

Gardner-Webb University

Digital Commons @ Gardner-Webb University

The PA Department Journal of Medical Science

2025

Lateral vs. Medial Parapatellar Approach Efficacy in Total Knee Arthroplasty

Savannah Howard

showard8@gardner-webb.edu

Follow this and additional works at: <https://digitalcommons.gardner-webb.edu/pa-department-journal-of-medical-science>



Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Howard, Savannah, "Lateral vs. Medial Parapatellar Approach Efficacy in Total Knee Arthroplasty" (2025). *The PA Department Journal of Medical Science*. 13.

<https://digitalcommons.gardner-webb.edu/pa-department-journal-of-medical-science/13>

This Capstone is brought to you for free and open access by Digital Commons @ Gardner-Webb University. It has been accepted for inclusion in The PA Department Journal of Medical Science by an authorized administrator of Digital Commons @ Gardner-Webb University. For more information, please see [Copyright and Publishing Info](#).

“Lateral vs. medial parapatellar approach efficacy in total knee arthroplasty”

Savannah Howard, PA-S

Evidence-based Medicine SCPE

Gardner-Webb University

Department of PA Medicine

Abstract

Introduction: Total knee arthroplasties are the mainstay of treatment in patients with osteoarthritis and can be completed in a lateral parapatellar surgical approach or a medial parapatellar surgical approach. The purpose of this review is to compare if the lateral parapatellar approach has superior clinical outcomes to the medial parapatellar approach.

Methods: PubMed was searched using MeSH terms and Boolean operators “lateral” AND “medial” AND “knee replacement” AND “outcomes”. Filters were applied to narrow the results to four articles directly related to the comparison of clinical outcomes. Four articles were selected for clinical review.

Results: In all articles reviewed it was concluded that there was not a statistically significant difference between the lateral or medial surgical approach to a total knee arthroplasty. One metaanalysis found that the lateral parapatellar surgical approach had a higher survivability rate in short term follow up compared to the medial parapatellar surgical approach. Two articles found that the postoperative knee society score was higher in patients who underwent the lateral parapatellar surgical approach.

Discussion: The articles reviewed provided evidence that both surgical approaches had positive clinical outcomes when directly compared. Comparable functional outcomes are shown throughout the reviewed articles for both surgical approaches.

Lateral vs. medial parapatellar approach efficacy in total knee arthroplasty

INTRODUCTION

As one ages, the tibiofemoral joints are one of the sites that has the highest risk of developing osteoarthritis.¹ The frequent pain and disability accompanied with knee osteoarthritis is due to the degeneration of the tibiofemoral joint.¹ The significant impact knee osteoarthritis has on one's personal life and daily function leads patients searching for various treatment options. Treatment options for knee osteoarthritis vary from steroid injections, medication therapy, rehabilitation, and total knee arthroplasty (TKA).¹ The most definitive treatment for knee osteoarthritis is a total knee arthroplasty making it one of the most common orthopedic procedures.² Population growth, obesity, and the 162% increase in enrollment within the United States Medicare are all factors leading to the continued increase of total knee arthroplasty procedures.² Even though total knee arthroplasty is the most effective treatment, 20-40% of patients undergoing conventional medial parapatellar approach for total knee arthroplasty are dissatisfied and continue to suffer with pain following recovery.¹

Current research presents that successful conventional medial parapatellar instrumentation for a total knee arthroplasty requires the use of intramedullary and extramedullary guides for proper alignment in order to achieve necessary functional post-operative outcomes.³ When a patient undergoes the current medial parapatellar approach, conventional instrumentation and patient-specific instrumentation are used to increase clinical outcome success.³ Patient specific instrumentation is custom made based on patient's computed tomography or magnetic resonance imaging.³ The preoperative imaging is also vital for surgical planning.³ In theory, surgical equipment custom made should translate to better functional outcomes.³ However, using the conventional approach, a patient has up to a 30% chance of postoperative patellar subluxation,

aseptic necrosis, and knee extensor disfunction.⁴ With the current projected 673% increase of total knee arthroplasties by 2030, researchers are looking to improve surgical technique to eliminate poor postoperative clinic outcomes.⁵ Clinical outcomes of recovery time, follow up, pain, and functional scores are being used to determine the clinical outcome success of conventional approach versus the minimally invasive lateral parapatellar approach.⁴ The lateral parapatellar approach is completed using four small incisions giving wider exposure of the lateral and posterolateral structures.⁶ With a smaller surgical field, higher technical precision is required for the lateral parapatellar approach to be completed creating limited availability at this time.⁶ Clinical studies comparing the two approaches show the minimal invasive approach results in reduced postoperative pain, quick restoration of quadricep function, and early-stage knee mobility.⁴

It is evident through collected data that total knee arthroplasties are the mainstay of treatment in patients with knee osteoarthritis and will continue to remain moving forward. The medial parapatellar approach is the current gold standard for exposure of the tibiofemoral joint when conducting a total knee arthroplasty.⁶ Current results of improved clinical outcomes using the lateral parapatellar approach allows justification of research to determine the most effective surgical approach for a total knee arthroplasty.⁶ The purpose of this review is to evaluate if the lateral parapatellar approach is superior in clinical outcomes to the medial parapatellar approach in a total knee arthroplasty.

METHODS

PubMed was searched using key terms “lateral,” “medial,” “knee replacement,” “arthroplasty,” and “outcomes”. MeSH terms and Boolean operators were added to get a final search of “lateral” AND “medial” AND “knee replacement,” AND “outcomes”. These search terms populated 437 results. Filters to only include articles from 2019 to 2024, randomized

controlled trials, systematic reviews, meta-analyses, full text, and the English language were used to consolidate the initial results to 13 articles. Of the final articles, 1 was excluded due to weak design with lack of statistical analysis. The final 4 articles chosen for review were selected based on direct comparison of statistical clinic outcomes of the lateral parapatellar approach and the medial parapatellar approach in a total knee arthroplasty.

RESULTS

Han et al⁷ conducted a meta-analysis according to PRIMSA criteria to gather 614 studies comparing participants undergoing medial parapatellar or lateral parapatellar approach to a total knee arthroplasty. The final 8 studies chosen for review compared pain and function scores in short term (<10 years) and long term (>10 year) follow up.⁷ Four studies were assigned to the short term (<10 years) subgroup and four studies were assigned to the long term (>10 years) subgroup.⁷ Within the 8 studies reviewed, there was 33,999 knees who underwent the medial parapatellar approach and 2,853 knees who underwent the lateral parapatellar approach.⁷ For resolution of post-operative healing, pain and function ability data were pooled to create a survivability mean score from 1 to 100%.⁷ In the short term (<10 years) subgroup, the lateral knee arthroplasty had a higher survivability rate with a 95.6% compared to 94.6% of the medial knee arthroplasty resulting in a survivability odds ratio of 0.98 (95% CI 0.64 - 1.48).⁷ In the long-term (>10 years) subgroup, a 92.8% survivability of medial knee arthroplasty was found compared to the 86.6% survivability of the lateral knee arthroplasty resulting in a survivability odds ratio of 2.51 (95% CI 0.67 - 9.43) which favors the medial parapatellar approach.⁷ Despite the favorable odds ratio of the medial parapatellar approach, both results were found to be not significant.⁷

An electronic meta-analysis was conducted by Xu et al⁸ to identify randomized controlled trials, prospective or retrospective studies. Studies were evaluated using the Cochrane guidelines for systematic review of intervention and quality evaluation.⁸ Four random controlled trails and five cohort studies were included for analysis in the comparison of clinic outcomes of the lateral parapatellar and medial parapatellar approach to a total knee arthroplasty.⁸ Initial comparison was directly related to surgical procedure by the operating time and blood loss of each approach.⁸ A mean difference of 2.49 (95% CI -0.17 - 5.16) was found with the lateral parapatellar approach knee arthroplasty operating time being 1.2 to 18.8 minutes longer than the medial parapatellar approach.⁸ Blood loss quantity between the two surgical approaches resulted in a mean difference of 4.72 (95% CI -2.34 - 11.79) concluding no statistical significance to be found.⁸

For comparison and evaluation of the postoperative knee, Xu et al⁸ used the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), International Knee Society System Score (IKSS) and the Knee Society Score (KSS). Pooled data included specific comparison of range of motion and postoperative pain.⁸ With a mean difference of 2.49 (95% CI 0.60 - 4.37), only 384 patients who received the lateral parapatellar surgical approach experienced postoperative decrease range of motion and significant postoperative pain compared to 684 patients who received the medial parapatellar surgical approach.⁸

In patients undergoing the lateral or medial surgical approach, postoperative valgus deformity was evaluated by the femoral and tibial anatomical axis and the mechanical axis.⁸ Including both the anatomical and mechanical axis, a mean difference of -0.10 (95% CI -0.58 - 0.38) resulted in no statistical difference in postoperative valgus deformity improvement between either surgical approach.⁸ Complications compared following each surgical approach included

migration of the tibial tuberosity, venous thrombosis, infection, hematoma, necrosis, and fracture of the tibial tuberosity.⁸ With a pooled total number of 342 lateral surgical approach patients compared to 178 medial surgical approach patients experiencing complications an odds ratio of 0.86 (95% CI 0.47 - 1.56) was found and concluded not statistically significant.⁸

A meta-analysis conducted by Mercurio et al⁶ reviewed 4 randomized-controlled and 6 cohort studies according to PRISMA guidelines to compare current evidence on clinical outcomes using the Knee Society Score (KSS), KSS function score, postoperative range of motion, and postoperative hip-knee-ankle angle. Postoperative complications rates between medial and lateral knee arthroplasty were also reviewed.⁶ Studies concluded that when compared the lateral surgical approach had improved outcomes in postoperative KSS (Knee Society Score) in 586 cases versus 266 cases using the medial surgical approach resulting in a 1.80 mean difference (95% CI: 0.48 - 3.12).⁶ Postoperative KSS function score comparison resulted in a 0.74 (95% CI: -1.72, 3.19) mean difference with 531 lateral surgical approach patients showing improved function compared to 224 medial surgical approach patients.⁶ In comparison of postoperative range of motion, there was a statistical significance found with a mean difference of 3.12 (95% CI: 0.45 - 5.79) in favor of the medial knee arthroplasty approach.⁶ The postoperative comparison of hip-knee-ankle angle resulted in a 0.22 mean difference showing no statistical significance in favor of either the lateral or medial knee arthroplasty approach.⁶

Complications compared by Mercurio et al⁶ to determine superior clinical outcome were periprosthetic joint infection, fracture rate, peroneal nerve injury, and deep vein thrombosis rate. In cases using the lateral parapatellar approach it was found that there was a 2.8% rate of periprosthetic joint infections compared to the 1.5% rate in the medial approach resulting in an odds ratio of 0.34 (95% CI: 0.08 - 1.38).⁶ The rate of periprosthetic fractures in the lateral

approach was 1.8% compared to the 2.2% rate of the medial approach resulting in an odds ratio of 0.72 (95% CI: 0.20 - 2.62).⁶ An odds ratio of 0.39 (95% CI: 0.12 - 1.28) was found with a 2% rate of peroneal nerve injury for the lateral approach compared to a 5.4% rate in the medial approach.⁶ The occurrence rate of deep vein thrombosis resulted in a 12.5% rate with the lateral approach and a 14.6% rate using the medial approach finding an odds ratio of 0.84 (95% CI: 0.26 - 2.70).⁶ All odds ratios of complications found in this meta-analysis resulted in no statistically significant difference between either approach.⁶

Yang et al⁴ conducted a meta-analysis reviewing 12 randomized-controlled trials according to PRISMA guidelines comparing the standard medial parapatellar approach to a minimally invasive medial parapatellar approach through the vastus medialis obliquus (MMV) using 788 knees. Comparisons were made using the KSS (Knee Society Score) of the knee joint at 3 months, 6 months, and 12 months post-operation.⁴ Postoperative knee pain, function, mobility, and complication post-operation were evaluated as well.⁴ KSS at 3 months post-operation comparison broke even with 198 cases each for the standard medial parapatellar approach compared to the vastus medialis obliquus approach resulting in a 2.89 mean difference (95% CI: 0.33 – 5.46).⁴ KSS at 6 months post-operation comparison broke even again with 123 cases each for the standard medial parapatellar approach compared to the vastus medialis obliquus approach resulting in a 0.54 mean difference (95% CI: -4.83 – 5.91).⁴ KSS at 12 months post-operation comparison broke even once more with 163 cases each for the standard medial parapatellar approach compared to the vastus medialis obliquus approach resulting in a 1.92 mean difference (95% CI: 0.16 – 3.69).⁴

Post-operative knee pain was compared at 3 months post-operation finding 97 cases of postoperative pain when using the vastus medialis obliquus approach compared to the standard

medial parapatellar approach with only 80 cases resulting in a -0.22 mean difference (95% CI: -0.36 - -0.09).⁴ Postoperative knee pain at 6 months post-operation concluded with 20 cases of postoperative pain when using the vastus medialis obliquus approach compared to the standard medial parapatellar approach with only 19 cases resulting in a -1.40 mean difference (95% CI: -2.82 - -0.02).⁴ Post-operative knee pain compared at 12 months post-operation concluded in 27 cases of postoperative pain when using the vastus medialis obliquus approach as well as the standard medial parapatellar approach resulting in a -0.20 mean difference (95% CI: -0.95 - -0.55).⁴ Post-operative KSS and knee pain compared at 3, 6, and 12 months post-operation showed no statistical significance in favor of either of the two surgical approaches.⁴ When comparing post-operative complications, Yang et al⁴ found no statistically significant difference with 241 patients having complications using the vastus medialis obliquus approach and 240 patients using the standard medial parapatellar approach resulting in a odds ratio of 0.62 (95% CI: 0.33 – 1.18).

DISCUSSION

The studies included in this review had an overall finding of no statistical significance in the comparison of clinical outcomes of the lateral parapatellar surgical approach verses the medial parapatellar surgical approach in a total knee arthroplasty.⁶⁻⁸ No statistical significance was found when comparing the medial parapatellar approach to the medial vastus medialis obliquus approach as well.⁴ However, findings within the reviewed studies suggest the lateral parapatellar surgical approach is a viable option and effective treatment in those in need of a total knee arthroplasty.⁶⁻⁸ The Mercurio et al⁶ analysis found that those who underwent the lateral parapatellar surgical approach had a higher postoperative Knee Society Score compared to those who underwent the medial parapatellar approach, though not clinically meaningful.

Limitations across all studies was the availability of randomized-controlled trials as this research topic is a comparison of surgical procedure outcome.^{4,6,8} The majority of the studies used were observational and resulted in heterogeneity due to uncontrolled bias.^{4,6-8} Evidence provided by Xu et al⁸ did not specify a time frame of clinical outcome comparison. Mercurio et al⁶ also stated this as potential limitation of their study and that a predetermined follow up time could potentially change the outcome of results. Within this review, a limitation of note is that this is a review of other meta-analyses. Data collected are of patients who are both males and females of all ages with various backgrounds for needing a total knee arthroplasty.^{4,6-8} A strength of this review is the articles used have strong methodological strategy and produced clinically meaningful comparison of clinical outcomes.

With specific comparable clinical outcomes found for the lateral parapatellar surgical approach, this option is viable to be done in a total knee arthroplasty.⁶⁻⁸ Since most data concluded did not provide a statistical significant difference at this time further research is needed to determine if one approach is truly superior to the other as the current gold standard is the medial parapatellar approach.⁶ Future research completed needs to have a standard design with well-defined study parameters.⁸

References

1. Vervullens S, Meert L, Baert I, et al. Prehabilitation before total knee arthroplasty: a systematic review on the use and efficacy of stratified care. *Ann Phys Rehabil Med.* 2023;66(4):101705. doi:10.1016/j.rehab.2022.101705
2. Dust P, Kruijt J, Stavropoulos NA, et al. Indication for total knee arthroplasty based on preoperative functional score: are we operating earlier? *Can J Surg.* 2023;66(5):E499-E506. Published 2023 Oct 24. doi:10.1503/cjs.013222
3. Rudran B, Magill H, Ponugoti N, Williams A, Ball S. Functional outcomes in patient specific instrumentation vs. conventional instrumentation for total knee arthroplasty; a systematic review and meta-analysis of prospective studies. *BMC Musculoskelet Disord.* 2022;23(1):702. Published 2022 Jul 23. doi:10.1186/s12891-022-05620-2
4. Yang X, Cheng QH, Yang YZ, Zhang AR, Fan H, Guo HZ. Minimally invasive medial femoral approach to total knee arthroplasty improves short-term outcomes compared to the standard medial parapatellar approach: a systematic review and meta-analysis. *J Orthop Surg Res.* 2023;18(1):657. Published 2023 Sep 4. doi:10.1186/s13018-023-04136-2
5. Mancino F, Cacciola G, Malahias MA, et al. What are the benefits of robotic-assisted total knee arthroplasty over conventional manual total knee arthroplasty? A systematic review of comparative studies. *Orthop Rev (Pavia).* 2020;12(Suppl 1):8657. Published 2020 Jun 25. doi:10.4081/or.2020.8657

6. Mercurio M, Gasparini G, Galasso O, et al. Lateral versus medial approach for total knee arthroplasty for valgus knee deformity shows comparable functional outcomes, hip-knee-ankle angle values, and complication rates: a meta-analysis of comparative studies. *Arch Orthop Trauma Surg.* 2024;144(2):869-878. doi:10.1007/s00402-023-05088-2
7. Han SB, Lee SS, Kim KH, et al. Survival of medial versus lateral unicompartmental knee arthroplasty: a meta-analysis. *PLoS One.* 2020;15(1). doi: 10.1371/journal.pone.0228150.
8. Xu G, Fu X, Tian P, et al. The lateral and medial approach in total arthroplasty for valgus knee: a meta-analysis of current literature. *J Comp Eff Res.* 2020;9(1):35-44. doi: 10.2217/cer-2019-0111.