Common gait deviations in the patient with hemiplegia

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Things to consider

• How did the patient walk before?
• Any previous orthopedic conditions?
• House set up
• Where can they practice walking outside of therapy?
• Caregiver’s ability (and/or willingness) to help patient
Initial Contact

• Problems
  – Ankle
    • Contacts with forefoot/flat foot
      – Is the step too short?
      – Is the gastroc tight?
        » Stretch in sitting
        » Stretch in long sit
        » Stretch in standing
        » Stretch in supine
Initial Contact

• Problems
  – Ankle
    • Contacts with the forefoot/flat foot
      – Are the dorsiflexors weak?
        » Seated exercises
        » Standing exercises
        » Supine exercises
        » Taping
        » Bracing
Initial Contact
Initial Contact

• Problems
  – Knee
    • Flexed at contact
      – Look at the ankle first
      – Tone-inability to extend knee with hip flexion at terminal swing
      – Are the hamstrings tight?
        » Supine stretch
        » Long sit stretch
        » Sitting stretch
        » Standing stretch
Initial Contact

• Problems
  – Pelvis
    • Rotation
      – Inadequate advancing of the leg
        » Manual cues for orientation of pelvis
        » Muscular tightness
Initial Contact

• Problems
  – Trunk
    • Flexed
      – Tight hip flexors
      – May be due to increased plantarflexion
    • Rotated
      – May be rotated forward to advance the leg
Loading response

• Ankle
  – Foot slap
    • Weak dorsiflexors
      – Closed chain dorsiflexion
Loading Response

• Knee
  – Hyperextension
    • May be due to short step
    • Muscular weakness
      – Modified stride squats
      – Standing knee extension against theraband
      – Affected leg on step, step up with sound side
Midstance

• Problems
  – Ankle
    • Increased inversion
      – Increased tone
        » Use of slanted surface attached to sole
      – Weakness in peroneals or dorsiflexors
Midstance

• Knee
  – Hyperextension
    • Weak quadriceps
    • Weak hip extensors
    • Increased plantarflexor tone
Midstance

- Hip
  - Decreased hip extension
    - Hip flexor tightness
Midstance

• Midstance exercises (Transition to and transition from)
  – Weight shift to affected side
    • With regular stance and stride stance
  – Weight shift to affected side followed by slight unweighting of sound side
  – Weight shift to affected side followed by step with sound side
Terminal Stance

• Ankle
  – Heel does not rise
    • Decreased toe extension
    • Weak plantarflexors
    • Ankle, foot, or toe pain
    • Small step with contralateral leg
    • Decreased knee extension
Terminal Stance

• Knee
  – Decreased extension of the knee
    • PPT
    • Decreased hip extension
Terminal Stance

• Hip
  – Decreased extension of the hip
Preswing

• Ankle
  – Heel does not rise
    • Decreased extension of the toes
    • Too short of step on the contralateral side
Preswing

• Knee
  – Decreased knee flexion
    • Tone
    • No heel off
    • Decreased step size
Preswing

- Hip
  - External rotation
    - Limb advancement
Preswing

- Pelvis
  - Hiking to advance limb
  - Protracted
Initial Swing

• Ankle
  – Not clearing the toes
    • Is it due to decreased hip flexion, knee flexion, or decreased dorsiflexion
    • Increased plantarflexion
      – Tightness
      – Tone
Initial swing

• Knee
  – Decreased knee flexion
    • Extensor tone
    • Inability to rapidly flex knee
    • Can be due to decreased step length/lack of momentum
Initial Swing

- Hip
  - Adduction
    - Increased tone
  - External Rotation
    - Advancing leg this way due to weak hip flexors
Initial Swing

• Hip
  – Decreased flexion
    • Weak hip flexors
    • Impaired ability to flex hip rapidly
Tools to help slide the feet
Midswing

• Ankle
  – May not clear ankle due to decreased hip flexion and knee flexion
    • Open chain exercises
Midswing

• Knee/Hip
  – Inadequate hip flexion/knee extension
    • Motor control problem
      – Resistance applied to increase proprioception
Terminal Swing

• Ankle
  – Increased inversion
    • Weak dorsiflexion
    • Increased tone
  – Increased plantarflexion
    • Weak dorsiflexion
    • Increased tone in plantarflexors
Terminal Swing

• Knee
  – Decreased extension
    • Increased tone
    • Inability to extend the knee with the hip flexed
    • Weak quadriceps
Terminal Swing

• Hip
  – Decreased hip flexion
    • Weak hip flexors
    • Motor control issues
Research

• Treadmill Training
• BWSTT
  – Increases gait speed and endurance but not necessarily independence
  
Research

• Overground gait training
  – Not enough evidence to determine if it improves function
  – Short term and small effects on gait distance and endurance

• States RA, Pappas E, Salem Y. Overground physical therapy gait training for chronic stroke patients with mobility deficits. Cochrane Database of Systematic Reviews 2009, Issue 3.
Research

- Circuit training
  - Decreased length of stay
  - Increased gait speed and confidence in balance
  - A majority of the subjects were already walking unassisted for short distances

Research

• Aerobic Exercise
  – Aerobic exercise can increase gait speed, endurance and independence in walking
  – All subjects had some ability to walk

• National Clinical Guideline Centre (UK). Stroke Rehabilitation: Long Term Rehabilitation After Stroke [Internet]. London: Royal College of Physicians (UK); 2013 May 23. (NICE Clinical Guidelines, No. 162.) 13, Movement.
Turns

- Start with patient turning toward affected side
- Step across with sound foot
- Pivot affected heel inward
- Keep the circle small
- Can use tape on the floor in the shape of a circle as a guide
• Unaffected leg steps forward and across
Affected foot pivots by sliding heel inward
Affected foot pivots by sliding heel inward
Pt has turned 90 degrees and can now take a step.