

Anterior cruciate ligament reconstruction and accelerated brace-free rehabilitation: a systematic review. Part I. Hamstring tendon autograft

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BACKGROUND

Successful anterior cruciate ligament (ACL) reconstruction requires understanding of several factors: anatomic graft placement, mechanical properties of the selected graft tissue, mechanical behavior and fixation strength of fixation materials as well as the biological processes that occur during graft remodelling, maturation and incorporation. They influence directly the mechanical properties of the knee joint after ACL reconstruction and, therefore, determine the rehabilitation and time course until normal function of the knee joint can be expected. A major challenge in postoperative rehabilitation after ACL reconstruction is optimizing the balance between muscular strengthening exercises and loading of the graft without compromising graft integrity.

OBJECTIVES

To summarize the current knowledge on accelerated rehabilitation after hamstring tendon autograft ACL reconstruction.

MATERIALS & METHODS

A systematic search was performed from January 1, 1990 till December 31, 2014 in Medline (Pubmed), EMBASE (OVID), Cochrane Library and CINAHL according to PRISMA guidelines. A risk of bias assessment of the eligible articles was determined. Data collection included surgical techniques, graft type, patient demographics, details of rehabilitation, patient-reported outcome, clinical outcome measures and radiological evaluation. A 'best-evidence synthesis' was performed for the formulated research questions. Forty-five studies were included in the study. Part I presents the current knowledge on accelerated rehabilitation after hamstring tendon ACL reconstruction.



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RESULTS

Fig. 1 PRISMA flow chart

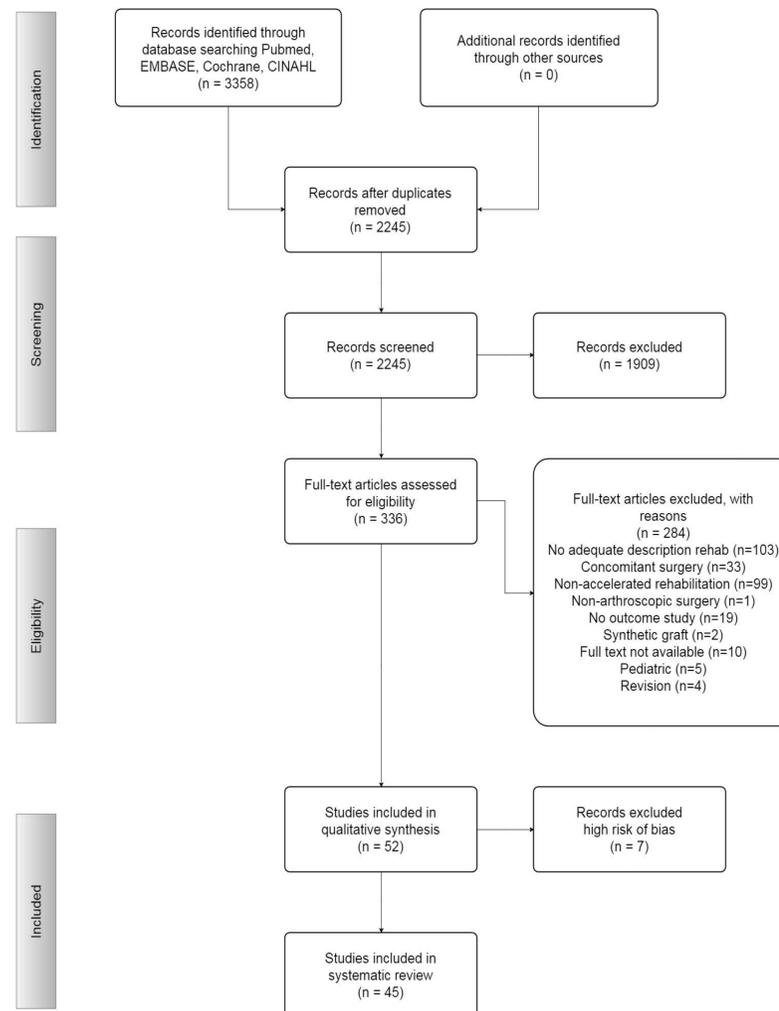


Table 1 Cochrane criteria for quality assessment of randomized controlled trials and cohort studies

Randomized controlled trial	Cohort studies
1. Is a method of randomization applied?	1. Are study groups clearly defined?
2. Is randomization blinded?	2. Is there any selection bias?
3. Are the patients blinded?	3. Is the exposure clearly defined?
4. Is the therapist blinded?	4. Is the outcome clearly defined?
5. Is the outcome assessor blinded?	5. Is the outcome assessment blinded?
6. Are the groups comparable?	6. Is the follow-up accurate?
7. Is there an acceptable lost-to-follow-up?	7. Is there an acceptable loss-to-follow-up?
8. Is there an intention-to-treat?	8. Are confounders described and/or eliminated?
9. Are treatments comparable?	



Research questions

1. How do different nonanatomic and anatomic surgical techniques affect the clinical outcome after accelerated brace-free rehabilitation?
2. How do different patient characteristics affect the clinical outcome after accelerated brace-free rehabilitation?
3. Does accelerated brace-free rehabilitation after ACL reconstruction influence tunnel widening?
4. How do differences in rehabilitation protocols affect the clinical outcome after accelerated brace-free rehabilitation?
5. Do hamstring tendons regenerate after harvest for ACL reconstruction with accelerated brace-free rehabilitation?
6. Does the current biological knowledge on hamstring autografts support early return to sports after ACL reconstruction with accelerated brace-free rehabilitation?

Results

After hamstring tendon ACL reconstruction with accelerated brace-free rehabilitation: (1) anatomic reconstructions showed better results than nonanatomic reconstructions; (2) there was no difference between single- and double-bundle reconstructions; (3) gender and age did not influence clinical outcome; (4) femoral and tibial tunnel widening occurred; (5) early start of open kinetic exercises at 4 weeks in a limited range of motion (90°-45°) and progressive concentric and eccentric exercises from 12 weeks did not alter outcome; (6) Nintendo Wii® activities could address physical therapy goals; (7) hamstring tendons regenerated after harvest and (8) biological knowledge did not support return to sports at 4-6 months.

CONCLUSIONS

Accelerated brace-free rehabilitation may contribute to successful ACL reconstruction with hamstring autografts in adult patients of all ages and gender. Further research is necessary to define the optimal balance of graft loading and graft healing in the various rehabilitation phases after ACL reconstruction as well as the development of valid, criterion-based assessments to determine readiness for sport-specific training and eventual safe return to sports.

Clinical rehabilitation impact

The commonly used accelerated rehabilitation protocol after ACL reconstruction needs to be customized and graft remodelling does not support return to sports at 4-6 months.

REFERENCES

Rob P.A. Janssen (2016) **Anterior Cruciate Ligament Reconstruction & Accelerated Rehabilitation. Hamstring Tendons, Remodelling and Osteoarthritis.** PhD Thesis Maastricht University ISBN/EAN 978-90-9029644-9

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