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Retrospective Study

Mortality following combined fractures of the hip and proximal humerus

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Abstract

BACKGROUND

Hip fractures and proximal humerus fractures are known to be associated with increased mortality, but the impact on mortality of combining these two common injuries is not well known.

AIM

To compare mortality, inpatient stay and discharge destination for patients with combined hip and proximal humerus fractures with those sustaining isolated hip fractures.

METHODS

Using the United Kingdom national hip fracture database, we identified all hip fracture patients over the age of 60 admitted to a single trauma unit from 2010-2016. Patients sustaining a proximal humerus fracture in addition to their hip fracture were identified using hospital coding data. We calculated the 30-d and one-year mortality for both the hip fracture cohort and the combined hip and proximal humerus fracture cohort. Other variables recorded included age, gender and whether the proximal humerus was treated with or without an operation.

RESULTS

We identified 4131 patients with hip fractures within the study period and out of those 40 had sustained both a hip and a proximal humerus fracture. Mean age in the hip fracture cohort was 80.9 years and in the combined fracture group 80.3 years. Out of the 40 patients in the combined group four were treated operatively. The 30-d mortality for our hip fracture cohort was 7.2% compared to the mortality of our combined cohort of 12.5% ($P = 0.163$). The one-year mortality for our hip fracture cohort was 26.4% compared to 40% for the combined fracture cohort ($P = 0.038$). We also found patients with combined injuries were less likely to return to their own home.

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CONCLUSION

The 30-d and one-year mortality is higher for those patients who have sustained a combined hip and proximal humerus fracture when compared to those with a hip fracture alone.

Key Words: Hip fracture; Proximal humerus fracture; Mortality; Return to home; Orthopaedics; Trauma

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Core Tip: This simple paper highlights a higher mortality for those patients who have sustained a combined injury with a proximal humerus and hip fracture when compared to those with a hip fracture alone. This would be useful for the general orthopaedic surgeon when dealing and discussing risk of death with patients and their families.

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INTRODUCTION

Hip fractures are common with over 66000 patients sustaining the injury in England and Wales in 2019^[1]. We also know that over a third of all fractures occur in patients over the age of 65^[2]. With an aging population the number of hip fractures presenting to our hospitals is likely to increase. Hip fractures are associated with a higher mortality in both the immediate and late post-operative periods. Mortality is usually quoted as around 10% at 30 d and 30% at 1 year^[1]. There are well established guidelines in place for the management of hip fractures in the elderly^[3].

Fractures of the proximal humerus are the third most common fragility fracture after hip and distal radius accounting for around 6% of all fractures^[2]. Longer term community studies have shown a higher mortality in those patients that have suffered a fracture of the proximal humerus with Wilson *et al*^[4] showing a two fold increase at 1 year (9.8%) and 5 years (28.2%)^[5]. Mortality is likely to be higher with advancing age and increasing number of comorbidities^[4,5].

Mortality following combined hip and proximal humerus fractures is likely to be higher and the aim of our study was to describe 30 d and 1-year mortality for these patients and compare them to patients who have suffered a hip fracture alone.

MATERIALS AND METHODS

All hip fractures over the age of 60 presenting to a single large trauma unit were identified using a prospective national database of hip fractures (National Hip Fracture Database) from January 2010 to December 2016. Patients sustaining a proximal humerus fracture in addition to their hip fracture were identified using hospital coding data which was then confirmed with radiographic review. All pathological hip and proximal humeral fractures were excluded in addition to those sustaining other significant orthopaedic injuries. Office of national statistics data was used to verify mortality in our patient group. We calculated 30 d and 1-year mortality for those patients that had sustained a hip fracture alone and those that had sustained a combined hip and proximal humeral fracture. Other variables recorded included age, gender, inpatient stay and discharge destination. A radiographic review of all proximal humeral fractures was performed to classify them and record their treatment.

Statistical analysis was carried out using the SPSS software (IBM, Armonk, NY, United States). Mortality and other secondary outcome measures were compared using Fisher's exact test due to a large difference in sample size between the two groups. Difference was considered significant if a *P* value of < 0.05 was reached.

RESULTS

In total, 4131 patients were identified with a hip fracture in the study period. Out of these 40 had sustained both a hip fracture and a proximal humerus fracture. Mean age in the hip fracture cohort was 80.9 years and in the combined fracture group 80.3 years. The male to female ratio in the hip fracture group was 1:2.4 and in the combined fracture group 1:3.4. In terms of our primary outcome measure the 30-d mortality in the hip fracture cohort was 7.2% compared to 12.5% in the combined cohort ($P = 0.163$). The 1-year mortality for our hip fracture cohort was 26.4% compared to 40% for the combined fracture cohort ($P = 0.038$) (Table 1).

In terms of secondary outcome measures, mean hospital stay was 14 d for hip fracture patients compared to 16.3 d for patients with the combined injury ($P = 0.163$). Only 29% of patients with the combined injury were discharged back to their own home compared to 47% in the hip fracture group ($P = 0.022$). Four of the 40 proximal humerus fractures had operative fixation. No difference in mortality was seen between different fracture types or methods of treatment.

DISCUSSION

Sustaining a hip fracture is amongst the commonest reasons for elderly patients needing emergency surgery. This comes with increased risk both in terms of morbidity and mortality^[1]. Few patients will go on to achieve their full pre-injury abilities, which means that a significant proportion of patients would require increased level of care^[6]. This poses a significant socioeconomic burden on the National Health Service. The national institute for health and care excellence estimates 30 d mortality of upto 10% and 1-year mortality of upto 30% in those patients that have sustained a hip fracture^[3]. National guidelines and the formation of the national hip fracture database have gone a long way in improving and standardising the care provided to these patients in England^[1].

In our study we wanted to compare the outcomes of a small cohort of hip fracture patients that have also sustained a concurrent proximal humerus fracture. Similar to other previous studies we found that combined hip and proximal humerus fractures were more prevalent in females (male:female = 1:3.4) and sustained by a comparably elderly group of patients (mean age 80.3 years). In our analysis patients with combined hip and proximal humeral fractures had higher mortality at 30 d and 1 year when compared to those patients that had suffered a hip fracture alone. Although the difference was not statistically significant at 30 d, it did become significant at one year. Patients with these combined injuries were also less likely to return to their own home.

Combined proximal humerus and hip fractures are relatively rare and we found that only 1% of hip fractures had sustained this injury. A single unit would therefore only expect to see a few of these injuries a year. In our cohort only 4 patients out of 40 had their proximal humerus fractures treated operatively. Patients that have sustained a combined hip and an upper limb fracture are likely to face greater difficulty in terms of rehabilitation. With proximal humeral fractures this can be more of an issue as splints and adapted walking aids cannot be used to help improve mobility as it can for distal radius fracture for example. It is unclear whether this is the actual reason for increased mortality, but the socioeconomic burden of these combined injuries is clear.

Previous studies with smaller numbers have described a possible increased risk of mortality with proximal humeral fractures but their numbers have been smaller. Robinson *et al*^[7] found 21 proximal humeral fractures in 1971 consecutive hip fracture patients and suggested that mortality was increased but when hip fractures were associated with a distal radius fractures, their mortality appeared to be slightly lower. Mulhall *et al*^[8] looked at 760 hip fractures and only found 5 fractures of the proximal humerus in their retrospective review, they found that with upper limb injuries there was an increase in inpatient stay with greater difficulties in mobilisation. Similar results were also reported by Kang *et al*^[9] in 2019 when they found 35 upper limb fractures in 1018 hip fracture patients. Only 8 had sustained a combined proximal humerus fracture with increased mean inpatient stay. We have included 4131 hip fractures in our study with 40 also sustaining a proximal humerus fracture.

Treating all proximal humeral fractures operatively in those patients that have also sustained a hip fracture may not be possible due to the nature of their co-morbidities. Operative treatment may, in addition, not lead to a lower mortality and the benefits of surgery in terms of rehabilitation may be limited by post-operative restrictions. More work is needed in this area, however, due to the rarity of these injuries, large studies

Table 1 Summary of mortality data for isolated hip fractures and combined hip and proximal humerus fractures

Hip fractures only (n = 4091)			Hip and proximal humerus fractures (n = 40)			P value
Mortality 30 d	294	7.19%	Mortality 30 d	5	12.5%	0.163
Mortality 1 yr	1078	26.35%	Mortality 1 yr	16	40.0%	0.038

would be difficult to perform.

The main limitation of our study is its single centre retrospective design, use of hospital coding data and small number of patients particularly in the combined hip and proximal humeral fracture group. This was, however, unavoidable due to relative rarity of this combined injury. The large difference in sample size between the two groups may lead to difficulties in statistical analysis and this is acknowledged.

CONCLUSION

This retrospective review of a prospectively collected database over 7 years in a large trauma unit has looked at 4131 hip fractures with 40 out of those sustaining a combined proximal humerus fracture. These combined injuries are relatively rare but are likely to be associated with a higher mortality at 1 year. They also cause increased difficulty in terms of patients reaching their pre-injury abilities as they are also less likely to return to their own home following discharge. Our hope is that publication of this information would not only lead to a more informed discussion with patients and their families, but also generate discussion amongst trauma and shoulder surgeons about developing better strategies of treating these combined injuries.

ARTICLE HIGHLIGHTS

Research background

Combined hip and proximal humerus fractures are rare injuries that may be associated with increased mortality and morbidity.

Research motivation

The motivation for this study came from the idea that patients being admitted to our unit following these combined injuries may not have been getting good care for the proximal humerus fracture as hip fractures were the priority. So we wanted to see if mortality is higher for these patients and inpatient stay. Also the motivation was to increase awareness of this injury with other trauma surgeons so that more consideration can be given to these injuries.

Research objectives

To compare mortality and inpatient stay for patients with combined hip and proximal humeral fractures and hip fractures alone.

Research methods

Retropective single centre analysis of local data from a national database.

Research results

Increased mortality and inpatient stay with combined injuries.

Research conclusions

Combined fractures of the hip and proximal humerus are associated with increased morbidity and mortality when compared to isolated hip fractures. These combined injuries are relatively rare and more equal consideration should be given to both fractures when they do occur.

Research perspectives

This is important for those surgeons looking after patients with hip fractures and specialist upper limb surgeons.

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