Injury, Int. J. Care Injured 48 (2017) 2180–2183

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Full length article

Perioperative mortality for patients with a hip fracture

Bassey Nkanang[a,*], Martyn Parker[b], Emily Parker[a], Richard Griffiths[a]

[a] Department of Anaesthetics, North West Anglia NHS Foundation Trust, Peterborough City Hospital, Peterborough, United Kingdom
[b] Department of Trauma & Orthopaedics, North West Anglia NHS Foundation Trust, Peterborough City Hospital, Peterborough, United Kingdom

ARTICLE INFO

Keywords:
Hip fracture
Mortality
Early postoperative mortality
Perioperative period
Postoperative care

ABSTRACT

Introduction: Studies on mortality following hip fracture surgery have hitherto focused on the 30 day to 1 year period and beyond. This study focuses on the immediate perioperative period. It examines mortality rates, patient characteristics, operative details and post-operative complications.
Patients and methods: A retrospective study of a hip fracture database in a large District General Hospital in the United Kingdom, from 1986 to 2015. A dataset of 9393 patients was identified, including patients undergoing surgery for curative and palliative purposes, over fifteen years of age and with no upper age limit imposed. It compared patients who survived the first 48 h from start of surgery with those who died within this perioperative period.
Results: 9393 patients were treated surgically and included within this study, with a mean age of 80.13 and consisting of 7130 female and 2263 male patients. The all cause mortality within 48 h from start of surgery was 0.8% (72 patients). Increased risk of perioperative mortality was associated with increasing age, ASA grade 3 and above, in-hospital falls, impaired mobility prior to the fall and a reduced mental test score on admission. For the patient with a perioperative death, the most common circumstances identified in this study involved being found dead in bed by attending staff within 48 h of surgery.
Discussion: There has been significant attention paid to the optimization of patient management leading up to hip fracture surgery and its attendant impact on medium and longer term survival. The information from this study may be used to identify patients most at risk of death in the 48 h after surgery. The importance of this dataset is that it provides large numbers, which are needed in order to look for associations, given the low 48 h mortality rate found.
Conclusion: We are unable to highlight any correctable or alterable factors associated with mortality. Further studies with detailed collection of data on a national scale may be needed to assess the impact of levels of postoperative care for hip fracture patients and perioperative mortality.

Introduction

Hip fracture is one of the most common reasons for an acute orthopaedic admission. Global numbers were estimated to be approximately 1.3 million in 1990, with a predicted increase to between 7 and 21 million by 2050 [1]. In 2012, Kanis et al. conducted a systematic review looking at hip fracture incidence across 63 countries [2], categorizing them into high, moderate and low risk. They found an up to 10 fold variation in the risk of hip fracture worldwide, with the UK female and male populations classed as high and moderate risk respectively. In 2011, the overall numbers for England were estimated at 65,000 [3] and are expected to rise to an annual figure of around 100,000 by 2033 [4].

One-year mortality following hip fracture has been reported to be between 22% and 29% [5], however only half of the deaths which occur within a few months of the injury are directly attributable to the hip fracture and related surgery [6]. A more realistic figure for the one year mortality rate due to hip fracture has previously been calculated at 15% [7]. The National Hip Fracture Database in Britain has revealed a downward trend in 30-day mortality, with rates of 10.9%, 8.5%, 7.5% and 7.1% in 2007, 2011, 2014 and 2015 respectively [6]. However, the number of deaths within the *early* postoperative period has hitherto not been reported. The aim of this study is to define how many patients die in the first 48 h after surgery and attempt to identify those patients who are at greatest risk of an adverse perioperative outcome.

Patients and methods

A hip fracture database has been kept in a District General Hospital since 1986. Data was collected for all patients with a

* Corresponding author.
E-mail address: bbnkanang@doctors.org.uk (B. Nkanang).

http://dx.doi.org/10.1016/j.injury.2017.07.007
0020-1383/

proximal femoral fracture. Information was collected from the time of admission on patient characteristics, fracture type and subsequent treatment. Premorbid mobility was assessed using a mobility score (Table 1) [8], mental state on admission was assessed using a mental test score [9] and physical state using ASA grade [10].

All surviving patients were followed up one year from injury. Enquiry to this database revealed that 9543 patients with a hip fracture were admitted over a 29-year period between September 1986 and November 2015. Excluded from this group were 150 (1.6%) patients who did not undergo surgical treatment. This left 9393 patients within the study. From the database, the number of hours from admission to surgery was known, but the data for time from admission to death was only recorded in days. Therefore, taking into account all patients who were recorded as having died zero or one day following admission, it was only possible to identify patient deaths which happened within 48 h of surgery. This was termed the perioperative period for this study. Statistical comparison between those patients who died in the perioperative period and those who did not was done using the Chi squared test for binary outcomes and the unpaired *t*-test for continuous variables.

Of the 72 patients who died within 48 h, only 55 had data available for mental test scores, 67 for haemoglobin, 68 for length of anaesthesia and 49 for operative blood loss. Of the 9321 who survived the first 48 h, only 8714 had data available for mental test scores, 9271 for mobility scores, 8794 for haemoglobin, 8855 for length of anaesthesia, 9318 for length of surgery and 6354 for operative blood loss. The analyses of mean values for these subsets were carried out taking into account only those patients whose records contained the relevant data. For 11 of the 72 patients who died within 48 h, we were unable to establish the grade of anaesthetist present; this was also the case in 893 of the 9321 patients who survived this period. The analyses for these subsets were likewise carried out taking into account only the cases in which we were able to identify the grade of anaesthetist involved.

Results

72 (0.8%) of the patients died within the perioperative period. Table 2 lists the characteristics of the two patient groups, as defined by whether or not they survived the first 48 h from start of surgery (the perioperative period). Those patients who died within the perioperative period were older, more likely to be from institutional care or having fallen in hospital. They were also more likely to have an ASA grade of 3 or higher, exhibit mental impairment and suffer from impaired mobility. Of the 9393 patients in our dataset, 4 (0.04%) were under 20 years of age; 85 (0.9%) were aged 20–39 years; 385 (4.1%) were aged 40–59 years; 3148 (33.5%) were aged 60–79 years; and 5771 (61.4%) were over 80 years of age. The mean age was 80.13 and the dataset consisted of 7130 female and 2263 male patients.

Fracture types and operative details are listed in Table 3. The only significant difference between groups was increased perioperative mortality for those patients who had local nerve blocks as the main method of anaesthesia. Table 4 lists the recorded complications implicated in the deaths of the 72 patients who died in the perioperative period.

Discussion

Data published in recent years has shown mortality rates of 11% and 20% at 30 and 90 days following hip fracture respectively, with a mortality rate at 2 years of 47% [11]. The reported 1-year mortality rate following hip fracture surgery ranges between 12% and 38% [12–15]. The positive impact of early surgical intervention on improving 30-day mortality after hip fracture surgery has been well established [16,17], and has also been shown to reduce length of stay [18]. As a result, the best practice tariff for hip fracture management was introduced in the UK in April 2010 to incentivise timely surgical intervention (time to theatre within 36 h), which in the subsequent years appears to have contributed to a steady downward trend in the 30-day mortality rate [19]. Similar standards have not as yet been set for the immediate post-operative care of hip fracture patients.

Four key characteristics have been associated with the risk of 12-month mortality, including abnormal ECG, cognitive impairment, advanced age, and impaired pre-fracture mobility [20]. Admittance from a nursing home is a very important predictor of 1-year mortality among hip fracture patients aged 65 and above [21], arguably due to the associated comorbidity and frailty this implies. Similar reasoning applies to conclusions in studies which showed an increased mortality among patients with hip fractures sustained as a result of falls in hospital, almost 50% of whom died within 1 year of the fall [22]. Men generally appear to have a higher hip fracture associated mortality risk than women [20,23,24], in contrast to the probability of fracture itself occurring, which, partly due to differences in bone mineral density and overall longevity, is higher in the female population [2]. The role of infection and cardiac disease as the principal causes of death in the first 9 months following hip fracture has been highlighted [25].

In addition to advanced age and male gender, the main risk factors for overall in-hospital mortality following hip fracture include pre-existing disease states such as congestive cardiac failure and liver disease [23]. Mortality following hip fracture surgery among nonagenarians has been linked to pre-existing congestive heart failure and chronic pulmonary disease [26], as well as a high ASA grade [20,27]. The most common causes of postoperative 30-day mortality in a high volume tertiary centre were found to be pneumonia and acute coronary syndromes, where the overall 30-day mortality rate was 7.5% [28]. It has thus been suggested that postoperative optimization of cardio-respiratory function and early intervention be actively pursued in patients presenting with signs of compromise or infection. Myocardial infarction following hip fracture repair is independently associated with increased 1-year mortality and seen to exceed infarction rates following other major orthopedic surgeries [29]. Of note, re-admission immediately after hip fracture surgery is also an important outcome measure associated with higher mortality rates [30].

Despite an intense focus on hip fracture associated morbidity and mortality in the last few years, there is a paucity of data available in the literature with regards to deaths in the immediate

Table 1
Mobility Score.

Mobility	No difficulty and no aid	With a walking aid	With help from another person	Not at all
Able to get about the house (indoor walking)	3	2	1	0
Able to get out of the house (outdoor walking)	3	2	1	0
Able to go shopping (walking during shopping)	3	2	1	0