

ERFORSSALEN_ Paper presentation, Thursday, October 16th 17.00

Chair: Anders Stålmán, PhD, Associate prof., and Tobias Wörner, PhD, RPT

5+3 = Presentation 5 minutes and questions/ discussion 3 minutes

1. 17.00-17.08 **Characterizing movement patterns in individuals with knee osteoarthritis using inertial measurement units** – Karol Gawelowicz, MD, Department of Women's and Children's Health, Karolinska Institutet, Stockholm, SWE
2. 17.09-17.17 **Fitness and activity improvements one year after total hip arthroplasty due to hip osteoarthritis** – Eva Andersson, PhD, MD, The Swedish School of Sport and Health Sciences, Stockholm SWE
3. 17.18-17.26 **Return to sport and patient-reported function within 2 years from ACL-injury or ACL- reconstruction** – Anna Samuelsson Selin, MD, Orthopedics and Department of Biomedical and Clinical Sciences, Linköping University, SWE
4. 17.27-17.35 **Injury pattern in Swedish male elite Ice Hockey – A registry study** – Stefan Kauppinen, MD, Department of molecular medicine and surgery, Stockholm Sports Trauma Research Center, Karolinska Institutet, Stockholm, SWE
5. 17.36-17.44 **Psychological support following ACL-reconstruction. The BACK in the Game randomized controlled trial** – Joanna Kvist, PhD, RPT, Unit of Physiotherapy, Department of Health, Medicine and Caring Science and Center for Medical Image Science and Visualization, Linköping University, SWE

Characterizing movement patterns in individuals with knee osteoarthritis using inertial measurement units

Karol Gawelowicz, MD, Karolinska Institutet, Department of Women's and Children's Health, Stockholm, Sweden; Morten Bilde Simonsen, PhD, Aalborg University, Department of Materials and Production - Center for Mathematical Modeling of Knee Osteoarthritis, Aalborg, Denmark; Cecilia Aulin, PhD, Karolinska Institutet, Department of Medicine Solna - Division of Rheumatology - Centre for Molecular Medicine, Stockholm, Sweden; Josefine Eriksson Naili, PhD, Karolinska Institutet and Karolinska University Hospital, Department of Women's and Children's Health, Stockholm, Sweden.

Key Words

Knee osteoarthritis, Functional movement analysis, Inertial measurement units (IMUs), Movement smoothness (SPARC), Molecular biomarkers

Background and aim

Understanding movement-related changes in knee osteoarthritis (KOA) can improve functional assessment and provide insights into disease-related impairments. This study aimed to characterize movement patterns in individuals with KOA using inertial measurement units (IMUs) during functional tests and explore associations with molecular markers identified through targeted proteomics.

Methods

Thirty-six individuals with KOA (mean age 63, 71% women) and nineteen healthy controls (mean age 62, 63% women) performed four functional tests with motion data captured using IMUs: 10-meter walk (10MWT), 30-second Sit-to-Stand (30STS), Single Leg Mini Squat (SLMS), and Jump for Distance (JFD). Plasma samples were analyzed using Olink panels. The study focused on sagittal knee kinematics during 30STS and SLMS, with movement smoothness assessed using Spectral Arc Length (SPARC) analysis.

Results

The KOA group performed significantly worse than controls in all functional tests. SPARC analysis revealed lower movement quality and worse consistency in the KOA group, reflected by lower mean SPARC and higher SPARC variance. Expression of the proteins CETN2 and PRTFDC1 differed between groups. Mean SPARC showed positive correlations with both proteins, while SPARC variance was negatively correlated (Figure 1).

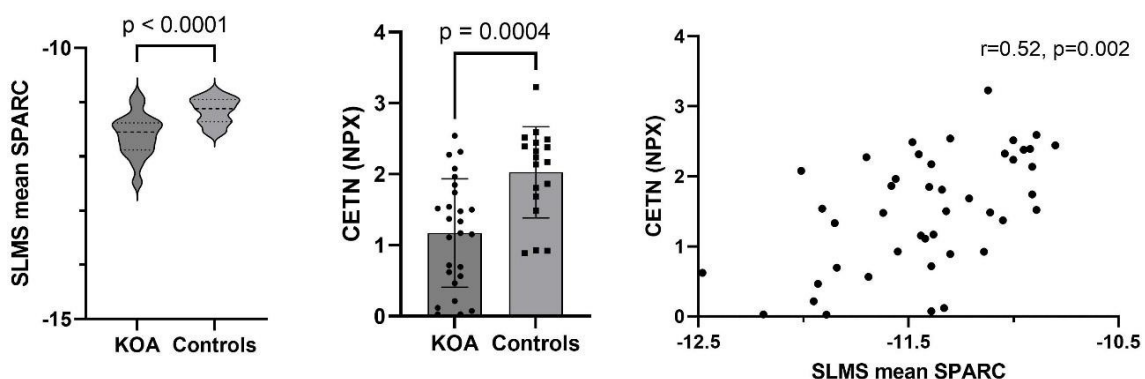


Figure 1.

Conclusion

This study found clear differences in movement quality between KOA and controls. SPARC analysis of IMU data showed reduced smoothness and repeatability in KOA, with lower mean SPARC and higher variance. Mean SPARC was positively associated with CETN2 and PRTFDC1 expression, while SPARC variance was negatively correlated. These proteins, both downregulated in KOA, may be linked to movement impairments. Findings support integrating movement analysis and molecular profiling in KOA research.

Fitness and activity improvements one year after total hip arthroplasty due to hip osteoarthritis.

Manne Godhe, PhD, MMK, Karolinska Institutet, The Swedish School of Sport and Health Sciences

Co-authors

Anders Ståhlman-MD, associate professor, Capio Artro Clinic, MMK, Karolinska Institutet, Johnny Nilsson-professor, The Swedish School of Sport and Health Sciences, Eva Andersson-MD, The Swedish School of Sport and Health Sciences, MMK, Karolinska Institutet

Key Words

osteoarthritis, hip surgery, physical capacity, physical activity patterns, functional recovery

Aim: This study aimed to evaluate test-retest reliability of fitness measures in hip osteoarthritis (OA) patients, compare fitness and activity patterns with healthy controls, and assess longitudinal changes in these parameters following total hip arthroplasty (THA).

Methods: Seventy-eight patients (74 ± 4.5 yrs, 81% women) scheduled for THA were included. Measures were made at two pre-op time points, and 4-month and 1-year post-op follow-up. Measures of muscle strength, motor fitness, and cardiorespiratory fitness were made. Physical activity was objectively measured using hip-worn triaxial accelerometers. Self-reported Hip disability and Osteoarthritis Outcome Score (HOOS) was also collected pre-to-post-op.

Results: Good to excellent test-retest-reliability was seen across 23 of 24 fitness parameters. Pre-operatively, hip OA patients showed significant deficits vs healthy controls in moderate-to-vigorous physical activity (MVPA, 18.7 vs 44.7 min/day) and several fitness tests. At 1-year post-op, significant improvements were observed in 23 of 45 measured parameters, including functional mobility (TUG: 29%), Six-Min-Walk-Test (16%), trunk-endurance-strength (71-82%), shoulder-press (33%), various leg strength tests (13-42%), 4m-max-walking-speed (42%), MVPA (+63%) and daily-step-count increased from 6004 to 7558 steps/day, (26%). OA-limb vs non-OA-limb step height asymmetry decreased from 27% pre-operatively to 8% at 1-year. VO_{2peak} demonstrated modest but significant improvement from 22.7 to 23.6 mL/kg/min 1-year postoperatively (4%).

Conclusions: This study revealed significant pre-operative functional deficits in hip OA patients, with substantial improvements observed across multiple performance domains 1-year post-surgery. Notably, patients failed to meet the recommended physical activity guidelines before surgery but achieved them post-operatively. The demonstrated reliability of the test battery reinforces its value for both research and clinical applications.

Return to sport and patient-reported function within 2 years from ACL-injury or ACL-reconstruction

Anna Samuelsson Selin, MD, PhD student, Orthopedics and Department of Biomedical and Clinical Sciences, Linköping University

Co-authors

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Key Words

return to sport, ACL-reconstruction, non-operative treatment, IKDC, rehabilitation

Background: There are few reports about patient-reported knee function and return to sport (RTS) in patients followed from initial anterior cruciate ligament (ACL) injury treated with or without ACL reconstruction (ACLR).

Aim: To study the outcome within two years after an acute ACL-injury or ACLR, in terms of patient-reported knee-function and return to sport in patient treated with and without ACLR.

Methods: Data from a national, multicenter, prospective cohort study (NACOX) were analyzed. Patients with an acute ACL-injury were included within 6 weeks from the injury and treated according to usual care. Data about ACLR, RTS and International Knee Documentation Committee Subjective Knee Evaluation Form (IKDC-SKF) were continuously collected within two years from ACL-injury or ACLR. The definition for RTS was returning to same preinjury Tegner activity level.

Results: 275 patients (52% females) were included, mean age 25.2 (CI 24.4-26.1) years. At two years follow-up, 170 (62%) patients had undergone ACLR. Preinjury Tegner level was higher in the ACLR group (median 8 vs. 6, $p<0.001$). There was no difference in RTS between groups (ACLR 75% vs non-ACLR 70%, $p=0.371$). IKDC score at two years adjusted for age, sex, pre-injury Tegner activity level, and new serious injury did not differ between the groups (75.5 [CI 71.2–79.8] in the non-ACLR vs 80.5 [CI 76.9–84.1] in ACLR group).

Conclusion: RTS or subjective rated knee function did not differ between patients treated with or without ACLR at two years after ACL-injury or ACLR. This could be important in the treatment decision considerations

Injury pattern in Swedish male elite Ice Hockey - A registry study.

Stefan Kauppinen, MD, PhD student¹, Sara Holmberg MD, associate prof ², Anders Stålmán, MD, associate prof¹, Björn Engström, MD, associate prof¹, Eva Bengtsson Moström, MD PhD¹,

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Key Words

Ice Hockey, Athletic Injury, Injury Incidence, Epidemiology, Concussion

Background: Ice hockey is a fast sport with a high risk of injury, even higher on a professional level. Checking and collisions are common. The speed and intensity are higher and the players more athletic and skilled than before. Although this sport has gone through changes no epidemiologic study describing the current injury pattern in Swedish hockey has been presented since the early 1990s. The number of other European studies are also few.

Aim: To report the game-related Incidence, Burden and Severity of Injury among Professional Male Ice Hockey Players during Six Seasons in the Swedish Hockey League (SHL).

Methods: In 2007 a web-based injury surveillance system, the Swedish National Sports Injury Registry, was launched for use in all SHL teams. It included a standardised injury and illness data form. Injury data has been prospectively collected by the team therapist and physician in every team using a combination of Time-loss and Medical Attention definition, including sutured lacerations, tooth injuries and fractures. Extracted injury data, from the last six SHL-seasons before the league was shut down due to Covid-19 pandemic 2020, where used.

Results: 2208 Injury Events captured in an Injury Report Form in the registry (regular/post season games/practices). The overall game-related Regular Season Incidence of Injury, Six Seasons (2013/2014-2018/2019) was 57.8 injuries/1000 player-game hours.

Conclusion: The Game-Related Incidence of Injury about the same as earlier Swedish studies but increased during the study period. Concussions more common and checking most common mechanism. Hip-groin and knee injuries were associated with longer time-loss.

Psychological support following ACL-reconstruction. The BAcK iN the Game randomised controlled trial

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AIM: To evaluate the efficacy of internet-delivered psychological support, the BAcK iN the Game (BANG) intervention after anterior cruciate ligament (ACL) reconstruction (ACLR) for improving return to pre-injury sport (RTS).

METHODS: Randomised control trial. Participants aged 15–30 years, who were playing contact or non-contact pivoting sport at least twice per week prior to ACL injury and intending to return to pivoting sports after ACLR, were included. Participants were randomised to either usual care (UC, standard post-operative treatment) plus the BANG intervention (BANG+UC group) or usual care alone (UC group). The intervention was a 24-week internet-delivered psychological support program. Participants reported sports participation fortnightly after ACLR and functional and psychological outcomes at 3- 6- and 12 months. Knee function was measured at 12 months after ACLR. New injuries were registered up to 24 months after ACLR.

RESULTS: 161 participants were included, 80 in BANG+UC group and 81 in the UC group. The RTS rate at 12 months was 36% in both groups with no significant differences in the proportion who RTS (rate ratio [RR], 1.01; 95% CI, 0.59–1.73; p=0.971) or in functional and psychological outcomes. Twelve participants sustained new ACL injuries (5 re-ruptures and 1 contralateral ACL injury in the BANG+UC group; 4 re-ruptures and 2 contralateral ACL injuries in the UC group) (p=0.974).

CONCLUSIONS: Internet-delivered psychological support did not improve the RTS rate, readiness to RTS or subsequent knee injuries beyond usual postoperative care for people with ACLR.