

Determining Factors of Mortality in the Elderly with Hip Fractures

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KOIKE, Y., IMAIZUMI, H., TAKAHASHI, E., MATSUBARA, Y. and KOMATSU, H. *Determining Factors of Mortality in the Elderly with Hip Fractures.* Tohoku J. Exp. Med., 1999, 188 (2), 139-142 — We conducted a retrospective study of the influence of various factors on the mortality of 114 patients with hip fractures. The mortality rate one year after surgery was 18%, which was 2.5 times larger than that of the general population. It was related to age, ECG abnormality, and post-operative complications. — hip fractures; femoral neck fractures; mortality; one-year survival © 1999 Tohoku University Medical Press

Fracture of the hip is one of the most common and potentially devastating injuries in the geriatric population. One of every six women will have a hip fracture during her lifetime (Cummings et al. 1989), and the current over-all mortality rate in elderly patients one year after a fracture of the hip ranges from 14 to 36% (Koval and Zuckerman 1994). Many reports have been published about the risk factors responsible for the increased mortality rate in elderly patients with hip fractures, while no reports have compared their mortality rate with that in the Japanese general population. We report some risk factors for mortality in elderly patients with hip fractures, comparing their mortality rate with that in the Japanese general population.

MATERIALS AND METHODS

From June 1995 to December 1997, 114 patients (27 men, 87 women) were treated at the Hiraka General Hospital in Akita Prefecture. The mean age was 81 years (range, 65 to 98). There were 33 neck fractures, 80 trochanteric fractures, and one subtrochanteric fracture. Patients had their operations as soon as possible, and physical therapy usually began the day after surgery and maximal efforts were made to get the patients sitting in a chair and standing with assistance as soon as possible. The type of surgery was predicted on the type of fracture and

Received October 8, 1998; revision accepted for publication May 26, 1999.

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patient age. When primary internal fixation was the operation of choice, the device selected was usually a compression hip screw. When hemiarthroplasty was selected, the implant was a cemented bipolar prosthesis.

The patients were followed up one year after the surgery. Physical examinations and interviews were performed on 70 patients. Forty four patients could not come to the hospital because they were bedridden or already deceased, therefore information was obtained by the telephone.

We made a control group matched for age and sex by using the 18th Life Table in Japan (reported from the Ministry of Health and Welfare in 1996), and the one-year mortality rate of the group was calculated.

Risk factors which seemed to have affected on the life expectancy were divided into 14 preoperative factors (age, gender, type of fracture, preoperative interval, intercurrent illness, type of housing, Goldman's cardiac risk index [Goldman et al. 1977], preoperative dependence, mental function, anemia, blood urea, electrocardiogram abnormality, malignancy, malnutrition) and 3 postoperative factors (postoperative complication, total hospital stay, postoperative mobility). Univariate and multivariate analyses were applied to each factor. We used Cox's proportional-hazards analysis to identify potential predictors of mortality and backward stepwise analysis to identify independent risk factors. A p value <0.05 was assumed significant.

RESULTS

Twenty patients (18%) died within one year after the operation. The mortality rate of the control group was 7.0%. This difference was statistically significant (relative risk [RR] = 2.8, $p=0.034$).

The cause of death was pneumonia in 8 patients, cerebrovascular accident in 5 patients, urinary-tract infection in 2 patients, chronic heart failure in 2 patients, and acute renal failure, gastric ulcer, and septicemia in one patient, respectively.

Two preoperative factors were found relating to the increased mortality.

At admission for their injuries, 8 patients were in their sixties, 37 in their seventies, 56 in their eighties, and 13 in their nineties. During one year follow-up period, one patient was deceased in her seventies, 12 in their eighties, and 4 in their nineties. The RR was 2.2/10 years old ($p=0.012$).

Twenty patients had abnormality on their electrocardiograms (ECG) such as (a) a rhythm other than sinus and/or (b) >5 paroxysmal ventricular contractions/minutes. The mortality among the patients with an abnormal ECG was 27%, while it was 10% in the patients with a normal ECG. This difference was statistically significant ($p=0.024$, RR=2.8/disease).

The distribution of postoperative complications is shown in Table 1. Seventy-three patients (64%) had no postoperative complications. Twenty-two (19%) had one, fifteen (13%) had two, four (4%) had three postoperative complications or more. The overall average number of postoperative complications was

TABLE 1. *The distribution of the postoperative complications*

	No.
Urinary-tract infection	21
Pneumonia	12
Congestive heart failure	3
Gastrointestinal diseases	11
Pressure sores	4
Metabolic diseases	4
DIC	2
Septicemia	1
Cerebrovascular accident	3
Others	2

DIC, disseminated intravascular coagulation.

TABLE 2. *Results of multivariable analysis of significant factors of one year mortality*

	RR	95% CI	<i>t</i> value
Advancing age	1.06	1.02-1.10	1.72
Postoperative complications	2.61	2.11-3.22	4.49
ECG abnormality	1.54	0.95-2.49	0.89

CI, confidence intervals, ECG, electrocardiograms.

0.80 per patient. The mortality rate was 6.8% among the patients without postoperative complication, while it was 23% among patients with one postoperative complication, 47% with two, and 75% with three postoperative complications or more. These differences were statistically significant ($p=0.00001$, $RR=2.8/\text{disease}$).

Multivariate analysis showed the relative importance of the three factors as RR and *t*-values with 95% confidence intervals (Table 2).

DISCUSSION

Many authors have reported the mortality rates of elderly patients one year after hip fractures. The current over-all mortality rate ranges from 14 to 36% (Koval and Zuckerman 1994). A few reports have reported the mortality rates comparing with that in the general population.

Dahl (1980) reported that the mortality among patients with hip fractures during the first month was about 15 times and during the second month about 7 times the expected mortality of that in the Norwegian general population.

Miller (1978) reported that 27% were dead in the hip-fracture population at one year, comparing 9% in the American population.

Our study showed that the mortality rate of the patients with fractures was about 2.5 times that of the control group. The hip fracture itself seemed to affect the life expectancy.

Many studies have been done to identify the preoperative factors responsible for the increased mortality after hip fractures. Advancing age, male sex, four or more medical comorbidities, psychiatric illness, institutional stay and a delay in the operation have been shown to affect the outcome (Dahl 1980; Wood 1992; Koval and Zuckerman 1994).

Our study showed that the advancing age, ECG abnormality were responsible for the increased mortality rate after hip fractures. Because these two factors are simple, easy to evaluate and available at admission, they could be good predictors for the mortality preoperatively.

Fewer reports have described the postoperative factors that are responsible for the increased mortality rate after hip fractures. Kenzora et al. (1984) reported that patients who died before discharge from hospital had had a higher rate of postoperative complications than those who survived. Our study also showed that the postoperative complications affect the mortality. The prevention and precise treatment of these complications may improve the life expectancy.

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