Anterior cruciate ligament reconstruction, hamstring versus bone-patella tendon-bone grafts: a systematic literature review of outcome from surgery

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CRD summary
This review compared the effectiveness of semitendinosus and gracilis (hamstring) grafts to bone-patella tendon-bone grafts in anterior cruciate ligament reconstruction. The authors concluded that there was no significant evidence to indicate that one graft is superior over the other. Given the lack of methodological detail, the conclusions of the review should be treated with caution.

Authors' objectives
To compare the effectiveness of semitendinosus and gracilis (hamstring, HT) grafts to bone-patella tendon-bone (PT) grafts in anterior cruciate ligament (ACL) reconstruction.

Searching
MEDLINE (from 1966 to 2003), CINAHL (from 1982 to 2002), Info Trac and the Cochrane Library (January 2003) were searched; the search terms were reported. The search was restricted to studies published in English. The reference lists of published articles were also checked.

Study selection
Study designs of evaluations included in the review
Quasi-randomised and randomised controlled trials (RCTs) were eligible for inclusion.

Specific interventions included in the review
Studies comparing HT grafts with PT grafts were eligible for inclusion. Where reported, the mean time between injury and surgery ranged from 10 weeks to 41.3 months.

Participants included in the review
Studies of adults and teenagers diagnosed with ACL injury in need of surgery were eligible for inclusion. Where reported, the mean age of the participants in the included studies ranged from 20.1 to 32 years and the majority of participants were male.

Outcomes assessed in the review
Studies reporting recovery of activity, treatment failure and functional outcomes were eligible for inclusion. The outcomes reported in the included studies were return to pre-injury level of sporting activity, pain, muscle strength, knee stability, range of motion, International Knee Documentation Committee (IKDC) score, reoperation and complications.

How were decisions on the relevance of primary studies made?
The authors did not state how the studies were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The criteria used to assess quality were: allocation concealment; the use of intention-to-treat analysis; blinding of the participants, carers and outcome assessors; the comparability of the baseline characteristics; the availability of additional care programmes, the reporting of inclusion and exclusion criteria; the definition of interventions and outcome measures; the use of a clinically useful diagnostic test in the outcome assessment; and whether surveillance was active and the study was of sufficient duration. The maximum score possible was 24. Methodological quality was assessed independently, without masking the authors' names or sources of the studies.
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative.

How were differences between studies investigated?
Differences between the studies were discussed in the text, and study details were tabulated in alphabetical order according to the first author.

Results of the review
Thirteen studies (n=1,145) were included in the review.

The quality of all the included studies was moderate, with the scores ranging from 6 to 16 out of a possible 24.

Return to pre-injury level of sporting activity: 9 studies were found. All 5 studies assessing outcomes using the Tegner activity score found no significant difference between PT and HT grafts. Two further studies reported that most patients returned to their pre-injury level of activity. Another study reported no significant difference in the return to sporting activity between the HT and PT groups. The final study found that more patients in the PT group returned to grade 3 and grade 4 activity levels, but there was no significant difference in the intensity of return to specific sport participation.

Pain: 8 studies were found. Three studies found no difference with respect to discomfort between PT and HT grafts. Studies found different results according to the site of pain. One study reported a difference in the site of pain experienced, with anterior pain worse after a PT graft and posterior pain worse after an HT graft. Over time, both groups reported anterior pain as worse. Two studies reported that patellofemoral pain was worse after a PT graft, whilst another 2 studies reported no difference.

Muscle strength: 9 studies were found. Six studies reported no difference in peak extension and flexion between PT and HT grafts. One study reported better isokinetic knee extension strength and endurance after 6 months in those with a PT graft, but this was no longer evident at 12 or 24 months.

Knee stability: 8 studies were found. Four studies found less residual anterior translation and, therefore, increased knee stability with a PT graft than with an HT graft. The other 4 studies found no difference in residual laxity. All 6 studies using the pivotal shift to assess stability reported that the majority of participants had a normal pivot shift 2 years post-surgery.

Range of motion: 11 studies were found. Seven studies found no significant difference in range of motion between PT and HT grafts. The other 4 studies found some differences in range of motion with PT and HT grafts, with mixed results: one reported no difference between the groups, one that flexion deficit was greater in the PT group, one that extension deficit was greater in the PT group, and one that extension deficit was greater in the HT group.

IKDC score: 7 studies were found. Four studies reported no difference in IKDC scores between PT and HT grafts. One study reported a higher incidence of A or B results after a PT graft. One study reported higher scores after a HT graft, but this was considered to be due to the underlying different general pain scores between the two groups.

Reoperation: 6 studies were found. Fifty-four patients who underwent a HT graft required additional surgery, compared with 20 patients after a PT graft.

Complications: 7 studies were found. Seven patients suffered complications after a HT graft versus 7 after a PT graft.
Authors' conclusions
There was no significant evidence to indicate that one graft was superior to the other.

CRD commentary
The review question and inclusion criteria were clearly reported. Several databases were searched. However, the search was restricted to studies published in English, thus potentially leading to language bias. Attempts were made to locate unpublished data and minimise publication bias, although the authors did not investigate whether publication bias was evident. The quality assessment was carried out in duplicate, but there was no indication as to whether the study selection and data extraction processes were conducted similarly. The potential for error and bias during the review process cannot, therefore, be assessed. The decision to combine the studies in a narrative was appropriate. The included studies had a wide range of quality scores, but the authors did not utilise these results in the narrative. In view of the lack of methodological detail, the conclusions of the review should be treated with caution.

Implications of the review for practice and research
Practice: The authors stated that both PT and HT grafts appear to improve patient performance, and that both are good choices for ACL reconstruction.

Research: The authors recommended further high-quality, large-scale RCTs that use the same surgical and fixation technique, rehabilitation protocol and outcome measures to compare HT and PT grafts.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.