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Hip fractures and the head

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Abstract

Hip fractures commonly lead to delirium, which is associated with poor outcomes. The fall causing the fracture may also lead to concussion, which may overlooked, and which may contribute to the delirium. It is conceivable that concussion, and other factors around the injury and related to the surgery, may contribute to subsequent enduring cognitive impairment. Most measures to provide cerebral protection are of unproven value but geriatric medical input undoubtedly reduces morbidity. Protecting the head and the brain during the management of hip fracture deserves more attention.

Keywords

Hip fractures, delirium, concussion, dementia, cerebral protection

Introduction

About 65,000 people experience a hip fracture each year in the UK. This is the biggest single cause of major trauma and the cost represents about 1% of the NHS budget [1]. Hip fractures are of course much commoner in older people and having a hip fracture is often a turning point in someone's life.

Hip fractures and delirium

As hip fractures happen suddenly, people are admitted to hospital urgently. They may be quite unwell with blood loss and dehydration. Perioperative delirium is common, occurring in between a quarter and a half of all patients with hip fracture [2]. Variables independently associated with delirium include a history of dementia or neurodegenerative disease, and advanced age (>75) [3]. A history of heart failure and multiple comorbidities are also associated with a higher risk of delirium [4]. These two recent studies had opposite findings as to whether treatment with analgesia, or its lack, were associated with delirium. The risk of delirium has been reported to be slightly lower in women (OR 0.83; 95 % CI 0.70-0.98) [4].

Hip fracture delirium is associated with worse outcomes than in patients who do not experience delirium, with increased mortality and morbidity, longer lengths of hospital stay and increased health care costs [5].

Hip fractures and dementia

Dementia is clearly a risk factor for falling and for sustaining a femoral fracture. The presence of dementia also affects outcomes following surgery, including mortality [6], post-operative complications [7], and whether the patient is discharged home or to institutional care [8].

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Hip fracture is not obviously a cause of dementia, though anecdotally family members will often date the onset of dementia to a hospital admission with a hip fracture. This is generally attributed to a number of possible factors, for example, if the person had significant post fracture delirium, or that the disruption to the person's life unmasked a degree of cognitive impairment that was perhaps already present but not causing problems at home.

The subsequent occurrence of dementia after hip fractures has not apparently been investigated, but studies after cardiac surgery have had conflicting results as to whether the incidence of dementia is more than would be expected [9,10]. Unsurprisingly, age seems to be the main predictor of persistent cognitive dysfunction after major surgery [11].

Hip fractures and concussion

Most hip fractures are secondary to a fall from a standing height. Hip fractures are commonly the consequence of a fall where the protective reflexes to falling are impaired. The fall for such patient is sideways, directly onto the hip. Hitting the head with this type of fall is therefore likely. A case series of 1,192 patients reported that 41% had head trauma [12].

Hitting the head on a hard surface (floor or pavement) may cause a brief period of concussion. Mild concussion comprises transient confusion without loss of consciousness. As it may be short-lived, these features may not be identifiable in the pre-hospital environment. They may have resolved by the time that emergency paramedics arrive on the scene. If features of concussion are observed, they may be attributed to the pain and discomfort associated with the hip fracture. Consequently, information about possible concussion is often not conveyed to emergency department (ED) clinicians.

During the post-admission period, numerous other factors may affect the brain, for example, hypovolaemia, hypotension, fat emboli, effects of medication, and postoperative infections. These can all potentially interact with any lingering degree of concussion, contributing to the development of delirium.

The published literature on concussion is dominated by concerns about sports safety and studies of younger people, often athletes. In marked contrast, a PubMed search of hip fracture and concussion yields nine results, none of which was in fact relevant to this clinical situation. The neglect of this area is of concern.

For example, traumatic brain injury is known to be a risk factor for cognitive decline in older people, with at least some studies finding mild traumatic brain injury to increase the risk of dementia: Lee et al [13] reported an odds ratio of 3.26 (95% Confidence interval, 2.69–3.94). Traumatic brain injury also seems to lead to dementia at an earlier age of onset, notably in people aged <65 [14]. Similar pathophysiologic changes around lesions in brains of patients with traumatic brain injuries and Alzheimer's disease have raised interesting challenges around our understanding of cerebrovascular disease and association with trauma [15].

Mild traumatic brain injury has largely been regarded as relatively trivial and self-limiting but recent evidence suggests that even a single injury may lead to persistent cognitive impairment, perhaps in up to 50% of cases [16]. It may also lead to fatigue, perhaps either

through increasing effort being required for cognitive processing or through disruption of sleep patterns [17], or other consequences such as decreased mobility or depression.

Many hip fracture patients may be undergoing surgery during a post-concussion period. There is no specific anaesthetic guidance for managing concussion patients except maintaining cerebral perfusion. There are no data on how neuroprotection is addressed in hip fracture patients in the ED. A UK national audit found that among all older people aged>75 years attending ED in an ambulance, only 11% had a formal cognitive assessment carried out the ED [18]. This combined with the lack of data on understanding mild concussion in people with hip fracture, makes it likely that clinicians are ignoring an important factor that may contribute to perioperative delirium in these patients, which in turn may have persistent effects on their outcomes.

Cerebral protection?

The prevention of delirium in hip fracture patients has rightly attracted much recent research interest. It is known that effective analgesia and early surgery help to reduce mortality and complications of hip fracture [19]. The time lag from ED presentation to surgery is associated with a higher risk of delirium in hip fracture patients with probable dementia, whereas the duration of surgery has a higher risk of delirium in patients without dementia [20]. Either way, the promptness of the treatment pathway is a critical factor.

It does not appear that cerebral CT scans are required in every case, however. In the absence of physical evidence of a head injury, new onset confusion and a Glasgow coma scale score of <15, CT scans do not reveal any signs of acute cerebral pathology and thus are of limited utility [12,21].

As regards anaesthesia, there is no difference in most outcomes, including delirium, between general and regional anaesthesia [22]. Among intraoperative measures, the use of light sedation, intra-operative EEG monitoring and use of Bispectral Index data have been recommended for reducing post-operative delirium in patients undergoing surgery for hip fracture [23]. Despite the growing literature on cerebral protection, there is little to offer at present, though endothelial protection and anti-inflammatory approaches may be promising avenues for reducing cerebral dysfunction [24]. Nerve blocks inserted on admission or at the time of surgery will reduce the need for opiates and may lead to a reduced occurrence of delirium [25].

There is little evidence that pharmacological measures, such as cholinesterase inhibitors, antipsychotics or melatonin, are effective in preventing delirium, whether after hip fracture or in other critically ill patients [26, 27]. A more recent systematic review, using network meta-analysis suggested that the melatonin agonist ramelteon may be the most effective drug in the prevention of delirium [28]; however, the accompanying editorial [29] points out this apparent effectiveness may be exaggerated by the network meta-analysis and the benefits of ramelteon rest solely on one trial with 67 participants [30]. For the time being, the best approach to medication in delirium prevention is to reduce or stop drugs with sedating effects [31].

However, specialist input from geriatric physicians or orthogeriatricians appears valuable in preventing delirium. Multidisciplinary approaches to assessment and management, such as comprehensive geriatric assessment, are effective in reducing the incidence of delirium [32] though their input needs to start early to be effective [33]. In addition, increased input from orthogeriatricians is associated with decreased mortality after hip fracture [34].

Mind that head!

It is our opinion that what happens with the brain in hip fractures is relatively neglected. Surgeons tend to concentrate on mending the broken bone, and on making sure that the person's chest and heart are ready to cope with having the anaesthetic for their operation. The brain doesn't get much of a look in. This is unfortunate, since the state of the brain is obviously vital in determining the subsequent outcome.

We suggest that more attention should be paid to the possibility of concussion and to the care of the person's brain at all stages of their journey from sustaining a hip fracture through the health care system. Future research should include the following: a systematic review of hip fractures and concussion; a review of reviews about delirium prevention in older people with acute medical conditions, including hip fracture; a cohort study of patients with evidence of concussion or traumatic brain injury on CT looking at outcomes; and an implementation study to examine whether incorporating management of the head into hip fracture protocols can make a difference to outcomes for patients.

Declaration

The authors have no conflicts of interest to declare.

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