Bioabsorbable versus metallic interference screw fixation in anterior cruciate ligament reconstruction: a meta-analysis of randomized controlled trials

Shen C, Jiang SD, Jiang LS, Dai LY

CRD summary
The review concluded that there was no significant difference between bioabsorbable and metal screw fixation in terms of knee joint stability and knee function outcomes. Knee joint effusion was more common after anterior cruciate ligament reconstruction with bioabsorbable screw fixation. The review was generally well conducted but limitations of the included trials should be borne in mind.

Authors' objectives
To identify and summarise the evidence on the differences in outcomes between bioabsorbable and metallic screw fixation in anterior cruciate ligament reconstruction.

Searching
PubMed and The Cochrane Library were searched from January 1966 to December 2008. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) or quasi-RCTs of ligamentous reconstruction with single-bundle graft with either bioabsorbable or metal screw fixation in patients who presented with anterior cruciate ligament disruption and needed surgical intervention were eligible for inclusion. Trials had to provide objective measures of clinical outcomes. Trials without comparison of the clinical results (such as case-series and reviews) and trials without an English abstract were excluded.

The included trials, where reported, studied titanium metal screws versus polyglycolic acid (PGA), poly-L-lactic acid (PLLA), trimethylene carbonate (TMC) and PLLA with hydroxyapatite bioabsorbable screws. Graft material included bone-patella tendon-bone (BPTB), quadrupled hamstring tendon, hamstring tendon and Achilles tendon. Time to rehabilitation varied from immediately after surgery to two weeks after surgery. Length of follow-up ranged from 12 to 29 months. All trials were published between 1995 and 2008.

Two authors independently undertook the selection process.

Assessment of study quality
Quality assessment was undertaken independently by two reviewers using the Detsky 21-point scale to assess quality factors that included randomisation, study design, allocation concealment and analysis method. Disagreements were resolved by referral to a third reviewer.

Data extraction
Two authors independently extracted data on functional outcomes, radiographic outcomes, stability of the knee outcomes and complications. The authors used these data to calculate standardised mean differences (SMDs) for continuous outcomes or relative risks (RRs) for dichotomous outcomes, together with 95% confidence intervals (CIs). Disagreements were resolved by referral to a third reviewer.

Methods of synthesis
Pooled relative risks or SMDs, together with 95% CIs, were calculated using fixed-effect or random-effects meta-analysis. Where pooling was not possible, data were presented as a narrative synthesis. Statistical heterogeneity was assessed using $X^2$ and the $I^2$ statistic. Publication bias was assessed with funnel plot analysis. Subgroup analysis by type of bioabsorbable screw was undertaken.

Results of the review
Ten RCTs were included in the review (n=790 patients). Sample size ranged from 40 to 204. Trial quality varied from...
11 out of 21 to 18 out of 21 and six RCTs scored at least 14 out of 21. Compared with metal screw fixation, bioabsorbable screw fixation did not offer any statistically significant benefits in terms of KT-1000/2000 arthrometer testing (SMD -0.01, 95% CI -0.20 to 0.18, I²=7%; seven RCTs), pivot-shift testing (RR 1.06, 95% CI 0.67 to 1.67, I²=35%; four RCTs), international knee documentation committee final score (RR 0.87, 95% CI 0.51 to 1.51, I²=0%; five RCTs), Lysholm score (SMD 0.03, 95% CI -0.39 to 0.45, I²=54%; four RCTs) and infection rate (RR 0.96, 95% CI 0.30 to 3.13, I²=0%; five RCTs). Compared with metal screw fixation, bioabsorbable screw fixation had a statistically significantly higher incidence of knee effusion (RR 2.57, 95% CI 1.03 to 6.43, I²=0%; four RCTs). Three out of seven trials reported that tunnel widening on the femoral or tibial side was more prominent in patients who received bioabsorbable screw fixation compared with those in the metal screw group; the remaining four trials provided insufficient data.

Results by type of bioabsorbable screw were presented in the review.

**Authors' conclusions**
There was no significant difference between bioabsorbable and metal screw fixation in terms of knee joint stability and knee function outcomes. Knee joint effusion was more common after anterior cruciate ligament reconstruction with bioabsorbable screw fixation.

**CRD commentary**
Inclusion criteria for the review were clearly defined. Two relevant databases were searched. There was potential for language bias as only trials with an English-language abstract were included. Publication bias was assessed only when significant heterogeneity was detected and, therefore, could not be ruled out from the analysis completely; there was no attempt to locate unpublished data. Two authors performed study selection, data extraction and quality assessment, which minimised risks of error and bias in the analysis. The quality assessment indicated variable quality of the included trials, which was acknowledged by the authors. There were no details on patient characteristics. The authors acknowledged variability among trials in terms of grafts and implants. Where possible, trials were combined using meta-analysis. Appropriate methods were used to assess statistical heterogeneity. A small number of trials were included in the comparisons and they had small sample sizes. Confidence intervals for some comparisons (for example, incidence of knee effusion) were wide, which questioned the robustness of the findings.

Aside from a somewhat limited literature search, this was generally a well-conducted review. The authors’ conclusions appeared to reflect the evidence, but the limitations of the included trials should be borne in mind.

**Implications of the review for practice and research**

**Practice**: The authors did not state any implications for practice.

**Research**: The authors stated that high-quality RCTs with standardised and objective outcome measures were needed. Measurements of quality of life and patient satisfaction should be considered at follow-up.

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