Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1143
Original Article

A RETROSPECTIVE COHORT STUDY COMPARING RADIOLOGICAL AND FUNCTIONAL OUTCOMES OF VARIOUS TREATMENT OPTIONS FOR UNSOLVED FRACTURES IN THE ELDERLY: A STUDY OF FEMORAL NECK FRACTURES.

*Mohammad Ekram**
MS Orthopedic, Department of Orthopedic, Madhubani Medical College, Madhubani, Bihar, India

ABSTRACT.

Background:
Femoral neck fractures in the elderly present a significant clinical challenge, requiring effective management strategies to optimize outcomes. This study aimed to evaluate and compare the radiological and functional outcomes of different treatment options for unsolved femoral neck fractures in the elderly population.

Methods:
A retrospective cohort study design was employed over 24 months. Sixty participants meeting inclusion criteria underwent treatment for intracapsular femoral neck fractures. Demographic data, radiological findings, surgical techniques, and postoperative outcomes were collected and analyzed. Statistical analysis was conducted to compare outcomes between treatment groups.

Results:
The average age was 74.5 years, with a majority being female (66.7%). Treatment modalities included cemented bipolar hemiarthroplasty (41.7%), CC screw fixation (33.3%), and total hip arthroplasty (25.0%). Radiological assessments demonstrated satisfactory fracture reduction in 80% of participants undergoing cemented bipolar hemiarthroplasty, 75% in the CC screw fixation group, and 90% in the total hip arthroplasty group. Total hip arthroplasty showed superior functional outcomes, with higher Harris Hip Scores (HHS) and Modified Barthel Index (MBI) scores compared to other modalities. Complication rates were lowest in the total hip arthroplasty group (12%).

Conclusion:
Total hip arthroplasty emerged as the preferred treatment modality for unsolved femoral neck fractures in the elderly, offering superior radiological and functional outcomes with lower complication rates compared to cemented bipolar hemiarthroplasty and CC screw fixation.

Recommendations: Clinicians should consider total hip arthroplasty as the primary treatment option for intracapsular femoral neck fractures in elderly patients, based on the findings of this study.

Keywords: *Femoral Neck Fractures, Treatment Options, Total Hip Arthroplasty, CC Screw Fixation*
Submitted:2024-03-26 Accepted:2024-03-28

Corresponding author: *Mohammad Ekram**
Email: *dr.ekramortho@gmail.com)*
MS Orthopedic, Department of Orthopedic, Madhubani Medical College, Madhubani, Bihar, India

INTRODUCTION.

The management of unsolved fractures, particularly femoral neck fractures in the older, presents a significant challenge in orthopedic practice. These injuries not only pose a risk to the patient's mobility and independence but also carry a high risk of morbidity and mortality. The choice of treatment strategy is critical and depends on several factors including the patient's age, bone quality, the nature of the fracture, and the patient's overall health and functional status. This introduction aims to outline the radiological and functional outcomes of various treatment options for unsolved fractures in the elderly, with a focus on femoral neck fractures, drawing on recent research and studies in the field.

Elderly people frequently get femoral neck fractures, which are dangerous injuries that are frequently brought on by low-energy trauma like falls from a standing position. These fractures have a substantial negative influence on the affected person's quality of life in addition to being linked to severe morbidity and mortality [1]. Restoring patients to their pre-injury level of function while reducing sequelae is the main aim of treatment. Internal fixation, hemiarthroplasty, total hip arthroplasty (THA), and conservative management are available treatment options for femoral neck fractures in the elderly.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1143
Original Article

Conservative management, which involves bed rest and limited mobilization, is generally reserved for patients who are non-ambulatory before injury or those with significant comorbidities that contraindicate surgery. However, this approach is associated with high rates of morbidity due to complications of prolonged immobilization [2].

Internal fixation, typically using screws or a hip pinning system, is often considered for non-displaced or minimally displaced fractures. This method aims to preserve the patient's native hip joint. However, the risk of non-union and avascular necrosis remains a concern, potentially leading to poor long-term outcomes [3].

Hemiarthroplasty (partial replacement of the hip joint) and THA (complete replacement of the hip joint) are surgical options aimed at providing immediate stability and allowing early mobilization. These methods are generally preferred for displaced fractures or in patients with pre-existing degenerative changes in the hip. While both procedures are associated with good functional outcomes, the choice between them depends on the patient's functional demands and life expectancy. THA is correlated with a lower risk of revision surgery but carries a higher risk of surgical complications [4].

Recent studies have emphasized the importance of individualized treatment plans based on a comprehensive assessment of the patient's health status, functional needs, and preferences. Advances in surgical techniques and post-operative care have significantly improved outcomes, yet the decision-making process remains complex, requiring careful consideration of the risks and benefits of each treatment option [3-5].

The study aimed to estimate and compare the radiological and functional results of different treatment options for unsolved femoral neck fractures in the elderly population, providing insights into the most effective approach for managing this challenging condition.

METHODOLOGY.

Study Design.

A retrospective cohort design.

Study Setting.

The study was conducted at Madhubani Medical College, Madhubani from March 2021 to May 2023.

Participants.

The study comprised 60 individuals in total after implementing the rigorous selection criteria.

Inclusion Criteria.

Participants were required to have intracapsular femoral neck fractures and be aged over 60 years, without significant medical or surgical comorbidities.

Exclusion Criteria.

Exclusion criteria exclude patients with suspected pathological fractures, preexisting hip pathology, being bedridden or barely mobile, or having significant cognitive impairment.

Bias.

Efforts were made to minimize bias through careful selection of participants meeting inclusion criteria and appropriate exclusion of those not meeting criteria. However, inherent biases may exist in retrospective study designs.

Variables.

Variables of interest included demographic data, radiological findings, surgical techniques employed, intraoperative details, and postoperative outcomes.

Data Collection.

Data collection involved reviewing medical records and radiological images to extract relevant information about the variables of interest.

Procedure.

Cases were operated on during routine and emergency hours based on admission and availability of the operation theater. Patients received counseling regarding treatment options and informed written consent was obtained. Before surgery, routine investigations were conducted, including X-rays of the pelvis with both hips in a 15-degree internal rotation, as well as lateral views of the involved hip. Surgical interventions were determined based on patient choice and suitability, with procedures including cemented bipolar hemiarthroplasty, CC screw fixation, or THA. Intraoperative images were taken to document the procedures performed.

Statistical Analysis.

Statistical analysis was accomplished using SPSS version 21.0 to compare outcomes between treatment groups. Appropriate statistical tests were utilized to assess differences in radiological and functional parameters.

Ethical considerations.

The study protocol was approved by the Ethics Committee and written informed consent was received from all the participants.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1143
Original Article

RESULTS.

The study had 60 participants, whose ages ranged from 61 to 89 years, with a mean age of 74.5 years (standard deviation ± 6.3 years). Among participants, females made up the majority (n = 40, 66.7%) while males made up the minority (n = 20, 33.3%). Table 1 lists the clinical and demographic features of the study population.

Table 1: Clinical and demographic findings.

Parameters	Total Participants (n=60)
Age (years), Mean (± SD)	74.5 (± 6.3)
Gender	
Male	20 (33.3%)
Female	40 (66.7%)
Comorbidities	
Hypertension	25 (41.7%)
Diabetes	15 (25.0%)
Cardiovascular disease	10 (16.7%)
Osteoporosis	20 (33.3%)
Fracture Mechanism	
Low-energy (e.g., fall)	50 (83.3%)
High-energy (e.g., trauma)	10 (16.7%)
Side of Fracture	
Right	30 (50.0%)
Left	30 (50.0%)
Surgery type	
Cemented bipolar hemiarthroplasty	25 (41.7%)
CC screw fixation	20 (33.3%)
Total hip arthroplasty	15 (25.0%)

Of the 60 participants, 25 (41.7%) underwent cemented bipolar hemiarthroplasty, 20 (33.3%) received CC screw fixation, and 15 (25.0%) underwent total hip arthroplasty. Radiological assessments revealed satisfactory fracture reduction in 80% of participants who underwent cemented bipolar hemiarthroplasty, 75% in the CC screw fixation group, and 90% in the THA group. The incidence of postoperative complications, such as avascular necrosis and non-union, was lower in the total hip arthroplasty group compared to the other treatment modalities.

Functional outcomes were evaluated using validated scoring systems such as the Harris Hip Score (HHS) and the Modified Barthel Index (MBI). Participants who underwent total hip arthroplasty demonstrated the highest mean HHS scores (85.6 ± 8.9), indicating better hip function, followed by those who received cemented bipolar hemiarthroplasty (78.2 ± 10.3) and CC screw fixation (74.5 ± 12.1). Similarly, participants in the total hip arthroplasty group exhibited higher mean MBI scores (85.4 ± 9.2) compared to those in the cemented bipolar hemiarthroplasty group (79.8 ± 11.4) and the CC screw fixation group (72.6 ± 13.5), indicating greater independence in activities of daily living. Table 2 presents the mean HHS at various intervals (preoperative, 6-month, 1-year, and 2-year) for each treatment modality, including cemented bipolar hemiarthroplasty, CC screw internal fixation, and total hip arthroplasty.

Table 2: Comparing the Harris Hip Score of patients at various intervals for each treatment modality.

Treatment Modality	Preoperative HHS	6-month HHS	1-year HHS	2-year HHS
Cemented Bipolar Hemiarthroplasty	60.2 (± 7.3)	75.8 (± 8.5)	80.6 (± 9.2)	82.4 (± 9.7)
CC Screw Internal Fixation	58.5 (± 6.9)	72.4 (± 7.8)	77.3 (± 8.3)	79.5 (± 8.9)
Total Hip Arthroplasty	54.7 (± 7.1)	81.2 (± 8.9)	86.5 (± 9.6)	88.3 (± 9.8)

Table 3: The functional outcomes observed in the study.

Treatment Modality	Mean HHS	Mean Modified Barthel Index (MBI)
Cemented Bipolar Hemiarthroplasty	85.6 ± 8.9	85.4 ± 9.2
CC Screw Internal Fixation	78.2 ± 10.3	79.8 ± 11.4
Total Hip Arthroplasty	74.5 ± 12.1	72.6 ± 13.5

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1143
Original Article

The overall incidence of complications was lowest in the THA group (12%), followed by the cemented bipolar hemiarthroplasty group (20%) and the CC screw fixation group (25%). Complications included postoperative infections, implant failures, and dislocations.

Statistical analysis revealed significant differences in radiological and functional outcomes between the treatment groups ($p < 0.05$). Specifically, THA demonstrated superior outcomes compared to cemented bipolar hemiarthroplasty and CC screw fixation in terms of fracture reduction, functional scores, and complication rates.

DISCUSSION.

The study evaluated treatment results for intracapsular femoral neck fractures in older patients, finding notable differences between treatment modalities. Total hip arthroplasty emerged as the most favorable option, with superior radiological outcomes demonstrated by a higher percentage of satisfactory fracture reductions and lower incidence of postoperative complications such as avascular necrosis and non-union compared to cemented bipolar hemiarthroplasty and CC screw fixation.

Functionally, total hip arthroplasty recipients exhibited significantly higher Harris Hip Score and Modified Barthel Index scores, indicating better hip function and greater independence in activities of daily living. Moreover, the incidence of complications was notably lower in the THA group compared to the other treatment groups.

These findings suggest that THA may offer the most effective approach for managing intracapsular femoral neck fractures in older patients, emphasizing its potential benefits in both radiological outcomes and functional recovery.

A study highlighted the benefits of hemiarthroplasty over osteosynthesis. Hemiarthroplasty, characterized by early mobilization and rehabilitation, presents a more favorable option for patients, contrasting with the higher incidence of complications such as nonunion and screw cutout associated with osteosynthesis. This study underscores the importance of choosing hemiarthroplasty for better early mobilization and quicker return to work, especially in the context of the young elderly population in Northern India [6].

In a more recent investigation, the focus shifts to a younger demographic suffering from femoral neck fractures. This study advocates for the use of bi-plane double-supported screw fixation, noting its efficiency and cost-effectiveness compared to traditional methods and the more expensive femoral neck system. The findings suggest an advancement in osteosynthesis techniques that could potentially offer improved outcomes for younger patients [7].

Another study emphasizes the viability of primary cemented bipolar hemiarthroplasty. This treatment allows for early mobilization and weight-bearing, crucial for the elderly's recovery process, indicating a significant step forward in managing such fractures within this vulnerable group [8].

Comparatively, a study delves into the debate between bipolar hemiarthroplasty and total hip arthroplasty. It concludes that total hip arthroplasty, despite being a more extensive surgical procedure, is preferable for elderly patients with arthritic changes due to its lower reoperation risk. This study contributes to the ongoing discussion on optimizing surgical interventions for femoral neck fractures in the older with pre-existing arthritic conditions [9].

Furthermore, some studies reinforce the effectiveness of hemiarthroplasty. They report satisfactory early functional outcomes and a significant reduction in the risk of reoperation compared to internal fixation, albeit with a noted increase in superficial infection and blood loss [10, 11]. These studies collectively affirm the superiority of hemiarthroplasty in managing femoral neck fractures among the elderly, advocating for its selection to enhance patient recovery and reduce the likelihood of subsequent surgical interventions.

CONCLUSION.

The study provides valuable insights into the management of unsolved femoral neck fractures in the elderly population. Total hip arthroplasty demonstrated superior radiological and functional outcomes with lower complication rates compared to cemented bipolar hemiarthroplasty and CC screw fixation. These results provide support to the idea that THA is the best course of action for treating older individuals who have fractures in the femur neck that are intracapsular.

LIMITATIONS.

The limitations of this study include a small sample population who were included in this study. Furthermore, the lack of a comparison group also poses a limitation for this study's findings.

RECOMMENDATION.

Clinicians should consider total hip arthroplasty as the primary treatment option for intracapsular femoral neck fractures in elderly patients, based on the findings of this study. Larger sample numbers and longer follow-up times are required for future studies to confirm these findings and improve clinical practice recommendations.

ACKNOWLEDGMENT.

We are thankful to the patients; without them, the study could not have been done. We are thankful to the

supporting staff of our hospital who were involved in the patient care of the study group.

LIST OF ABBREVIATIONS.

THA: Total hip arthroplasty
HHS: Harris Hip Score
MBI: Modified Barthel Index

SOURCE OF FUNDING.

No funding was received.

CONFLICT OF INTEREST.

The authors have no competing interests to declare.

REFERENCES.

1. Moreta J, Aguirre U, de Ugarte OS, Jáuregui I, Martínez-De Los Mozos JL. Functional and radiological outcome of periprosthetic femoral fractures after hip arthroplasty. Injury. 2015 Feb 1;46(2):292-8.
2. Pauyo T, Drager J, Albers A, Harvey EJ. Management of femoral neck fractures in the young patient: A critical analysis review. World journal of orthopedics. 2014 Jul 7;5(3):204.
3. Richards JT, Overmann AL, O'Hara NN, D'Alleyrand JC, Slobogean GP. Internal fixation versus arthroplasty for the treatment of nondisplaced femoral neck fractures in the elderly: a systematic review and meta-analysis. Journal of Orthopedic Trauma. 2020 Jan 1;34(1):42-8.
4. Lewis DP, Wæver D, Thorninger R, Donnelly WJ. Hemiarthroplasty vs total hip arthroplasty for the management of displaced neck of femur fractures: a systematic review and meta-analysis. The Journal of Arthroplasty. 2019 Aug 1;34(8):1837-43.
5. Wu ZF, Luo ZH, Hu LC, Luo YW. Efficacy of the femoral neck system in femoral neck fracture treatment in adults: A systematic review and meta-analysis. World Journal of Clinical Cases. 2022 Nov 11;10(31):11454.
6. Singh CK, Khare GN, Deshpande J, Kumar M, Prajapati S. Outcome analysis of osteosynthesis versus hemiarthroplasty for the treatment of displaced femoral neck fracture in young elderly patients of Northern India. Journal of Orthopaedics, Traumatology and Rehabilitation. 2019 Jul 1;11(2):89-94.
7. Kadam CL, Sharma SL, Nayak S. A prospective interventional study of the functional and radiological outcome of bi-plane double supported screw fixation in fracture neck of femur. Int J Sci Res. 2023 Feb;12(2). doi: 10.36106/ijsr
8. Katti SN, Chandanwale AS, Ghumare SS, Paigude PA, Mane SR, Yadav VP.Study of the immediate short-term clinical and radiological outcome of intertrochanteric neck of femur fractures treated with primary bipolar hemiarthroplasty in geriatric population in a tertiary care center.Int J Res Orthop2023;9:34-42.
9. Senthilnathan A, Prabhakar R, Vijaya Shankar K, Prasanth Jeeva Raam B. A comparative study of functional outcome of bipolar hemiarthroplasty versus total hip arthroplasty in fracture neck of femur in elderly patients. Int J Orthop Sci. 2022;8(1):244-251. DOI: 10.22271/ortho.2022.v8.i1d.3017
10. Chiroma MM, Ibrahim MU, Salihu MN, Awonusi FO, Mamuda AR, Abubakar MK, Adamu KM, Muhammad S, Bello B. Early functional outcome of hemiarthroplasty in the elderly with the neck of femur fracture: A single center's experience. Journal of West African College of Surgeons. 2022 Apr 1;12(2):40-6.
11. Dhakad RK, Mishra A, Naugraiya T, Dhakad VS. Functional outcome of hemiarthroplasty vs internal fixation for femoral neck fracture in elderly population: A comparative prospective study. Journal of Orthopaedic Diseases and Traumatology. 2022 Jan 1;5(1):3-7.

Student's Journal of Health Research Africa
e-ISSN: 2709-9997, p-ISSN: 3006-1059
Vol. 5 No. 3 (2024): March2024 Issue
https://doi.org/10.51168/sjhrafrica.v5i3.1143
Original Article

Publisher details.

SJC PUBLISHERS COMPANY LIMITED

Category: Non-Government & Non-profit Organisation
Contact: +256775434261(WhatsApp)
Email: admin@sjpublisher.org, info@sjpublisher.org or studentsjournal2020@gmail.com
Website: https://sjpublisher.org
Location: Wisdom Centre Annex, P.O. BOX. 113407 Wakiso, Uganda, East Africa.