

PRIMARY ARTHROPLASTY VERSUS OPEN REDUCTION AND INTERNAL FIXATION OF DISTAL FEMUR FRACTURES IN ELDERLY PATIENTS: A SYSTEMATIC REVIEW

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ABSTRACT

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Background: Distal femur fractures are the second most common type of femoral fracture in the elderly following proximal femoral fractures. It can be devastating injuries in the elderly, resulting in similar morbidity and mortality to what has been observed in geriatric femoral neck fractures. Although surgical fixation (SF) with either a locking plate or retrograde intramedullary nail (RIN) remains the most common treatment strategy, not all surgeons allow immediate postoperative weight bearing, and complications such as nonunion, malunion, knee stiffness and compromised function remain relatively common.

Aim of the work: To evaluate the outcome & complications of primary arthroplasty versus open reduction and internal fixation of fractures in distal femur in elderly patients.

Patients and Methods: We used a systematic review approach similar to that advocated by the Cochrane Collaboration, accordance to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), appropriately modified for the epidemiological nature of our review objective and available data. We included a comprehensive search, transparent study selection and data extraction, risk of bias assessment, and synthesis of sufficiently similar data.

Results: Primary arthroplasty is becoming a promising option for treatment of distal femoral fractures in elderly patients as it provides many advantages over traditional methods of internal fixation such as early mobilization and avoiding non-union and knee stiffness, with shorter length of hospital stay and less cost on health-economics.

Conclusion: Primary arthroplasty is a reliable alternative to surgical fixation of acute distal femur fractures in geriatric population. This systematic review reinforces the potential value of a prospective randomized trial.

Keywords: Distal Femur Fractures; Open Reduction; Primary Arthroplasty

INTRODUCTION:

Distal femur fractures occur in elderly because of the falls in osteoporotic individuals, representing 1% of all fractures and 4-6% of all femoral fractures. They are

the second most common type of femoral fracture in the elderly following proximal femoral fractures.¹

Distal femur fractures management in elderly is challenging because of the poor

bone quality, possible pre-existing implants, either knee or hip arthroplasty, and impaired compliance during rehabilitation in mentally and physically restricted patients, besides, the high mortality rates, which is up to 33% after 12 months and 50% after 5 years.²

The treatment of distal femur fractures in the elderly can be conservative or operative depending on fracture morphology and patients' characteristics. Fractures can be conservatively managed with plaster casts or braces, as well in patients with increased operative risks or with very low functional demands, especially non-ambulatory patients. However, surgical management is the most widely accepted management for displaced distal femur fractures, with the aim to restore length, alignment and rotation, as well as restoring articular congruence of intra-articular fractures.³

Closed, minimally invasive or open reduction and internal fixation (ORIF) with a nail or a plate are the most commonly used techniques.⁴ Various implants and techniques for internal fixation of distal femur fractures are available including intramedullary nailing with different distal locking features, lateral locking plates.⁵

The outcome of surgical treatment depends on various factors that includes patient's characteristics, fracture type and the respect of soft tissues which allows preserving the biology of bone healing. Technical difficulties arise from metaphyseal comminution, presence of small articular fragments, also, the presence of osteosynthesis devices or prosthetic implants (hip or knee prosthesis) that is not infrequent in distal femur fractures in elderly patients.⁶

Primary total knee arthroplasty (TKA) is rarely indicated in managing of distal femur fractures. Several clinical trial recommended primary TKA for patients with intra-articular DFFs and pre-existing

osteoarthritis or rheumatoid arthritis, severe comminution, or poor bone stock.⁷

Primary total knee arthroplasty (TKA) for the treatment of distal femur fractures in the elderly had advantages over internal fixation for the patient and economic advantages for health care providers. Acute arthroplasty has the theoretical advantage of elimination of fracture healing issues, early mobilization, and immediate weight bearing, shorter duration of hospital stay postoperatively, however, it requires a highly skilled expert surgeon, availability of prosthesis. Theoretically, there is fear of loosening of the component, periprosthetic fractures.⁸

AIM OF THE WORK

This systematic review aim to evaluate the outcome & complications of primary arthroplasty versus open reduction and internal fixation of fractures in distal femur in elderly patients.

METHODOLOGY

We used a systematic review approach similar to that advocated by the Cochrane Collaboration, accordance to the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), appropriately modified for the epidemiological nature of our review objective and available data. We included a comprehensive search, transparent study selection and data extraction, risk of bias assessment, and synthesis of sufficiently similar data.

Study Selection and Eligibility Criteria:

The present review included studies that fulfilled the following criteria: Studies on elderly patients aged > 65 years diagnosed with acute displaced DFF for surgical indication, studies that compare the arthroplasty or open reduction and internal

fixation of distal femur, and studies that reported any of the following outcomes: ROM, mobilization, length of hospital stay, outcome scores, complications and mortality. We excluded studies published in languages other than English and studies classified as review articles, editorial commentaries, and technique articles without reporting clinical outcomes, histology study articles, case reports, biomechanical studies and postoperative rehabilitation studies, Studies on animals, Studies on cadavers, and studies regarding non-acute (>3 months or non-union) DFFs or periprosthetic fractures.

Search Strategy and Screening:

An electronic search was conducted from Jan 2000 to July 2020 in the following databases: Medline (Ovid), PubMed, Cochrane library, EMBASE, and manual search of the reference lists of the included studies will be searched for additional eligible articles. We used different combinations of the following queries: (“Distal femur fracture”, “DFF”, “primary TKA”, “*knee arthroplasty*”, “*knee replacement*”, “elderly”, “geriatric”, “open reduction”, “ORIF”)

Screening:

Retrieved citations were imported into EndNote X7 for duplicates removal. Subsequently, unique citations were imported into an Excel sheet and screened by two independent reviewers; the screening was conducted in two steps: title and abstract screening, followed by a full-texts screening of potentially eligible records.

Data Extraction:

Data entry and processing were carried out using a standardized Excel sheet and reviewers extracted the data from the included studies. The extracted data included the following domains: number of subjects, age, sex, post-operative outcome scores, duration of hospital stay, ROM, and mortality rate, complications, mobilization.

Meta-analysis was not applicable to our systematic review due to lack of standardized outcome scores, heterogeneous data extracted from the three available comparable studies. Functional outcomes were assessed using multiple measurement tools among studies with minimal overlap, precluding integration with meta-analysis.

Risk of Bias Assessment:

We assessed the quality of each selected study using the Newcastle-Ottawa scale⁹. This scale awards a maximum of nine stars to each study. We defined studies of high quality as those that scored the maximum nine stars on the Newcastle-Ottawa scale; studies of medium quality scored seven or eight stars, and studies of low quality scored six or less.

RESULTS

Search Results

In the present study, we searched Medline (Ovid), PubMed, Cochrane library, and EMBASE from Jan 2000 to July 2020. The search retrieved 779 unique records. We then retained 13 potentially eligible records for full-texts screening. Finally, 3 studies were included.

Diagram (1): PRISMA flow chart

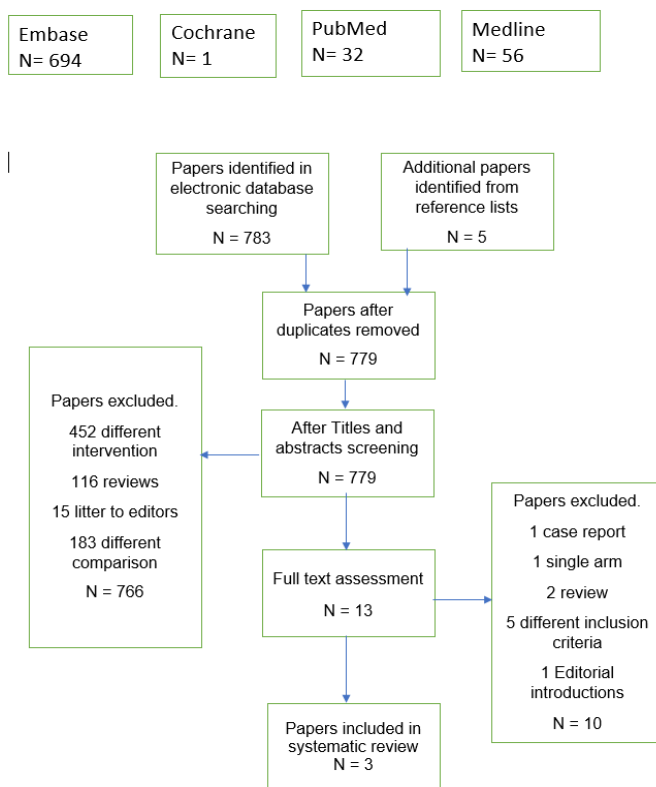


Table (1): Summary of included studies

Author	Year		study type	number of subjects	Inclusion criteria	Exclusion criteria	Quality (Newcastle-Ottawa scale)
Pearse	2004	ORIF	cohort retrospective	4	<ul style="list-style-type: none"> The patient <ul style="list-style-type: none"> Age 75 and over ASA grade 2 or less Walked independently prior to admission <ul style="list-style-type: none"> The injury <ul style="list-style-type: none"> Low energy Closed No neurovascular deficit AO type A or C fractures 	NR	Medium
		DFR		6			
Pasaruka	2019	ORIF	cohort retrospective	3	minimum age of 74 years and a complex fracture of the distal femur with an intraarticular component (minimum severity of AO33 B1 according to the AO classification)	multiple trauma and cases of periprosthetic fracture.	High
		DFR		3			
Hart	2016	ORIF	cohort retrospective	28	<ul style="list-style-type: none"> Aged 70 years or older had sustained comminuted, intra-articular (AO/OTA classification 33C) distal femur fracture 	inability to ambulate before injury, fractures above a total knee arthroplasty, and the presence of bilateral injuries	Medium
		DFR		10			

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Table (2): Demographics of the studies.

Author		Age	Sex	length of follow up	Activity level	Laterality
Pearse	ORIF	Mean age (year) 87	NR	Mean follow up (month) 26	Mean time of 3.3 days to walk.	NR
	DFR	Mean age 85		Mean follow up (month) 33	Mean time of 9.5 days to walk.	
Pasurka	ORIF	mean age 82.67	2 males	2 years	mobilization at room level after an average of 7.5 ± 6 days	NR
	DFR	mean age 77.3	14 female among the whole participants.		mobilization at room level after an average of 3.6 ± 2.1 days	
Hart	ORIF	Mean age 82.0 y	2 males 26 female	1 year	NR	NR
	DFR	Mean age 81.8 y	10 females			

Table (3): Types of implanted used.

Author		Types of implant used
Pearse	ORIF	Dynamic condylar screws (3) Retrograde nail femur (1)
	DFR	Cemented Stanmore knee replacement
Pasurka	ORIF	Angle-stable plates
	DFR	BPK-S Integration implants by Peter Brehm
Hart	ORIF	Smith and Nephew PERI-LOC locking distal femur plate (Smith and Nephew, Memphis, TN). Synthes LCP locking distal femur plate (Synthes, West Chester, PA).
	DFR	Biomet Orthopedic Salvage System (Biomet, Warsaw, IN) Zimmer Segmental System Distal Femur (Zimmer, Warsaw, IN) Stryker Global Modular Replacement System (Stryker, Mahwah, NJ).

Table (4): ROM, Outcome score

Author		post-operative outcome score	ROM
Pearse	ORIF	Mean Oxford score 27.5 (24—31)	Mean flexion 75
	DFR	Mean Oxford score 32.5 (26—36)	Mean flexion 86
Pasurka	ORIF	NR	<ul style="list-style-type: none"> The average ROM at time of discharge in the osteosynthesis group was 22.5° (± 21.8°) (flexion: 23.1° ± 21.2°; extension: 0.7° ± 1.8°)
	DFR	NR	<ul style="list-style-type: none"> The average ROM at time of discharge in the arthroplasty group 84.4° (± 8.2°) (flexion: 90.6° ± 1.8°; extension: 1.8° ± 2.5°)
Hart	ORIF	NR	NR
	DFR	NR	NR

Table (5): Mobilization, Duration of hospital stay.

Author		Mobilization	Duration of hospital stay
Pearse	ORIF	Walking ability Days to walking 9.5 (2—16) Days to independent walking 19	Mean post-operative stay (days) 23 (9-41)
	DFR	Walking ability Days to walking 3.3 (1—6) Days to independent walking 10	Mean post-operative stay (days) 15 (9-19)
Pasurka	ORIF	NR	Average 19.9 ± 14.4 days
	DFR	NR	Average 21.6 ± 6.1 days
Hart	ORIF	NR	mean 7.5 days
	DFR	NR	mean 7.3 days

Table (6): Complication and mortality

Author		complications	mortality
Pearse	ORIF	One patient reported mild pain	One case of death after 26 months
	DFR	one patient reported mild pain and three patients' moderate pain	No death
Pasurka	ORIF	<ul style="list-style-type: none"> • One case of minor bleeding • One case of Secondary dislocation of the tibia 	<ul style="list-style-type: none"> • One case of death in each group not related to surgery • No deaths complicated the surgical operations
	DFR	No complication reported	
Hart	ORIF	<ul style="list-style-type: none"> • One case of deep vein thrombosis • One case of superficial infection • One case of deep infection 	No death in both groups postoperatively
	DFR	<ul style="list-style-type: none"> • One case of superficial infection • One case of deep infection 	

DISCUSSION:

This systematic review aim to evaluate the outcome & complications of primary arthroplasty versus open reduction and internal fixation of fractures in distal femur in elderly patients.

Thus, we conducted the present study in order to review comparative studies between primary arthroplasty and open reduction and internal fixation (ORIF) of distal femur fractures in elderly patients.

In the present study, we searched we will search the major databases Medline, PubMed, EMBASE (Excerpta Medica dataBASE), and the Cochrane Library for articles published since 2000 till the end of July 2020. The search retrieved 779 unique records. We then retained 13 potentially eligible records for full-texts screening. Finally, 3 studies were included.

Descriptive analysis of all studies included:

We found that the included studies published between from Jan 2000 to July 2020. The 3 studies were cohort retrospective study comparing distal femur replacement (DFR) and open reduction and internal fixation (ORIF) for management of distal femur fractures in elderly patients. The total number of patients in all the included studies was 54 patients, 35 of them had done ORIF and 19 had done DFR.

The average age of all patients was (82.5 years); with youngest mean age of 81.8 years in *Hart, (2016)*¹⁰ study; and oldest mean age of 87 years in *Pearse (2005)*¹¹ study. Regarding ORIF, the average age was (83.89) years; with total (35) patients. Regarding DFR, the average age was (81.37) years; with total (19) patients.

Newcastle Ottawa scale was medium in all studies except *Pasurka (2019)*¹² was high. The shortest period of follow up was in *Hart (2016)*¹⁰ study (12 m). The longest period of follow up was in *Pearse (2005)*¹¹ study (33 m).

Comparative analysis of studies:

By analysis of the results in the present work we found that post-operative outcome score study was Reported only in *Pearse (2005)*¹¹ study and not reported in other studies. The Mean Oxford score for ORIF in *Pearse (2005)*¹¹ study was 27.5 (24—31). The Mean Oxford score for DFR in *Pearse (2005)*¹¹ was 32.5 (26—36).

The analysis of ROM of the study showed that The Mean flexion for ORIF in *Pearse (2005)*¹¹ study was 75. The Mean flexion for DFR in *Pearse (2005)*¹¹ study was 86. The Mean flexion for ORIF in *Pasurka (2019)*¹² study was (flexion: $23.1^{\circ} \pm 21.2^{\circ}$; extension: $0.7^{\circ} \pm 1.8^{\circ}$). The Mean flexion for DFR in *Pasurka (2019)*¹² study was (flexion: $90.6^{\circ} \pm 1.8^{\circ}$; extension: $1.8^{\circ} \pm 2.5^{\circ}$). The ROM not reported in *Hart, 2016*⁸¹ study.

By analysis of the Mobilization of the study we found that mobilization outcome study was Reported only in *Pearse (2005)*¹¹ study and not reported in other studies. The Walking ability for ORIF in *Pearse (2005)*¹¹ study was Days to walking 9.5 (2—16) Days to independent walking 19. The Walking ability for DFR in *Pearse (2005)*¹¹ study was days to walking 3.3 (1—6), days to independent walking 10. The Mobilization outcome not reported in *Hart (2016)*¹⁰ study and *Pasurka (2019)*¹².

The analysis of Duration of hospital stay of the study showed that. Mean post-operative stay of our study was 15.75 days. The shortest period for hospital stay was in *Hart (2016)*¹⁰ study (7.5 days). The longest period o for hospital stay was in *Pearse (2005)*¹¹ study (23 days).

By analysis of the complication and mortality of the study we found that all studies reported complication such as pain, bleeding, secondary dislocation, DVT & infection except *Pasurka (2019)*¹² in DFR group in which no complication reported. No death reported in all studies in both groups related to surgery postoperatively except *Pearse (2005)*¹¹ study reported one case of death after 26 months in ORIF group.

The present study results was in agreement with that study done by *Meluzio et al. (2020)*¹³ systematic review showing DFR to be a viable treatment option in a diverse group of adult patients with native or periprosthetic distal femur fractures and nonunion based on a pooling of 104 patients. The study showed that use of knee mega prosthetic implants could represent a valid treatment option aiming to reduce patients' immobilization and hospital stay. Good clinical outcomes with low rate of complications were reported by all included studies.

The present study results was in agreement with that study done by *Wang et*

*al. (2018)*¹⁴ retrospective study about Primary total knee arthroplasty for complex supracondylar femoral fractures in patients with knee arthritis showing that the usage of TKA with a stemmed femoral implant is a reasonable method for elderly patients suffering from supracondylar femoral fractures and concomitant knee arthritis.

The present study results was in disagreement with that study done by *Salazar et al. (2021)*¹⁵ systematic review about Distal Femur Replacement Versus Surgical Fixation for the Treatment of Geriatric Distal Femur Fractures Studies evaluating complications in elderly patients treated for distal femur fractures with either immediate DFR or SF were included. Studies with mean patient age younger than 55 years, and non-traumatic indications for DFR, or SF with non-locking plates were excluded. It reported no significant differences in complication rates or knee range of motion between SF and DFR. But In our study ORIF reported higher complication and mortality with better ROM in DFR. This conflict may be due to lower complications rate among ORIF group in *Salazar et al. (2021)*¹⁵ than reported in literature, such as the non-union rate which is reported to be $8.6\% \pm 8.3\%$, while the it is reported in literature to be as close as 24% ⁵⁰, in addition to the higher rates of complications in the oldest study on DFR done by Appleton et al.⁶¹ a study conducted between 1987 and 2004, which included 54 patients out of 125, with the lack of recent techniques and modalities of arthroplasty. In which 13% of cases underwent revision surgery, 7% had periprosthetic fractures, and deep infection 1.9%.

To our knowledge this is the first systematic review done on comparative studies between DFR and ORIF in geriatric distal femur fracture.

This systematic review has limitations. First, although we searched the Cochrane Library, PubMed and Medline, an

incomplete literature search may have biased our analysis because we only included articles written in English; all articles written in other languages were excluded. However, we believe that the articles we included from these databases constitute a very important part of the field. The included studies are predominantly observational in design and, therefore, subject to inherent selection bias. Comparing treatment failures between 2 fundamentally different operations poses a methodological challenge because some modes of failure after SF are not possible after arthroplasty and vice versa. To address this, we defined overall treatment failure for both SF and arthroplasty to create a broad profile of complications that would capture secondary surgeries for unsuccessful operations. This review includes 3 retrospective studies. Unfortunately, there is no sufficient body of evidence in the literature involving prospective studies and randomized controlled trials. These retrospective studies were included due to sufficient data for comparison. More rigorous prospective research comparing SF vs. DFR to treat acute geriatric distal femur fracture is warranted.

Conclusion:

Primary arthroplasty is a reliable alternative to surgical fixation of acute distal femur fractures in geriatric population. This systematic review reinforces the potential value of a prospective randomized trial.

REFERENCES:

1. Athar SM, Fazal MA, Hassan M, and Ashwood N (2017): Distal Femoral Fractures in the Elderly: Does Early Treatment with Locking Plates Reduce Mortality Rates? Clin Res Open Access 3(1).
2. Moloney GB, Pan T, Van Eck CF, Patel D and Tarkin I (2016); Geriatric distal femur fracture: Are we underestimating the rate of local and systemic complications? Injury; 47(8):1732-6.

3. Canton G, Giraldi G, Dussi M, Ratti C and Murena L (2019). Osteoporotic distal femur fractures in the elderly: peculiarities and treatment strategies. *Acta Bio Medica Atenei Parmensis*, 90(12-S), 25-32.
4. Ehlinger M, Ducrot G, Adam P and Bonnomet F (2013): Distal femur fractures. Surgical techniques and a review of the literature. *Orthop Traumatol Surg Res.*; 99(3):3, 53-60.
5. Loosen A, Fritz Y and Dietrich M (2019): Surgical Treatment of Distal Femur Fractures in Geriatric Patients. *Geriatric orthopaedic surgery & rehabilitation*, 10, 2151459319860723.
6. Yaacobi E, Sanchez D, Maniar H and Horwitz DS (2017): Surgical treatment of osteoporotic fractures: An update on the principles of management. *Injury*;48 Suppl: S34-S40.
7. Boureau F, Benad K, Putman S, Dereudre G, Kern G and Chantelot C. (2015): Does primary total knee arthroplasty for acute knee joint fracture maintain autonomy in the elderly? A retrospective study of 21 cases. *Orthop Traumatol Surg Res*; 101(8):947-951.
8. Bishop JA, Suarez P, Diponio L, Ota D and Curtin CM. (2013): Surgical versus nonsurgical treatment of femur fractures in people with spinal cord injury: an administrative analysis of risks. *Arch Phys Med Rehabil.*;94(12):2357-2364.
9. Stang A (2010): Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *Eur J Epidemiol.*; 25(9):603-605.
10. Hart GP, Kneisl JS, Springer BD, Patt JC, Karunakar MA (2017): Open reduction vs distal femoral replacement arthroplasty for comminuted distal femur fractures in the patients 70 years and older. *J Arthroplasty*; 32(1):202-206.
11. Pearse EO, Klass B, Bendall SP, Railton GT (2006): Stanmore total knee replacement versus internal fixation for supracondylar fractures of the distal femur in elderly patients. *Injury*; 36(1):163-168.
12. Pasurka M, Krinner S, Gelse K (2020): Osteosynthesis or arthroplasty of fractures near the knee joint in geriatric patients—a clinical-economical comparison. *Z Für Orthop Unfallchirurgie*; 158(03):283-290.
13. Meluzio MC, Oliva MS, Minutillo F, Ziranu A, Saccomanno MF, Maccauro G (2020): The use of knee mega-prosthesis for the management of distal femoral fractures: A systematic review. *Injury*. 2020;51:S17-S22.
14. Wang W, Yang K, Yang P, et al. (2018): Primary total knee arthroplasty for complex supracondylar femoral fractures in patients with knee arthritis: a retrospective study of a patient cohort. *Medicine (Baltimore)*; 97(40).
15. Salazar BP, Babian AR, DeBaun MR, et al. (2021): Distal Femur Replacement Versus Surgical Fixation for the Treatment of Geriatric Distal Femur Fractures: A Systematic Review. *J Orthop Trauma*; 35(1):2-9.

إعادة بناء وتقويم المفاصل مقابل التدخل الجراحي المفتوح والتثبيت الداخلي لكسور عظم الفخذ السفلية عند المرضى المسنين : مراجعة منهجية .

محمود حسن محمود عزت رزق وائل سمير عثمان ، مصطفى على العبد

الخلفية: كسور عظم الفخذ البعيدة هي ثاني أكثر أنواع كسور عظم الفخذ شيوعًا عند كبار السن بعد كسور أعلى عظمة الفخذ، ويمكن أن تكون إصابات مدمرة لدى كبار السن، مما يؤدي إلى مرضة ووفيات مماثلة لما لوحظ في كسور عنق الفخذ عند كبار السن. على الرغم من أن التثبيت الجراحي (SF) إما بلوحة قفل أو الظفر داخل النخاع الرجعي (RIN) يظل هو استراتيجية العلاج الأكثر شيوعًا، لا يسمح معظم الجراحين بتحمل الوزن فورًا بعد الجراحة، وتظل المضاعفات مثل عدم الالتئام، والتنام، وتيبس الركبة، والإعتلال الوظيفي شائعة نسبيًا.

الهدف: تقييم نتائج ومضاعفات تقويم المفصل الأولي مقابل الرد المفتوح والتثبيت الداخلي للكسور في كسور عظمة الفخذ السفلية في المرضى المسنين.

الطرق: استخدمنا نهج مراجعة منهجية مشابهًا لتلك التي دعت إليها مجموعة كوكرين التعاونية، وفقًا لتوصيات عناصر الإبلاغ المفضلة للمراجعات المنهجية والتحليلات التلوية (PRISMA) ، والتي تم تعديلها بشكل مناسب للطبيعة الوبائية لهدف المراجعة والبيانات المتاحة. قمنا بتضمين بحث شامل، واختيار دراسة شفاف واستخراج البيانات، وتقييم مخاطر التحيز، وتوليف بيانات مماثلة بما فيه الكفاية.

النتائج: أصبحت عملية تقويم المفصل الأولية خيارًا واعدًا لعلاج كسور الفخذ السفلية لدى المرضى المسنين لأنها توفر العديد من المزايا مقارنة بالطرق التقليدية للتثبيت الداخلي مثل الحركة المبكرة وتجنب عدم الالتئام وتيبس الركبة، مع مدة إقامة أقصر في المستشفى وأقل تكلفة على اقتصاديات الصحة.

الخلاصة: تقويم المفصل الأولي هو بديل موثوق به للتثبيت الجراحي لكسور عظم الفخذ البعيدة الحادة لدى كبار السن. تعزز هذه المراجعة المنهجية القيمة المحتملة لتجربة عشوائية مستقبلية.