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Treatment options of pelvic and acetabular fractures in patients with osteoporotic bone

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Summary The incidence of pelvic ring and acetabular fractures in the elderly is climbing relentlessly. This increase is attributed to a greater longevity and a decrease in the incidence of alcohol-related trauma in younger adults. Often, the elderly trauma patient has compromised physiological reserve and healing capacity due to concomitant morbidities, resulting in a less favourable clinical outcome. The presence of osteopenic or osteoporotic bone and other treatments for existing comorbidities hamper some treatment alternatives, especially those designed for younger patients.

Diverse clinical presentations include minor trauma, major polytrauma and insufficiency fractures. An assessment of the general health and functional status of the patient is of utmost importance to determine the optimal treatment. The different treatment options of pelvic and acetabular fractures in the presence of osteoporosis vary mainly according to the clinical presentation and include: conservative methods, percutaneous or minimally invasive procedures, open reduction and fixation, and primary total hip arthroplasty.

Whichever treatment is chosen, even for elderly people, the aim is a rapid mobilisation of the patient in order to reduce complications to some extent inherent to this age group.

Introduction

Pelvic ring or acetabular fractures in the elderly represent the most rapidly growing segment of the spectrum of pelvic trauma. This is partially the result of the relative decrease in motor vehicle-related pelvic and acetabular fractures during the past decade.[28]

The incidence of fractures of the pelvis in the elderly is climbing relentlessly,[10] with a marked predominance in women.[40] In Finland from 1970 to 1997, the age-adjusted incidence of pelvic fractures increased from 31/10,000 to 103/100,000 in women and from 13/100,000 to 38/100,000 in men, i.e., by 23% per year. The mean age at the time of

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injury increased from 74 to 80 years. In addition, the proportion of pelvic fractures related to osteoporosis increased from 18% to 64% overall and from 65% to 94% among individuals older than 60 years off age.[23] A fall, mainly due to an ''age-associated multifactorial gait disorder'' described by Runge[55] was by far the most common trauma in 83% of cases. In 47% no other fractures were diagnosed. A mortality rate of 7.6% was noted during the immediate post-fracture period, 27% after 1 year and 10% per year subsequently; after 3 years the survival rate was 50%. Among survivors, 70.9% were able to return home (with home help in 84.3%) and 29.1% required institutionalisation. Dependency was consistently greater after than before the fracture.[41]

Some fracture patterns are the result of excessive force exerted on relatively normal bone. These are the fracture types we are most familiar with and described by Tile,[65] Letournel and Judet.[21,27] However, most pelvic or acetabular fractures in the elderly are pathological fractures through osteoporotic bone and are the result of minimal trauma.

Reconstructive surgery by means of open reduction and internal fixation becomes less important in severe osteoporosis. Salvage procedures on the other hand, which enable elderly people to continue their normal daily life within acceptable time limits are preferable. The purpose of this paper is to review the different treatment options of pelvic ring and acetabular injuries in osteoporotic bone, taking into account the different types of injuries as well as the prior health and functional status of the patient.

Pelvic ring injuries

Low-energy pelvic ring fractures

Low-energy pelvic ring fractures in the elderly frequently result from a fall while walking, and especially involve stable fractures of the pelvic ring. Insufficiency fractures also occur in elderly patients, typically of the sacrum and anterior pelvic ring.

Closed pelvic ring fractures

Fractures of the pelvic ring in the elderly are the result of low energy trauma, a fall. Falls, defined as any accident in which the patient unintentionally ends up on the floor,[71] become more common with increasing age.[2] Low energy trauma in this sense implies that the forces applied to the bony structures in the process of injury are those arising only from the dissipation of potential energy in the change of position from standing height or less to the ground level. Thirty percent of persons over the age of 65 will fall each year.[2,49] This rate rises to 40% for those over 80.[49] Between 10% and 25% of falls result in serious injury and up to 6% culminate in a fracture.[1,67] Such fractures are considered as stable fractures (usually of the pubic rami) without disruption of the pelvic ring[65] and hence, are treated conservatively.

Morris et al.[41] reported on 148 patients (mean age: 83) who suffered a pelvic fracture in low energy trauma, treated conservatively. Adequate quality radiographs were available in 115 patients of which 107 had a Singh index[59] of four or less, indicating osteoporosis. Single breaks of the superior or inferior pubic ramus accounted for 47.2% of all fractures and 47.9 were found to have sustained fractures at multiple pelvic sites.

These fractures, if isolated and not associated with other major system injuries, can be treated by means of bed rest until the patient is comfortable. Analgesia may be required, which in this situation should be minimal. All of the aggressive measures necessary to prevent thromboembolic diseases and other complications of bed rest should be vigorously pursued, including turning in bed and deep breathing exercises.

Insufficiency fractures of the pelvis

Patients with *insufficiency fractures of the pelvic ring* present with groin or coxofemoral pains, which may produce limping or functional disability of joint movement.[8,18,48,56] There may also be pelvic pains and ill-defined pain in the lower limbs. Fractures may be asymptomatic and discovered accidentally.[56] Risk factors include osteoporosis, rheumatoid arthritis, corticosteroid treatment and mechanical constraint resulting from total hip replacement.[18,31,56] Radiographs are often normal, in which case a bone CT scan is useful to make the diagnosis. A CT scan may show bone destruction with a pseudotumour appearance.[58] Diagnosis of fracture should be considered when there are predisposing factors and if radiographs show an osteolytic area surrounded by osteosclerosis.[58] Finally, MRI imaging can demonstrate an insufficiency fracture. MRI characteristically shows high signal intensity in a mass on T2-weighted sequences surrounded by a ring with low signal intensity.[17]

Most *insufficiency fractures of the sacrum* occur in women (94.3%) of advanced age (mean age: 70.6 years).[6] The most common risk factor is osteoporosis. Patients have often undergone prolonged corticosteroid treatment.[57] Other risk factors mentioned by Finiels et al.[6] include radiotherapy, osteomalacia, rheumatoid arthritis hip arthroplasty and fluoride treatment.