Secondary Fracture and Mortality Risk in Severe Osteoporosis Patients with Proximal Femoral Fracture: A Multicenter Prospective Study

Tomohiro Shimizu[1], Hotaka Ishizu[2], Norimasa Iwasaki[2]
[1]Department of Orthopaedic Surgery, Faculty of Medi, [2]Hokkaido University School of Medicine

INTRODUCTION:

The definition of severe osteoporosis with a high risk of fracture typically includes patients exhibiting risk factors such as low bone mineral density (BMD), history of previous fractures, advanced age, and familial history of proximal femoral fractures. Additionally, certain factors have been identified that can independently define severe osteoporosis. However, no studies to date have reported on the prognosis of severe osteoporosis patients following a proximal femoral fracture. Through this multicenter, prospective study, we aim to investigate the rates of secondary fractures, mortality, and associated risk factors among patients with severe osteoporosis who have experienced a proximal femoral fracture.

METHODS:

This study was designed as a multicenter, prospective cohort investigation. Our cohort comprised patients who had sustained proximal femoral fractures and received surgical treatment in four participating hospitals between April 2020 and March 2021. Postoperative assessments were carried out at 6, 12, 18, and 24-month intervals, during which we examined clinical data and evaluated rates of secondary fractures and mortality in patients with and without severe osteoporosis. Severe osteoporosis was identified based on any of the following three criteria: 1) a lumbar BMD T-score < -3.3 SD measured one-week post-surgery; 2) a history of at least two previous vertebral fractures; or 3) a semi-quantitative grading for vertebral fractures of over 3. Cumulative incidence analysis was conducted, with secondary fracture or mortality serving as the endpoint. To calculate the odds ratio (OR) (with 95% confidence intervals [CI]) for secondary fracture and mortality rates among patients with proximal femoral fractures within the first 24 months, we performed both univariate and multivariate analyses.

RESULTS:

Out of the 350 registered patients with proximal femoral fractures, 159 (45.4%) were diagnosed with severe osteoporosis. Despite a postoperative osteoporosis rate exceeding 94% in both groups, the use of osteoanabolic agents remained notably low. Patients with severe osteoporosis demonstrated significantly higher rates of secondary fractures and mortality over a 24-month period, especially at the 12-month mark. This outcome correlated with the number of severe osteoporosis criteria met by each patient. Cumulative incidence analyses over the first 24 months showed that patients in the severe osteoporosis group experienced more secondary fractures and higher mortality than those in the osteoporosis group, although these differences were not statistically significant (P=0.098 and 0.108, respectively) (Fig. 1). In contrast, cumulative incidence analyses based on the number of severe osteoporosis criteria met did reveal a significant difference among groups (P=0.009 and 0.039, respectively). Of particular note, patients who met all the criteria for severe osteoporosis had secondary fractures and mortality rates of 15.8% and 26.3%, respectively.

DISCUSSION AND CONCLUSION:

Almost half of patients with proximal femoral fractures had severe osteoporosis. Although anti-resorptive agents were prescribed for over 94% of patients, secondary fracture and mortality risk remained significant. The number of met severe osteoporosis criteria directly correlated with secondary fracture and mortality rates. This emphasizes the need for considering severe osteoporosis risk during treatment selection, including the use of osteoanabolic agents, and calls for a reevaluation of the prevailing healthcare approach.

A

Secondary fracture

p=0.098

Mortality

p=0.108

B

Secondary fracture

p=0.009

Mortality

p=0.039

—— Severe osteoporosis group
- - - - Osteoporosis group

—— Matched 3 criteria group
········· Matched 2 criteria group
—·—·— Matched 1 criteria group
- - - - Osteoporosis group

months