Gait analysis in the diagnosis of knee ligament apparatus injury

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Abstract: The purpose of this paper is to show the advantages of using Avatar system for gait analysis on patients with knee ligament apparatus injury.

The movement curves are being obtained on the basis of the markers placed on the patient's lower extremities. The markers' position in space is periodically recorded with infrared cameras. The simulation of the patient's recorded movements is enabled by using the reconstructed model of the femur and tibia and by the curves of movement. The bone reconstruction is based on CT scans and Hounsfield index. Generated polygonal models are optimized in order to obtain the adequate grid for the translation of the model into the surface and solid phase. The existence of curves that define the movement of the tibia and femur provides us with quite simplified and accurate translation of one bone into the other.

The results obtained in this research reveal that the more precise diagnosis of the ligament instability can be set, as well as some indications for the type of treatment.

Key words: Gait analysis, free-form modeling, reverse engineering, femur, tibia