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Patellar Denervation in Total Knee Arthroplasty Without Patellar Resurfacing and Postoperative Anterior Knee Pain: A Meta-Analysis of Randomized Controlled Trials

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ABSTRACT

The aim of this meta-analysis was to investigate whether patellar denervation with electrocautery (PD) after total knee arthroplasty (TKA) could reduce the postoperative anterior knee pain (AKP). Five randomized controlled trials (RCTs) with 572 patients and 657 knees were eligible for this meta-analysis. Our results showed that PD was associated with less AKP, lower visual analogue scale (VAS), higher patellar scores and better knee function compared with no patellar denervation (NPD). Complications did not differ significantly between the two groups. The existing evidence indicates that PD may be a better approach, as it improves both anterior knee pain and knee function after TKA. Future multi-center randomized controlled studies with large sample sizes are required to verify the current findings.

Total knee arthroplasty (TKA), a major orthopedic procedure, is an established reliable means to correct deformity, relieve pain and restore joint function in arthritic knees [1–3]. However, anterior knee pain (AKP), which decreases patients' satisfaction [4,5], is reported to occur in up to one fourth of all patients following primary TKA [6]. With the yearly increase in the number of TKAs performed and patient demands for higher quality of life, AKP attracts increasing attention from orthopedic surgeons. Although several potential contributors to AKP have been found [7–10], its specific cause is unknown. Recently, patellar denervation with electrocautery (PD) has been used to prevent AKP. PD theoretically can interrupt the patellar peripheral nerves conduction, thereby blocking the pain receptors and providing pain relief. Several studies [11–13] found that PD can reduce AKP compared with no patellar denervation (NPD). However, other studies [14–16] found no significant difference in AKP between PD and NPD.

A systematic review [17] regarding this topic compared many variables of PD and NPD, but the study still needs to be improved in four aspects. Firstly, Cochrane methodological quality assessment, used to assess RCTs, was adopted to assess the retrospective study [16]. Secondly, the data of patellar scores were from both the RCTs and the retrospective study. Thirdly, the authors concluded that AKP did not significantly differ between those with PD and NPD only based on the incidence of pain, in spite of the patellar scores being different between in PD and NPD. Therefore, we consider their conclusion neither accurate nor reliable enough. Fourthly, no subgroup analysis or sensitivity analysis was used to evaluate heterogeneity in AKP. Therefore, we conducted this meta-analysis using only RCTs to assess AKP for those with PD or NPD, to aid surgeons in making a clinical decision to the use of PD.

Materials and Methods

Search Methods

A comprehensive search of the literature for all studies comparing PD with NPD after primary TKA was conducted through the electronic literature databases of PubMed, Embase, the Cochrane Library, China National Knowledge Infrastructure (CNKI), Weipu Bibliographic Database (VIP) and Wangfang Med Online (WANFANG). Retrieval time was from the time when the databases were built to August 2013. A manual search was also performed for relevant trials, reviews and related articles. This process continued iteratively until no additional articles could be identified.

Inclusion Criteria

All RCTs comparing PD with NPD after primary TKA were eligible. No language or publication date limits were applied. If there were more than one eligible publication from a trial, the one with either higher-quality data or the most recent publication date was enrolled. Studies of revision of TKA, previous knee surgery, hemophilia arthritis and serious knee deformity (≥15° of the varus or valgus) were excluded. All non-randomized trials and quasi-randomized trials were also excluded.

The Conflict of Interest statement associated with this article can be found at http://dx.doi.org/10.1016/j.arth.2014.01.024.

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Outcomes of Interest

The primary outcome of interest was AKP, which includes three indicators (incidence of AKP, VAS score and patella scores [28]). The secondary outcomes include improvement in knee function and complications. Improvement in knee function was measured by the difference in clinically relevant scores (Knee Society Score [KSS] and the Western Ontario and McMaster Universities Arthritis Index [WOMAC]) between preoperative and postoperative status. Complications were stratified into wound infections (including superficial and deep infection) and patella-related complications (such as patella fractures, dislocation, subluxation and osteonecrosis).

Data Extraction

We extracted the following data from the included articles: authors, publication date, number of patients and knees, gender percentage, age, body mass index (BMI), diagnosis, depth of electrocautery, indicators of pain, type of tibial plateau, surgical approach, use of cement and follow-up time in both PD and NPD groups. Two reviewers independently extracted the data from all eligible RCTs. Any disagreement was resolved by discussion with the senior reviewer and the reasons for exclusion were recorded. When the available data were not adequate, the primary authors of the article were contacted by e-mail for more information.

Methodological Quality Assessment

Two independent reviewers used the Cochrane Collaboration recommendations [18] to assess the methodological quality of the included trials. The following information was evaluated: random sequence generation, allocation concealment, blinding of outcome assessments, incomplete outcome data, selective reporting and other biases. An independent arbiter was consulted to reconcile any disagreement.

Statistical Analysis

For each included study, odds ratio (OR) and 95% confidence intervals (CI) were calculated for dichotomous outcomes, while weighted mean differences (WMD) and 95% CI were calculated for continuous outcomes. Statistical heterogeneity was assessed using the I^2 value and the chi-squared test. A P value >0.1 and an I^2 value $\leq 50\%$ were considered to represent no statistical heterogeneity and a fixed-

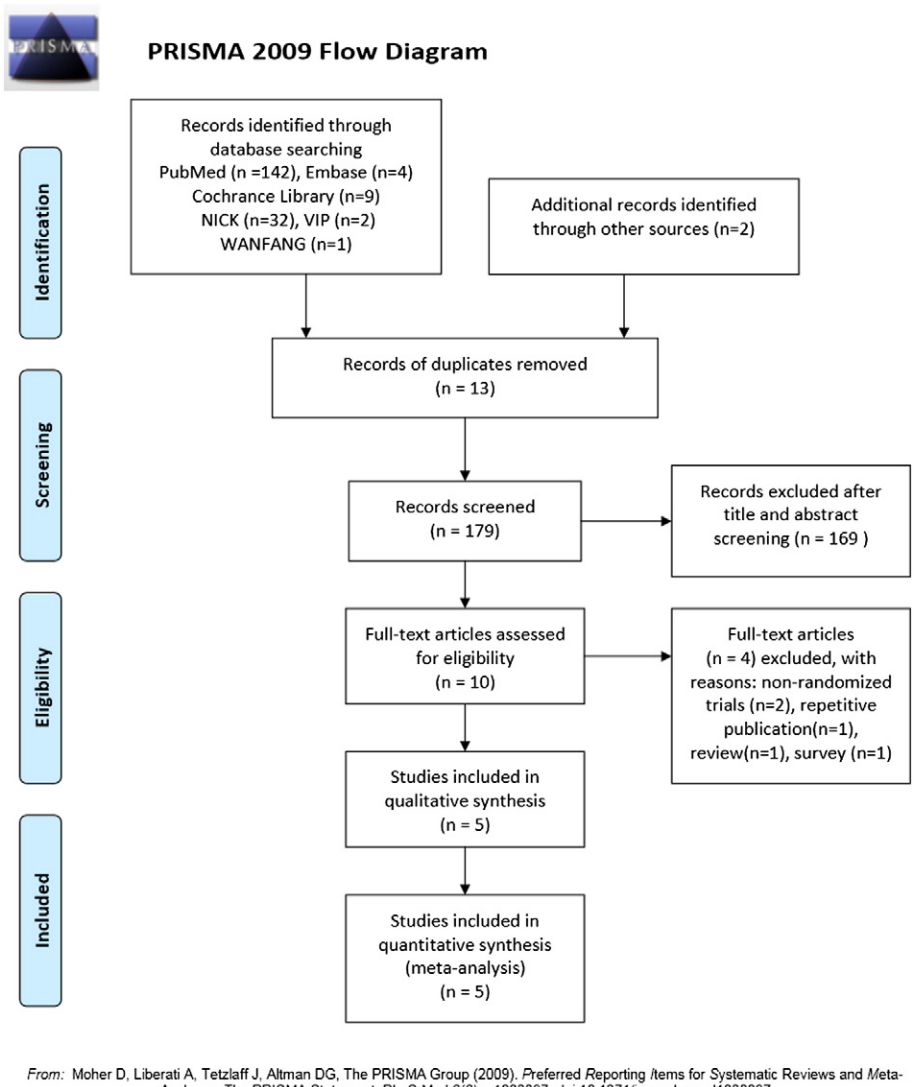

Fig. 1. PRISMA 2009 flow diagram.