

Coronal Plane: Typical Deviations & Possible Causes

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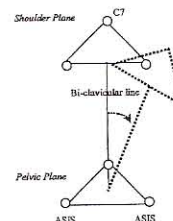
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Upper Body

Angle definition

- The lateral (side to side) inclination of the long axis of the torso
- As viewed from the front of the subject, perpendicular to the plane formed by the long axis of the torso and the bi-clavicular line



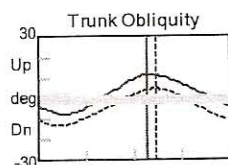
Upper Body: Increased Excursion of Motion

• Primary Causes

- Hip abductor insufficiency*
- Used to assist with lateral weight transfer onto the stance limb

• Secondary Causes

- Motion required with assistive devices (crutches)



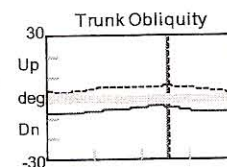
Upper Body: Fixed Lateral Lean

• Primary Causes

- Scoliosis*
- Lateral trunk musculature tightness

• Secondary Causes

- Asymmetrical arm flexion when using a walker
- Leg length discrepancy

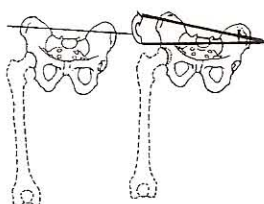


Pelvis

Angle Definition

-The angle of inclination of the right and left anterior superior iliac spine (ASIS) in relation to the horizontal

-As viewed from the front of and in the pelvis plane (formed by the right and left ASIS and point on line connecting the right and left posterior superior iliac spines (PSIS) markers)



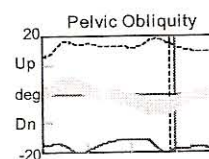
Pelvis: Fixed Obliquity

• Primary Causes

- Adductor tightness
- Scoliosis
- Lateral trunk tightness/spasticity

• Secondary Causes

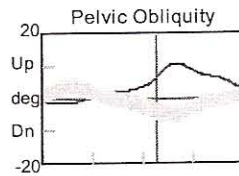
- Leg length discrepancy* (actual/functional)



Pelvis: Increased Upward Position in Swing

- **Secondary Causes**

- Hiking pattern to assist with clearance*

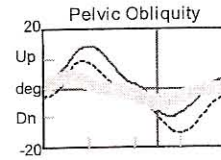


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Pelvis: Increased Excursion of Motion

- **Primary Cause**

- Hip abductor weakness*

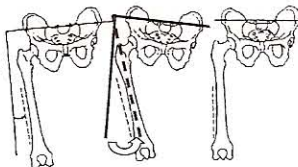


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Hip

Angle definition

- The relative angle between long axis of the thigh and a perpendicular to the pelvic plane
- As viewed from the front of and in the pelvic plane



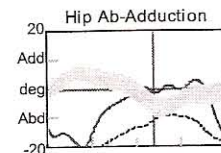
Hip: Increased Abduction in Stance

- **Primary Causes**

- Abductor tightness
- Adductor weakness/insufficiency (after obturator neurectomy)

- **Secondary Causes**

- External hip rotation
- Pelvic obliquity (down side)
- Poor Balance*
- Counterbalance for trunk lateral lean



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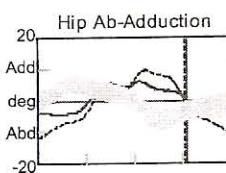
Hip: Increased Adduction in Stance

- **Primary Causes**

- Adductor tightness/spasticity
- Abductor weakness*

- **Secondary Causes**

- Internal hip rotation and crouch
- Pelvic obliquity (up side)

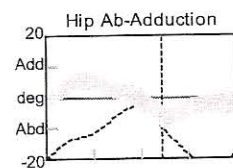


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Hip: Increased Abduction in Swing

- **Secondary Causes**

- Pelvic drop (depression) in swing
- Circumduction to aid in clearance*
- Poor balance



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Ankle/Foot: Pes Planus

(forefoot abduction + midfoot collapse + hindfoot valgus)

- Ankle plantar flexor tightness
- Peroneal spasticity/tightness
- Posterior tibialis weakness
- “Shortened” lateral column



Ankle/Foot: Hindfoot Varus

- Posterior tibialis tightness/spasticity
- Plantar flexed first ray
- Achilles tendon tightness
- Increased plantar flexion
- Internally rotated foot progression



Ankle/Foot: Forefoot Supination

- Anterior tibialis “overpull” (imbalance between anterior tibialis versus toe extensors)
- Posterior tibialis spasticity
- Abnormal bony midfoot coalition



Ankle/Foot: Forefoot Adduction

- Metatarsus Adductus
- Abductor hallucis tightness
- Tight plantar fascia
- Posterior tibialis spasticity/tightness



Misconceptions in Interpretation

Visual Versus Kinematic (Apparent Inconsistencies)

Circumduction

- “Circumduction” has been conventionally thought of as a combination of (Perry J, Slack, 1992):
pelvic rotation + pelvic hiking + hip abduction
- However joint kinematics will tell you exactly what is happening in terms of hip motion during gait.

Pelvic Hiking in Swing



- Pelvic hiking in swing often has the visual impression of "circumduction" (specifically of hip abduction)
- However, kinematics will show that the hip often remains in neutral

Pelvic Drop in Swing



- When there is a pelvic drop during swing there is not a visual impression of "circumduction" (specifically hip abduction) as the thigh segment is vertical in swing
- However, when the pelvis drops in swing there is an associated abduction (noted on kinematics) of the swing hip to clear the stance limb.