

Summary

Hip fractures are mainly problems of the elderly population. The incidence in the Czech Republic is one of the highest in the world. They include a pertrochanteric fracture. One possibility of its therapy is intramedullary nailing. The advantages of the nailing is allowing a sliding effect of the proximal fragment which leads to better contact between fragments. Surgical procedure has its own risks and complications. We decided to evaluate a group of patients with pertrochanteric fractures treated in 2009–2011 with the PFN Medin. We analyzed the sliding effect and factors which can influence it and complications. The study cohort covers 304 patients. We found out that the sliding effect was in 195 cases (67.1%). The type of the fracture did not affect the sliding. There was no significant difference depending on the length or screw placement in the proximal fragment. We found following complications: 3 medial displacement (0.9%), 6 varus collapses (1.9%), 4 necroses of the head of the femur (1.3%), 13 cases of the femoral neck resorption (4.3%), 10 fractures around the nail (3.2%), 4 Z-effects (1.3%) and 3 „cut-out“ phenomena (1.0%). We have created a model of stable and unstable fractures with the finite element method. The analyzes focused on the placement of the neck screw, showed that in stable fractures the stability is dependent on the placement of the neck screws. In unstable fractures the system stability depends on the placement of the screws, the key factor is the proper placement in the axial view. If the neck screws are not in correct placement of the neck axis, it increases the risk of failure. In macroscopic dissection we have revealed in 20 samples risk structures that can be injured during the nail insertion. We confirmed that the surgical approach is undemanding. Intrusive surgical techniques can damage gluteus maximus and medius muscles and the branches of the superior gluteal nerve, which can be responsible for postoperative lateral hip pain. Injury to branches of the medial circumflex femoral artery may lead to avascular necrosis of the femoral head. In conclusion, we can say that the finite element analysis gives valid results. Biomechanical and clinical views support the opinion that the PFN Medin nail enables a safe treatment intertrochanteric fractures in a manner that fully meets the current concepts of clinical practice.