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Patients with leg length inequality following total hip arthroplasty have greater gait asymmetry

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INTRODUCTION

Following total hip replacement (THR), some patients experience symptomatic leg length inequality (LLI).

Symptomatic LLI accounts for 8.7% of claims made against the UK National Health Service Litigation authority [1].

Postoperative symptomatic LLI may lead to lower back pain and cause [2-6]

• Lower back pain
• Osteoarthritis in the opposite hip and knee
• Nerve palsy

The influence of symmetry in leg length on the parallel symmetry in gait kinematics and kinetics remains unclear as is the corresponding influence on preoperative surgery/postoperative rehabilitation and potential for adverse implant durability.

AIMS

To investigate the symmetry in kinematics and kinetics during gait in unilateral THR patients with symptomatic LLI and to compare these to both normal healthy controls and to a control group of ‘successful’ asymptomatic unilateral THR patients

METHODS

Gait kinematics and ground reaction forces were measured for

• 15 symptomatic unilateral LLI patients > 12 months post-THR (LLI)
• 15 asymptomatic unilateral THR patients > 12 months post-THR (THR)
• 15 healthy people (Normal)

LLI was measured as from anterior superior iliac spine (ASIS) to medial malleolus (MM) and from greater trochanter (GT) to floor for the three cohorts.

Hip contact forces were determined through inverse ground reaction forces, hip moment and hip contact force (O: operated limb; NO: non-operated limb).

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These results suggest that attempts should be made both to minimise structural LLI intra-operatively and to improve postoperative rehabilitation to minimise the asymmetry in gait biomechanics.

RESULTS

The LLI patients had significantly greater asymmetry in flexion/extension angle, abduction/adduction angle, ground reaction force, hip moment and hip contact force (O: operated limb; NO: non-operated limb).

The asymmetrical THR patients had comparable symmetry in gait biomechanics to the healthy people.

The symmetry in hip contact force were not strongly correlated with the magnitude of LLI.

DISCUSSION

• The greater asymmetry in gait kinematics and kinetics of the symptomatic LLI patients provides a potential explanation why LLI patients are more likely to be symptomatic.

• The weak correlation between the magnitude of LLI and hip contact force suggests that there are other more complex interactions, involved such as anatomical variations and compensatory mechanisms.

• These results suggest that attempts should be made both to minimise structural LLI intra-operatively and to improve postoperative rehabilitation to minimise the asymmetry in gait biomechanics.

References

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