Function and social status 10 years after hip fracture

Prospective follow-up of 103 patients

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Function and social outcome for 103 consecutive patients, mean age 75 years, admitted from their own homes after a hip fracture were studied during a 10-year period. Within 4 months after the fracture, 81 patients had returned home, and the percentage of survivors living at home from then on was then fairly constant. At 10 years after fracture, 31 patients were living at home, 6 were in institutions, and 66 were dead. ADL, walking ability, and household activities remained at the level already achieved within 4 months after fracture during the 10-year period. The need for social services help did not increase; about one third of the survivors had communal home help throughout the 10-year period. Patients who before fracture were healthy and living with someone and within 2 weeks after the fracture could walk with a four-legged aid or better had a good prognosis for living in their own home. The hip fracture did not effect their subsequent fate.

Most previous studies of patients with hip fractures have followed the outcome no longer than 2 years, and the long-term functional and social outcome is not known. We have studied the outcome for 10 years after the fracture to test if the prognostic indicators for returning and remaining at home identified by Ceder et al. (2) in their 1-year follow-up remained valid.

Patients and methods

The study involved 103 consecutive patients above 50 years of age with a fresh hip fracture; all of them were residents of the primary catchment area of Lund (2, 4). Further, all of them were admitted from their own homes and primarily treated at the Department of Orthopedics in Lund from September 1976 to April 1977. There were 28 men and 75 women with 65 cervical and 38 trochanteric hip fractures. The mean age was 75 years in both groups (Table 1).

Patients were divided into two groups (healthy and nonhealthy) according to their medical history and physical status on admission (2). Healthy patients included patients with no known disease or patients who had additional disease not likely to impede rehabilitation, i.e. the walking ability.

Cervical fractures were nailed according to the method of Rydell, and most of the trochanteric fractures were nailed and plated according to Thornton and Mc Laughlin; six trochanteric fractures were operated on with Ender nails.

Within the first year after fracture, 12 of the patients with cervical fractures had been reoperated on with a total or a hemiprosthesis, and 1 patient had the nail removed. During the same period, one of the trochanteric fractures had been reoperated on.

Within 5 years, another two cervical fractures and one trochanteric fracture had a prosthesis and 8 further patients (five cervical and three trochanteric fractures) had their nails extracted. After 5 years, no reoperation was performed.

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Table 1. Observations in 103 patients with hip fracture followed for 10 years

Case	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X	Y	Z	A1	B1	C1	D1	E1	F1	G1	H1
1	62	F	14	2	1	1	1	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	2	1	1	1	1
2	60	F	11	2	1	2	2	T	1	1	2	2	1	2	2	1	2	1	2	2	1	2	2	2	–	–	–	–	–	–	–	–	–
3	83	F	16	1	2	1	1	C	1	1	1	1	1	1	2	2	1	1	1	1	2	2	2	2	–	–	–	–	–	–	–	–	–
4	83	F	18	2	1	2	2	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5	70	F	10	1	1	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6	79	F	18	1	1	1	2	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7	74	F	26	2	2	1	1	T	1	1	2	1	1	1	2	1	1	2	1	2	1	1	1	1	–	–	–	–	–	–	–	–	–
8	78	M	15	2	2	1	2	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
9	64	F	12	1	1	1	2	T	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	2
10	86	F	21	1	2	2	2	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11	81	F	182	2	1	2	2	T	2	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
12	84	F	14	1	1	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
13	98	F	51	2	2	1	1	T	2	2	2	2	2	2	2	1	2	2	6	2	2	2	2	2	–	–	–	–	–	–	–	–	–
14	90	F	44	2	2	2	2	T	2	2	2	1	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
15	89	M	10	1	1	2	2	C	1	1	1	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
16	84	F	22	2	1	2	2	T	1	1	1	1	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
17	64	M	9	1	1	1	1	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	2	1	1	1	1
18	72	M	9	1	1	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
19	78	F	31	2	1	2	2	T	2	2	1	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
20	61	F	22	1	1	1	1	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	2	2	1	1	1	1
21	77	F	17	1	1	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
22	79	F	12	1	1	1	1	C	1	1	1	1	1	1	1	2	1	1	2	2	1	1	1	2	2	2	2	2	1	1	2	2	2
23	69	F	12	1	1	1	1	C	1	1	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
24	73	F	73	2	1	2	2	C	2	2	1	1	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
25	65	M	18	1	2	1	1	C	1	1	2	2	2	2	1	1	2	1	2	2	1	2	2	2	1	1	1	2	1	1	2	2	1
26	79	M	16	1	1	1	1	T	1	2	1	1	1	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1	2	2	1
27	62	F	21	1	1	1	1	C	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
28	76	M	14	1	1	1	1	C	1	1	1	1	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
29	80	M	36	2	1	1	2	T	2	2	2	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
30	83	F	39	2	2	2	2	T	2	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
31	66	F	13	1	2	1	1	C	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	–	–	–	–	–	–	–	–	–
32	60	F	10	1	2	1	1	T	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	1	–	–	–	–	–	–	–	–	–
33	71	F	24	2	1	2	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
34	73	F	15	1	1	1	1	C	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
35	74	F	12	1	2	1	1	C	1	1	2	1	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
36	72	F	67	1	1	1	1	T	2	2	2	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
37	69	M	55	2	2	1	1	T	2	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
38	89	M	10	2	2	1	1	C	1	1	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
39	75	F	18	1	1	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
40	64	F	8	1	1	1	1	C	1	1	1	1	1	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
41	83	M	102	2	1	2	2	C	1	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
42	72	F	13	1	1	1	1	T	1	1	1	1	1	1	2	1	1	1	2	1	1	1	2	2	–	–	–	–	–	–	–	–	–
43	59	M	13	1	1	1	1	T	1	1	1	1	1	1	1	2	1	1	1	2	1	2	1	1	2	1	1	1	2	1	2	2	1
44	83	F	20	2	1	1	1	C	1	2	1	1	1	1	2	1	2	1	2	1	1	1	1	2	–	–	–	–	–	–	–	–	–
45	77	F	11	1	1	2	1	C	1	1	1	1	1	2	2	1	2	2	2	2	1	2	2	2	–	–	–	–	–	–	–	–	–
46	58	F	17	1	1	1	1	T	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	2	2	1	1	1	1
47	66	F	15	2	1	1	1	T	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	6	1	1	2	2	2
48	69	F	30	2	1	2	2	T	1	2	1	1	1	1	1	2	2	1	2	2	1	2	2	2	2	2	1	5	1	1	2	2	2
49	70	F	23	1	2	1	1	C	1	1	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1	2	1	2	2	1	1	1	1
50	81	F	60	1	2	1	1	C	1	2	1	1	1	2	2	1	2	2	6	2	2	2	2	2	–	–	–	–	–	–	–	–	–
51	68	F	14	1	2	1	1	C	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	3	1	1	1	1	1
52	79	M	27	1	2	2	2	T	1	2	2	1	2	2	2	1	1	1	2	2	1	1	1	1	1	2	2	6	2	1	2	2	2
53	77	M	15	1	1	1	1	T	1	2	2	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
54	80	F	24	1	2	1	1	T	1	1	1	1	1	2	2	1	1	1	2	2	1	2	2	2	–	–	–	–	–	–	–	–	–
55	62	F	11	1	1	1	1	C	1	1	1	1	1	1	1	2	1	2	2	1	1	1	2	2	1	1	1	1	1	1	1	1	1
56	84	M	13	1	2	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
57	79	F	14	1	1	1	2	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
58	86	F	20	2	1	1	1	C	1	1	1	1	1	2	2	1	2	1	3	2	1	2	2	2	–	–	–	–	–	–	–	–	–
59	71	F	72	2	1	1	2	C	1	2	1	1	1	1	1	2	1	1	1	2	1	1	2	2	1	1	1	2	1	1	1	2	2
60	77	M	22	1	1	1	2	C	1	2	1	1	1	1	2	1	2	1	1	1	1	2	2	2	–	–	–	–	–	–	–	–	–
61	77	F	19	1	2	1	1	T	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
62	83	F	10	1	2	2	1	C	2	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
63	51	F	9	1	1	1	1	C	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
64	59	M	10	1	1	1	1	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	2	1	1	2	1
65	81	F	12	1	1	1	1	T	1	1	2	1	1	1	2	2	1	1	1	2	1	2	2	2	–	–	–	–	–	–	–	–	–
66	79	F	1	2	1	1	1	C	1	1	2	1	1	1	1	1	1	1	4	1	1	2	2	2	1	1	1	5	1	1	1	2	2
67	53	F	10	1	1	1	1	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	2	1	1	1	1
68	68	F	26	2	1	2	2	C	2	2	1	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
69	82	M	9	1	1	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
70	51	F	12	1	1	1	1	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	2	1	1	1	1
71	84	F	15	2	2	1	1	C	1	1	2	2	2	2	2	1	2	2	4	2	2	2	2	2	–	–	–	–	–	–	–	–	–
72	57	F	13	1	1	1	1	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	2	1	1	1	1
73	72	M	13	1	1	1	1	T	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1
74	54	F	18	1	2	1	1	T	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
75	84	F	14	1	2	1	1	T	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
76	63	M	17	1	2	1	1	C	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2	1	1	2	1	1	1	1
77	80	F	15	1	2	1	1	C	1	1	2	1	1	2	2	1	1	2	6	2	2	2	2	2	1	2	2	6	2	2	2	2	2
78	76	F	15	1	2	1	1	C	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1
79	78	F	29	1	2	1	1	T	1	2	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
80	86	M	57	2	2	1	1	T	2	2	2	2	1	1	2	2	2	2	4	2	2	2	2	2	–	–	–	–	–	–	–	–	–
81	85	F	30	2	1	2	2	C	1	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
82	89	F	144	2	2	2	2	C	2	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Case	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	X	Y	Z	A1	B1	C1	D1	E1	F1	G1	H1
83	74	F	59	1	1	1	1	C	2	2	1	2	1	1	1	1	2	1	2	2	1	1	1	1	1	1	1	2	2	1	1	2	2
84	74	F	13	1	2	1	1	C	1	1	1	1	1	2	2	1	2	1	2	2	1	2	2	2	2	2	2	6	2	1	2	2	2
85	73	F	11	1	2	1	1	C	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
86	75	F	11	1	1	1	2	C	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	2	1	1	1	2	1	1	1	1
87	78	M	19	2	1	1	2	T	1	2	1	1	1	2	2	2	2	2	6	2	2	2	2	2	–	–	–	–	–	–	–	–	–
88	71	F	10	1	2	1	1	C	1	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	–	–	–	–	–	–	–	–	–
89	80	M	49	2	2	2	2	C	2	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
90	67	M	44	2	1	2	2	T	2	2	1	1	1	1	2	2	2	2	6	2	2	2	2	2	1	1	2	7	2	2	2	2	2
91	86	M	27	2	1	2	2	C	1	2	1	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
92	85	F	31	1	2	2	1	T	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
93	81	F	30	2	1	1	2	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
94	97	F	21	1	2	1	1	C	1	1	1	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
95	81	F	28	1	2	1	1	C	1	1	1	1	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
96	78	F	43	2	1	2	2	T	2	2	2	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
97	59	M	12	2	1	2	2	T	1	2	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
98	73	M	15	2	1	1	2	C	2	2	1	1	1	1	2	2	2	2	6	2	2	2	2	2	–	–	–	–	–	–	–	–	–
99	83	F	26	2	2	1	1	T	1	1	1	1	1	1	2	1	1	1	3	1	1	1	2	2	–	–	–	–	–	–	–	–	–
100	83	F	59	2	2	1	1	T	2	2	2	2	1	2	2	1	2	1	2	2	1	2	2	2	1	2	2	7	2	2	2	2	2
101	85	F	43	2	2	2	2	T	2	2	2	1	1	1	2	1	1	2	6	1	1	1	2	2	–	–	–	–	–	–	–	–	–
102	86	F	53	2	1	2	2	T	2	2	1	2	2	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
103	80	M	18	1	2	1	1	C	1	1	1	1	1	2	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

A Age
B Sex
C Hospital days (acute)
D Healthy: 1 yes, 2 no
E Living with someone before fracture: 1 yes, 2 no
F Visiting someone before fracture: 1 yes, 2 no
G Shopping before fracture: 1 yes, 2 no
H Type of fracture: C cervical, T trochanteric
I Ability to walk within 2 weeks postsurgery: 1 yes, 2 no
J Managed ADL within 2 weeks postsurgery: 1 yes, 2 no

Living at home at different periods of time
K Discharged to own home: 1 yes, 2 no
L Living at home 4 months after the fracture: 1 yes, 2 no
M Living at home 12 months after the fracture: 1 yes, 2 no
N Living at home 5 years after the fracture: 1 yes, 2 no
O Living at home 10 years after the fracture: 1 yes, 2 no

Five-year follow-up
P Living with someone: 1 yes, 2 no
Q Visiting someone monthly after fracture: 1 yes, 2 no
R Ability to climb stairs: 1 yes, 2 no
S Walking-aid
  1 without any aid
  2 one walking-stick
  3 two walking-sticks
  4 two four-legged aids
  5 roller
  6 wheelchair or bedridden
T Communal home help: 1 yes, 2 no
U Ability to manage dressing: 1 yes, 2 no
V Ability to manage cooking: 1 yes, 2 no
X Ability to manage cleaning: 1 yes, 2 no
Y Ability to manage shopping: 1 yes, 2 no

Ten-year follow-up
Z Living with someone: 1 yes, 2 no
A1 Visiting someone monthly after fracture: 1 yes, 2 no
B1 Ability to climb stairs: 1 yes, 2 no
C1 Walking aid
  1 no aid
  2 one walking-stick
  3 two walking-sticks
  4 two four-legged aids
  5 roller
  6 wheelchair or bedridden
D1 Communal home help: 1 yes, 2 no
E1 Ability to manage dressing: 1 yes, 2 no
F1 Ability to manage cooking: 1 yes, 2 no
G1 Ability to manage cleaning: 1 yes, 2 no
H1 Ability to manage shopping: 1 yes, 2 no

After mobilization in the orthopedic department in Lund, an active rehabilitation program was applied for each patient, with the social and functional abilities monitored after discharge by a specially appointed physiotherapist during the first 4 months.

At 1 year, the follow-up was done by a physiotherapist by a telephone interview monitoring the same social and functional factors as at 4 months.

Five years after the fracture, 58 patients were alive. All were examined by 2 orthopedic surgeons (LC, KGT) at the hospital using the 1-year follow-up criteria.

Ten years after the fracture, a questionnaire was answered by all the 37 survivors.

The chi-square test with Yates' correction was used in the statistical analysis, and stepwise regression analysis was used to study predictive factors for remaining at home at 5 and 10 years after hip fracture.

Results

Residence. In the total material, 81 patients were living in their own homes 4 months after the fracture (Table 2). The fraction of survivors living at home was somewhat more than 4 out of 5 patients and fairly constant over time. At 5 years after the frac-

Table 2. Residence at different time periods after hip fracture

	Years after fracture			
	1/3	1	5	10
Own home	81	78	44	31
Old people's home	6	5	9	4
Nursing home	5	8	5	2
Acute hospital	7	0	0	0
Deceased	4	12	45	66
Total	103	103	103	103

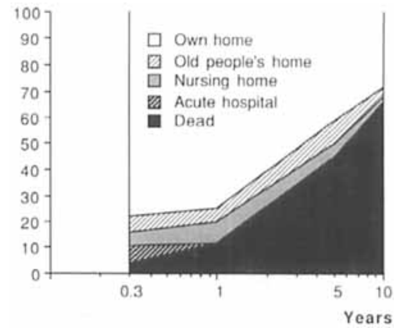

Figure 1. Residence (percent) with increasing time (log scale) after hip fracture.

ture, 44 patients were living in their own homes and 45 patients were dead. At 10 years after the fracture, 31 patients were living in their own homes and 66 patients were dead. The fraction of patients needing nursing home or geriatric hospital facilities was fairly constant during the 10-year period: about 5 percent (Figure 1).

Age. In the youngest age group, 50–64 years, all (19 patients) were living at home after 4 months, and all 16 survivors remained there even after 10 years. Four out of 5 surviving patients in the age group 65–79 years (46 patients) lived at home throughout the 10-year period. Three fifths of the oldest patients, above 80 years at fracture (38 patients), returned home; and they remained there until 5 years, when almost half of them were still living at home. After 10 years, none of the oldest patients were living at home (2 lived in old people's homes).

Sex. During the first 12 months after fracture, there was no difference in the proportion of those returning and staying at home between men and women. This was also true at 5 and 10 years after the fracture.

Type of fracture. At 4 months and 12 months after the fracture, the rate of being at home was almost the same for both cervical and trochanteric fractures (about 4 out of 5 patients). After 5 years, there was a decline in the fraction of patients at home for the trochanteric fractures, 15 out of 22 surviving patients compared with 29 out of 36 patients with cervical fractures. At 10 years, 7 out of 11 surviving patients with a trochanteric fracture and 24 out of 26 patients with a cervical fracture were living at home.

The general medical condition before fracture was important in the rehabilitation and for returning

Table 3. Predictive factors for living at home. Total number of patients and number of patients living at home

		Years after hip fracture			
	Total	1/3	1	5	10
Healthy	63	58	55	32	26
vs		***	**	NS	**
Not healthy	40	23	23	12	5
Living with someone	62	51	50	30	23
vs		NS	NS	NS	NS
Living alone	41	30	28	14	8
Visiting	76	68	68	41	30
vs		***	***	***	**
Not visiting	27	13	10	3	1
Shopping	69	60	62	36	27
vs		**	***	*	**
No shopping	34	21	16	8	4
Ability to walk within 2 weeks after surgery					
Yes	82	73	69	39	30
vs		***	***	NS	*
No	21	8	9	5	1
Ability to manage ADL within 2 weeks after surgery					
Yes	69	63	60	35	28
vs		***	***	*	**
No	34	18	18	9	3
Total	103	81	78	44	31

General medical condition, and social and functional statuses on admission for hip fracture, as well as abilities to walk with a four-legged aid or better within 2 weeks after surgery and to manage ADL (dressing/personal hygiene) as predictive factors for living at home. Healthy patients included patients with no known disease or patients who had additional disease not likely to impede rehabilitation.
*** $P < 0.001$, ** $0.001 < P < 0.01$, * $0.01 < P < 0.05$.

Table 4. Function after hip fracture. Values are fraction of the surviving patients

	Before	Years after hip fracture 1/3	1	5	10
Dressing /personal hygiene	0.89	0.83	0.88	0.83	0.92
Walking	0.95	0.73	0.80	0.80	0.76
Climbing stairs	0.89	0.78	0.84	0.78	0.84
Cooking /washing dishes	0.74	0.63	0.60	0.62	0.70
Cleaning /doing laundry	0.59	0.47	0.48	0.53	0.54
Shopping	0.67	0.39	0.53	0.52	0.68

home during the first 12 months, and patients who were healthy before fracture remained at home in a high proportion even at 5 and 10 years after the fracture (Table 3).

Social and functional status may be expressed by means of different factors. Living with someone before the fracture, the ability to visit friends or relatives monthly before the fracture, the ability to shop before the fracture, and the ability to walk within 2 weeks after the fracture were all such factors of importance for returning home and remaining there during the 10-year period (Table 3).

Functions like dressing, managing personal hygiene, climbing stairs, and walking, as well as household functions, e.g., cooking/washing dishes, cleaning/doing laundry and shopping, were fairly stable over time (Table 4).

Important factors for returning and remaining at home. The general medical condition, living with someone, and the ability to walk within 2 weeks postsurgery were the three factors that proved to be of greatest importance for return home upon discharge from the hospital. Patients with two or three of these factors had a significantly better prognosis for directly returning home after discharge from the acute hospital (2). Patients without any positive factor or with only one positive factor did not live at home after 10 years. One third of the patients with two of the factors lived at home 10 years after fracture. However, half of the patients with all three factors remained at home after 10 years (Figure 2).

Type of fracture was also of value for directly returning home (3). During the first year after the fracture, visiting someone monthly before their fracture and age were the two most valuable factors for remaining at home. These two factors, age and visiting someone monthly before fracture, were also the most important factors for remaining at home after 5 and 10 years in a stepwise regression analysis.

Social resources. The need of communal help for surviving patients with hip fractures was fairly constant over time: about one third at 4 months (27/81), at 1 year (25/78), at 5 years (10/44), and at 10 years after the fracture (11/31), respectively.

Discussion

This 10-year follow-up study of patients with hip fractures coming from their own homes shows that most of these patients return home very early and remain there. Only patients above 80 years of age at fracture gradually need institutional care. Within 4 months after the fracture, four out of five of the surviving patients regained and retained, at a high degree, their hip function, ADL activities, as well as household functions during the 10-year period.

Thus, the hip fracture in itself is not an obstacle for a continued long active life. Other social and

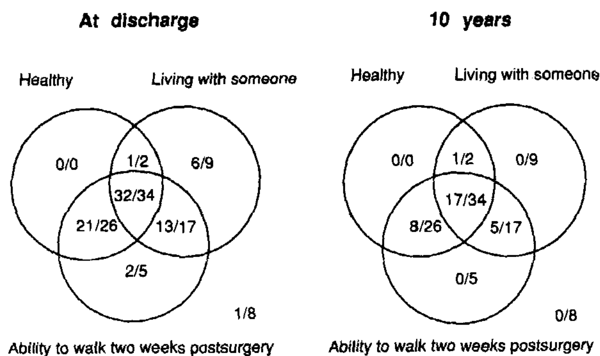

Figure 2. Living at home at discharge from the orthopedic department (76/101) and at 10 years (31/101) after hip fracture based on presence or absence of three key factors: healthy, living with someone before the fracture, and the ability to walk within 2 weeks postsurgery. Two patients who died during the hospital stay were excluded. Figures outside the Venn diagram show absence of the three key factors.

medical factors are more important. Age and visiting someone monthly are the most discriminating factors for the prognosis at 1, 5, and 10 years. The probability of returning and remaining at home for a patient who monthly goes out to visit friends or relatives before the fracture is very good in a 10-year perspective. A combination of the three positive factors—healthy at fracture, living with someone before fracture, and the ability to walk within 2 weeks postsurgery—means that every other patient will be living at home with good hip function 10 years after the fracture.

However, a patient with a trochanteric fracture has less chance of being at home after 10 years compared with a patient with a cervical fracture. The reason is that the former patient, on an average, is older and sicker than the latter, and thus has a poorer prognosis (12). It is noteworthy that in our study the mean age upon admission was 75 years in both fracture groups, and the proportions of patients living in their own homes were almost the same at 12 months after the fracture. After 1 year, the proportion of patients with trochanteric fractures living in their own homes decreased during the observation period, especially between 1 and 5 years after the fracture. At 10 years after the fracture, 14 out of 17 surviving patients with the three positive factors healthy at fracture, living with someone before fracture, and ability to walk within 2 weeks postsurgery were those with cervical fractures. Of these 17 patients, all of them visited friends or relatives monthly before their fracture, they all managed ADL, and 16 patients did their own shopping.

The survival rate was 36 percent, which is somewhat higher compared with other studies (6, 7). Age is the single most important factor determining long-term survival; e.g., in Gothenburg (6) a survival rate of 23 percent was presented in a 10-year hip fracture material with patients coming from both their own homes and from institutions. The better prognosis in our study was because all the patients came from their own homes.

Because of both an increasing proportion of elderly and an increasing incidence of hip fractures in Scandinavia and in other Western countries, the number of hip fractures will probably continue to increase in the coming decades (9). The incidence of hip fractures is higher for patients living in a city compared with patients living in a rural area (10). During past decades, there has been an adaptation to the increasing number of patients. Different ways of reducing hospitalization time have been applied, such as new techniques and rehabilitation programs (4, 5).

In the beginning of the 1950s, all rehabilitation was done in the hospital. The patient was confined to bed for approximately 4 months, and the hospital stay was more than 5 months (1). There was a fear of healing complications, and because of this, the nonweight-bearing period was very long. During the 1950s and 1960s, different time periods were applied for how long the patient should be off weight-bearing. The nonweight-bearing period was reduced from 4 months to 2 months during the 1950s and from 2 months to 1 day at the end of the 1960s. Further strategic changes in the treatment of cervical hip fractures, i.e., a program with rehabilitation at home in collaboration with primary care and change in surgical techniques decreased the mean hospitalization time from 44 to 16 days (5). During the same period, the return rate home at discharge from the hospital increased from 44 to 75 percent for patients coming from their own homes.

At the present time (1988), the average stay in our hospital is still about 14 days for cervical fractures and 18 days for trochanteric fractures. One very important factor showing the resource consumption is whether or not the patients will be returning home. Residence at different periods of time after hip fracture for our material shows that, on an average, about 16 percent of the surviving patients were living in institutions. To be at home with or without home help is the least resource-consuming state of residence (8). In this respect, it is of great value to know the social and functional outcome in the long run for this large group of patients. It is noteworthy that there was no increase in social resources; about one third of the surviving patients had communal home help throughout the 10-year period.

The gains in rehabilitation are now won early. Both patient and society gain from early rehabilitation at home at low cost in cooperation with primary care personnel and social workers without a long hospital stay and/or unnecessary institutional aftercare.

A new strategy to adapt to the increasing number of patients and the scarcity of resources is illustrated by the active involvement of primary care; e.g., since 1985, all postsurgical routine follow-ups are performed by the primary health care centers in the catchment area of Lund University Hospital. There are, however, patients who have a poor prognosis and who are highly resource-consuming, e.g., old and single patients with trochanteric fractures (11, 12). These patients constitute an increasing challenge to the geriatric rehabilitation centers and to the primary health care sector for further interventions.

However, some of them may ultimately return home.

On the whole, the present study showed that 4 out of 5 patients returned home after their hip fracture and remained in their homes with a good functional level until they died of other diseases. The prognostic indicators identified by Ceder et al. (2), especially age and visiting friends or relatives monthly, remained valid in the 5- and 10-year perspective. Thus, the hip fracture patient coming from his or her own home is no extra burden to the health care system in the long-term perspective.

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References

1. Borgquist L. Organisationsnivåer inom sjukvården. En studie av höftfrakturer hos åldringar. Thesis, University of Lund, Lund, Sweden 1974.
2. Ceder L, Thorngren K-G, Walldén B. Prognostic indicators and early home rehabilitation in elderly patients with hip fractures. Clin Orthop 1980; 152: 173–84.
3. Ceder L, Svensson K, Thorngren K-G. Statistical prediction of rehabilitation in elderly patients with hip fractures. Clin Orthop 1980; 152: 185–90.
4. Ceder L. Hip fracture in the elderly. Prognosis and rehabilitation. Thesis, University of Lund, Lund, Sweden 1980.
5. Ceder L, Strömqvist B, Hansson L-I. Effects of strategy changes in the treatment of femoral neck fractures during a 17-year period. Clin Orthop 1987; 218: 53–7.
6. Elmerson S, Zetterberg C, Andersson G B. Ten year survival after fractures of the proximal end of the femur. Gerontology 1988; 34(4): 186–91.
7. Holmberg S, Conradi P, Kalén R, Thorngren K-G. Mortality after cervical hip fracture. 3002 patients followed for 6 years. Acta Orthop Scand 1986; 57(1): 8–11.
8. Jarnlo G B, Ceder L, Thorngren K-G. Early rehabilitation at home of elderly patients with hip fractures and consumption of resources in primary care. Scand J Prim Health Care 1984; 2(3): 105–12.
9. Jarnlo G B, Jakobsson B, Ceder L, Thorngren K-G. Hip fracture incidence in Lund, Sweden, 1966–1986. Acta Orthop Scand 1989; 60(3): 278–82.
10. Sernbo I, Johnell O, Andersson T. Differences in the incidence of hip fracture. Comparison of an urban and a rural population in southern Sweden. Acta Orthop Scand 1988; 59(4): 382–5.
11. Snaedal J, Thorngren M, Ceder L, Thorngren K-G. Outcome of patients with a nailed hip fracture requiring rehabilitation in a hospital for chronic care. Scand J Rehabil Med 1984; 16(4): 171–6.
12. Thorngren M, Nilsson L T, Thorngren K-G. Prognosis determined rehabilitation of hip fractures. Compr Gerontol (A) 1988; 2(1): 12–7.