Do Concomitant Fractures With Hip Fractures Influence Complication Rate and Functional Outcome?

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Abstract

Background Owing to the aging population, the incidence of hip fractures is increasing. While concomitant fractures are not uncommon, it is unclear how they influence subsequent function.

Questions/purposes Therefore, we determined (1) the incidence, type and treatment of concomitant fractures accompanying hip fractures, (2) the length of hospital stay, (3) the impact of concomitant fractures on mortality and complication rate, and (4) patients' function.

Methods We retrospectively reviewed 402 patients older than 60 years with hip fractures. We recorded the presence of concomitant fractures and their treatment. We analyzed the duration of hospital stays, in-hospital mortality, peri-operative complications, and function. We recorded function with the Barthel Index, Harris hip score, and timed up and go test. For this study we followed patients 1 year.

Results Twenty-two patients (5%) had concomitant fractures, the most frequent being proximal humeral fractures ($n = 8$) and distal radius fractures ($n = 6$). Patients without and with concomitant fractures had similar lengths of hospitalization (mean, 14 days; 95% CI, 13–15 days), in-hospital mortality (5% with concomitant fractures, 6% without concomitant fractures), and incidence of complications (41% versus 40%). Function at discharge and last followup were similar in both groups.

Conclusion The most frequent concomitant fractures were typical osteoporotic fractures (radial and humeral fractures). Concomitant fractures did not influence length of hospitalization, in-hospital mortality, complication rate, and function. Hip fracture and comorbidities predicted the incidence of complications and patients' function.

Level of Evidence Level II, prognostic study. See the Guidelines for Authors for a complete description of levels of evidence.

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Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

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Introduction

Hip fractures [16] are typical fragility fractures of the elderly. In 2009, nearly 140,000 of these fractures were reported in Germany [9]. These injuries constitute one of the most serious healthcare problems affecting the elderly [24], contributing to estimated costs of €2 to €4 billion (Euros) per year in Germany [22]. Owing to the demographic transition with longer life expectancy, the global incidence of fractures of the proximal femur has increased [17, 24, 33] and will continue to do so [33]. Proximal femoral fractures commonly lead to high rates of complications [20, 21], morbidity, decline in function [5, 18], premature death [1, 8], and reduced quality of life [25, 31]. Thus, successful treatment of these fractures has become increasingly important.

Table 1. Baseline data for all patients

Data	All patients	With concomitant fractures	Without concomitant fractures
Average age (years) ($\pm$ SD) (range)	81 ($\pm$ 8) (60–99)	82 ($\pm$ 8) (63–98)	81 ($\pm$ 8) (60–99)
95% CI	80–83	78–86	80–83
Sex			
Men	109 (27%)	3 (14%)	106 (28%)
Women	293 (73%)	19 (86%)	274 (72%)
Fracture location			
Femoral neck	195 (48%)	8 (36%)	187 (49%)
Trochanteric	186 (46%)	14 (64%)	172 (45%)
Subtrochanteric	21 (5%)	0 (0%)	21 (6%)
Fracture side			
Right	204 (51%)	8 (36%)	196 (52%)
Left	198 (49%)	14 (64%)	184 (48%)
Interval between admission and surgery (hours) ($\pm$ SD) (range)	18 ($\pm$ 13) (1–92)	19 ($\pm$ 13) (3–48)	18 ($\pm$ 13) (1–92)
95% CI	17–20	13–25	16–20
Type of surgery			
Internal fixation	237 (59%)	16 (73%)	221 (58%)
Hip arthroplasty	165 (41%)	6 (27%)	159 (42%)
Average ASA score ($\pm$ SD) (range)	2.9 ($\pm$ 0.6) (1–5)	2.9 ($\pm$ 0.6) (1–5)	2.9 ($\pm$ 0.6)(1–5) 2.9–3.0
95% CI	2.8–3.0	2.5–3.2	
Prefracture average Barthel Index ($\pm$ SD) (range)	80 ($\pm$ 25) (0–100)	82 ($\pm$ 24) (10–100)	79 ($\pm$ 25) (0–100)
95% CI	77–82	71–93	76–82
Average Charlson Comorbidity Index ($\pm$ SD) (range)	2.4 ($\pm$ 2.3) (0–12)	2.0 ($\pm$ 2.2) (0–7)	2.4 ($\pm$ 2.3) (0–12)
95% CI	2.1–2.7	1.0–3.0	2.1–2.7

ASA = American Society of Anesthesiologists.

Some studies report coexisting chronic comorbidities such as cardiovascular diseases [29], diabetes mellitus [13], or neurologic disorders [34] in patients with hip fractures. These conditions are risk factors for the occurrence of hip fractures [24] and predict prolonged hospitalization, higher complication rates, and mortality [21]. It is likely that patients with concomitant fractures might have particular problems in mobilization and achieving a satisfactory functional level. Several studies have reported concomitant fractures of the upper limb [10, 11, 26, 30, 32] but not all followed the patients long enough to determine function or did not report overall function including the upper extremities. Two of these studies [26, 30] reported a longer hospital stay for patients with concomitant fractures. However one study suggested patients recovered during rehabilitation and achieved similar function to patients with single hip fractures [11]. Thus, it is unclear whether surgical treatment of the concomitant fracture could accelerate functional recovery, reduce hospital stay, and influence the complication rate.

Therefore, we determined (1) the incidence, type, and treatment of concomitant fractures accompanying hip

fractures, (2) the length of hospital stay, (3) the impact of concomitant fracture on mortality and complication rates, and (4) patients' function.

Patients and Methods

We retrospectively reviewed 402 patients with proximal femoral fractures treated from April 1, 2009 to September 30, 2011 at the University Hospital of Marburg, Germany; 293 (73%) were women and 109 (27%) were men, with an average age of 81 years (range, 60–99 years). We excluded 62 patients with multiple trauma (injury severity score [4] of 16 or greater) and patients with pathologic fractures associated with malignancy. By March 2012, 310 patients were due for their 1-year followup. Included in these 310 patients were 16 with concomitant fractures and 294 with single hip fractures. Fifty-eight patients (22%) died during the first year after hip fracture and 78 patients (25%) refused to attend the followups. Thus we had data for 174 of the 402 patients (43%) regarding function after 1 year. Of these 174 patients, 13 had concomitant fractures and

Fig. 1A–B The radiographs of the concomitant pelvic ring fracture on (A) admission and (B) after hip fracture surgery are shown.

161 had single hip fractures. We obtained approval from the Ethics Committee of the University of Marburg (AZ 175/08), and on admission, all patients gave written consent to participate in the study.

Hip fractures were classified according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision [16], as intracapsular femoral neck fractures, trochanteric fractures, and subtrochanteric fractures: 195 (48%) were femoral neck fractures, 186 (46%) were trochanteric fractures, and 21 (5%) were subtrochanteric fractures. The right-to-left proportion of the fractured side totaled 204 (51%) versus 198 (49%). We determined the presence of concomitant fractures.

We documented the patients' age, sex, American Society of Anesthesiologists (ASA) classification [2], fracture type, interval between admission and surgery (in hours), and type of treatment (internal fixation or hip arthroplasty). The ASA physical status classification is accepted worldwide to assess patients' fitness before surgery. There are six categories. Healthy patients were assessed as ASA Class 1, patients with mild systemic disease as ASA Class 2,

patients with severe systemic disease as ASA Class 3, patients with severe systemic disease that is a constant threat to life as ASA Class 4, moribund patients as ASA Class 5, and patients who were brain-dead as ASA Class 6 [2]. All patients were asked for information about their prefracture functional state and comorbidities. The functional status was determined using the Barthel Index according to the Hamburg Classification Manual [23]. The patients were scored in different areas (eg, feeding, bathing, dressing, walking) depending on the independence of performance. The total scores range from 0 (complete dependence) to 100 (complete independence) [23]. Comorbidities were documented using the Charlson Comorbidity Index [7]. This index collected a total of 22 different comorbid conditions for each patient. If a condition is present, it is scored with 1, 2, 3, or 6 points depending on the risk of dying associated with the particular condition [7]. Concerning the physical status of the included patients, the mean ASA score was 2.9 (± 0.6), the mean Barthel Index on admission was 80 (± 25), and the mean Charlson Comorbidity Index was 2.4 (± 2.3).

The values of the aforementioned continuous parameters were similar between patients with single hip fractures and patients with accompanying concomitant fractures. However 86% of the patients ($n = 19$) with concomitant fractures were women, and 72% patients ($n = 274$) with single hip fractures were women. In addition, patients with concomitant fractures more often had had a trochanteric fracture ($n = 14$ [64%] versus 172 [45%]) and therefore were treated with internal fixation more often ($n = 16$ [73%]) than patients without a concomitant fracture ($n = 221$ [58%]). In eight patients (36%) with concomitant fractures, the right side was affected by the hip fracture. In contrast, patients with a single hip fracture had the fracture on the right side in 52% ($n = 196$) of cases (Table 1).

We surgically treated all hip fractures with either internal fixation or hip arthroplasty. Patients with displaced femoral neck fractures were treated either with bipolar hemiarthroplasty or with THA, whereas patients with nondisplaced femoral neck fractures or stable trochanteric fractures were treated with a dynamic hip screw. Intramedullary nails were used for internal fixation of unstable trochanteric fractures and subtrochanteric fractures. Mobilization was performed daily from the first postsurgical day except on Sundays. The physiotherapist spent 30 minutes with the patients two times per day even when the patients were in the intensive care unit. Full weightbearing on the fractured hip was allowed immediately after surgery. Various aids such as wheeled walkers or crutches were used for mobilization.

Patients were visited in the morning and afternoon every working day and once per day on the weekends by a resident and a consultant. During the visits, the patients were asked about any complaints and examined clinically.

Table 2. Cofractures and treatment

Fracture location	Count	Side in relation to hip fracture		Treatment		Number of surgeries (number of patients × number of operations)
		Ipsilateral	Contralateral	Surgical	Nonsurgical	
Proximal humerus	8	8	0	6	2	5 × 1 1 × 2
AO 11-A-2	1				1	
AO 11-B-1	1				1	
AO 11-B-2	2			Two plate osteosynthesis		
AO 11-B-3	2			Two arthroplasties		
AO 11-C-2	2			Two plate osteosynthesis		
Distal radius	6	6	0	4	2	4 × 1
AO 23-A-2	1				1	
AO 23-C-1	1			One plate osteosynthesis		
AO 23-C-2	3			Two plate osteosynthesis	1	
AO 23-C-3	1			One plate osteosynthesis		
Pelvic ring	2	2	0	0	2	
Vertebral body	2	Both sides		One kyphoplasty	1	2
Glenoid	1	1	0	One screw fixation	0	1
Greater trochanter	1	0	1	0	1	
Metacarpus	1	0	1	0	1	
Metatarsus	1	1	0	One screw fixation	0	1
Rib	1	1	0	0	1	
Total	23	19	2	13	10	11 × 1 2 × 2

Postoperative radiographs of the fractured hip and, if present, of the concomitant fracture were routinely obtained. The wounds were checked every other day and the laboratory parameters were determined respectively. Additional studies were performed only when needed. The duration of hospitalization was noted.

We recorded in-hospital mortality and surgical complications according to Grades II to IV of the classification of Dindo et al. [12]. Grade II complications were those requiring pharmacologic treatment, Grade III complications required surgical treatment, and Grade IV complications were life-threatening.

We assessed approved functional measurements [15]. The Barthel Index and Harris hip score [14] were performed at discharge, and the difference between the Barthel Index at discharge and on admission was calculated. The timed up and go test [27] was performed at discharge in 155 patients (43%) without concomitant fractures and nine patients (41%) with concomitant fractures.

At followup 1 year after the trauma, patients were asked for information regarding their functional state. For the followup, the patients were invited to come to the hospital. Patients, who were not able or not willing to come, were visited at home, if they agreed. Functional status was determined using the Barthel Index, the Harris hip score,

and timed up and go test. We also calculated the difference between the Barthel Index at followup and before fracture. The timed up and go test was performed by 127 patients (79%) without concomitant fractures and seven (53%) with concomitant fractures. We collected the data in a File-maker® database (FileMaker Inc, Santa Clara, CA, USA) and performed a double-entry with a plausibility check to improve data quality.

Predictive Analysis SoftWare (PASW®) version 18.0 (SPSS Inc, Chicago, IL, USA) was used for the data analysis. For the baseline data and data regarding the concomitant fractures we performed descriptive statistics and explorative data analysis. We determined the frequencies for dichotomous variables and the means, standard deviations, and confidence intervals for continuous variables. Differences in length of hospital stay between the two groups of patients were determined by the t-test. We performed a chi-square test to determine differences in the occurrence of complications and mortality. Thus, the number of patients with Grade II, III, or IV complications or who died was compared. Because not all of the metric variables had a normal distribution in the Kolmogorov-Smirnov test, we performed nonparametric tests. The Barthel Index, Harris hip score, and timed up and go test at discharge and at the 1-year followup between

patients with concomitant fractures and patients with single hip fractures were compared using the Mann-Whitney U test. The various results of the difference between pre-fracture Barthel Index and at discharge also were compared with the Mann-Whitney U test.

Results

We identified 22 patients with a total of 23 (5%) concomitant fractures. Eight patients had proximal humeral fractures, including one coincidental distal radius fracture. Overall, fractures of the distal radius occurred six times,

whereas pelvic ring fractures (Fig. 1) and vertebral body fractures each occurred twice (Table 2). In the case of the trochanteric and metacarpal fractures, which occurred contralateral to the hip fracture, the occurrence of concomitant fractures dated a few days before the hip fractures. In 13 (56%) cases, the concomitant fracture was treated surgically. The glenoid fracture, for example, was stabilized with a screw and suture anchors (Fig. 2). Except for two cases, the surgery for the concomitant fracture was performed at the same time as the surgery for the hip fracture. In one of these cases, the patient had a complex humeral head fracture requiring an arthroplasty; the other patient had a vertebral body fracture that was treated with a kyphoplasty some days later (Table 2).

The mean time of hospitalization was 14 days (95% CI, 13–15 days; $p = 0.799$) in both groups (Fig. 3A).

The in-hospital mortality was 6.2% (25 patients). Patients with concomitant fractures had a similar mortality ($p = 0.738$) to those without (4.5% versus 6.3%, respectively) (Fig. 3B). Ten patients (40%) died of cardiovascular diseases and five patients (20%) died of acute renal failure (Table 3). We detected no relevant complication relating to the concomitant fractures (Table 4). Nine patients (41%) with concomitant fractures had complications. The proportion of patients with at least one complication was similar ($p = 0.913$) in patients with singular hip fractures (151 patients [40%]) (Fig. 3C). In the comparison of complications in the different subgroups (Groups II–IV), the two

Fig. 2A–B (A) Preoperative and (B) postoperative radiographs of the concomitant glenoid fracture are shown.

Fig. 3A–C The graph shows (A) the duration of hospitalization in days, (B) the in-hospital mortality, and (C) the incidence of complications in patients with and without concomitant fractures.

Table 3. Causes of death

Cause of death	Number of patients	Patients with concomitant fractures	Patients without concomitant fractures
Cardiovascular system	10		10
Cardiac arrest	3		3
Acute cardiovascular failure	4		4
Myocardial infarction	1		1
Bacterial endocarditis	1		1
Ventricular fibrillation	1		1
Respiratory tract	4		4
Acute respiratory distress syndrome	1		1
Apnea	1		1
Pneumonia	1		1
Pulmonary embolism	1		1
Kidney	5	1	4
Acute renal failure	5	1	4
Liver	2		2
Liver failure	2		2
Others	4		4
Sepsis	2		2
Multiorgan failure	2		2
Total	25	1	24

patient groups had similar incidences of complications (Table 4).

The mean Barthel Index at discharge was similar ($p = 0.670$) in patients with concomitant fractures (51; 95% CI, 38–64) and patients without concomitant fractures (49; 95% CI, 45–52) (Fig. 4A). The mean difference between the Barthel Index at discharge and before fracture also was similar ($p = 0.693$). It was -30 (95% CI, -17 to -44) in patients with concomitant fractures and -30 (95% CI, -28 to -33) in the other cohort (Fig. 4B). Both cohorts achieved a Harris hip score of 50 (95% CI, 43–57 versus 95% CI, 48–52; $p = 0.928$) (Fig. 4C). For patients who completed the timed up and go test, the test required an average of 45 seconds (CI, 33–48 seconds). There was no difference ($p = 0.977$) between patients with concomitant fractures (45 seconds; 95% CI, 10–79) and without concomitant fractures (41 seconds; 95% CI, 33–48) (Fig. 4D). At followup we found no differences in the Barthel Index (76 with concomitant fractures versus 70 without concomitant fractures; $p = 0.739$) (Fig. 5A), Harris hip score (58 versus 71; $p = 0.104$) (Fig. 5B), or timed up and go test (35 seconds versus 29 seconds; $p = 0.369$) (Fig. 5C). The differences between Barthel Index at the 1-year followup and before fracture were -14 in patients with concomitant fractures and -11 in patients with single hip fractures ($p = 0.769$) (Fig. 5D).

Discussion

The incidence of hip fractures has increased worldwide owing to the ongoing demographic transition [24]. They still are associated with high rates of complications [20, 21] and declines in function [5, 18] and mortality [1, 8], constituting a serious healthcare problem for ageing societies [24]. Previous studies have reported on concomitant fractures without reporting on the long-term effects of concomitant fractures on patients' function. In addition, the incidence and potential effects of concomitant fractures other than upper limb fractures were not investigated in these studies. Therefore we assessed the incidence of concomitant fractures and their management in geriatric patients with hip fractures. Their affect on length of acute hospital care, in-hospital mortality, complication rate, and function was measured.

Our study has some limitations. First, we had a small number of patients with concomitant fractures. These are not common fractures despite the relatively large number of patients with hip fractures. Second, we had 1 year of followup on only 43% of the 402 patients. Only 310 patients were due to have their 1-year followup by the time this article was written. In addition, the one-year mortality rate (58 patients [22%]) and high morbidity of the patient sample for whom even a home visit was too exhausting are reasons for the small sample size at 1 year.

With an incidence of 5%, concomitant fractures were not uncommon in our patient sample. The 5% incidence is comparable to those in other investigations where only the upper limb or radial concomitant fractures were assessed [26] (Table 5). Most of the acquired concomitant fractures were typical osteoporosis-associated fractures, especially humeral ($n = 8$) and radial fractures ($n = 6$). This correlates with the results of previous studies. In contrast to the studies of Di Monaco et al. [10] and Shabat et al. [30], where the concomitant fractures were treated nonoperatively, we treated 56% of the concomitant fractures surgically. In 85% (11/13), surgeries for the hip fracture and concomitant fracture were performed simultaneously (Table 2). We believe single-stage surgery would minimize the risks of multiple anesthetics in this vulnerable cohort of geriatric patients although we have no data to confirm this view.

Unlike Mulhall et al. [26] and Tow et al. [32] who reported longer hospitalizations for patients with concomitant fractures, we found the average duration of hospital stay for both of our patient groups was 14 days and the patients seemed unaffected by the occurrence of concomitant fractures (Fig. 3A).

We had an in-hospital mortality of 6.2% which is comparable to that of other investigations [3, 6, 21] (Table 5). Mortality was not influenced by the presence of concomitant fractures (4.5% versus 6.3%) (Fig. 3B). By contrast, Mulhall et al. [26] reported a mortality rate of

Table 4. Complications

Complications*	All patients (n = 402)	Patients with concomitant fractures (n = 22)	Patients without concomitant fractures (n = 380)	p value
Grade 4	21 (5%)	1 (5%)	20 (5%)	0.924
Myocardial infarction	10	1	9	
Acute renal failure	3		3	
Ischemic stroke	3		3	
Respiratory failure	2		2	
Acute heart failure	1		1	
Epileptic seizure	1		1	
Perforated sigmoid diverticulitis	1		1	
Grade 3	47 (12%)	2 (9%)	45 (12%)	0.696
Hematoma	13		13	
Pleural effusion	12		12	
Seroma	6		6	
Deep wound infection	5		5	
Failure of osteosynthesis	4	1	3	
Ileus	2		2	
Cholecystitis	1		1	
Diverticular hemorrhage	1		1	
Luxation of prosthesis	1		1	
Periprosthetic fracture	1		1	
Postoperative hemorrhage	1	1		
Grade 2	110 (27%)	8 (36%)	102 (27%)	0.330
Urinary tract infection	92	7	85	
Pneumonia	7		7	
Hypohydration	2		2	
Atrial fibrillation	3		3	
Pulmonary edema	2	1	1	
Electrolyte imbalance	1		1	
Infection of central venous catheter	1		1	
Infectious diarrhea	1		1	
Respiratory obstruction	1		1	

* Complication grades are those described by Dindo et al. [11].

5.6% in patients with concomitant fractures and 10.3% general mortality rate but they did not report the causes of death or provide any statistical analysis. We found similar rates of Grades II to IV complications in patients with concomitant fractures (41%) compared with those without concomitant fractures (40%) (Table 4). Lack of consistency in the definitions of complications used in other studies hampered a comparison of the data, however, high rates of complications have been reported [21] (Table 5). Lawrence et al. [20], for example, reported a complication rate of 19% without including urinary tract infections, which were the most frequent complication in our study population (Table 3). If the incidence of complications had been much greater in patients with concomitant fractures, prolonged or repeated surgery and anesthesia and delayed

mobilization would have been a conclusive explanation. Instead, delay of surgery and male gender [21] and pre-existing factors such as comorbidities, limited functional and mental status, and physical inactivity were risk factors for complications [18, 19, 21].

We found a similar Barthel Index in both patient groups at discharge (Fig. 4A). In contrast, Di Monaco et al. [11] reported a lower Barthel Index on admission to a rehabilitation facility for patients with nonsurgically treated radial or humeral fractures in comparison to those without concomitant fractures. However, by the end of rehabilitation, they reported the difference no longer existed [11]. Our observations suggest the recovery process might be accelerated by the surgical treatment of the concomitant fracture. Functional recovery was incomplete because

Fig. 4A–D The mean (A) Barthel Index at discharge, (B) the difference between the Barthel Index at discharge and prefracture, (C) the Harris hip score at discharge, and (D) the required time for the timed up and go test at discharge are shown for patients with and without concomitant fractures.

Fig. 5A–D The mean (A) Barthel Index at 12 months, (B) the Harris hip score at 12 months, (C) the required time for the timed up and go (TUG) test at 12 months, and (D) the difference between the Barthel Index at 12 months and prefracture are shown for patients with and without concomitant fractures.

Table 5. Comparison of data from the current study and previous studies.

Study	Incidence of concomitant fractures	Treatment of concomitant fractures	Duration of hospital stay (in days)	In-hospital mortality	Complication rate	Function	Followup
Di Monaco et al. [10]	4.1% (upper limb)	100% conservatively	*38.1 versus 39.0 (rehabilitation)	NA	NA	Barthel Index *75.6 versus 75.6	Discharge from rehabilitation
Mulhall et al. [26]	4.7% (upper limb)	NA	*20.4 versus 15.6	NA	NA	NA	Discharge from acute care
Shabat et al. [30]	NA	100% conservatively	10	3%	16%	84% returned to prefracture activities of daily living	Discharge from either acute care or rehabilitation
Tow et al. [32]	2.7% (distal radial fracture)	NA	*23 versus 18	NA	NA	Able to ambulate *36% versus 64%	Discharge from acute care
Aros et al. [3]	NA	NA	6	16% (within 30 days)	NA	NA	12 months
Bertram et al. [5]	NA	NA	NA	NA	NA	29% did not reach their prefracture level	12 months
German External Quality Assurance Program [6]	NA	NA	14%	5.2%	NA	Able to ambulate 83%	Discharge from acute care
Lawrence et al. [20]	NA	NA		3.3	19%	NA	12 months
Lefaivre et al. [21]	NA	NA	23	7.9%	51%	NA	Discharge from acute care
Reuling et al. [28]	NA.	NA	17.2	NA	48%	Harris hip score 71.8–80.6	12 months
Current study	5%	56% surgically; 44% conservatively	14	6.2%	40%	Barthel Index *76 versus 70	12 months
			*14 versus 14	* 4.5% versus 6.3%	*41% versus 40%		

* Patient with concomitant fracture versus patients with single hip fracture; NA = not available.

prefracture values of the Barthel Index were not reached during the followup (Fig. 5A) without a difference between the two groups (Fig. 5B). Shabat et al. reported a high rate of 84% of patients who returned to prefracture activities of daily living, but they had no control group [30]. A decline in function is a frequent implication of hip fractures [6] (Table 5). Many factors influencing short-term and long-term function such as increasing age, low prefracture functional level, and poor health status [19] seemed to be more important for patients' function than the absence or presence of a concomitant fracture. According to this, both groups had a similar mean Harris hip score of 50 points at discharge (Fig. 4C). One explanation could have been the weight of the data obtained regarding pain. We found hip fracture was the major trauma and contributed most to pain severity. We also found no differences in the Harris hip score after 1 year which increased in comparison to discharge (Fig. 5B) but was low in comparison to the findings of Reuling et al. [28]. Their patient sample, however, was younger and had a lower ASA score. In our study, a similar number of patients in both groups could perform the timed up and go test without differences in time required for assessment at discharge (Fig. 4D) and at followup (Fig. 5C). It is likely that full weightbearing after hip fracture surgery decreased the importance of upper limb use (eg, for walking frames). In addition, surgical treatment of the concomitant upper limb fracture allows active motion immediately. That seems to be sufficient for patients' walking ability.

Our observations suggest that concomitant fractures with hip fractures did not substantially influence the in-hospital treatment and patients' function. Functional recovery potentially could be accelerated by surgical treatment of the concomitant fracture. Patient function seems to be determined and limited by the hip fracture and preexisting conditions in these patients. High mortality, a high incidence of complications, and a decline in function emphasize the importance of careful handling of these vulnerable patients.

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