

## Summary

The present study focuses on the operative treatment of intraarticular calcaneal fractures. Osteosynthesis of calcaneal fractures through an extensile lateral approach accompanies an increased risk of wound healing complications. The less invasive surgical approaches reduce these risks but achieving a fracture reduction is harder. Another problem is a technically demanding placement of a sustentacular screw. The incorrect placement of a sustentacular screw is followed by an increased risk of the screw penetration into the talocalcaneal joint. A too-long screw can threaten the anatomical structures around *sustentaculum tali*. Finally, the malposition of the screw can negatively influence the stability of the osteosynthesis. The purpose of the study was to compare the results of the treatment of calcaneal fractures using a plate osteosynthesis through an extensile lateral approach and the less invasive intramedullary fixation with C-nail using a *sinus tarsi* approach from the perspective of the incidence of wound healing complications, stability of the osteosynthesis and the functional results. Furthermore, the impact of various positions of the sustentacular screw on the stability of osteosynthesis was also analyzed. The thesis consists of two sections – clinical and experimental.

In the **clinical section**, the retrospective analysis of the results of treatment of patients (n=98) treated for calcaneal fracture using a calcaneal plate or C-nail was performed. In this group, 22 patients underwent the gait analysis using a dynamic plantography to compare the quality of restoration of the gait stereotype after the treatment of calcaneal fracture using two different surgical approaches. Furthermore, the position of the sustentacular screw was evaluated based on a postoperative CT scan. The impact of various positions of the screw on the stability of osteosynthesis was investigated.

In the **experimental section**, the stability of the model of plate osteosynthesis of a calcaneal fracture with various ways of sustentacular screw insertion was tested using the finite element method.

The lower rate of wound complications and shorter time of surgery were recorded in patients operated with C-nail while the stability of osteosyntheses was comparable regardless of the surgical method. The insertion of the sustentacular screw out of the tip of *sustentaculum tali* did not cause a significant loss of achieved fracture reduction at the end of follow-up. The intra-articular penetration of the screw was clinically significant and required an early screw removal. The results of the experimental study showed comparable stability of plate osteosynthesis when the sustentacular screw was inserted either into or under the tip of *sustentaculum tali*. The least

stable fixation was the one with the screw placed in the peripheral part of the sustentacular fragment.

In conclusion, the osteosynthesis with C-nail is an appropriate alternative to plate osteosynthesis due to the lower rate of wound healing problems. The dynamic plantography showed an earlier restoration of the gait stereotype in patients treated with C-nail. The sustentacular screw position under the tip of *sustentaculum tali* is acceptable from the perspective of the stability of the plate osteosynthesis and safer from the perspective of the risk of screw penetration into the talocalcaneal joint.

