

A biomechanical approach to gait rehabilitation following stroke

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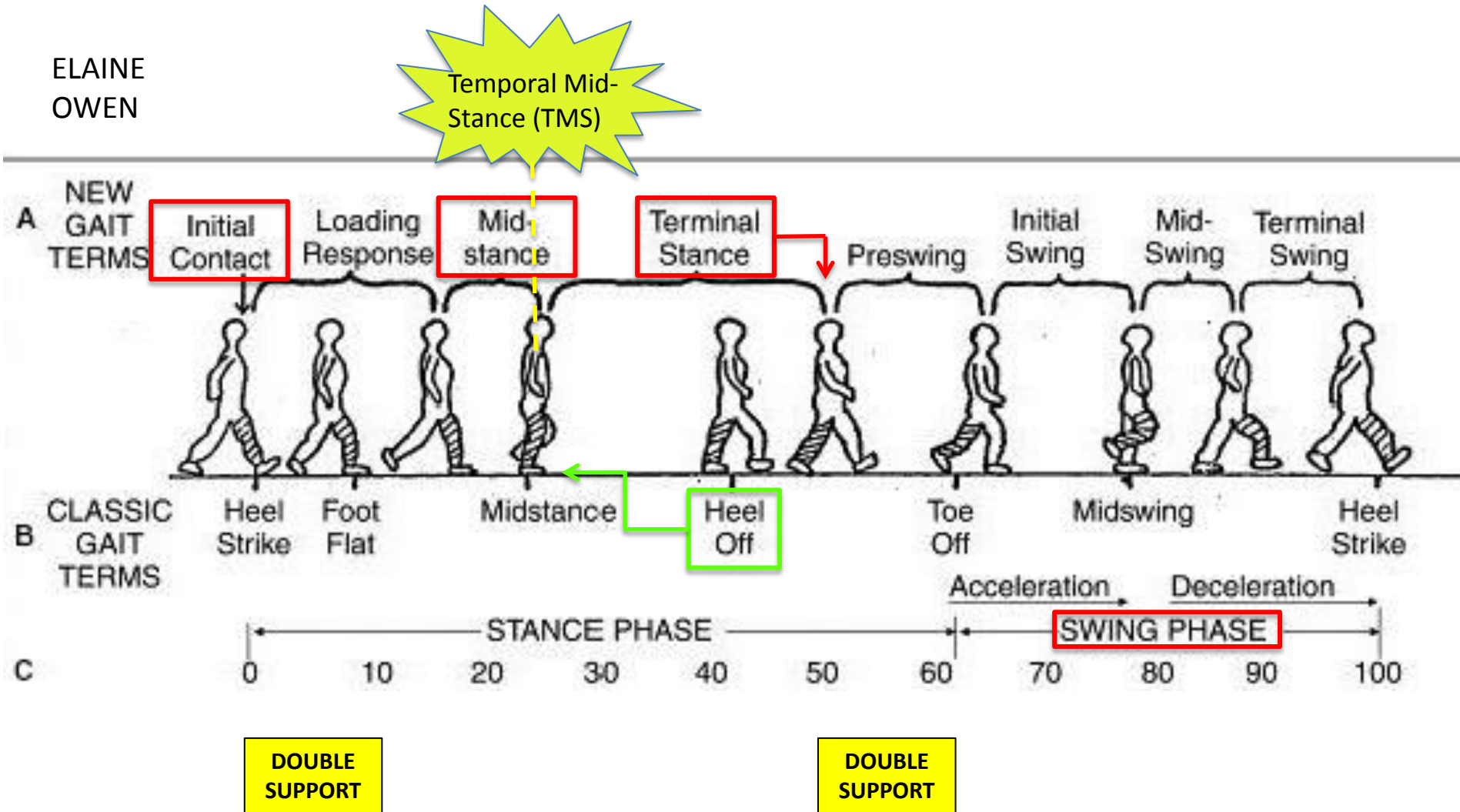
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The gait cycle

ELAINE
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Prerequisites of normal gait

- ◆ Stability in stance
 - ◆ Foot clearance in swing
 - ◆ Prepositioning of foot for initial contact
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- ◆ Adequate step length
(requires stability in stance on the other side)
 - ◆ Conservation of energy
(minimise vertical and horizontal movement, use ground reaction forces to the body's advantage)

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informa
healthcare

The importance of being earnest about shank and thigh kinematics especially when using ankle-foot orthoses

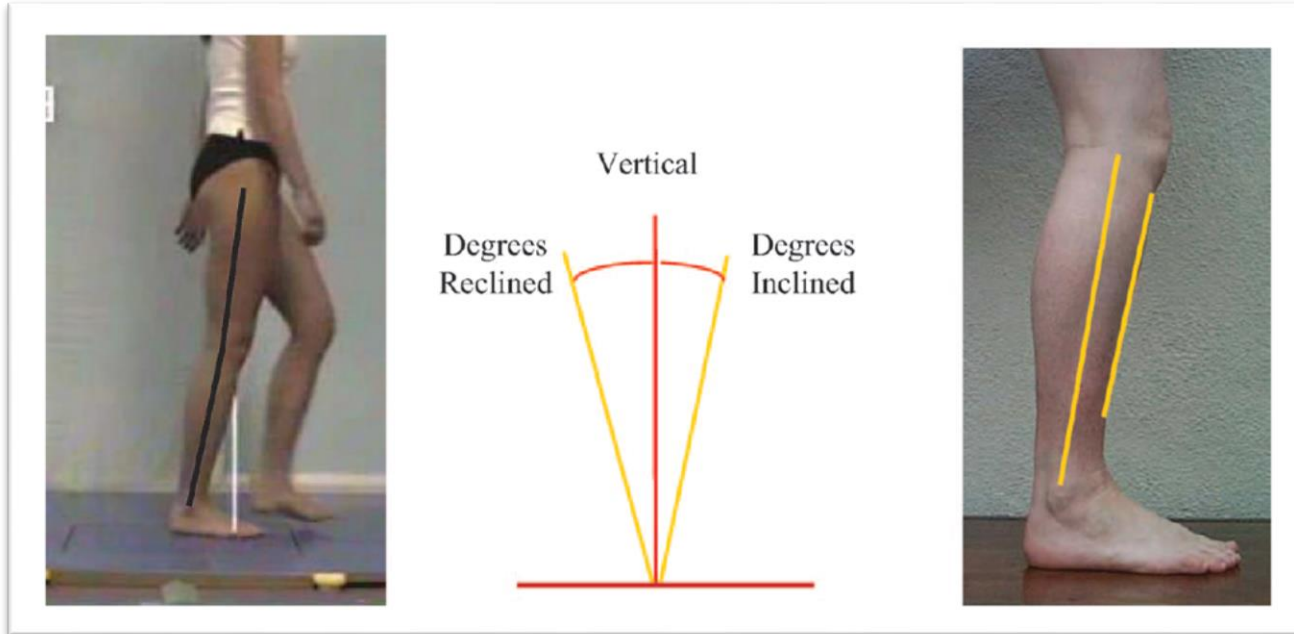
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Abstract

This paper reviews and summarizes the evidence for important observations of normal and pathological gait and presents an approach to rehabilitation and orthotic management, which is based on the significance of shank and thigh kinematics for standing and gait. It discusses normal gait biomechanics, challenging some traditional beliefs, the interrelationship between segment kinematics, joint kinematics and kinetics and their relationship to orthotic design, alignment and tuning. It proposes

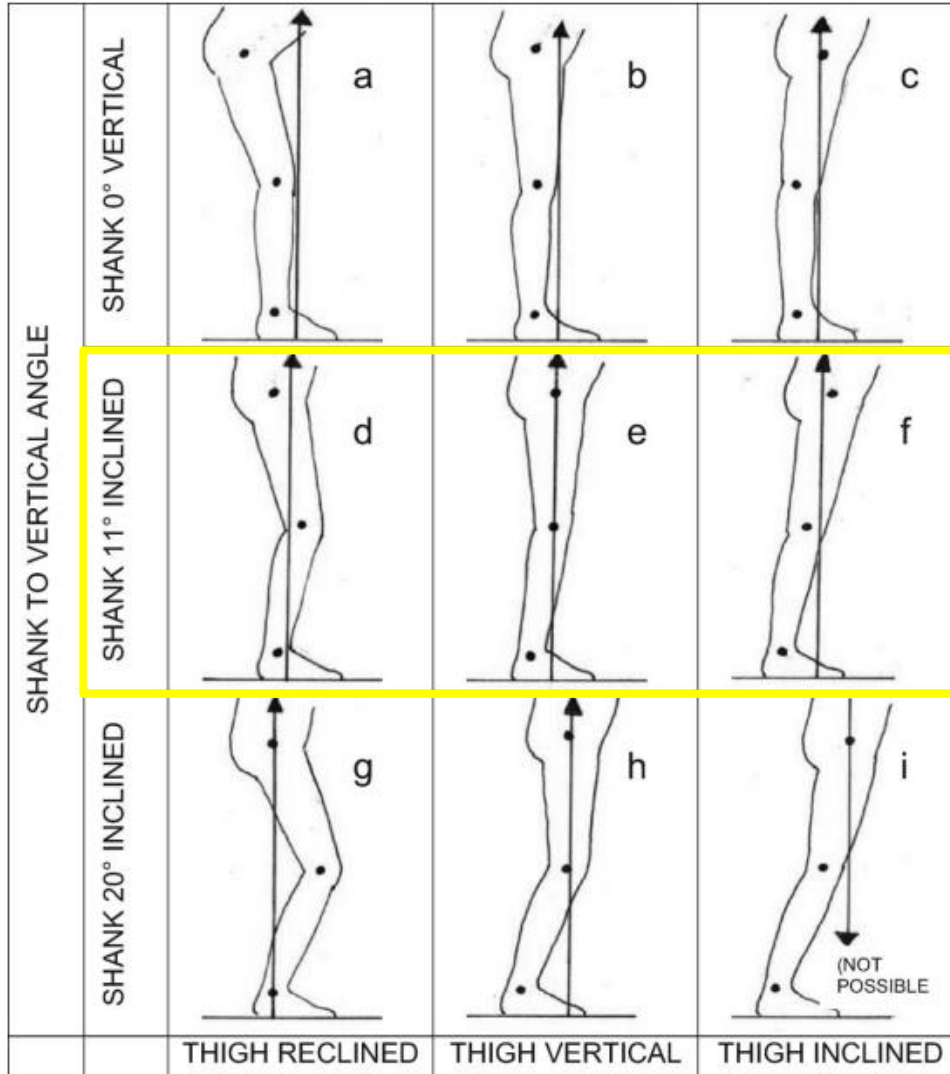
Shank to vertical angle



Elaine Owen (2010)

- ◆ Should achieve this at temporal midstance
- ◆ Highly significant for stability in stance
- ◆ Places knee joint over centre of BOS
- ◆ Allows thigh to incline at terminal stance

Relationship of shank to thigh



SVA of 10-12° allows thigh inclination without strong extension moment at knee (would cause knee hyperextension)

Elaine Owen (2010)

Common scenarios we use soft and scotch/ orthotics for early post-stroke:

- ◆ Foot drop/supination in swing with unstable ankle in stance
- ◆ Knee hyperextension
- ◆ Extensive weakness – difficult to take weight at all on leg

Case Study 1

Case Study 2

Cast Study 2

Case Study 3

Case Study 4

SUMMARY:

Advantages

- Provides stability in stance
- Prevent injury from mal-alignment
- Enhances alignment in stance and swing phase
- “Frees up” physio to be able to facilitate elsewhere
- Can be used outside therapy sessions – 24 hour rehab
- Soft and scotch quick and cheap

Disadvantages

- Lose flexibility in function (rockers and propulsion in terminal stance)
- Heavy and stiff in swing phase
- Reduced sensation/interaction with floor
- Pressure areas – needs careful monitoring
- Donning and doffing can be challenging