

Survival after trochanteric fracture

Biological factors analyzed in 270 patients

Luigi de Palma¹, Luigi Rizzi¹, Giovanni Lorini¹ and Francesco Greco²

Factors that influence mortality were analyzed in 270 patients operated on for trochanteric hip fracture. Survival was closely related to age and medical con-

dition at the time of injury; methods of treatment had little influence on survival.

Departments of Orthopedics, ¹Catholic University of the Sacred Heart, School of Medicine, Rome, and ²University of Ancona, School of Medicine, Ancona, Italy

Correspondence: Dr. Luigi de Palma, Istituto di Clinica Ortopedica, Università Cattolica del Sacro Cuore, Largo A. Gemelli, 8, I-00168 Rome, Italy. Tel +39-6 30154353. Fax -6 3051161

Submitted 91-12-26. Accepted 92-06-03

Ceder et al. (1980), Jensen (1984), Kenzora et al. (1984) and others have reported that survival of patients with trochanteric hip fracture is mainly due to biological factors related to the patient, notably old age and poor health. Other studies have shown that the method of treatment may also contribute to postoperative death (Amici et al. 1980, Zain Elabdien et al. 1985, Raunest et al. 1990).

We have analyzed factors related to survival of patients with trochanteric hip fracture treated during the last 10 years.

Patients and methods

From 1980 through 1986, 270 patients with trochanteric hip fracture were operated on at the Orthopedics Department of the Catholic University; 205 were women. The mean age of the women was 78 (28-101) years and of the men 63 (15-101) years.

State of health

Based on their degree of social self-sufficiency, their mental state and the nature of any associated diseases (Kenzora et al. 1984), the patients were retrospectively classified into three different groups. Group I included 60 completely self-sufficient patients with no or mild associated disease; group II included 124 moderately self-sufficient patients with moderately severe disease; group III included 86 barely self-sufficient patients with severe associated disease, e.g., previous myocardial infarction and renal failure.

Treatment

The Jewett plate was used in 202 patients and Ender nails in 68. All received prophylactic antibiotics and anticoagulants; early mobilization was favored.

Age, sex, preoperative state of health, number of associated diseases, timing of surgery following injury, postoperative process, the kind of surgery and duration of the operation, the amount of transfused blood, postoperative hospitalization time and medical complications were recorded for each patient.

The follow-up for the survival analysis was carried out either directly, through physical examination, or indirectly, through questionnaires, after an average period of 3 (1-8) years.

The statistical analysis was carried out by multivariate analysis (Murtagh and Heck 1987) and cluster analysis (Anderberg 1973).

The evaluation of survival was made by the actuarial method. The log-rank test, as formulated by Peto et al. (1977), was used to identify the predictable possible influence of each factor. Finally, the postoperative period of time with the highest mortality risk was calculated by comparing the survival curve of the population under observation with that of the general population, taken from the National Central Bureau of Statistics. The point at which the two curves become parallel is the point at which the patients die at the same rate as the general population (Dahl 1980).

Results

The multivariate analysis clearly showed the relationship between the age and the state of health at the time of injury ($r = -0.49$), as well as between the general

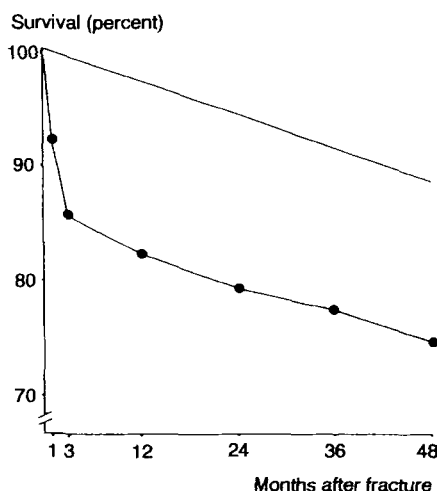


Figure 1. Survival of 270 patients after sustaining trochanteric fractures (closed circles) compared to an age-matched population (straight line).

state of health and the number of associated diseases ($r -0.69$).

The average hospitalization time was preoperatively 9 (1-36) days and postoperatively 26 (15-101) days.

The average length of the operation was 85 (40-240) min; for the patients treated with Ender's method, it was usually shorter. The average amount of transfused blood was 260 (0-1750) mL, related to the length of surgery ($r 0.42$).

The influence of the preoperative state of health was 17 percent, that of the number of associated diseases 16 percent, and that of age 13 percent. Taken together, the influence of these three variables on survival was 46 percent. The remaining variables were found to have little influence on the survival of the probands.

The survival analysis showed that the comparative death risk was increased by a factor of 14 for patients with a poor state of health. The high mortality rate following a trochanteric fracture persisted for about three months after surgery (Figure 1). Preoperative and postoperative hospitalization time did not influence survival ($r 0.00$; $r -0.04$).

Discussion

The population with trochanteric fractures is characterized by old age and by a predominance of females. Jensen and Tøndevold (1979), for instance, found a ratio of 3:1 between women and men and a mean age of 78 years. Ceder et al. (1980) reported the same inci-

dence with a mean age of 75 years. Our population had similar characteristics.

The literature reports mortality rates within one year of trochanteric hip fracture that vary from 15 to 40 percent (Kenzora et al. 1984, White et al. 1987, Dolk 1989). Our mortality rate of 18 percent within the first year is in the lower range, partly because our series included a few young individuals. The increased death risk in our series persisted for a period of 3 months after surgery; our data agree with Alffram (1964). Our data confirm Ceder et al.'s (1981), Kenzora et al.'s (1984) and Holmberg et al.'s (1986) that mortality depends on biological factors rather than on the method of treatment.

Opinions about the influence of preoperative hospitalization on mortality vary. McGoe and Evans (1960) and Davis et al. (1987) stated that immediate operation in the 24 hours following trochanteric fracture reduces the mortality rate. On the contrary, Kenzora et al. (1984) showed that the mortality rate was higher among patients operated on early than among those who underwent surgery on days 3-5. In our series neither preoperative nor postoperative hospitalization time influenced survival.

Acknowledgements

We thank Massimo Fofi, Osservatorio Astronomico di Monte Mario (Rome), for his help with the statistical analysis.

References

- Alffram P A. An epidemiologic study of cervical and trochanteric fractures of the femur in an urban population. Analysis of 1, 664 cases with special reference to etiologic factors. *Acta Orthop Scand (Suppl 65)* 1964: 1-109.
- Amici F Jr, Wigren A, Vollsater J. Pertrochanteric fractures of the femur treated by Ender's nails. *Ital J Orthop Traumatol* 1980; 6 (2): 213-8.
- Anderberg M R. Cluster analysis for applications. Academic Press, New York 1973.
- Ceder L, Thorngren K G, Wallden B. Prognostic indicators and early home rehabilitation in elderly patients with hip fractures. *Clin Orthop* 1980; 152: 173-84.
- Ceder L, Elmqvist D, Svensson S E. Cardiovascular and neurological function in elderly patients sustaining a fracture of the neck of the femur. *J Bone Joint Surg (Br)* 1981; 63B (4): 560-6.
- Dahl E. Mortality and life expectancy after hip fractures. *Acta Orthop Scand* 1980; 51 (1): 163-70.
- Davis F M, Woolner D F, Frampton C, Wilkinson A, Grant A, Harrison R T, Roberts M T, Thadaka R. Prospective, multi-centre trial of mortality following general or spinal anaesthesia for hip fracture surgery in the elderly. *Br J Anaesth* 1987; 59 (9): 1080-8.

- Dolk T. Influence of treatment factors on the outcome after hip fractures. *Ups J Med Sci* 1989; 94 (2): 209-21.
- 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.
- Jensen J S. Determining factors for the mortality following hip fractures. *Injury* 1984; 15 (6): 411-4.
- Jensen J S, Tøndevold E. Mortality after hip fractures. *Acta Orthop Scand* 1979; 50 (2): 161-7.
- Kenzora J E, McCarthy R E, Lowell J D, Sledge C B. Hip fracture mortality. Relation to age, treatment, preoperative illness, time of surgery, and complications. *Clin Orthop* 1984; 186: 45-56.
- McGoey P F, Evans J. Fractures of the hip: immediate versus delayed treatment. *Canad Med Assoc J* 1960; 83: 260-3.
- Murtagh F, Heck A. Multivariate data analysis. D Reidel Publ Co, Dordrecht 1987.
- Peto R, Pike M C, Armitage P, Breslow N E, Cox D R, Howard S V, Mantel N, McPherson K, Peto J, Smith P G. Design and analysis of randomized clinical trials requiring prolonged observation of each patient. II. analysis and examples. *Br J Cancer* 1977; 35 (1): 1-39.
- Raunest J, Kaschner A, Derra E. Zur Komplikationsinzidenz und Frühletalität bei der operativen Versorgung coxaler Femurfrakturen. *Langenbecks Arch Chir* 1990; 375 (3): 156-60.
- White B L, Fisher W D, Laurin C A. Rate of mortality for elderly patients after fracture of the hip in the 1980s. *J Bone Joint Surg (Am)* 1987; 69 (9): 1335-40.
- Zain Elabdien B S, Olerud S, Karlström G. Ender nailing of pertrochanteric fractures. Complications related to technical failures and bone quality. *Acta Orthop Scand* 1985; 56 (2): 138-44.