Delay to surgery prolongs hospital stay in patients with fractures of the proximal femur

A. W. Siegmeth, K. Gurusamy, M. J. Parker

From Peterborough District Hospital, Peterborough, England

Previous studies on the timing of surgery for fracture of the hip provide conflicting evidence as to the effect of prolonged delay before operation. We have prospectively reviewed 3628 such fractures in patients older than 60 years of age. Those for whom the delay was for medical reasons were excluded. Patients were followed up for one year or until death. Operation was undertaken within 48 hours in 95.2% and after this in 4.8%. A significant increase in length of stay was found in patients operated on after 48 hours when compared with those in the earlier group (21.6 vs 32.5 days). No increase in hospital stay was found for lesser delays.

The number of patients with fragility fractures of the proximal femur is increasing. The World Health Organisation estimates that by 2050 a total of six million fractures of the hip will occur worldwide every year, with a consequent extra burden on health services. Surgery is often postponed in these patients because of lack of operating time and theatre space. Whether early surgery is of any benefit is uncertain. Most studies include a limited number of patients analysed retrospectively and without complete follow-up.

We have attempted to determine the effects of delay in surgery on the length of hospital stay and ability of the patient to return home in a large consecutive group of patients who were followed up prospectively.

Patients and Methods

Between January 1989 and February 2004, all patients with a fracture of the hip were admitted to the Peterborough Hip fracture service under the care of the senior author (MJP). Data were collected prospectively on admission using a standard proforma for complete recording of information concerning the care and later follow-up of the patients. Those who failed to attend follow-up were contacted to determine the eventual outcome. All surviving patients were followed up either in the clinic or by telephone until one year after injury. Excluded from the study were patients younger than 60 years of age, those treated conservatively and those with a pathological fracture or a fracture of the shaft or distal femur. We also excluded patients who were delayed for any medical reason when orthopaedic or anaesthetic staff felt that operation should be delayed in order to improve the patient’s fitness for surgery. Reasons for such delay included anaemia requiring transfusion, correction of electrolyte imbalance, untreated heart failure, chest infection, gastro-intestinal haemorrhage, cardiac arrhythmia, severe dehydration, anticoagulation treatment, uncontrolled hypertension and the need for echocardiography. Delay for non-medical reasons was because of lack of operating theatre space, equipment or available staff.

Surgical treatment involved either internal fixation with cannulated screws or hemiarthroplasty for intracapsular fractures. Those with extracapsular fractures were operated on with a dynamic hip screw or an intramedullary nail device.

On admission the medical condition was assessed and classified according to the American Society of Anaesthesiologists (ASA) grade. Mobility was assessed using a mobility score with a scale of 0 (immobile) to 9 (independently mobile). The mental state was evaluated using a 10-point mental test score. Residential status was divided into two groups, those from their own home and those from institutions, including residential care homes, nursing homes and other hospital wards. All patients were subdivided into six groups according to the delay between admission and operation (1 to 12 hours, 13 to 24 hours, 25 to 36 hours, 37 to 48 hours, 49 to 72 hours and 73 or more hours).
The outcomes assessed were the length of hospital stay and the eventual place of discharge after surgery and rehabilitation. Hospital stay included the time spent on the orthopaedic ward and any other hospital wards or convalescent units until eventual discharge to a permanent place of residence. Patients were discharged either to the residence from which they were admitted or to more dependent accommodation, such as a residential or nursing home. They were discharged from hospital as soon as appropriate home care facilities were available after assessment by a multidisciplinary rehabilitation team. Delay in discharge was because of medical complications, poor functional abilities or lack of availability of community support services.

**Statistical analysis.** Univariate analysis was employed to calculate the length of hospital stay and Fisher’s exact test and the chi-squared approximation for functional outcome and mortality using GraphPad InStat version 3.00 software (GraphPad Software, San Diego, California). A regression analysis, using Stats Direct version 2.4 (Stats Direct Ltd, Cheshire, UK), was performed to determine whether the length of stay and discharge destination were influenced by the delay in surgery after adjusting for the ASA status, prefracture mobility and the mental test score. A p value of < 0.05 was considered statistically significant.

**Results**

During the period of the study 4329 patients were admitted with a fracture of the hip. After applying all exclusion criteria, including medical delay, 3628 patients remained, 701 being excluded. The mean age of patients was 81 years (SD 9.6). There were 2124 (59%) with an intracapsular fracture and 1504 (41%) with an extracapsular fracture. The majority of patients (95.2%) were treated within 48 hours of admission (Table I). The reason for delay was always because of unavailability of an operating theatre, surgeon, anaesthetist or theatre staff. Information was available for all patients regarding their hospital stay. Two were subsequently lost to follow-up.

Table I shows the characteristics of the patients related to the time between admission and surgery. Analysis of the four groups with delays of ≤ 48 hours showed no significant difference with regards to length of hospital stay or destination on discharge. For those operated on in ≤ 48 hours, the mean length of hospital stay was 21.6 days, SD 13.5 days for those > 48 hours (95% confidence interval for the difference (CI) 5.7 to 16.0; p < 0.0001). There was also a significant difference in patients returning to their original residence after discharge with 2974 (86.1%) in the early group and 128 (73.6%) in the delayed group (Table II, 95% CI 7.2 to 17.9; p < 0.0001).

The number of patients who required a change of living accommodation increased from 6.9% (240) for those operated on in ≤ 48 hours to 12.6% (22) for those > 48 hours (Table II; 95% CI 3.4 to 11.9; p < 0.0007). The mortality rate for the early group was 6.9% (23) but 13.8% (24) in the delayed surgery group (Table II).

A logistic regression analysis showed no influence of the hours of delay upon the destination on discharge and the mortality rate when adjusted for the ASA, mental score and the pre-fracture mobility score. Multiple linear regression analysis showed a strong correlation between delay to surgery and length of hospital stay (95% CI 0.07 to 0.18;
p < 0.001). The relationship between the number of hours of delay and the number of days of hospital stay after adjusting for the ASA, mental score and pre-fracture mobility score can be calculated by the formula: hospital stay (in days) = 0.1274 x delay (in hours). For 7.85 hours delay in surgery (95% CI 5.43 to 14.14; p < 0.001), the hospital stay increased by one day.

Discussion
This study provides further evidence that elderly patients with fractures of the hip benefit from early surgery. We studied the influence of delay to surgery on a large number of consecutively treated and prospectively followed up patients older than 60 years of age who had surgery between one and more than 73 hours following their admission to hospital. Patients who had their operation delayed for any medical reason were excluded but despite this there was still a tendency for the fitter patients to proceed to surgery earlier. There was some delay in those of higher ASA status and mental test score, despite no medical intervention being undertaken to improve their status. This difference led us to undertake the logistic regression analysis.

Orosz et al\(^4\) conducted a similar study dividing patients into an early (≤ 24 hours) or late group (> 24 hours) and also excluding unfit patients. They found no association between early surgery and reduced mortality but there was a reduced length of hospital stay and fewer major complications.\(^4\) With a cut-off point of 48 hours, we could find no evidence of an increased length of hospital stay, increased mortality or worse functional outcome. Rogers et al\(^5\) reported similar findings in a retrospective study of 82 patients where the cut-off point was after 72 hours. They excluded patients who were unfit for surgery. Kenzora et al\(^6\) concluded that a delay of more than 24 hours resulted in a mortality rate of 34% vs 11% for patients treated between the second and fifth day. They included patients with serious medical comorbidities in their study, and recommended a delay of 24 hours to treat and improve acute medical conditions.\(^3\) Zuckerman et al\(^8\) studied 367 patients prospectively. They included patients over the age of 65 who were able to walk before the injury. When age and gender were controlled, they found that an operative delay beyond two calendar days doubled the risk of the patient dying before the end of the first post-operative year.\(^6\) Dorotka et al,\(^7\) in a retrospective study, compared the mortality rates of 79 patients treated within six hours with 103 patients treated after this time. They found an increased mortality in the second group but no difference in the length of hospital stay. However, this study was performed retrospectively on a small number of patients.\(^7\)

Our study of 3628 patients did not find any difference in mortality rates for patients who underwent surgery within 48 hours of admission. The mortality rate for those undergoing surgery after this increased from 7% to 15.8%. However, when the mortality rates were adjusted for ASA, mental score and mobility score, no influence of a delay to surgery could be demonstrated.

Delay in surgery because of staffing problems or lack of operating time affects all aspects of hospital management and patient care. A large proportion of acute hospital beds in the National Health Service are currently blocked with patients with hip fractures. Prolonged hospital stay increases the rate of pressure sores, infection and costs. Shabat et al\(^16\) studied the economic effects of delay to surgery in hip fractures and concluded that spending more resources to perform surgery within 48 hours of admission is cost effective. Our study showed that early surgery reduces the mean length of hospital stay from 36.5 to 21.6 days. Previous investigations by Davis et al,\(^4\) Beals\(^7\) and Dolk\(^10\) found no influence of a delay in surgery on the length of hospital stay or on mortality. However, these studies were retrospective and included a small number of patients with significant medical comorbidities. When the length of hospital stay was analysed with the patients subdivided by ASA grade, we found a significant increase within the early group, reflecting the increase in comorbidities in ASA groups three and four compared with groups one and two. An early operation does not have such a profound effect in patients with an ASA rating of three and four.

We demonstrated a better functional outcome in the group with early surgery (Table II). However, this difference disappeared after adjusting for ASA, mental score and mobility score. These findings were similar to those of Orosz et al\(^4\) who could not find a better functional result in their early group.

The most important conclusion from this study is that a delay to surgery does have a significant impact on the length of hospital stay even after adjusting for ASA, mental score and mobility score. Based on our findings one can expect a further day in hospital bed occupancy for each 7.85 hours of delay to surgery. Emergency surgery is not necessary in elderly patients with fractures of the hip. Medically-fit patients should be operated on, on the next available list, and under controlled conditions during daytime working hours. Any delay of more than 48 hours, other than to improve an acute and treatable condition, must be avoided.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References


