Femoral Neck Fracture Increase the Chance of Suffering depression: A National Population-Based Follow-Up Study

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The Asian Conference on Psychology and the Behavioral Sciences 2014
Official Conference Proceedings 2014

0169

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Objective: Comorbidities, poor levels of activity and pain may contribute to the development of depression, but these factors have not been well addressed. This study aims to investigate the frequency and risk of major depression after a femoral neck fracture using a nationwide population-based study.
Methods: The Taiwan Longitudinal Health Insurance Database was used in this study. A total of 4,547 patients who were hospitalized for femoral neck fracture within 2003 to 2007 were recruited as a study group; 13,641 matched non-fracture participants were enrolled as a comparison group. Patients who had histories of any form of depression or femoral neck fracture before the study period were not included. Each patient was prospectively followed for 3 years to monitor the occurrence of major depression. Cox proportional-hazards models were used to compute the risk of major depression between members of the study and comparison groups after adjusting for residence and socio-demographic characteristics. The most common physical comorbidities that were present after the fracture were also analyzed.
Results: Fifty-five (1.2%) femoral neck fracture patients and 95 (0.7%) non-fracture comparison patients were diagnosed with major depression during the study period. The stratified Cox proportional analysis showed a covariate-adjusted HR of major depression among patients with femoral neck fracture that was 1.82 times greater (95% CI, 1.30-2.53) than that of the comparison group. Most major depressive episodes (34.5%) presented within the first 200 days following the fracture. Peptic ulcers (40.0%) were the most common comorbidity after fracture that differed between the study and comparison patients ($P<0.05$).
Conclusion: Patients with a femoral neck fracture are at an increased risk of subsequent major depression. Most importantly, major depressive episodes mainly occurred within the first 200 days following the fracture.

Table 1 Characteristics and personal histories between patients with femoral neck fracture and comparison patients

	Patients with femoral neck fracture (n=4,547)		Comparison patients (n=13,641)		
	No.	%	No.	%	*p*-value
Gender					1.000
Male	2029	44.62	6087	44.62	
Female	2518	55.38	7554	55.38	
Mean age (y/o) (Mean±SD)	71.4± 16.6		70.4±16.2		1.000
Age group (y/o)					1.000
18-39	324	7.13	972	7.13	
40-49	234	5.15	702	5.15	
50-59	324	7.13	972	7.13	
60-69	617	13.57	1851	13.57	
70-79	1506	33.12	4518	33.12	
>= 80	1542	33.91	4626	33.91	
Economic level (monthly income) (USD$) *					<0.001
<600	2744	60.35	7783	57.06	
601~1000	1682	36.99	5167	37.88	
>1000	121	2.66	691	5.07	
Urbanization					<0.001
1 (most)	921	20.26	3207	23.51	
2	339	7.46	959	7.03	
3	1021	22.45	3003	22.01	
4	2266	49.84	6472	47.45	
Geographic regions of Taiwan*					0.004
Northern	2019	44.4	6380	46.77	
Central	900	19.79	2492	18.27	
Southern	1472	32.37	4389	32.18	
Eastern	156	3.43	380	2.79	
Personal history					
Diabetes Mellitus*	959	21.09	2619	19.2	0.006
Hypertension	1349	29.67	4038	29.6	0.941
Renal failure*	832	18.3	1491	10.93	<0.001
Liver cirrhosis*	223	4.9	418	3.06	<0.001
Stroke*	943	20.74	1809	13.26	<0.001
Osteoporosis*	1660	36.51	2237	16.4	<0.001

*Significant differences

Table 2 Crude HR for the presence of new-onset major depression among patients with femoral neck fracture and the comparison patients

Presence of depression	Total sample (n=18,188)		Patients with femoral neck fracture (n=4,547)		Comparison patients (n=13,641)	
3-year follow-up	No.	%	No.	%	No.	%
Yes	150	0.8	55	1.2	95	0.7
No	18,038	99.2	4,492	98.8	13,546	99.3
Crude HR (95% CI)	-		1.82* (1.30-2.53)		1.00	

*p- value =0.001

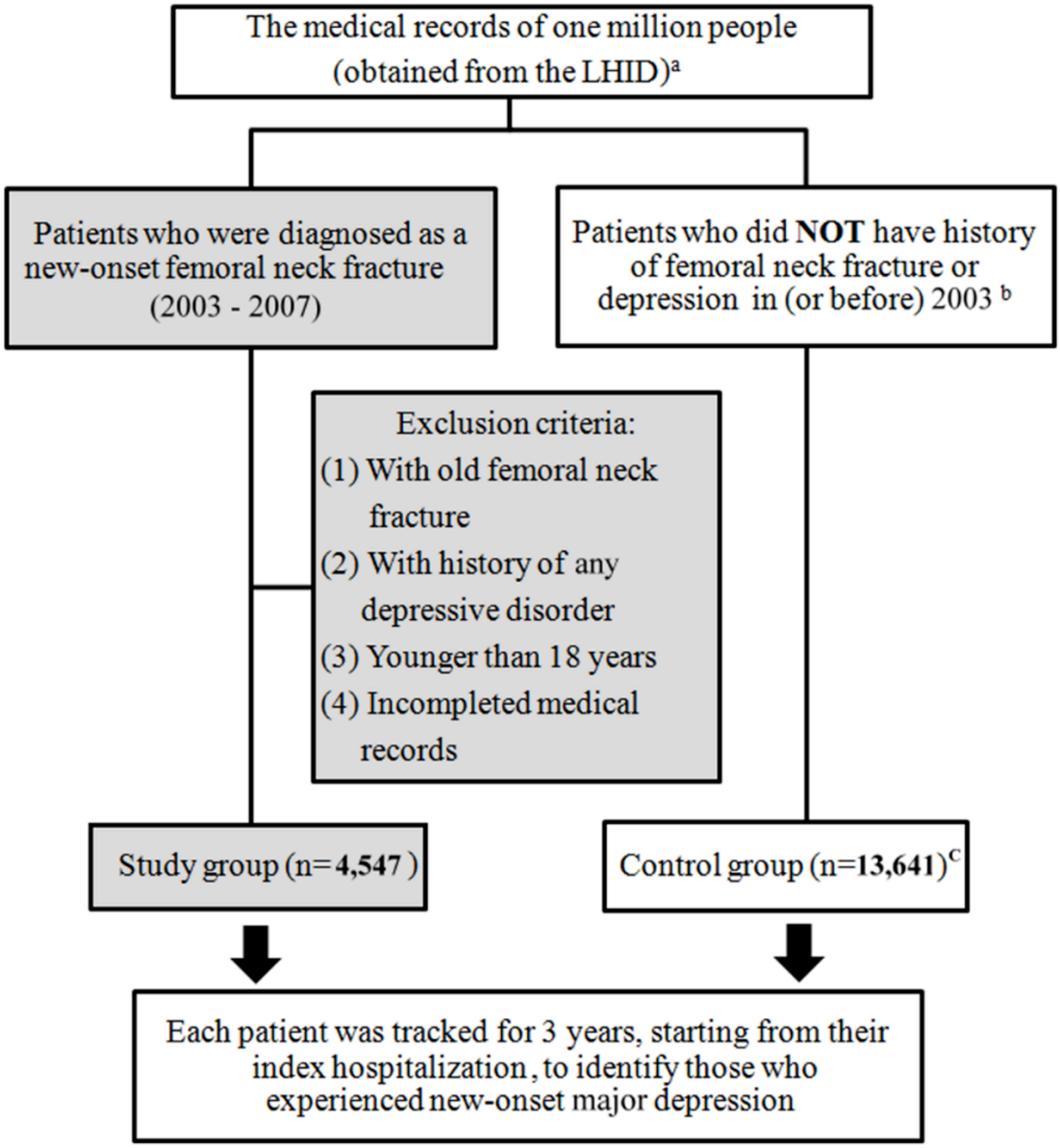

Figure 1 Flowchart of the selection methods in study and comparison patients. [a] The LHID contained medical records of one million people, which was randomly selected from the Taiwan National Health Insurance (NHI) program (supported by Taiwan government and over 98% of the Taiwanese population was enrolled in this program). [b] All personal medical records (diagnosis, treatments, medications), which had been recorded by different hospitals, were finally input into the NHI for requiring payments. Because almost all hospitals in Taiwan have joined the NHI; therefore, we could use it to screen patients' past histories. [C] Three comparison patients for each femoral neck fracture patient (matched with study group patients in terms of sex, age and years of healthcare use)

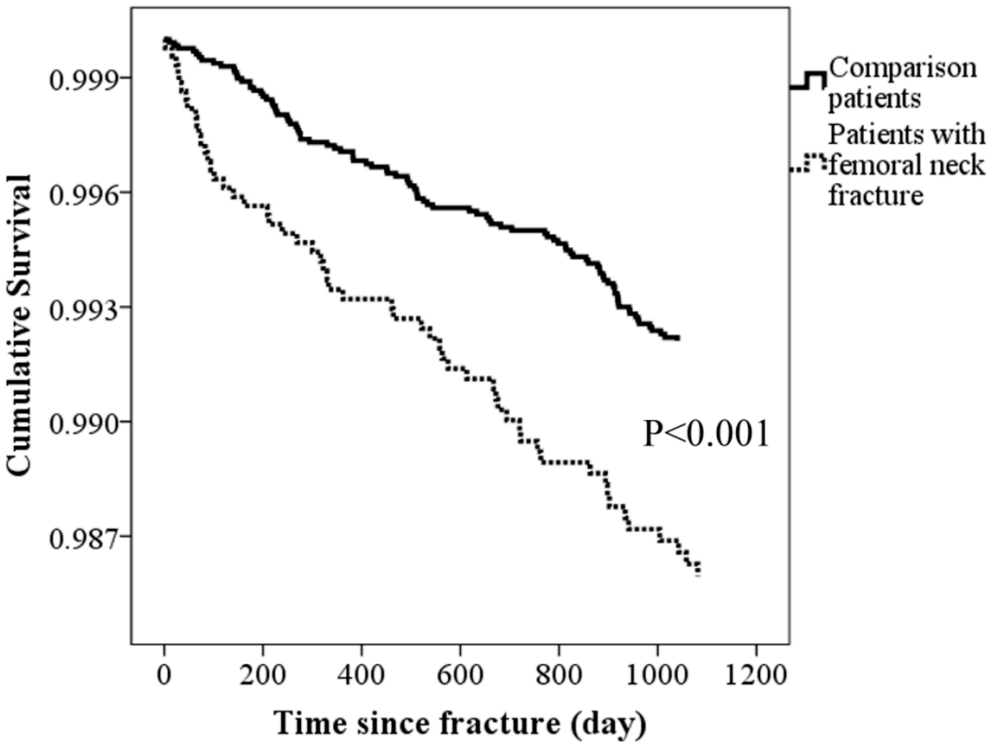

Figure 2 Time-related factor associated with the major depression occurrence. (A) Major depression-free survival curves for patients with femoral neck fracture and the comparison patients during the 3-year follow-up period (p=<0.001).

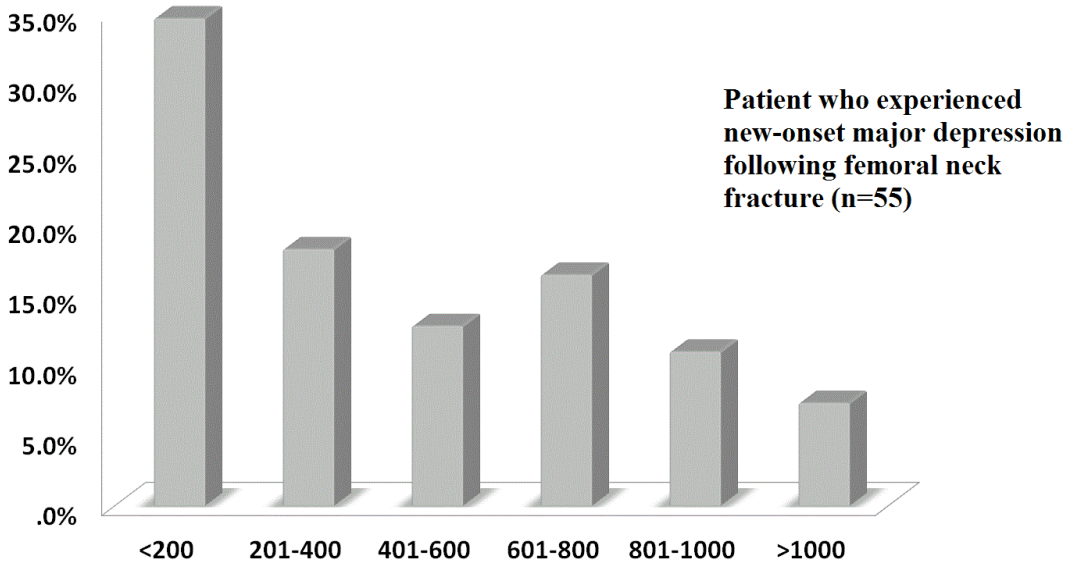

Figure 3 Most major depressive episodes (34.5%) occurred within the first 200 days following femoral neck fracture. The percentage of major depression patients also gradually decreased as the observation period prolonged.