

## NEW HORIZONS

# Orthogeriatrics moving forward

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## Abstract

The role of the orthogeriatrician has grown over the last few years. Orthogeriatrics was primarily involved in the care and management of fragility hip fractures, but has recently been expanded to provide specialist care to patients admitted with other various fractures, the spine, pelvis, appendicular, and those suffered from major trauma. There is also an increasing role for the orthogeriatrician to optimise the pre-operative care of patients undergoing elective joint and spine surgery. Much of what we do incorporates comprehensive geriatric assessment of the frail older person, and research into new and innovative ways of managing various types of fragility fractures such as the use of enhanced recovery after surgery (ERAS) pathways, regional anaesthesia, vertebral augmentation in spinal fractures, sacral augmentation and anabolic treatment in pelvic fractures. Ultimately, this reduces post-operative complication rates, improves outcomes and leads to better patient care and recovery.

**Keywords:** *orthogeriatrics, hip fracture, vertebral fracture, pelvic fracture, vertebroplasty, kyphoplasty, sacroplasty*

## Introduction

Orthogeriatrics is the subspeciality area in geriatrics involved in the care of older people with fragility fractures. Up until recently, this has predominately been the care of older people admitted to hospital with an acute low trauma hip fracture. However, older people present to hospital with a number of other fragility fractures, such as fractures of the spine, pelvis, and appendicular fractures. In addition, there are a growing number of older people presenting with fractures related to major trauma. As the role of the orthogeriatrician expands, we feel that it is important that the role not only incorporates looking after older patients admitted with hip fractures, but also those admitted with other fractures. Furthermore, there is also a role for orthogeriatricians in the pre-operative assessment and management of patients undergoing elective hip, knee and spinal surgery. In this review, we will look at current management strategies for these patients, new developments in the offering, and how we envisage orthogeriatric care to develop in the future.

## Hip fractures

Hip fractures are associated with significant morbidity and mortality. Approximately 10% of patients die in a month, and a third within a year [1]. About half of these patients do not return to their pre-fracture level of mobility [2], with only a half returning home within 30 days [3]. The role of the

orthogeriatrician is well established in England in this patient group, due to the development of the best practice tariff (BPT). The BPT was introduced in 2010 to incentivise the improvement of hip fracture care in acute hospitals and is composed of the following: [4]

- surgery within 36 h from time of diagnosis or presentation to the emergency department;
- admission under joint orthopaedic and geriatric care using a joint care assessment proforma agreed by geriatrics, orthopaedics and anaesthesia;
- peri-operative assessment by a geriatrician within 72 h of admission;
- an assessment of falls and bone health.

The BPT was further modified to include an assessment of pre- and post-operative cognitive function for 2013–14 [5]. Nationally, this has led to a significant reduction in both acute and post-acute length of stay (LOS) by 2 days. [3] The National Institute for Health and Care Excellence (NICE) has further produced a quality standard for hip fracture care, focusing on markers of high-quality care to improve the effectiveness and experience of care of hip fracture patients [6]. It is recommended that these quality standards should be considered when commissioning and providing a hip fracture service (see Box 1).

One of the other ways of potentially improving patient outcomes in this area is through the use of enhanced

recovery after surgery (ERAS) pathways. This involves the use of 'bundling' a number of key interventions which work in conjunction to improve outcomes. Indeed, it has been shown that ERAS used in elective colorectal surgery was able to bring about a reduction in LOS as well as a reduction in complication rates [7]. Consequently, it has been suggested that a number of important factors that could be incorporated into such a bundle for hip fracture patients could include optimal management of peri-operative pain control, pre- and post-operative anaemia, cognitive impairment along with post-operative delirium, and also tackling malnutrition [8] The National Institute for Health Research (NIHR) have recently funded a £2 million research programme to develop an ERAS pathway for hip fracture care [9].

A lot of interest has been generated in the use of regional anaesthesia in the management of hip fracture patients. Fascia iliaca compartment blocks have been used in the emergency department, and have been shown to be easy to use with few complications [10]. However, data on effectiveness is limited. One study showed that the block reduces

morphine requirements [11], but in another study analgesic effects were wearing off early post-injection [10]. Furthermore, adequate pain control is only achieved in a third of patients [12]. Femoral nerve blocks have also been used with some success [13, 14], but because the studies only involved a small number of patients, it was difficult to know if it was more beneficial over traditional analgesic methods [13]. A further NIHR trial is ongoing to examine the effects of femoral nerve block, followed by a continuous nerve block infusion, which may be more effective [15].

## Vertebral fractures

Vertebral compression fractures are common, and are usually due to osteoporosis, but in some cases to other less common causes such as malignancy or trauma. They can be associated with acute back pain, and if recurrent, can lead to loss of height and spinal deformity. They are also associated with significant morbidity and mortality. Traditionally, vertebral fractures are managed conservatively, with bed rest, a thoracolumbar sacral orthosis brace and analgesia. However, over the last few years there has been a shift towards active management of such fractures, with the use of vertebral augmentation.

The two main methods of vertebral augmentation are vertebroplasty and kyphoplasty. Vertebroplasty has been shown to improve pain control compared with optimal non-surgical pain management when using a visual analogue scale (VAS) [16, 17, 18]. Pain improvement occurs immediately post-procedure, but the effects compared with conservative management are maintained anywhere from 2 weeks [19], 3 months [17] and up to a year [18]. There does not seem to be much difference between vertebroplasty vs. conservative management beyond a year [16, 20]. Vertebroplasty is usually done under local anaesthetic, and involves injecting bone cement in the form of poly(methyl methacrylate) into the vertebral body, with the aim of relieving pain and strengthening the bone, thereby preventing future fractures.

Kyphoplasty is usually done under local or general anaesthetic, and involves the insertion of a balloon-like device into the vertebral body, and then inflating it to restore height to the vertebral body, or until the balloon reaches its maximum volume. The balloon is then deflated and the space is filled with bony cement [21]. The FREE study showed that kyphoplasty produced an improvement in pain symptoms when compared with non-surgical management using the SF-36 scale [22]. Looking at survival rates, the adjusted survival rates for patients following vertebroplasty or kyphoplasty were 57.3 and 62.8%, respectively ( $P < 0.001$ ). The relative risk of mortality for kyphoplasty patients was 23% lower than that for vertebroplasty patients (adjusted HR = 0.77,  $P < 0.001$ ) [23].

Side-effects of vertebroplasty and kyphoplasty include local and systemic infection, bleeding and damage to neural or other structures, leakage of bone cement, displacement of bone marrow or other material by the cement, systemic reactions to the cement and complications of anaesthesia [21].

### Box 1 Quality standard for hip fracture (adapted from NICE QSI 6) [6]

Statement 1 Hip fracture patients are offered a hip fracture programme from admission.

Statement 2 The hip fracture programme team retains leadership for all stages of the pathway of care.

Statement 3 Patients with hip fracture have cognitive assessment.

Statement 4 Patients with hip fracture should receive prompt and effective pain management throughout their hospital stay.

Statement 5 Hip fracture patients should have their surgery on the day of admission, or the day after.

Statement 6 Surgery should be on a planned trauma list, with senior supervision.

Statement 7 Those with displaced intracapsular fracture should receive cemented arthroplasty, or total hip replacement if eligible.

Statement 8 Those with trochanteric fractures above and including the lesser trochanter should receive extramedullary implants in preference to an intramedullary nail.

Statement 9 Physiotherapy assessment should be offered on the day after surgery, with mobilisation at least once a day unless contraindicated.

Statement 10 Patients with hip fracture should be offered early supported discharge.

Statement 11 Patients should be offered a multifactorial falls risk assessment, and offered individualised intervention if appropriate

Statement 12 Patients should be offered a bone health assessment, and commenced on pharmacological treatment as needed prior to discharge from hospital.

Recent NICE guidance recommends vertebral augmentation in patients who have (i) severe ongoing pain after a recent unhealed vertebral fracture despite optimal analgesia, and (ii) where the pain is at the level of the fracture confirmed by imaging and clinical examination [21]. Given that many of these patients present to acute hospital care and may have significant co-morbidities, the role of the orthogeriatrician is critical in the care of these patients.

### Pelvic and sacral fractures

Pelvic fractures such as those affecting the pubic bones, the ischial rami and sacral insufficiency fractures (SIFs) form part of the spectrum of pelvic fractures in the elderly. In fact, it may not be unusual to have them occur concomitantly, sometimes with one preceding the other, and it has been suggested that the reason for this presentation is because of disruption of the pelvic ring [24]. Although these fractures can occur with minimal trauma as a result of a fall, they are also known to occur occultly [24]. SIFs present with diffuse low back pain, and may sometimes have palpable tenderness in the lower back and sacral region [25]. Although the main cause of SIFs is due to osteoporosis [25, 26], it can be confused with metastatic malignant disease, as both conditions tend to occur in elderly people, and approximately half of those with SIFs have a history of malignancy [27]. Routine imaging involves plain film X-rays, but this may lead to fractures being missed [28]. Other imaging modalities are preferable and include computed tomography (CT), magnetic resonance imaging (MRI) or bone scintigraphy with Tc99m-MDP (methylene diphosphonate) [28]. MRI is the most sensitive imaging modality for the detection of SIFs and will identify acute oedema if present [25]. Although CT is less sensitive, it is useful for identification of fracture lines, and for confirming equivocal MRI or bone scintigraphy findings [25, 29].

The traditional management of both these types of fractures is usually conservative with analgesia and mobilisation as pain allows. However, the role of the orthogeriatrician is important in providing optimal care for these patients, who may require anabolic treatment and assessment for sacral augmentation. Anabolic treatment (parathyroid hormone) has been shown in a randomised controlled trial to be efficacious in accelerating fracture healing in osteoporotic patients with recently sustained pelvic fractures. There were significant improvements in terms of time to complete cortical bridging, accelerated fracture healing at 8 weeks, and functional outcomes as measured by VAS and Timed 'Up and Go' (TUG) tests [30]. Clearly when parathyroid hormone is licensed for fracture healing, it will have major implications to patients care.

Sacroplasty involves the injecting of cement into the fractured sacrum to help with pain control, in much a similar way as vertebral augmentation for the management of acute spine fractures. Poly(methyl methacrylate) cement is injected in the sacrum with additional screw fixation if necessary. Needle placement is guided by X-ray fluoroscopy, CT guidance, CT fluoroscopy or a combination of CT and X-ray fluoroscopy.

X-ray and CT fluoroscopy have the advantage of real-time imaging, which gives better needle placement and also probably helps with detecting cement extravasation [28]. CT with fluoroscopy is the most commonly used imaging technique [31].

A recent review showed an improvement in VAS scores following sacroplasty over an average follow-up period of 9 months, which was associated with improvement in mobility and ability to perform activities of daily living [31]. One retrospective case series showed 60% patients requiring less opioid analgesia post-procedure [32], and another retrospective case series showed 31% of patients reporting complete pain relief [33]. Sacroplasty has been shown to provide sustained improvement at 1 year [33, 34].

Complications that can occur include bleeding, infection, sacroiliac joint entry, cement extravasation into the sacral foramina or canal, dural tear, lumbosacral plexus injury, and cement embolus [33]. There has also been a reported case of the procedure being unsuccessful due to progressive fracture dislocation [33].

### Appendicular fractures

The incidence of older patients presenting to acute care with low trauma appendicular fractures, such as fractures of the upper arm, wrist and ankle are also high. Such patients are at risk of further fractures, including the more serious fractures described above, and because they are not always admitted to hospital there is this risk that they may be missed. Therefore, the role of the orthogeriatrician in undertaking a comprehensive geriatric falls and bone health assessment is important in this group of patients. Reversible falls risk factors should be treated and non-reversible risk factors modified. Bone health assessment should include a bone densitometry (DXA) scan where feasible and appropriate treatment of osteoporosis. Furthermore, there is evidence to suggest that a quarter of these patients who present to the fracture clinic setting will have an unknown vertebral fracture, of whom, up to 50% of those identified, will have two or more fractures [35]. Having a well-established fracture liaison service can help to improve the pick-up rate for this particular fracture group, with benefits of consideration of commencement of secondary prevention medications, falls assessment, referral for DXA and links to an orthogeriatrician [36].

### Major trauma

A small proportion of elderly patients are involved in poly-trauma, sustaining fractures secondary to high impact accidents. These can be fractures involving any part of the body, and the initial management involves basic resuscitation and haemodynamic stabilisation. Subsequently, there would be a fairly urgent need to fix the various fractures sustained, but in some patients conservative treatment may involve prolonged bed rest. Again it is important to look at the patient as a whole, and to ensure that everything is done to optimise the patient's fitness for theatre should this be necessary and reduce the risk of bed rest complications in those managed conservatively. The role of

the orthogeriatrician in this would be to liaise closely with the various other specialities that need to be involved in this patient's care, and invariably require close collaboration with the general surgeons, orthopaedic surgeons and the anaesthetists.

### Elective hip, knee and spine surgery

The NCEPOD report 'Knowing the Risk' recommends that there should be a UK wide system that allows for the identification of patients at high risk of post-operative mortality and morbidity, and that all elective high-risk patients should be seen and fully investigated in pre-assessment clinics. This follows on from the observation that 80% of the mortality of surgical patients occur in this 'high-risk' group [37]. Identification and pre-operative optimisation of these patients will therefore lead to a reduction in morbidity and mortality. A number of older people undergoing elective surgery fall into this patient category, and are usually labelled as being 'too frail for surgery' and hence their access to such surgery is reduced. However, when they do undergo surgery, they are at high risk of intra-operative and post-operative complications. Over the last few years, there has been significant progress in the peri-operative care of older patients undergoing elective surgery. Some examples of such services that currently exist are the Proactive care of Older People undergoing Surgery (POPS) model, established in Guys and St Thomas' Hospital in 2004; and the Systematic Care of Older People in Elective Surgery (SCOPES) model, established in Nottingham in November 2010. Both services consist of a dedicated team comprised of a dedicated nurse, physiotherapist, and an occupational therapist, led by a consultant geriatrician. The function of these services serves to assess and optimise high-risk older patients for elective surgery. The POPS model looked into people undergoing elective orthopaedic surgery, and was found to bring about improvements in management of pressure sores, pain control, early mobilisation and inappropriate catheter use. There was also a significant reduction in LOS by 4.5 days [38]. The focus of SCOPES was to provide comprehensive geriatric assessment pre-operatively to elective hip, knee and spine surgery patients. It demonstrated a reduced average LOS of 2.1 days for hip and 2.35 days for knee operations. The benefits were thought to be due to reduction in complications rates and better discharge planning [39].

There is thus an increasing emphasis on the role of the orthogeriatrician to focus on this particular group of patients for whom benefits in medical optimisation can mean more of them may be eligible for surgery, and in turn better outcomes may also be achieved.

### Conclusion

The role of the orthogeriatrician has been expanding over the last few years, with an emphasis not just on managing hip fractures, but more comprehensive care of older people admitted to hospital with any major fracture. Much progress has been made with the management of hip fractures

through BPT and emerging pathways such as ERAS and the greater use of regional anaesthesia. There is also an increasing trend towards active management of vertebral fractures with augmentation, and the management of pelvic and sacral fractures with anabolic treatment and sacral augmentation. There has also been an expansion of the orthogeriatric role in optimisation of 'high-risk' patients for elective joint and spine surgery as it has been increasingly recognised that comprehensive geriatric assessment can have a positive impact on reducing complication rates and improving post-operative outcome, which ultimately translates to better patient care and recovery.

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### Key points

- Regional anaesthesia for hip fractures should be explored as a option for pain relief to reduce the side-effects of systemic opioid analgesia.
- Vertebral augmentation has been shown to improve pain control over optimal non-surgical pain management in acute vertebral fractures and should be considered a management option for such fractures.
- Anabolic treatments accelerate fracture healing in pelvic insufficiency fractures, and also improve functional outcomes.
- Sacroplasty is associated with improved pain control and improvement in mobility and the ability to perform activities of daily living.
- Peri-operative optimisation of frail elderly patients via comprehensive geriatric assessment has been shown to reduce morbidity associated with elective surgery, as well as the LOS.

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### Conflict of interest

None declared.

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