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Original article

Burden of proximal humerus fractures in the French National Hospital Database



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ABSTRACT

Objective: To describe the characteristics of patients hospitalized for osteoporotic proximal humerus fracture in 2009 in France, in-patient mortality, and further hospitalizations for hip fracture.

Methods: Data were extracted from the French Hospital National Database. We selected patients aged 40 years and over hospitalized for proximal humerus fracture in 2009, without cancer. Based on their unique identification number, we described the next hospitalizations occurring in 2009–2011 whatever the causes. Incidence, in-patient mortality, and hospital costs were calculated.

Results: We numbered 10,874 patients (77% of women, mean age 72.5 years). The incidence per million was 477 and 163 in women and men, respectively. This incidence increased with age and was higher in women (i.e. 1374 and 320 in women and men aged over 74 years, respectively). Surgical treatment was applied in 56% of patients; median hospital stay was 5 days. Rehabilitation unit was necessary in 26% of cases. In-patient mortality was 1.1%. The overall hospital costs was € 34 millions. Rehospitalizations occurred for 61% of the patients and had more co-morbidities than others. Near 8% of the rehospitalized patients were for hip fractures occurring in a median of 353 days after hospitalization for proximal humerus fracture. The hospital costs for these rehospitalizations was € 52 millions.

Conclusion: Proximal humerus fractures incidence increases with aging, especially in women. These fractures are associated with a significant in-patient mortality and health care resources utilization. Patients with such fracture must receive high priority for optimal post fracture treatment.

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1. Introduction

Proximal humeral fractures (PHF) are the third most frequent non-vertebral fractures in the elderly, after hip and forearm fractures; the majority of them can be treated non-operatively, with various durations of arm immobilization; several months are necessary for good recovery [1]. Patients are at risk for falls and subsequent fractures within a year after the PHF; during this period of time, there is a 6-fold increase in the risk of sustaining a hip fracture [2]. Moreover, an excess of mortality in women with PHF has been reported in prospective studies [3]; mortality is significantly

increased immediately after the fracture, and is not significantly different from mortality of the general population at 5 years [4].

As the population ages, the incidence of such fractures is expected to increase. There is no current information about the number of PHFs supposed to be due to osteoporosis, their cost and in-patient mortality in France. The aims of our study were to describe the population of patients hospitalized for PHF in 2009, to assess in-patient mortality, and to describe the further hospitalizations of these patients. We hypothesized that patients presenting with PHF and co-morbidities are at higher risk of rehospitalization and occurrence of other osteoporotic fracture, such as hip one.

2. Methods

2.1. Source of data

The data were extracted from the French hospital national database in acute care setting, which has been previously used

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to assess the burden of osteoporotic hip, proximal humerus and vertebral fractures in France [5–7]. This database includes 100% of hospitalizations occurring in both public and private acute care setting in France. Health professionals gather the information using ICD-10 codes. A number of variables including co-morbidities can be assessed, but treatments are not available. According to our objectives, we selected stays due to the first management of PHF in 2009 for patients aged more than 40 years, and the next hospitalizations occurring whatever the cause from 2009 to 2011 for these patients. Briefly, we performed two extractions. The first one in order to identify the patients aged 40 years and over on their unique identification number related to hospitalization for PHF in 2009 (ICD-10 codes encoded as primary diagnosis: S42.2, M80..1, M81.–1) classified in medical and surgical disease-related group (DRG) related to PHF management, except for polytrauma which were excluded. We numbered 14,408 hospitalizations (13,719 patients) corresponding to the 80% of stays having PHF encoded as primary diagnosis. The second one corresponded to all hospitalizations occurring from 2009 to 2011 (included) for these patients. If a patient was hospitalized for a contralateral PHF, only the first hospitalization was identified as belonging to the PHF group and the other hospitalization was taken into account as a further hospitalization. We excluded patient whose stays mentioned a cancer disease or was classified in an unclassified DRG after using the last classification of DRGs. Our final selection focused on 10,874 patients (i.e. 79% of the initial selection) and 23,213 hospitalizations described as followed: 37% for PHF, 63% after PHF whatever the reason during the study period from 2009 to 2011.

2.2. Analysis of data

We performed a description of the patients hospitalized for PHF in 2009: the patients' characteristics (gender, age, co-morbidities), and the characteristics of the hospitalizations (mode of entry and discharge, length of stay, need of intensive care, type of management, hospital costs). Co-morbidities were described according to the ICD-10 codes. In-patient mortality was described for any hospitalization, and we calculated the time between discharge after PHF and the stay ended with death. We described characteristics of patients rehospitalized for hip fractures.

We calculated the incidence of PHF per million inhabitants using the information of the 2012 estimated French population (www.insee.fr) and expressed the information according to different ages groups (40–59, 60–74, and ≥ 75 years) and gender.

For economic evaluation, we applied the 2012 public tariff per disease-related group (DRG) after reclassification of all stays in the 11c version of the classification of DRG for the study period 2009–2011 (classification used in 2011). In this method, if one stay was unclassified in the last DRG version, all stays of this given patient were excluded in the overall analysis. We took into account the variation of the tariff according to the duration of stay and the additional tariff due to the management in intensive care units or dialysis during the stay. The additional costs of the material of osteosynthesis or prosthesis, which is for some of them paid in addition to the tariff per DRG, was not calculated. Costs were expressed in equivalent 2012 euros.

We performed descriptive statistics as mean (standard deviation, SD) or median (minima–maxima), only.

3. Results

3.1. Incidence of PHF

In 2009 in France, 10,874 patients aged more than 40 years were hospitalized for PHF. The incidence per million adults aged 40 years

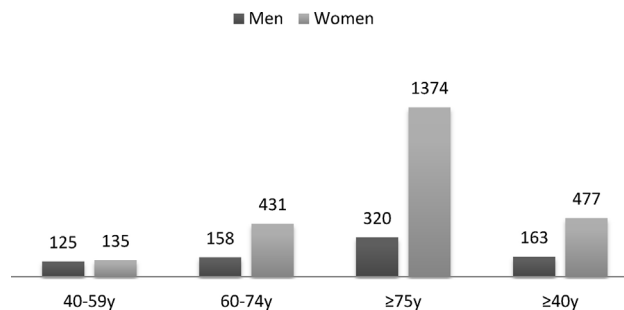


Fig. 1. Incidence per million for PHF in 2009 (2012 French population).

and over is reported in Fig. 1; it ranged from 130 to 980 per million in patients aged 40–59 and ≥ 75 years, respectively. As expected the incidence was higher in women than in men after the age of 60.

3.2. First hospitalization for PHF in 2009

Among the 10,874 patients, 77% of them were women, and the mean age of this population was 72.5 (13.8) years. The vast majority of these patients (96%) were previously at home. They received medical treatment (44%), or osteosynthesis (44%) or shoulder prosthesis (12%). The mean (standard deviation) hospital stay was 6.7 (6.7) days, median (minima–maxima) 5 days (0–139). The median hospital stay was longer in women than in men: median 5 (10–139) and 4 (0–71), days respectively. In the majority of cases (64%), patients returned to home, but the mode of discharge was a rehabilitation unit for 26%; 855 (8%) patients were referred to an acute care unit. Sixty-one percent of them had at least one comorbidity. The in-patient mortality was 1.1%, 0.9%, and 1.5% in the overall population, women and men, respectively. The total costs related to these hospitalizations in 2009 was € 33.6 millions (Table 1).

3.3. Further hospitalizations 2009–2011

Among these 10,874 patients, 6588 (61%) were rehospitalized between 2009 and 2011 (16,118 rehospitalizations). The mean number of rehospitalizations was 2.78 (9.62), and the median 2 (1–440), respectively. The higher number of rehospitalizations is related to 21 patients receiving iterative dialysis.

Patients with further hospitalizations were older and had more co-morbidities than the others, as shown in Table 2. There was no difference in the duration of stay of the first hospitalization. The in-patient mortality reached 3.5% during the first rehospitalization, and was 2.4%, 1.3% and less than 1% during the second, third, and further hospitalizations, respectively. Thus, the in-patient mortality rate over 3 years in-patients hospitalized for a PHF in 2009 is 6.7% (i.e. 612 patients). In-patient death occurred 361 (273) days with a median of 332 days after the hospitalization for PHF.

Among these 6588 patients, 7.5% were rehospitalized because of a hip fracture, occurring in a mean of 381 (281) days (median: 353 days) after hospitalization for PHF. In this population, 86% were women; the mean age was 82.2 (10.8). As shown in Table 2, patients with hip fracture were older and had more co-morbidities than patients without hip fracture. The overall costs of these rehospitalizations was € 52.2 millions.

4. Discussion

This study shows that the overall incidence rate of hospitalized osteoporotic PHF in adults after the age of 40 years is 477 and 163 per million in women and men, respectively, reaching 1374 per million in women after the age of 75. In these patients hospitalized for PHF, the in-patient mortality rate over 3 years is 6.7%.

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