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[Intervention Review]

Retention versus sacrifice of the posterior cruciate ligament in total knee replacement for treatment of osteoarthritis and rheumatoid arthritis

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ABSTRACT

Background

The functional and clinical results to support the choice whether or not to retain the posterior cruciate ligament (PCL) during total knee arthroplasty have not been gathered and analysed so far. There are at least some trials showing no difference.

Objectives

To identify the difference in functional, clinical, and radiological outcome between retention and sacrifice of the PCL in total knee arthroplasty in patients with osteoarthritis and other non-traumatic diseases.

Search methods

A search was conducted in MEDLINE (Through PubMed; 1966 - March 2004), EMBASE (1980 - March 2004), Cochrane Central Register of Controlled Trials (CENTRAL Issue 2004 - 1), and Current Contents (1996 - March 2004). Also, references of selected articles were checked and citation tracking on the articles selected was performed.

Selection criteria

Randomised controlled trials comparing retention to sacrifice of the PCL during total knee arthroplasty with regard to functional, radiological and clinical outcome in patients with osteoarthritis and other non-traumatic diseases were selected by two independent reviewers.

Data collection and analysis

Methodological quality was assessed with the checklist by van Tulder and the Jadad list. Data was collected with a predeveloped form. Meta-analysis was performed with subgroup analyses on age, gender, disease severity, and follow-up time, if allowed by adequate power.

Main results

Eight randomised controlled trials were found. Two treatment options were compared against PCL retention: PCL sacrifice without additional stabilisation (post and cam mechanism) (2 studies), and PCL sacrifice with posterior stabilized design (5 studies). One study included all three options. Range of motion was found to be 8.1° higher in the posterior stabilized group compared to the PCL retention group ($p=0.01$, 95% confidence interval [1.7, 14.5]), although the heterogeneity was high ($I^2 = 66.3\%$). PCL resection without substituting

the PCL with a posterior stabilised prosthesis showed no difference compared to PCL retention ($p=0.31$, $I^2 = 83.2\%$). On clinical scores, only Hospital for Special Surgery score revealed a significant difference of 1.6 points ($p=0.03$, 95% confidence interval [-3.1, -0.1]) between PCL retention versus PCL sacrifice and substitution combined favouring the latter group. The necessary subgroup analyses could not be performed for the clinical scores.

Authors' conclusions

These results should be interpreted with caution as the methodological quality of the studies was highly variable. We conclude that there is, so far, no solid base for the decision to either retain or sacrifice the PCL with or without use of a posterior stabilized design during total knee arthroplasty. The technique of PCL retention is difficult because the normal configuration and tension need to be reproduced with ligament tensioners. Knowledge of the technique needs to be improved before it can yield superior results compared to the more straightforward techniques of PCL sacrifice or use of a posterior stabilized design. Also, studies evaluating the effect of both techniques should address the right outcome parameters such as range of motion, contact position, and anterior-posterior stability. Suggestions are given to improve future research on this specific topic of knee arthroplasty.

PLAIN LANGUAGE SUMMARY

Total knee replacement for osteoarthritis and rheumatoid arthritis

In Total Knee Replacement surgery for osteoarthritis and rheumatoid arthritis of the knee, is it better to keep the Posterior Cruciate Ligament (PCL) or not?

Eight studies of low to high quality were reviewed and provide the best evidence we have today. The studies tested over 570 people with osteoarthritis or rheumatoid arthritis of the knee. The benefits and harms of the surgery were measured up to 5 years after surgery.

What is osteoarthritis and rheumatoid arthritis of the knee and how could the PCL make a difference?

Osteoarthritis and rheumatoid arthritis are two forms of arthritis that can affect the knees. In some people, damage and pain in the knee from arthritis may be severe enough for surgery. In these people, the damaged joint surfaces can be replaced by an artificial joint or knee implant.

The posterior cruciate ligament (PCL) is one of the major ligaments in the knee. It provides support and stable movement of the knee. In total knee replacement surgery, the PCL can be kept or removed and this choice depends on the condition of the PCL, the type of knee implant or the type of surgery the surgeon likes to do. When removing the PCL a special knee implant is sometimes used to provide some stability. The special implant has a peg which guides/facilitates forward and backward movement. Keeping the PCL is a new method, more difficult to do and may cause pain or an unstable joint if not done properly. It is not clear which method is better.

What did the studies show?

Pain and strength: Studies show that the people who kept their PCL had the same improvement in pain and strength after surgery than those who had the PCL removed.

Range of motion: Studies show that improvement was similar in people who did or did not keep their PCL. But when a special knee implant was inserted after the PCL was removed, range of motion was better.

Range of motion was 8 degrees better when the PCL was removed and a special implant inserted than when the PCL was kept

Overall pain, knee function and strength: Studies show that improvement was better in people who had the PCL removed (whether with a special implant or not) than people who kept their PCL.

What is the bottom line?

The level of quality of the evidence is "silver".

There is not enough evidence to say whether keeping the Posterior Cruciate Ligament (PCL) or removing the PCL is best in total knee replacement surgery.

It is likely that methods and knowledge about surgery for keeping the PCL will need to be improved before it is proven better than surgeries that remove the PCL.