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Opinion

What is the best evidence for graft choice in ACL reconstruction protocol for a systematic review and network meta-analysis

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Statistics

Figures	00
Tables	00
References	07

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Abstract

One of the most common sports medicine procedures is anterior cruciate ligament (ACL) reconstruction. For reconstruction, a variety of grafts, including allograft and autograft, are currently used. There is no high-quality quantitative synthesis of all randomised controlled trial (RCT) data on graft choice, despite numerous meta-analyses.

Keywords: proximal femoral nailing; osteosynthesis; numerical simulation; traumatology; FEM

INTRODUCTION

Multiple digital databases, including MEDLINE, Embase, and CENTRAL, will be searched independently and in duplicate for RCTs randomising graft choice in skeletally mature patients undergoing ACL reconstruction. For NMA, a Bayesian framework with a random-effects model will be used. For each outcome, the Surface Under the Cumulative Ranking Curve (SUCRA) values will be used to generate a rank list. The results will be reported as mean differences (MD) (or, if necessary, standardised mean differences) or Relative Risk (RR) with 95% Credible Intervals (CI). If the 95% CI of MD does not cross zero or the 95% CI of relative risk does not cross one, the comparison is considered statistically significant. The Cochrane risk of bias assessment tool will be used to evaluate the quality of the studies. For network meta-analyses, the quality of evidence will be determined using the Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) approach. This network meta-analysis will be reported in accordance with the PRISMA extension statement for network meta-analyses. Outcomes of interest: Range of motion, return to activity/sport, and IKDC, Lysholm, Tegner, ACL-QOL, and KOOS scores are among the functional outcomes of interest. Lachman's persistent laxity, pivot-shift, side-to-side, and measured laxity (e.g. KT-1000) will also be investigated. Tunnel osteolysis, failure (including but not limited to graft rupture and/or persistent laxity), and complications (e.g., infection, graft failure, donor site pain) will be compared between grafts[1,2].

RESULT

Anterior Cruciate ligament (ACL) reconstruction is one of the most commonly performed sports medicine procedures, and its use is increasing. For reconstruction, a variety of grafts, including allograft and autograft, have been used.

The most commonly used grafts are Bone-Patellar Tendon-Bone autograft (BPTB), hamstring autograft Quadriceps Tendon autograft (QT), and tibial tendon Allograft (TT), while hybrid grafts (autograft augmented with allograft) have recently received attention. Each graft has a distinct functional and complication profile, leaving surgeons and patients with the task of selecting grafts on an individual basis In fact, with the exception of QT, which has recently increased, modern graft preference has remained fairly consistent. Despite numerous meta-analyses and large prospective knee ligament registries, there is no clear preferred graft, as evidenced by the widespread use of a variety of grafts. There is currently no high-quality quantitative synthesis of all Randomised Controlled Trial (RCT) data on graft selection. Traditional meta-analyses are limited to comparing two groups, requiring either the exclusion of commonly used grafts or the grouping of different graft types. Network Meta-Analysis (NMA) generates multiple concurrent comparisons by combining direct and indirect evidence. As a result, the goal of this study is to identify the best graft for ACL reconstruction by conducting the first systematic review and NMA that includes both functional outcomes and complications.

METHOD

This systematic review and network meta-analysis will be performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) for network meta analyses and the Cochrane Handbook for Systematic Reviews of Interventions.

A PRISMA checklist for the reporting of network meta-analyses will be included as a supplementary material in the final publication [3-7].

STATISTICAL ANALYSIS

Statistical analysis was performed using R along with BUGSnet (Lighthouse Outcomes, Toronto, Canada) and CINeMA. The I2 statistic will be used to calculate study heterogeneity; if heterogeneity is high, a Bayesian framework with a random-effects model and non-informative priors will be used. For each outcome, a graphical framework of all trials comparing different interventions will be created. For each outcome, ranking diagrams and forest plots will be created. Additionally, surface under the cumulative ranking curve (SUCRA) values for each study will be reported. The SURCRA score indicates the likelihood that a given treatment will rank first in a specific category; a score closer to one indicates that the treatment is more likely to be the best treatment. The network's results for functional outcomes will be reported as mean differences (or, if necessary, standardised mean differences) with 95% Credible Intervals (CI).

As appropriate, complications will be presented using Relative Risk (RR), 95% credible intervals, and number needed to treat.

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