“‘Identification of Lumbar Spine kinematics with the use of inertial measurement units (IMU)”

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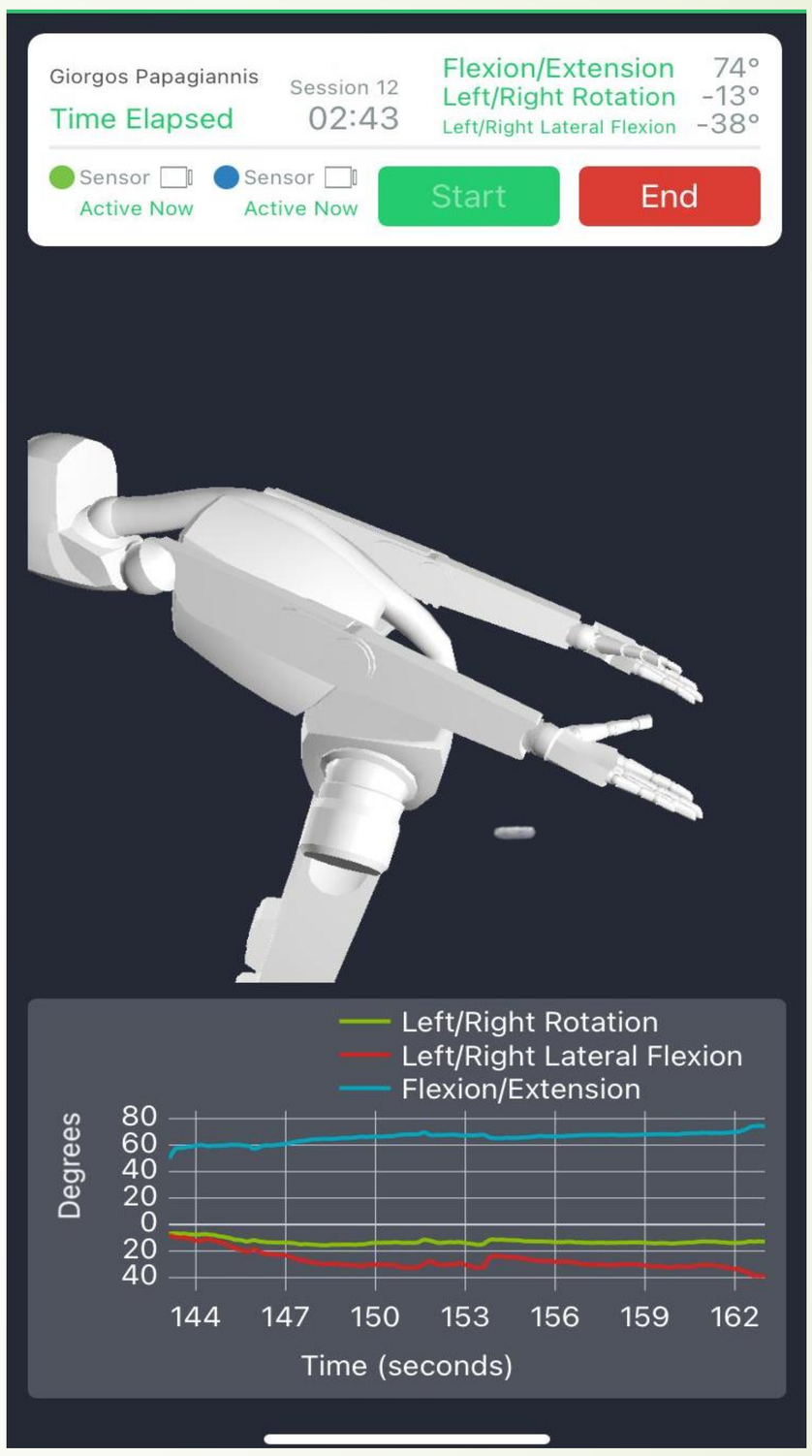
BACKGROUND: The literature reports 5%-15% recurrence rate of lumbar spine microdiscectomies (LSMs). Lumbar spine flexion (LSF) is mentioned as the most harmful load to the intervertebral disc that could lead to recurrence during the 6 post-operative weeks. Patients with sagittal plane ROMs more than 10° during that period had a recurrence rate of 26.5%, whereas those with less than 10° had a rate of 4.1%. The purpose of this study is to quantify LSFs, following LSM, by quantifying (monitoring during daily activities) the frequency of more than 10° LSF ROM, at the period of 6 weeks postoperatively.

METHODS: ROMs where recorded during 33 subjects’ daily activities for 24 hours twice per week. MetaMotionR+, Inertial Measurement Unit (IMU), was used for the measurement of lumbar spine kinematics.

RESULTS: The mean number of more than 10 degrees of LSFs per hour were: 40,1/hour during the 1st postoperative week (P.W.) (29% normal subjects-N.S.), 2nd P.W. 61,2/h (44% N.S.), 3rd P.W. 72,9/h (52,7% N.S.), 4th P.W. 61,1/h (61,1% N.S.), 5th P.W. (69,7% N.S.) and 6th P.W. 106,25 (76,9% N.S.).



- **DISCUSSION:** LSFs constitute important risk factors for rLDH.This the first time to our knoweledge of recording-monitoring the lumbar spine kinematic pattern of such patients during their daily activities. Although patients’ data report less sagittal plane movements than normal, further in vitro studies should be done by using our results of the patients' kinematic, to identify if such a kinematic pattern could cause reherniation of microdiscectomied lumbar discs. Furthermore IMUs could be additionally used as a precaution measure, to alert patients by vibration, whenever they exceed acceptable rates of LSFs.