

Gait Disorders

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What are the classical Gait Patterns for the Following Conditions?

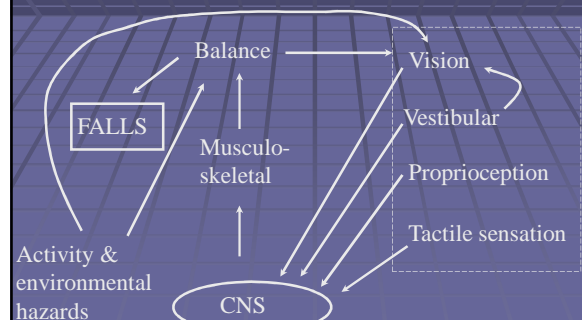
- Alzheimers Disease
- Hemiparetic Stroke
- Parkinsons Disease
- Osteomalacia
- Lateral popliteal nerve palsy
- Knee OA
- Vitamin B12 deficiency with dorsal column loss

Statistical summaries of risk factors for falls From cohort studies- Perell 2001

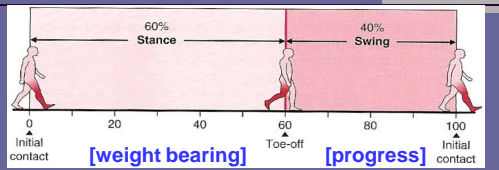
RISK FACTOR	Mean RR/OR	Range
▪ Muscle weakness	4.4	(1.5-10.3)
▪ Falls history	3.0	(1.7-7.0)
▪ Gait deficit	2.9	(1.3-5.6)
▪ Balance deficit	2.9	(1.6-5.4)
▪ Use of assistive devices	2.6	(1.2-4.6)
▪ Visual deficit	2.5	(1.6-3.5)
▪ Arthritis	2.4	(1.9-2.7)
▪ Impaired ADLs	2.3	(1.5-3.1)
▪ Depression	2.2	(1.7-2.5)
▪ Cognitive impairment	1.8	(1.0-2.3)
▪ Age > 80	1.7	(1.1-2.5)



Simple Model for Balance

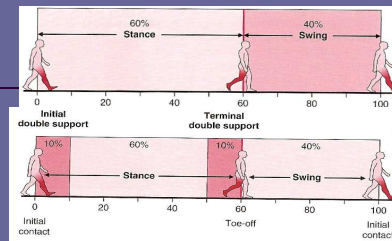


Gait cycle



Asymmetry

Stance phase	Condition
↓	Pain, weakness
↑	Impaired balance: vestibular, cerebellum dysfunction



- Running: stance 50% - swing 50%, then no double support period
- Disabled: increased bilateral stance phase to increase double support period

Clinical gait analysis

- Pattern recognition
 - Most quickly, recall from memory
- Structured Approach
 - Hypothetico-deductive
 - Basic gait knowledge / Anatomy
- Exhaustive strategy
 - Comprehensive and systematic evaluation

Pattern Recognition of Gait

- Hemiplegic
- Parkinsonian
- Apraxic
- Neuropathic
- Ataxic
- Waddling
- Spastic
- Hyperkinetic
- Antalgic

Gait Disorder in Older People

by level of Sensorimotor Deficit

High Level

Middle Level

Low Level

From- Alexander, Goldberg, Cleveland Clinic J Med 2005; 72: 592-600

High Level Gait Disorders

Frontal Related

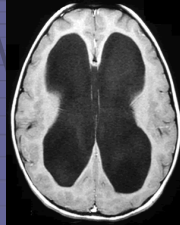
- Cerebrovascular
- Dementia

- Apraxic
- Magnetic
- Freezing

High Level Gait Disorders

Frontal Related

- Cerebrovascular
- Dementia
- N.P. Hydrocephalus



High Level Gait Disorders

Frontal Related

- Cerebrovascular
- Dementia
- N.P. Hydrocephalus

Cautious / Hesitant Gait

- Fear of falling

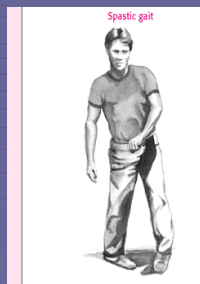
Depression

Middle Level Gait Disorders

Circumduction

Spasticity

- Hemiparesis



Middle Level Gait Disorders

Scissoring

Spasticity

- Hemiparesis
- Paraparesis



Middle Level Gait Disorders

Spasticity

- Hemiparesis
- Paraparesis

Parkinsonism



Hypokinetic
Festinant

Middle Level Gait Disorders

Spasticity

- Hemiparesis
- Paraparesis

Parkinsonism

Cerebellar Ataxia

Ataxic gait

- Irregular, wide based uncoordinated gait, lurching from side to side, feet thrown out
- Causes:
 1. **Cerebellar** - worse when feet together even when eyes open
 - cerebellar signs
 2. **Sensory** - stomping, stamping (heavy heel strike)
 - patient looks to floor or feet
 - positive Rombergs
 - often dorsal column eg proprioception loss
 - (sometimes thalamus, parietal, peripheral nerves)
 - FTN and HTS tests worse when eyes closed
 3. **Vestibular** - often vertigo, nausea, vomiting
 - positive Rombergs
 - tests for vertigo
 - if bilateral, get disequilibrium

Lower Level Gait Disorders

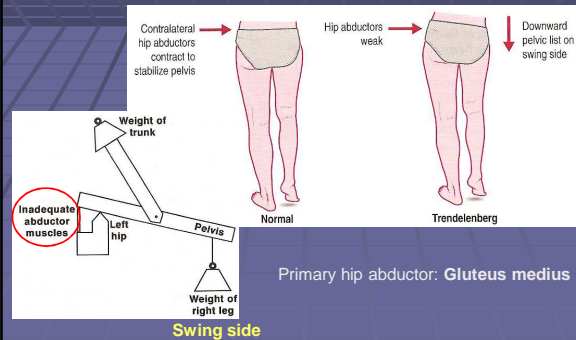
Peripheral Sensory Ataxia

- Posterior column
- Peripheral nerves
- Vestibular
- Visual

Peripheral Motor Deficit (weakness)

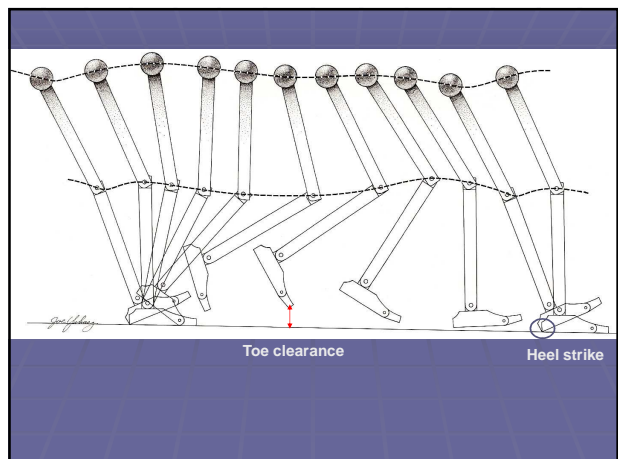
- Myopathy
- Neuropathy

Trendelenburg's Sign



Waddling Gait

- Myopathic gait
- Weakness of hip girdle muscles
- Gowers' sign
- **Gait**: wide base, hip drop over swing side, upper trunk compensated to the opposite side



Steppage Gait

- Equine gait, neuropathic gait
- Foot drop
 - Toe clearance decreased during stride phase
 - The foot is thrown out and falls to the ground, toe first
 - Double tap (toe then heel)
- Sensory ataxia
 - Romberg sign
 - Keep eyes on the floor when walking
 - May be normal in forward walking, but difficult in backward walking

Lower Level Gait Disorders

Peripheral Sensory Ataxia

- Posterior column
- Peripheral nerves
- Vestibular
- Visual

Peripheral Motor Deficit (weakness)

- Myopathy
- Neuropathy

Peripheral Deficit- Arthritis

Antalgic gait

SUMMARY

- Learn to recognize common gait disorder patterns
- Use a structured approach

Gait Disorder in Older People

[by level of Sensorimotor Deficit]
(often more than one present)

High Level

- Frontal Related
 - Cerebrovascular
 - Dementia
 - NPH
- Cautious gait
 - Fear of Falling
- Depression

Middle Level

- Spasticity
 - Hemiparesis
 - Paraparesis
- Parkinsonism
- Cerebellar Ataxia

Low level

- Peripheral Sensory Ataxia
 - Posterior column
 - Peripheral nerves
 - Vestibular
 - Visual
- Peripheral Motor Deficit (weakness)
 - Myopathy
 - Neuropathy
- Peripheral Deficit- Arthritis

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Thank you for your attention

Any Questions?

