Femoral Neck Fracture in Geriatri Patient: A Case Studies and Approaches to Post-Operative Rehabilitation

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ABSTRACT

Introduction: Femoral collum fractures are a common injury in the geriatric population, particularly postmenopausal women with osteoporosis. The intracapsular location of the fracture and proximity to the blood supply of the femoral head increases the risk of complications such as non-union and avascular necrosis. Early and appropriate treatment is essential to minimize long-term functional impact.

Case Illustration: A 67-year-old woman experienced severe pain in the right hip after slipping while mopping the floor. The patient was unable to stand or walk after the incident. History showed osteoporosis which was not treated regularly. Radiologic examination revealed a right collum femur fracture with Garden type IV classification. The patient underwent arthroplasty bipolar and a gradual physiotherapy rehabilitation program for six months.

Discussion: This case illustrates a common pattern of osteoporotic fractures in the elderly, where minor trauma can cause severe damage to the bone. The selection of arthroplasty is appropriate to the patient's bone condition and fracture type, providing stability and allowing early mobilization. Intensive rehabilitation has been shown to support functional recovery. Long-term management of osteoporosis with antiresorptive therapy such as zoledronate, patient education, and environmental modification are also important for the prevention of recurrent fractures.

Conclusion: A comprehensive approach that includes surgery, early rehabilitation, and management of osteoporosis can result in a better.

Keywords: Femoral neck fracture; geriatrics; osteoporosis; arthroplasty; postoperative rehabilitation.

Introduction

A collum femur fracture or femoral neck fracture is a common type of intracapsular fracture of the hip joint, especially in geriatrics. These injuries occur in the area of the collum femur that connects the head of the femur to the shaft of the femur, right at the point of connection with the acetabulum. This sensitive anatomical location, coupled with the limited blood supply to the femoral head, makes this area highly susceptible to serious complications such as non-union and avascular necrosis, especially in displaced fractures.[1]

Globally, the incidence of bone fractures is alarming. Based on the World Health Organization (WHO) report in 2020, there were more than 13 million fracture cases that occurred worldwide, with a prevalence rate of 2.7%. Meanwhile, in Indonesia, records show that out of 14,127 cases of trauma due to blunt or sharp objects, 1,775 people (3.8%) experienced bone fractures. The overall fracture prevalence was recorded at 1.7%. This data emphasizes that fractures, including collum femur fractures, are a serious public health issue and should receive special attention, especially in the elderly who are at high risk due to conditions such as osteoporosis and decreased physical stability.[2]

This case report aims to systematically describe the diagnosis process, operative management, and postoperative rehabilitation approach in a female geriatric patient with a collum femur fracture. Emphasis is placed on the importance of prompt and integrated multidisciplinary management, as well as the clinical relevance of evaluating comorbid conditions such as osteoporosis in determining the final outcome of recovery. It is hoped that this report will contribute to the clinical understanding of managing femoral collum fractures, particularly in high-risk populations.

Anatomy of Collum Femur and Blood Supply

The collum femur or femoral neck is the part of the femur that connects the head of the femur to the diaphysis. Anatomically, the collum femur is located within the hip joint capsule (intracapsular) and plays an important role in weight transfer between the torso and the lower extremities. This location makes it highly susceptible to injury, especially in the geriatric population who experience bone deterioration.[3]

The blood supply to the femoral head comes mainly from the medial femoral circumflex artery, which forms a vascular ring around the neck of the femur. From here, ascending cervical branches enter the femoral head through a structure called the fovea capitis. In displaced collum femur fractures, this blood supply may be interrupted, resulting in a high risk of avascular necrosis of the caput femoris.[4]

Garden Classification

Type I: Incomplete/valgus impacted

Type II: Complete and nondisplaced on AP and lateral views

Type III: Complete with partial displacement; trabecular pattern of the femoral head does not line up with that of acetabulum.

Type IV: Completely displaced; trabecular pattern of the head assumes a parallel orientation with that of the acetabulum.

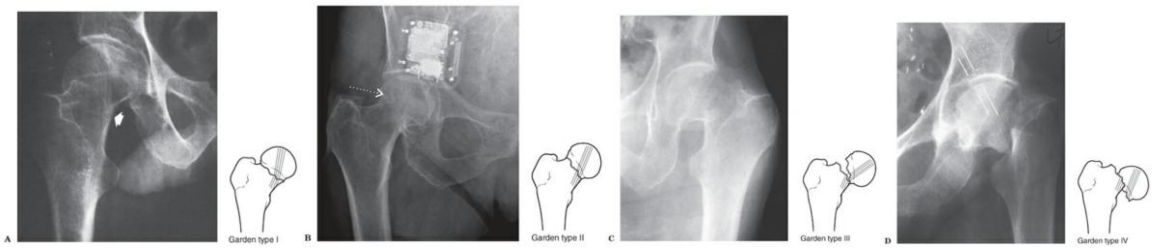
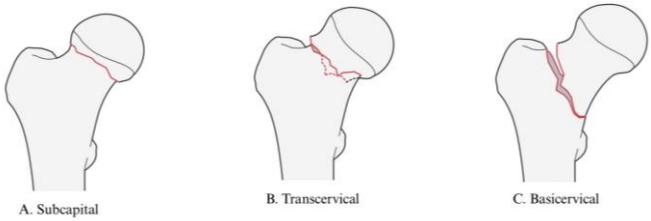


Figure 1: **A: Garden Type I** is an incomplete fracture, but is generally impacted in valgus and retroversion directions. The bone fragments are still relatively stable due to the impaction. **B: Garden Type II** is a complete nondisplaced fracture. Despite the fracture line in the trabeculae, the anatomical position of the head and shaft of the femur remain aligned. **C: Garden Type III** shows marked angulation with partial displacement, but generally no significant proximal translation of the femoral shaft. **D: Garden Type IV** is a complete fracture with complete dislocation, where the femoral shaft is displaced proximally, and the femoral head is free to rotate and readjust its position within the acetabulum, so that the main trabeculae appear to be rearranged (Egol KA, Koval KJ. Handbook of Fractures. 6th ed. Philadelphia: Wolters Kluwer; 2021. p. 400–403).

Classification of Arbeitsgemeinschaft für Osteosynthesefrage/Orthopaedic Trauma Association



Gambar 2: Neck fractures using the AO/OTA system: A1: Subcapital, A2: Transcervical, and A3: Base-cervical. This classification helps determine the appropriate fixation and stabilization approach (AO/OTA Fracture and Dislocation Classification Compendium; 2018).

Differences between Geriatric and Young Adult Bone Structure

Bone in geriatric patients shows a decrease in density as well as mechanical strength due to biological changes that occur with aging. The bone cortex becomes thinner, trabecular tissue is sparser, and osteoblastic activity is reduced. These conditions make the bone more susceptible to fracture from even minor trauma. In contrast, young adult bone has better structural strength and faster healing ability.[5]

Vulnerability in Older Women with Osteoporosis

Postmenopausal women are particularly vulnerable to collum femur fractures due to the impact of decreased estrogen on bone metabolism. Estrogen has a protective role on bone tissue by stopping osteoclast activity and promoting new bone formation. After menopause, the imbalance between bone resorption and formation causes osteoporosis to appear as a result of the imbalance of bone resorption and formation after menopause, especially in trabecular bones such as the neck of the femur.[6]

Osteoporotic fractures in women pose not only a physical burden but also significant economic and social consequences, including reduced quality of life, increased need for long-term care, and risk of premature mortality. More than half of all osteoporosis-related fractures are in women, and femoral neck fractures are one of the most severe forms that often require surgical intervention and intensive rehabilitation.[6]

Case Illustration

A 67-year-old woman complained of severe left hip pain after slipping while mopping the floor in her home. The patient was unable to stand or walk after the incident. No overt bleeding or head trauma was found. Previously, the patient was able to perform light activities at home using a cane. Medical history showed that the patient had been diagnosed with osteoporosis several years ago but did not undergo regular therapy.

Physical examination revealed tenderness in the left inguinal and greater trochanter region, shortening of the left leg, and passive lateral rotation. Distal neurovascular function remained unchanged. Plain X-Ray examination of the pelvis revealed a fracture of the collum femur sinistra and total dislocation of the femoral head from the acetabulum, in accordance with Garden type IV classification. The patient then underwent arthroplasty with the insertion of a bipolar prosthesis on the sinistra femur. After arthroplasty or postoperatively, the patient can perform early weight bearing using a walking frame.

Figure 3. AP Pelvic Plain X-Ray showing displaced sinistra collum femur fracture.

Figure 4. Postoperative AP Pelvic Plain X-Ray showing bipolar arthroplasty sinistra.

Discussion

The patient in this report is a 67-year-old woman with a history of osteoporosis who sustained a collum femur fracture after slipping while mopping the floor at home. This event illustrates the common characteristics of hip fractures in geriatrics, where minor trauma can trigger significant structural bone damage due to reduced bone density. Uncontrolled osteoporosis is a major cause of the decreased trauma threshold required to trigger a fracture.

This is consistent with the explanation that trabecular bones such as the femoral neck become highly susceptible to fracture due to progressive loss of bone mass in postmenopausal women.[7]

Management of collum femur fractures in elderly patients needs to consider the fracture classification and functional status of the patient. In this case, the radiographs showed a Garden type IV (totally displaced) fracture, which has a high risk of complications such as nonunion and avascular necrosis. Therefore, arthroplasty was performed, which is the primary option for elderly patients with displaced fractures and poor bone quality. This approach promotes early mobilization and reduces the risk of reoperation, as noted in the literature on hip fracture management in geriatric patients.[8]

A recovery duration of six months until the patient is able to walk again without assistive devices is part of the common recovery range. Studies show that mobility recovery in post-fracture geriatric patients generally lasts between four to eight months, depending on age, comorbid status, and adherence to the physiotherapy program.9 In this case, the patient underwent an intensive rehabilitation program from the third postoperative day, including range of motion exercises, muscle strengthening, and gradual walking training, which proved to support positive functional outcomes.

In addition to surgical and rehabilitation aspects, management of comorbid osteoporosis is crucial to prevent recurrent fractures. A recent study by Bolland et al. showed that infrequent administration of zoledronate (every two years) can significantly reduce the risk of new fractures in women aged 50-60 years.10 This intervention is highly relevant for secondary prevention. In addition, home environment modification, patient education, and calcium and vitamin D supplementation are also important strategies to reduce the risk of falls and maintain long-term bone strength.

As such, the management of collum femur fractures in geriatric patients should be comprehensive, starting with appropriate surgical intervention, a proactive rehabilitation program, and management and therapy of comorbidities such as osteoporosis. This comprehensive approach aims to improve functional recovery and reduce the risk of future complications and re-fracture.

Conclusion

Collum femur fracture in geriatric patients, especially women with osteoporosis, is a serious condition that can result from minor trauma and is at risk of long-term complications. This case demonstrates that a comprehensive approach that includes arthroplasty, early and

structured rehabilitation, and management of osteoporosis with antiresorptive therapy and environmental education, can result in optimal functional recovery and prevent re-fracture. A prompt and appropriate approach involving multiple disciplines is essential to improve quality of life and accelerate recovery of mobility function in elderly patients.

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