Morbidity and in-hospital mortality after hip fracture surgery on weekends versus weekdays

Steven John Kent,1 Sam Adie,2 Gregory Stackpool3
1 John Hunter Hospital, New South Wales, Australia
2 South West Sydney Clinical School, University of New South Wales, Australia
3 Orthopaedic Department, Wollongong Hospital, New South Wales, Australia

ABSTRACT

Purpose. To compare morbidity and in-hospital mortality in patients who underwent surgery for femoral neck fracture on weekends versus on weekdays.

Methods. Records of 90 men and 225 women (mean age, 80.5 years) who underwent surgery for femoral neck fractures on weekends or public holidays (n=110) or on weekdays (n=205) were retrospectively reviewed. The morbidity and in-hospital mortality of the 2 groups were compared.

Results. The 2 groups were comparable in terms of age, sex, and time to surgery, but more hemiarthroplasties were performed on weekdays (35.0% vs. 25.0%, p=0.036). Compared with surgery on weekdays, surgery on weekends was associated with increased in-hospital mortality (3.4% vs. 9.1%, p=0.04). None of the potential confounders (age, type of surgery, presenting hospital, and time to surgery) had a significant effect on in-hospital mortality.

Conclusion. In patients with femoral neck fractures, surgery on weekends was associated with increased in-hospital mortality but not with increased morbidity after adjusting for confounders, compared with surgery on weekdays.

Key words: hip fractures; hospital mortality; morbidity

INTRODUCTION

Hip fractures in elderly patients are a major burden on the public hospital system.1 These patients often have considerable comorbidities resulting in operative delay; early surgery has been shown to improve mortality and morbidity.2-7 Owing to limited theatre time, regular orthopaedic trauma surgery is provided on weekends to ensure timely surgery for these patients. However, on-call staff may be unfamiliar with equipment and procedures, and implant company representatives are often unavailable. In addition, there are challenges with the postoperative care of such patients on the ward. Hospitals function less effectively on weekends, because of lower numbers and less experienced staff working on weekends.8-10
Furthermore, weekend medical staff often provide
cover for other medical professionals, and may be
less familiar with the patients under their care.11 This
study compared morbidity and in-hospital mortality
in patients who underwent surgery for femoral neck
fracture on weekends versus on weekdays.

MATERIALS AND METHODS

Records of 90 men and 225 women (mean age, 80.5
years) who underwent surgery for femoral neck
fracture on weekends or public holidays (n=110)
or on weekdays (n=205) between January and
December 2010 at our regional referral hospital were
retrospectively reviewed. Patients with periprosthetic
fractures, bilateral fractures, or additional acute
fractures were excluded.

On weekdays, the trauma list is generally
run by a senior registrar, often with the aid of a
junior registrar, an experienced scrub nurse, and
an anaesthetic consultant, with supervision of a
consultant surgeon. Postoperatively, patients are
generally cared for by a dedicated junior medical
officer, who is responsible for 5 to 30 patients at a time
during business hours.

On weekends, the policy of a dedicated trauma
list remains, but scrub nurses, registrars, and
anaesthetists may be of varying experience, with
supervision of a consultant surgeon during working
hours. Postoperatively in the evening and weekends,
the single junior medical officer is responsible for up
to 90 patients at a time in multiple wards.

The morbidity and in-hospital mortality of the
2 groups were calculated. Univariate analysis was
performed for each potential confounder (age, sex,
referring hospital, type of surgery, time to surgery,
and day of surgery. Variables with a p value of <0.25
were included in a multivariable backward stepwise
logistic regression model, and variables with a p value
of <0.05 were considered statistically significant, after
adjusting for potential confounders.

RESULTS

The 2 groups were comparable in terms of age, sex,
and time to surgery, but more hemiarthroplasties
were performed on weekdays (35% vs. 24%, p=0.036,
Table). Compared with surgery on weekdays,
surgery on weekends was associated with increased
in-hospital mortality (3.4% vs. 9.1%, odds ratio
[OR]=2.83, 95% confidence interval [CI]=1.05–7.65,
p=0.04), but not associated with increased morbidity
(18% vs. 22%, OR=1.2, 95% CI=0.67–2.15, p=0.54).
None of the potential confounders (age, type of
surgery, presenting hospital, and time to surgery) had
a significant effect on in-hospital mortality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Weekdays (n=205)</th>
<th>Weekends (n=110)</th>
<th>Odds ratio (95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>81.0±12.3</td>
<td>80.0±11.3</td>
<td>-</td>
<td>0.48</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td>-</td>
<td>0.45</td>
</tr>
<tr>
<td>Male</td>
<td>61 (30)</td>
<td>29 (26)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>149 (70)</td>
<td>76 (74)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Presentation</td>
<td>-</td>
<td>0.22</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>135 (66)</td>
<td>65 (59)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Referral</td>
<td>70 (34)</td>
<td>45 (41)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Time from diagnosis to surgery (days)</td>
<td>3.4±1.9</td>
<td>3.1±1.5</td>
<td>-</td>
<td>0.94</td>
</tr>
<tr>
<td>Type of surgery</td>
<td>-</td>
<td>0.19</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Dynamic hip screw fixation</td>
<td>68 (33)</td>
<td>45 (41)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Hemiarthroplasty</td>
<td>72 (35)</td>
<td>26 (24)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Femoral nail fixation</td>
<td>65 (32)</td>
<td>39 (35)</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Patients with morbidity/complication</td>
<td>37 (18)</td>
<td>24 (22)</td>
<td>1.20 (0.67–2.15)</td>
<td>0.54</td>
</tr>
<tr>
<td>Morbidity/complication</td>
<td></td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Intensive care unit admission</td>
<td>8 (3.9)</td>
<td>7 (6.4)</td>
<td>1.67 (0.59–4.74)</td>
<td>0.33</td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>3 (1.5)</td>
<td>0 (0)</td>
<td>0.26 (0.01–5.11)</td>
<td>0.38</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>6 (2.9)</td>
<td>9 (8.2)</td>
<td>2.96 (1.02–8.53)</td>
<td>0.05</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>23 (11.2)</td>
<td>11 (10)</td>
<td>0.88 (0.41–1.88)</td>
<td>0.33</td>
</tr>
<tr>
<td>Transient ischaemic attack/stroke</td>
<td>1 (0.5)</td>
<td>4 (3.6)</td>
<td>7.70 (0.85–69.75)</td>
<td>0.07</td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>7 (3.4)</td>
<td>10 (9.1)</td>
<td>2.83 (1.05–7.65)</td>
<td>0.04</td>
</tr>
</tbody>
</table>

* Data are presented as mean±SD or no. (%) of patients
DISCUSSION

Admission during a holiday period is an independent risk factor for 5-day and 30-day mortality in hip fracture patients. Weekend admission is associated with higher rates of mortality and surgical complications than normal weekday admission. This ‘weekend effect’ also applies to patients with femoral neck fractures. However, in patients who underwent late night (after hours) surgery for hip fracture, the overall daytime and night-time mortality rates at 1 month, 1 year, and 2 years as well as the complication rate are comparable to those in patients who underwent surgery during normal hours. Night-time surgery has similar challenges to surgery on weekends and public holidays, such as potentially less-experienced staff, fatigued surgeons, and reduced ward cover. In our study, surgery on weekends was associated with increased in-hospital mortality but not with morbidity.

Our study had a number of limitations. It may have been underpowered, as indicated by the wide confidence intervals; the number of patients/deaths/complications may have been too small to produce significant results (type II error). There may have been confounders that were unaccounted for, particularly pre-existing comorbidity, and this may have resulted in the increased risk of acute myocardial infarction in the weekend group. The American Society of Anesthesiologists score for preoperative comorbidity status should have been assessed. There may also have been selection bias; fractures were not subdivided based on their stability. Surgery for unstable fractures may have been delayed to normal weekday hours; thus the time to surgery was slightly longer in the weekday group, as complex fractures were occasionally postponed until the consultant surgeon was available. This may have skewed the results.

Larger prospective studies to include risk factors relating to pre-existing co-morbidity are needed. Establishment of a national hip fracture registry can provide a reference to improve the standard of care for patients with femoral neck fractures. The National Hip Fracture Database of the United Kingdom has shown to improve standards of care such as time to surgery, medical management, and assessment for future risk of fracture and mortality.

CONCLUSION

In patients with femoral neck fractures, surgery on weekends was associated with increased in-hospital mortality but not with increased morbidity after adjusting for confounders, compared with surgery on weekdays.

DISCLOSURE

No conflicts of interest were declared by the authors.

REFERENCES

11. Petersen LA, Brennan TA, O’Neill AC, Cook EF, Lee TH. Does housestaff discontinuity of care increase the risk for preventable