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THIRTY-DAY MORTALITY OUTCOMES IN ELDERLY PATIENTS WITH PROXIMAL HIP FRACTURES TREATED AT A TERTIARY CARE HOSPITAL: AN OBSERVATIONAL STUDY USING THE NOTTINGHAM HIP SCORE

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Abstract

Introduction And Aim **:** Proximal hip fractures in the elderly are associated with high morbidity, mortality, and a substantial healthcare burden due to functional decline and prolonged recovery. With an increasing incidence driven by global aging, understanding early outcomes such as 30-day mortality is vital for evaluating perioperative care quality. This observational study investigates the 30-day mortality rate in elderly patients with proximal hip fractures treated at a tertiary care hospital, utilizing the Nottingham Hip Score (NHS) as a prognostic tool. By examining the correlation between NHS and early mortality, the study aims to enhance risk stratification and inform targeted interventions to improve outcomes in this high-risk population.

Materials And Methodology **:** This prospective observational study was conducted at a tertiary care hospital to evaluate 30-day mortality in elderly patients (≥60 years) with proximal hip fractures, using the Nottingham Hip Score (NHS) as a predictive tool. The study included patients with femoral neck, intertrochanteric, or subtrochanteric fractures who underwent surgical or conservative treatment. Exclusion criteria included pathological fractures from malignancies, polytrauma, terminal illness with life expectancy under 30 days, and loss to follow-up. Data collected included patient demographics, comorbidities, fracture type, injury mechanism, preoperative assessments (including NHS and ASA classification), treatment modality, complications, and 30-day mortality outcomes. The primary endpoint was 30-day mortality.

Conclusion **:** This observational study examines the burden of proximal hip fractures in the elderly, revealing a predominance among older females with common comorbidities such as hypertension and diabetes. Intertrochanteric fractures were the most frequent, with intramedullary fixation using trochanteric fixation nails (TFN) being the preferred surgical approach. Despite modern fixation techniques, functional recovery—as assessed by the Nottingham Hip Score—remained limited, underscoring the multifactorial challenges in managing this frail patient population.

Keywords : Proximal hip fracture, elderly, 30-day mortality, Nottingham Hip Score, trochanteric fixation nails, surgical intervention, intertrochanteric fractures, femoral neck fractures, functional recovery, comorbidities, hypertension, diabetes, postoperative complications.

INTRODUCTION

Proximal hip fractures are a significant cause of morbidity and mortality among the elderly, frequently resulting severe functional decline, prolonged hospital stays, and increased healthcare burden.[1] These fractures significantly impair mobility and independence, frequently necessitating long-term rehabilitation or institutional care. The incidence of hip fractures is rising due to the aging global population estimated to be around 150 to 300 per 100,000 persons per year,

making it a critical public health concern.[2] Among elderly patients, 30-day mortality serves as a critical benchmark for assessing early post-surgical outcomes, offering insights into both the magnitude of the injury and the quality of perioperative care. [3] Several factors influence early mortality, including pre-existing comorbidities, frailty, perioperative complications, and the level of post-surgical care provided.

The Nottingham Hip Score (NHS) is widely used to predict mortality and functional recovery following hip fractures, aiding in risk stratification and clinical decision-making 4 which can be attributed to various factors including existing health conditions, weakness, and complications during or after surgery 5. Recognizing these risk elements is crucial for developing effective early intervention methods and enhancing patient results.

This observational study aims to evaluate the 30-day mortality rate in elderly patients with proximal hip fractures managed at a tertiary care hospital, using the Nottingham Hip Score as a prognostic tool. By analyzing the relationship between NHS and mortality outcomes, this study seeks to provide insights into risk assessment and potential improvements in perioperative care for this vulnerable population.

MATERIAL AND METHODOLOGY

Study Design

This study is a prospective observational study conducted at a tertiary care hospital to assess the 30-day mortality outcomes in elderly patients with proximal hip fractures utilising the Nottingham Hip Score as a predictive tool to evaluate postoperative outcomes and mortality risk.

Study Population

The inclusion criteria for the study encompassed patients aged 60 years or older who were diagnosed with proximal hip fractures, including femoral neck, intertrochanteric, and subtrochanteric fractures. Eligible patients had undergone either surgical intervention or conservative management at the tertiary care hospital.

Patients were excluded from the study if they had pathological fractures due to malignancies, sustained multiple fractures as part of polytrauma, or had pre-existing terminal illnesses with a life expectancy of less than 30 days. Additionally, individuals who were lost to follow-up within 30 days post-treatment were also excluded from the analysis.

Data collection:

A standardized data collection form was utilized to document patient demographics, clinical presentation, treatment modalities, and outcomes. Demographic details included age, sex, and comorbidities such as hypertension, diabetes, and cardiovascular diseases. Fracture characteristics were classified based on the type of hip fracture, including femoral neck, intertrochanteric, and subtrochanteric fractures, along with the mechanism of injury, categorized as either a low-energy fall or high-energy trauma.

Preoperative assessment involved the calculation of the Nottingham Hip Score (NHS) to predict mortality risk, as well as the evaluation of preoperative hemoglobin levels, renal function, and electrolyte balance. Additionally, the American Society of Anesthesiologists (ASA) classification was recorded to assess surgical risk. Treatment details encompassed surgical interventions, including hemiarthroplasty, total hip arthroplasty, dynamic hip screw fixation, and proximal femoral nail fixation. Conservative management was considered in cases where surgery was contraindicated.

Postoperative and follow-up data included the length of hospital stay, the occurrence of complications such as infections, thromboembolism, pneumonia, and delirium, as well as 30- day mortality outcomes, which served as the primary endpoint of the study.

Statistical analysis

SPSS (Statistical Package For Social Sciences) version 21. (IBM SPASS statistics [IBM corporation: NY, USA]) was used to perform the statistical analysis

Data was entered in the excel spread sheet. Descriptive statistics of the explanatory and outcome variables were calculated by mean, standard deviation for quantitative variables, frequency and proportions for qualitative variables.

Ethical Considerations

The study was approved by the Institutional Ethics Committee. Written informed consent was obtained from all participants or their legal guardians.

RESULTS

A total of 131 subjects were included in the study. The mean age was 78.53 ± 10.61 years, with participants ranging from 45 to 99 years old. The majority (52.7%) were aged between 76 and 90 years, followed by 29.8% in the 61–75 age group.

Demographic Profile

Of the participants, 71% were female and 29% male. Most subjects (82.4%) had schooling- level education, while only 3.1% were graduates. A variety of living arrangements were reported, with the majority (64.9%) categorized as "Others," potentially indicating diverse or non-traditional setups. A small number lived alone (1.5%) or in old-age homes (0.8%). (Table 1)

TABLE 1: DISTRIBUTION OF THE SUBJECTS BASED ON DEMOGRAPHIC DETAILS

)emographic Details		**requency**	**ercent**
.ge Groups	5 to 60 yrs		.1
	l to 75 yrs	9	9.8
	6 to 90 yrs	9	2.7
	90 yrs	5	1.5
ducation	raduate		.1
	lil	9	4.5
	chool	08	2.4
ender	emales	3	1
	lales	8	9
iving With	lone		.5
	hildren		.1
	aughter		.1
	amily		.5
	ld age home		
	thers	5	4.9
	elatives		.3
	on		.8
	pouse	7	3.0

Clinical Characteristics

The mean duration of stay was 12.79 ± 4.30 years. The most common fractures were intertrochanteric fractures on the left (35.1%) and right (32.8%) sides. Neck of femur (NOF) fractures occurred in 16.8% of subjects on the left and 11.5% on the right. Less frequent injuries included subtrochanteric fractures, osteoarthritis of the hip, and nonunion fractures (each 0.8%).

Associated injuries were rare, with 98.5% of subjects reporting no additional injuries. Two individuals had L1 vertebral compression fracture and malunited humerus, respectively.

Pre-injury mobility status revealed that 77.9% were ambulatory, while 22.1% were non- ambulatory. Vision was normal in 81.7% of participants; however, 9.9% reported diminished vision. Other visual conditions included prior cataract surgery (3.1%), spectacle use (3.9%), and glaucoma (0.8%). (Table 2)

TABLE 2: DISTRIBUTION OF THE SUBJECTS BASED ON CLINICAL FINDINGS

		requency	**ercent**
YPE OF FRACTURE	T -L	6	5.1
	T-L, NOF-L		.8
	T-R	3	2.8
	OF-L	2	6.8
	OF-R	5	1.5
	A HIP-L		.8
	ONUNION-R		.8
	UBTROCHANTERIC RACTURE-R		.8
	UBTROCHANTERIC		.8

	RACTURE-L		
SSOCIATED INJURIES	1 VERTEBRA OMPRESSION FRACTURE		.8
	ALUNITED HUMERUS		.8
	IIL	29	8.5
REINJURY	mbulatory	02	7.9
	on-Ambulatory	9	2.1
ision	/24.		.8
	Cataract surgery	4	3.1
	iminished	4	.9
	laucoma		.8
	il	07	1.7
	pectacle		.9

Condition of Ipsilateral/Contralateral Hip, Knee, and Spine

On physical examination, the majority of the subjects (83.2%) had findings within normal limits (WNL) regarding their ipsilateral and contralateral hip, knee, and spine. Osteoarthritis (OA) of both knees was the most frequent abnormality, seen in 9.92% of participants.

Other findings included pubic rami fractures (1.5%), intertrochanteric fractures on the contralateral side (1.5%), and ipsilateral knee osteoarthritis (1.5%). A few subjects had complex or chronic issues, such as degenerative changes due to iliotibial band contracture from prior burn injury or prior intertrochanteric fracture with distal femur fracture—each seen in 0.8% of cases. Both knee effusion was also observed in one subject (0.8%) (Table 3)

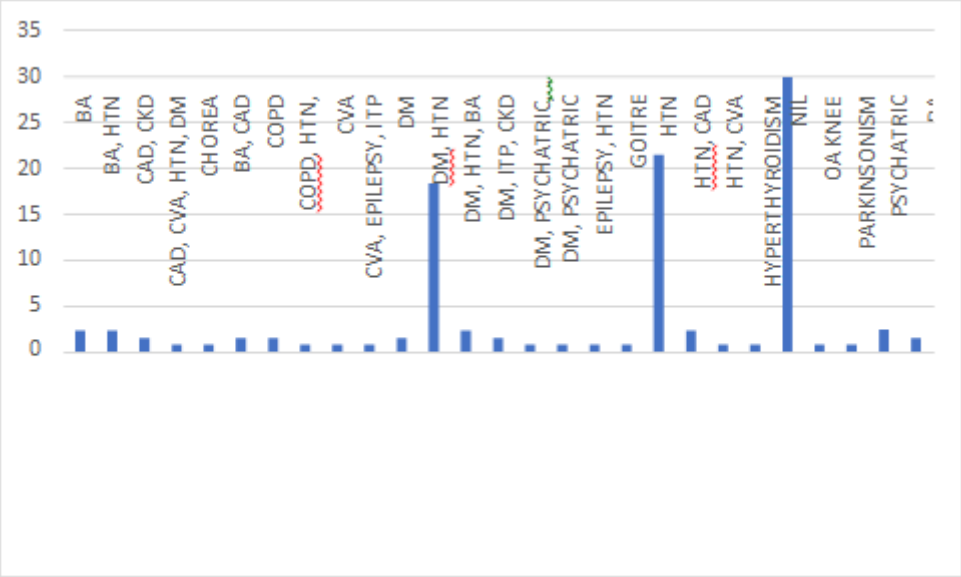
CONDITION OF IPSILATERAL/ CONTRALATERAL HIP& KNEE / SPINE EXAMINATION	Frequency	Percent
WNL	109	83.2
OA both knee	13	9.92
Pubic rami fracture	2	1.5
Intertrochanteric fracture left hip8yrs back(dhs) fracture distal femur 8 months back(orif)	1	.8
Ipsilateral knee OA	2	1.5
Ipsilatreral & contralateral knee OA genuvalgum, degerative change secondary to IT band contracture after burns 40 yrs back	1	.8
Both knee effusion	1	.8
Intertrochanteric fracture contralateral	2	1.5
Total	131	100.0

TABLE 3: DISTRIBUTION OF THE SUBJECTS BASED ON CONDITION OF IPSILATERAL/ CONTRALATERAL HIP; KNEE / SPINE EXAMINATION

Co-morbidities

A total of 70.2% of the subjects had at least one co-morbidity. Hypertension (HTN) was the most common condition (21.4%), often seen with diabetes mellitus (DM) in 18.3% of the cases. Other reported conditions included bronchial asthma (2.3%), coronary artery disease (CAD), chronic kidney disease (CKD), psychiatric disorders, Parkinsonism, and epilepsy. About 29.8% of the subjects had no co-morbidities. (Figure 1)

Figure 1



Hematological and Consultation Profile

The mean haemoglobin level was 10.50 ± 1.57 g/dL, with values ranging from 6.90 to 14.80 g/dL. The majority of patients required specialist consultations, with the most frequent being a combination of medicine, cardiology, and anaesthesia (17.6%). Pulmonology, cardiology, and psychiatry were also commonly consulted specialties. Only 3.8% of subjects did not require any consultation.

Surgical Management

Closed reduction and internal fixation (CRIF) with trochanteric fixation nail (TFN) was the most common surgical procedure (48.1%), followed by dynamic hip screw (DHS) fixation (19.8%). Hemiarthroplasty (HRA) was performed in 25.2% of cases (14.5% AMP type and 10.7% BPP type). Conservative treatment was used in 6.1%, and total hip replacement (THR) in 0.8% of cases.(Figure 2)

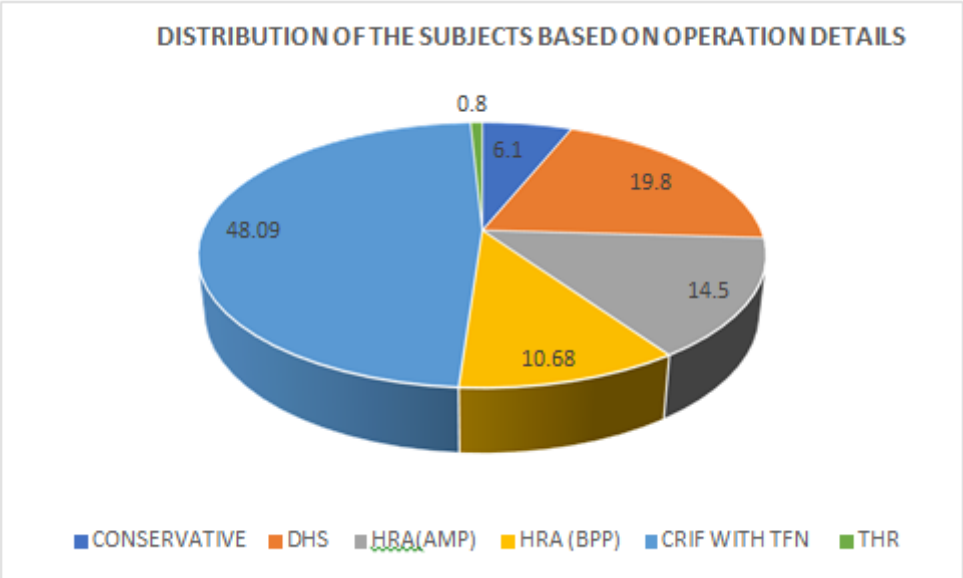


Figure 2
Functional Outcome

The mean Nottingham Hip Score (NHS) was 3.74 ± 1.55, with scores ranging from 0 to 6.(Table 4)

TABLE 4: MEAN NHS (NOTTINGHAM HIP SCORE)

		Minimum	Maximum	Mean	.D
HS Nottingham Hip Score)	31	)	.0	.740	.5471

DISCUSSION

In this observational study conducted at a tertiary care center, the mean age of elderly patients presenting with proximal hip fractures was 78.53 ± 10.61 years, aligning with global data indicating that hip fractures predominantly affect the older population. A retrospective cohort study by Tay et al 6 reported a similar mean age of 80 years among hip fracture patients.

Our findings showed a strong female predominance (71%), consistent with global epidemiological trends. Several studies have consistently documented a higher incidence of hip fractures among women, attributed largely to postmenopausal osteoporosis and longer life expectancy. For instance, a study analyzing 2460 hip fracture cases found that patients who were female suffered 2.9 times more then men.6,7

Regarding educational status, the majority (82.4%) of subjects had schooling-level education, with only a small fraction (3.1%) being graduates. Low educational attainment has been associated with poorer health literacy, reduced access to preventive healthcare, and higher fracture risks in the elderly. A study from China highlighted that individuals with higher educational attainment had better health-related quality of life outcomes post-hip fracture.8

Living arrangements showed that a significant number of subjects (64.9%) were classified under the “Others” category, suggesting they might live in nontraditional settings or extended family environments. Previous studies have shown that elderly individuals not living in traditional family units (such as living alone or in institutionalized care) are at higher risk for falls, delayed fracture management, and poorer post-fracture outcomes. A Welsh nationwide study found that hip fracture patients living alone had increased one-year mortality and higher rates of care home admission.9 These demographic features—advanced age, female predominance, lower educational attainment, and varied living arrangement highlights the need for targeted prevention strategies.

In the present study, the mean duration of stay among elderly patients with hip fractures was 12.79 ± 4.30 years, reflecting the chronic and complex care requirements of this vulnerable population. Intertrochanteric fractures were the most common injury pattern, accounting for 67.9% (35.1% left, 32.8% right), followed by neck of femur (NOF) fractures. This distribution is consistent with global epidemiological data, where intertrochanteric fractures account for approximately 50%–60% of proximal femoral fractures among older adult.10 A recent study by Hu et al 11 found intertrochanteric fractures to be more common than femoral neck fractures in Asian populations, likely related to differences in bone geometry and fall mechanics.

Associated injuries were uncommon in our study, with 98.5% of subjects having isolated fractures. Similar findings were reported by Roche et al. (2005), who noted that most hip fractures in the elderly occur as isolated injuries, typically resulting from low-energy falls.12 The low incidence of additional trauma such as vertebral fractures or humeral malunion highlights the fragility of the population but also reflects the typical low-energy mechanism.

Pre-injury mobility status showed that 77.9% of the cohort was ambulatory, aligning with observations from studies such as those by Prestmo et al. (2015), where the majority of elderly hip fracture patients were independently mobile before injury.13 Ambulatory status is a critical prognostic factor; ambulatory individuals before a fracture have significantly better postoperative recovery rates and lower mortality.

Visual impairments were relatively uncommon in our cohort, with 81.7% having no visual deficits. However, 9.9% had diminished vision, and smaller proportions had conditions such as cataracts or glaucoma. Vision impairments are a well-recognized risk factor for falls and fractures. A 2022 review by Hong et al. indicated that even mild visual impairment can increase fall risk by up to twofold.14 Thus, the presence of visual impairments in a subset of our population may have contributed to fall-related fractures.

In the present study, a high prevalence of co-morbidities (70.2%) was observed among elderly patients with proximal hip fractures. Hypertension (HTN) emerged as the most common condition, present in 21.4% of the subjects, often coexisting with diabetes mellitus (DM) in 18.3% of cases. This is consistent with previous research indicating that hypertension and
diabetes are among the most prevalent comorbidities in hip fracture patients.15 The presence of multiple comorbidities, particularly cardiovascular and metabolic disorders, has been associated with increased perioperative complications and higher mortality rates in hip fracture patients.16

In this study, closed reduction and internal fixation (CRIF) with trochanteric fixation nail (TFN) was the most commonly performed surgical procedure (48.1%) among elderly patients with proximal hip fractures, followed by dynamic hip screw (DHS) fixation (19.8%). The preference for CRIF with TFN in intertrochanteric fractures is consistent with current best practices. Recent guidelines and meta-analyses have shown that intramedullary nailing (IMN), including TFN, provides better biomechanical stability and lower failure rates compared to extramedullary fixation (such as DHS), particularly in unstable intertrochanteric fractures. 17

The mean Nottingham Hip Score (NHS) among elderly patients with proximal hip fractures. The NHS is a widely used patient-reported outcome measure that assesses pain, mobility, and functional status following hip surgery. This mean score suggests moderate postoperative function across the cohort, aligning with previous literature that highlights diminished hip function as a common outcome in frail elderly patients post-fracture. A recent extensive cohort study revealed that mortality rates remain elevated in patients over 80 years undergoing hip fracture surgery, with factors such as the type of surgical procedure, male sex, advanced age, the need for blood transfusion, and higher Charlson Comorbidity Index (CCI) scores being significantly associated with increased mortality.18

CONCLUSION

This observational study highlights the significant challenges associated with proximal hip fractures in the elderly population. The findings demonstrate that most patients were of advanced age, predominantly female, with a high prevalence of comorbidities, particularly hypertension and diabetes. Intertrochanteric fractures were the most common injury pattern, and intramedullary fixation using trochanteric fixation nails (TFN) emerged as the preferred surgical method, reflecting global trends toward more stable fixation techniques. Despite surgical intervention, functional outcomes as measured by the Nottingham Hip Score remained modest, underlining the complex interplay between age, comorbidities, fracture type, and recovery potential.

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