

Updated Review of Total Knee Arthroplasty: Systematic Review

¹Raed Tlaat Abdullah Miralam, ²Hussain Khalid H Kaaki,
³Mohammed Rabah A Alkhateeb, ⁴Mohammed Saeed M Alghamdi,
⁵Wafaa Abdulkareem M Abdullghaffar, ⁶Hussein Ali M Fitaihi

Abstract: TKA is typically carried out to deal with advanced inflammatory and degenerative knee arthritis. With increasing use in younger patients, it is essential to define the best practices to boost clinical performance and implant longevity. The crucial findings of this study were that, comparing to the basic parapatellar method, the midvastus technique supplied significant advantages in short-term pain and ROM, and the subvastus method offered much better outcomes in short-term ROM, earlier straight leg raise and less lateral retinacular release. The main aim of this study is to quantitatively compare the midvastus and subvastus approaches to the medial parapatellar approach in TKA .

Keywords: TKA (Total Knee Arthroplasty), short-term ROM.

1. INTRODUCTION

Total knee arthroplasty (TKA) is a major orthopedic procedure that is commonly carried out in patients with degenerative disease of the knee joint and can relieve disabling joint pain, bring back movement, and improve lifestyle⁽¹⁾. Nowadays, the Total knee arthroplasty (TKA) is among the most effective orthopedic surgical procedures, with rates of good or excellent long-lasting outcomes ranging from 90% to 98%⁽²⁻³⁾. The primary sign for total knee arthroplasty (TKA; also referred to as total knee replacement) is relief of significant, disabling pain caused by severe arthritis (See the image below). Subvastus, midvastus and medial parapatellar methods are the most popular approaches in total knee arthroplasty (TKA), As well as evolved from the basic approach. Subvastus approach was described as a more "anatomic" method as it protected the knee extensor system and decreases vascular damages to the knee⁽⁴⁾ Subvastus technique thus was believed as the true minimally invasive procedure. The critiques to this technique consisted of the limited personnel field and more technical requirement. These may be the main reasons for limiting the popularity of subvastus approach. Midvastus approach was introduced as a compromise of the above 2 methods. It supplied fairly better surgical visualization and lessened the interruption to patellar blood supply⁽⁵⁾. However, these theoretical advantages were not confirmed in the clinical practice^(6,7). The exceptional approach in TKA still stays controversial. We for that reason performed a meta-analysis to quantitatively compare the midvastus and subvastus methods to the median parapatellar method in TKA. The meta-analysis suggested that, when compared with the median parapatellar technique, the midvastus method showed much better outcomes in pain and knee series of motion at postoperative 1-2 weeks however also was related to longer personnel time; the subvastus method showed much better results in knee variety of movement at postoperative 1 week, straight leg raise and lateral retinacular release⁽⁸⁾.



2. METHODOLOGY

The databases of PubMed, the Cochrane library, EMBASE, Chinese Biomedical Database and ISI Web of Knowledge were searched up to July 2015 without language and publication status restrictions. The search strategies included the following terms: “Arthroplasty, Replacement, Knee” [Mesh], “knee arthroplasty”, “knee replacement”, “medial parapatellar”, “subvastus”, “mini-subvastus”; “midvastus”, “mini-midvastus”, “muscle splitting” and “vastus splitting”. In addition, Google scholar and the lists of references were also searched for other relevant RCTs.

3. RESULTS AND DISCUSSION

The most important findings of this research study were that, comparing to the basic parapatellar technique, the midvastus approach supplied substantial benefits in short-term pain and ROM, and the subvastus method supplied better outcomes in short-term ROM, earlier straight leg raise and less lateral retinacular release. However, the midvastus method had a downside in a longer operative time. There were no distinctions in the other outcomes among various methods.

In this meta-analysis, twenty-two RCTs compared the clinical results of the midvastus with parapatellar method. Regarding the primary results, our results revealed that the midvastus technique lowered pain and enhanced ROM in the early 1-2 weeks postoperatively, but these benefits vanished in the long periods. These results were well in concordance with other studies.

Bathis et al ⁽⁹⁾ and Fu et al ⁽¹⁰⁾ compared midvastus with standard TKA and discovered substantially less pain rating in midvastus group within postoperative 7 and 8 days, respectively. Fu et al ⁽¹¹⁾ and Juosponis et al ⁽¹²⁾ also discovered considerably greater ROM in midvastus group within postoperative 6 weeks. Nonetheless, all these distinctions were also limited in the early term, not in the long follow-up duration. Relating to the secondary outcomes, there were no differences in between the groups in straight leg raise, lateral retinacular release, blood loss, health center stay and complications. Our meta-analysis discovered substantially longer operative time related to the midvastus technique. The possible factor was that the most RCTs (18/22) utilized minimally intrusive technique in midvastus group, which required more surgical actions and lowered the operation field, and therefore required more time.

A meta- analysis carried out by Alcelik et al ⁽¹³⁾ concluded that the midvastus technique caused less lateral release rate than the standard technique. Our outcome did not support this conclusion. A sensitivity analysis found that the reason was a quasi-RCT ⁽¹⁴⁾ they consisted of, which reported a considerable reduction of lateral release in the midvastus group (1/22)

than the parapatellar group (13/29). After excluding this study⁽¹⁵⁾, the analytical distinction was not legitimate. Eleven RCTs were consisted of for the meta-analysis of subvastus versus parapatellar technique. Relating to the main outcomes, the outcomes recommended that the subvastus approach showed better outcomes in ROM at postoperative 1 week, and no distinctions were found in VAS and KSS. That was since the subvastus technique preserved the innervation of the vastus medialis and the extensor system, which led to a much better recovery than parapatellar method⁽¹⁶⁾ Relating to the secondary results, the subvastus group had substantial advantages in straight leg raise and lateral retinacular release. Both groups showed comparable results in operative time, blood loss, hospital stay and issues. Our outcomes were a little various with Teng et al⁽¹⁷⁾ and Hu et al⁽¹⁸⁾ who likewise carried out a meta-analysis comparing subvastus with parapatellar technique. They validated that the subvastus approach not only significantly decreased lateral release rate however also improved KSS score within 3 months.

Today research study quantitatively compared the effectiveness of midvastus and subvastus versus medial parapatellar technique in TKA by meta-analysis. To guarantee top quality proof, all the data included in meta-analysis were gathered from RCTs. Nevertheless, numerous restrictions must be kept in mind in this study. First, analytical heterogeneity was found in a number of results, particularly when comparing subvastus with parapatellar technique. The heterogeneity was decreased and integrated by carrying out subgroup analysis and random-effect model. The possible causes of heterogeneity were the clinical diversity among studies such as, the attributes of patients, kinds of implants, period of subsequent, the nursing programs and the methodological factors. Second, our evidence was limited by the methodological quality of the included RCTs. Some studies did not use the approach of allotment concealment and blinding in the design of clinical trial, which may cause a high threat of choice and detection bias. In addition, the sample sizes in some research studies were reasonably small and the duration of subsequent was short, which might disregard the unfavorable outcomes to some extent. For that reason, future research studies ought to improve their work in these elements.

4. CONCLUSION

In conclusion, when compared to the median parapatellar approach, the midvastus technique has advantages in VAS and ROM at postoperative 1-- 2 weeks but has downside in operative time, and no distinctions are found in KSS, straight leg raise, lateral retinacular release, blood loss, healthcare facility stay and issues in between both groups. The subvastus technique has advantages in ROM at postoperative 1 week, straight leg raise and lateral retinacular release, and no differences are found in VAS, KSS, operative time, blood loss, hospital stay and problems. There are no differences in the long-lasting clinical outcomes in between the midvastus and subvastus versus the median parapatellar approach in TKA.

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