

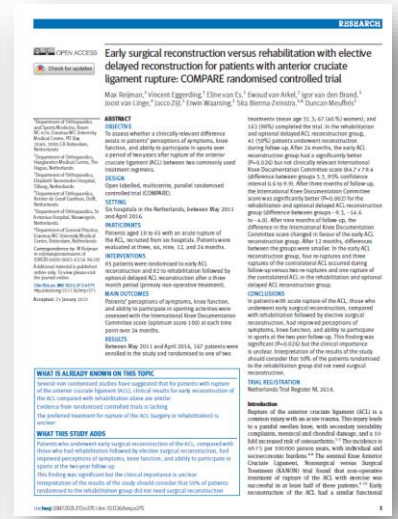
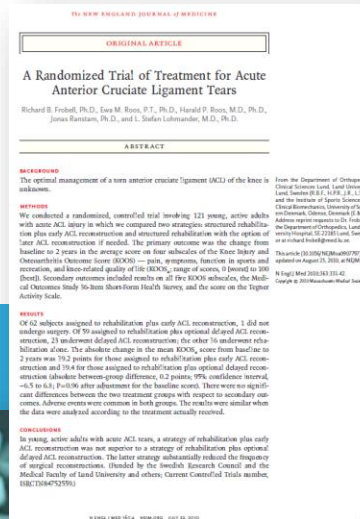
# ACL rupture



paradigm shift


• evidence based

Higher	Level 1	Meta-analysis of Homogenous RCTs Randomized Control Trial
	Level 2	Meta-analysis of Level 2 or Heterogenous Level 1 Evidence Prospective Comparative Study
	Level 3	Review of Level 3 Evidence Case-control Study Retrospective Cohort Study
	Level 4	Uncontrolled Cohort Studies Case Series
	Level 5	Expert Opinion Case Report Personal Observation
	Foundational Evidence	Animal Research <i>In Vitro</i> Research Ideas, Speculation
Lower		



KCE-181158: Feasibility of conducting a pragmatic, randomized trial that compares Immediate versus Optional Delayed surgical repair for treatment of acute anterior cruciate ligament injury - IODA trial

- Options:
  - early reconstruction or rehabilitation with optional delayed reconstruction
- Evidence:
  - KANON trial, COMPARE trial, (SNNAP trial: chronic)
  - (ongoing: IODA trial, NNKLR trial)
- Masterpaper KUL (Lissens, Peers 2020)
  - 240/395 (60%): 1 option (early ACLR)
  - 328/395 (83%): insufficient information
  - 25/395 (6%): EBM options

**VISUAL ABSTRACT**  **Primary surgery versus primary rehabilitation for treating anterior cruciate ligament injuries**

BMJ Journals Living systematic review

Owen PJ, Saueressig T, Braun T, Steglich N, Diemer F, Zebisch J, Herbst M, Zinser W & Belavy DL

**Summary** In people with acute anterior cruciate ligament (ACL) rupture, primary rehabilitation with optional surgical reconstruction results in no clinically relevant differences in patient-reported outcome measures compared to early surgical reconstruction.

**Data** 3 studies 320 patients Randomised controlled trials of patients with acute anterior cruciate ligament rupture.

**Comparison**  
**Surgery** Any method of reconstruction or type of reconstruction technique.  
**Rehabilitation** Any type (e.g. physiotherapy, exercise training) with optional delayed surgery.

**Estimates** Meta-analysis estimated odds ratio (OR) or standardised mean difference (SMD) with 95% credible intervals (CrI) at short- (<1 year), medium- (>1-3 years) and long-term (>3 years) follow-up. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach assessed certainty of evidence.

Outcome	Time Point	SMD (95% CrI)	GRADE
Self-reported knee function	Short-term	-0.1 (0.2, -0.4)	Low
	Medium-term	-0.1 (0.2, -0.4)	Low
	Long-term	-0.1 (0.2, -0.4)	Very low
	Any follow-up	-0.1 (0.2, -0.4)	Low
Radiological knee osteoarthritis	Long-term	0.8 (0.4, 1.2)	Very low
	Meniscal surgeries (Long-term)		
	Long-term	0.8 (0.4, 1.2)	Low
Health-related quality of life	Medium-term	-0.1 (0.2, -0.4)	Low
	Any follow-up	-0.1 (0.2, -0.4)	Low
	Self-reported return to activity		
Self-reported return to activity	Medium-term	-0.1 (0.2, -0.4)	Very low
	Long-term	-0.1 (0.2, -0.4)	Very low
	Any follow-up	-0.1 (0.2, -0.4)	Very low

**Updates:** <https://bit.ly/3ogGYle>

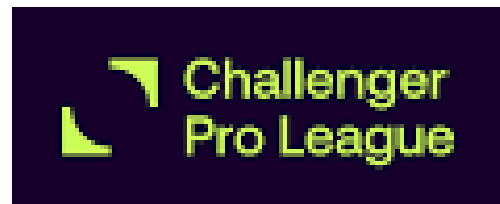
@PatrickOwenPhD | @PhysioMeScience | @belavyprof

**Full article:** <https://bit.ly/bjasm-acl>

**New and noteworthy**

- For people with persistent instability post ACL tear who did not receive rehabilitation, the ACL SNNAP trial showed surgery may be associated with greater improvements in patient-reported knee function.
- Spontaneous ACL healing (verified by magnetic resonance imaging) may occur within two years in 30-53% of people who receive primary rehabilitation.

- Return to sport elite/pivoting sports without ACLR?
  - Premier league: *Weiler BMJ 2015*
  - Jupiler league / Proximus league
  - Basket – Volley – Cheerleading – Jiu-jitsu – ...



Myth exploded

CASE REPORT

Non-operative management of a complete anterior cruciate ligament injury in an English Premier League football player with return to play in less than 8 weeks: applying common sense in the absence of evidence

Richard Weiler,<sup>1,2,3</sup> Mathew Monte-Colombo,<sup>4</sup> Adam Mitchell,<sup>5</sup> Fares Haddad<sup>2</sup>

BMJ

The top 100 most impactful articles on the anterior cruciate ligament: An altmetric analysis of online media

Matthew D Civilette<sup>1,2</sup>, William R Rate<sup>1</sup>, Brett D Haislup<sup>1</sup>, Andrew S Cohen<sup>2</sup>, Lyn Camire<sup>2</sup>, Blake M Bodendorfer<sup>4</sup> and Heath P Gould<sup>2</sup>

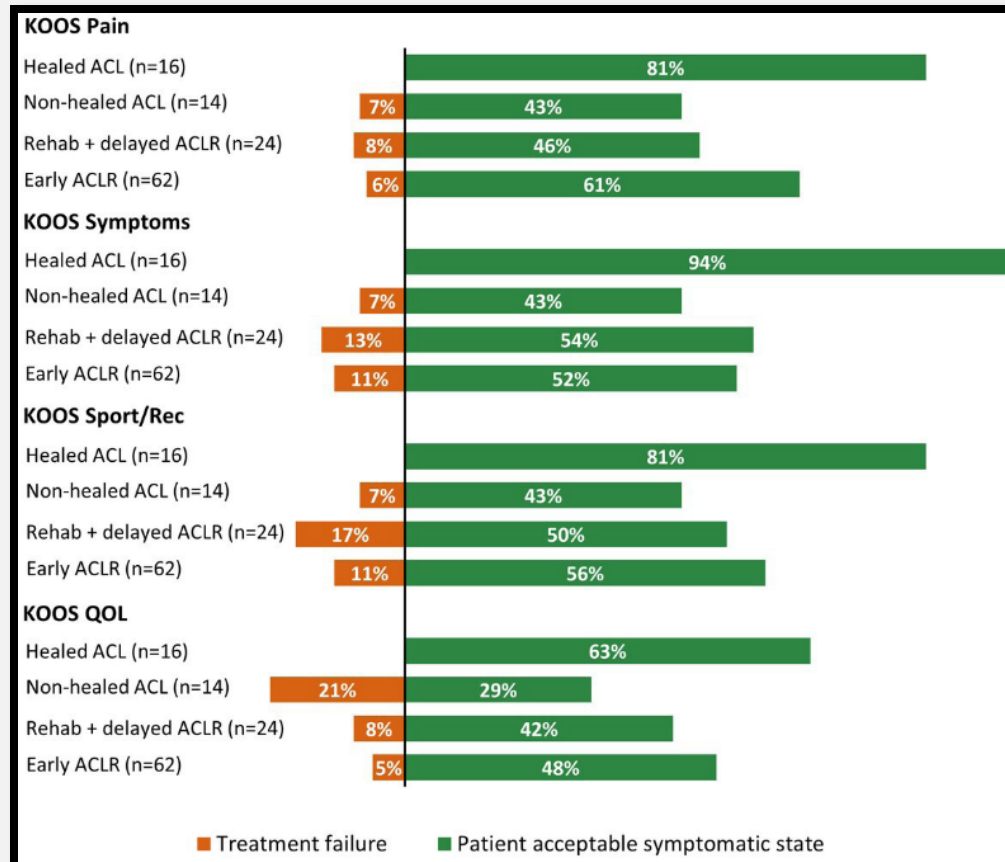


Evidence of ACL healing on MRI following ACL rupture treated with rehabilitation alone may be associated with better patient-reported outcomes: a secondary analysis from the KANON trial

Stephanie Rose Filbay <sup>1</sup>, Frank W Roemer <sup>2,3</sup>, L Stefan Lohmander <sup>4</sup>, Aleksandra Turkiewicz <sup>5</sup>, Ewa M Roos <sup>6</sup>, Richard Frobell <sup>4</sup>, Martin Englund <sup>5</sup>

		Rehabilitation alone at 5-year follow-up (n=28)				
ACLOAS ACL grade		3 months	6 months	1 year	2 years	5 years
Normal ACL	0	0 (0)	2 (17)	5 (38)	7 (28)	8 (33)
Thickened but normal course	1	8 (57)	4 (33)	0 (0)	0 (0)	0 (0)
Thinned/elongated but continuous	2	2 (14)	3 (25)	5 (38)	7 (28)	6 (25)
Absent/discontinuity	3	4 (29)	3 (25)	3 (23)	11 (44)	10 (42)
Delayed ACLR		–	–	–	–	–
Missing MRI		14*	16*	15*	3	4

## Patients with evidence of ACL healing - best PROMS



### WHAT THIS STUDY ADDS

- ⇒ Approximately half of all participants randomised to rehabilitation who did not cross over to delayed ACL reconstruction (ACLR) had evidence of ACL healing on MRI at 2-year and 5-year follow-up.
- ⇒ People with evidence of ACL healing on MRI at 2 years reported better Knee Injury and Osteoarthritis Outcome Score (KOOS) patient-reported sport and recreational function and KOOS-quality of life scores compared with the non-healed, delayed ACLR and early ACLR groups.
- ⇒ A high proportion of people (63% to 94%) with evidence of ACL healing on MRI reached the patient acceptable symptom state threshold for each KOOS subscale, and no one reached the criteria for treatment failure.

(Re)injury without ACL reconstruction?

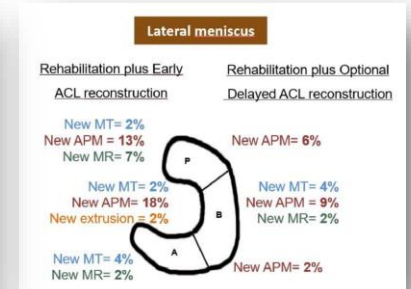
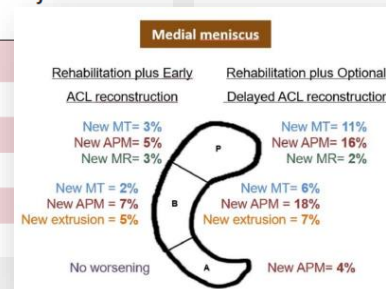
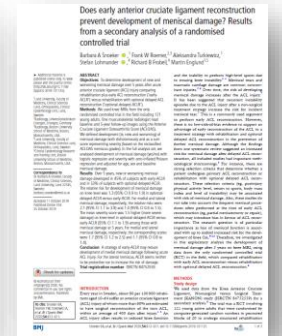
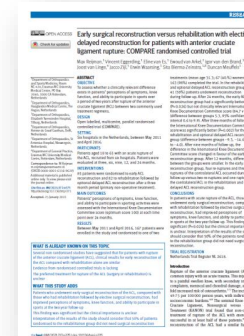
- COMPARE: 2Y f/u

Table 5 | Serious adverse events

Adverse event	Early ACL reconstruction (n=85)	Rehabilitation+optional delayed ACL reconstruction (n=82)
Re-rupture of ACL reconstruction (No)	4	2
Rupture of contralateral ACL (No)	3	1
Removal of tibial screw (No)	1	2
Arthroscopic intervention for meniscal tear after ACL reconstruction or new knee trauma (No)	4	3
Arthroscopic debridement for extension deficit (No)	2	4

- KANON: 5Y f/u meniscal surgery - damage

	Rehabilitation plus early ACL reconstruction (n=61)	Rehabilitation plus delayed ACL reconstruction (n=30)	Rehabilitation only (n=29)
Persons with development of meniscal damage on MRI, N (%)	27 (45)*	17 (57)§	12 (46)¶
Persons with meniscal surgeries (N, %)	30 (49)	17 (57)	15 (52)
Number of meniscal surgeries	37	25	19
Before ACLR, N (%)‡	0 (0)	13 (52)	—
During ACLR, N (%)‡	28 (76)	9 (36)	—
After ACLR, N (%)‡	9 (24)	3 (12)	—



- Osteoarthritis without ACLR?
  - 5y: KANON no difference on MRI
  - 20y: no RCT results

## Osteoarthritis and Cartilage



Surgical reconstruction of ruptured anterior cruciate ligament prolongs trauma-induced increase of inflammatory cytokines in synovial fluid: an exploratory analysis in the KANON trial

S. Larsson\*, A. Struglics, L.S. Lohmander, R. Frobell

Lund University, Faculty of Medicine, Department of Clinical Sciences Lund, Orthopaedics, Lund, Sweden

Original article

Loss of patellofemoral cartilage thickness over 5 years following ACL injury depends on the initial treatment strategy: results from the KANON trial

Adam G Culvenor,<sup>1,2</sup> Felix Eckstein,<sup>2,3</sup> Wolfgang Wirth,<sup>2,3</sup> L Stefan Lohmander,<sup>4</sup> Richard Frobell<sup>4</sup>

► Early reconstruction is unable to prevent structural deterioration in the patellofemoral joint after anterior cruciate ligament injury—from the viewpoint of patellofemoral pathology, early reconstruction is not indicated.

## Radiology

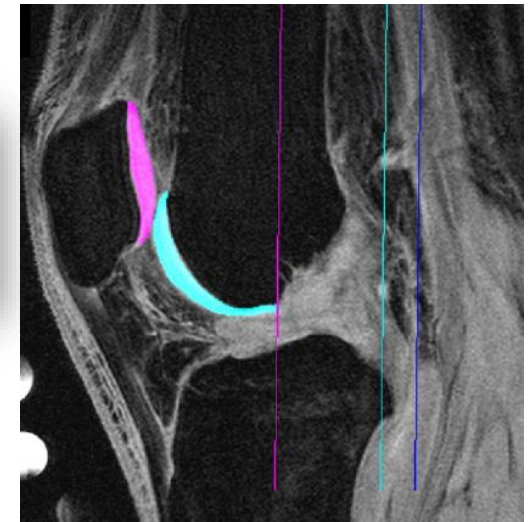
ORIGINAL RESEARCH • MUSCULOSKELETAL IMAGING

Development of MRI-defined Structural Tissue Damage after Anterior Cruciate Ligament Injury over 5 Years: The KANON Study

Frank W. Roemer, MD • L. Stefan Lohmander, MD, PhD • Martin Englund, MD, PhD • Ali Guermazi, MD, PhD • Anna Akesson, BSc • Richard Frobell, PT, PhD

### Summary

Young adults with acute anterior cruciate ligament injury showed no major difference in frequency of structural tissue damage on MRI scans at 2 and 5 years whether their injury was treated with reconstruction or rehabilitation alone.





- Osteoarthritis without ACLR?
  - 5y: KANON no difference on MRI
  - 20y: no RCT-results

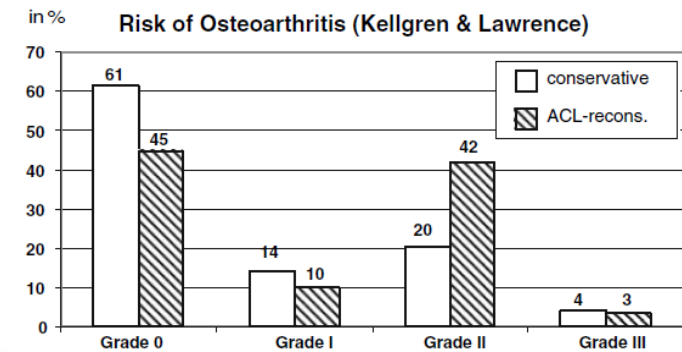
## Twenty-Year Follow-up Study Comparing Operative Versus Nonoperative Treatment of Anterior Cruciate Ligament Ruptures in High-Level Athletes

Daan T. van Yperen,<sup>\*,†</sup> MD, Max Reijman,<sup>†</sup> PhD, Eline M. van Es,<sup>†</sup> MSc, Sita M.A. Bierma-Zeinstra,<sup>‡</sup> PhD, and Duncan E. Meuffels,<sup>†</sup> MD, PhD  
*Investigation performed at the Department of Orthopaedic Surgery, Erasmus University Medical Center, Rotterdam, the Netherlands*



No difference regarding:

- Knee OA
- Functional outcome
- Meniscectomies

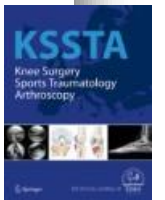


Knee Surg Sports Traumatol Arthrosc (2008) 16:442–448  
 DOI 10.1007/s00167-008-0498-x

KNEE

## Function, osteoarthritis and activity after ACL-rupture: 11 years follow-up results of conservative versus reconstructive treatment

M. A. Kessler · H. Behrend · S. Henz · G. Stutz ·  
 A. Rukavina · M. S. Kuster





- Cost effectiveness ?
  - EBM: ACLR unlikely to be cost-effective

## Original research



OPEN ACCESS

## ACL reconstruction for all is not cost-effective after acute ACL rupture

Vincent Eggerding <sup>1</sup>, Max Reijman,<sup>1</sup> Duncan Edward Meuffels <sup>1</sup>, Eline van Es,<sup>1</sup> Ewoud van Arkel,<sup>2</sup> Igor van den Brand,<sup>3</sup> Joost van Linge,<sup>4</sup> Jacco Zijl,<sup>5</sup> Sita MA Bierma-Zeinstra,<sup>6</sup> Marc Koopmanschap<sup>7</sup>

Routine early ACL reconstruction (index) is not considered cost-effective as compared with rehabilitation plus optional reconstruction for a standard ACL population (comparator) given the maximum willingness to pay of 20 000 €/QALY

## No economic benefit of early knee reconstruction over optional delayed reconstruction for ACL tears: registry enriched randomised controlled trial data

Aliasghar A Kiadaliri,<sup>1,2</sup> Martin Englund,<sup>1,3</sup> L Stefan Lohmander,<sup>4,5,6</sup> Katarina Steen Carlsson,<sup>7,8</sup> Richard B Frobell<sup>4</sup>

From a societal perspective, early ACL reconstruction is unlikely to be a cost-effective option compared with optional delayed ACL reconstruction if needed over a 5-year period.

- EBM: early ACLR or rehabilitation + optional delayed ACLR



- Shared decision



- Prediction: IODA



Receive news | Contact | Jobs | Sitemap | Data processing

Looking for what?  [SEARCH](#)

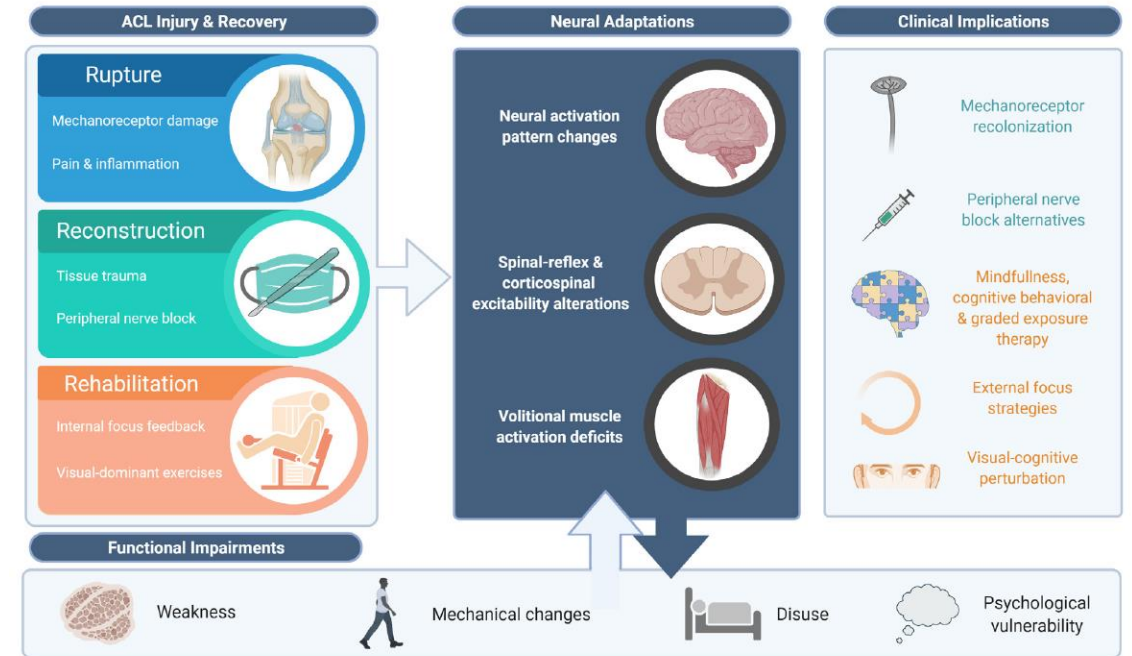
[Publications](#) [Workprogramme](#) [KCE Trials](#) [COVID-19 Contributions](#)

Home > KCE Trials > Eunded trials > KCE-181158

**KCE-181158: Feasibility of conducting a pragmatic, randomized trial that compares Immediate versus Optional Delayed surgical repair for treatment of acute anterior cruciate ligament injury - IODA trial**

Summary ([French](#) or [Dutch](#))

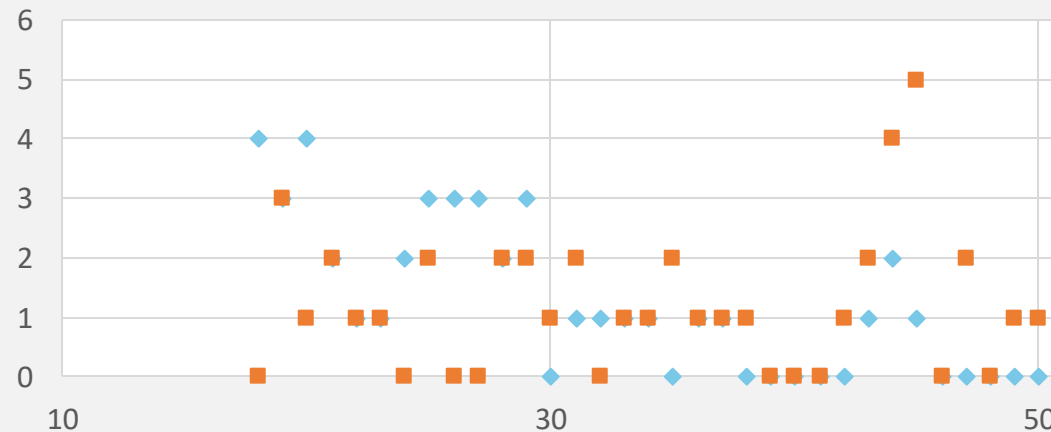
- Musculoskeletal complexity not simplicity
  - EBM: stability ≠ functionality
  - Neural impairments – adaptations
  - Fear and rehab / RTS
  - Risk factors: age – level of sport ?



- Musculoskeletal complexity not simplicity
  - Age – level of sport
  - = rehabilitation / reconstruction / general population

### AGE ≈ COMPARE

◆ delayed reconstruction    ■ rehabilitation only



**Early surgical reconstruction versus rehabilitation with elective delayed reconstruction for patients with anterior cruciate ligament rupture: COMPARE randomised controlled trial**

Max Heister, Vincent Eijndring, Eilwan Lu, Tamasz Aradi, Igor van den Broek, Frank van Laar, Casus Zuij, Frank Brouwer, Tim Steina-Dijkstra, Lucian Bekele

**ABSTRACT**  
To assess whether a clinically superior difference exists in patient-reported outcomes, knee function, and quality of life between early and delayed reconstruction of the anterior cruciate ligament (ACL) between the nonoperative and delayed groups.

**DESIGN**  
Open-label, randomised, parallel comparison randomised controlled trial (COMPARE).

**SETTING**  
The Hospital of the Netherlands, between May 2011 and April 2015.

**OBJECTIVE**  
To compare the effects of early ACL reconstruction (EARLY) and delayed ACL reconstruction (DELAYED) on patient-reported outcomes, knee function, and quality of life between the nonoperative and delayed groups.

**RESULTS**  
Patients in the EARLY group were significantly better at the primary outcome (Lysholm score) at 12 months (mean difference 1.5, 95% CI 0.5 to 2.5) compared with the DELAYED group. At 24 months, there was no significant difference between the groups. At 48 months, there was a significant difference in favour of the EARLY group (mean difference 1.5, 95% CI 0.5 to 2.5).

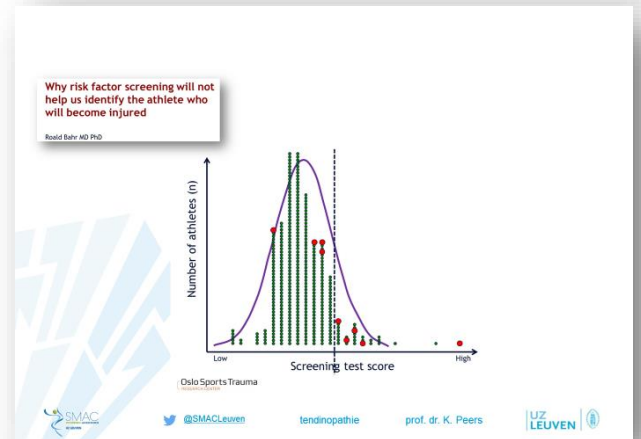
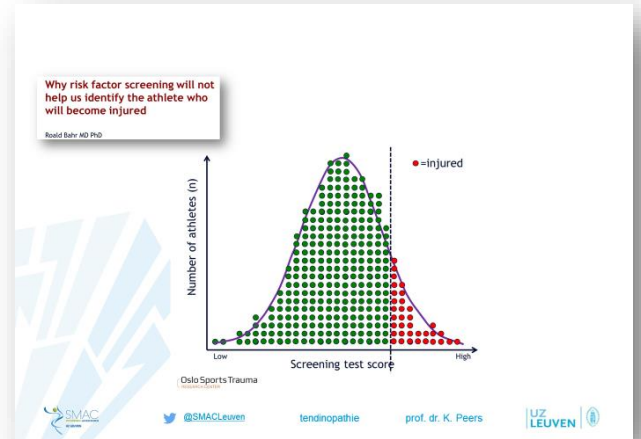
**CONCLUSIONS**  
Early ACL reconstruction resulted in better patient-reported outcomes at 12 months compared with delayed reconstruction. At 24 and 48 months, there was no significant difference between the groups.

**KEY WORDS**  
Anterior cruciate ligament, reconstruction, delayed reconstruction, randomised controlled trial, patient-reported outcomes, knee function, quality of life.

**WHAT IS ALREADY KNOWN ON THIS TOPIC**  
Several meta-analyses have suggested that for patients with acute ACL rupture, early ACL reconstruction is superior to nonoperative treatment. However, the comparative effectiveness of early and delayed reconstruction has not been established.

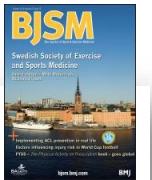
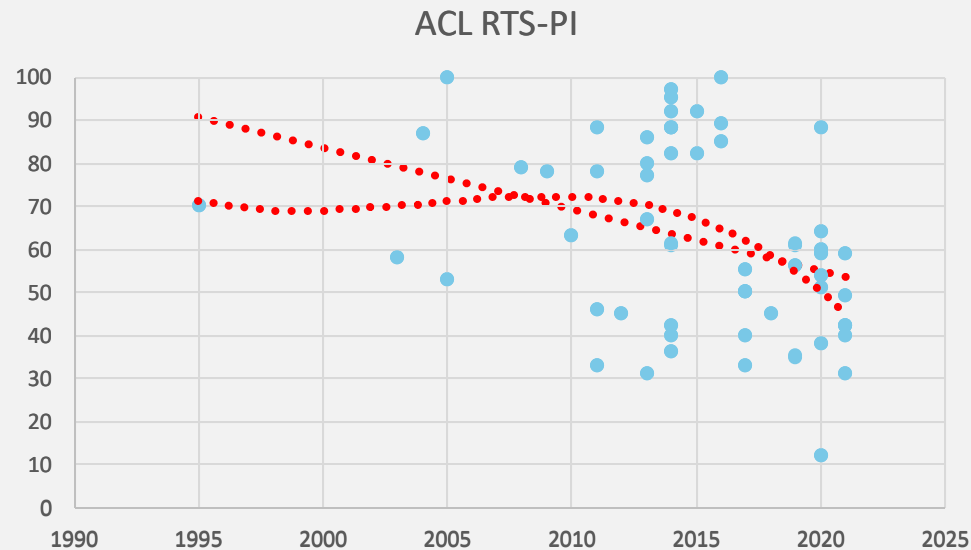
**WHAT THIS STUDY ADDS**  
Patients in the EARLY group were significantly better at the primary outcome (Lysholm score) at 12 months compared with the DELAYED group. At 24 and 48 months, there was no significant difference between the groups.

**REGISTRATION**  
COMPARE was registered on ClinicalTrials.gov on 10 May 2011 (NCT01250137).



- Importance of high quality ACL rehabilitation

### RTS-pre injury level: systematic reviews



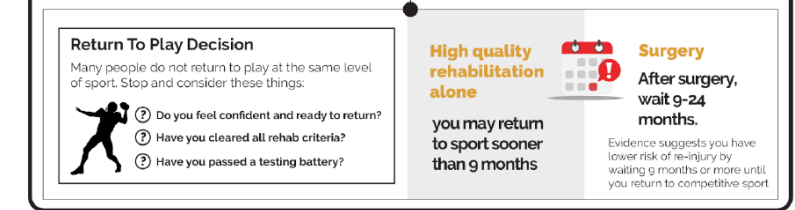
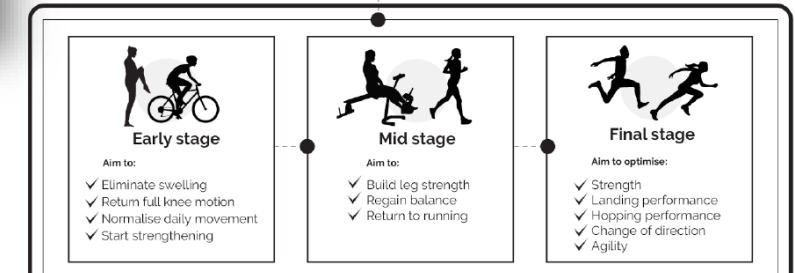
### Lower extremity performance following ACL rehabilitation in the KANON-trial: impact of reconstruction and predictive value at 2 and 5 years

Ylva B Ericsson,<sup>1</sup> Ewa M Roos,<sup>2</sup> Richard B Frobell<sup>3</sup>

- ▶ Muscle strength and physical performance can recover (as compared with the uninjured side) after 8 months of supervised exercise in a high proportion of young active individuals with acute anterior cruciate ligament (ACL) injury.
- ▶ We failed to identify differences in muscle strength and functional performance test results, performed at the end of the exercise period after ACL injury, between those treated with and without ACL reconstruction (ACLR).
- ▶ Results of the one-leg rise test, performed at the end of the exercise period after ACL injury, predicted self-reported outcome at 2 and 5 years after the injury.

Importance of high quality ACL rehabilitation

- Early rehabilitation
- Hard work
- Specific, criteria driven
- Variable, enjoyable
- Neural plasticity
- RTS decision



**Six-part return to sport tests** Discharge permitted when each of these criteria was met

Isokinetic test at 60, 180 and 300°/s	Quadriceps deficit < 10% at 60°/s
Single hop	Limb symmetry index > 90%
Triple hop	Limb symmetry index > 90%
Triple crossover hop	Limb symmetry index > 90%
On-field sports-specific rehabilitation	Fully completed
Running 1 test	< 11 s

• Importance of high quality ACL rehabilitation

- Early rehabilitation
- Hard work
- Specific, criteria driven
- Variable, enjoyable
- Neural plasticity
- RTS decision

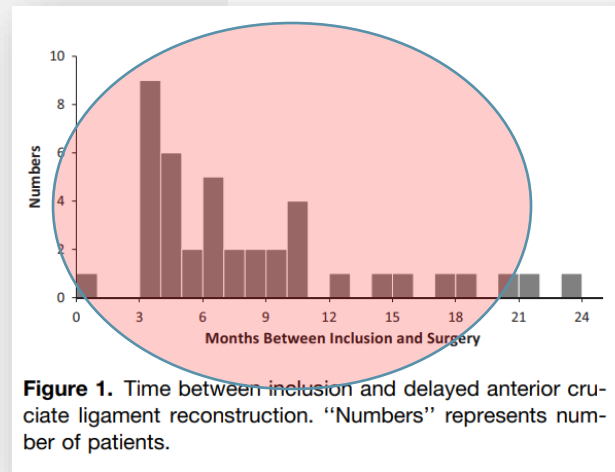


Figure 1. Time between inclusion and delayed anterior cruciate ligament reconstruction. "Numbers" represents number of patients.

2-3 → 1  
delayed surgery

Why, When, and in Which Patients Nonoperative Treatment of Anterior Cruciate Ligament Injury Fails

An Exploratory Analysis of the COMPARE Trial

Sabine J.A. van der Graaf,<sup>1</sup> MD, Duncan E. Meuffels,<sup>1</sup> MD, PhD, Sita M.A. Biema-Zainstra,<sup>2</sup> MD, PhD, Eline M. van Es,<sup>1</sup> MSc, Jan A.N. Verhaar,<sup>1</sup> MD, PhD, Vincent Eggerding,<sup>1</sup> MD, and Max Reijnen,<sup>1</sup> PhD  
Investigation performed at Erasmus MC University Medical Center

**Background:** The optimal treatment strategy for patients with an anterior cruciate ligament (ACL) rupture is still under debate. Different determinants of the need for a reconstruction have not been thoroughly investigated before.

**Purpose:** To investigate why, when, and which patients with an ACL rupture who initially started with rehabilitation therapy required reconstructive surgery.

**Study Design:** Case-control study; Level of evidence, 3.

**Methods:** In the Conservative versus Operative Methods for Patients with ACL Rupture Evaluation (COMPARE) trial, 167 patients with an ACL rupture were randomized to early ACL reconstruction or rehabilitation therapy plus optional delayed ACL reconstruction. We conducted an exploratory analysis of a subgroup of 82 patients from this trial who were randomized to rehabilitation therapy plus optional delayed ACL reconstruction. The reasons for surgery were registered for the patients who underwent a delayed ACL reconstruction. For these patients, we used the International Knee Documentation Committee (IKDC) subjective knee form, Numeric Rating Scale for pain, and instability question from the Lysholm questionnaire before surgery. To determine between-group differences between the nonoperative treatment and delayed ACL reconstruction group, IKDC and pain scores during follow-up were determined using mixed models and adjusted for sex, age, and body mass index.

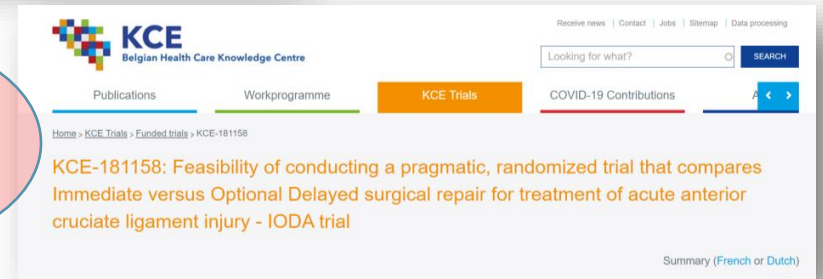
**Results:** During the 2-year follow-up of the trial, 41 of the 82 patients received a delayed ACL reconstruction after a median time of 6.4 months after inclusion (interquartile range, 3.5–10.3 months). Most reconstructions occurred between 3 and 6 months after inclusion (n = 17, 41.5%). Ninety percent of the patients (n = 37) reported knee instability concerns as a reason for surgery at the moment of planning surgery. Of these patients, 18 had an IKDC score ≤60, 70 had a pain score of ≥3, and 33 patients had knee instability concerns according to the Lysholm questionnaire before surgery. During follow-up, IKDC scores were lower and pain scores were higher in the delayed reconstruction group compared with the nonoperative treatment group. Patients in the delayed reconstruction group had a significantly younger age (27.4 vs 35.3 years; P < .001) and higher preinjury activity level compared with patients in the nonoperative treatment group.

**Conclusions:** Patients who experienced instability concerns, had pain during activity, and had a low perception of their knee function had unsuccessful nonoperative treatment. Most patients received a delayed ACL reconstruction after 3 to 6 months of rehabilitation therapy. At baseline, patients who required reconstructive surgery had a younger age and higher preinjury activity level compared with patients who did not undergo reconstruction.

**Keywords:** anterior cruciate ligament rupture; nonoperative treatment; patient-reported outcome measures

Finding out who needs which treatment at what moment is the challenge we try to solve after each anterior cruciate ligament (ACL) rupture. Currently, which treatment would be best for every patient cannot be determined on a scientific basis, and we do not know what treatment is successful in what situation. In a randomized controlled trial (RCT) comparing 2 different treatment strategies for ACL rupture, we found that early surgical reconstruction compared with rehabilitation therapy with optional delayed reconstruction, resulted in improved clinical outcomes at a 2-year follow-up that were significant but of uncertain clinical importance.<sup>1</sup> This study (Compare)

The American Journal of Sports Medicine  
DOI: 10.1177/0363546211066832  
© 2012 The Author(s)





<b>IODA PILOT TRIAL</b>	Total sample (mean±SD)
Number	29
Gender	6 females / 23 males
Age	27,25 ± 8,26 years
Height	176,89 ± 7,59 cm
Weight	75,57 ± 14,74 kg
Education	9 secondary school 14 bachelor degree 6 master degree
Randomization	14 immediate surgery 15 conservative treatment
Time to randomization	24,28 ± 10,59 days post-injury
Injury Mechanism	5 contact injury 24 non-contact injury

Competitive level	Recreational level	No regular sport participation
<b>17 soccer</b>	<b>3 soccer</b>	<b>1</b>
<b>2 ultimate frisbee</b>	<b>1 cycling</b>	
<b>2 volleybal</b>		
<b>1 handball</b>		
<b>2 basketball</b>		

Cruciate ligaments	+ Meniscus	+ Collateral ligaments	+ Cartilage
Full ACL: 16	Medial: 1	MCL: 9	Yes: 3
Partial ACL: 9	Lateral: 4	LCL: 1	No: 22
PCL : 0			

IODA: - Pragmatic RCT vs selection bias  
 - Trend less re-rupture  
 - Trend less delayed surgery

Cross over	Delayed surgery
5 patients	4 patients
3 patients Conservative → surgery 2 patients Surgery → conservative treatment	Between 6 en 36 months post-injury

**BMJ Open** Pilot study to investigate the feasibility of conducting a randomised controlled trial that compares Immediate versus Optional Delayed surgical repair for treatment of acute Anterior cruciate ligament injury: IODA pilot trial

Arvonne Smeets, Fergal Gallagher, Arvaz, Sjoey Boguett, An De Groot, Franck Rogge, Jean-François Kaloupek, Christophe Deruy, Jean-Louis Croisier, François Delvaux, Annouchka Lamen, Filip Blaes, Koen Poets

**ABSTRACT**  
 Background: Limited data on anterior cruciate ligament (ACL) repair include surgical reconstruction of the ACL. However, the nonoperative treatment of ACL reconstruction has not been evaluated. We conducted a randomised controlled trial comparing immediate versus optional delayed surgical repair for treatment of acute ACL injury. We aimed to assess whether patient specific parameters determine whether a patient would benefit from non-operative or operative treatment. We also assessed whether a patient's decision to undergo ACL reconstruction was influenced by patient specific parameters. We also assessed whether a patient's decision to undergo ACL reconstruction was influenced by patient specific parameters. We also assessed whether a patient's decision to undergo ACL reconstruction was influenced by patient specific parameters.

**Strengths and limitations of this study**  
 This pilot study assessed the feasibility of recruiting patients with an acute anterior cruciate ligament injury to a randomised controlled trial comparing immediate versus optional delayed surgical repair for treatment of acute ACL injury. The feasibility study is necessary because recruitment might be challenging because of patient-specific parameters. The pilot study also assessed whether patient specific parameters were associated with patient decision to undergo ACL reconstruction or not. The pilot study also assessed whether patient specific parameters were associated with patient decision to undergo ACL reconstruction or not. The pilot study also assessed whether patient specific parameters were associated with patient decision to undergo ACL reconstruction or not.

**INTRODUCTION**  
 An anterior cruciate ligament (ACL) rupture is a common sports-related injury, often affecting young adults. Approximately 7% of ACL ruptures are treated surgically. The decision to undergo ACL reconstruction is often influenced by patient specific parameters. The purpose of the ACL and damage to other knee structures, including meniscus, results in knee joint instability affecting daily activities and sports, leading to poor long-term quality of life.



## CONCLUSION:

EBM two options



Embrace complexity



Improve rehabilitation



Thanks & welcome to join us @ IODA

