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Comparison between Total Hip Replacement and Internal Fixation for the Treatment of Displaced Femoral Neck Fractures in Elderly Patients: A comparative longitudinal study

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Abstract

Aim: To Compare between Total Hip Replacement and Internal Fixation for the Treatment of Displaced Femoral Neck Fractures in Elderly Patients

Study design: Comparative longitudinal study

Place and duration: This study was conducted at Pakistan Institute of Medical Sciences Islamabad Pakistan from Jan 2020 to Jan 2021.

Methodology: A total of 80 patients with femoral neck fracture were included in this study. The study participants were divided into, Group A treated with internal fixation and Group B treated with THR. Harris hip score, time patient, stayed at the hospital, blood loss, and surgery time was recorded. Statistical analysis was performed using SPSS software version 22 to compare the functional outcomes of both groups.

Results: Harris hip score was statistically significantly higher in the total hip replacement group after 12-month follow-up as compared to the internal fixation. There was no significant difference found in both the groups in terms of associated complications. The average Harris hip score was significantly higher in total hip arthroplasty (96.2) as compared to the internal fixation (92.3). There was a strong association found between the non-union and avascular necrosis and the advanced age indicating that the risk of complications increased with the progression in age.

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Conclusion: It is concluded that primary hip arthroplasty is found to be a safe treatment strategy for elderly patients as it provides better functional outcomes and fewer complications as compared to internal fixation.

Keywords: primary hip arthroplasty, Internal Fixation, Displaced Femoral Neck Fractures, elderly people

Introduction

Femoral neck fracture (FNF) is a prevalent type of hip fracture, considered a worldwide health burden, and its prevalence is increasing with time. It accounts for more than 10 % of hospitals cases and its incidence will increase to more than 5 million cases per year by 2050 (1). The fractures can occur at any age in both genders, but it is more prevalent in elderly patients. The incidence of femoral neck fracture in males is about 6 %, and in females, it is about 25 % (2).

The treatment approaches for (FNF) include hemiarthroplasty (HA), total hip replacement (THA), and internal fixation. Internal fixation is a preferable treatment approach for patients who are intolerant to prosthesis surgery (3). It unites the fracture by joining the femoral head with the hip joint. The common complications include nonunion or malunion and avascular necrosis. HA is a cost-effective management approach for DFNF and is linked with several advantages, including shorter surgery time, reduced blood loss, and less technical demand. THA provides improved hip function, decreased acetabulum erosion, and low chances for revision surgery (4, 5, 6). However, the appropriate treatment approach for DFNF in elderly patients is unclear yet. Several studies have suggested that the outcomes of the treatment approaches depend on patient health status, age of the patient, and individual's risk profile (7).

The health status of elderly patients with FNF may vary, including patients active physical state, healthy lifestyles, bedridden patients, and cognitively impaired patients. Therefore, it is not possible that one treatment approach would be considered appropriate for all elderly patients. For patients with active and healthy lifestyles, total hip replacement is considered an appropriate approach rather than internal fixation. The objective of the present study was to identify the functional outcomes of DFNF treated with internal fixation and total hip replacement.

Methodology:

This comparative longitudinal was conducted at Pakistan Institute of Medical Sciences Islamabad Pakistan from January 2020 to January 2021, after getting approval from the institutional review committee. A total of 80 patients with DFNF were included in this study. Demographic data (name, age, gender, and BMI), pre-operative health and physical data of all the patients were recorded. The patients were divided into two groups; group A included 40 patients treated with internal fixation by placing a cannulated screw, and group B included 40 patients treated with total hip replacement. Inclusion criteria include patient with age group 50-80 years with DFNF. The exclusion criteria of study include patients with bilateral hip fractures, previous history of ipsilateral fractures, significant physical illness, and

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pathological fractures. All the patients were pre-operatively treated with antibiotics and anticoagulants. After surgery, the patients were transferred to the post-operative recovery ward. The operative data included the number of days patients were in hospitals, the time required for surgery to complete, and recorded complications during the surgery.

The post-operative outcomes in all the patients were recorded. In Group A mobilization was recorded after the 48 hours of the surgery. In Group B patients were immediate mobilization was recorded also the patients were guided for the precautions needed to limit the dislocation of prosthesis. Post-operatively patients were followed-up for one year. Functional outcomes were recorded using Harris hip score.

Statistical analysis was performed using SPSS version 26. Mean and standard deviation were calculated for age, height, weight, BMI and duration of injury. Frequency and percentage was calculated for gender and functional outcome. Effect modifiers like age, gender, BMI and duration of injury were controlled through stratification and post-stratification. T-test was applied to see their effects on outcome. P-value ≤ 0.05 were considered as significant.

Results

A total of 80 patients diagnosed with displaced femoral neck fracture who met the inclusion criteria were enrolled in this study. The study participants included 34 males and 46 females with a mean age of 65 years ranging between 55 – 75 years. The study participants were randomly allocated in Group A and Group B and received their respective treatments. Most of the patients (62.5%) had Garden type IV femoral fracture. The baseline characteristics of patients are summarized in table 1.

During surgery, mean blood loss and mean surgery time was recorded in both groups. The average surgery time for group A (50 ± 5) was significantly low as compared to group B (110 ± 10; $P < 0.05$). There was a significant more blood loss in group B (2.7 ± 0.9 units) as compared to group A (1.6 ± 0.6 units; $P < 0.05$). The average pain score of group A was 35.5 ± 6.5, and group B was 42.8 ± 4.2, which is statistically low in group A ($P < 0.05$). The hospitalization time was significantly shorter in group A (5.3 ± 0.8) as compared to group B (12 ± 1.2; $P < 0.05$).

In group A, three patients had non-union, and five patients had avascular necrosis that further needed the total hip replacement. While in group B, none of the patients had any complications that required further intervention (As shown in Table 2). Several other complications that include wound infection, bedsore, foot drop, urinary retention, urinary tract infection, and pulmonary embolism were observed in both groups (As shown in Table 4). The average Harris hip score in total hip replacement was significantly better (96.4 ± 2.5) than the internal fixation group (92.3 ± 2.6; $P < 0.05$) (As shown in Table 3). The rate of non-union and avascular necrosis was found to be 7.5% in the age group 55 – 65 years; however, 12.5% in the age group 66 – 75 years indicates that the incidence of avascular necrosis and non-union was progressively increased with age (As shown in Table 5). When compared to the fracture type, it was found that fracture non-union was more common for Garden type IV than Garden type III.

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Table 1: Socio-Demographic Characteristics of the Study Participants (n = 40 in each group)

Variable	Total hip replacement n (%)	Internal fixation n (%)
Mean age (range)	**62 (55 – 70)**	**67 (55 – 75)**
Mean BMI (range)	**24 (22 – 26)**	**23.5 (21 – 25)**
Gender		
Male	**16 (40)**	**18 (45)**
Female	**24 (60)**	**22 (55)**
garden type		
Type 3	**16 (40)**	**14 (35)**
Type 4	**24 (60)**	**26 (65)**
side involved		
Right	**22 (55)**	**19 (47.5)**
Left	**18 (45)**	**21 (52.5)**

Table 2: Operative and post operative characteristics of the study participants (n = 40 in each group)

Variable	Total hip replacement [Mean ± SD / n (%)]	Internal fixation [Mean ± SD / n (%)]
Blood loss (Units)	**2.7 ± 0.9**	**1.6 ± 0.6**
Surgery time (min)	**110 ± 10**	**50 ± 5**
Hospital stay (days)	**12 ± 1.2**	**5.3 ± 0.8**
Pain score	**42.8 ± 4.2**	**35.5 ± 6.5**
Complications that required further intervention		
Non-union	**0**	**3 (7.5)**
Avascular necrosis	**0**	**5 (12.5)**

Table 3: Functional outcomes in terms of Harris hip score at 3-, 6-, 9-, and 12 months follow-up

Harris	**3 months**	**6 months**	**9 months**	**12 months**

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hip score	Total hip replacement	Internal fixation	Total hip replacement	Internal fixation	Total hip replacement	Internal fixation	Total hip replacement	Internal fixation
Mean	**77.6**	**74.3**	**84.1**	**80.9**	**93.7**	**90.2**	**96.4**	**92.3**
SD	**3.2**	**4.1**	**3.9**	**4.8**	**3.7**	**3.2**	**2.5**	**2.6**
SEM	**0.82**	**0.91**	**0.56**	**0.67**	**0.54**	**0.53**	**0.34**	**0.35**
P-value		**0.02**		**0.003**		**0.004**		**0.0003**

Table 4: Complication in total hip replacement group and internal fixation group (n = 40 in each group)

Complications	Total hip replacement group n (%)	Internal fixation group n (%)
Superficial wound infection	**5 (12.5)**	**3 (7.5)**
Bed sore	**3 (7.5)**	**1 (2.5)**
Foot drop	**1 (2.5)**	**0 (0)**
Urinary retention	**3 (7.5)**	**2 (5)**
Urinary tract infection	**2 (5)**	**1 (2.5)**
Non-union	**0 (0)**	**3 (7.5)**
Avascular necrosis	**0 (0)**	**5 (12.5)**
Pulmonary embolism	**1 (2.5)**	**0 (0)**

Table 5: Incidence of non-union and avascular necrosis in different age group

Age group (Years)	Non-union n (%)	Avascular necrosis n (%)
55 – 65	**1 (2.5)**	**2 (5)**
66 – 75	**2 (5)**	**3 (7.5)**

Discussion

Surgical interventions are the commonly used treatment strategy for femoral neck fracture by orthopedic surgeons. Reduced internal fixation, hemiarthroplasty, and total hip arthroplasty are the currently available surgical interventions (8). Best treatment for femoral neck fracture is still a debatable matter (9-12). In the past few years, patient-related treatment approaches were more preferably used in clinical orthopedic research rather than diagnosis-related

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approaches (13). Despite all the treatment variety, the optimal therapy for displaced hip fracture in the older people is debatable. Several clinical studies claimed that hip arthroplasty has better functional outcomes rather than other treatment approaches (14). The major complications associated with internal fixation are non-union and avascular necrosis that required another salvage procedure like hemiarthroplasty or total hip replacement. In addition, it may require the second anesthesia to remove the screw after fracture union. Several studies reported that arthroplasty provides better functional outcomes with fewer complications and improves the quality of life (15-17).

In the current study, the functional outcomes and complications of reduced internal fixation and total hip arthroplasty were evaluated in elderly patients with a displaced femoral neck fracture. There is more incidence of complications observed in internal fixation. The postoperative functional score up to 12 months was evaluated which favored the total hip arthroplasty group. There is little to no risk of revision surgery required in total hip replacement that reduced the rate of superficial infection, blood loss, and surgical time (14, 17).

Our findings are consistent with the meta-analysis conducted by Dai et al which evaluated the clinical outcomes of reduced internal fixation and arthroplasty in elderly patients. In this meta-analysis, arthroplasty was found to be superior in terms of associated complications and functional outcomes (18). Arthroplasty not only reduced the surgical time but also reduced the incidence of associated complications and mortality (18). A study found that arthroplasty is associated with better clinical and functions outcomes with improved quality of life as compared to the reduced internal fixation in patients of over 60 years (19, 20). Blomfeldt et al. reported that total hip arthroplasty provides better functional outcomes after 4-year follow-up in mentally competent elderly patients with displaced femoral neck fracture as compared to the reduced internal fixation (14). These findings are consistent with the current study. Despite the complications associated with internal fixation that include malunion, non-union, and avascular necrosis, arthroplasty is associated with a few other complications including superficial wound infection, sciatic nerve palsy, hip joint dislocation, thigh pain, femoral stem loosening, and mortality (16, 21). Superficial wound infection, urinary retention, and urinary tract infection were also observed in the current study and found to be more prevalent in the total hip replacement group. In the reduced internal fixation group, 8 patients were required for reoperation due to avascular necrosis or non-union. Although the number of patients included in this study and the scoring method increased the value of the study and strengthen this study. Despite it, the lack of a scientific method of randomization and shorter follow-up are the few limitations of this study. The shorter follow-up limits the evaluation of long-term functional and clinical outcomes between both the treatment strategies especially in total hip replacement.

Conclusion

The results of the current study revealed that total hip replacement is found to be the better therapy for older patient having displaced femoral neck fracture. Older patients have low physical demands that may benefit them from total hip arthroplasty in terms of better functional outcomes and improved quality of life. Although, the extensive surgery of total hip

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replacement may not lead to complications and mortality but the he major risk associated with total hip arthroplasty is the dislocation of fracture which is acceptable low in the elderly population due to their limited physical activity.

Ethical approval

It was taken from the ethical review committee of the institute

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Conflict of interest

None

REFERENCES

1. Florschutz AV, Langford JR, Haidukewych GJ, Koval KJ. Femoral neck fractures: current management. Journal of orthopaedic trauma. 2015; 29(3):121-9.
2. Perry DC, Metcalfe D, Griffin XL, Costa ML. Inequalities in use of total hip arthroplasty for hip fracture: population based study. Bmj. 2016 Apr 27; 353.
3. Bhandari M, Swiontkowski M. Management of acute hip fracture. New England Journal of Medicine. 2017; 377(21):2053-62.
4. Sonaje JC, Meena PK, Bansiwal RC, Bobade SS. Comparison of functional outcome of bipolar hip arthroplasty and total hip replacement in displaced femoral neck fractures in elderly in a developing country: a 2-year prospective study. European Journal of Orthopaedic Surgery & Traumatology. 2018; 28(3):493-8.
5. Wang F, Zhang H, Zhang Z, Ma C, Feng X. Comparison of bipolar hemiarthroplasty and total hip arthroplasty for displaced femoral neck fractures in the healthy elderly: a meta-analysis. BMC musculoskeletal disorders. 2015; 16(1):1-3.
6. 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; 34(8):1837-43.
7. Sköldenberg O, Chammout G, Mukka S, Muren O, Nåsell H, Hedbeck CJ, Salemyr M. HOPE-trial: hemiarthroplasty compared to total hip arthroplasty for displaced femoral neck fractures in the elderly-elderly, a randomized controlled trial. BMC musculoskeletal disorders. 2015; 16(1):1-6.
8. Joyo MR, Ahmed N, Shah GA, Khanzada AA, Afzal T, Keerio NH, Noor SS. Outcome Analysis of Osteosynthesis Versus Hemiarthroplasty for the Treatment of Displaced Femoral Neck Fracture in Young Elderly Patient. JPRI [Internet]. 23Jun.2021 [cited 13Jan.2022];33(33A):53-9.
9. Foss NB, Palm H, Krasheninnikoff M, Kehlet H, Gebuhr P. Impact of surgical complications on length of stay after hip fracture surgery. Injury. 2007; 38(7):780-4.
10. Frydrýšek K, Šír M, Pleva L. Strength Analyses of Screws for Femoral Neck Fractures. J Med Biol Eng. 2018; 38(5):816-34.
11. Ricci WM, Della Rocca GJ, Combs C, Borrelli J. The medical and economic impact of preoperative cardiac testing in elderly patients with hip fractures. Injury. 2007; 38 Suppl 3:S49-52.

12. Leighton RK, Schmidt AH, Collier P, Trask K. Advances in the treatment of intracapsular hip fractures in the elderly. Injury. 2007; 38 Suppl 3:S24-34.
13. Noor SS, Keerio NH, Valecha NK, Qureshi MA. J Biochem Tech (2019) 11(3): 92-96
14. Blomfeldt R, Törnkvist H, Ponzer S, Söderqvist A, Tidermark J. Comparison of internal fixation with total hip replacement for displaced femoral neck fractures. Randomized, controlled trial performed at four years. J Bone Joint Surg Am. 2005; 87(8):1680-8.
15. Jain NB, Losina E, Ward DM, Harris MB, Katz JN. Trends in surgical management of femoral neck fractures in the United States. Clin Orthop Relat Res. 2008; 466(12):3116-22.
16. Wani IH, Sharma S, Latoo I, Salaria AQ, Farooq M, Jan M. Primary total hip arthroplasty versus internal fixation in displaced fracture of femoral neck in sexa- and septuagenarians. J Orthop Traumatol. 2014; 15(3):209-14.
17. Keating JF, Grant A, Masson M, Scott NW, Forbes JF. Randomized comparison of reduction and fixation, bipolar hemiarthroplasty, and total hip arthroplasty. Treatment of displaced intracapsular hip fractures in healthy older patients. J Bone Joint Surg Am. 2006; 88(2):249-60.
18. Dai Z, Li Y, Jiang D. Meta-analysis comparing arthroplasty with internal fixation for displaced femoral neck fracture in the elderly. J Surg Res. 2011; 165(1):68-74.
19. Noor SS, Hussain N, Javed I. Outcome of Hemiarthroplasty in elderly patients with fracture neck of femur. Journal of Pakistan orthopedic association. feb 2010; 22 (1) :14-19.
20. Noor SS, Hussain N, Javed I. Functional outcome of locked intramedullary interlocking nail in patients with diaphysial femur fracture. Journal of Pakistan orthopedic association August 2010; 22 (2) :119 -123