

The aetiology, treatment and future of hip fractures in the UK

Highlighting the current and future prevalence of hip fractures, **Dr James Roche** and **Professor Chris Moran** examine the factors influencing the consequent medical complications. They also look at methods of preventing hip fractures and osteoporosis, outline the typical pathway of care for these patients while future interventions are discussed with a view to helping decrease excess mortality from hip fractures.

Osteoporosis related hip fractures constitute a major clinical and financial burden to the NHS. Hip fracture bed occupancy was in excess of 1.5 million days in England in 2002/3 and represents 20 per cent of total orthopaedic bed stays. In 2004/5, there were 81,313 admissions to NHS hospitals for fractured neck of femur, 96 per cent of which occurred in people over 65¹. In the Western world, the lifetime risk of hip fracture is about six per cent in men and 18 per cent in women².

In women the prevalence of hip fractures rises from three per cent in those aged 65–74 to 12.6 per cent in those aged above 85³. The population as a whole is ageing with the percentage of people above 60 years set to rise from 20 to 30 per cent by 2030. The mean age of patients sustaining a hip fracture is now 82⁴ and therefore the incidence of osteoporotic hip fractures is set to dramatically increase over the next two decades as the population ages⁵. Eighty per cent of those sustaining a hip fracture are women. Sixty per cent of patients are admitted from their own homes, 10 per cent from warden-aided accommodation, 15 per cent from residential homes and 13 per cent from nursing homes. Fifty-seven per cent of fractures are intracapsular and 43 per cent are extracapsular. The median length of stay is 12 days on a trauma ward and six days on a rehabilitation ward⁴.

For many patients, sustaining a hip fracture is a pre-terminal event. Excess mortality is 20 per cent in the first year and higher in older men^{6,7}. The high mortality, particularly in the first three months, is probably due to the combination of trauma, major surgery, concurrent medical problems and the low physiological reserve of these patients⁸. To reduce this mortality, attention must focus on optimising health status preoperatively and preventing postoperative complications. Those who do recover from the surgery may never regain their independence – up to half of people will not be able to walk unaided following fracture. They also require a higher level of care following the injury; half of those who were previously independent become partly dependent and one-third become totally dependent. This obviously demands huge resources – not only for treatment of the fracture and associated complications – but for rehabilitation, home adaptations and the increase in dependency following hip fracture surgery.

Aetiology of illness

The main risk factors for sustaining a hip fracture are decreased bone mineral density and increased frequency of falls. The potential causes of falls are varied and multifactorial. They include poor eyesight, impaired cognition and awareness

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of surroundings, muscle weakness, decreased co-ordination and balance, neurological disturbances (stroke), drugs (such as sedatives, diuretics or anti-hypertensives) and medical events such as syncope or a cardiac dysrhythmias. The most important risk factors for predicting an osteoporotic fracture are: previous low trauma fracture after the age of 50, maternal history of hip fracture, smoking and body mass index <math><18.5^9</math>.

Prevention of hip fractures

Prevention of falls and osteoporosis should help reduce the incidence of hip fractures. Simple measures such as home safety improvements, the use of walking aids, stopping unnecessary medications or providing corrective eyewear may help to reduce falls. Other measures, such as hip protectors, are known to reduce hip fractures by up to 66 per cent¹⁰ in elderly high risk patients, but they are disliked and have a low rate of compliance.

Preventing the decline in bone mineral density (BMD) should be a priority and all patients should be encouraged to lead an active lifestyle wherever possible. Calcium and vitamin D – when taken together – reduce the incidence of hip fractures in the elderly¹¹. There is a role for screening patients and those at high risk should receive prophylactic vitamin D and calcium supplements. Various bisphosphonates have been shown to reduce the risk of hip fractures following a vertebral fracture in women with low BMD¹²⁻¹⁴ but, in those aged 80 and above, they are no more effective than calcium and vitamin D alone¹⁴. Currently bisphosphonates are much more expensive than calcium and vitamin D treatment, and so usually only prescribed after confirmation of a low BMD with a DEXA (dual emission x-ray absorptiometry) scan; however, their exact role in preventing hip fractures, when and to whom they should be prescribed, has not been clearly defined. The strongest predictor of a future osteoporotic fracture is having already suffered one; therefore secondary prevention is extremely important. It is never too late to start treatment and prevent further decline in the BMD.

Pathway of care

Many hospitals now use fast-track systems to minimise delay in admission to the ward. After arriving in the Accident and Emergency (A&E)

Department, patients with a suspected hip fracture are identified by the triage nurse and sent directly for an X-ray. If a fracture is diagnosed, patients enter the streamlined admission pathway to try and ensure the time taken to reach the ward is minimised. Patients are seen by an A&E doctor, given analgesia and have baseline investigations prior to transfer to an orthopaedic ward. Here they are seen and formally 'admitted' by medical and nursing staff. An important benefit of this approach is to minimise the time patients spend on a trolley, decreasing the risk of developing pressure sores.

Only a few units in the UK have dedicated orthogeriatricians, in most units the junior orthopaedic doctors will optimise any medical condition preoperatively and manage the patient's medical problems in the perioperative period. Prior to surgery they are reviewed by an anaesthetist and further investigations arranged as required. At this point the opinion of a physician may be requested for specialist medical management preoperatively.

The type of hip fracture surgery depends on the fracture pattern. The majority of intracapsular fractures are treated with a hemiarthroplasty to replace the femoral head because its blood supply is compromised by the fracture causing a high risk of avascular necrosis and non-union. Extracapsular fractures do not interrupt the blood supply to the femoral head and are usually reduced and fixed with a dynamic hip screw, which allows controlled impaction of the fracture as it heals. All patients should receive both deep venous thrombosis (DVT) and antibiotic prophylaxis prior to surgery in line with British Orthopaedic Association guidelines¹⁵. Following surgery, patients have routine blood tests and relevant radiographs. Patients are then mobilised by the nurses and physiotherapists, and should be able to sit out of bed the day after surgery. One of the major aims of surgery is to allow immediate full weight-bearing so the patient can begin rehabilitation early.

Complications and mortality

Complication and mortality rates in patients following hip fracture surgery are high. The mortality rate in patients aged 65 and above is 9.6 per cent at 30 days, rising to 33 per cent at one year⁴. The crude mortality rates are striking but a rate of 10 per cent over a 12-month period would

be expected in this group even without a hip fracture. This still leaves an excess mortality of approximately 20 per cent in the first year^{6,8}.

There are numerous factors that contribute to the excess mortality; some patients will be malnourished, many will have poor cognitive function¹⁶ and all undergo major emergency surgery. Other variables affecting mortality include the type of fracture fixation, mode of anaesthesia and gender. Male patients have significantly higher mortality throughout the postoperative period, although the explanation for this is unknown.

There is a high prevalence of medical conditions: 60 per cent will have at least one major medical co-morbidity noted on admission. Those with greater than three co-morbidities have 2.5 times the mortality at 30 days compared to those with none. In isolation, preoperative respiratory or renal disease are associated with double the mortality at 30 days⁴. Those patients in whom treatment of any acute medical condition delays surgery also have a higher mortality¹⁷.

The rate of postoperative medical complications is 20 per cent. The most common and important medical complications following surgery are acute heart failure, which affects five per cent of patients, and chest infection, which affects nine per cent. In the 30 days following surgery 13 per cent of patients develop one of these complications yet they are associated with 73 per cent of the deaths. Postoperative heart failure has a mortality rate of 65 per cent at 30 days and 92 per cent at one year. Risks for developing heart failure postoperatively are age >90 years, male gender and a history of cardiovascular disease⁴. Postoperative chest infection has a mortality rate of 43 per cent at 30 days and 71 per cent at one year. Risks for developing a chest infection following hip fracture surgery are known respiratory disease, enteral steroid use and age over 80⁴.

Treatment of complications

Complications should be anticipated and prevented where possible with appropriate measures, such as nutritional assessment and support, prophylactic antibiotics, thromboprophylaxis, supplementary oxygen, adequate analgesia and early mobilisation. Healthcare professionals should have a high index

of suspicion for complications, especially chest infection and heart failure in the high risk groups outlined above. Their investigation and treatment should be prompt and thorough, with a multidisciplinary approach and early involvement of relevant specialities such as physicians, respiratory physiotherapists and critical care teams.

Surgical complications

Deep infection following hip fracture surgery is probably the most feared surgical complication and has an incidence of <5 per cent¹⁸. Other complications depend on the type of surgery and include dislocation of the hip prosthesis, acetabular erosion, loosening of the femoral stem, avascular necrosis, non-union and implant failure.

Future management

The aim for the future must to reduce the risk of sustaining a hip fracture and reduce the excess mortality in the first year. To achieve this we must decrease the risk of falls, and identify and treat those with osteoporosis. Once a fracture has been sustained we must focus on optimisation of patients' medical co-morbidities, pre- and postoperatively. These interventions should be targeted on the high risk patients and may involve a new system of care with the regular consultation of a senior physician, greater use of routine specialist investigations or even planned admission to a high dependency unit.

Invasive physiological monitoring of cardiac output patients in the perioperative period, using oesophageal doppler or pulmonary artery catheters, may be of benefit¹⁹. Outcomes have been improved in other surgical specialities by invasive monitoring of fluid and ionotrope therapy in high risk patients undergoing major surgery²⁰. Currently, this has not been extrapolated to orthopaedic surgery but these techniques could be helpful in optimising cardiac output and reducing postoperative cardiac failure in vulnerable patients.

No study has yet specifically targeted these patients who may have the most to gain from more specialised medical care. The difference in outcome between patients who have access to joint orthopaedic and geriatric care and those who do not has been investigated^{21,22}, but these studies mainly evaluated interventions related to

Key points

- > In 2004/5 in England, there were 81,313 admissions for a hip fracture; this is set to increase as the population ages.
- > Mortality of those suffering a hip fracture is nine per cent at 30 days, and 33 per cent at one year.
- > The most common complications are chest infection and cardiac failure, both are associated with a large increase in mortality.
- > Future aims must be to lower the prevalence of osteoporosis and decrease the mortality from this common injury by prompt recognition and treatment of medical complications.

rehabilitation rather than acute medical intervention and have not shown a significant difference in early mortality.

There is increased use of regional anaesthesia in hip fracture surgery. It has shown a non-significant trend towards reduced mortality but it does not significantly alter the incidence of heart failure or chest infection postoperatively²³. If the high risk patients were evaluated alone it is possible regional anaesthesia would decrease mortality, but further studies of sufficient power are needed to clarify this.

National Hip Fracture Registry

The British Geriatric Society, British Orthopaedic Association and Royal College of Physicians have combined to develop a national audit system for hip fracture patients. This is based on the experience of the Scottish hip fracture audit²⁴ and the Myocardial Infarction Audit Project (MINAP), which have initiated sustained improvements in the quality of care. The hip fracture audit will collect data from the entire patient journey – from the emergency department through surgery, rehabilitation and secondary prevention of hip fractures.

Data collection will be required at each hospital and be collated centrally using a web-based system. Data analysis will allow feedback to each unit in terms of outcome (eg, mortality and infection rates) and process of care (eg, time to