

# THE METHOD OF THE OPEN POSITION AND INTERNAL FIXATION IN TREATMENT OF PATIENTS WITH "PYLON" FRACTURES

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## Abstract

The “pilon” fracture, or intraarticular fracture of the distal metaepiphysis of the tibia, is a complex disease with a high percentage of unsatisfactory treatment results. In most cases, surgeons are committed a bone or transosseous osteosynthesis.

**Aim:** to show the effectiveness of open reposition and internal fixation in patients with “pilon” fracture and to emphasize the importance of computed tomography (CT) in the choice of operative access. to show the effectiveness of open reposition and internal fixation in patients with pilon fracture and to emphasize the importance of computed tomography (CT) in the choice of operative access.

**Patients and methods:** 64 patients aged 21-68 years were operated on. In most cases, there were complete intraarticular fractures of type C according to the x-ray classification AO/ASIF. Treatment results were evaluated 1-2 years after surgery on the AOFAS scale.

**Results:** It was found that in 95.3% of cases wound healing occurred by primary tension. Excellent and good result in 1-2 years was achieved in 85.9% of patients.

**Key words:** distal metaepiphysis of the tibia, “pilon” fracture, intra-articular fractures of the distal tibia, plate osteosynthesis.

## **Introduction**

An intraarticular fracture of the distal metaepiphysis of the tibia, or a "pylon" fracture, is often a severe high-energy trauma, has a multi-comminuted character and is accompanied in most cases by local damage to soft tissues of varying severity. [1]

The frequency of fracture "pylon" according to literary sources makes up 1-10% of all skeletal injuries; 1% of the fractures of the lower extremities and 5-7% of fractures of the tibia. [2; 3]

The peculiarity of the treatment of fractures of this localization is due to the need for accurate reposition of the articular surface, stable fixation of fragments in conditions of minimal traumatization of soft tissues and early activation. [4; 5; 6]

The success of open reposition and internal fixation in the treatment of patients with pylon fracture is directly related to the choice of operative access, each of which has its advantages and disadvantages. The contradictions between the desire to reduce the trauma of the operation and the need for good visualization of the articular component of the fracture determine the unsolved problem and the existing differences in the choice of optimal access and their combinations. [7; 8; 9; 10; 11]

In our opinion, the selection of the most damaged column of the "pylon" by Tang X. is the basis for the choice of operative access, minimizes the traumatization of soft tissues, while creating optimal conditions for the reposition and internal fixation. [12]

## **Materials and methods**

The study was conducted on the basis of traumatological and orthopedic Department of FGBU "Clinical hospital №1" (Volyn) 2009 to 2018 and is based on the analysis of the results of surgical treatment of 64 patients with intraarticular fracture of the distal metaepiphysis of the tibia. The study included 37 men (57.8%) and 27 women (42.2%) aged 21 to 68 years.

Criteria for inclusion in the study: closed "pylon" fractures of varying degrees of fragmentation, a satisfactory condition of soft tissues.

Exclusion criteria: severe somatic status, open fracture, soft tissue damage of the 3rd degree according to Tscherne classification, high risk of infection, hypocoagulation syndrome, osteoporosis.

As the materials of the study used discharge epicrisis, protocols of operations, CT data and radiography.

The fractures were closed. The distribution of the degree of damage according to the classification of H. G. Tscherne was: 0 degree-33% (n=21); 1 degree – 64% (n=41), 2 degree – 3% (n=2).

All patients underwent radiography of the ankle joint in standard and additional projections. According to the AO/ASIF classification, complete intraarticular fractures were mainly found: C2 (34.4%), C1 (17.2%) and C3 (15.6%), less often: in 3 (14.1%), B1 (10.9%) and B2 (7.8%).

In order to clarify the anatomical and morphological features of the nature of the fracture before the operation, computed tomography was performed. Selection of the most damaged column according to Tang X. classification determined the choice of operational access. [12]

According to Tang X classification, the distribution of the prevailing column was as follows: anterior – in 19 patients (29.7%), medial – in 18 (28.1%), posterior – in 12 (18.8%), lateral – in 15 (23.4%).

With the greatest damage to the medial column by Tang X. the front medial access was used. This provides a good view of the inner and anterior parts of the ankle, as well as the inner ankle. [10]

**Example 1.** The patient M, 42 y.o., injured by a fall from a height of 1.5 m. First aid provided abroad, produced by immobilization with a plaster langety. 3 days after the injury, the patient was taken to CH#1 with a diagnosis: closed comminuted fracture of the distal metaepiphysis of the tibia and external ankle. (43C3). The condition of soft tissues corresponded to 1 degree Tscherem. According to CT data, the greatest damage occurs on the inner column of the Tang. Surgical treatment was carried out the next day after admission. In view of this, an anterior medial access was chosen for the performance of submerged osteosynthesis. (Fig. 1)



Figure. 1. Osteosynthesis of the “pylon” fracture with the use of anterior-internal access. a - fracture of the "pylon" with the greatest damage to the inner column by Tang (CT); b - with subsequent fixation via front-internal access; c - X-ray examination of the ankle joint in 1.5 years; d - supporting function of the operated lower limb after 1.5 years; e - postoperative scars after 1.5 years; a - the volume of movements in the ankle after 1.5 years.

With the most damage to the lateral column by Tang, we used the anterior lateral approach. This provides a good overview of the outer and anterior parts of the ankle, as well as the anterior part of the tibiofibular syndesmosis. [13, 14]

**Example 2.** Patient L., 42 y.o., falling off a bicycle. She was taken to the hospital three hours after the injury by the ambulance team. Diagnosis on admission: closed intraarticular fracture of the distal metaepiphysis of the tibia with a fracture of the outer ankle (43C2). The general condition of moderate severity. The condition of soft tissues in the fracture region is 0-1 degree according to Tschern H. G. classification.

According to CT data, the greatest impression is on the outer column by X. Tang, which determined the choice of anterior lateral access. After preoperative preparation on the next day after the injury, an operation was performed: open reposition, osteosynthesis of the distal metaepiphysis of the tibia with a plate and screws were performed through the anterior-lateral access.

Osteosynthesis of the outer ankle, made by plate and screws (Fig. 2).

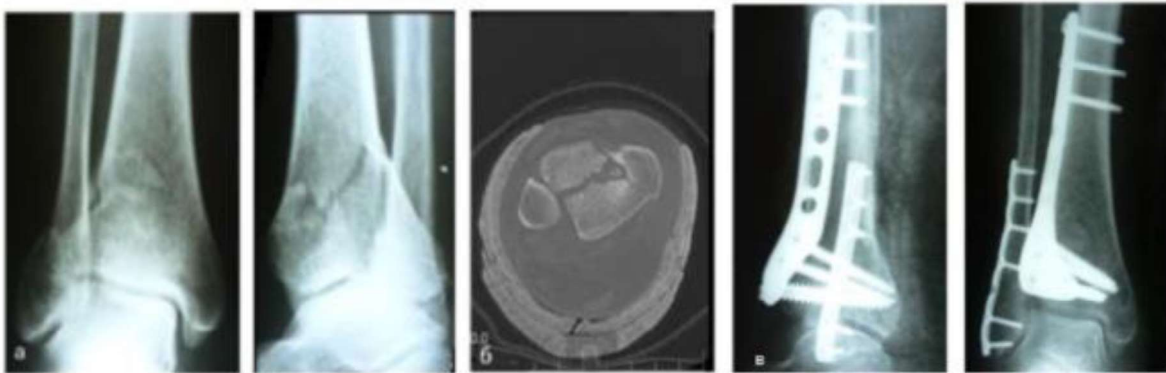


Figure. 2. Fracture of the "pylon" with the greatest damage to the outer column.

a-b – X-ray and CT scan before surgery; c - osteosynthesis of the fracture of the distal metaepiphysis of the tibia from the anterior external access, osteosynthesis of the outer ankle by the plate and screws.

On the control examination after 1.5 years, the X-ray showed complete consolidation of the fracture, restored the function of the ankle, the patient returned to an active lifestyle.

When fractures "pylon" with the greatest destruction of the rear column is advisable to perform rear access. АнглийскийПеревести вGoogleBingAlso, this access can be a method of choice in case of unsatisfactory condition of the soft tissues of the anterior surface of the ankle [15; 16].Also, this access can be a method of choice in case of unsatisfactory condition of the soft tissues of the anterior surface of the ankle. [15; 16]

**Example 3.** Patient C, 49 y.o. Injury as a result of a Traffic accident (driver). Delivered 7 hours after the injury. Somaticly not burdened. The condition of soft

tissues in the fracture region is 1-2 degree according to the classification of H. G. Tscherne on the anterior surface. Upon admission, there was a severe deformation in the area of the ankle joint. According to the CT data of the ankle joint, the greatest damage with areas of maximum impression, interposition and displacement was in the region of the rear column according to X. Tang, which determined the choice of rear access. A day after admission, surgical treatment with the use of posterior access was performed: osteosynthesis of the distal tibia with a plate and screws (the medial column is additionally fixed by a plate from a separate access) (Fig. 3).



Figure. 3. Fracture of the "pylon" with the greatest damage to the rear column. a - CT of the "pylon" zone with the greatest damage to the rear column; b - osteosynthesis of the distal metaepiphysis of both shin bones with plates and screws from the posterior-lateral approach.

On the control examination after 1.5 years, the X-ray showed complete consolidation, the volume of movements in an ankle joint is restored.

The results of surgical treatment were evaluated 1-2 years after surgery using SOFA scale. [17]

## Results

The majority of patients (84.4% of patients (n=54)) were operated within the first 48 hours after admission to the hospital.

In 61 patients (95.3%) wound healing occurred by primary tension, in 3 (4.7%) - there was a defect of postoperative wound healing, treated by skin plastics.

All patients achieved timely consolidation, confirmed by X-ray examination, as well as clinically. Full load on the operated limb is allowed on average in 10-12 weeks.

In 1-2 years after surgical treatment pain syndrome at rest and with minimal load was observed in 1 patient (1.6%). The need for additional support in the form of a cane was in 2 patients (3.1%).

The severity of posttraumatic arthrosis of the ankle joint after 1-2 years was evaluated according to the radiological classification of Kellgren-Lawrence: stage 1 – 86% (n=55), stage 2 – 14.1% (n=9).

According to the AOFAS scale: excellent results were achieved in 24 cases (37.5%), good – in 31 (48.4%), satisfactory – in 9 (14.1%).

## **Discussions**

The “pylon” fracture is a severe pathology with a high risk of complications in any of the chosen tactics of surgical treatment.

The number of publications on the use of open reposition and internal fixation as primary and final fixation has decreased since the emergence of the two-stage Protocol for the treatment of pylon fractures.

Concern about the quality of reposition, the timing of surgical treatment, increased health care costs, the possibility of infection in the area of the supporting part of the external fixator induced a number of surgeons to return to the principle of early final internal fixation [18].

Many authors apply immersion osteosynthesis in patients with a satisfactory condition of soft tissues in the first few days after injury, while receiving excellent and good results of treatment [19, 20, 21, 22].

The unresolved choice of surgical access in submerged osteosynthesis of intraarticular fractures of the distal metaepiphysis of the tibia is justified by the contradiction between the desire to reduce the trauma of the operation and the need for good visualization of the articular component of the fracture.

All types of operational access have their advantages and disadvantages. A common criterion for the choice of access in many works is the localization of the greatest damage detected by computed tomography [23].

However, in the scientific literature there are still differences in the choice of optimal access, as well as the feasibility of their combinations.

## **Conclusion**

Preoperative planning using computed tomography and selection of the most damaged column by Tang X. allows you to choose the operative access and implant, which allows you to perform the operation with minimal soft tissue damage.

Antero-medial access is used when there is the greatest damage of the interior and front of the column (46.9%); Antero-lateral - with most of the damage of the outer column and the outer edge of the front of the column (34.4%); posterior in case of damage of the rear of the column and as an alternative access when an unsatisfactory condition of the soft tissues on the anterior surface of the tibia (18.8%).

Surgical treatment of the pylon fracture by open reposition and internal fixation can be used in patients with a satisfactory condition of the soft tissues as the primary and final treatment, as evidenced by a high percentage (85.9%) of excellent and good results on the AOFAS scale.

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