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Abstract: Most people with a fractured femur need some sort of surgery, usually ORIF. Without the surgery, your broken femur may not heal properly. ORIF can place your bones back into their proper configuration. This significantly increases the chance that your bone will heal properly. Your healthcare provider might recommend nonsurgical treatment for a very young child, or for people with other medical conditions that make surgery more dangerous.

Key words: surgical treatment, femur fracture, injuries, open reduction and internal fixation.

The femur is the large bone in the upper part of your leg. Different kinds of trauma can damage this bone, causing it to fracture into 2 or more pieces. This might happen to the part of the femur near your knee, near the middle of the femur, or in the part of the femur that forms part of your hip joint. In certain types of femur fractures, your femur has broken, but its pieces still line up correctly. In other types of fractures (displaced fractures), the trauma moves the bone fragments out of alignment.

If you fracture your femur, you usually need ORIF to bring your bones back into place and help them heal. During an **open reduction**, orthopedic surgeons reposition your bone pieces during surgery, so that they are back in their proper alignment. This contrasts with a **closed reduction**, in which a healthcare provider physically moves your bones back into place without surgically exposing your bone.

Internal fixation refers to the method of physically reconnecting your bones. This might involve special screws, plates, rods, wires, or nails that your surgeon places inside your bones to fix them in the correct place. This prevents your bones from healing abnormally. For a fracture in the long, middle part of your femur, your surgeon

may insert a long metal rod through the middle of your bone. The entire operation usually takes place while you are asleep under general anesthesia.

As one of the leading causes of elderly patients' hospitalisation, proximal femur fractures (PFFs) will present an increasing socioeconomic problem in the near future. This is a result of the demographic change that is expressed by the increasing proportion of elderly people in society. Peri-operative management must be handled attentively to avoid complications and decrease mortality rates. To deal with the exceptional needs of the elderly, the development of orthogeriatric centres to support orthogeriatric co-management is mandatory. Adequate pain medication, balanced fluid management, delirium prevention and the operative treatment choice based on comorbidities, individual demands and biological rather than chronological age, all deserve particular attention to improve patients' outcomes. The operative management of intertrochanteric and subtrochanteric fractures favours intramedullary nailing. For femoral neck fractures, the Garden classification is used to differentiate between non-displaced and displaced fractures. Osteosynthesis is suitable for biologically young patients with non-dislocated fractures, whereas total hip arthroplasty and hemiarthroplasty are the main options for biologically old patients and displaced fractures. In bedridden patients, osteosynthesis might be an option to establish transferability from bed to chair and the restroom. Postoperatively, the patients benefit from early mobilisation and early geriatric care. During the COVID-19 pandemic, prolonged time until surgery and thus an increased rate of complications took a toll on frail patients with PFFs. This review aims to offer surgical guidelines for the treatment of PFFs in the elderly with a focus on pitfalls and challenges particularly relevant to frail patients. PFFs are divided into intracapsular and extracapsular femoral neck fractures, including intertrochanteric and subtrochanteric fractures. Depending on their location, femoral neck fractures are identified as sub-capital, mid-cervical, and basicervical fractures. Especially in the elderly, the mid-cervical femoral fracture is the most common by far, with a frequency of over 86%. Frailty fractures are classified as fractures in the absence of adequate trauma or a fall from standing height or less with hip fractures represent the most common frailty fracture types.

1. A comprehensive geriatric assessment helps to identify treatable geriatric conditions to prevent complications in elderly patients. Evidence suggests that comprehensive geriatric assessment improves the outcome of people above the age of 65 with a hip fracture. This can be done after surgery, since older people receiving comprehensive geriatric assessment are less likely to die and more likely to return to their previous environment.
2. For the radiological confirmation of the diagnosis of a PFF, an ap X-ray is sufficient. A second plane X-ray in most cases does not contain additional information but is often very painful for the patient. If available, a planning body for preoperative determination of the prosthesis size should be added if a prosthesis is needed. If an X-ray cannot confirm the diagnosis, but a hip fracture is highly suspected, it is recommended to perform a computed tomography (CT).
3. Sufficient pain management is mandatory and its importance needs to be expressed. Not only is it humane, but it is also an essential factor in the prevention of delirium. In the peri-operative pain management of elderly patients, NSAIDs are not recommended. However, it is advised to offer non-NSAIDs such as paracetamol every 6 h unless contraindicated. If no sufficient pain control is accomplished, i.e. or oral opioids can be titrated according to the patient's constitution accompanied by a routine constipation prophylaxis.
4. If non-NSAIDs and opioids are not sufficient, femoral nerve blocks may be considered. Guay et al. stated in a Cochrane review that there is moderate quality evidence for reducing pneumonia risk, decreased time to first mobilisation, and cost reduction in pain medication after single-shot blocks. High-quality evidence suggests that a regional blockade reduces pain on movement within 30 min after block placement.
5. Routine laboratory tests should be performed on all patients, including complete blood count, inflammation markers, INR, partial thromboplastin time, and a basic metabolic profile. As hip fracture patients tend to be dehydrated, i.e., hydration might be needed with the amount depending on clinical judgment. A flow rate of 100–200 ml/h for isotonic crystalloids is estimated to be safe.

Volume status needs to be monitored carefully, however, as many elderly patients have cardiac diseases, making them predisposed to heart failure triggered by volume overload.

6. With age, the incidence of urinary tract infections increases. In addition to symptomatic urinary tract infections, asymptomatic bacteriuria is common among the elderly. It is estimated that asymptomatic bacteriuria is present in around 20% of healthy women over the age of 80 years.

The link between hardware infection and asymptomatic bacteriuria has been investigated, especially in the context of arthroplasty. Even though there is a correlation between an increased occurrence of prosthetic joint, superficial wound infections and the presence of asymptomatic bacteriuria, Zhang et al. showed in a systematic review that the incidence of postoperative infectious complications did not decrease when the asymptomatic bacteriuria is treated before arthroplasty. In hip fracture patients, screening for urinary tract infections is recommended, although those should only be treated if symptomatic. femoral neck fractures can either be treated with osteosynthesis, total hip arthroplasty or hemiarthroplasty. In patients with more than one comorbidity above the age of 70, there is an 83% risk of secondary fracture dislocations when treated conservatively, making surgery the treatment of choice for elderly patients. When choosing the implant, two main aspects need to be kept in mind: older patients are less likely to follow weight-bearing restrictions, while, on the other hand, the indication for osteosynthesis needs to be carefully considered. Due to biomechanical aspects, according to Pauwels classification, any femoral neck fracture classified as type I or II is an indication for internal fixation. Dislocated femoral neck fractures are related to a high incidence of interrupted blood supply of the femoral head (as described above), and therefore, predisposed for fixation failure. Existing osteoporosis and age-related changes in bone structure might lead to an increased risk of non-unions in elderly patients. Osteosynthesis is, therefore, suggested in either biologically young patients with non-dislocated fractures or as a salvage option, if the patient is bed-bound and operative therapy is only indicated for pain management. Providing medical care to elderly patients with hip fractures remains a great challenge. Interdisciplinary

orthogeriatric management reduces the length of hospital stay, the number of complications and mortality.

The most critical peri-operative management aspects include proper pain management, early mobilisation, a thorough fluid management, the prevention of delirium and the choice of operative treatment depending on comorbidities, demands, and biological rather than chronological age. For elderly patients, direct weight bearing and as little delay as possible in operative treatment are of great importance. While inter- or subtrochanteric fracture requires intramedullary nailing, the treatment options for femoral neck fractures include osteosynthesis, total hip arthroplasty and hemiarthroplasty. The Garden classification and the patient's activity level may allow osteosynthesis treatment for a biologically young patient with a non-dislocated fracture showing no signs of osteoarthritis. Total hip arthroplasty is recommended for active patients with dislocated fractures, and hemiarthroplasty for frail patients.

The COVID-19 pandemic brings additional obstacles in medical care for elderly hip fracture patients, leading to a delay in surgery, corresponding to a higher complication rate.

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