A Comparison of Complication Rates between Early and Delayed Surgery among Filipino Patients with Fragility Fractures of the Hip

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ABSTRACT

Objectives. Existing standards of care recommend operative management for fragility fractures of the hip. Early intervention has been associated with lower incidence of morbidity and mortality. A lack of consensus remains in the Philippines however, regarding timing of surgery. We sought to determine the effects of surgical timing on in-hospital complications among Filipino patients with fragility hip fractures.

Methods. All patients admitted for fragility hip fractures in a single tertiary-care facility from 2014-2016 were analyzed retrospectively. Subjects treated within 72 hours were grouped under "early intervention," while those managed beyond were designated "delayed intervention." Primary outcomes were complications during admission, while secondary outcome was length of hospital stay. A total of 96 patients met our inclusion criteria, of which 41 (42.71%) underwent early intervention. Baseline characteristics for both groups were comparable.

Results. A significantly lower incidence of pressure ulcers (2.4% for ≤72hours vs 45.5%; p=<0.0001), pneumonia (7.32% vs 47.27%; p=<0.0001), and urinary tract infection (4.88% vs 40%; p=<0.0001), as well as shorter hospital stay (mean: 8.85 days±5.4 vs 14.6 days±13.3; p=0.01) were seen in the early intervention group. More cases of documented deep vein thrombosis were recorded in the delayed intervention group (83.3% versus 16.6%), as was the only case of in-hospital mortality.

Conclusion. Early intervention showed a significantly lower incidence of in-hospital complications among patients with fragility fractures of the hip, suggesting that surgery within 72 hours may lead to better outcomes by helping to reduce the incidence of pressure sores, pneumonia, and urinary tract infection among Filipinos with hip fractures, while reducing length of admission.

Keywords: fragility fracture, hip fracture, osteoporotic fracture

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INTRODUCTION

Hip fractures are among the most devastating consequences of falls in elderly patients, with mortality rates reaching 30% in the year following injury. "Fragility fractures" occur following minor trauma in osteoporotic bone with the exclusion of other causes (such as malignancy), seen predominantly among individuals aged 60 and above.[1-3] With the local prevalence of osteoporosis in the elderly as high as 2.5%, an estimated 2.5 million Filipinos are at risk of potentially debilitating complications secondary to immobility. Included among these are pulmonary and urinary tract infections, as well as cardiovascular events.[3-5]

Sixty percent of patients surviving a hip fracture are unable to return to their previous level of activity, requiring either assistance while walking, or full-time nursing care.[6,7]

In the Philippines, this is further complicated by financial issues. According to local data, socioeconomic status is the primary determinant of health-seeking behavior among elderly Filipinos. Medical expenses constitute a major impediment to timely intervention, leading to treatment delay as well as increased usage of traditional remedies, self-medication, and receiving substandard care.[8,9]

Significant morbidity, mortality, and costs associated with hip fractures emphasize the need to improve current standards of care and outcomes for patients particularly in the local setting, where data remains scarce. Despite the large number of foreign studies, a lack of consensus persists with regard to surgical timing.[7,10]

Early intervention, defined in literature as surgery within 24 to 72 hours after injury, has been associated with shorter length of hospital stay and fewer complications caused by prolonged immobilization.[2,5,6,11,12] Proponents against this practice stress the need for optimizing physiologic status, particularly in the setting of multiple comorbidities, which increase the risk of peri-operative events. Cardiac and renal failure have been identified as compelling reasons for recommending delay, adding to the uncertainty with regard to optimal timing.[7,10,13]

The study sought to determine the incidence of in-hospital complications among patients who underwent early versus delayed surgical management for fragility hip fractures in a tertiary-care setting, while describing other factors such as length of confinement that may be related to timing of surgery. Understanding such outcomes may further improve current standards of care for osteoporotic hip fractures in the local setting.

MATERIALS AND METHODS

Population and Sample

A total of 107 patients were admitted for a fragility fracture of the hip and scheduled for surgical management during admission between January 2014 and December 2016. To ensure homogeneity of pre-morbid health status and to limit potential confounding factors, we excluded 11 patients (10.3%) who were diagnosed with multiple fractures, pathologic fractures secondary to endocrinologic or neoplastic/metastatic origin, and did not undergo surgery within the same admission (Figure 1).

After securing approval from the institution's Ethics Review Board, all medical records were analyzed without personal identification outside of patient number. Retrospective non-identifiable data were utilized for analysis, precluding the need for informed consent.

All patients admitted to a tertiary-care facility for fragility hip fractures from 2014-2016 were analyzed retrospectively. Subjects treated within 72 hours were grouped under "early intervention," while those managed beyond were designated "delayed intervention."

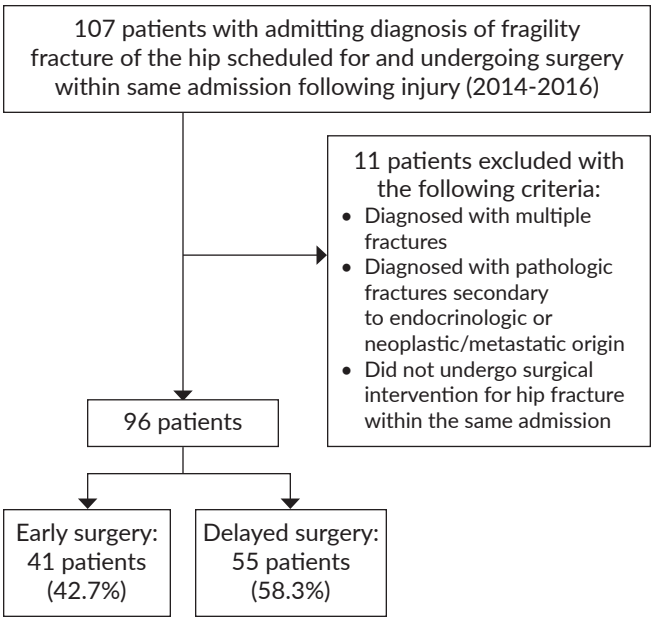

Figure 1. Study diagram. Parameters for inclusion and exclusion to ensure homogeneity of pre-morbid health status and limit potential confounding factors, as recommended by Librero et al.[14]

Outcome measures

Post-operative complications during admission (pneumonia, pressure ulcers, urinary tract infection, and symptomatic deep vein thrombosis) and in-hospital mortality were the main outcome measures, while the main exposure variable was time to surgery, from date of injury to actual date of intervention. The secondary outcome was length of hospital stay.

Additional independent variables analyzed for comparability included patient age and sex, fracture type (intra-capsular versus extra-capsular), type of surgery (partial hip replacement, total hip replacement, or fixation), and the number of existing comorbidities.

Analysis

Data analysis was performed using STATA® SE version 13. Quantitative variables were summarized in terms of mean and standard deviation, while qualitative variables were tabulated in terms of frequency and percentage. Comparability of baseline characteristics between early and late surgery was analyzed using Independent *t*-test for quantitative variables, and Fisher's exact test for qualitative variables. The level of significance for all tests was set at 5% ($p \leq 0.05$).

RESULTS

A total of 96 patients met our inclusion criteria, of which 79.2% were female. Forty-one patients (42.71%) underwent early intervention (Table 1). Baseline characteristics were

found to be comparable between both groups after statistical analysis.

The mean age of patients in the early intervention group was 81.6 years old, slightly older than 77.2 years for those in the delayed intervention group [(M=81.6, SD=10.5 versus M=77.2, SD=11.8), t (94) = -1.9, p=0.06] (Table 2).

Majority of the fragility fractures were intra-capsular (61.5%), with partial hip arthroplasty being the preferred surgical method (59.4%), over fixation (33.33%) and total hip arthroplasty (7.3%). The number of comorbidities prior to surgery was higher in the delayed intervention group, but not statistically significant (mean: 2.5 ± 0.7 for ≤72 hours vs. 2.89 ± 1.2; t (94) = -1.9, p=0.05) (Tables 3 to 5).

In terms of post-operative complications during admission, a significantly lower incidence was noted for pressure ulcers (2.4% for ≤72 hours versus 45.5%; p= <0.0001), pneumonia (7.32% versus 52.7%; p= <0.0001) and urinary tract infection (4.88% versus 40%; p= <0.0001), as well as length of hospital stay (mean: 8.85 days ± 5.4 versus 14.6 days ± 13.3; p=0.011) among patients in the early intervention group (Tables 6 to 9).

It is pertinent to note that more cases of documented deep vein thrombosis (DVT) were recorded in the delayed intervention group (9.1% versus 2.4%), as did the only case of in-hospital mortality (Tables 10 and 11), despite no significant difference after statistical analysis.

DISCUSSION

The results of this retrospective cohort study indicate a lower incidence of post-operative, in-hospital complications among patients who underwent early intervention for

Table 1. Comparability of Baseline Characteristics – Sex of Patients (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Female	N = 34 (76.4%)	N = 42 (82.9%)	76 (79.2%)	0.46
Male	N = 20 (23.6%)	N = 13 (17.1%)	20 (20.8%)	
Total	41	55	96 (100%)	

Table 2. Comparability of Baseline Characteristics – Age of Patients (T-test for Independent Variables)

Group	Number of patients	Mean age	Standard Error of the Mean	Standard Deviation	Combined Confidence Interval (95%)	*p*
Early intervention	41	81.6	1.59	± 11.78	(76.8-81.4)	0.06 [t (94) = -1.9]
Delayed intervention	55	77.2	1.64	± 10.52		

Table 3. Comparability of Baseline Characteristics – Fracture Type (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Femoral neck	N = 28 (68.3%)	N = 31 (56.4%)	59 (61.5%)	0.3
Intertrochanteric	N = 13 (31.7%)	N = 24 (43.6%)	37 (38.5%)	
Total	41	55	96 (100%)	

Table 4. Comparability of Baseline Characteristics – Surgical Method (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Fixation	N = 13 (31.7%)	N = 19 (34.6%)	32 (33.33%)	0.95
Partial hip replacement	N = 25 (60.98%)	N = 32 (58.2%)	57 (59.4%)	
Total hip replacement	N = 3 (7.3%)	N = 4 (7.27%)	7 (7.3%)	
Total	41	55	96 (100%)	

Table 5. Comparability of Baseline Characteristics – Number of Co-Morbidities Prior to Surgery (T-test for Independent Variables)

Group	Number of patients	Mean	Standard Error of the Mean	Standard Deviation	Combined Confidence Interval (95%)	*p*
Early intervention	41	2.46	0.12	± 0.74	(-0.86-0.01)	0.05 [t (94) = 1.9]
Delayed intervention	55	2.89	0.17	± 1.24		

Table 6. Outcome Measures – Pressure Ulcer (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Developed pressure ulcer post-surgery	N = 1 (2.4%)	N = 25 (45.5%)	26 (27.1%)	<0.0001
Did not develop pressure ulcer post-surgery	N = 40 (97.6%)	N = 30 (54.5%)	70 (72.9%)	
Total	41	55	96 (100%)	

Table 7. Outcome Measures – Pneumonia (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Developed pneumonia post-surgery	N = 3 (7.3%)	N = 26 (52.7%)	29 (30.2%)	<0.0001
Did not develop pneumonia post-surgery	N = 38 (92.7%)	N = 29 (47.3%)	67 (69.8%)	
Total	41	55	96 (100%)	

Table 8. Outcome Measures – Urinary Tract Infection (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Developed UTI post-surgery	N = 2 (4.9%)	N = 22 (40%)	24 (25%)	<0.0001
Did not develop UTI post-surgery	N = 39 (95.1%)	N = 33 (60%)	72 (75%)	
Total	41	55	96 (100%)	

Table 9. Outcome Measures – Days of Confinement

Group	Number of patients	Mean length of stay (days)	Standard Error of the Mean	Standard Deviation	Combined Confidence Interval (95%)	*p*
Early intervention	41	8.85	0.84	± 5.4	(9.92 - 14.37)	0.01 [t (94) = 2.6]
Delayed intervention	55	14.6	1.79	± 13.28		

Table 10. Outcome Measures – Deep Vein Thrombosis (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Developed DVT post-surgery	N = 1 (2.4%)	N = 5 (9.1%)	6 (6.3%)	0.23
Did not develop DVT post-surgery	N = 40 (97.6%)	N = 50 (90.9%)	90 (93.8%)	
Total	41	55	96 (100%)	

Table 11. Outcome Measures – Mortality (Fisher's Exact Test)

Group	Early Intervention	Delayed intervention	Total	*p*
Mortality post-surgery, during admission	N = 0 (0%)	N = 1 (1.82%)	1 (1.04%)	1.00
Discharged	N = 41 (100%)	N = 54 (98.2%)	95 (98.96%)	
Total	41	55	96 (100%)	

fragility hip fractures. For this group (41 patients, 42.7% of the total population), the time from injury to surgery ranged from less than 24 hours to 72 hours. All patients operated on beyond that period were included in the delayed intervention group (55 patients, 57.3% of the total population), with time to surgery ranging from 4 days to 4 months after injury. The comparable number between both groups suggests that compliance with and adherence to internationally-recognized standards of care is possible even in a low-resource setting such as the Philippines.[4,8,15] Baseline parameters such as age, fracture type, and surgical method (arthroplasty versus fixation) were found to be comparable between both groups, with some notable observations.

An Australian report determined a 20-25% mortality rate within the first year following surgery for a hip fracture, with poorer outcomes and more complications associated with increasing age and the presence of multiple systemic illnesses.[6] In our study, patients who underwent delayed

intervention had more co-morbidities, despite having a younger mean age. While these findings appear to suggest that the incidence of post-operative complications and prolonged hospital stay may simply be a reflection of the number of existing medical conditions prior to surgery, the lack of statistical significance supports our recommendation for early intervention. Upon further analysis, delays in surgical management for our study population were secondary to additional pre-operative work-up precluding necessary medical clearances. This is consistent with other reports that emphasize the need for physiologic stabilization in the setting of multiple co-morbidities, particularly among patients with poor cardiovascular and renal status, to decrease the risk of adverse peri-operative events.[2,3,6,7,11-13]

The devastating medical and socioeconomic impact of complications secondary to prolonged immobility on overall well-being and survival of patients with osteoporotic hip fractures has been well-documented.[1,8,10,13,16-18] Immobilization is a known modifiable risk factor for developing pressure ulcers, urinary tract infection, and pneumonia particularly among the elderly.[16,17,19] Early intervention addresses these key issues by promptly decreasing pain both at rest and during transfers before complications develop, as well as allowing for immediate mobilization post-surgery.[1,7,20] Results from analysis of our primary outcome measures support these findings, showing a significantly lower incidence of post-operative pressure ulcers, pneumonia, and urinary tract infections among patients in the early intervention group.

In a 2015 UK report, a significant reduction was noted in overall length of stay for patients undergoing hip fracture surgery within the first two days of admission.[11,12] This is consistent with our findings, which revealed a shorter period of confinement for patients in the early intervention group (mean: 8.85 days ± 5.4 versus 14.6 days ± 13.3; p=0.011). Early intervention has also been associated with fewer days of severe pain reported by patients along with faster recovery, due in part to less time spent in recumbency both prior to and following surgery, which may partly account for our significant results.[18,20]

Of prime relevance to the Philippine setting are the psychosocial and financial implications of fragility hip fractures. In a developing country, socioeconomic status has been identified as the main determinant influencing health-seeking behavior among the elderly.[8] Cultural norms play a key role as well: the negative attitude toward medical consults exhibited by older Filipinos has been attributed to feelings of embarrassment, perceived social stigmas, and the potential for neglect.[8,15] These may be exacerbated by dependence on caregivers due to immobility, and increased hospital expenses secondary to surgical delay.[8,18] The need to identify options that may potentially decrease costs related to confinement while improving patient outcomes highlights the significance of our results in the local setting.

Limitations

Our study was limited by the use of retrospective data obtained from administrative databases. We controlled for potential confounders and ensured homogeneity of samples through strict inclusion and exclusion criteria. Our statistical analyses however, would have benefitted from a larger sample size. Complications during admission and length of confinement were selected as outcome measures to avoid selection bias, healthy worker bias, and attrition bias associated with prospective cohort studies. Difficulty with consistent long-term follow-up is also a frequent problem encountered in the local setting, particularly among patients in private, tertiary-care institutions. Further investigation into the overall condition of these patients following discharge is thus recommended to determine the possible long-term implications.

CONCLUSION

The high prevalence of osteoporosis among elderly Filipinos puts a significant portion of our population at risk of potentially devastating complications secondary to fragility fractures. Existing standards of care invariably recommend surgical management for hip fractures among elderly patients, with few exceptions. In clinical practice however, a lack of consensus remains with regard to timing of surgery. In support of early intervention, the authors cite shorter hospital stay and fewer complications associated with prolonged immobilization such as pressure ulcers, pneumonia, and urinary tract infections.

Early intervention showed a significantly lower incidence of in-hospital complications among patients surgically managed for osteoporotic hip fractures. Our findings suggest that surgery within 72 hours leads to better outcomes by reducing the incidence of pressure sores, pneumonia, and urinary tract infection among patients with fragility fractures of the hip, while reducing length of confinement. These have positive implications on the socioeconomic and psychologic well-being of elderly patients in the local setting.

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Statement of Authorship

ART contributed in the conceptualization, acquisition and analysis of data, drafting and revising of manuscript, and final approval of the published version. RSC contributed in the conceptualization, drafting, and revision of data.

Author Disclosure

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