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Review

Non-resurfacing techniques in the management of the patella at total knee arthroplasty: A systematic review and meta-analysis

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ABSTRACT

Background: Recent meta-analyses support not resurfacing the patella at the time of TKA. Several different modes of intervention are reported for non-resurfacing management of the patella at TKA.
Methods: We have conducted a systematic review and meta-analysis of non-resurfacing interventions in TKA. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) study methodology and reporting system was adopted, utilising the PRISMA checklist and statement.
Classes of patella interventions were defined as:

0. No intervention.
1. Osteophyte excision only.
2. Osteophyte excision, denervation, with soft tissue debridement.
3. Osteophyte excision, denervation, soft tissue debridement, and drilling or micro-fracture of eburnated bone.
4. Patellar resurfacing.

A meta-analysis was conducted upon the pre- and post-operative KSS for each technique.
Results: Four hundred and twenty-three studies were identified, 12 studies met the inclusion criteria for the systematic review and eight for the meta-analysis. Two studies compared different non-resurfacing patellar techniques, the other studies used the non-resurfacing cohort as controls for their prospective RCTs comparing patellar resurfacing with non-resurfacing. The meta-analysis revealed no significant difference between the techniques.
Conclusions: We conclude that there is no significant difference in KSS for differing non-resurfacing patellar techniques, but further trials using patellofemoral specific scores may better demonstrate superior efficacy of specific classes of patella intervention, by virtue of greater sensitivity for patellofemoral pain and dysfunction.
Level of evidence: I

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1. Introduction

Recent published meta-analyses have demonstrated no significant advantage of patellar resurfacing over non-resurfacing at primary Total Knee Arthroplasty (TKA) [1,2]. The failure to demonstrate superior post-operative clinical knee scores, the increased risk of complications following patellar resurfacing, and the challenge posed by managing the resurfaced patella at revision, have led some to advocate a non-resurfacing approach to the patella at TKA [1]. The recent National Joint Registry of England and Wales [3] annual report records 34% of TKAs having the patella resurfaced, though it is recognised that rates of patellar resurfacing varies from nation to nation.

Despite this trend towards not resurfacing the patella, few papers describe or explore the surgical management of the patella when not resurfacing. When one assesses and reviews Randomised Control Trials (RCTs) comparing patellar resurfacing with not resurfacing at TKA, and examines the surgical management of the patella in the non-resurfacing arms, a number of techniques and strategies are adopted.

These include, either in isolation or combination, removal of the peripheral osteophytes, circumferential denervation of the patella, chondroplasty to any fibrillated cartilage and drilling of the eburnated bone, lateral soft tissue balancing or formal lateral release. It is unclear from the literature whether there is any significant difference in the improvement in knee scores or complications between these surgical strategies.

As well as the non-resurfacing control groups, there has been an RCT comparing osteophyte excision to osteophyte excision with circumferential denervation in 262 knees [4]. This group demonstrated improved outcomes with circumferential patellar electrocautery resulting in an improved total Western Ontario and McMaster Universities osteoarthritis index (WOMAC) score ($p = 0.04$) [5] and decreased overall incidence of anterior knee pain at one year follow-up (32% vs 19%; $p = 0.02$). However, there was no significant improvement in the Knee Society Scores (KSSs) [6] ($p = 0.14$ knee score and $p = 0.49$ function score). Altay et al. [7] performed a double-blinded RCT of patellar denervation and osteophyte excision versus osteophyte excision alone in 35 single-stage bilateral TKAs. They report a statistically significant pre- to post-operative improvement in KSS, Visual Analogue Scale and range of motion ($p < 0.05$) in favour of denervation.

In view of this and wishing to investigate and better understand the differences between various techniques of non-resurfacing intervention we have conducted a systematic review of the available literature in order to assess the effectiveness of each method of managing the non-resurfaced patella at TKA. We have also conducted a meta-analysis, assessing the impact upon the KSS following differing techniques of non-resurfacing patellar management at TKA.

2. Materials and methods

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology and guidelines were followed within our methodology [8].

2.1. Search strategy

MEDLINE, EMBASE, Ovid and the Cochrane Central Register of Controlled Trials were searched from their inception up until the 4th February 2014. The search terms and Boolean linkage used were "knee replacement" OR "knee arthroplasty" AND "patellar resurfacing" OR "patellofemoral resurfacing" OR "patella retention" OR "patellar non-resurfacing" OR "patelloplasty" OR "patellaplasty". The titles and abstracts of the resulting articles were reviewed by three of the authors to assess eligibility. Any differences were resolved by consensus. The bibliographies of the included publications were also reviewed to identify any other relevant publications. A review of the grey literature was conducted using the Grey Literature Report (http://greylit.org), OpenGrey (http://www.opengrey.eu), as well as search engines Google, Yahoo, and Bing using the search terms as detailed in Section 2.1 (Search strategy). A further search was conducted for trial registries using clinicalTrials.gov, Current Control Trials, NHS Choices Clinical Trials, CenterWatch, IFPMC Clinical Trial Results Portal, and OAIster. Studies to be used for further meta-analyses were individually reviewed for eligibility.

2.2. Inclusion criteria

We considered all randomised trials. Where reports pertained to the same cohort of patients, the study with the longest follow-up period was retained. Only articles that used the KSS Clinical Rating System [6] and that described the surgical technique for patellar non-resurfacing during TKA were used. All trials that reported the KSS as an outcome measure were included for systematic review. However only articles that stated within their papers their mean and standard deviation (SD) for KSSs pre- and post-operatively, or were able to provide their mean and SD upon contacting their authors, were eligible for inclusion for meta-analysis.

Articles in all languages were considered. Articles in languages other than English were translated by medical personnel whose first language was that of the article [9]. When clarification with regard to data was required, authors were contacted via email [4,10]. Unpublished trials and abstracts were excluded to reduce the risk of bias from selective outcome reporting [8].

2.3. Assessment of methodological quality

2.3.1. Data extraction

Three investigators (IF, CS, FW) independently reviewed the search results, and extracted data before comparing results and reaching a consensus, and lack of consensus was resolved by the senior author (AA). For each trial we collated data on the characteristics of the study populations. Complications and revision surgery were recorded. Pre- and post-operative KSSs were recorded as the mean with SDs. If this was not the data published in the original paper attempts were made to retrieve this information directly from the authors [4,10].

All papers included for review, were subjected to a quality assessment using the abridged Downs and Black [11]. Fifteen criteria were used to score a study, with a positive criterion result scoring 1 mark and a negative criterion result scoring 0. The assessment was performed independently by two of the authors. Any possible disagreement was resolved by the senior author. The level of evidence was also determined.