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TREATMENT OF CONSEQUENCES OF DISTAL METAEPIPHYSIS FRACTURES OF TIBIA COMPLICATED BY TERMINAL ANKLE ARTHROSIS

Abstract. *The objective of this research was a posthoc analysis of the surgical outcomes in patients with consequences of distal metaepiphysis fractures of the tibia. Considering their clinical and radiologic findings, all patients underwent osteoplastic fusions of ankle joints and their deformities were corrected. The ankle joints were fixated with* retrograde intramedullary interlocking tibia nails. It was found that *osteoplastic fusion of the ankle joint provides complete recovery of the supporting function of the lower limb as well as* pain management in 3-4 months after the surgical intervention.

Keywords: *posttraumatic joint deformity, ankle arthrosis, joint fusion.*

Background. Long-term observations prove that as much as 43 percent of working-age individuals who suffered fractures of distal metaepiphysis of the tibia (pilon fracture) never returned to their former profession lives impaired by post-traumatic contractures (29-50 %), acquired deformities of ankle joint (AJ) (12-20 %) and progressing of post-traumatic ankle arthrosis (60-80 %). Terminal arthrosis deformans of AJ along with pilon deformity result in persistent pain syndrome and limited functioning of the injured lower limb. Ankle fusion is the first choice surgical rehabilitation technique in such a clinical situation [1, 2]. The issue of the choice of the talotibial fixation technique remains unsolved. The experts use external compression apparatuses [3-5] and implanted constructions combined with ankle and tibia grafting depending on the clinical situation and preferences [1, 7-9, 10].

The research objective is a posthoc analysis of surgical outcomes in patients with consequences of distal metaepiphysis fractures of the tibia such as posttraumatic deformities complicated with terminal posttraumatic ankle arthrosis.

Material and methods. The follow-up group involved 16 working-age patients (11 men, mean age 47±10 y. o.; 5 women, mean age 34±15 y. o.) who suffered consequences of distal metaepiphysis fractures of the tibia and got operated in Scientific Research Institute of Traumatology, Orthopedics and Neurosurgery, Federal State Budgetary Educational Institution of Higher Education ‘V.I. Razumovsky Saratov State Medical University', the Russian Federation

Ministry of Healthcare in 2015-2019. All patients sought medical assistance, as they were not satisfied with the outcomes of their treatment in 6 months to 3 years of the time they had got injured. We examined the patients and studied their surgical outcomes with clinical and radiological methods.

The examinations revealed the dislocation of the ankle axis as well as the abnormality of anatomy interaction in the ankle caused by malunited or slow-uniting fractures of tibia and fibula, posttraumatic bone defects, signs of stage 3-4 ankle arthrosis. The combined deformities in frontal and sagittal planes prevailed in the structure of revealed deformities of the limb axis. Considering the obtained clinical and radiological data all patients underwent osteoplastic ankle fusion with epithesis. The surgery approach and the type of correcting osteotomy were chosen depending on the type of prevailing deformity. In varus deformity of the pilon with the abnormality of ankle axis, we performed the approach through the ankle front surface to enable an adequate view of the pathology area in the frontal plane. The ankle axis was restored by epimalleolar osteotomy in the apex of tibia deformity with the transection of the fibula at the level of malunited fracture, while the approach through the outer surface of the ankle joint with the ablation and abduction of the outer ankle for a better view of the pilon in the sagittal plane was considered to be the best option for valgus, antecurvature or retrocurvature ankle deformities. Arthrotomies, revisions, and ankle joint arthrolysis as well as the sparing modeling resection of the talus and tibia joint surfaces and tight apposition of talus and tibia were also performed, and the ankle and subtalar joints were fixated with the retrograde intramedullary tibial nail. The bone defects were corrected with bone powder alloplasty. The distal fibula was ablated, cleaned of soft tissues, and fixated to the outer talus and tibia, and the joint line was overlapped in the form of the autograft. The surgical intervention was completed with the active drain attaching and layered closure of the wound. The post-surgery treatment involved bandaging, antibacterial and anesthetic therapies, physiotherapeutic procedures. No additional immobilization of the operated segment was applied. After their sutures were removed the patients walked around with the controlled load on the operated limbs that rose gradually and reached its full weight in 6 weeks.

Results. The check-up examinations in 2 months of the surgeries revealed

significant pain management in the ankle joint area, the patients bore the full weight on their operated limbs and refused to use walking aids despite their physicians' recommendations. The X-ray findings featured the formation of bone ankylosis in the ankle joint area in all clinical observations in 6 to 12 months of the surgeries. One patient had the signs of inflammation around proximal fixation screws, and the intramedullary nail was removed as early as in 4 months of the surgery; the patient's ankle joint was additionally fixated in the tutor are another 2 months. In 10-14 months of the surgeries, 12 patients had their metal constructs removed due to the pain syndrome in the area around the constructs.

Discussion. The examination findings suggested that the developed deformity of the distal ankle was the key pathomorphological factor leading to the terminal arthrosis of the ankle joint. The type of deformity depends on the involvement of the anatomy sections of the pilon in the pathological process. The algorithm of surgical intervention (surgical approach, type and the level of correcting osteotomy for tibia and fibular, extent of resection of talus articular surface) is conditioned by the form of post-traumatic deformity of the distal ankle and its joint. The intramedullary fixation with the retrograde interlocking nail was preferred for the ankle joint stabilization to enable the loading of the operated limb for the time needed to form bone ankylosis.

Conclusion. We performed a posthoc analysis of the surgical outcomes in 16 patients with consequences of distal metaepiphysis fractures of tibia complicated by post-traumatic deformities and ankle joint arthrosis to find that osteoplastic fusion of ankle joint provides complete recovery of the supporting function of the injured lower limb as well as pain management in 3.4 months after surgical intervention. Epimalleolar tibial osteotomy or modeling resection of talus and tibia articular surfaces can be the options for the correction of limb anatomical axis in post-traumatic deformities of the ankle joint depending on the value of damage to medial, lateral or posterior pilon columns. No additional immobilization was needed if the ankle joint was fixated with the retrograde intramedullary interlocking nail was used thus enabling early loading of the operated limb.

Conflict of interest. The research was a part of the government assignment 121032300174-6 'Designing patient-focused approach for the choice of surgical

rehabilitation technique in patients with consequences of intraarticular fractures of distal tibia', performed by the Scientific Research Institute of Traumatology, Orthopedics and Neurosurgery, Federal State Budgetary Educational Institution of Higher Education 'V.I. Razumovsky Saratov State Medical University', the Russian Federation Ministry of Healthcare.

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