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Research Article

SURGICAL TREATMENT OF FEMORAL SHAFT FRACTURES IN POLYTRAUMATIZED PATIENTS

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ABSTRACT

Fractures of the femur are common, usually serious and are the result of high-energyaccidents. They can be associated with involvement of other organs, causing deformities and sequelae for the patient, due to immediate or late complications. Anatomical reduction and stable internal fixation are essential in order to achieve the treatment objectives in patients with good bone quality. Treatment is eminently surgical as it allows early rehabilitation and reduces the risk of systemic complications. There are numerous therapeutic options, but osteosynthesis with an intramedullary plate and nail stands out. However, some factors influence the choice of the type of surgical intervention to be performed, such as hospital resources, availability of suitable material for the procedure, trained staff and availability of an image intensifier.

KEYWORDS

Fracture; Polytraumatized; Femur fracture; Femur shaft fracture; Therapeutics.

INTRODUCTION

Femur fractures are common, usually serious and are the result of high-energy accidents, generally associated with the involvement of other organs and which can cause deformities and sequelae for the patient, due to immediate or late complications. The femur is the strongest and largest bone in the human skeleton and has a well-vascularized muscle envelope, which allows fractures to heal quickly in most individuals (Guerra, et al., 2010). Anatomical reduction and stable internal fixation are essential to achieve the treatment objectives in patients with good bone quality, and it is necessary to institute appropriate therapy to prevent sequelae and functional incapacity (Pires et al., 2006).

Nowadays, due to the greater occurrence of serious accidents, in which the dissipation of kinetic energy is great, coupled with improved rescue and initial care techniques, with a consequent increase in survival, more serious diaphyseal fractures of the femur are observed, with great instability, requiring a new therapeutic approach, while the soft tissues surrounding the fractures should be treated less aggressively. Because of this, less manipulation of the shell around the bone is important in maintaining the irrigation of the fragments and in the biological process of bone healing. This is the concept of biological fixation, in which the fracture is stabilized with minimal manipulation of the fragments in order to maintain their vascularization and healing potential (Muller, et al., 1991; Krettek, 1997; Baumgaertel; Buhl; Rahn, 1998).

Regarding the classification of this fracture, there are two groups: AO-ASIT and Winquist. The first consists of a coding system based on location (proximal, medial and distal), fracture trace and degree of comminution. The second considers the degree of comminution and indicates the type of treatment, type I (fracture with simple trace or minimal comminution); type II (comminution of up to 50% of the circumference of the diaphysis); type III (comminution of 50 to 100% of the diaphysis) and type IV (circumferential comminution of the diaphysis, with no contact between the two larger fragments after reduction) (Pires et al., 2006).

The treatment of femoral shaft fractures is eminently surgical as it allows early rehabilitation and reduces the

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risk of systemic complications(Almeida; Farias; Lisboa, 2012). In agreement with this statement, in 1958, the AO group in Switzerland, influenced by Belgian orthopedics and with the support of the country's Social Security system, found that surgical treatment of this type of fracture offered better functional results, with a reduction in time off work and in compensation for disability(Reis, 2005). Some secondary parameters should be analyzed when choosing the type of treatment, such as age, associated fractures, configuration of the fracture line, soft tissue injuries and neurovascular structures (Pires et al., 2006).

The many methods used to treat these fractures include uni- or multipolar external fixators, intramedullary rods, blocked or not, milled or not, compression plates with an open or bridging technique and alternative methods such as skeletal traction and immobilization with plaster (Pires et al., 2006). Osteosynthesis with the principle of absolute stability using compression plates is a reality in Brazil, although the use of biological fixation of the diaphyseal structures of the femur with intramedullary rods is more indicated(Pires et al., 2006), from an anatomical, physiological and functional point of view(Oliveira; Mathias; Guimarães, 1994).

In Brazil, the frequent use of locked intramedullary nails is somewhat difficult, due to the high financial costs of the nail instruments and the need for an image intensifier(Paschoal; Paccola, 2000). However, most orthopaedic surgeons opt for this approach due to its greater consolidation compared to other types of synthesis, satisfactory stability and ability to withstand high loads in vivo(Pires et al., 2006; Odael et al., 2006). The aim of this study is to evaluate the therapeutic approach to femoral shaft fractures, in particular the use of a locked intramedullary nail and plate osteosynthesis.

METHOD

This is a literature review, using databases from the Information Department of the Unified Health System (DATASUS). The inclusion criterion was consultation of the SUS Hospital Information System (SIH/SUS) regarding hospitalization for femur fractures in the various regions of Brazil, from January 2012 to December 2019. The variables evaluated were: number of hospitalizations, gender, age group, color/race, regime and character of hospitalizations, value of hospital services according to hospitalization regime, deaths and mortality rate.

The Pubmed, Lilacs, Scielo and Sciencedirect databases were used to search for articles, using the Health Sciences Descriptors (DeCs), the descriptors: "femoral fracture", "femoral shaft fracture", "diaphyseal fracture" and "polytrauma". The 22 articles that best met the study criteria, available in Portuguese, English and Spanish and published between 1991 and 2016, were selected.

RESULTS

Overall, there was an increase in both prevalence and the number of hospitalizations between 2012 and 2019. The percentage analysis showed an increase in prevalence of 88% in the Midwest region, 62% in the Northeast, 45% in the North, 41% in the South and 40% in the Southeast. The number of hospitalizations followed the same upward trend as prevalence. The Southeast is the region with the highest number of hospitalizations, totaling 207,270 cases in the period analyzed, followed by the Northeast, with 75,678 cases. Following in descending order of total cases is the South with 73,725, the Midwest with 25,258 and the

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North with 15,347. At the end of 2019, the South took first place in the prevalence ranking with a result of 37.24 cases for every 100,000 inhabitants in the region, followed by the Southeast (37.13). The descending order of prevalence in 2019 is followed by the Midwest (30.00), Northeast (20.98) and North (14.08).

Examining the epidemiological and clinical data of patients hospitalized for femur fractures between 2012 and 2019, we found that the frequency of cases was mainly concentrated in the over-80 age group (n=191,521; 47.80%) in all regions of Brazil. The youngest population analyzed, aged 60 to 64, accounted for 37,038 (9.24%) of all cases.

With regard to color/race, there is a predominance of white people (n=179,449; 44.78%), followed by brown people (n= 113,151; 28.24%), and for 93,798 (23.41%) of the cases no information was obtained. With regard to the individuality of each region, it can be seen that in the South and Southeast there is a higher prevalence of admissions among white people (n=60,304; 78.91%/ n=110,052; 52.70%, respectively). This profile was not evident in the other states, with brown people having the highest number of hospitalizations in the North (n=10,087; 64.87%), Midwest (12,862; 50.45%) and Northeast (33,628; 45.21%).

As for whether the hospitalization was elective or urgent, the largest number of hospitalizations were urgent (n=62,439; 90.75%). Regarding public or private hospitalization, the highest frequency was private (n=88,653; 22.12%), and in 236,086 (58.92%) of the cases this information was ignored. However, analyzing each region, the North and Northeast had the highest number of hospitalizations in the public system, while in the other regions the predominance was in the private system. In terms of financial expenditure on inpatients, this was higher in the private service in the Midwest, Southeast and South, while in the North and Northeast it was higher in the public service.

According to sociodemographic data from the SUS Hospital Information System (SIH/SUS), a mortality rate of 5.14% and deaths of 20,640 were recorded throughout Brazil between 2012 and 2019. The majority of deaths occurred in the Southeast, accounting for 12,016 deaths. The South, Northeast, Midwest and North regions accounted for 4,154, 2,704, 1,147 and 583 deaths respectively. With regard to the sex most affected, there was a higher prevalence of deaths from femur fractures among women, accounting for 65.56%.

DISCUSSION

Osteosynthesis using the principle of absolute stability through compression plates is still a reality in Brazil, which is probably due to the fact that some regions of the country do not have fluoroscopy or a team trained in the use of intramedullary nails. Since plate and screw is a therapy that promotes tissue devitalization, a higher rate of infection, late healing and pseudoarthrosis (Pires et al., 2006). The literature considers this method to be an option for fixing diaphyseal femoral fractures(Basumallik; Bandopadhyay, 2002), especially where there is no access to intramedullary implants(Almeida; Farias; Lisboa, 2012).

The intramedullary nail is a major advance in orthopedic medicine, especially in femoral fractures (Almeida; Farias; Lisboa, 2012). It is the method of choice for the treatment of diaphyseal femoral fractures in adults(Tornetta; Tiburzi, 2000; Zhang et al., 2015). Compared to other therapies, it is less aggressive for the tissues, can reduce fragments without approaching the fracture zone and is associated with less bleeding, complications (Zhang et al., 2015; Trompeter; Newman, 2013) and high healing rates (85

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to 99%) (1; Yu et al., 2007; Duan et al., 2011). In addition, it provides weight bearing and earlier movement in the injured extremity, which is an advantage for elderly or polytraumatized patients, avoiding complications due to prolonged immobilization (Gangavalli; Nwachuku, 2016).

This therapeutic option can be inserted via a proximal (anterograde) or distal (retrograde) approach (Cannada et al., 2008; Shan; Desai; Mounasamy, 2015). The disadvantages of the anterograde approach include implant-related pain, gluteus medius insufficiency, difficulty inserting the stem in obese patients and the risk of femoral head fracture or necrosis and heterotopic ossification around the hip (Ricci et al., The disadvantages of the retrograde approach include knee pain, restricted mobility and the need to open the joint to insert the implant, iatrogenic injury to the anterior cruciate ligament and the risk of septic arthritis (O'Toole et al., 2010).

The advantages of the proximal approach are the familiar technique, absence of joint violation associated with fracture treatment and greater availability of rods (Ricci et al., 2001; Yu et al., 2007). Indications for the distal use of the implant include stabilization of the floating knee through the same access route, shorter surgical time due to less manipulation required to position the patient, the possibility of performing the procedure on a radiolucent table in the case of polytraumatized patients and the feasibility of simultaneous fixation in the same operative field in cases of bilateral femoral fractures or simultaneous diaphyseal/proximal fractures using two implants(Shan; Desai; Mounasamy, 2015 ; Taitsman et al., 2009). According to the literature, both techniques have similar clinical results in terms of healing and complication rates (Tornetta; Tiburzi, 2000; Zhang et al., 2015; Yu et al., 2007).

CONCLUSION

It is concluded that the treatment of diaphyseal femoral fractures is eminently surgical, as it enables early rehabilitation of the patient and reduces the risk of systemic complications. There are various techniques and different types of implants used to stabilize these fractures. However, hospital resources such as the availability of suitable material for osteosynthesis, image intensification and the training of the surgical team influence the choice of the type of surgical intervention to be performed. Some parameters are secondary, but are evaluated to indicate the treatment of fractures, such as: configuration of the fracture line; lesions of soft tissues and neurovascular structures; associated fractures and age. The treatment of choice is the intramedullary nail, either anterograde or retrograde, but like any other surgical procedure it is not without its complications, although it does have its advantages in terms of early ambulation and loading.

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