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INPLASY

Clinical and functional outcomes of surgical approaches for distal periprosthetic femoral fractures: a systematic review protocol

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 29 July 2026 and was last updated on 30 July 2026.

INTRODUCTION

Review question / Objective The primary objective will be to evaluate the clinical outcomes, including time to fracture union, and functional outcomes, including time to postoperative weight-bearing, range of motion and validated patient-reported outcome measures, of fixation methods and revision arthroplasty used to manage distal periprosthetic femoral fractures. The secondary objective will be to evaluate complications associated with each treatment strategy.

Rationale Distal periprosthetic femoral fractures following total knee arthroplasty are challenging injuries associated with poor bone quality, complex fracture patterns and substantial morbidity. Available treatments include plate fixation, intramedullary nailing, combined nail-plate constructs and distal femoral replacement, but no clear consensus exists regarding the optimal approach. Previous reviews have focused mainly on union and complications, with less detailed assessment of functional recovery. This review will provide a comprehensive evaluation of clinical outcomes, functional outcomes and complications across contemporary operative strategies.

Condition being studied Distal periprosthetic femoral fractures are fractures of the distal femur occurring adjacent to a total knee arthroplasty. They may occur following primary or revision total knee arthroplasty. These fractures are commonly encountered in older patients and may be complicated by poor bone quality, fracture comminution and interference from the femoral prosthetic component. They are associated with risks including non-union, malunion, infection, fixation failure, impaired mobility and further surgery.

METHODS

Search strategy The electronic search will be conducted in MEDLINE, Embase, PubMed and the Cochrane Library. The search strategy will combine controlled vocabulary (including Medical Subject

Headings [MeSH] and database-specific indexing terms where appropriate) with free-text keywords relating to distal periprosthetic femoral fractures, total knee arthroplasty and operative treatment strategies. Search terms will be combined using the Boolean operators "AND" and "OR", and the search syntax will be adapted for each electronic database.

Participant or population Adults aged 18 years or older with a distal periprosthetic femoral fracture following primary or revision total knee arthroplasty will be eligible. Patients will be required to have undergone operative management at the initial presentation of the fracture. Studies involving mixed populations will be eligible only if outcomes specific to distal periprosthetic femoral fractures following total knee arthroplasty can be extracted separately. Patients with fractures secondary to malignancy, those undergoing surgery for a previously failed treatment of a distal periprosthetic femoral fracture, and paediatric populations will be excluded.

Intervention Eligible interventions will include locking plate fixation, non-locking plate fixation, intramedullary nailing, combined nail-plate constructs and revision arthroplasty using distal femoral replacement. Variations in plate configuration and intramedullary nail type will be recorded where reported.

Comparator Comparators will include any alternative eligible operative treatment. Non-comparative studies evaluating a single eligible intervention will also be included because direct comparative evidence is limited.

Study designs to be included Comparative and non-comparative peer-reviewed clinical studies will be eligible, including prospective and retrospective cohort studies, case-control studies, controlled studies and case series involving at least 10 patients. Case reports, smaller case series, animal studies and non-clinical studies will be excluded.

Eligibility criteria Eligible studies must evaluate operative treatment of distal periprosthetic femoral fractures following total knee arthroplasty and report relevant clinical or functional outcomes and complications. Comparative and non-comparative peer-reviewed clinical studies will be included, including case series involving at least 10 patients. Only full-text English-language articles published within the predefined publication period will be eligible. Studies involving malignant fractures, failed previous treatment, paediatric patients, non-operative management without separately extractable operative data, case reports, case series involving fewer than 10 patients, conference abstracts and non-peer-reviewed publications will be excluded.

Information sources MEDLINE, Embase, PubMed and the Cochrane Library will be searched. Reference lists of included studies will also be screened for additional eligible articles. Conference abstracts, unpublished studies and other grey literature will not be included. Trial registries will not be searched, and authors will not be contacted for additional data.

Main outcome(s) The main clinical outcome will be time to fracture union. The functional outcomes will be time to postoperative weight-bearing, range of motion and validated outcome measures, including the Knee Society Score, Oxford Knee Score, Western Ontario and McMaster Universities Osteoarthritis Index, Jeju Lower Extremity Trauma Scale, SF-12 and other validated measures. Outcomes will be extracted at the final or principal follow-up reported by each study and summarised using the definitions and units provided by the study authors.

Additional outcome(s) Additional outcomes will comprise perioperative and postoperative complications, including non-union, delayed union, malunion, infection, wound complications, implant failure, loss of reduction, periprosthetic fracture, prosthetic instability, reoperation, revision surgery, hardware removal, venous thromboembolism, neurovascular injury and other reported adverse events.

Data management Search results will be deduplicated before independent title, abstract and full-text screening by two reviewers. Disagreements will be resolved through discussion and consensus. Data will be extracted using a standardised form and will include study characteristics, patient demographics, fracture classification, operative treatment, follow-up, clinical and functional outcomes, and complications.

Quality assessment / Risk of bias analysis Methodological quality will be assessed using the Methodological Index for Non-Randomized Studies (MINORS). Each item will be scored as 0 if not reported, 1 if reported inadequately and 2 if reported adequately, with maximum scores of 16 for non-comparative studies and 24 for comparative studies. Quality assessment will inform interpretation of the evidence but will not be used as the sole basis for study exclusion.

Strategy of data synthesis A narrative synthesis will be undertaken because substantial clinical and methodological heterogeneity is expected across studies. Studies will be grouped by operative treatment, and clinical outcomes, functional outcomes and complications will be summarised descriptively using the measures reported. A meta-analysis will only be considered if studies are sufficiently comparable in population, intervention, outcome definition and follow-up.

Subgroup analysis No formal subgroup analysis will be planned because of the limited number of studies within treatment categories, inconsistent fracture classifications, heterogeneous outcome reporting and limited patient-level data. Relevant differences between treatment techniques, fracture classifications and study designs will be considered descriptively.

Sensitivity analysis No formal sensitivity analysis will be planned because a quantitative meta-analysis is not expected to be appropriate. The robustness of the narrative findings will be considered by examining consistency across studies and differences in methodological quality, sample size, follow-up and outcome definitions.

Language restriction Only studies published in English will be included.

Country(ies) involved United Kingdom.

Other relevant information This protocol is being registered after completion of the review to provide a transparent, publicly accessible record of the review methodology. Although prospective registration was not undertaken before commencement of the review, the review followed a predefined methodology and will be reported in accordance with the PRISMA 2020 Statement.

Keywords Periprosthetic femoral fracture; distal femur; knee arthroplasty; locking plate; intramedullary nail; distal femoral replacement; functional outcomes; systematic review.

Dissemination plans The findings will be submitted for publication in a peer-reviewed orthopaedic or trauma journal and may be presented at relevant national or international scientific meetings. The review is intended to provide a contemporary synthesis of the available evidence and to inform future clinical practice and research.

Contributions of each author
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