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Impact of comorbidity on 6-month hospital readmission and mortality after hip fracture surgery

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ABSTRACT

Objectives: Impact of comorbidity on risk of readmission and death after hip fracture surgery has not been sufficiently explored. We planned to investigate the role of common diseases in predicting adverse events during recovery after hip surgery.

Patients and methods: We prospectively evaluated 272 consecutive patients (age, 82.6 ± 8.9 years; 196 females, 72.1%) who underwent acute surgery for hip fracture at a regional university hospital. Baseline comorbidity and hospital stay were analysed. Number, timing and reasons for readmissions as well as mortality within 6 months after hospital discharge were recorded. An age- and sex-adjusted logistic regression model was applied to assess relations between comorbidity and relative risk of rehospitalisation or death.

Results: Hypertension (44%), cognitive disorders (26%), and ischaemic heart disease (19%) were the most common comorbidities. The mean length-of-postoperative-stay was 12.7 ± 7.9 days. Eighty-six patients (32%) were readmitted to hospital within 6 months from initial discharge and 36 patients (13%) died during that period. Increased risk of readmission was associated with hypertension (odds ratio (OR): 2.0, 95%CI, 1.2–1.9, $p = 0.009$), and pacemaker treatment (OR: 6.6, 95%CI, 1.7–26.3, $p = 0.007$), while there was a tendency towards readmission among men with prostate disease (OR: 5.0, 95%CI, 0.9–27.2, $p = 0.06$). In contrast, mortality was predicted by ischaemic heart disease (OR: 2.2, 95%CI, 1.0–4.9, $p = 0.05$), and malignancy (OR: 2.5, 95%CI, 1.1–5.7, $p = 0.04$).

Conclusions: Common comorbidities are associated with higher risk of rehospitalisation and mortality following hip fracture surgery in the elderly. This information may be useful in postoperative risk assessment and prevention of negative outcomes.

Introduction

Hip fractures are among the major causes of morbidity and mortality in the elderly and outcomes following hip fracture have been the focus of several studies over recent decades [1–3]. The rising annual incidence of hip fracture has made it one of the most common and expensive causes for admission following trauma [1–3]. The mean age of patients with hip fracture is high, >80 years [4], and comorbidity in this patient group is therefore frequent [4–6]. Due to this, patients with hip fracture are at high risk of experiencing complications during the perioperative period including infection, such as pneumonia and urinary tract infection, cardiac ischaemia, and thromboembolism [7]. Furthermore, complications are not uncommon after hospital discharge leading to readmissions and death [7].

Many studies have identified predisposing factors for hip fracture such as advancing age, osteoporosis, stroke [4–6], cardiovascular diseases [5,8], diabetes [9] and dementia [10]. Some

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authors have observed higher mortality among patients with hip fracture than in the general population [3,11], but only a few studies have investigated causes and predictors of hospital readmission [7,12,13] and late mortality after hip fracture surgery [14].

The aim of this study was to assess prevalence of coincident diseases in a consecutive series of patients admitted for surgery of hip fracture. Further, the impact of comorbidity on 6-month readmission rate and mortality was explored.

Patients and methods

Patients

Between November 2009 and June 2011, we enrolled 281 consecutive patients with a preliminary Emergency Department diagnosis of hip fracture who were admitted to the Department of Orthopaedics at Skåne University Hospital in Malmö, Sweden. Of these, we excluded nine patients: four who did not undergo surgery, three who underwent surgery at another hospital, and two for whom the complete dataset was not available. The remaining 272 patients who met the eligibility criteria and underwent hip surgery at the study site accepted participation in the study. The ethical advisory board of Lund University approved the study protocol (Ref. No. 2010/237) and all patients gave their informed consent.

Methods

Patient characteristics were recorded after admission and included biometric data, information about past and present diseases, and current medications. Information about the principal, secondary and possible additional diagnoses was verified in the patients' medical records according to the International Classification of Diseases, 10th Revision (ICD 10). The data collection was performed by the first author (MH) who filled in a specifically designed database using the computerized hospital journal system covering the period from 2000 to 2011 as the main information source. In case the data were incomplete or conflicting, the investigators (MH and AF) contacted the patient, patient's family and/or general practitioner, as appropriate.

Past and present diseases were classified as cardiovascular, including subgroups of hypertension, atrial fibrillation, ischaemic heart disease (IHD), heart failure, pacemaker treatment, valvular heart disease, syncope, and stroke, or other categories such as neurological, mental, metabolic, respiratory, and malignant diseases. Patients were also assessed using American Society of Anaesthesiologists (ASA) classification of Physical Health [15], and the length-of-stay (LOS) was recorded in the database.

In the study setting, almost 95% of hip fracture patients undergo a postoperative multidisciplinary discharge planning coordinated by representatives from the local municipality with participation of nurse, physiotherapist, occupational therapist, patient's relatives, and specialist or resident in orthopaedics, however, without involvement of geriatrician. Approximately 80% of hip fracture patients are community dwelling; of these nearly 45% are discharged to intermediate care facilities usually with a stay of 2–4 weeks. The remaining community-dwelling hip fracture patients are, after being discharged, frequently visited at their homes by municipal nurses and rehabilitation team members according to the pre-planned schedule. The rest of hip fracture patients (≈20%) are institutional care residents who are discharged to their original residencies. The majority of discharged hip fracture patients have no appointments at the outpatient clinic. Only those with complications such as severe fractures and weight-bearing restrictions have scheduled follow-up.

The study patients were followed for 6 months after discharge from hospital. All Swedish citizens have an individual and unique 10-digit identity number that can be linked to the Swedish National Hospital Discharge Register and the Swedish National Cause of Death Register. The total number, dates and causes of readmissions plus data on vital status/mortality covering the corresponding 6-month post-discharge period for each patient were retrieved from available hospital records and national registers. The Skåne University Hospital serving the study catchment area has a shared digital medical record system and all hospital contacts are noted and the records reviewed. Planned visits due to pre-existing diseases and primary care visits were not included in this study, nor were planned follow-up visits of the hip fracture surgery. Of note, primary care physicians routinely assess all hip fracture patients during a control visit about 3 months after discharge from hospital. Further, visits to the emergency department that did not lead to readmission were excluded. The reasons for the admission to hospital were classified according to the main diagnosis in the ICD-10 coding system. Specific categories of readmission were defined as traumatic injury/fall, cardiac, neurological, psychiatric, surgical, infection and other.

Statistical analyses

Patient characteristics were reported as mean and standard deviation or proportions as appropriate. Time to first readmission, number of and reasons for readmission within the first 6 months were determined. The relations of age, gender, type of comorbidity, length of hospitalisation with the readmission risk and mortality, as the categorical dependent variables, were assessed using a multivariate-adjusted (for age and gender) logistic regression model. Further, the relation between readmission and mortality was analysed using the same model with mortality as a dependent variable. All analyses were performed using IBM SPSS Statistics version 22 (SPSS Inc., Chicago, IL). All tests were two-sided whereby $p < 0.05$ was considered statistically significant.

Results

The characteristics of study population are shown in Table 1. Women were overrepresented ($n = 196$ patients, 72%), and the mean age was 82.6 ± 8.9 years (range from 54 to 100 years). The mean length-of-stay was 12.7 ± 7.9 days (range from 3 to 72 days), and 71 patients (26%) were treated with antibiotics for 76 nosocomial infections (range from 1 to 3), mainly urinary tract infection, pneumonia, and wound infection. Eighty-six patients (32%) were readmitted at least once, and 36 (13%) died during the 6-month follow-up.

Comorbidities

Cardiovascular diseases were most common with 120 patients (44%) treated for hypertension, followed by 51 patients (19%) with IHD, and 50 patients (18%) with atrial fibrillation. Seventy patients

Table 1
Age, sex and length of hospitalisation among 272 consecutive patients with hip fracture.

Characteristic	*n*	%
Age (mean ± SD)	82.6 ± 8.9	
Female	196	72.1
Length of stay, days (mean ± SD)	12.7 ± 7.9	
Length of stay, days 1–10	109	40.1
11–20	148	54.4
21–30	10	3.7
>31	5	1.8