Common gait deviations in the patient with hemiplegia

Kim Carter, PT, NCS

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

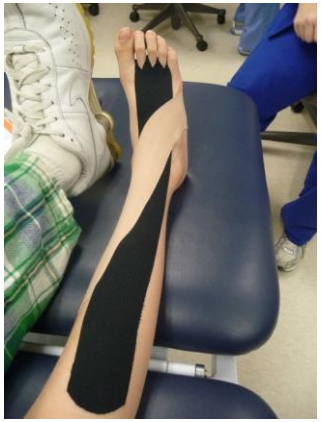
Initial Contact

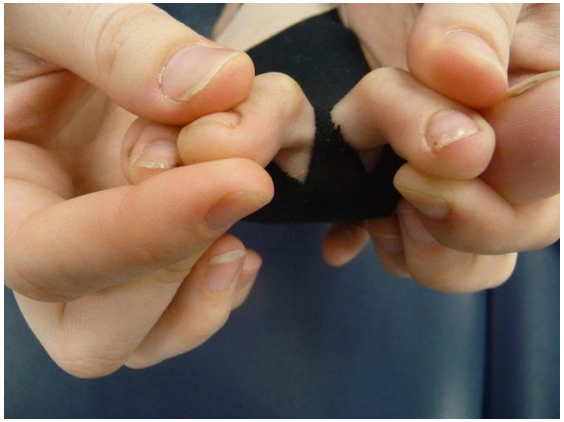
- Problems
  - Ankle
    - Contacts with forefoot/flat foot
      - Is the step too short?
      - Is the gastroc tight?
        - » Stretch in sitting
        - » Stretch in long sit
        - » Stretch in standing
        - » Stretch in supine

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 transtion 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

  - Mehrholz J, Pohl M, Elsner B. Treadmill training and body weight support for walking after stroke. Cochrane Database of Systematic Reviews 2014, Issue 1.

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

- English C, Hillier SL. Circuit class therapy for improving mobility after stroke. Cochrane Database of Systematic Reviews 2010, Issue 7.

Research

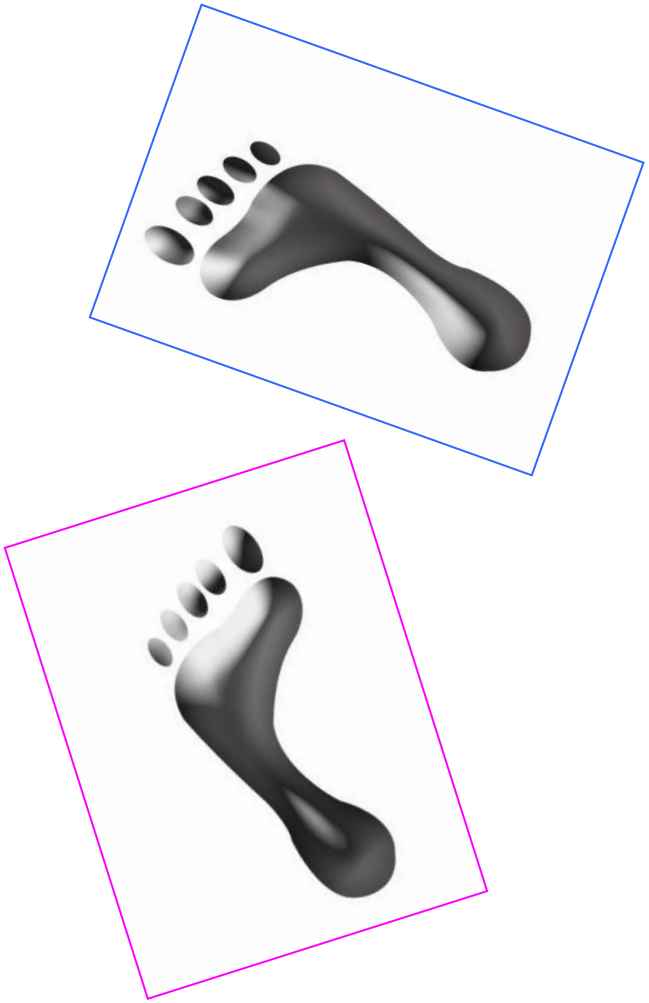
- Aerobic Exercise
  - Aerobic exercise can increase gait speed, endurance and independence in walking
  - All subjects had some ability to walk

- 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.

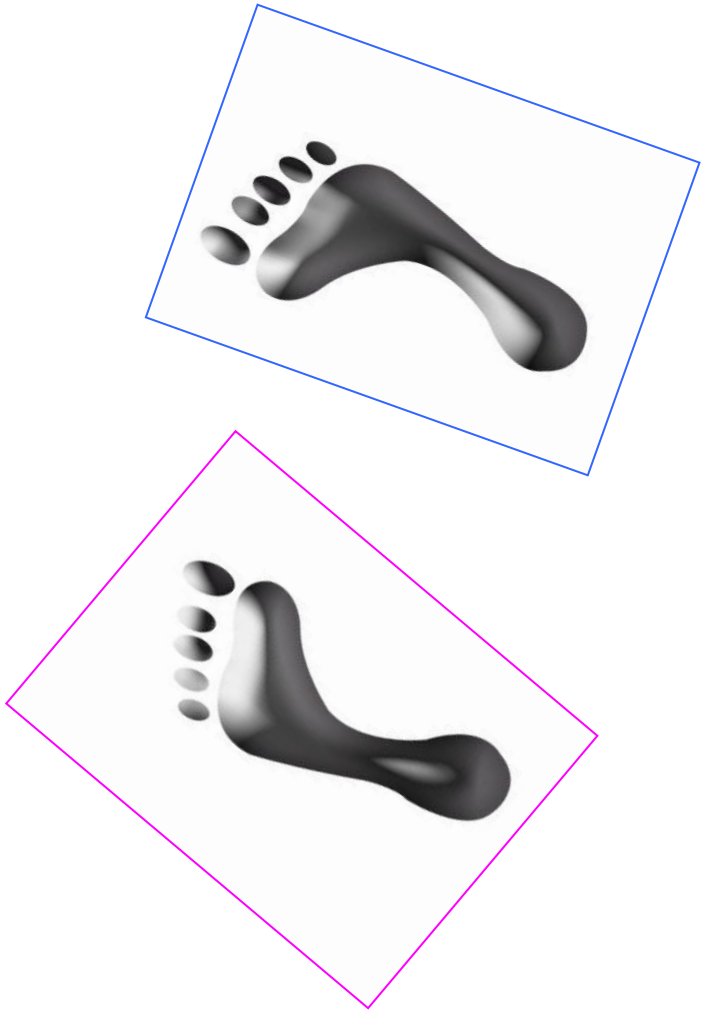
Turns

- 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.