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ISOKINETIC DEFICITS AT 6 MONTHS AFTER ACL RECONSTRUCTION INFLUENCE THE RATE OF REINJURIES AND ACTIVITY LEVEL

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Background Recent evidence suggests that athletes may not be prepared to return to sport at 6 months following an anterior cruciate ligament (ACL) reconstruction.

Objective Identify knee isokinetic neuromuscular deficits at 6 months after ACL reconstruction and assess if deficits impact on the rate of new knee injuries and level of activity.

Design Retrospective study.

Setting Recreational and competitive athletes.

Patients (or Participants) Fifty-eight patients (27.1±7.1 years old; 79% male) that underwent ACL reconstruction (62% hamstrings and 38% bone-patellar-tendon-bone grafts) and that performed the knee isokinetic testing at 6 months.

Interventions (or Assessment of Risk Factors) Bilateral knee isokinetic assessment at 6 months, 6 and 8 Con/Con repetitions, at 60°/s and 180°/s, respectively.

Main Outcome Measurements Peak torque of knee extensors and flexors at 60°/s and 180°/s and Con/Con unilateral ratio. Prevalence of bilateral (>10%) and unilateral ratio (<0.47 and >0.80) abnormalities. The level of activity (Tegner) and number of new knee injuries (ACL or other knee injury).

Results Fifty-two participants (90%) had bilateral deficits at 60°/s, 74% and 59% for knee extensors and flexors, respectively. Unilateral abnormalities were present on 16% of participants at 60°/s and 180°/s. Thirty-seven participants had 2 or more years follow-up (28 hamstrings and 9 bone-patellar-tendon-bone graft). From these, there were 4 new ACL injuries (75% contralateral) and 8 other knee injuries (50% contralateral). Rate of new knee injuries was more frequent on hamstrings graft (25% vs 10%). Those with bilateral deficits at 60°/s (n=31) had higher rate of new knee injuries (23% vs 17%) and higher rate of Tegner level decrease (45% vs 17%).

Conclusions We found an unacceptably high rate of participants (90%) display knee isokinetic bilateral deficits at 60°/s at 6 months after ACL reconstruction. Bilateral deficits seem to influence the rate of new knee injuries and Tegner activity level.

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ASSESSMENTS FOR NEUROMUSCULAR CONTROL AFTER AN ANTERIOR CRUCIATE LIGAMENT INJURY TO DECIDE UPON RETURN TO SPORTS

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Background Adequate neuromuscular control of the knee could be one element to prevent secondary injuries after an anterior cruciate ligament (ACL) injury. However, it is unclear which measurements should be used to assess neuromuscular control of the knee for a safe return to sports (RTS).

Objective To summarize assessments for neuromuscular control after an ACL injury to decide upon a safe RTS.

Design Systematic literature review, registered in PROSPERO (CRD42019122188).

Setting MEDLINE, EMBASE, CINAHL, Cochrane Library, SPORTDiscus, PEDro, and Web of Science were searched from inception to March 2019 and updated in November 2020. Risk of bias was assessed with a modified Downs & Black checklist.

Patients (or Participants) Male or female adults after an ACL injury, either treated surgically or conservatively. Time from injury until the assessment should be at least six months and the participants should have medical clearance for RTS.

Interventions (or Assessment of Risk Factors) Assessments for neuromuscular control in ACL-injured adults compared to the contralateral limb or healthy controls during dynamic activities.

Main Outcome Measurements Outcome measures describing neuromuscular control of lower limb muscles in domains of time, amplitude or activity related to electromyography (EMG).

Results From initially 1388 hits, a total of 38 mainly cross-sectional, case-controlled studies were included for qualitative analysis. Most studies provided surface EMG outcomes of thigh muscles during jumping, running or squatting. Outcomes measures described neuromuscular control of the knee in domains of time, amplitude or activity. Risk of bias was medium to high due to an unclear description of participants and prior interventions, confounding factors and incompletely reported results.

Conclusions Despite a wide range of EMG outcome measures for neuromuscular control, none was used to decide upon a safe RTS. Additional studies are needed to assess neuromuscular control in adult ACL patients to prevent secondary injuries.

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RISK FACTORS FOR CONTRA-LATERAL SECONDARY ANTERIOR CRUCIATE LIGAMENT INJURY: A SYSTEMATIC REVIEW WITH META-ANALYSIS

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Background There is limited knowledge about which risk factors that contribute to the high numbers of contra-lateral anterior cruciate ligament (C-ACL) injury after primary ACL injury.

Objective To systematically review intrinsic risk factors for sustaining a C-ACL injury.

Design A systematic review with meta-analysis according to the PRISMA guidelines. Four databases (MEDLINE, CINAHL, EMBASE, Sport Discus) were searched from inception to January 2020. Meta-analyses were performed and expressed as odds ratios (OR).

Setting The included studies describe a variety of sport settings and activity levels.

Participants The review comprises studies including males and/or females of any age with ACL injury.

Assessment of Risk Factors The review comprises longitudinal studies investigating any intrinsic risk factor for future C-ACL injury.

Main Outcome Measurements C-ACL injury

Results Thirty-five moderate-to-high quality studies were eligible for meta-analysis, including up to ~59 000 individuals. The following factors all independently increased the odds of sustaining a C-ACL: Returning to a high activity level (OR: 3.26, 95% CI: 2.10–5.06), BMI < 25 (OR: 2.73, 95% CI: 1.73–4.36), Age ≤ 18 years (OR: 2.42, 95% CI: 1.51–3.88), Family history of ACL injury (OR: 2.07, 95% CI: 1.54–2.80), Primary ACL reconstruction performed ≤ 3 months post injury (OR: 1.65, 95% CI: 1.32–2.06), Female sex (OR: 1.35, 95% CI: 1.14–1.61) and Concomitant meniscal injury (OR 1.21, 95% CI: 1.03–1.42). There were no associations between the odds of sustaining a C-ACL injury and Smoking status, Pre-injury activity level, Playing soccer compared to other sports or Timing of return to sport.

Conclusions Demographic factors such as female sex, young age and family history of ACL injury, as well as early reconstruction and returning to a high activity level all contribute to the risk of sustaining a C-ACL injury. Studies on modifiable sensorimotor risk factors are warranted.

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RISK FACTORS FOR GRAFT RUPTURE AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A SYSTEMATIC REVIEW WITH META-ANALYSIS

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Background Underlying factors contributing to increased risk of graft rupture after anterior cruciate ligament reconstruction (ACLR) are not well described.

Objective To systematically review intrinsic risk factors for sustaining a graft rupture.

Design A systematic review with meta-analysis according to the PRISMA guidelines. Four databases (MEDLINE, CINAHL, EMBASE, Sport Discus) were searched from inception to January 2020. Meta-analyses (random effect model) were performed and expressed as odds ratios (OR).

Setting The included studies describe a variety of sport settings and activity levels.

Participants The review comprises studies including males and/or females of any age who have had ACLR.

Assessment of Risk Factors All longitudinal studies investigating any intrinsic risk factor for future graft rupture were included.

Main Outcome Measurements Graft rupture.

Results Seventy-seven studies were eligible for meta-analysis. The following factors all independently increased the odds of sustaining a graft rupture after ACLR: Age ≤ 18 years (OR: 3.87, 95% CI: 2.32–6.46), higher pre-primary injury activity level (OR: 2.43, 95% CI: 1.56–3.82), family history

of ACL injury (OR: 1.98, 95% CI: 1.50–2.62), returning to a high activity level (OR: 1.87, 95% CI: 1.11–3.15), and increased lateral tibial slope (OR: 1.64, 95% CI: 1.13–2.38). None of the following factors were found to be associated with future graft rupture; sex, smoking status, generalized joint laxity, timing of surgery or return to sport (RTS), playing soccer compared to other sports, hop performance at time of RTS or concomitant meniscal or collateral ligament injuries.

Conclusions Young age, family history of ACL injury, high tibial slope and previous and current high activity level should be considered when screening for increased risk of graft rupture following ACLR. Future studies on the possible role of sensorimotor factors, e.g., muscle activation and/or strength and proprioception for future graft ruptures are warranted.

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PREVENTING ACL REINJURIES – IS PERSISTENT KNEE UNDERLOADING AT RETURN TO SPORTS AFTER RECONSTRUCTION THE CULPRIT?

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Background Hop tests are part of the discharge criteria to determine return to sports (RTS) following anterior cruciate ligament reconstruction (ACLR). Usually, only the distance hopped is measured, but little is known regarding biomechanical performance during these tests.

Objective Describe biomechanical parameters of ACLR patients during single and triple hop for distance at the time of RTS.

Design Cross-sectional study.

Setting Laboratory, level I sport athletes.

Patients (or Participants) 28 males: 14 primary ACLR patients (24±6 years) who were cleared to RTS, 14 healthy recreational athletes (30±5).

Interventions (or Assessment of Risk Factors) Biomechanical differences between limbs and groups.

Main Outcome Measurements Knee power absorption and generation during the propulsion and landing phases of single and triple hops.

Results Despite similar hop distance, ACLR patients had significantly lower between-limb knee power generation ($d=1.12$, $p=0.001$), and absorption ($d=1.00$, $p=0.002$) during single hop and less power compared to controls in both phases ($d=0.78$, $p=0.05$). During triple hop, ACLR patients displayed less knee power generation in the first ($d=1.11$, $p=0.001$) and second hop ($d=1.14$, $p=0.001$) and less power absorption in the final landing ($d=0.73$, $p=0.017$) in comparison to the uninjured leg. Similarly, ACLR patients had less knee power generation in the first ($d=1.69$, $p=0.000$) and second hop ($d=1.21$, $p=0.004$) and less absorption in the final landing ($d=1.09$, $p=0.008$) compared to the control group.

Conclusions ACLR patients underload their injured knee despite meeting hop distance targets to be cleared to RTS. This pattern has not been documented previously and could explain the high risk of reinjury to the knee and other structures in the kinetic chain after RTS.