

CLINICAL CHARACTERISTICS OF PATIENTS WHO TREATED CLOSED DISTAL END OF THE TIBIA FRACTURES BY LOCKING PLATE AT MILITARY HOSPITAL 175

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ABSTRACT

Objectives: To survey some clinical characteristics of patients with closed fractures of the distal end of the tibia who were osteosynthesis with a locking plate at Military Hospital 175. **Subjects and methods:** A retrospective combined prospective research conducted at Military Hospital 175 including 51 adult patients with closed fractures of the distal end of the tibia treated surgically by locking plate method during the period from January 2021 to January 2024. **Results:** The average age of the study subjects was 52.76 ± 15.67 years old, the oldest age was 85, the youngest was 21, of which the age group < 60 years old accounted for 60.78%. The ratio of male patients / female patients was 1.22/1 with males accounting for 28/51 cases. The main cause of distal end of the tibia fractures was traffic accidents accounting for 72.55%, due to daily life accidents accounting for 21.57%, and due to occupational accidents accounting for 5.88%. The proportion of patients with combined medical diseases was 14/51 cases. The majority of patients had associated fibula fractures, with a ratio of 49/51 cases. **Conclusion:** In this study, the distal end of the tibia fractures were common in the working age group, the cause of injury is mainly due to traffic accidents with high energy trauma, so there were often other accompanying injuries, rarely a simple fracture of the lower end of the tibia.

Key words: Lower limb, distal end of the tibia, clinical characteristic.

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I. INTRODUCTION

Distal end of the tibia fractures account for 5%-7% of all tibial fractures [1], treating this type of fracture with good results is a challenge for orthopedic surgeons due to the complexity of the fracture. Surgery is the treatment of choice, with the goal of regenerating the articular surface of the cartilage, restoring the alignment of the limb and protecting the soft tissue layer [2]. For treatment to be effective, preoperative examination and preparation play an important role in helping the surgeon prepare and predict in advance, while avoiding missing accompanying injuries. For the above reasons, the study was conducted to achieve the goal of “Surveying some clinical characteristics of patients with closed fractures of the distal end of the tibia who were osteosynthesis with a locking plate at Military Hospital 175”.

II. SUBJECTS AND METHODS

2.1. Research subjects

During the period from January 2021 to January 2024, 51 patients with isolated closed distal end of the tibia fractures or combined fibula fractures underwent surgical fixation with a locking plate and screw at Military Hospital 175.

The criteria for patient selection were patients aged 18 years or older with a distal end of the tibia fracture according to the AO/ASIF classification, closed fractures indicated for surgical fixation with a locking

plate and screw, who agreed to participate in the study, and had complete medical records according to the study requirements.

Exclusion criteria included patients with pathological distal end of the tibia fractures; fractures accompanied by complications in the lower leg area such as compartment syndrome, vascular and nerve injuries, etc.; patients with lower limb paralysis due to stroke, traumatic brain injury or spinal injury; patients with chronic medical conditions contraindicated for surgery.

2.2. Research methods

Retrospective and prospective study design.

Some characteristics evaluated include: age, gender, fracture cause, side of injury, fracture classification, and associated fibula injury.

Data analysis using SPSS 22 medical statistical software.

2.3. Ethics

The research was conducted under the permission of Military Hospital 175 and was only carried out with the consent of the research subjects. The information of the research subjects was kept confidential and was only used for research purposes. The authors commit to having no conflict of interest in the research.

III. RESULTS

Table 1: Distribution of patients by age and gender (n=51)

| Average age | X ± SD | |
|-------------|--------------------|----------------|
| | 52.76 ± 15.67 | |
| Age group | Number of patients | Proportion (%) |
| ≤ 40 | 12 | 23.53 |
| 41 – 60 | 19 | 37.25 |
| > 60 | 20 | 39.22 |
| Total | 51 | 100 |
| Gender | Number of patients | Proportion (%) |
| Male | 28 | 54.90 |
| Female | 23 | 45.10 |

Table 2: Cause of injury (n=51)

| Causes | Number of patients | Proportion (%) |
|------------------------|--------------------|----------------|
| Traffic accidents | 37 | 72.55 |
| Occupational accidents | 3 | 5.88 |
| Daily life accident | 11 | 21.57 |
| Total | 51 | 100 |

Table 3: Combined internal medical diseases (n=51)

| Characteristic | Number of patients | Proportion (%) |
|--------------------|--------------------|----------------|
| Associated disease | 14 | 27.45 |
| None | 37 | 72.55 |
| Total | 51 | 100 |

Table 4: Fracture characteristics and fracture classification (n=51)

| Injured side | Number of patients | Proportion (%) |
|--|---------------------------|-----------------------|
| Right side | 26 | 50.98 |
| Left side | 25 | 49.02 |
| Injured side | Number of patients | Proportion (%) |
| Isolated closed distal end of the tibia fracture | 2 | 3.92 |
| Combined fibula fracture | 49 | 96.08 |
| Fracture classification | Number of patients | Proportion (%) |
| A1 | 24 | 47.06 |
| A2 | 11 | 21.57 |
| A3 | 9 | 17.65 |
| C1 | 7 | 13.72 |

IV. DISCUSSION

Results from Table 1 show that the average age in this study is 52.76 ± 15.67 years old, the oldest age is 85, the youngest age is 21, in which the age > 60 accounts for the highest rate of 39.22%, followed by the 41 - 60 age group with a rate of 37.25%, the age group ≤ 40 accounts for the lowest rate of 23.53%. From the results, it can be seen that the age of distal end of the tibia fractures mainly occurred in the working age (ages from 18 - 60 accounted for 60.78%), this is the age group that often participates in traffic as well as heavy work with a higher risk of accidents than other age groups. In our study, the age group > 60 accounted for a fairly high proportion of 39.22%. In this age group, besides traffic accidents, daily life accidents are also common causes (in the study, in the age group > 60 , 5/11 patients had daily life accidents).

Regarding the gender distribution in the study according to Table 1, male patients accounted for 54.90%, higher than female patients with a rate of 45.10%. This result is similar to domestic and international studies when it was found that men often have distal end of the tibia fractures higher than women. In Vietnam, a study by Nguyen Van Duong et al. (2023) conducted at Thanh Nhan Hospital on 47 patients with closed distal tibial and fibular fractures were combined with locking plates, the result was that men

accounted for 61.7% with 29/47 cases, women accounted for 38.7% with 18/47 cases [3]. In a study by Maufrey et al. (2012), men accounted for 66.7%, women accounted for 33.3%, the male/female ratio was 2/1 [4]. From our study as well as other studies, it can be seen that the rate of men in distal end of the tibia fractures is always higher than that of women, this may be because in today's society, men often play the role of the main laborer, doing heavy work in the family, at the same time, men are also more likely to participate in traffic and their compliance with traffic laws and caution are also less than that of women, therefore, the risk of accidents in men is always higher than in women.

According to the results of table 2, the main cause of distal end of the tibia fractures is traffic accidents accounting for 72.55%, the cause due to daily life accidents accounts for a lower percentage at 21.57%, and the cause due to occupational accidents accounts for the lowest rate at 5.88%. This result may be due to the fact that in Vietnam, the main means of transportation for people is motorbikes, the traffic density is high especially in big cities, in addition, the traffic infrastructure is not really developed, so traffic accidents account for a high rate. Through analysis of causes by age, we see that in the group of causes due to daily life accidents, the proportion of patients

gradually increases with age, in which daily life accidents are most common in the age group > 60 (45.45 %), followed by the 41 - 60 year old group (36.36%), while traffic accidents are common in the working age group. This is consistent with the characteristics of each age group. For the age group from 18 to 60 years old, this is the working age, participating in traffic with high frequency, while in our country the main means of transportation of people is motorbike, high traffic density especially in big cities, in addition, the traffic infrastructure is not really developed, so the risk of traffic accidents will be higher. Meanwhile, for the age group over 60, this is the retirement age, so the frequency of participating in traffic will be lower, but the rate of chronic diseases is higher, the rate of osteoporosis will be higher, so they will be more vulnerable to household accidents.

Associated diseases play an important role in preoperative patient preparation and postoperative care. As shown in Table 3, in this study, the proportion of patients with associated medical diseases was 14/51 cases, accounting for 27.45%. The most common associated medical disease was hypertension with 10/51 patients, accounting for 19.61%, followed by diabetes with 8/51 patients, accounting for 15.69%. Hypertension is a high risk factor during anesthesia and surgery. The impact of hypertension during surgery is determined mainly by the occurrence of late complications of hypertension such as stroke, heart failure and renal failure, all of which are known to affect the rate of postoperative complications and mortality [5]. Diabetes is considered a risk factor for complications in the perioperative period of orthopedic surgery, in addition, diabetes and perioperative hyperglycemia have been reported to increase the risk of surgical site infection [6]. Therefore, surgeries should be delayed when possible,

to determine, consult with specialists to fully assess the risks of these diseases for surgery and must be actively treated before surgery on the patient.

According to the results of Table 4, the number of patients with isolated closed distal end of the tibia fractures only accounted for 3.92% with 2/51 patients, the remaining patients had combined fibula fractures, accounting for 96.08% with 49/51 cases. This is explained based on the anatomical characteristics and force transmission mechanism. The lower leg is composed of two bones, the tibia is the main load-bearing bone and the fibula runs parallel to the tibia. The fibula combines with the tibia to create an upright posture for the leg, while also stabilizing the knee and ankle joints for flexible movement. Compared to the tibia, the fibula is smaller. When the tibia is fractured, due to the force spreading through the interosseous membrane from the tibia to the fibula, it can lead to an associated fibula fracture. A study by Nguyen Ba Ngoc and colleagues (2023) at Military Hospital 103 from October 2018 to May 2023 on 37 cases of closed fractures of the distal end tibia that underwent surgical fixation with locking screws and plates showed that the rate of associated fibula fractures was 97.3% [7].

Table 4 shows that in 51 patients with distal end of the tibia fractures when classified according to AO/ASIF (Arbeitsgemeinschaft für Osteosynthesefragen/ Association for the Study of Internal Fixation), type A fractures accounted for 86.27%, type C1 fractures accounted for only 13.73%. In the group of patients with type A fractures, type A1 fractures accounted for the highest rate at 47.06%, followed by type A2 fractures with a rate of 21.57% and type A3 fractures with the lowest rate at 17.65%. The results of our study are similar to the study of Nguyen Ba Ngoc et al. (2023), with the number of

patients with type A1 fractures accounting for the highest rate of 37.9%, followed by type A2 fractures with a rate of 32.4%, only 8.1% of patients with A3 fractures, 21.6% of patients with type C fractures [7]. Thus, the results of our study are quite similar to those of other authors, in which type A fractures account for the highest proportion, with A1 fractures accounting for the highest proportion. To explain this, we found that in most studies on the results of treating distal end of the tibia fractures by locking plate fixation, the proportion of type A injuries accounts for the majority because all 3 type A injuries have bone and soft tissue characteristics suitable for plating. Meanwhile, type B, C2 and C3 injuries are not suitable for plating due to the complex nature of the injuries, with the characteristics of both bone and soft tissue injuries being very severe, easily leading to many complications such as non-union and infection after treatment. Type C bone injuries are complex bone injuries, often accompanied by severe soft tissue damage, easily leading to open fractures or complications of vascular and nerve damage, and these subjects were not included in our study and were often excluded. Therefore, patient selection may also be a contributing factor to the very low rate of type C fractures in the study, and type A injuries are more common.

V. CONCLUSION

In this study, distal end of the tibia fractures were common in the working-age group, the main cause of injury was traffic accidents with high-energy trauma, so there were often other injuries, and isolated closed distal end of the tibia fractures were rare. It is important to note that initial examination

must be careful to avoid missing accompanying injuries.

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