

The Impact of COVID-19 Lockdown on Hip Fractures in Elderly: A Retrospective Cohort Study

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Abstract— The COVID-19 pandemic has caused a substantial burden on health care systems. It has called for extreme measures including lockdown for containment and better allocation of available resources. This study aims to dwell on the effect of this pandemic on the incidence rate of hip fractures in the elderly Lebanese population. A descriptive retrospective study includes hip fracture surgery elderly patients admitted during the COVID-19 lockdown. The time periods studied corresponded to the two months leading up to lockdown (Period A), two months during lock-down (Period B), and the same two-month period in 2019 (Period C). Data collection included patient demographics, injury mechanism, and treatment of choice. There was no significant difference in the rate of hip fractures in the elderly population during the 3 studies periods ($p = 0.826$). There was no difference in age, gender, type of fracture, or location of the injury. Head trauma and associated fractures were observed to be higher during the lockdown period of the study ($p = 0.003$ & $p = 0.017$ respectively). After stratification according to fracture type, Parkinson's disease was higher in the intertrochanteric group during period B ($p = 0.036$). Head trauma and associated fractures were also confined to the intertrochanteric group favoring period C ($p = 0.038$). The national lockdown had little effect on fragility hip fractures requiring surgery. Careful understanding of these injuries should allow a more flexible approach and a timely intervention to accommodate for increased morbidity and mortality associated with these injuries.

Keywords— Covid-19; Lockdown; Hip Fractures; Elderly; Lebanese Population.

1. Introduction

Since the beginning of the COVID-19 pandemic, hospitals around the world have been noticing a significant drop in admissions and emergency department (ED) visits. Studies in countries like Italy, the United States of America, Austria, Argentina and England have been reporting a decline ranging from 30 to 70% in hospital admissions and ED visits during the pandemic compared to prior years. A study reported a 61% decline in sprains and strains presentations to the ED during the outbreak compared to the year before in a tertiary care center in Lebanon.¹ This foreseen drop could be explained by the strict measures to decrease the rate of spread of this pandemic, like social distancing, or full lockdown that were implemented in most countries including Lebanon.^{1,2}

This pandemic also necessitated the reallocation of the limited resources available in the healthcare sector towards accommodating for the surge in COVID-19 cases while only caring for emergent cases in other fields.² Therefore, it is important to see the effect of lockdown on the incidence of these medical presentations.

Orthopedic trauma admission has been on the decrease during the pandemic.² This could be partially explained by the

national lockdown imposed by the government. Hip fractures are one the most frequent fractures to occur in the elderly (age >70 years). Such fractures require admission and surgical fixation or arthroplasty to prevent complications.³ Moreover, older people tend to have more comorbidities, of them being osteoporosis, consequently requiring more extensive surgical and medical care.⁴ Early surgical intervention and ambulation have been proven to have favorable outcome in terms of early mobilization and pain.⁵⁻⁷

Reducing the risk of falls play a major role in reducing fragility hip fractures in the elderly. Having a good support system, living with a family member, plays a major role in decreasing the risk of fall hence decreasing these types of fractures.⁸ Studies showed that, elderly people living on the Mediterranean usually prefer living with their descendants, where it was found that only 15% alone in Spain and 21 % in Italy of people older than 65 live alone.^{9,10} The fact that most of the elderly population have a support system available at home should be a protective factor contributing to decreasing the risk of falls in such population.¹¹

During lockdown, working from home and online schooling became widely acceptable, this in terms decreased the time that

an elderly person would spend alone compared to pre-pandemic era.¹² The study aimed to determine if there was a change in the incidence of hip fractures among the Lebanese population during the COVID-19 pandemic and lockdown periods.

2. Materials and Methods

2.1 Study Design and Setting:

This is a descriptive, retrospective study conducted at an urban healthcare center. This research has been approved by the Institutional Review Board (IRB) of the authors' affiliated institutions.

The American University of Beirut Medical Center (AUBMC) is a 384-bed tertiary care teaching hospital in Beirut, Lebanon. The ED is one of the largest in the country with an annual pre-COVID volume of 57,000 visits.

2.2 Study Population

The study included all patients over the age of 70 years who were admitted with a hip fracture at our institution. The types of fractures included in this study were femoral neck fractures, intertrochanteric fractures, and subtrochanteric fractures regardless of the treatment modality implemented. Patients that presented with fractures of the shaft or distal femur, peri-prosthetic fractures, other fractures of the ipsilateral leg, or fractures due to polytrauma were all excluded.

2.3 Study period:

The lockdown in our region was fully implemented on March 15, 2020, during which most workplaces were closed with only essential services (COVID-19 healthcare and food-related services) being allowed to operate.¹³ These patients were divided into three groups based on the lockdown period. Period A corresponded to March 15 to May 15, 2019. Period B corresponded to the two months prior to lockdown implementation i.e., January 15 to March 15, 2020. Period C was between March 15, 2020, and May 15, 2020, i.e. the lockdown period.

2.4 Data Collection

Medical records and electronic trauma handover lists were used to identify patients who had been admitted with the included hip fractures. Untraceable data of patients were collected concerning demographics, medical condition and comorbidities, fracture information, and other parameters about the patient's overall welfare. These variables included age, gender, comorbidities, American Society of Anesthesiologists (ASA) physical status classification score, smoking status, mechanism of injury, location of the injury, and the fracture type. For patients admitted during the lockdown period, their COVID-19 test status was also assessed. Patients' functional status, ambulatory status, Charlson Comorbidity Index (CCI) score for 10-year survival and Clinical fragility score were measured and calculated as appropriate.¹⁴

2.5 Statistical Analysis

Data was entered and analyzed by IBM SPSS Statistics version 25 (SPSS, Inc. Armonk, NY). A general descriptive analysis of the data was initially performed. Continuous variables were

reported as means and standard deviations (SD). Categorical variables were presented as absolute numbers and percentages. Analysis of variance (ANOVA) was used to compare continuous variables, whereas the Pearson chi-square test or Fisher Exact test was used to compare categorical variables. A p-value of ≤ 0.05 was considered statistically significant.

3. Results

Overall, 162 patients with hip fractures were identified in the three study periods mentioned above. The incidence of hip fractures in period C, lockdown period, was slightly less than other periods which was 38.8%. However, there was no significant difference in the rate of fragility hip fractures in the elderly population during period C as compared to periods A and B ($p = 0.826$) (Figure 1). There was no difference in age, gender, or fracture types among patients admitted during these periods. (Appendix I, Table 1). The only statistically significant difference among the groups was prior history of deep vein thrombosis (DVT)/Thromboembolism with a marginal p-value = 0.049.

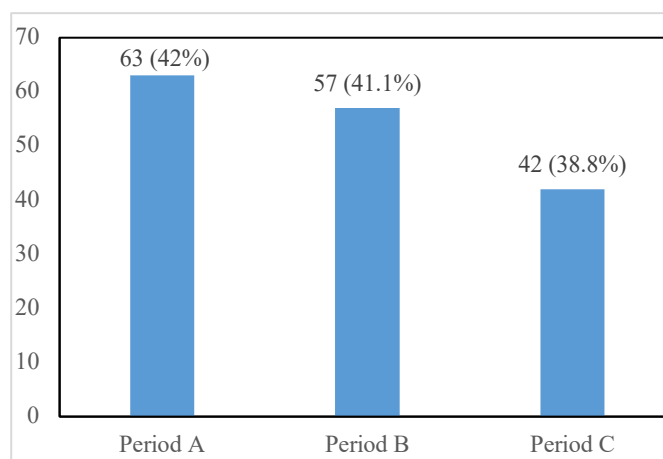


Figure 1. Hip fracture frequencies during the three studied periods. Period A: one year pre-lockdown / March 15 -May 15, 2019. Period B: two months prior to lockdown implementation /January 15- March 15, 2020. Period C: the lockdown period/ March 15- May 15, 2020

The majority of hip fractures were femoral neck fractures ($n = 93$) vs intertrochanteric fractures ($n = 69$) with no statistical significance between the three periods. The mechanism of injury identified in the study included syncope or pre-syncope in 15 patients (9.3%) and atraumatic fracture in 9 patients (5.6%). While most common mechanism of injury was a fall from height (46 - 85.2 %) with no statistical differences between the 3 studied periods ($p = 0.288$). In terms of the location of the injury, we were concerned whether the fracture happened at home or outside. The outside home locations included 6 street cases, 6 parking lot cases, and 3 case in a garden. These accounted for 9.3 % of the cases in the study. Home was the most common location of fracture reported in the study with 90.7 % with no statistical difference between the 3

periods (p -value = 0.302). Most of the fractures happened during period A ($n = 63$) of the study (p -value = 0.015). The most common concomitant fracture was surgical neck fracture of the proximal humerus followed by distal radius fracture. Head trauma among our study population was also higher in period C ($p = 0.024$). No statistical difference was found in the CCI index or clinical fragility scale between the 3 periods.

We further stratified the demographics according to the type of hip fracture whether femoral neck or intertrochanteric fracture (Appendix I, Table 2). History of DVT/Thromboembolism was found to be confined to the femoral neck group during period A ($p = 0.026$). Parkinson's disease (PD) was found to be higher in the intertrochanteric group during period B ($p = 0.004$) while benign prostate hyperplasia (BPH) was found to be higher in the femoral neck group during period B (0.04). No further differences were noticed in the demographic stratification of both fracture types among the 3 studied periods. The stratification of the fracture-related outcomes according to the type of fracture identified the significant difference in the associated fractures and head trauma to be confined to the intertrochanteric group only (Appendix I, Table 3). Head trauma and associated fractures were significantly higher in period C of the intertrochanteric group ($p = 0.004$ & 0.078 respectively). Treatment ranged from total hip arthroplasty, hemiarthroplasty, hip nailing, or pinning in situ based on the location of the fracture and functional status of the patient. All the fracture-related outcomes are recorded in (Appendix I, Table 4).

4. Discussion

Our study evaluated the rate of hip fractures, as well as their characteristics, during and before nationwide lockdown measures were implemented during the COVID-19 pandemic. Our aim was to report any changes in the demographics of people presenting with hip fractures, type and frequency of hip fractures during the lockdown. No differences in the rate of hip fracture in the elderly population were appreciated between the three allocated periods. These results are in accordance with multiple epidemiological studies describing a similar trend in fragility hip fractures in a similar population during the COVID-19 pandemic.^{2,15} They were assessing the impact lockdown had on the incidence of orthopedic trauma in different age groups. In this study, we focused mainly on hip fractures in the elderly population and the implications lockdown had in a society where most elderly are living with their relatives. The constant rate of hip fractures during the lockdown show that we need to better control risk factors for these injuries, especially at times when our healthcare system is oversaturated.

Similar trend of sites of injuries was noted before and after the lockdown, despite the confinement requested due to lockdown in the country. These results can be explained in two possible ways. First, falls at home are usually low-energy trauma, which, when coupled with an elderly patient with an element of osteoporosis, is enough to cause a fracture.^{3,4} This mechanism of injury is described as the most common method of hip fractures in the elderly. These patients have limited

participation in high-risk activities due to the lockdown, making falls the main cause of injury during the quarantine. Second, elderly people usually spend most of their time at home participating in usual activities of daily living (cooking, cleaning, using toilet...) that have not changed during the lockdown.

We believe having support system, being mainly the nuclear family (sons, daughters, or grandchildren ...), at home would provide the elderly the assistance needed to carry their daily activities. The availability of such support system has been increased due to the longer time spent at home during the lockdown.¹³ However, the unfortunate event of a fall seems to not be affected by the presence of a support system at home. It might be that these activities are taking place as usual and are not being prevented by the help of family members. This could be reflected by our results that showed a stable rate of hip fractures along the study period.

Fragility fractures are fractures occurring after low-energy trauma such as a fall from standing height or less. Around one-half of all women and one-third of all men will experience a fragility fracture during their lifetime. The most detrimental type of fragility fracture is hip fracture, that is the most common cause in the elderly is falling.¹⁶ Our study in accordance with the literature, showed a similar predominance of females as a gender and fall as a reason for fracture.

Many of the risk factors of falls are non-modifiable and will persist despite the best measures taken. Risk factors vary, including previous falls, sociodemographic factors, medical and psychiatric comorbidities.¹⁷ In terms of sociodemographic risk factors, living alone, physical disability, disability in instrumental activities of daily living, and use of walking aids were associated with increased risks of falls.¹⁸ In terms of sociodemographic risk factors, living alone, physical disability, disability in instrumental activities of daily living, and the use of walking aids were associated with increased risks of falls.

A more comprehensive approach towards the modifiable factors could lead to a decrease in these financially and health wise costly fractures. In this study, we were concerned with comparing the characteristics of our patient population, being elderly people, and how the lockdown would influence the rate of hip fracture. It is expected that the increased social support in the households during lockdown would help ease some of these modifiable risk factors such as living alone, physical disability, and use of walkers. Our results did not show any statistical significance when comparing the rate and location of fractures between the 3 allocated periods.

The rate of associated fractures, including head trauma, was significantly higher in period C of the study. This can be attributed to the specific factors related to the mechanism of fall and the site affected by the given trauma. All our reported injuries were low energy trauma in patients that are similar in terms of demographics and mechanism of injuries spanning the 3 time periods, we concluded that although a statistical significance may be present when comparing type of fractures in period C versus other periods, no clinical significance could be appreciated.

Furthermore, the baseline characteristics including functional status, CCI index, and clinical fragility scale were all similar in the 3 periods rendering the comparison more feasible. No significance was found among any of the characteristics studied irrespective of the lockdown except for the rate of previous DVT/Thromboembolism which was confined to the femoral neck group with only 4 patients involved. Two of these patients reported previous use of contraceptives at childbearing age, one patient reported long history of travel for 40 years, and one patient had a spontaneous DVT 30 years ago.

Upon further stratification, Parkinson's disease in the intertrochanteric fracture group and BPH in the femoral neck group were the only characteristics that showed statistical significance for increased hip fractures during period B of the study. Parkinson's has been reported in the literature as a risk factor associated with falls and hence hip fractures while BPH was indirectly involved using duct dilating medications known to cause orthostatic hypotension.¹⁸ However, our limited number of cases in patients with Parkinson's or BPH renders drawing conclusions regarding its actual implications difficult.

The lockdown was initially implemented on a worldwide scale in affected countries to decrease contact and force social distancing in attempts to isolate patients with the COVID-19 virus and slow down its spread.¹⁹ These measures were shown to be effective in Wuhan, China, as well as in most of Europe, where a decline in the number of daily reported cases was seen. A secondary effect of the implemented lockdown was the decline in-person visits and the exponential increase in the number of tele-visits in outpatient clinics. A worldwide decision to decrease the number of elective surgeries and outpatient procedures was taken as well to increase capacity in hospitals for incoming COVID-19 cases.²⁰ This decreased patient load together with the controlled spread of COVID-19 due to the lockdown has allowed hospitals to reallocate resources to appropriately combat the pandemic via methods including the creation of COVID-19 task force teams, dedicated COVID-19 hospitals and emergency centers, COVID-19 community facilities, and respiratory care split hospitals.²¹ Many of these measures were applied in our tertiary care center as well. While these measures have been instrumental in slowing down the progression of the pandemic as well as handling the load imposed on health care facilities, this study has identified hip fragility fractures as an important burden that has to be accounted for. The constant number of falls and subsequent hip fractures at home in the elderly has called for a clearer understanding of how to allocate resources during this pandemic. This combined with the confirmed decrease in morbidity and mortality upon rapid surgical treatment of such fractures highlights the importance of maintaining an adequate work-force for orthopedic teams handling such cases.^{22,23}

After discussing our research outcomes on the trend of hip fractures during the COVID-19 pandemic, it is important to highlight that the effect was worldwide. For instance, it was noted that in Spain, the government imposed a lockdown that resulted in notable decrease of almost half (49.2%) in diagnosed hip fractures during this period.²⁴ In Poland there were similar results where the occurrence of hip fracture per 100,000 inhabitants decreased by 13.4%.²⁵ In addition, study done on

Chile showed a 18.5% decrease in incidence of hip fracture.²⁶ Among Brazilian population, a cohort reduction in rate of hip fractures.²⁷ Another study showed that less hip fracture cases were admitted to the hospital during lockdown.²⁸

This proves that the pandemic has tremendous effects worldwide. We believe that this study will help hospital leaderships and stakeholders to have a better understanding of the types of fractures and the demographics of the population that are at highest risk of such fractures. Hence, enhancing the allocation of available resources and manpower more efficiently.

5. Conclusions

The national lockdown designed to limit the spread of COVID-19 has dramatically reduced orthopedic trauma admissions worldwide with little effect on the incidence of fragile hip fractures. The incidence of fragile hip fractures requiring surgery at our institution has not changed. A careful understanding of these injuries should enable a more flexible approach in orthopedic care management during lockdowns, ensuring proper and timely intervention for these fractures. During lockdowns, no change in hip fracture rates should be anticipated. Hospital administration should be prepared to allocate the proper resources for hip fracture care based on their usual load during such lockdowns. Finally, institutional and large-scale studies will help medical centers further understand their patients' needs.

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Appendix I

Table 1. Baseline characteristics of hip fracture patients. The frequency and percentage of baseline characteristics of hip fracture patients during one-year pre-lockdown (period A), two-month pre-lockdown (period B), and during the lockdown (period C) where p-value of <0.05 indicating statistical significance. (ASA: American Society of Anesthesiologists (ASA) physical status classification score, DVT: Deep Vein Thrombosis, COPD: Chronic Obstructive Pulmonary Disease, CAD: Coronary Artery Disease, CHF: Congestive Heart Failure, CKD: Chronic Kidney Disease, BPH: benign prostate hyperplasia)

Fracture-related outcomes		2 months pre-lockdown (period B) N=57	During lockdown (period C) N=42	1 year pre-lockdown (period A) N=63	Total	p-value
Fracture	Femoral neck fractures	36 (63.2%)	21 (50.0%)	36 (57.1%)	93 (57.4%)	0.751
	Intertrochanteric fractures	21 (36.8%)	21 (50.0%)	27 (42.9%)	69 (42.9%)	
Mechanism of injury	fall	48 (84.2%)	36 (85.7%)	54 (85.7%)	138 (85.2%)	0.288
	dizziness	6 (10.5%)	0 (0.0%)	9 (14.3%)	15 (9.3%)	
	atraumatic	3 (5.3%)	6 (14.3%)	0 (0.0%)	9 (5.6%)	
Location	inside the house	48 (84.2%)	42 (100.0%)	57 (90.5%)	147 (90.7%)	0.302
	outside the house	9 (15.8%)	0 (0.0%)	6 (9.5%)	15 (9.3%)	
Side	right	27 (47.4%)	21 (50.0%)	36 (57.1%)	84 (51.9%)	0.816
	left	30 (52.6%)	21 (50.0%)	27 (42.9%)	78 (48.1%)	
Associated fracture		3 (5.6%)	15 (35.7%)	3 (4.8%)	21 (13.2%)	0.015
Head trauma		6 (10.5%)	18 (42.9%)	6 (9.5%)	30 (18.5%)	0.024
CCI Index		5.79 ± 1.55	5.64 ± 1.45	1.20 ± 1.62	5.70 ± 1.52	0.935
10-year survival (in %)		19.02 ± 22.64	18.35 ± 20.92	21.68 ± 22.35	19.88 ± 21.73	0.920
Clinical Frailty Scale		4.63 ± 1.67	4.64 ± 1.65	4.24 ± 1.70	4.48 ± 1.66	0.652
Intervention	Total Hip Arthroplasty	21 (36.8%)	6 (14.3%)	18 (27.8%)	45 (27.8%)	0.699
	Hemiarthroplasty	15 (26.3%)	15 (35.7%)	15 (23.8%)	45 (27.8%)	
	Intramedullary Nailing	21 (36.8%)	21 (50.0%)	27 (42.9%)	69 (42.6%)	
	Pinning	0 (0.0%)	0 (0%)	3 (4.8%)	3 (1.9%)	

Table 2. Baseline characteristics stratified according to hip fracture-type (Femoral neck vs intertrochanteric). The p-value of <0.05 indicates statistical significance.

(CCI: Charlson Comorbidity Index)

Baseline Characteristics	Femoral neck fractures				Intertrochanteric fractures			
	2 months pre-lockdown (period B) N=36	During lockdown (period C) N=21	1 year pre-lockdown (period A) N=36	p-value	2 months pre-lockdown (period B) N=21	During lockdown (period C) N=21	1 year pre-lockdown (period A) N=27	p-value
Age	78.75 ± 7.36	81.71 ± 4.92	80.00 ± 6.18	0.630	83.14 ± 7.20	87.57 ± 6.23	81.67 ± 8.02	0.282
Gender (male)	21 (58.3%)	9 (42.9%)	18 (50.0%)	0.801	6 (28.6%)	9 (42.6%)	12 (44.4%)	0.789
Smoking	9 (25.0%)	3 (14.3%)	15 (41.7%)	0.414	3 (14.3%)	0 (0%)	9 (33.3%)	0.211
Alcohol	12 (33.3%)	3 (14.3%)	3 (8.3%)	0.279	0 (0%)	3 (28.6%)	0 (0%)	0.082
ASA Score								
I	0 (0%)	0 (0%)	0 (0%)	0.555	0 (0%)	0 (0%)	0 (0%)	0.665
II	18 (50.0%)	12 (57.1%)	12 (33.3%)		3 (14.3%)	3 (14.3%)	9 (33.3%)	
III	9 (25.0%)	9 (42.9%)	15 (41.7%)		12 (57.1%)	6 (28.6%)	9 (33.3%)	
IV	9 (25.0%)	0 (0%)	9 (25.0%)		6 (28.6%)	6 (28.6%)	6 (22.2%)	
V	0 (0%)	0 (0%)	0 (0%)		0 (0%)	6 (28.6%)	3 (11.1%)	
Functional status								
independent	21 (58.3%)	12 (57.1%)	21 (58.3%)	0.956	3 (14.3%)	3 (14.3%)	12 (44.4%)	0.608
mildly dependent	9 (25.0%)	6 (28.6%)	6 (16.7%)		9 (42.9%)	9 (42.9%)	9 (33.3%)	
severely dependent	6 (16.7%)	3 (14.3%)	3 (25.0%)		9 (42.9%)	9 (42.9%)	6 (22.2%)	
Ambulatory Status								
unassisted	18 (50.0%)	12 (57.1%)	21 (58.3%)	0.829	3 (14.3%)	3 (14.3%)	9 (37.5%)	0.934
assisted	3 (8.3%)	0 (0%)	6 (16.7%)		6 (40.0%)	6 (40.0%)	3 (20.0%)	
one cane	6 (16.7%)	6 (28.6%)	6 (16.7%)		9 (42.9%)	9 (42.9%)	9 (37.5%)	
walker	9 (25.0%)	3 (14.3%)	3 (8.3%)		3 (14.3%)	3 (14.3%)	3 (12.5%)	
DVT/Thromboembolism (history)	0 (0%)	0 (0%)	12 (33.3%)	0.026	0 (0%)	3 (14.3%)	3 (11.1%)	0.604
Hypertension	27 (75.0%)	12 (57.1%)	24 (66.7%)	0.721	18 (85.7%)	18 (85.7%)	27 (100%)	0.495
Diabetes mellitus	21 (58.3%)	6 (28.6%)	9 (25%)	0.202	3 (14.3%)	9 (42.9%)	12 (44.4%)	0.393
COPD	6 (16.7%)	3 (14.3%)	3 (8.3%)	0.824	6 (28.6%)	3 (14.3%)	3 (11.1%)	0.637
CAD	15 (41.7%)	6 (28.6%)	6 (16.7%)	0.402	6 (28.6%)	9 (42.9%)	3 (11.1%)	0.352
CHF	12 (33.3%)	0 (0%)	3 (8.3%)	0.105	3 (14.3%)	9 (42.9%)	6 (22.2%)	0.450

Renal failure (CKD and dialysis)	3 (8.3%)	0 (0%)	0 (0%)	0.441	0 (0%)	6 (28.6%)	3 (11.1%)	0.277
BPH	15 (41.7%)	0 (0%)	3 (8.3%)	0.040	6 (28.6%)	3 (14.3%)	6 (22.2%)	0.810
Parkinson	0 (0%)	3 (14.3%)	0 (0%)	0.170	12 (57.1%)	0 (0%)	0 (0%)	0.004
Dementia	3 (8.3%)	6 (28.6%)	3 (8.3%)	0.372	3 (14.3%)	3 (14.3%)	3 (11.1%)	0.976
Cancer	6 (16.7%)	3 (14.3%)	6 (16.7%)	0.852	3 (14.3%)	0 (0%)	6 (22.2%)	0.726
History of any morbidity	33 (91.7%)	18 (85.7%)	36 (100%)	0.447	21 (100%)	21 (100%)	21 (100%)	NA

Table 3. Fracture related outcomes stratified according to hip fracture-type (femoral neck vs intertrochanteric). The p-value of <0.05 indicates statistical significance.

(ASA: American Society of Anesthesiologists (ASA) physical status classification score, DVT: Deep Vein Thrombosis, COPD: Chronic Obstructive Pulmonary Disease,

CAD: Coronary Artery Disease, CHF: Congestive Heart Failure, CKD: Chronic Kidney Disease, BPH: benign prostate hyperplasia)

Baseline Characteristics		Femoral neck fractures				Intertrochanteric fractures			
		2 months pre-lockdown (period B) N=36	During lockdown (period C) N=21	1 year pre-lockdown (period A) N=36	p-value	2 months pre-lockdown (period B) N=21	During lockdown (period C) N=21	1 year pre-lockdown (period A) N=27	p-value
Age		78.75 ± 7.36	81.71 ± 4.92	80.00 ± 6.18	0.630	83.14 ± 7.20	87.57 ± 6.23	81.67 ± 8.02	0.282
Gender (male)		21 (58.3%)	9 (42.9%)	18 (50.0%)	0.801	6 (28.6%)	9 (42.6%)	12 (44.4%)	0.789
Smoking		9 (25.0%)	3 (14.3%)	15 (41.7%)	0.414	3 (14.3%)	0 (0%)	9 (33.3%)	0.211
Alcohol		12 (33.3%)	3 (14.3%)	3 (8.3%)	0.279	0 (0%)	3 (28.6%)	0 (0%)	0.082
ASA Score									
I		0 (0%)	0 (0%)	0 (0%)	0.555	0 (0%)	0 (0%)	0 (0%)	0.665
II		18 (50.0%)	12 (57.1%)	12 (33.3%)		3 (14.3%)	3 (14.3%)	9 (33.3%)	
III		9 (25.0%)	9 (42.9%)	15 (41.7%)		12 (57.1%)	6 (28.6%)	9 (33.3%)	
IV		9 (25.0%)	0 (0%)	9 (25.0%)		6 (28.6%)	6 (28.6%)	6 (22.2%)	
V		0 (0%)	0 (0%)	0 (0%)		0 (0%)	6 (28.6%)	3 (11.1%)	
Functional status									
independent		21 (58.3%)	12 (57.1%)	21 (58.3%)	0.956	3 (14.3%)	3 (14.3%)	12 (44.4%)	0.608
mildly dependent		9 (25.0%)	6 (28.6%)	6 (16.7%)		9 (42.9%)	9 (42.9%)	9 (33.3%)	
severely dependent		6 (16.7%)	3 (14.3%)	3 (25.0%)		9 (42.9%)	9 (42.9%)	6 (22.2%)	
Ambulatory Status									
unassisted		18 (50.0%)	12 (57.1%)	21 (58.3%)	0.829	3 (14.3%)	3 (14.3%)	9 (37.5%)	0.934
assisted		3 (8.3%)	0 (0%)	6 (16.7%)		6 (40.0%)	6 (40.0%)	3 (20.0%)	

one cane	6 (16.7%)	6 (28.6%)	6 (16.7%)		9 (42.9%)	9 (42.9%)	9 (37.5%)	
walker	9 (25.0%)	3 (14.3%)	3 (8.3%)		3 (14.3%)	3 (14.3%)	3 (12.5%)	
DVT/Thromboembolism (history)	0 (0%)	0 (0%)	12 (33.3%)	0.026	0 (0%)	3 (14.3%)	3 (11.1%)	0.604
Hypertension	27 (75.0%)	12 (57.1%)	24 (66.7%)	0.721	18 (85.7%)	18 (85.7%)	27 (100%)	0.495
Diabetes mellitus	21 (58.3%)	6 (28.6%)	9 (25%)	0.202	3 (14.3%)	9 (42.9%)	12 (44.4%)	0.393
COPD	6 (16.7%)	3 (14.3%)	3 (8.3%)	0.824	6 (28.6%)	3 (14.3%)	3 (11.1%)	0.637
CAD	15 (41.7%)	6 (28.6%)	6 (16.7%)	0.402	6 (28.6%)	9 (42.9%)	3 (11.1%)	0.352
CHF	12 (33.3%)	0 (0%)	3 (8.3%)	0.105	3 (14.3%)	9 (42.9%)	6 (22.2%)	0.450
Renal failure (CKD and dialysis)	3 (8.3%)	0 (0%)	0 (0%)	0.441	0 (0%)	6 (28.6%)	3 (11.1%)	0.277
BPH	15 (41.7%)	0 (0%)	3 (8.3%)	0.040	6 (28.6%)	3 (14.3%)	6 (22.2%)	0.810
Parkinson	0 (0%)	3 (14.3%)	0 (0%)	0.170	12 (57.1%)	0 (0%)	0 (0%)	0.004
Dementia	3 (8.3%)	6 (28.6%)	3 (8.3%)	0.372	3 (14.3%)	3 (14.3%)	3 (11.1%)	0.976
Cancer	6 (16.7%)	3 (14.3%)	6 (16.7%)	0.852	3 (14.3%)	0 (0%)	6 (22.2%)	0.726
History of any morbidity	33 (91.7%)	18 (85.7%)	36 (100%)	0.447	21 (100%)	21 (100%)	21 (100%)	NA

Table 4. Fracture-related outcomes comparing the three study periods. The p-value of <0.05 indicates statistical significance (CCI: Charlson Comorbidity Index)

Fracture-related outcomes		Femoral neck fractures				Intertrochanteric fractures			
		2 months pre-lockdown (period B) N=36	During lockdown (period C) N=21	1 year pre-lockdown (period A) N=36	p-value	2 months pre-lockdown (period B) N=21	During lockdown (period C) N=21	1 year pre-lockdown (period A) N=27	p-value
Mechanism of injury	fall	36 (100%)	15(71.4%)	30 (83.3%)	0.033	12 (57.1%)	21 (100%)	24(88.9%)	0.252
	dizziness	0 (0%)	0 (0%)	6 (16.7%)		6 (28.6%)	0 (0%)	3 (11.1%)	
	atraumatic	0 (0%)	6 (28.6%)	0 (0%)		3 (14.3%)	0 (0%)	0 (0%)	
Location	inside the house	30 (83.3%)	21 (100%)	30 (83.3%)	0.512	18 (85.7%)	21 (100%)	27 (100%)	0.303
	outside the house	6 (16.7%)	0 (0%)	6 (16.7%)		3 (14.3%)	0 (0%)	0 (0%)	
Side	right	15 (41.7%)	9 (42.9%)	18 (50.0%)	0.910	12 (57.1%)	12(57.1%)	18(66.7%)	0.901
	left	21 (58.3%)	12(57.1%)	12 (50.0%)		9 (42.9%)	9 (42.9%)	9 (33.3%)	
Associated fracture		0 (0%)	6 (28.6%)	6 (8.3%)	0.139	3 (14.3%)	9 (42.9%)	0 (0%)	0.078
Head trauma		6 (16.7%)	3 (14.3%)	3 (8.3%)	0.824	0 (0%)	15(71.4%)	3 (11.1%)	0.004

CCI Index*	5.75 1.71	4.86 0.90	5.42 1.62	0.577	5.86 1.35	6.43 1.51	6.00 1.66	0.710
10-year survival (in %)*	21.74 24.60	29.63 23.56	26.19 25.14	0.569	14.37 19.70	7.07 9.81	15.68 17.57	0.726
Clinical Frailty Scale*	4.17 1.64	3.86 1.21	4.08 1.73	0.952	5.43 1.51	5.43 1.72	4.44 1.74	0.354
*Kruskal-Wallis H test								