

MODULE BIOMECHANICS OF GAIT

Didactic Unit D: INSTRUMENTED ANALYSIS OF GAIT

D.1 Which gait biomechanical instrumented evaluation protocols exist?

TEACHER'S DOCUMENT: Reinforcement activity solutions

ACTIVITY ONE

To solve the following activities, you must have studied the contents of Unit D.1. After reading the clinical case that we present below, answer the proposed questions.

A 54-year-old male patient goes to a medical consultation with a traumatologist specialist after right knee joint replacement surgery. He refers that during walk feels instability in the operated knee and intense pain in his left hip, which disappears when he is sitting or supine position. When the patient walks, a limp of the right side is observed, taking less time of the stance phase with the affected side. At the passive and active range of motion examination, no limitation of movement is observed in the left hip.

- 1. Which biomechanical assessment tool would you use to make an objective assessment of the gait deficit? Justify your answer**

Because the alteration referred by the patient only occurs during gait, the assessment with photogrammetry would allow observed the functional limitation of the knee and the hip. It will also allow to monitoring the progress of the gait.

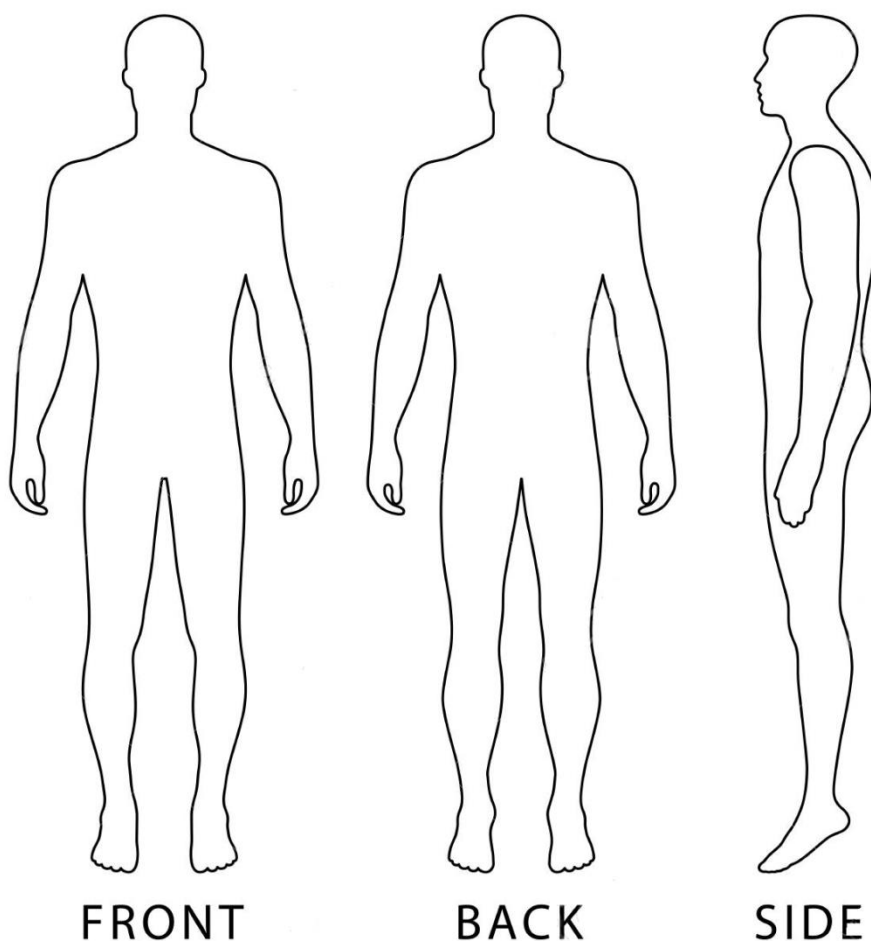
In addition, to objectify the load during walking, it is advisable to perform a force analysis with force platforms. It is possible to do the evaluation with both instruments at the same time. Many photogrammetry software allows simultaneous control of other techniques.



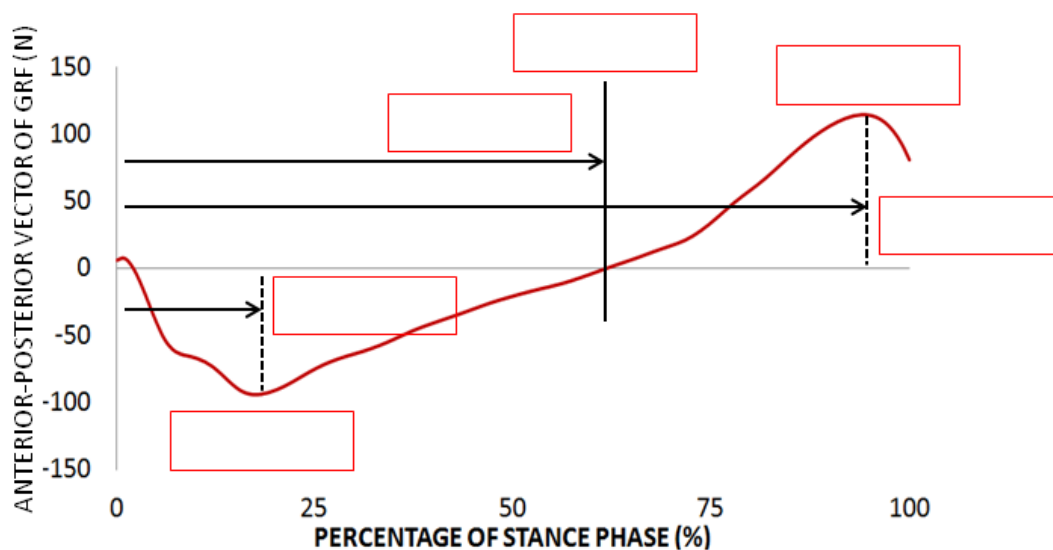
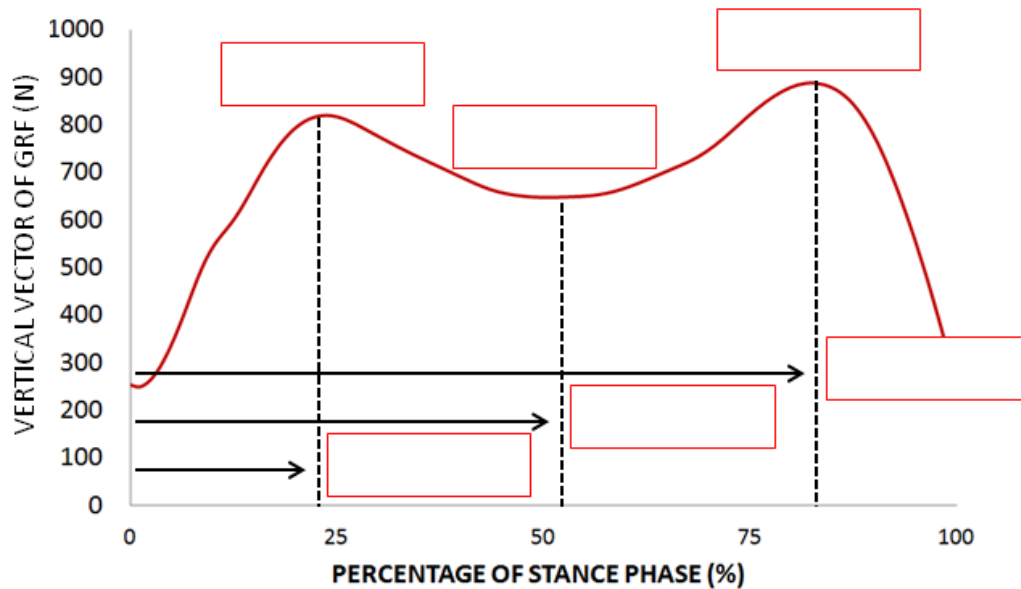
2. In the case of performing a kinematic evaluation of gait with photogrammetry, which segments would you define with a marker model? Where should markers be located to define the segments involved and do a three-dimensional study? Draw in the image the markers that you think are necessary.

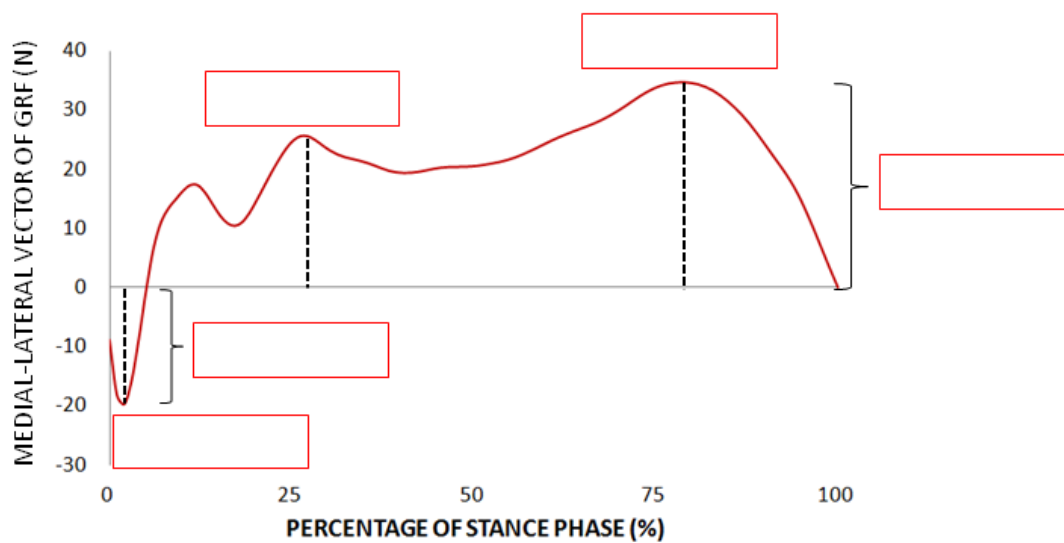
For the analysis of knee movement, the segment to be instrumented are the femoral and tibial segment. For the analysis of hip, it should be instrumented the femoral and pelvis segment. If we implement the Calibrated Anatomical System Technique Marker set for analysis the gait in the sagittal, frontal and transverse plane, the following markers should be located:

- Tibial segment
 - Anatomical markers: medial and lateral malleoli and femoral epicondyles
 - Segment markers: at least three non-coplanar markers randomly arranged on the leg
- Femoral segment
 - Anatomical markers: femoral epicondyles and the greater trochanter
 - Segment markers: at least three non-coplanar markers randomly arranged on the thigh

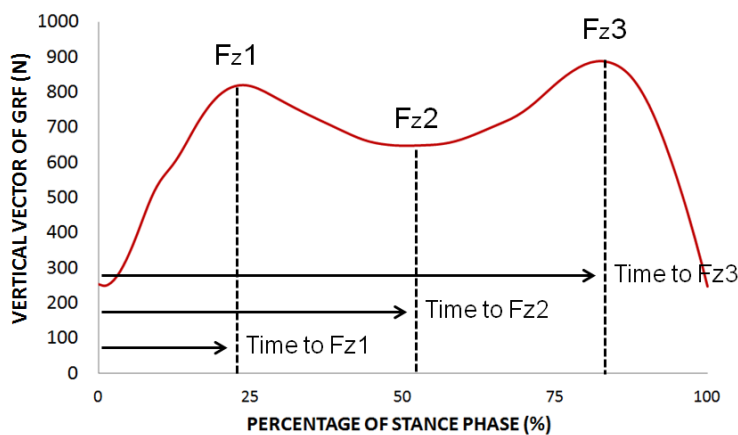


3. In addition to performing the kinematic evaluation with photogrammetry, you also perform a kinetic evaluation with dynamometric platforms. Before reading the patient's results, you review the meaning of the forces that make up the ground reaction force vector. Put the corresponding name in the blank boxes.

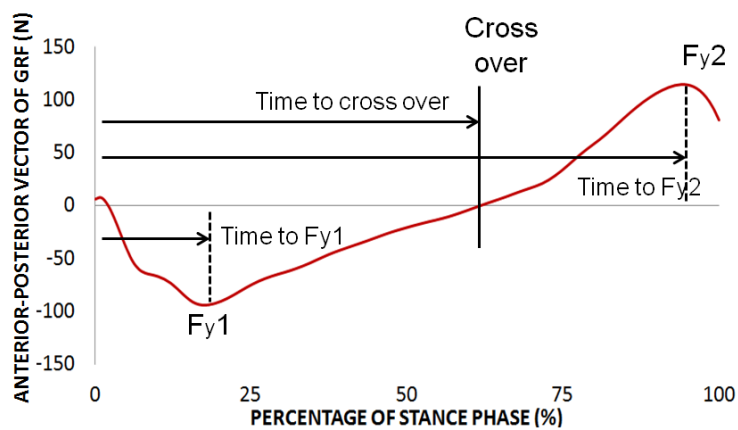




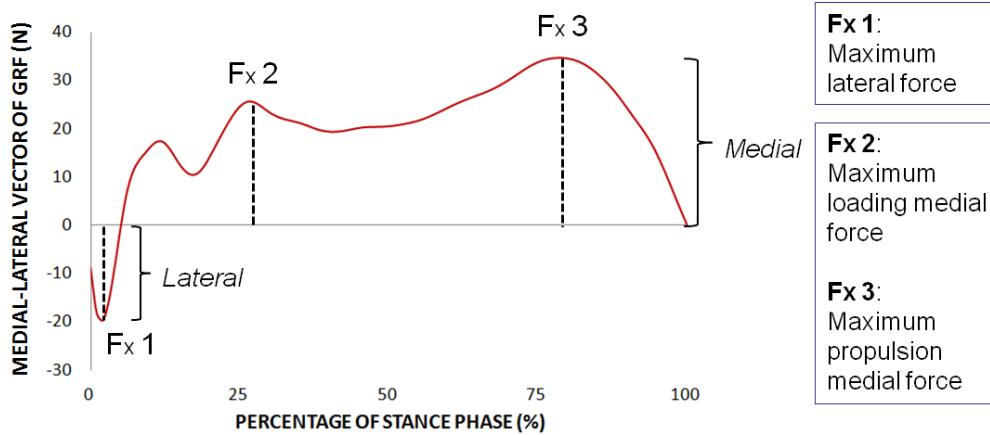
Answer to previous question



- Fz 1:** Peak force in maximal weight acceptance
- Fz 2:** Peak force in mid stance
- Fz 3:** Peak force in push-off



- Fy 1:** Maximum posterior force. Correspond to the braking
- Fy 2:** Maximum anterior force



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