

## **Practical gait analysis using IMU sensors in a complete femoral nerve-injured patient: A Case report**

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### **Background**

Conventional kinematic gait analysis requires facilities with motion capture cameras, which is not affordable in many hospitals. With improvement of engineering technology, an alternative Method using inertial measurement unit (IMU) sensors for each lower-limb joints can be more practical.

### **Case presentation**

An 28-year-old female received the operation for removal of schwannoma encasing left femoral nerve. After the operation, she experienced left knee extensor weakness. The electromyography was performed about 3 weeks after the operation, which revealed abundant abnormal spontaneous activities in all left quadriceps muscles with no recruitment of motor unit. The muscle power of left knee extensor is nearly zero, and has not been improved. Although the gait velocity is low, she can walk with or without single cane, and go up and down stairs without alternation. The 3-dimensional gait analysis system with 7 IMU sensors (Human Track™, RBiotech) revealed mild left genu recurvatum (about 3° of knee hyperextension) in sagittal plane from initial to terminal stance phase. She complained left knee pain due to strenuous gait training by herself, which improved with intermittent rest between walking. After 4 week-period of gait training, the follow-up gait analysis showed improved knee motion in the coronal plane without deterioration of genu recurvatum in sagittal plane.

### **Conclusion**

The kinematic gait analysis system with IMU sensors may be reliable and feasible in neurological and musculoskeletal disorders. Initial and follow-up gait analysis with the practical wearable sensor system may provide relevant rehabilitation strategies.



The 3-dimensional gait analysis system with IMU sensors