean

# FES Setup

- FES in Test → co-contraction of:
  - posterior tibial muscles
  - ankle evertors
  - toes extensors (except great toe)
- Increased rising ramp 0.5 sec
- Electrode repositioning
- Co-contraction coincided with stimulation period.
- FES in Walking → plantar flexion during swing.  
Forefoot Initial contact. Only 2 steps managed

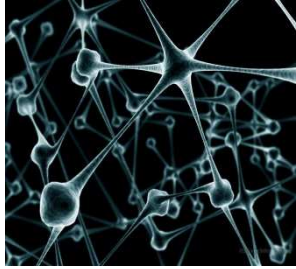
# FES Setup Continued:



- ? Depolarising tibial nerve.
  - ? Reduce depth of stimulation to avoid stimulating posterior tibials
  - Tried:      Active:      proximal tibialis anterior  
                  Passive:      distal tibialis anterior
- No gap between electrodes**

→ flickers of tibialis anterior without co-contraction of posterior tibials

→ Yielded  $<5^\circ$  DF movement – not enough to be helpful movement in walking



## FES Setup Cont:



- Exercise Mode
  - Improve efficiency of muscle contraction
  - Strengthen neural connections

# FES Setup Cont:

- Exercise mode
- Current 90mA
- symmetric
- 40Hz
- ramps 2 sec, on/off 5 sec
- duration 30 mins 2 x day
- 6 weeks



# 6 Week Review

- No falls, 1 x trip due to catching big toe (whilst holding baby)
- Using stimulator - 30 mins, 1 x day
- Noticed increased Dorsiflexion with stimulator **on and off.**
- Now getting extension of big toe with FES on
- No leg cramps except 1 episode of severe cramp during FES Painful for ~ 36 hours following

# 6 Week Review Cont:

- FES in TEST:  
Good dorsiflexion and eversion. No co-contraction of plantar flexors.  
(No foot movement with electrodes in any other position)
- FES in walking:  
Subtle increase in dorsiflexion and some correction of inversion ( no video)



# FES (Walking Setup)

- Settings:

Current	90mA
RR	250
Ext	200
FR	150
Time out	2500
Waveform	Symmetric

- Advised to continue in exercise mode 2 x 15 mins/day
- Commence use in walking - build up gradually and monitor carefully
- Plan – r/v 3 weeks



## 3 Week Review

- Very positive.
- Using FES ~ 2 x week at sons football training
- Particularly helpful on uneven ground
- No trips/scuffs with FES on (~6xday FES off)
- Corrects inversion
- Improved balance
- Feels safer and more confident
- Less concentration required. Less looking at ground
- 500m FES off, 2 miles FES on
- No cramps/falls since commencing FES
- 1 x episode sciatica ? Due to increased amount of walking

## 3 Week Review Cont:

- FES on TEST – Good DF with eversion
- Reduced RR to 100 (due to walking speed)

Videos

# Observational Gait Analysis: FES On

## Coronal plane

- Reduced trunk excursion and forward lean,
- Reduced step width
- Reduced forward progression of foot
- Looking up, appears more relaxed
- More arm swing
- Reduced inversion

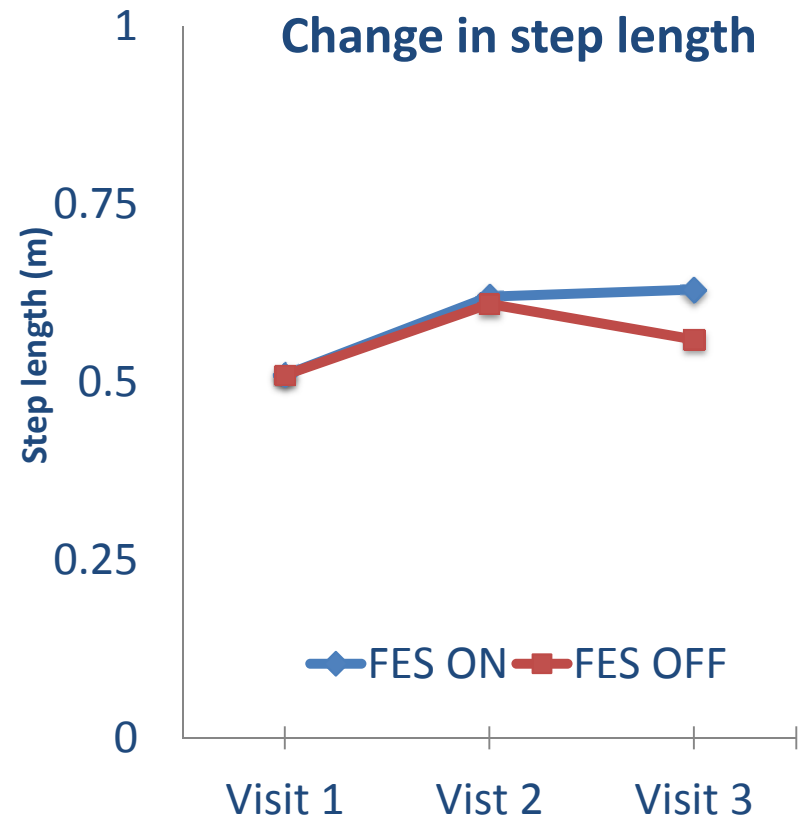
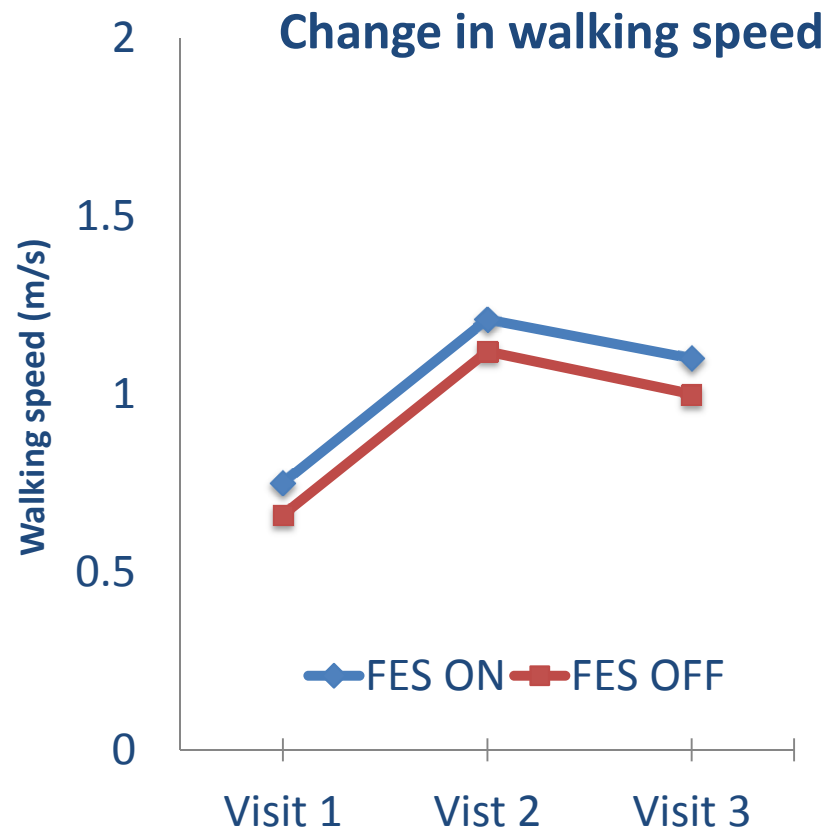
## Sagittal Plane

- Increased dorsiflexion
- ? Earlier heel rise and increased push off
- Reduced forward trunk lean

# 3 Month Review

- Financial pressures – had taken second job – Using FES had become impractical
- Keen to continue FES for days when not at work
- On TEST, Small amount of dorsiflexion
- Less noticeable difference with FES on Vs off during observational analysis of gait
- Plan: Continue using FES . R/V 6 months

# Walking Speed and Step Length



# Discussion Points



- Cause of foot drop/ Mechanisms for improvement
- Plantar flexion response
- Electrode positioning to minimise tissue area reached.
- Subtle observational changes = significant benefit for patient
- Barriers to using FES