capacity, and a significant risk of permanent functional impairment. This case reinforces the axiom that "chronic osteomyelitis is a surgical disease." Modern, adequate treatment based on practice-proven protocols – involving radical debridement, effective dead space management with vascularized tissue, and appropriate stabilization – can successfully eradicate even a complex, chronic infectious process and help prevent long-term disability. Extremely thorough postoperative care and close monitoring are essential to ensure these long-term successful outcomes.

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CASE-BASED CLINICAL ANALYSIS OF SURGICAL TREATMENT OF THE CALCANEAL BONE PATHOLOGICAL FRACTURES IN PATIENTS WITH DIABETIC FOOT SYNDROME: OSTEOSYNTHESIS WITH ILIZAROV FIXATOR FOR FULL FUNCTIONAL RECOVERY

Introduction

The prevalence of diabetes mellitus is continuously increasing worldwide and represents a major global health problem. Chronic hyperglycemia leads to various long-term complications affecting the nervous, vascular, and musculoskeletal systems. One of the most serious complications is diabetic foot syndrome (DFS), which develops as a result of peripheral neuropathy, micro- and macroangiopathy, and infection, leading to progressive destruction of soft tissues and bones of the foot [1].

Clinically, diabetic foot syndrome is usually divided into neuropathic, ischemic and neuroischemic forms depending on the predominant pathological mechanism. Among these conditions, diabetic osteoarthropathy (Charcot's foot) is characterized by progressive destruction of bones and joints caused by peripheral neuropathy and abnormal mechanical load on the structures of the foot [2, 3]. These pathological changes weaken bone tissue and increase the risk of deformities and pathological fractures. Several classification systems are used in clinical practice to assess the severity of foot lesions in diabetes. Radiological diagnosis of diabetic osteoarthropathy is based on Sanders classification (Sanders L. J. and Frykberg R. G., 1991): type I with localization of the

pathological process in the metatarsal-phalangeal joints, type II with localization in the Lisfranc joint, III with localization in the Chopar joint, type IV with localization in the ankle joint and V type with localization in the subtalar joint and calcaneus [3]. Advanced stages of osteoarthropathy are accompanied by severe infection, bone destruction, and a high risk of limb loss.

Heel bone damage is considered particularly dangerous because it plays a key role in weight transfer and gait biomechanics. Osteomyelitis, chronic ulceration and osteonecrosis of the calcaneus can lead to pathological fractures and significant impairment of foot function [4]. In advanced cases, there is a need for surgical treatment (osteonecrectomy and partial resection of the calcaneus) to prevent the progression of infection and preserve the limb [5]. In this regard, the question of the possibility of using osteosynthesis of pathological fractures of the calcaneus in diabetic osteoarthropathy is relevant in order to prevent the development of these complications and complete functional recovery [6].

Goal

The aim of this study was to investigate the possibility of surgical treatment of pathological calcaneus fractures in patients with diabetic foot syndrome, as well as to analyze clinical results and determine the possibilities of preserving the limb and restoring functionality in patients with this severe complication.

Material and methods of research

This work was performed as a descriptive case-based clinical analysis of two patients with pathological fractures in patients with diabetic foot syndrome. The following parameters were evaluated from the case histories: age, affected side, probable etiologic background, clinical diagnosis, type of surgical intervention, and postoperative outcome. Particular attention was paid to the ability of effective type of osteosynthesis with full functional recovery.

Both patients had long diabetes mellitus history with diabetic foot syndrome complicated with diabetic osteoarthropathy (Charcot foot). After X-ray and Computed tomography verification of the lesion, osteosynthesis of the calcaneal bone was performed, followed by rehabilitation. The observations were compared in order to identify clinically relevant patterns that may help improve treatment modality in clinical practice and reduce the risk of chronic disability.

The results of the research and their discussion

Case 1. Patient H, born in 1972, sought help for deformity and formation of an ulcer on the sole of her right heel. She was diagnosed with right foot diabetic osteoarthropathy type V according to Sanders classification. Pain in the left foot appeared more than 2 years before the operation. For a long period, the patient received conservative treatment – painkillers, temporary fixation. During the 6 months before the operation, the patient developed severe pain in the heel, then an ulcer and fistula formed. During X-ray examination, the patient was diagnosed with a pathological fracture of the heel bone. Conservative treatment of total castes with bandages and bandages did not bring results.

To correct the problem, osteosynthesis was performed using screws and K-wires, as well as a skin graft. After the operation, it turned out that osteosynthesis did not work, so the metal implants were removed. Calcaneal osteosynthesis was performed using Ilizarov apparatus. After 3 months, the fusion was diagnosed, and in 2019 the device was removed. The patient returned to her normal physical activity and walking with full support. The effect of treatment has been preserved for more than 6 years.

Case 2. Patient P, born in 1985, sought help for deformity and ulcer in the sole of his right heel. For a long time suffers from diabetes. 9 months ago, pain appeared in the right foot. Conservative treatment was prescribed – walking with crutches and anti-inflammatory drugs. After X-ray examination, the patient was diagnosed with diabetic osteoarthropathy (ARP) of the right foot, type V according to Sanders classification. Due to the constant load on the foot, the fragments shifted with the formation of an ulcer and an extensive skin defect. The patient was sent for treatment to

the 3rd surgical department of the Homel City Clinical Hospital No. 3 where the infected wound was sanitized; the extensive ulcer defect was cleared and covered with autodermoplasty.

After healing the defect and stopping the infectious process, the patient sought help due to severe deformation of the right foot and the inability to rest on the right leg. Due to the pronounced displacement of calcaneal fragments, an Achilles tendon extension with local skin plasty was performed, as well as an open reduction of the right calcaneus with osteosynthesis in the Ilizarov fixator. The pathological processes were stopped, and the patient continues treatment in the Ilizarov fixator until complete bone fusion is achieved.

The comparison shows that delayed surgical treatment of pathological calcaneal fractures in diabetic osteoarthropathy is a problem that prolongs ineffective treatment and increases the risk of permanent deformity and disability. Earlier X-ray and CT diagnosis in patients with diabetic osteoaropathy may shorten the path to definitive treatment. Initial treatment is usually conservative and includes total cast fixation in the acute period and long-term targeted osteotropic chemotherapy. Surgery should be considered when the absence of calcaneal fusion is detected after a period of immobilization or after ulceration healing. The use of Ilizarov's fixative should be considered as an effective method of osteosynthesis.

In case of displacement of fragments under the influence of the Achilles tendon and the formation of foot deformity, osteosynthesis with the Ilizarov fixator should be supplemented with lengthening of the Achilles tendon and local skin plasty to cover the defects.

Recovery after surgery takes place in stages: the early period focuses on protecting wounds and components of the apparatus from microbial contamination and pain control; later phases require maintenance compression and correction in the Ilizarov fixator. After achieving fusion and dismantling of Ilizarov fixator, passive and active range of motion is restored, then force, neuromuscular control and return to vertical load. The complete recovery observed in the first patient shows that an accurate diagnosis, the use of Ilizarov fixator and disciplined rehabilitation together can restore function even in advanced cases.

Conclusions

Pathological calcaneal fractures in patients with diabetic foot syndrome represent a serious complication associated with neuropathy, infection, and impaired bone regeneration. Early diagnosis through clinical evaluation and radiological examination is critical to prevent severe complications.

Complex management, including infection control, unloading of the affected limb and active surgical treatment using osteosynthesis in the Ilizarov fixator, can provide bone fusion and functional recovery of these patients.

Further clinical studies are needed to optimize diagnostic and surgical approaches in patients with heel bone fractures associated with diabetic osteoarthropathy.

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