ABSTRACT

Purpose. To evaluate various postoperative complications and their risk factors in hip fracture patients.

Methods. 207 female and 87 male consecutive patients (mean age, 78.1 years) who underwent surgical (n=242) or conservative (n=52) treatment for closed fractures of the femoral neck (n=157) or peritrochanter (n=137) were prospectively studied. The types of complication and outcome were recorded. The comorbidity status of the patients was categorised based on the American Society of Anesthesiologists (ASA) classification. Complications and their associations with various risk factors and mortality were analysed.

Results. For all patients, the mean length of hospitalisation was 14.6 days. For the 242 patients who underwent surgical treatment after a mean of 3.6 days, 56.8% of them had at least one complication. Acute urinary retention (39.3%) and urinary tract infection (24.0%) were most common. Patients with ASA grade III or higher had 2.3 fold higher risk of developing complications than those with lower-grade comorbidity, whereas patients with delayed operation (>48 hours after presentation) had 1.8 fold higher risk of developing complications than those without delayed operation. Four patients died in hospital: 2 from myocardial infarction and 2 from upper gastrointestinal bleeding.

Conclusion. Complications after hip fracture surgery were common. Advanced age, high ASA status, and delay in surgery were associated with higher complication rates. Operations should be performed on medically fit patients as early as possible.

Key words: femoral neck fractures; gastrointestinal hemorrhage; hip fractures; myocardial infarction; postoperative complications; urinary retention; urinary tract infections; venous thrombosis

INTRODUCTION

In 2000, the number of hip fractures worldwide was about 1.6 million.1 By 2050 the number is projected...
to reach 4.5 million, and more than 50% of all osteoporotic hip fractures will occur in Asia owing to the growing proportion of ageing population, low dietary calcium intake, low activity level, and high incidence of undiagnosed and untreated osteoporosis. In Singapore, the number of hip fractures from 1991 to 1998 has increased 40%. In 2008, the average in-patient cost was about US$7300 for treating an uncomplicated hip fracture and about US$8600 for that with complications (p=0.022).

Elderly people are usually osteoporotic, have multiple comorbidities, and are at high risk of hip fractures and postoperative complications. The latter may lead to functional decline, prolonged recourse to specialised care, and mortality. The goal of treatment is to restore pre-injury function with minimal morbidity. This study evaluated various postoperative complications and their risk factors in hip fracture patients.

### MATERIALS AND METHODS

Between January 2010 and December 2010, 207 female and 87 male consecutive patients with a mean age of 78.1 (standard deviation [SD], 10.2) years who underwent surgical (n=242) or conservative (n=52) treatment for closed fractures of the femoral neck (n=157) or peritrochanter (n=137) were prospectively studied. Patients with pathological fractures (other than from osteoporosis) were excluded.

The treatment decisions were made by the patients or their next-of-kin after explanation of the potential risks and benefits of each option. Patient characteristics, comorbidities, types of fracture and operation, time to operation, duration of hospitalisation, presence and types of complications (acute urinary retention, urinary tract infection, deep vein thrombosis, chest infection, upper gastrointestinal bleeding, myocardial infarction, and cerebrovascular accident), and outcomes were recorded.

According to the American Society of Anesthesiologists (ASA) classification, comorbidity status of patients was categorised into grades I, II, III, and higher. Complications and their associations with various risk factors and mortality rates were calculated along with 95% confidence intervals (CI), using Pearson Chi squared test. Multiple logistic regression analysis was used to evaluate the risk factors of the complications.

### RESULTS

For all patients, the mean length of hospitalisation

### Table 1

<table>
<thead>
<tr>
<th>Complications following hip fracture surgery</th>
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<tbody>
<tr>
<td>Type of complication</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>Acute urinary retention</td>
</tr>
<tr>
<td>Urinary tract infection</td>
</tr>
<tr>
<td>Deep vein thrombosis</td>
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<tr>
<td>Chest infection</td>
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<tr>
<td>Upper gastrointestinal bleeding</td>
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<td>Myocardial infarction</td>
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<td>Cerebrovascular accident</td>
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### Table 2

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<th>Variables associated with postoperative complications</th>
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<tr>
<td>Variable</td>
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<tr>
<td>Mean±SD age (years)</td>
</tr>
<tr>
<td>American Society of Anesthesiologists grade</td>
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<tr>
<td>Time to operation (hours)</td>
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<td>Mean±SD length of hospitalisation (days)</td>
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### Table 3

<table>
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<tr>
<th>Risk factors of developing postoperative complications</th>
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<tbody>
<tr>
<td>Risk factor</td>
</tr>
<tr>
<td>Odds ratio</td>
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<td>p Value</td>
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was 14.6 (SD, 11.7) days. For the 242 patients who underwent surgical treatment after a mean of 3.6 (SD, 3.2) days, 56.7% of them had at least one complication. Acute urinary retention (39.3%) and urinary tract infection (24.0%) were most common (Table 1). Patients with advanced age, comorbidity status of ASA grade III or higher, and delayed operation (>48 hours after presentation) were more likely to develop complications. Patients with at least one complication had significantly prolonged hospitalisation (Table 2). Patients with ASA grade III or higher had 2.3 fold (95% CI, 1.4–3.9) higher risk of developing complications, whereas patients with delayed operation had 1.8 fold (95% CI, 1.2–2.2) higher risk of developing complications (Table 3). Four patients died in hospital: 2 from myocardial infarction and 2 from upper gastrointestinal bleeding.

DISCUSSION

The distribution of age, gender, and types of fracture in our patients were similar to those in other studies.5,6 The length of hospitalisation was shorter in our patients than those in another local hospital (14.6±11.7 vs. 18.7±13.5 days).6 Acute urinary retention is a common complication after hip fracture surgery, accounting for 38% to 56% of patients.7,8 Its contributing factors include the direct effects of anaesthetic agents on the bladder, bladder over distensions during the procedure, immobilisation after the procedure, pain, patient age, and sex.9 Urinary tract infection is not associated with wound infection.10 Wound infection is associated with the use of more than 2 urinary catheters and prolonged usage.11 Urinary tract infection occurs in 12 to 53% of hip fracture patients; diabetes, female gender, and dehydration are the risk factors.12,13 In our study, acute urinary retention and urinary tract infection were associated with longer hospitalisation and higher 2-year mortality but not with in-patient mortality.7 Moreover, urinary tract infection has been associated with postoperative delirium and prolonged hospital stay.12

In our series, 8.6% of the patients had deep vein thrombosis; the rate was higher in males than females (p=0.003), which was consistent with findings from another study.14 Compared with the deep vein thrombosis rate of up to 50% in western populations, the rate is much lower in Asian populations: 7.7% in Thailand,15 9.7% in Singapore,16 8% in Hong Kong,17 4% in Thailand,18 10% in Korea,19 and 12.5% in Malaysia.20 Routine chemoprophylaxis was not given to our patients, but mechanical prophylaxis (pneumatic calf pumps and compression stocking) were used by all patients, and venous Doppler scanning was carried out on postoperative day 5.

In our series, the rates of cardiac, pulmonary, gastrointestinal bleeding, and cerebrovascular complications were relatively low. In other studies, the in-patient complication rates were 7 to 8% for cardiac, 6 to 10% for pneumonia, and 2 to 3% for gastrointestinal bleeding.5,21–23 The rate for stroke was 3 to 4% within one year.24,25

Upper gastrointestinal bleeding is associated with 5 independent risk factors: being a current smoker, a history of peptic ulcer disease, blood type O, and perioperative use of non-steroidal anti-inflammatory and/or antiplatelet drugs.26 The use of prophylactic proton pump inhibitors for patients with one or more risk factors significantly reduces the rate of upper gastrointestinal bleeding.26 For our patients, routine screening for risk factors and the use of proton pump inhibitors were prescribed to those at risk of developing upper gastrointestinal bleeding during hospitalisation. Care must be taken to monitor the side-effects of proton pump inhibitors such as osteoporosis (usually associated with long-term high-dose use),27 nosocomial pneumonia, and Clostridium difficile-associated diarrhoea.28

Delayed surgery (>48 hours after presentation) is associated with higher complication rates.29,30 Delays for medical reasons depend on the time required for further investigations or optimisation of patient’s condition (e.g. dealing with cardiovascular problems, anaemia, and electrolyte imbalance). A joint orthogeriatric unit may reduce the delays to surgery and length of hospitalisation.31 Such co-managed care leads to earlier surgery, fewer complications, and shorter length of hospital stay.32 Delays for non-medical reason can be due to the lack of resources (operating theatres, equipment, and staff) and the time needed by the patients and family before consenting to surgery. Medically fit patients should be operated on as soon as possible. Delays of >48 hours should be avoided unless deemed necessary to optimise patient’s condition for surgery.

One limitation of this study was that some complications may have been missed because they were not clinically apparent and thus undiagnosed. Therefore, data were verified by cross-referencing with daily case note entries, results, and treatment orders. In addition, late complications (after hospitalisation) were not covered.

DISCLOSURE

No conflicts of interest were declared by the authors.
REFERENCES


