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# Current status of diagnosis and treatment of femoral neck fractures in the elderly

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### ABSTRACT

Femoral neck fractures are common fractures in the elderly, especially in elderly women. There are many mature treatment methods for femoral neck fractures. However, which option is better is still controversial. In order to allow clinicians to better develop treatment plans for elderly patients with femoral neck fractures, this article summarizes the diagnosis and treatment status of elderly femoral neck fractures from the aspects of epidemiology, etiology and diagnosis, treatment methods and progress of elderly femoral neck fractures.

**Keywords:** Elderly patients with femoral neck fracture; conservative treatment; surgical treatment; accelerated recovery

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## 1. Epidemiology overview

Relevant statistical studies have shown that femoral neck fractures account for 3.6% of all fractures in China, and account for 48%-54% of all hip fractures. And femoral neck fractures are most likely to occur in the elderly. Patients over 60 years old account for 97% of femoral neck fractures [1].

Femoral neck fracture is one of the main diseases that cause the elderly to lose their ability to live, and it is also one of the main causes of death in the elderly. 13.5% of the elderly with femoral neck fracture will die within 3 months [2], and more than 20% of the elderly with femoral neck fracture will die within 1 year [3]. The post-injury mortality rate of non-surgical patients exceeds 40% [4]. Even if the patient receives surgical treatment, the mortality rate in the first month after surgery is as high as 8% -10% [5]. According to a multicenter study covering 73 tertiary hospitals in 24 provinces in China, the average hospitalization cost for femoral neck fractures (excluding malignant fractures and multiple traumas) is 52,649 yuan, and the average hospital stay is 14.7 days. The high incidence of femoral neck fractures and huge treatment costs have become a heavy burden on patients' families and the medical system [6].

## 2. Overview of etiology and diagnosis

Femoral neck fracture refers to a fracture that occurs between the base of the femoral neck and the femoral head. Femoral neck fractures in the elderly are often associated with low-energy violence such as wrestling and minor bumps. The main reason that low-energy blows can cause femoral neck fractures in the elderly is that the elderly are often associated with osteoporosis, especially women [7,8]. Currently, more than one-third of 60-year-olds in China suffer from osteoporosis. The typical pathological feature of

osteoporosis is a decrease in bone mass and bone strength, which leads to a significant decrease in the resistance to violence and torsion of the bone. This is the main reason why low-energy injuries cause femoral neck fractures in the elderly [9]. At the same time, the elderly are often accompanied by bad habits such as excessive drinking and long-term medication, as well as a high risk of myocardial infarction, cerebral infarction, and cerebral hemorrhage, which all increase the risk of falling in the elderly [10-12]. Falls are the most common cause of femoral neck fractures in the elderly.

If an elderly person's hip touches the ground first when he falls and at the same time the hip function is restricted or lost after injury, it should be highly suspected that the person's femoral neck has fractured. A small number of patients can continue to walk after injury, and their walking activities are severely restricted only a few days later when the pain is unbearable. Such patients initially have stable fractures after injury, and then gradually develop unstable fractures. Patients with femoral neck fractures often have obvious hip pain, limited hip joint movement, and shortened external rotation of the affected limb [1,13]. The vast majority of patients can be clearly diagnosed by hip X-ray examination, and a small number of patients have occult fractures, which need to be diagnosed by CT or MRI [14,15].

## 3. Treatment methods and progress

Elderly patients often have one or more underlying diseases such as malnutrition, diabetes, hypertension, chronic lung disease, and heart disease. At the same time, elderly patients are prone to a series of complications such as pneumonia, deep vein thrombosis, and hip pressure ulcers. In addition, femoral neck fractures can easily damage the blood vessels that supply the femoral head. These unfavorable factors greatly

increase the difficulty of treating elderly femoral neck fractures. There are currently three methods for treating femoral neck fractures: conservative treatment, internal fixation treatment and hip replacement. At present, clinicians choose treatment options mainly based on the patient's age, health before injury, and the type of fracture [16-19].

Conservative treatment is to promote fracture healing through bed immobilization and Chinese medicine conditioning. It is an option for non-displaced femoral neck fractures (Garden I, II) or displaced femoral neck fractures that cannot tolerate surgery. The advantage of conservative treatment is that it can avoid the risks of anesthesia and surgery. However, conservative treatment requires the patient to stay in bed for a long time and the limbs are prohibited from moving for a long time, which greatly limits the patient's functional rehabilitation exercise and increases the incidence of complications such as pneumonia, thrombosis, and pressure sores [20]. In addition, 20% of patients undergoing conservative treatment have their fracture ends displaced during treatment. If the fracture is displaced, it needs to be treated as a displaced femoral neck fracture [16,21]. At the same time, the existing evidence shows that the use of traction for hip fractures (skin or bone traction) does not seem to be of any benefit [22], but increases the risk of complications such as avascular necrosis of the femoral head and pressure sores. Therefore, the medical community no longer recommends traction treatment for patients with femoral neck fractures [23].

At present, surgical treatment is the first choice for most clinicians to treat elderly femoral neck fractures. Especially for displaced femoral neck fractures, surgical treatment will shorten the patient's hospital stay and promote patient recovery.

In particular, surgical treatment within 24 hours after the patient is injured will greatly reduce the risk of fracture nonunion [24,25]. There are two main surgical methods: internal fixation (open reduction, closed reduction) and hip replacement surgery (half hip, total hip replacement). The type of surgery performed depends on the patient's age, health before injury, fracture type, and family financial situation. Internal fixation treatment includes lag screw fixation, dynamic hip screw and anti-rotation screw combination fixation, intramedullary fixation and so on. Internal fixation has a certain effect but there is a high incidence of delayed union or nonunion of fractures, and the risk of requiring a second operation is high. Hip replacement is an efficient and repeatable operation. Hip replacement surgery can quickly reduce the patient's pain and restore hip joint function. Hip replacement surgery is not only suitable for fresh fractures, but also for patients who have failed other treatments. Therefore, hip replacement is the first choice for most clinicians to treat elderly femoral neck fractures [26,27]. However, in recent years, with the continuous advancement of internal fixation materials and diagnosis and treatment techniques, the clinical emphasis has been increasing. Individualized treatment strategies for femoral neck fractures.

#### **4. Nursing and rehabilitation**

Elderly patients with femoral neck fractures often have a series of underlying diseases, and femoral neck fractures can easily induce acute attacks of the original chronic diseases. Therefore, the condition of elderly patients with femoral neck fracture is more complicated than that of ordinary fracture patients, and these patients have more requirements on treatment and care. Elderly patients with femoral neck fractures require joint treatment in orthopedics, anesthesia-

ology, geriatric diseases, and rehabilitation [28]. In the past, orthopedics was the center, and the treatment mode assisted by internal medicine was extremely inefficient. Therefore, hospitals are increasingly tending to form a multidisciplinary model of accelerated rehabilitation surgery. When a patient is admitted to the hospital, physicians from the Endocrinology Department, Hypertension Department, Nutrition Department, and Rehabilitation Department cooperate with orthopedic physicians. They jointly evaluate the patient's condition and formulate a diagnosis, treatment, care, and rehabilitation plan for the patient [29,30].

**Preoperative nursing and rehabilitation training.** According to the characteristics of different patients, a one-person-one-case rehabilitation plan is developed. First, perform blood biochemical examinations to evaluate the patient's health, and appropriately increase the patient's protein intake to enhance the patient's resistance and tolerance. At the same time, instruct patients to practice bed movement, turn over, deep breathing, cough, expectoration, urination, defecation, etc., so that patients can quickly adapt to the postoperative state after the operation [31]. Encourage patients to watch rehabilitation education videos before surgery, which include basic knowledge of femoral neck fractures, rehabilitation training methods for patients after hip replacement, the use of walkers, and home care methods. Video education can relieve patients' anxiety before surgery and promote postoperative recovery [32, 33].

**Postoperative care and rehabilitation training.** After the patient is fully awake on the day of the operation, lower limb muscle contraction training can be carried out. Patients with internal fixation treatment can sit up in bed 2-3 days after the operation, and can get up and exercise with the

help of a walking aid 3 days after the operation (note that the affected limb cannot be weight bearing). X-rays were re-examined 6 weeks after the operation. If the X-rays showed that the patient's callus grew well and the fracture line was blurred, the patient could start walking with partial weight on the crutches, and walk normally after the fracture was completely healed [16]. If the hip replacement patient has no complications (fractures around the prosthesis, thrombosis of the lower extremities), the patient can sit up on the first 1-2 days after the operation, and can practice standing with the help of a walker, 3-7 after the operation Practice walking on the day [34-35]. Patients with femoral neck fractures should strengthen muscle strength training, balance training, hip joint mobility training and gait training throughout the rehabilitation period. Discharged patients should be reviewed regularly in outpatient clinics. Those who cannot come to the outpatient clinic for review can be followed up by telephone.

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