

***Alternatives to KAFOs & Crutches in L4
Myelomeningocele:
Thinking (Anatomically) Outside the Box***

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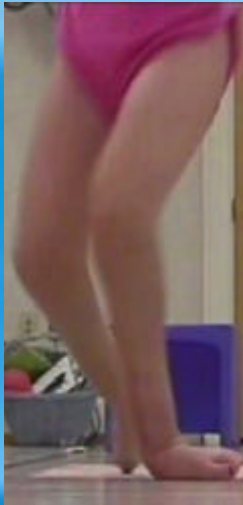
Background

Characteristic gait kinematics in persons with lumbosacral myelomeningocele. Gutierrez et al. *Gait Posture* 2003;18:170-177.

The effect of ankle-foot orthoses on the ankle and knee in persons with myelomeningocele: an evaluation using three-dimensional gait analysis. Thomson, Öunpuu et al. *J Pediatr Orthop* 1999;19(1):27-33.

An examination of the knee function during gait in children with myelomeningocele. Öunpuu et al. *J Pediatr Orthop* 2000;20(5):629-635.

The gait of patients with lower lumbar level myelomeningocele: how to abduct without abductors. Eames, Baker et al. *Gait Posture* 1999;10:76-77.



Patient History

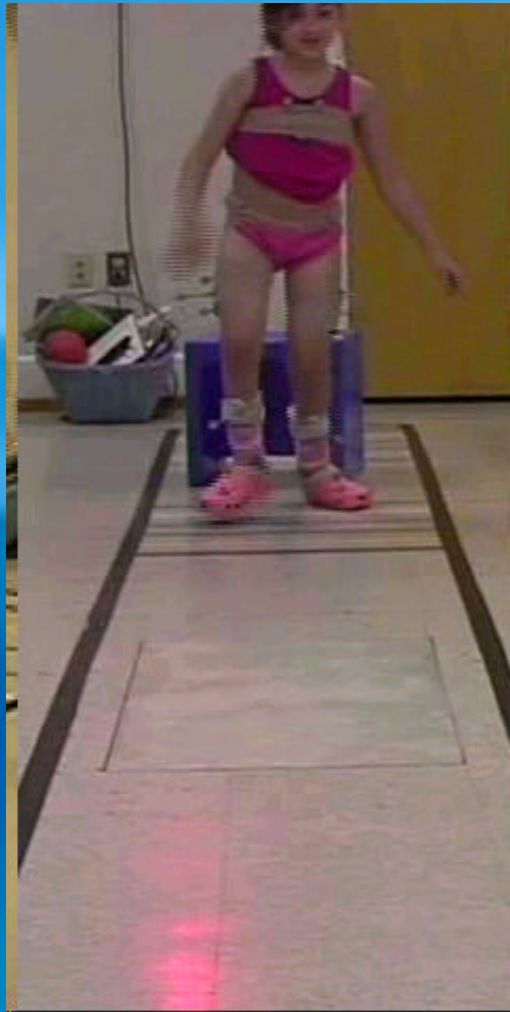


- 10 yo female with L4 myelomeningocele
- s/p 12 surgeries; T5-L4 spinal fusion
- Recurrent left tibial external rotation
- Last surgery 5 months prior to CGA (bilateral tibial derotation osteotomies)

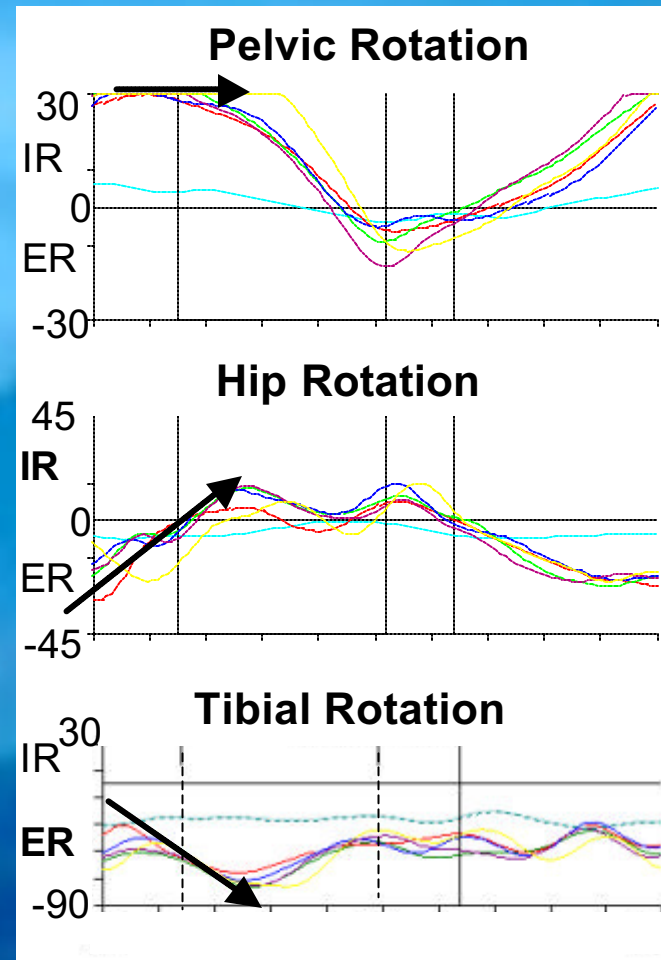
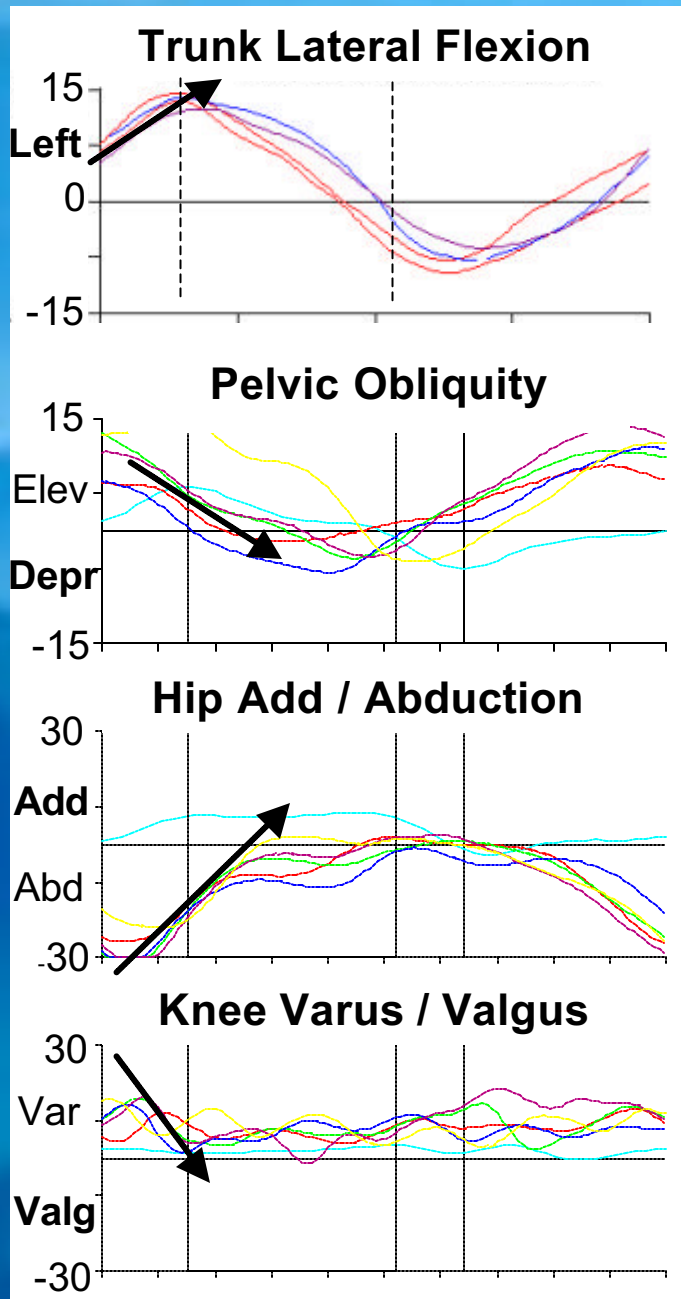
Clinical Data



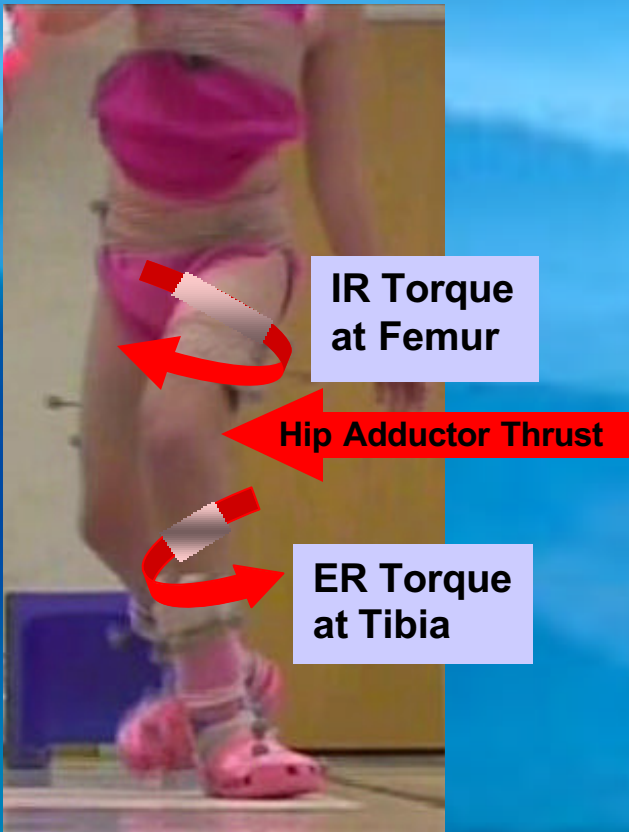
- **Level 9 ambulator on G-FAQ**
- **No assistive device, solid AFOs**
- **NO pain during gait**
- **Knee ligamentous laxity**
- **Excessive axial tibial external rotation**
- **Shortened iliotibial band L>R**
- **Weak hip extensors/abductors L>R**



Gait Data: With AFOs



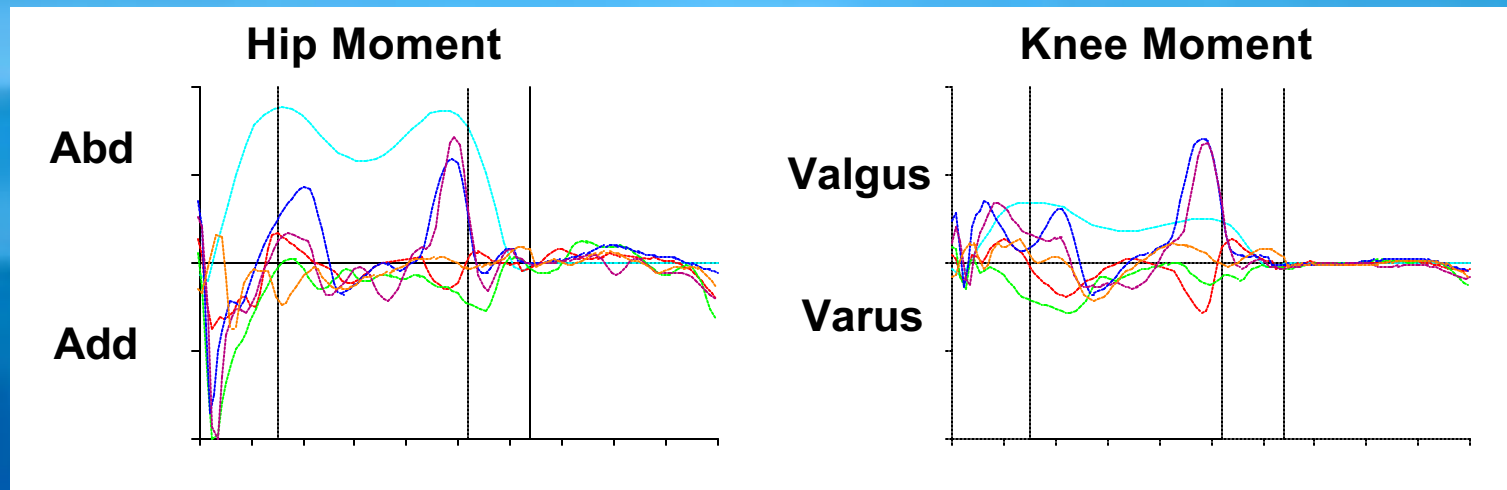
Gait Data: With AFOs



- Rapid trunk lean left
- Rapid pelvic depression
- Rapid hip IR + adduction
- Rapid knee ER + valgus

**Etiology for rotatory
knee instability???**

Gait Data: With AFOs



Frontal Plane Kinetics

Rationale for Treatment Decisions

Rotatory instability at knee

Related to

- **Weak hip abductors + extensors**
- **Shortened iliotibial band**
- **Impaired ligamentous support at knee?**
- **Absent popliteus, gastrocnemius f(x)**
- **Poor distal foot position**
- **Excessive forces during gait**

***Abnormal lower extremity kinetic chain
biomechanics***

Treatment Recommendations

- **Functional MRI - knees**
- **External oblique transfer to GT**
 - **Augment hip abduction**
- **Release / lengthen iliotibial band**
- **Transfer ITB distally to popliteus origin to check excessive axial tibial ER**
- **Repair of disrupted / absent knee ligaments**

KAFOs or crutches not acceptable !

Alternatives to KAFOs & Crutches in L4 Myelomeningocele: Thinking (Anatomically) Outside the Box

- **Knee dysfunction may have *causes* other than “tibial torsion”**
- **Specific clinical exam measures crucial (e.g. axial tibial rotation)**
- **Anatomically accurate kinematic models *critical* for clinical problem- solving**

