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ORIGINAL RESEARCH **REGIONAL ANESTHESIA**

Impact of frailty and comorbidity index on postoperative complications and functional outcomes among elderly patients undergoing hip fracture surgeries under regional anesthesia techniques

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ABSTRACT

Background & Objective: Elderly patients sustaining hip fractures often are physically very frail and have multiple co-morbidities that might significantly affect their clinical outcomes after surgery. We evaluated the effect of frailty and co-morbidities on the functional outcomes, morbidity and mortality among elderly patients undergoing hip fracture surgeries under regional anesthesia.

Methodology: Elderly patients who underwent hip fracture surgeries under regional anesthesia between 1 April 2021 to 30 April 2022 were included in this non-concurrent cohort study. Besides basic demographic and perioperative data, the Charlson Comorbidity Index (CCI), length of hospital stay, length of ICU stay and 30-day readmission rates were noted. Telephonic interviews were conducted at 3 months following surgery and a note was made of their pre-operative Clinical Frailty Score (CFS), ability to walk within 3 months of discharge, Activities of Daily Living (ADL) using Katz Index (KI) and 90-day mortality.

Results: Of the 109 patients included in the final analysis, forty belonged to the prefrail and sixty-nine to the frail group. Forty-five had moderate CCI while sixty-four belonged to severe CCI. Patients with severe co-morbidities had a significantly lower KI score ($P = 0.023$) and longer length of ICU stay ($P = 0.005$). Frail patients had significantly higher mortality rates at 30, 60 and 90 days compared to prefrail, (mortality at 30-days $P = 0.029$, 60-days $P = 0.006$, 90-days $P < 0.001$)

Conclusions: Presence of Frailty and multiple co-morbidities result in significantly worse outcomes (both mortality and functional outcomes) among elderly patients undergoing hip fracture surgeries. This underlines the importance of routine assessment of frailty and CCI scores during preoperative screening.

Abbreviations: ADL - Activities of daily living; CCI - Charlson Comorbidity Index; CFS - Clinical Frailty Score; ICU – Intensive Care Unit; KI - Katz Index; MI - Myocardial Infarction

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Key words: Hip Fracture; Elderly; Frailty; Comorbidity; Mortality; Functional Outcome; Clinical Frailty Scale; Charlson Comorbidity Index

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1. INTRODUCTION

Hip fracture is a global health burden for vulnerable elderly patients which results in hospitalisation, functional disability and death. Approximately 1.66 million hip fractures occur worldwide each year, and the majority (95%) of hip fractures occurs in patients aged 60 or over. By the year 2025, the incidence of hip fractures is estimated to be double to 2.6 million.[1,2] The annual incidence of hip fractures in India is estimated to be 0.6 million.[2] This number is expected to increase significantly because of the increased life expectancy and the resulting ageing population, particularly in Asia (India and China).[3,4] The index hospitalization and the subsequent disability-related health and social care impose a high economic burden. The costs incurred during the first year following hip fracture were found to be greater than equivalent estimates for acute coronary syndrome and ischemic stroke.[5]

The elderly population who sustains hip fractures often have multiple comorbidities and are vulnerable to being frail affecting their postoperative and functional outcomes. Frailty is defined as a state in which a vulnerable individual has a diminished physiological capacity to respond to external stressors such as trauma or infection. Increasing age has a well-defined correlation with frailty status, but ageing alone is not necessarily synonymous with frailty.[6] Studies on the prevalence of frailty in India ranged from 11 to 55%.[7] Frail older adults are more vulnerable to stressors such as acute illness, surgical or medical interventions, or trauma than younger or non-frail older adults. Frailty is associated with adverse health outcomes.[8] Similarly, studies have concluded that the presence of comorbidities is a risk factor for poor functional outcomes[9] and postoperative mortality.[9,10,11]

This non-concurrent cohort study aimed to investigate the effect of frailty measured using the Clinical Frailty Scale (CFS) and of comorbidities measured using the Charlson Comorbidity Index (CCI) on the functional outcome (assessed by Katz Index), postoperative morbidity and mortality in patients who underwent hip fracture surgeries under regional anesthesia at our tertiary referral centre. We hypothesized that increased clinical frailty scores and comorbidity index would be associated with poor functional outcome, increased incidence of postoperative complications and mortality during hospitalization, at 30 days, 60 days and 90 days.

2. METHODOLOGY

2.1. Study design and participants

We conducted a non-concurrent cohort study of all patients presenting with hip fractures and undergoing surgical repair at a single tertiary care centre between 1 April 2021 and 30 April 2022. This study was approved by Institutional Research Board and Ethics committee.

Patients who met the following criteria were eligible: age of 65 years or older; admitted with hip fracture and received a hip fracture surgery under regional anesthesia at our hospital. Regional anesthesia procedures included the following; spinal anesthesia, epidural anesthesia, and combined spinal-epidural anesthesia. Most patients routinely receive a preoperative nerve block for pain relief. There were no bilateral fractures or repeat surgery on the same side within this time period. We excluded the following patients: those whose medical record or surgical records were not accessible (e.g., incomplete or confidential records), patients with periprosthetic fractures, patients with nonsurgical intervention, patients who were robust (CFS 1−3) and patients with low CCI score (1−2), patients who received general anesthesia or had a conversion from regional to general anesthesia, those who could not be contacted telephonically and those who were not willing to take part in the study.

Data were collected from electronic medical records or admission files of the patient. Variables included demographics (age, gender), ASA physical status classification, comorbidities, CCI score, type of fracture, type of surgery, time to surgery, preoperative nerve block, type of anesthesia, intraoperative local anesthetic dose, use of vasopressor infusion or boluses, postoperative complications; e.g., respiratory (including desaturation, pneumonia, pulmonary embolism) cardiac (acute coronary syndrome, MI, pulmonary oedema, atrial fibrillation), renal (acute kidney injury, acute on chronic kidney disease) postoperative COVID infection, other infectious complications (surgical site infections, urinary tract infections, sepsis; repeat surgery, delirium and cerebrovascular accident. Other variables such as length of hospital stay, length of ICU stay, and 30-day readmission were also included.

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This study was merged with data collected from telephonic interviews after informed consent, either with the patient or the patient's relative. Variables collected were preoperative clinical frailty score; ability to walk within 3 months of discharge, classified as 'independent', 'assistance needed- walking stick/walker', 'dependent/bedridden'; ADL measured using KI and mortality up to 90 days.

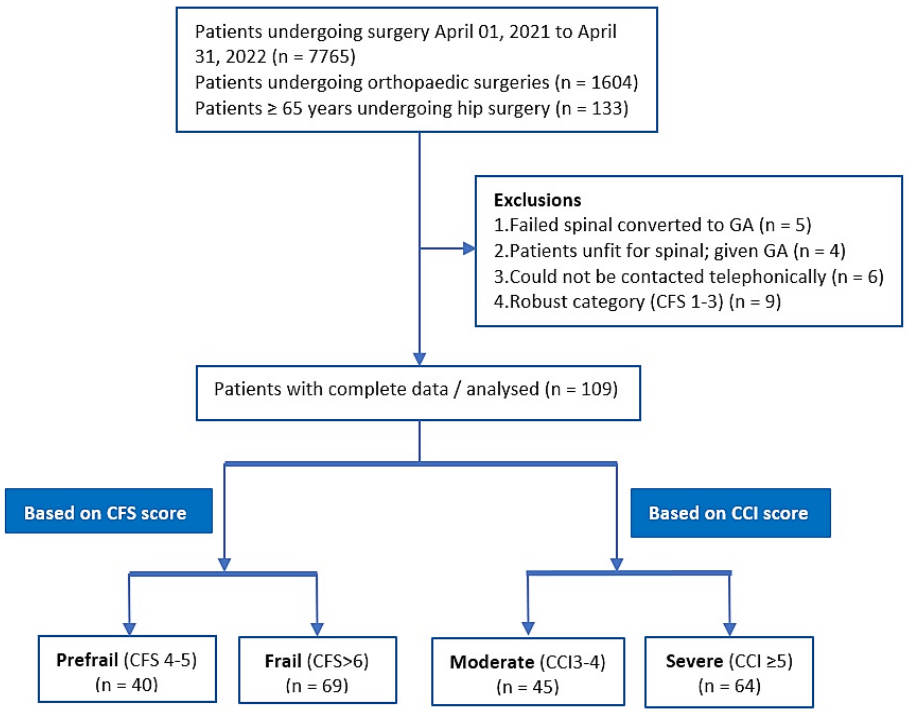

Figure 1: Patient selection flow diagram

Abbreviations: *CCI: Charlson Comorbidity Index; CFS: Clinical Frailty score*

2.2. Assessment of Frailty

Frailty was measured using CFS. It is one of the common well-validated tools that was proposed in the Canadian Study of Health and Aging by Rockwood et al.[12] CFS was initially a seven-point scale which was modified into 9-point scale to include very severely frail and terminally ill. CFS evaluates specific domains of comorbidity, cognition, and function which range from 'very fit' −1 to 'terminally ill' − 9. The CFS score has been validated against adverse outcomes in large community cohorts.[13–15] Data was measured retrospectively based on a detailed chart review of admission notes, physician's notes, nursing notes and telephonic interviews. During the telephonic interview, all questions pertaining to the pre-fracture frailty status were asked to either the patient, family member or caretaker after informed consent. For statistical analysis, we categorised the CFS score into prefrail – categories 4−5 and frail - categories 6−9.

2.3. Assessment of Comorbidity

Comorbidities of the patient were procured from admission and progress notes and discharge summaries. The comorbidity score was completed using the CCI.[16] CCI is a weighted index that strongly predicts patients' mortality within one year of hospitalization. Based on the CCI score we categorized the patients into moderate = 3−4 and severe ≥ 5.

2.4. Outcomes Measures

Assessment of Activities of daily living (ADL)

Independence of daily living was assessed by Katz Index (KI). It was described by Katz in 1960 for the evaluation of patients with hip fractures.[17] It grades dependence or independence of the patient based on the analysis of the performance of six functions: bathing, dressing, toileting, transferring, continence and feeding. This score varies from 0 to 6, with higher scores denoting better functional capability. For statistical analysis, we categorized patients into high (5,6) and low scores (0−4). We also assessed the ability of the patient to walk after 3 months of fracture and divided them as 'independent', 'assistance needed' (walking stick/ walker) and 'dependent' (bed ridden).

The secondary outcomes were the postoperative complications; respiratory (including desaturation, pneumonia, pulmonary embolism) cardiac (acute coronary syndrome, MI, pulmonary oedema, atrial fibrillation), renal (acute kidney injury, acute on chronic kidney disease), postoperative COVID infection, other infectious complications (surgical site infections, urinary tract infections, sepsis); repeat surgery, delirium and cerebrovascular accident. The other secondary outcome was in-hospital mortality and mortality at 30, 60 and 90 days, time to surgery from time of fall, number of days in ICU and total length of hospital stay.

2.5. Statistical Analysis

Data were analysed using R version 4.03 (R core team, R Foundation for Statistical Computing, Vienna, Austria

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2021). Quantitative variables were assessed using appropriate measures of central tendency (mean/median) and variance (standard deviation/interquartile range). Pearson's Chi-squared test; Wilcoxon rank sum test; Fisher's exact test were used for hypothesis testing.

3. RESULTS

Figure 1 shows the patient flow diagram. One hundred and thirty-three patients fulfilled the inclusion criteria. They were followed up till 3 months after the fracture. Twenty-four patients were excluded from this study, which included 9 patients given general anesthesia, 6 patients who could not be contacted telephonically and 9 patients who were in the robust category of CFS (1−3). There were zero patients with mild CCI scores. The total number of participants/relatives who consented to enrol with a complete data set were 109 patients.

Table 1: Baseline demographics by frailty status

Characteristic		Prefrail (n = 40)	Frail (n = 69)	P-value
Age (y), (Mean ± SD)		79 ± 8	82 ± 8	0.053
Sex, n (%)	Male	13 (32)	19 (28)	0.6
	Female	27 (68)	50 (72)	
Diagnosis n (%)	Fracture neck of femur	15 (38)	32 (46)	0.7
	Intertrochanteric fracture	21 (52)	32 (46)	
	Sub trochanteric fracture or multiple locations	4 (10)	5 (7.2)	
ASA, n (%)	1	1 (2.5)	0 (0)	0.052
	2	7 (18)	12 (17)	
	3	32 (80)	49 (71)	
	4	0 (0)	8 (12)	
Charlson comorbidity index, n (%)	Moderate (CCI 3−4)	18 (45)	27 (39)	0.5
	Severe (CCI ≥ 5)	22 (55)	42 (61)	

Abbreviations: *CCI: Charlson Comorbidity Index, CFS: Clinical Frailty score; Prefrail (CFS 4−5), Frail (CFS ≥6)*

Table 2: Intraoperative characteristics- Prefrail Vs Frail

Characteristic		Prefrail (n = 40)	Frail (n = 69)	P-value[1]
Pre-operative nerve block		33 (82)	56 (81)	0.9
Spinal dose (ml)		1.97 ± 0.56	1.87 ± 0.54	0.2
Adjuvants	Buprenorphine	11 (28)	30 (43)	0.11
	Fentanyl	12 (30)	22 (32)	
	None	17 (42)	17 (25)	
Duration of surgery (min)		85 ± 34	85 ± 26	0.5
Vasopressor infusion		4 (10)	15 (22)	0.12

[1]Pearson's Chi squared test; Wilcoxon rank sum test; Fisher's exact test
Data presented as mean ± SD or n (%)

3.1. Baseline demographics and intraoperative characteristics

Table 1 shows the characteristics of the study group by frailty status. Among 109 patients, 40 were prefrail and 69 were frail. The majority of the patients were females (77/109, 71%) and the mean age was 79 y in the prefrail and 82 y among the frail. Most patients belonged to ASA 3 in both groups (prefrail vs frail was 80% vs 71%). Among both groups, the majority of the patients had severe comorbidity (CCI ≥ 5). Incidence by type of fracture was also recorded. The intertrochanteric fracture was the maximum reported type of fracture in both groups (52%/46%).

Table 2 shows intraoperative characteristics among frail and prefrail. More than 80% patients received preoperative nerve block prior to spinal anesthesia or a combined spinal- epidural anesthesia in both groups. The dosage of 0.5% bupivacaine (heavy) and adjuvants(fentanyl/buprenorphine) used intrathecally was comparable in both groups. We did not find a significant difference in the duration of surgery, and intraoperative vasopressor infusion in both prefrail and frail groups.

3.2. Outcomes-based on frailty classification

Table 3 shows the outcome among the prefrail and frail patients. On evaluating the functional outcome of ADL among the survivors at 90 days as measured by KI, there

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was no significant difference in patients belonging to prefrail and frail groups. Most patients in both prefrail (77%) and frail category (74%) scored high (score 5−6), and hence were relatively independent with regards to basic ADL.

On assessing the ability to walk among the survivors, 26% were completely independent in both groups while

the majority needed assistance among the prefrail (54%) and frail (62%) groups. The proportion of patients who were dependent was higher in the prefrail group (21% vs 13%, prefrail vs frail). This could be due to the higher mortality among the frail group (22 patients in the frail group died at the end of 90 days compared to one patient in the prefrail group). Thus, we did not find an association between frailty and the functional outcome of ADL and the ability to walk.

We found a significant association of frailty with 30-, 60- and 90-day mortality. Mortality increased with frailty at 30 days (P = 0.029), 60 days (P = 0.006) and 90 days (P < 0.001). Postoperative complications were similar in both groups. Delirium was the most frequent postoperative complication in our cohort followed by respiratory and cardiac complications. Delirium was more common in the frail group. There were no significant differences in the overall complications among both cohorts. The readmission within one month, time to surgery from time of fall, the number of patients requiring ICU stay, length of ICU stay and hospital stay were not statistically significant among prefrail and frail groups.

Table 3: Outcomes among Prefrail vs Frail group

Characteristic	Prefrail (n = 40)	Frail (n = 40)	p-value*
Katz Index*	N=39	N=47	0.8
• High (5−6)	30 (77)	35 (74)	
• Low (0−4)	9 (23)	12 (26)	
Ability to walk*			
• Independent	10 (26)	12 (26)	0.13
• Assistance needed	21 (54)	29 (62)	
• Dependent	8 (21)	6 (13)	
In hospital mortality	0 (0)	4 (5.8)	0.3
• 30-day mortality	1 (2.5)	12 (17)	**0.029**
• 60-day mortality	1 (2.5)	15 (22)	**0.006**
• 90-day mortality	1 (2.5)	22 (32)	**< 0.001**
Post-op complications	21 (52)	40 (58)	0.6
• Delirium	8 (8)	11 (16)	
• Respiratory	2 (5)	10 (14)	
• Cardiac	1 (2.5)	6 (8)	
• Stroke	0 (0)	3 (4)	
• COVID infection	2 (5)	2 (3)	
• Acute kidney injury	1 (3)	1 (1)	
Time to surgery from time of fall			
• < 24 h	6 (15)	3 (4.3)	0.084
• 24−48 h	9 (22)	11 (16)	
• > 48 h	25 (62)	55 (80)	
Postoperative ICU requirement	7 (18)	20 (29)	0.2
• Total length of ICU stay (days)	1 ± 3	1 ± 2	0.2
• Total length of hospital stay (days)	8 ± 3	9 ± 6	0.3
Readmission	3 (6.4)	1 (2.6)	> 0.9

**Pearson's Chi-squared test; Fisher's exact test; Prefrail (CFS 4−5), Frail (CFS ≥ 6); *Assessed at 90 days among survivors; Data given as Mean ± SD or n (%)*

3.3. Characteristics and outcomes based on comorbidity status

Table 4 shows the demographic and intraoperative characteristics of the study group by CCI score. In these hundred and nine patients the gender and type of fracture were comparable. There was a significant reduction in the dose of local anesthetic used in patients with severe comorbidities. Table 5 depicts outcomes among patients with moderate and severe comorbidities. On the assessment of ADL with the KI, patients with severe comorbidities had a statistically significant lower score, and thus were more dependent (Low score (0−4), Moderate vs Severe, 13% (5/39) vs 34% (16/47), P = 0.023). While evaluating the ability to walk, more than half of the patients in both groups required assistance at 90 days but the difference was not statistically significant.

The in-hospital, 30-, 60-, and 90-day mortality and postoperative complications were comparable in both

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Table 4: Baseline demographics and Intraoperative characteristics by comorbidity status

Characteristic		Moderate (N = 45)	Severe (N = 45)	P value
Age (y), mean ± SD)		79 ± 9	82 ± 7	**0.023**
Sex, n (%)	Male	10 (22)	22 (34)	0.2
	Female	35 (78)	42 (66)	
Diagnosis, n (%)	Fracture neck of femur	15 (33)	32 (50)	0.2
	Intertrochanteric fracture	26 (58)	27 (42)	
	Sub trochanteric fracture or multiple locations	4 (8.9)	5 (7.8)	
ASA, n (%)	1	1 (2.2)	0 (0)	**0.005**
	2	12 (27)	7 (11)	
	3	32 (71)	49 (77)	
	4	0 (0)	8 (12)	
CFS category, n (%)	Prefrail (CFS 4−5)	18 (40)	22 (34)	0.5
	Frail (CFS ≥ 6)	27 (60)	42 (66)	
Intraoperative characteristics	Preoperative nerve block, n (%)	35 (78)	54 (84)	0.4
	Spinal dose (ml), mean ± SD	2.04 ± 0.63	1.82 ± 0.45	**0.017**
Adjuvant, n (%)	Buprenorphine	20 (44)	21 (33)	0.5
	Fentanyl	13 (29)	21 (33)	
	None	12 (27)	22 (34)	
Duration of the surgery (min), mean ± SD		85 ± 30	85 ± 29	0.8

Abbreviations: *CCI: Charlson Comorbidity Index, CFS: Clinical Frailty score; Moderate (CCI 3−4), Severe (CCI ≥5); 1Pearson's Chi-squared test; Fisher's exact test*

groups. The most common complication recorded was delirium followed by a respiratory complication.

The number of patients requiring ICU shifts postoperatively (Moderate vs Severe, % (n/N), 0 (1) vs 2 (3), P = 0.005), length of postoperative ICU stay (Moderate vs Severe, mean (SD), 0 (1) vs 2 (3), P = 0.005) and the total length of hospital stay (Moderate vs Severe, mean (SD), 7 (3) vs 10 (6), P = 0.004) was significantly prolonged in the severe comorbid category. Time to surgery after fall and the readmission rates were similar between the two groups.

4. DISCUSSION

Hip fractures account for worst outcomes including institutionalization, deterioration in functional ability, and mortality in elderly patients.[18–20] This populations often has various associated comorbidities and are usually very frail. Our study aimed to find the association of frailty and comorbidity index with postoperative complications, functional outcome, and 90-day mortality.

An increase in mortality following hip fracture has been widely established.[21,22] The cumulative mortality after 1 year of a hip fracture occurrence, ranges between 20 and 40%.[23,24] The overall mortality at 90 days in our cohort was 22% (n/N = 23/104). The association between frailty and mortality has been established. Frailty is a multidimensional syndrome that commonly affects the older population characterised by a diminished response to stress. This gradual decline of muscle and bone mass leads to sarcopenia and osteoporosis, particularly among older women.[25] Frailty is also associated with deterioration of quality of life and mobility. Studies have reported frailty as a predictor of short-term mortality.[26] Beggs et al. in their meta-analysis examining frailty and perioperative outcomes, concluded that irrespective of the frailty assessment tool used, frail patients had a significant association with mortality and postoperative complications.[27] Similarly another meta-analysis by Ma et al. reported that regardless of the type of study and

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Table 5: Outcomes based on the severity of comorbidities among the patients

Characteristic	Moderate N = 45	Severe, N = 64	p-value*
Katz Index, n (%)	N = 39	N = 47	**0.023**
• High (5−6)	34 (87)	31 (66)	
• Low (0−4)	5 (13)	16 (34)	
Ability to walk, n (%) *	N = 39	N = 47	0.13
• Independent	14 (36)	8 (17)	
• Assistance needed	20 (51)	30 (64)	
• Dependent	5 (13)	9 (19)	
In hospital mortality, n (%)	3 (6.7)	1 (1.6)	0.3
30-day mortality, n (%)	5 (11)	8 (12)	0.8
60-day mortality, n (%)	5 (11)	11 (17)	0.4
90-day mortality, n (%)	6 (13)	17 (27)	0.10
Post-op complications, n (%)	22 (49)	39 (61)	0.2
• Delirium	8 (18)	11 (17)	
• Respiratory	4 (9)	8 (12)	
• Cardiac	2 (4)	5 (8)	
• Stroke	2 (4)	1 (2)	
• COVID infection	2 (4)	2 (3)	
• AKI	0 (0)	2 (3)	
Time to surgery from the time of fall, n (%)			0.077
• < 24 h	6 (13)	3 (4.7)	
• 24−48 h	11 (24)	9 (14)	
• > 48 h	28 (62)	52 (81)	
Postoperative ICU requirement, n (%)	5 (11)	22 (34)	**0.006**
Total length of ICU stay (days) mean ± SD	0 ± 1	2 ± 3	**0.005**
Total length of hospital stay (days) mean ± SD	7 ± 3	10 ± 6	**0.004**
Readmission, n (%)	1 (2.6)	3 (6.4)	> 0.9

** Pearson's Chi-squared test; Fisher's exact test; Prefrail (CFS 4−5), Frail (CFS ≥6); *Assessed at 90 days among survivors*

frailty assessment tool, preoperative frailty was associated with postoperative hospital mortality and 30-day mortality.[28] Our results parallel the findings from this meta-analysis. We observed that among the elderly patients who underwent hip fracture surgery under regional anesthesia, frail patients had significantly higher mortality at 30-, 60- and 90-days than prefrail patients. Although postoperative complications were reportedly more frequent in the frail group, we could not find a significant association. Among the patients who survived at 90 days, there was no difference in the ADL measured by KI and the ability to walk among the prefrail and frail. Both could be due to our small sample size. We did not find a difference in the length of ICU stay and hospital stay in the frail group. Ma et al. in their pooled data results could not find frailty as a predictor for 30-day readmission. Our result regarding readmission reported the same.

Our study population had a high burden of comorbidities with 59% in severe and 41% in moderate grade of CCI score. Life among the elderly population post-fracture entails a physical burden to the patient and their relatives. We assessed functional outcomes by evaluating the ADL using the KI and the ability to walk 90 days post-surgery. Previous studies reporting functional recovery,[29] after hip fractures have demonstrated that only 40–70% of patients recover from the performance of basic living activities. We observed that only 26% (22/86) patients could walk independently, and 58% (50/86) required assistance at 90 days. Our study observed that the comorbidity index had a significant association with poor ADL scores. Yoon et al. in their study reported that comorbidities particularly dementia and diabetes result in a poor functional outcome at 6 months [9] Our results parallel with their study. The incidence of postoperative complications was higher in the severe comorbidity group but not statistically significant. Patients with comorbidities had

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a longer ICU stay and total length of hospital stay. Similar to our findings, Wei et al. found a significant association between the comorbidities measured using CCI and the length of hospital stay.[30]

The ability to walk, readmission, and time to surgery from the fracture was comparable in both categories of comorbidity.

There are many instruments described in literature to measure frailty, including Fried Frailty Tool or Frailty Phenotype, Cardiovascular Health Study (CHS), Edmonton Frail Scale, Modified Frailty Index (mFI), the Study of Osteoporotic Fractures (SOF) frailty tool, the FRAIL scale. But the Clinical Frailty Scale stands out due to ease of use in the clinical setting and as it can be easily measured by non-geriatricians with no requirement for specialized equipment or personnel. The CFS has good criterion validity, with a dose–response effect in relation to 5-year prediction of death or entry into an institutional facility, and has very good inter-rater reliability.[14,15]

Understanding the association between pre-existing comorbidities and post-operative functional outcomes may improve decision-making with regard to postoperative evaluation and/or rehabilitation strategies. A multidisciplinary team-based approach is essential for the management of hip fractures.[18] Frailty and comorbidity impact different spectrum of health domain among elderly population. Both CFS and CCI are validated and quick assessment tools. On routine preoperative assessment, inclusion of both tools may render in identifying high risk population, prognostic counselling of the patient and better perioperative care. We also hope to extrapolate our results across other sub-specialities of surgery.

The strength of our study was the use of easily applicable scores of CFS and CCI to this vulnerable patient group, and inclusion of ASA I−IV category of patients in both elective and emergency setting.

5. LIMITATIONS

Our study had certain limitations as well. A small sample size limits the power of the study. All patients were selected from a single tertiary care centre and the follow-up was limited to 90-days. There is also risk of recall bias, as we retrieved the preoperative CFS score during our telephone interview after 90-days post-surgery. We excluded cases done under general anesthesia, as the majority of the hip surgeries are routinely done under regional anesthesia at our centre, with exception being any condition contraindicating the same. All such cases would represent patients with more severe comorbidities and greater degrees of frailty and hence act as confounders.

6. CONCLUSION

In our present study, we have found a positive association between frailty and mortality up to 90 days post-surgery and between comorbidity and poor functional outcome measured at 90 days in elderly patients undergoing hip fracture surgeries under regional anesthesia. The number of days in ICU and total length of hospital stay were also higher in patients with severe comorbidities.

7. Data availability

The numerical data generated in this study can be requested from the authors of this paper.

8. Conflict of interests

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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10. Author contributions

All authors took part in the concept, conduction of the study, manuscript writing, and editing. All authors have read the manuscript and confirmed.

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