

## RECOVERY OF DAILY ACTIVITY PATTERNS IN PATIENTS AFTER ACL RECONSTRUCTION

Dieter Rosenbaum<sup>1</sup>, Maik Sliepen<sup>1</sup>, Benedikt Schliemann<sup>2</sup>, Johannes Glasbrenner<sup>2</sup>, Simon Lenschow<sup>2</sup>, Mirco Herbort<sup>2</sup>, Michael Raschke<sup>2</sup>, Clemens Kösters<sup>2</sup>

<sup>1</sup>Institute of Experimental Musculoskeletal Medicine, <sup>2</sup>Department of Trauma, Hand and Reconstructive Surgery, University Hospital Münster, University of Münster, Münster, Germany

Injuries of the anterior cruciate ligament are one of the most often occurring injuries during sports activities. For young active patients, surgical treatment with repair, augmentation or replacement of the involved structure(s) is advised. The present study compared the outcome after Ligamys repair and Semitendinosus reconstruction during the first six postoperative weeks with objective measurements of the activity/inactivity behavior in daily life.

**KEYWORDS:** ACL injury, ACL reconstruction, Activity assessment, Step count

**INTRODUCTION:** For stabilizing the knee joint after an ACL injury a dynamic intra-ligamentous procedure has recently been developed (Ligamys, Fa. Mathys, Bettlach, CH). This ACL-retaining approach is an alternative to well-established surgical ACL-replacing procedures. First clinical results after this procedure appear promising [1,2] but objective data about functional recovery is still missing. Therefore, the aim of the present study was to compare the short-term recovery of patients after two different procedures for reconstructing the Anterior Cruciate Ligament (ACL) after a (sports) injury. The hypothesis was that an objective assessment of the patients' activities in daily life would reveal potential differences in the level of activity for the ACL-retaining approach.

**METHODS:** In total, 38 patients were included after providing informed consent, with patients in two groups: 1. SEMI = reconstruction with a semitendinosus transplant (n=17); 2. LIGA = dynamic intra-ligamentous stabilization with the Ligamys system (n=21). Surgery was performed about 2 weeks after the initial trauma. Patients agreed to wear – during the waking hours of the first six weeks after surgery – an accelerometer ('SAM' StepWatch Activity Monitor, Orthocare Innovations, USA) around the ankle that counts and stores the number and intensity of step activities in one-minute intervals. The device was explained and given to the patients on the day of their release from the hospital. Patients' level of sports activity was categorized using the Tegner score.

When the patients returned to the out-patient clinic for the six-week follow-up examination the step monitor was returned and the activity data was analyzed with in-house excel macros. From the daily information, we determined the average weekly activity levels to show the progress for these first 6 weeks after surgery. Furthermore, the bouts of activity and inactivity during the wear times were analyzed in more detail. Group differences were compared with a repeated-measures ANOVA, independent samples t-tests and Mann-Whitney U-tests at a significance level of  $p < 0.05$ .

**RESULTS:** Patients' age and height were comparable for the two groups, whereas body mass and BMI were higher for the SEMI patients (LIGA:  $28.0 \pm 10.4$  yrs.,  $177.7 \pm 6.5$  cm,  $72.8 \pm 10.5$  kg,  $22.7 \pm 1.4$  kg/m<sup>2</sup>; SEMI:  $28.7 \pm 12.4$  yrs.,  $179. \pm 6.5$  cm,  $81.0 \pm 11.5$  kg;  $25.3 \pm 3.4$  kg/m<sup>2</sup>). The average Tegner score was almost identical (LIGA  $6.1 \pm 1.6$ ; SEMI  $6.1 \pm 1.7$ ) indicating a comparable sports activity level.

Both patient groups showed a significant increase in the average daily steps over the six-week period, with the LIGA group consistently exceeding the SEMI group (not significant,

except for week 3; Fig. 1). The degree of improvement did not differ between groups. Both groups started on a clearly reduced activity level and did not yet reach the recommended 10,000 steps per day after 6 weeks (**Fig. 1**). The actively-spent time gradually increased from 20% to 33% for the LIGA group and from 19% to 35% for the SEMI group. Additionally, both groups more often performed longer bouts that lasted at least 10 minutes (LIGA: 2.7 vs. 6.6, SEMI: 2.6 vs. 7.4). The average cadence during activity periods increased from 20 to 34 steps/min for the LIGA group and from 19 to 30 steps/min for the SEMI group. On average, the inactivity bouts were shortened from 21 to 13 min for the LIGA group and from 22 to 12 min for the SEMI group.

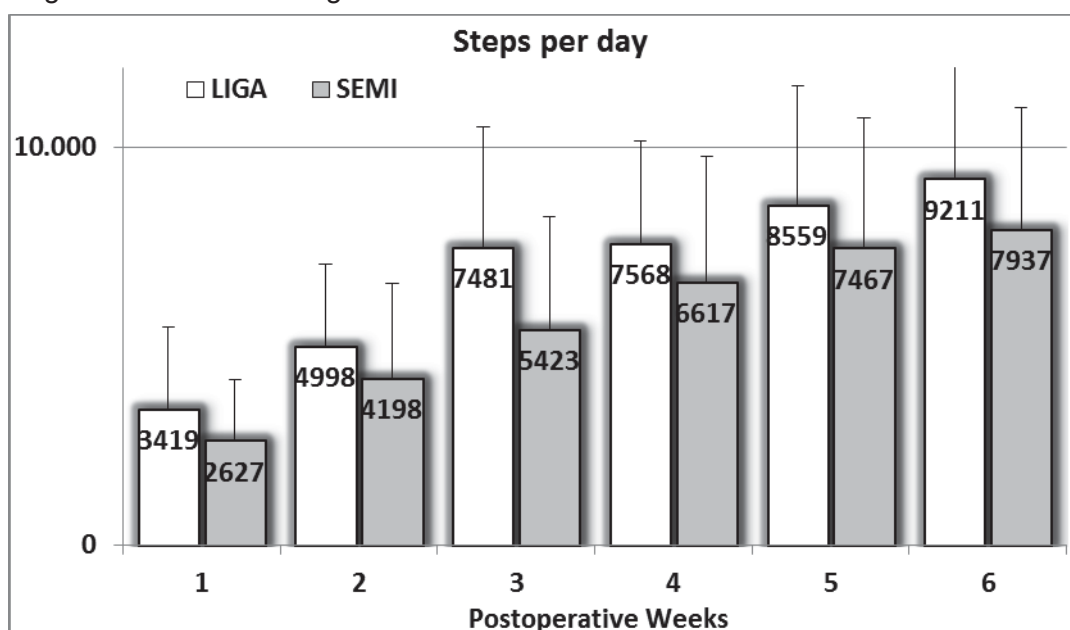
**DISCUSSION:** The analysis of the activity and inactivity behavior of both patient groups revealed a consistent improvement during the six-week postoperative period. Nonetheless, patients still spent a fairly high amount of time being inactive. Only minor differences were seen between the procedures, so that they appeared functionally comparable in this early post-operative phase during which patients not yet reached a normal level of activity as seen in insufficiently increased step numbers and a fairly high percentage of inactivity. Even though the LIGA group showed a slightly higher level of activity they did not reveal a faster recovery from surgery as compared to the SEMI group. The positive development was revealed with respect to increased activities as well as a decreased inactivity behavior.

**CONCLUSION:** Patients quickly improve their level of activities in daily life during the first six weeks after ACL surgery but this time span is not sufficient to fully recover to a normal activity level of the recommended minimum of 10,000 steps per day. The degree of improvement was not different for the two surgical procedures that either repair or replace the torn ACL.

#### REFERENCES:

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**Fig. 1:** Development of the average number of daily steps over the course of the first six postoperative weeks for the two patient groups after Ligamys or Semitendinosus surgery.