

The Epidemiology of Fracture in Patients with acute ischemic stroke in Korea

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Background & Objectives

- Many stroke survivors have disabilities and complications which could increase the risk of falls and serious fractures which are a major cause of death among the patients with stroke.
- However, it is largely unknown on the incidence of fractures after stroke in Asian population.

Methods

- Korean CRCS-K acute ischemic stroke registry
 - Consecutive, prospective, nationwide, multicenter, web-based
- National Health Insurance Service (NHIS)
 - Mandatory universal health insurance service
 - Comprehensive medical care coverage for 97% of whole Korean
 - NHIS sample cohort established in 2002
 - men: 513,258, women 512,258 representative of NHIS database
- CRCS-K cohort linked to a claimed database of the NHIS sample cohort
 - Jan 2011 - Nov 2013, N=11,452
- Cumulative incidence function (CIF) estimates
 - Hip fracture, spine fracture and other fractures
 - Comparison of distribution of fracture incidence by age/sex and risk factors
- Fine and Gray's model for competing risk (mortality) analysis

Results

Table 1. The CIFs of each type of fractures for 4 years after acute ischemic stroke

Fracture type	No. of Event	% at 6 months	% at 1 year	% at 2 year	% at 4 year
Any Fracture	1616	2.63 (2.35, 2.93)	4.43 (4.07, 4.82)	8.09 (7.60, 8.60)	13.00 (12.38, 13.64)
Spine Fracture	712	1.11 (0.93, 1.31)	1.88 (1.64, 2.14)	3.28 (2.97, 3.62)	5.79 (5.37, 6.24)
Hip Fracture	397	0.61 (0.48, 0.77)	1.03 (0.86, 1.23)	1.86 (1.63, 2.12)	3.15 (2.84, 3.49)
Other Fracture	714	1.03 (0.86, 1.23)	1.81 (1.57, 2.06)	3.51 (3.18, 3.85)	5.61 (5.20, 6.05)

Table 2. Comparison of the cumulative incidence functions between spine and hip fractures

	Any fracture				Spine fracture				Hip fracture			
	% at 6 months	% at 1 year	% at 2 years	% at 4 years	% at 6 months	% at 1 year	% at 2 years	% at 4 years	% at 6 months	% at 1 year	% at 2 years	% at 4 years
Age												
<55	0.66	1.62	2.88	5.79	0.10	0.25	0.40	0.97	0.00	0.00	0.10	0.41
55-64	1.42	2.75	5.45	9.19	0.49	0.89	1.51	2.98	0.13	0.40	0.75	1.30
65-74	2.47	4.35	8.72	14.73	1.00	1.86	3.83	7.16	0.48	0.94	1.77	3.14
75-84	4.02	6.59	11.61	17.71	1.90	3.21	5.28	9.09	0.96	1.59	3.11	5.43
≥85	6.69	8.74	12.70	16.38	3.04	4.01	5.80	7.41	2.91	3.88	5.40	7.01
Male	1.53	2.64	5.23	8.47	0.52	0.87	1.82	3.07	0.32	0.58	1.12	1.87
Male <55	0.75	1.71	2.94	5.60	0.07	0.14	0.27	0.78	0.00	0.00	0.14	0.31
Male 55-64	1.04	2.03	4.05	7.03	0.55	0.86	1.35	2.13	0.18	0.43	0.74	1.16
Male 65-74	1.50	2.80	6.04	9.74	0.29	0.78	2.23	4.12	0.34	0.73	1.40	2.21
Male 75-84	2.69	3.85	7.33	10.87	0.95	1.46	2.86	4.56	0.66	1.02	1.97	3.49
Male ≥85	3.19	3.98	7.97	10.82	2.01	2.81	4.82	5.62	1.20	1.20	2.39	4.02
Female	4.21	7.02	12.20	19.51	1.99	3.33	5.40	9.73	1.02	1.68	2.93	5.00
Female <55	0.39	1.35	2.71	6.29	0.19	0.58	0.77	1.48	0.00	0.00	0.00	0.68
Female 55-64	2.39	4.62	9.08	14.78	0.32	0.96	1.91	5.17	0.00	0.32	0.80	1.67
Female 65-74	3.87	6.56	12.57	21.89	2.02	3.41	6.13	11.54	0.69	1.25	2.29	4.47
Female 75-84	5.13	8.88	15.16	23.39	2.70	4.67	7.31	12.90	1.21	2.06	4.06	7.05
Female ≥85	8.52	11.23	15.18	19.30	3.58	4.63	6.32	8.36	3.82	5.31	7.01	8.61
Disability												
mRS(0-1)	1.92	3.74	7.53	12.24	0.84	1.76	3.20	5.69	0.24	0.45	0.98	2.02
mRS(2-3)	2.81	4.64	8.44	14.41	1.27	2.05	3.80	7.04	0.57	1.07	2.02	3.57
mRS(4-5)	3.55	5.29	8.52	12.28	1.33	1.83	2.69	4.18	1.29	1.93	3.11	4.47
Osteoporosis												
No	1.35	2.46	5.05	8.45	0.38	0.67	1.55	2.98	0.31	0.53	1.05	1.79
Yes	4.71	7.65	13.01	20.39	2.31	3.85	6.13	10.40	1.10	1.83	3.18	5.38
eGFR(mL/min/1.73 m ²)												
≥60	2.32	4.12	7.73	12.60	1.00	1.76	3.15	5.61	0.49	0.89	1.65	2.79
<60	3.88	5.71	9.54	14.59	1.54	2.33	3.83	6.54	1.10	1.58	2.72	4.61

- Age by a 10-year increment (HR, 1.23; 95% CI, 1.17-1.30), female (1.74; 1.54-1.97), previous fracture (1.72; 1.54-1.92) and osteoporosis (1.44; 1.27-1.63) were independent risk factors of poststroke fracture.

- The incidence rate of hip fracture was 566.8 (481.7-667.0) per 100,000 for men and 1495.2 (1321.5-1691.7) per 100,000 for women.

Conclusion

- The CIFs of fractures in survivors from acute ischemic stroke was as frequent as about 8% at 2 year and 13% at 4 years after stroke in Korea.

- The fracture risk in our ischemic stroke population would be expected to be 3 times higher than an age-adjusted reference population in Korea.

- The fracture incidence of 8.09% at 2 years in this study was 2-times higher than those estimated from other Caucasian stroke populations.

- The most common type of fracture was spine fracture, the frequency of which was about as twice as that of hip fracture, the second common type.

- The incidence was highest in the first year. It should be noted that approximately one third of spine and hip fractures during the first 4 years after stroke occurred within 6 months in this group.

- With ageing, the fracture incidence was increasing; 6.0% at 4 years in aged less than 55 years and 25.4% in aged 85 years or more; this tendency was more evident for hip and spine fractures compared to any fracture.

