

Midshaft femoral fracture in an elderly patient with a rich history. Therapeutic and economic insights

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Abstract

In the context of an ever-increasing elderly population, we attempted to trace the portrait of the typical orthopedic patient of the future. We presented the case of a 92-year-old woman who presented with a midshaft femoral fracture and a rich medical and surgical history. We reported the management, treatment, and evolution while touching upon the economic side of orthopedic surgery.

Keywords: Midshaft femoral fracture, pertrochanteric bilateral fracture, intramedullary nail, dynamic hip screw (DHS), cost-containment

Introduction

It is estimated that the Romanian population segment of 65 years and over will almost double by 2060 [1].

While men are the ones mostly affected by lower limb fractures before the age of 65, the incidence of those fractures in women sees a gradual increase starting from this point overtaking that of men in the >65 segment. Such fractures display a gradually increasing incidence up to 90 years old, seeing a tenfold increase between 65 and the 90-94 segment [2]. 2 Romania falls in the moderate-risk category when it comes to osteoporosis development [3] and the general elderly population associates a high 1-year mortality

rate following lower limb fractures [4].

The femur is the bone of the thigh and the longest and strongest bone in the body. The femoral shaft fracture is a type of injury that usually associates damage to surrounding soft tissues [5] and given the abundance of muscle insertions in the midshaft surgical treatment is the most frequent indication for such trauma [6]. Femoral shaft fractures have an incidence of 10 per 100.000 person-years [7].

Case Report

We report the case of a 92-year-old woman who presented with pain and function loss of the left thigh following a low energy, same-level fall traumatism. The patient's history revealed

2 previously operated bilateral pertrochanteric fractures and high blood pressure which she kept controlled under treatment. On physical examination, inspection objectified swelling and bruising of the left thigh. The surgical scar over the lateral aspect of the left hip confirmed the previous intervention for the pertrochanteric fracture. The patient was neither able to walk nor stand and the left foot was fixed in external rotation. Superficial palpation revealed local tenderness and bone crepitus while mobilization attempts confirmed the loss of function.

Following the suspicion of a midshaft femoral fracture, a blood panel, ECG, and lower limb X-ray were ordered. The ECG findings showed chronic ischemic cardiopathy and a right bundle branch block while the X-ray confirmed the initial hypothesis. The patient was diagnosed with a femoral fracture in the middle third of the femoral shaft, Winquist classification type 3 [8]. Blood samples had no significant abnormalities to remark on.

The indication was exclusively surgical so the patient was further referred for a pre-anesthesia assessment. The surgical history of the patient meant that the previous Dynamic Hip Screw (DHS) implant used for the reduction and fixation of the pertrochanteric fracture needed to be removed prior to the resolution of the present complaint. Consequently, the intervention commenced with a longitudinal incision along the old surgical scar followed by the removal of the DHS plate and screws. The greater trochanter was trepanned and an intramedullary co-reductor was inserted under X-ray guidance down to the distal fragment. A Stryker's Dall-Miles™ Cable System 2mm cerclage was used to reduce the fracture. An intramedullary nail with a radius of 11mm and a length of 360mm was filled through the co-reductor and fastened using 4 screws, 2 distally and 2 proximally.

Postoperatively, the patient was administered low molecular weight Heparin to counteract the prothrombotic status, Ceftriaxone for antibiotic prophylaxis, a combination of Paracetamol, and an opiate for pain management and Beta-Blockers for her underlying high blood pressure. Glucose and Ringer's Lactate were also administered for fluid replacement.

On the 4th day following the surgery, the patient developed respiratory symptoms that required a pneumologist's assessment. A chest X-ray was ordered and it indicated interstitial lung disease (ILD) and the presence of opacity in the lower right lobe. A suspicion for a right bronchopulmonary tumor was formulated and a CT scan was ordered. Notable findings included lower right lobe pneumonia, bilateral pleurisy with fluid buildup and heart failure. Accentuated diffuse osteoporosis was also noted. The patient was consequently placed on a more aggressive antibiotic course and hydrocortisone hemisuccinate. The patient stayed afebrile and the general status was good.

On the 12th day of hospitalization, a left hip X-ray was ordered to assess the postoperative healing process.



Fig. 1 Proximal aspect of the intramedullary nail



Fig. 2 Distal aspect of the intramedullary nail



Fig. 3 Femoral midshaft cerclage

Discussion

Romania is a moderate-risk country for osteoporosis development (3) and the population segment most affected by this condition is represented by women of 65 years and over which explains why women overtake men in the statistics when it comes to the incidence of lower limb fractures. Around 66% of the fractures in women are potentially osteoporotic [9].

With the elderly population gradually increasing in number, one could imagine the typical orthopaedic patient of the future; the

elderly individual with a history of multiple low-energy fractures and an array of comorbidities increasing the odds of developing complications, which further burden the health system and negatively affect the proper management of resources. Pneumonia, for instance, has an incidence of up to 14% as a complication after orthopaedic procedures [10] while infection is present in 4.1% of the cases [11] with patients suffering from diabetes being at an increased risk (a factor of ten when compared to patients without diabetes) of developing infections postoperatively [12].

In our case, the main complication developed by the patient was minor respiratory distress. Taking into account the advanced age and comorbidities, the assessment of the newly installed symptoms was quite important in order to diagnose a potentially severe complication in an early stage. Consequently, a multidisciplinary approach was required, which undoubtedly led to a prolonged hospital stay with the inherent risk of hospital-acquired infection contraction. One of the main concerns once the patient developed these symptoms was pulmonary embolism. Fat embolism occurs in more than 90% of the patients with traumatic injury with only 3-4% of the patients with long bone fractures developing fat embolism syndrome, which is a multisystemic condition leading to rapid deterioration [13].

Two alternatives for inserting the intramedullary nail were taken into consideration. Trepanning the greater trochanter to later use as entry portal was preferred based on the previous surgical history of the patient and the experience of the surgeon. It has been shown that using the greater trochanter is not only a rational alternative to conventional nailing through the piriform fossa but also leads to decreased fluoroscopy time and operative time in obese patients [14]. Closely documenting the patient's evolution postoperatively revealed several aspects of the economic side of healthcare, which we would like to discuss about.

Properly managing the resources allocated for healthcare is paramount for a more sustainable health system in the future. The physicians of tomorrow will have to be able to make accurate price estimations and evidence-based choices between which devices and implants to use. In their study analyzing "perception vs. reality in the cost of orthopedic trauma implants", Ayoub et al. concluded that surgeons need to be more aware of the real costs involved in using orthopedic implants with nearly half of the doctors interviewed not considering cost as a decisional factor [15]. Okike et al. found that even though physicians rated their medical devices price knowledge as "below average" or "poor", more than 80% of those interviewed indicated that the cost of a specific device should be at least of moderate importance when making a selection. This demonstrates that the healthcare community could be open to cost-containment strategies [16]. Making physicians' cost aware is thought to be an opportunity to reduce surgical expenditures. In their 2017 economic/ decision analyses study, Wasterlain et al. found that, when made aware of the costs, surgeons were not only more likely to factor in the cost in their decision but actually choose the less expensive equivalent device [17].

Conclusions

We discussed a case of an elderly woman who presented with a midshaft femoral fracture. The patient's surgical and medical history guided the therapeutic approach and required the reversal of previous orthopedic device implantation. We discussed the impact of an ever-growing elderly population, which is likely to require a multidisciplinary approach in order to treat the most basic of orthopedic conditions and we stressed the importance of cost-awareness for the physicians of tomorrow.

Disclosure of Potential Conflicts of Interest

Nothing to declare.

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