

Assessment of changes in gait parameters and vertical ground reaction forces after total hip arthroplasty

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Abstract

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The principal objectives of arthroplasty are relief of pain and enhancement of range of motion. Currently, postoperative pain and functional capacity are assessed largely on the basis of subjective evaluation scores. Because of the lack of control inherent in this method it is often difficult to interpret data presented by different observers in the critical evaluation of surgical method, new components and modes of rehabilitation. Gait analysis is a rapid, simple and reliable method to assess functional outcome. This study was undertaken in an effort to evaluate the gait characteristics of patients who underwent arthroplasty, using an Ultraflex gait analyzer.

Materials and Methods:

The study was based on the assessment of gait and weight-bearing pattern of both hips in patients who underwent total hip replacement and its comparison with an age and sex-matched control group. Twenty subjects of total arthroplasty group having unilateral involvement, operated by posterior approach at our institution with a minimum six-month postoperative period were selected. Control group was age and sex-matched, randomly selected from the general population. Gait analysis was done using Ultraflex gait analyzer. Gait parameters and vertical ground reaction forces assessment was done by measuring the gait cycle properties, step time parameters and VGRF variables. Data of affected limb was compared with unaffected limb as well as control group to assess the weight-bearing pattern. Statistical analysis was done by 't' test.

Results:

Frequency is reduced and gait cycle duration increased in total arthroplasty group as compared with control. Step time parameters including Step time, Stance time and Single support time are significantly reduced (P value $<.05$) while Double support time and Single swing time are significantly increased (P value $<.05$) in the THR group. Forces over each sensor are increased more on the unaffected limb of the THR group as compared to the control group. Vertical ground reaction force variables are also altered.

Conclusion:

Significant changes (P value $<.05$) in gait parameters and vertical ground reaction forces show that gait pattern is not normalized after THR and weight-bearing is not equally shared by both hips. Patient walks with residual antalgic gait even after surgery, which results in abnormal loading around hip joints and the integrity of the prosthesis fixation could be compromised.