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CHRONIC IATROGENIC OSTEOMYELITIS: A CASE-BASED ANALYSIS OF PREVENTION FAILURES AND THE IMPERATIVE OF ADHERING TO STANDARD SURGICAL PROTOCOLS

Introduction

Osteomyelitis, an infection of the bone and bone marrow, is most commonly caused by bacterial pathogens, with *Staphylococcus aureus* being the predominant isolate. While acute osteomyelitis can often be managed effectively with prompt intervention, the chronic form represents a persistent, deep-seated infection that fundamentally alters bone physiology. It is characterized by the presence of avascular necrotic bone (sequestrum) that harbors microorganisms beyond the reach of systemic antibiotics, making combined surgical and medical management mandatory [1, 2].

The transition to chronicity typically results from inadequate or delayed initial treatment, or from the presence of foreign materials, such as orthopedic hardware, which act as a nidus for infection [3]. Iatrogenic osteomyelitis, a preventable subset, arises directly from surgical procedures. The burden of this condition is profound, extending beyond the immediate infection to encompass prolonged patient suffering, repeated hospitalizations, multiple surgeries, significant functional impairment, and substantial socioeconomic costs due to disability and lost productivity [4]. Globally, chronic osteomyelitis remains a significant health challenge, with higher incidence in developing nations where access to timely and specialized care may be limited [5].

The cornerstone of treatment for chronic osteomyelitis is radical surgical debridement (sequestrectomy) to remove all non-viable tissue until healthy, bleeding bone is reached. This is followed by the obliteration of the resulting dead space, often requiring vascularized muscle flaps or bone grafts, and targeted antibiotic therapy [6, 7].

Goal

The aim of this study was to analyze the clinical importance of preventing chronic osteomyelitis by strictly adhering to standard surgical protocols, using a detailed case analysis to illustrate the consequences of iatrogenic deviation.

Material and methods of research

This work is a descriptive clinical case analysis of a patient who experienced two distinct episodes of iatrogenic chronic osteomyelitis. Data were extracted from the patient's medical records. The following parameters were assessed: the probable etiological background, tactical errors in surgical and postoperative management, the sequence of treatment stages, the types of surgical interventions performed, and the final postoperative outcomes. Particular attention was paid to identifying the factors that contributed to the development and persistence of the infectious complications and evaluating the methods used to ultimately combat them.

The results of the research and their discussion

Patient L., born in 1975, was diagnosed in 2022 with neuropathy of the right peroneal nerve, resulting in an equinus deformity of the right foot ("foot drop"). Due to the ineffectiveness of conservative therapy, a surgical release and decompression of the peroneal nerve at the level of the knee joint was performed at a specialized neurosurgical center.

The immediate postoperative period was complicated by the formation of a synovial fistula. This fistula subsequently became infected, leading to the development of chronic prepatellar bursitis. In 2023, a surgical excision of the bursa and closure of the fistulous tract were performed.

Despite these interventions, the synovial fistula recurred and progressed to contact osteomyelitis involving the distal femur and proximal tibia. Consequently, in 2024, a radical fistulonecrectomy combined with primary arthrodesis of the right knee joint was performed using a combined Ilizarov pin-rod external fixator. Six months later, as fusion was achieved, the external fixator was removed.

Shortly thereafter, a new fistulous form of perifocal osteomyelitis developed in the diaphyseal region of the anterior tibia. A limited debridement of this osteomyelitic focus in 2025 proved ineffective.

On January 21, 2026, a radical fistulo-osteonecrectomy was finally performed. The resulting dead space was obliterated using a pedicled muscle flap ("muscle tamponade"), which successfully resolved the infectious process.

However, due to severe osteoporosis and the bone stock loss from the extensive resection, a pathological fatigue fracture of the right tibia occurred. To stabilize the fracture and correct the recurrent foot drop, osteosynthesis of the tibial fracture and corrective arthrodesis of the ankle joint were performed using the Ilizarov apparatus. The pathological process is currently controlled, and the patient continues treatment in the external fixator until complete bone consolidation is achieved.

Conclusions

This case provides a stark illustration of how a cascade of complications can arise from minor deviations in surgical and postoperative care, ultimately leading to severe, chronic iatrogenic osteomyelitis. The initial error was likely an unrecognized or inadequately managed iatrogenic injury to the synovial membrane during the primary nerve decompression, which led to the formation of a persistent synovial fistula.

The subsequent failure to adhere to the principle of early and definitive closure of the fistula, opting instead for prolonged conservative management, allowed for ascending infection. This created a pathway for pathogens to reach the epiphyseal regions of the femur and tibia, resulting in chronic osteomyelitis.

Furthermore, the management of the first episode of osteomyelitis via knee arthrodesis was compromised by a deviation from another standard protocol. The use of transosseous rods in the external fixator for a period exceeding the recommended two months created a second portal of entry for infection. This led to the development of a new, distinct focus of pin-track-related osteomyelitis in the tibial diaphysis. This highlights a critical principle: external fixation devices, while invaluable, must be used with strict adherence to timelines and meticulous pin-site care to prevent iatrogenic complications.

The turning point in this patient's journey came with a return to fundamental, evidence-based principles for managing chronic osteomyelitis. The radical resection of all infected and devitalized tissue, combined with the immediate transfer of a well-vascularized muscle flap to obliterate the dead space, successfully eradicated the infection. This approach restores local blood flow, delivers antibiotics effectively, and provides a biological barrier against recurrence. Subsequent stabilization of the resultant pathological fracture in the Ilizarov apparatus provided the necessary mechanical environment for bone healing. This case demonstrates that while failure to follow protocols leads to poor outcomes, a return to these very protocols can eventually salvage the limb and halt the infectious process.

This clinical case powerfully demonstrates that chronic osteomyelitis can become a devastating and disabling complication following routine surgical procedures. The primary causes were twofold: first, a failure to meticulously manage iatrogenic soft tissue damage, and second, non-adherence to the established safety protocols for the duration of external fixator component use.

Late recognition and suboptimal initial management led to the chronification of the infection, resulting in prolonged ineffective treatment, reduced mobility, diminished physical and occupational

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