STOCKHOLM SPORTS TRAUMA
RESEARCH CENTER

ERFORSSALEN_ Paper presentation, Thursday, October 16th 16.00

Chair: Anders Stålman, PhD, Associate prof., MD, and Björn Engström, PhD, Associate prof. MD

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

1. 16.00-16.08 **Outcomes following Arthroscopic Chondro-Gide repair of osteochondral defects of the talus** – Yousef Al-Khatib, MD, Trauma and Orthopaedics, Stoke Mandeville Hospital, Aylesbury, GBR

2. 16.09-16.17 **Fiber continuity following non-surgical treatment after ACL-injury and associations with clinical outcomes** – 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

3. 16.18-16.26 **Arthroscopic and longitudinal MRI findings in the ACL-injured knee – the prospective NACOX cohort** – Håkan Gauffin, PhD, MD, Orthopedics and Department of Biomedical and Clinical Sciencies, and Center for Medical Image Science and Visualization, Linköping University, SWE

4. 16.27-16.35 **Knee hyperextension is not associated with anterior knee laxity, subjective knee function or revision surgery after ACL reconstruction in children and adolescents** – Frida Hansson, MD, Department of Molecular Medicine and Surgery, Stockholm Sports Trauma Research Center, Karolinska Institutet, SWE

5. 16.36-16.44 **Associated injuries at primary ACL reconstruction in higher-level athletes: A nationwide cross-sectional study from the Swedish National Knee ligament Registry linked to six sports organizations** – Daniel Castellanos Dolk, MD, Department of Molecular Medicine and Surgery, Stockholm Sports Trauma Research Center, Karolinska Institutet, SWE

6. 16.45-16.53 **Second ACL injury in Football Players: A Meta–analysis and Systematic review to identify new Research Frontiers** – Adolfo López, MD, Department of Molecular Medicine and Surgery, Stockholm Sports Trauma Research Center, Karolinska Institutet, SWE

Outcomes Following Arthroscopic Chondro-Gide Repair of Osteochondral Defects of The Talus

Yousef Al-Khatib[1], Adetokunbo Adesina[1], Bennet Aboagye[1], Radwane Faroug[1]

1. Trauma and Orthopaedics, Stoke Mandeville Hospital, Aylesbury, United Kingdom.

Background:

Osteochondral defects (OCD) of the talus are associated with pain and ankle joint dysfunction. Autologous Matrix-Induced Chondrogenesis (AMIC) is one of the arthroscopic surgical techniques described for the treatment of talar OCD.

There is very little evidence evidence on the use of Chondro-Gide or any other synthetic matrix for OCD of the talus.

Aims:

Investigating patient outcomes along with the relationship between lesion diameter and patient outcomes.

Methods:

A retrospective cross sectional study was carried out with patient outcomes being recorded. Olerud-Molander Ankle Score (OMAS) was recorded for each patient during clinic follow ups as well as visual analogue scores (VAS). Both pre-operative and post-operative OMAS and VAS scores were recorded at the 12-week post-operative follow up. Other factors recorded were recorded such as lesion size, site of OCD, post-operative complications, patient age and gender.

Results:

16 patients were identified with isolated talus OCD. Average Pre-operative OMAS score was 30(range=10-45) while post-operative OMAS scores were 72.7 (range= 65-100, $P<0.05$). VAS scores were on average 7.85 pre-operatively compared to 2.69 post-operatively ($P<0.05$). Average OCD diameter was 8.9mm (Range= 3-14). There was no statistically significant correlation between OCD lesion diameter and improvement in OMAS scores($p>0.05$). The most commonly reported complication by patients was post-operative stiffness.

Conclusion:

We demonstrated positive outcomes following arthroscopic osteochondral lesion repair using Chondro-gide. While there is a paucity of evidence on the use of AMIC to treat talar OCDs, this is the largest study investigating the use of Chondro-Gide for isolated OCD of the talus.

Fiber continuity following non-surgical treatment after ACL-injury and associations with clinical outcomes

Joanna Kvist PhD,[1,2] Nicola Giannotti,[3] Angie Liu,[4] Stephanie Filbay PhD,[5] Henrik Hedevik MSc,[1] Anders Stålman PhD,[6] Richard Frobell PhD,[7] Håkan Gauffin PhD,[2,8] Martin Englund PhD[7]

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[6] Stockholm Sports Trauma Research Center, MMK, Karolinska Institutet. FIFA Medical Center of Excellence at Capio Artro Clinic, Sophiahemmet hospital.
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AIM: i) compare ACL fiber continuity on MRI at 3- and 6-months post-injury, between patients treated with or without ACL-reconstruction (ACLR) during the first year after injury, and ii) associate with clinical outcomes

METHODS: We included 129 patients, aged 15–40 years, with acute ACL injury from the NACOX cohort where patients were treated according to usual clinical practice (supervised rehabilitation before considering ACLR). Patients were censored after ACLR.

3D-MRIs were acquired at baseline, 3 and 6-months post-injury. The fiber continuity dimension of the ACL Continuity Thickness and Shape (ACTS) scoring system was used to analyse change in fiber continuity status. At 3-months post-injury, patients completed questionnaires about perceived knee function and knee stability, and they were tested for knee laxity (KT-1000) and muscle strength.

RESULTS: At 12 months, 56 (43%) participants had undergone ACLR (9 before 3-months and 31 before 6-months). At least one step improvement in fiber continuity grade was seen at 3- and 6-months in 10 (22%) and 8 (38%) of those who underwent ACLR compared to 22 (37%) and 33 (57%) of those who did not undergo ACLR (Fisher's exact, $p>0.05$). Interactions between treatment and fiber continuity showed better self-reported knee stability (full factorial linear regression, $p=0.007$) at 3-months in those who did not undergo ACLR. No other interactions were found between fiber continuity, treatment and patient-reported or clinically-measured outcomes.

CONCLUSIONS: Fiber continuity improved post-injury. Although not statistically significant, there was a tendency towards greater improvement in fiber continuity in the non-ACLR group

KEY-WORDS: ACL, non-surgical treatment, MRI, ligament continuity, knee stability

Arthroscopic and longitudinal MRI findings in the ACL-injured knee - the prospective NACOX cohort

Key words: ACL, 3D MRI, MRI scoring, knee arthroscopy, knee laxity, knee function.

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Background: There are resent reports showing improvements of MRI structure after ACL injury.

Aim: To report the arthroscopic findings in the prospective NACOX cohort and relate it to 3D MRI findings of the ACL structure.

Methods: In 129 patients, 15–40 years, with acute ACL injury from the prospective NACOX-cohort, 22 had a knee arthroscopy in the first two years post-injury.
Initially an orthopaedic surgeon made a clinical diagnosis verified by standard clinical 2D MRI. At baseline and follow-ups 3-, 6-, 12- and 24-months post ACL-injury, MRIs were also acquired with 3D sequences, reconstructed on oblique coronal parallel to ACL, sagittal and axial planes and evaluated according to the ACL Continuity Thickness and Shape (ACTS) score.

Results: One patient had at least 1 step deterioration in the ACL continuity up to 24 months and ACL was totally ruptured at arthroscopy.
15 patients had at least 1 step improvement in the ACL continuity score up to12 months and 14 up to 24 months. Still, two of them had a total ACL rupture at arthroscopy.
However, three were planned for ACL reconstruction, but had it cancelled since they were mechanically stable at the preoperative examination and in an initial arthroscopic check ACL was almost intact. Two of these stayed improved in ACL continuity, but one deteriorated up to 24 months.

Conclusion: 3D MRIs and ACTS scoring reveals that ACLs considered to be completely ruptured initially by 2D MRI may have parts in continuity and could potentially improve gradually, but probably not completely.

Knee hyperextension is not associated with anterior knee laxity, subjective knee function or revision surgery after anterior cruciate ligament reconstruction in children and adolescents

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1. Department of Molecular Medicine and Surgery, Section of Sports Medicine, Karolinska Institutet, Stockholm, Sweden.
2. Stockholm Sports Trauma Research Center (SSTRC), FIFA Medical Centre of Excellence, Stockholm, Sweden.

Background: Anterior cruciate ligament (ACL) injuries are one of the most common knee injuries in children and adolescents. ACL reconstruction (ACLR) is indicated in patients experiencing instability and aim to return to pivoting sports. Knee hyperextension (KHE), may influence ACLR outcomes, but the literature is conflicting in adult populations and there is limited evidence in paediatric and adolescent populations.

Aim: To evaluate whether contralateral knee hyperextension (KHE) is associated with anterior knee laxity, subjective knee function or revision surgery after primary ACLR in patients <18 years.

Methods: Patients <18 years who underwent primary ACLR at Capio Artro Clinic, Stockholm, Sweden between January 2002 and March 2017 were identified. They were dichotomised into a 'hyperextension' group (≤-5°) and 'no hyperextension' group (>-5°) depending on preoperative contralateral passive knee extension degree. Anterior knee laxity (KT-1000 arthrometer) was measured preoperatively and 6 months post-operatively. The knee injury and osteoarthritis outcome score (KOOS) was collected preoperatively and after 2 years. Revision ACLR within 5 years after primary ACLR was captured in the Swedish National Knee Ligament Registry.

Results: 1250 patients (63.6% female [n = 795]; mean age 15.5 ± 1.5 years) were included (hyperextension group: 52.9% [n = 661]). Mean extension was -6.1 ± 2.2° in the hyperextension group and 0 ± 0.7° in the no hyperextension group. Hamstring autograft was used in 93.3% (1166 out of 1250). No significant difference between the groups was seen in anterior knee laxity or in the rate of surgical failure at 6 months post-operatively (side-to-side difference: >5 mm) (hyperextension group, 6.6% [32 out of 484 patients] vs. no hyperextension group, 6.8% [29 out of 428 patients]; p = ns). Statistically significant but non-clinically relevant intergroup differences were seen in the KOOS Sport/Recreation and Quality of Life subscales after 2 years. The rate of revision ACLR within 5 years was 11.1% (119 out of 1073 patients). The hazard for revision ACLR in the hyperextension group was not significantly different from the no hyperextension group (hazard ratio, 0.91; 95% confidence interval, 0.63-1.31; p = ns).

Conclusions: There was no significant association between preoperative passive contralateral KHE and anterior knee laxity, subjective knee function or the risk of revision ACL surgery in paediatric patients. These findings suggest that KHE alone should not preclude the use of hamstring tendon grafts in children and adolescents undergoing ACL reconstruction. The study found a high rate of revision ACL surgery in this paediatric population.

Keywords: ACL reconstruction; adolescents; children; knee hyperextension; laxity; revision

Associated injuries patterns in primary ACLR in athletes across six sports.

Daniel Castellanos Dolk, MD[1]; Helena Stigson, PhD[1]; Per Wretenberg, PhD, MD[2]; Joanna Kvist, PhD, RPT[3]; Anders Stålman, MD, PhD[1]

[1]Karolinska Institutet; [2]Örebro University; [3]Linköping University

Background

Patterns of associated injuries found during anterior cruciate ligament reconstruction (ACLR) vary, likely due to differing sport injury mechanisms, but few studies have examined patterns in higher-level athletes.

Aim

This study aimed to investigate the pattern of associated injuries in higher-level athletes across six sports undergoing primary ACLR.

Methods

This cross-sectional cohort study included higher-level athletes from the SWEREX cohort to assess associated injuries during primary ACLR (n=725). Logistic regression analysis was performed comparing sports, sexes, age and time from injury to surgery.

Results

Males had higher odds of lateral meniscus injury (OR 1.65; 95% CI 1.16-2.36) and cartilage injury (OR 1.59; 95% CI 1.01-2.52). Compared to football (n=224), there was a higher odds of cartilage injuries in basketball (OR 2.90; 95% CI 1.54-5.47), and a higher odd of MCL injury and multiligament knee injury in both ice-hockey and alpine sports. Athletes undergoing ACL-R > 6months after injury had higher odds of medial meniscus injury (OR 1.84; 95% CI 1.03-3.29) compared to those undergoing surgery within the first 3 months. Compared to athletes <20 years, those ≥ 26 years had higher odds of lateral meniscus injury (OR 1.91; 95% CI 1.21-3.03).

Conclusion

Males had higher odds of associated lateral meniscal and cartilage injuries; basketball players were prone to cartilage injuries, while ice-hockey players and alpine skiers had higher odds of multiligament injuries. Delayed ACL surgery >6 months was linked to two times higher odds of medial meniscus tears. Age ≥26 years increased twice the odds of lateral meniscus injury.

Key words

Knee; anterior cruciate ligament; associated injuries; athletes; registry

Second ACL injury in Football Players:
A Meta–analysis and Systematic review to identify new Research Frontiers.

Adolfo López, Gonzalo Mariscal, Anders Stålman, Christoffer Von Essen, Alexander Sandon

Abstract

Objective

To describe the incidence of subsequent anterior cruciate injuries (ACL) in football players and analyze related factors in order to identify key areas for future research.

Design

Systematic review and metaanalysis.

Data sources

PubMed, EMBASE and the Cochrane Collaboration Library. The search period extended from the inception of each database to 10 January 2025.

Methods

Studies that reported subsequent ACL injuries in football players were identified and included in the meta-analysis. The outcome of interest was the rate of subsequent ACL injuries calculated as the sum of graft rupture (ipsilateral) or contralateral ACL injury. The methodological quality of the studies was assessed using MINORS criteria. Statistical analysis were performed using Review Manager. Subgroup analyses were conducted based on potentially influential factors. Sensitivity analyses were carried out to assess the robustness of the estimates.

Results

Thirty-one studies with data over 15,000 players (52% male and 48% females) were included. The overall rate of second ACL injury was 22.2% (95% CI 19.06–25.27, p<0.01). There was a slightly higher rate of contralateral injuries 12.4% (95% CI 9.24–15.60, p<0.01) compared to graft ruptures 10.7% (95% CI 8.51–12.89, p<0.01). Among professional players, the incidence was 20.3% (95% CI 16.17–24.36, p<0.01). Female players showed a 30% higher risk of subsequent ACL injury (OR 1.3, p<0.01), with higher rate of graft rupture and contralateral ACL injury. The pooled incidence of second ACL injuries in football players was 18.5% in males and 25.3% in females. Hamstring grafts showed a higher graft rupture rate (11.2%) compared to BPTB grafts (9.49%). Players aged under 21 years at first ACLR faced the highest risk of second ACL injury with a pooled rate of 32.56% (95% CI 17.44–47.67, p<0.01).

Conclusions

Between one in five to one in four football players sustained a subsequent ACL injury. The reported incidences may be underestimated due to study limitations and methodological design of the studies. Future research should focus on football-specific populations, taking into account differences in sex, level of play, and age. The football medical community must address ACL injuries from multiple perspectives

to develop effective surgical strategies, optimize rehabilitation protocols, and ensure safer return-to-sport practices for football players and reduce subsequent injuries.

PROSPERO Registration ID: CRD42025638110