

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

**Kimberly Wesdock, PT, MS, PCS**

**Susan Blair, MSPT**

**George Masiello, BSEET**

**Chester Sharps, MD**

**Children's Hospital – Richmond, Virginia**

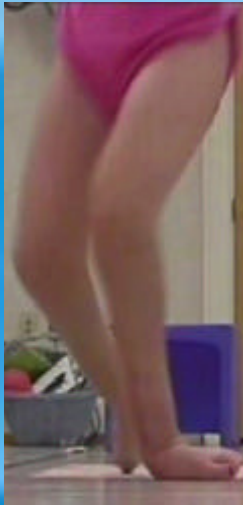
# ***Background***

**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***

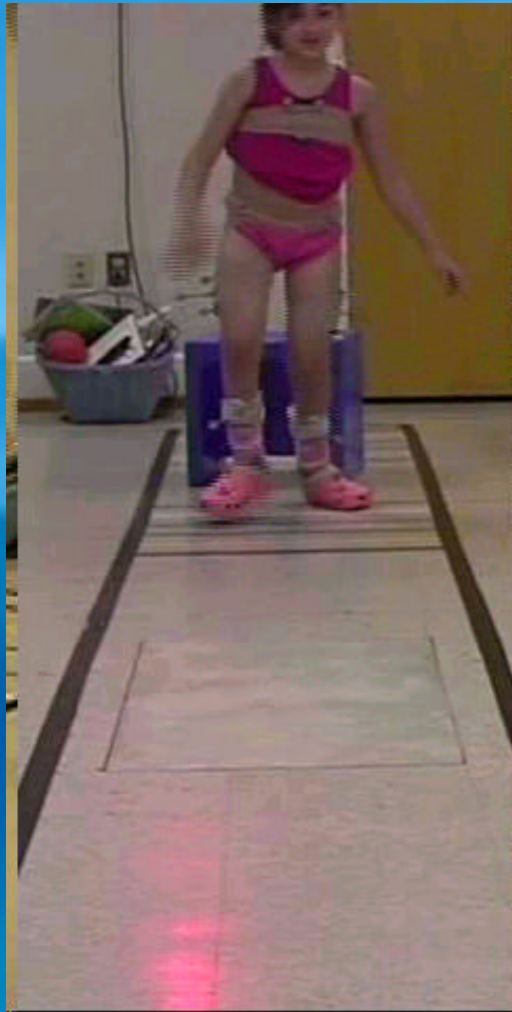


- 10 yo female with L4 myelomeningocele
- s/p 12 surgeries; T5-L4 spinal fusion
- Recurrent left tibial external rotation
- Last surgery 5 months prior to CGA (bilateral tibial derotation osteotomies)

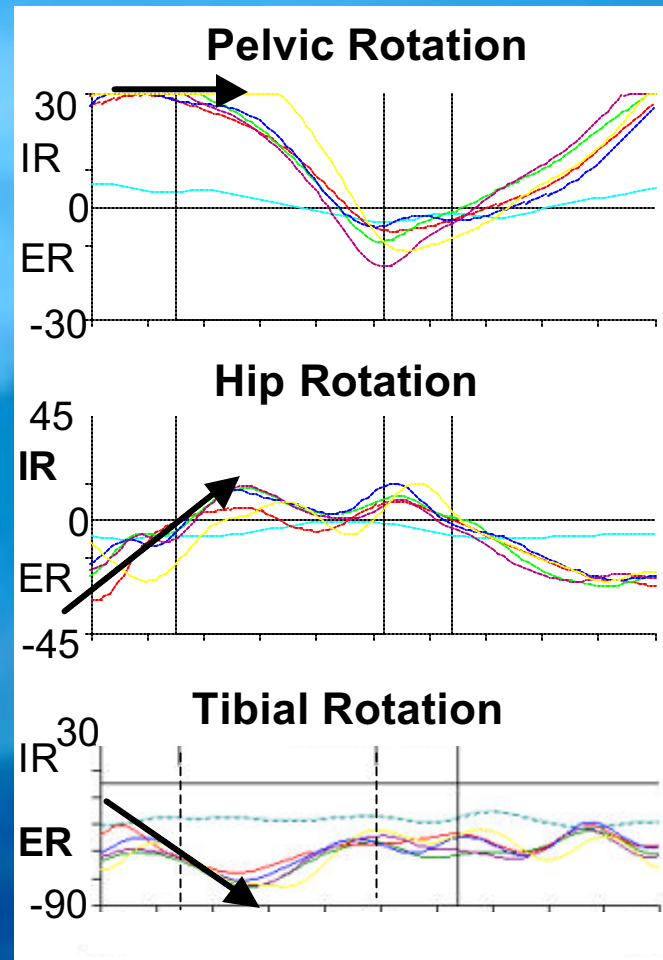
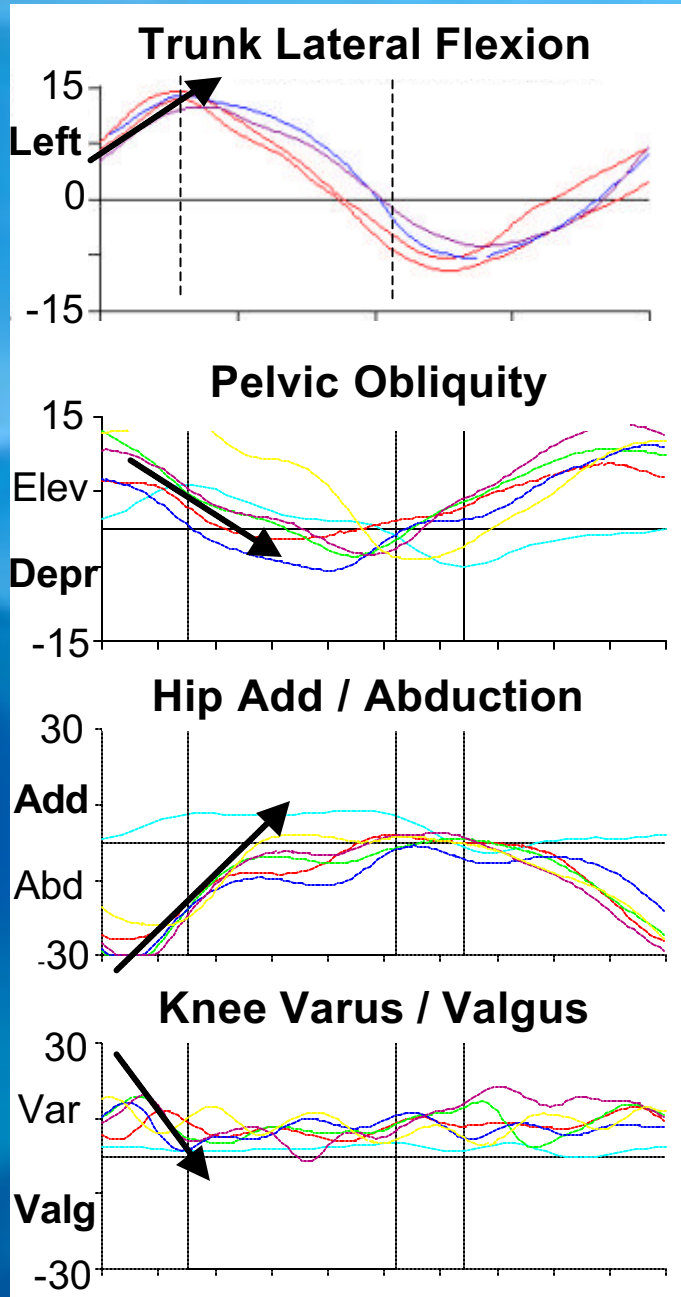
# ***Clinical Data***



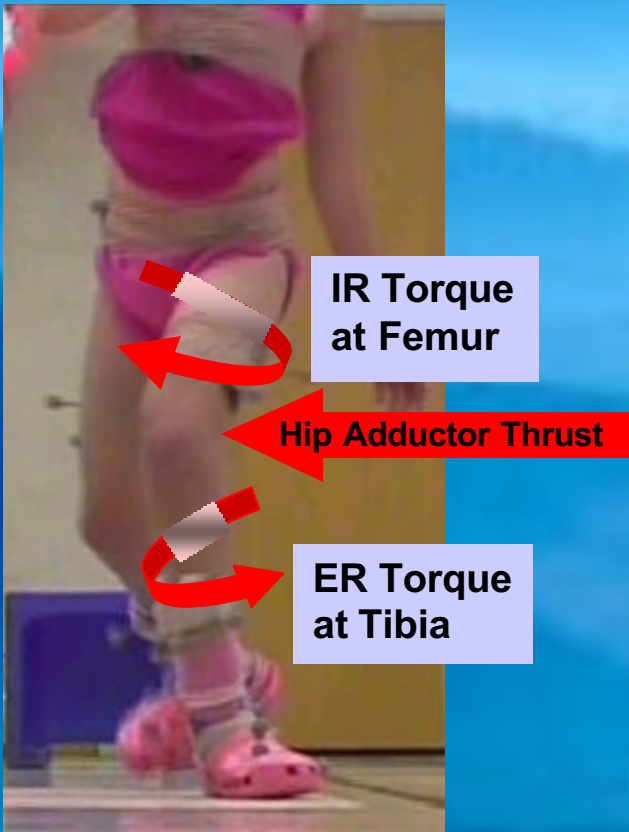
- **Level 9 ambulator on G-FAQ**
- **No assistive device, solid AFOs**
- **NO pain during gait**
- **Knee ligamentous laxity**
- **Excessive axial tibial external rotation**
- **Shortened iliotibial band L>R**
- **Weak hip extensors/abductors L>R**



# Gait Data: With AFOs



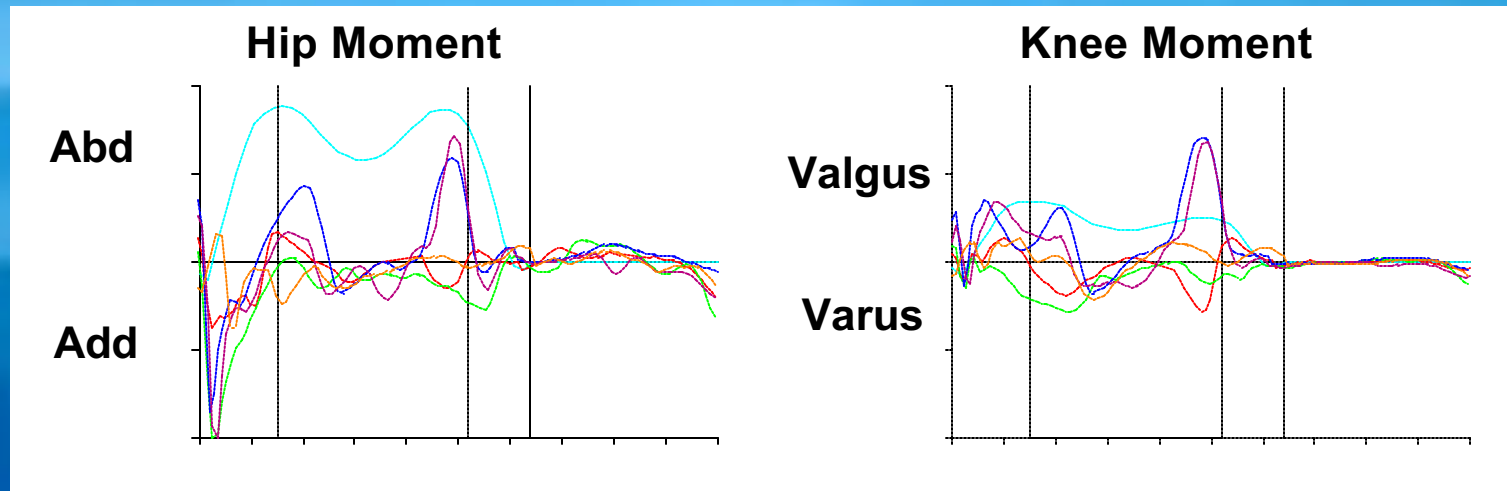
# ***Gait Data: With AFOs***



- 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**

