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A NOVEL METHOD FOR SURGICAL TREATMENT OF OSTEOMYELITIS OF DISTAL PHALANX: A CLINICAL CASE

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ABSTRACT — **BACKGROUND:** Osteomyelitis is an infectious-inflammatory destructive bone disease caused by nonspecific and specific microflora, or microbial communities. Diabetes mellitus is the most common pathology associated with osteomyelitis and may be responsible for exacerbation of chronic osteomyelitis. **OBJECTIVE:** to demonstrate a new patented technique for surgical treatment of osteomyelitis of distal phalanx (I finger) on the example of a clinical case. **METHODS:** A female patient P. 34 years old, who has type 2 diabetes mellitus, decompensated. Daily glucosometry shows changes in capillary blood glucose from 7 to 25 mmol/L during the last month; the last blood test for HbA1c — 10.4%, it should be noted that the patient adheres to the diet prescribed by the endocrinologist and receives drug therapy according to treatment standards, however, attempts to compensate the disease have been failed. The patient suffers from obesity of 1 degree (BMI = 30.11). **RESULTS:** Operation: after preparation of the surgical site with Betadin's solution, local anesthesia according to Oberst-Lukashovich (injection of 3 ml 2% Lidocaine solution on each side into the lateral surfaces of the I finger of the right hand from the place of harness application, proximal to the intervention area) was provided. Extraction of the nail plate with dissection of soft tissues along the phalanx and along the projection of the nail bed and rotation of tissues downwards to expose the bone destruction focus. Then necrectomy of the damaged bone was performed followed by sanitization and returning of soft tissues to their place without suturing. **CONCLUSION:** The given example of surgical treatment of finger osteomyelitis has undeniable advantages due to a number of reasons: elimination of traumatization of finger's working surface, achievement of cosmetic effect, preservation of aesthetic and function of hand, as well as all types of sensitivity of finger skin. It is worth noting that this method of surgical treatment of osteomyelitis has more favorable course of the postoperative period due to a shorter duration of pain syndrome and the general reaction of the body.

KEYWORDS — Osteomyelitis, distal phalanx, surgery, aesthetics.

RELEVANCE

Osteomyelitis is an infectious-inflammatory destructive bone disease caused by nonspecific (*S. aureus*, *S. epidermidis*, less often *E. faecalis*, *P. aeruginosa*, *E. coli*, etc.) and specific microflora (*M. tuberculosis*, *T. pallidum*, etc.), or microbial communities. The most common osteomyelitis causative agent is golden staphylococcus, which was isolated from pus of patient with osteomyelitis by French microbiologist and chemist Louis Pasteur in 1880. Pathogenic microorganisms can get into the bone tissue in the result of injury of soft tissues located in close proximity to the bones; through damaged joint tissues and open fractures, as well as from contiguous or distant focus of infection (for example, in case of tonsillitis).

Finger osteomyelitis, or bone panaritium, is a result of dissemination of the pathological process from the soft tissues of the finger to the bone. Signs of osteolysis can be determined only by the end of the 2nd or beginning of the 3rd week of the disease on finger radiograph images. Visualisation and treatment of osteomyelitis remains difficult, because of depending on the age of patient, type of inflammatory process (acute or chronic), way of spreading (hematogenic or non-hematogenic), as well as on the state of the vessels of any anatomical region and on the immune status of the patient [1]. It is known that reduced immune resistance contributes to the development of infectious-inflammatory disease and the addition of secondary infection.

Various disorders of the humoral immune system (low level of complement factor C4, decreased cytokine activity after stimulation) are described in patients with type 2 diabetes mellitus [2].

Dysfunction of immune response is caused by hyperglycemia which characterizes diabetes mellitus [3]. Diabetes mellitus is a chronic endocrine-metabolic disease that develops due to impaired secretion and/or action of insulin in tissues, attributed to hyperglycemia and disruption of all types of metabolism leading to various complications. Blood examination for glycat-hemoglobin (glycohemoglobin, HbA1c) is the most important diagnostic sign and the dominant indicator of chronic glycemia [4]. Blood glucose measurement, unlike HbA1c, shows its level only at the time of the study, while HbA1c provides information on the aver-

age glucose level over the past 8–12 weeks [5]. In patients with diabetes mellitus, level of HbA1c depends on the level of hyperglycemia: the higher the level of HbA1c, the higher the hyperglycemia in recent months is and, accordingly, the risk of developing complications of diabetes mellitus is greater.

Therefore, in patients with diabetes mellitus, HbA1c is used as a predictor of risk of microvascular complications [5].

Metabolic disorders in diabetes mellitus affect various organ systems [6]. The most frequent and multiple are diseases of the musculoskeletal system as the result of microangiopathy, pathological changes in connective tissue and peripheral nerves associated with chronic hyperglycemia. Their prevalence in patients is usually correlated with poor glycemic control. Although the most of musculoskeletal complications of diabetes mellitus are usually not life-threatening, they often cause serious diseases and worsen the quality of life of patients [7, 8]. Diabetes mellitus is the most common pathology associated with osteomyelitis and may be responsible for exacerbation of chronic osteomyelitis [9].

Aim:

to demonstrate a new patented technique for the surgical treatment of osteomyelitis of distal phalanx (I finger) on the example of a clinical case.

MATERIALS AND METHODS

A female patient P. 34 years old has decompensated type 2 diabetes mellitus. Daily glucosometry shows changes in capillary blood glucose from 7 to 25 mmol/L during the last month; the last blood test for HbA1c — 10.4%. It should be noted that the patient adheres to the diet prescribed by the endocrinologist and receives drug therapy according to treatment standards, however, attempts to compensate the disease have been failed. The patient suffers from obesity of I degree (BMI = 30.11).

The study took place at Polyclinic No. 1 of the Municipal clinical hospital No. 7 in Tver (Russia), where the patient first saw a surgeon with complaints of pain and swelling in the area of the distal phalanx of the first finger of the right hand.

The surgical method used is covered by patent RU 2745028 C1 18.05.2020, <https://www.elibrary.ru/item.asp?id=45807088>.

RESULTS AND DISCUSSIONS

During the first contact with the surgeon, the patient was complaining for pain of the area of the first right finger, which appeared about two weeks ago after an injury at home. The patient did not seek for medi-

cal help before. At the moment of examination, the patient's body temperature was 37.5° C. Status localis: the distal phalanx of the first finger of the right hand is swollen, skin in the phalanx is hyperemic, during palpation and movement there is acute pain. Fluctuance is observed in the area of the medial nail fold, which indicates the presence of a purulent focus. Paronychia of the I finger of the right hand was diagnosed. Based on the anamnesis and examination of the patient, surgery was proposed. After obtaining the patient's informed consent it was carried out.

Surgery plan: preparation of the surgical site with Betadin's solution, local anesthesia according to Oberst-Lukashevich (injection of 3 ml 2% Lidocaine solution on each side into the lateral surfaces of the I finger of the right hand from the place of harness application, proximal to the intervention area) was provided. Purulent focus was opened with the release of thick yellow purulent content; repeated treatment of the surgical site and application of an aseptic bandage with Levomecol ointment (chloramphenicol + methyluracil). Daily bandages with Levomecol ointment (chloramphenicol + methyluracil) were prescribed. Next day, the control radiograph image of the I finger of the right hand was performed, the image determined decrease of bone density, structure heterogeneity of the nail phalanx of the I finger of the right hand, the articular surface is not changed, preserved and clear. Soft tissues are infiltrated.

Report: osteomyelitis of the distal phalanx I finger of the right hand. It was decided to carry out conservative therapy, oral antibacterial drugs were added to the bandages – Lincomycin 250 mg 2 tablets 3 times a day for 1 month. Bandages with antibacterial drugs were carried out daily, minor serous secretion from the wound was noted.

After 2 weeks against the background of conservative therapy, the patient felt herself worse, I finger of the right hand swelled, hyperemia and pain during movement appeared. The symptoms were eliminated after a week of daily bandages. I finger of the right hand was radiographed, total destruction (sequestration) of the terminal phalanx I finger of the right hand except articular surface was determined. Conclusion: osteomyelitis of the distal phalanx I finger of the right hand.

Based on the anamnesis and examination of the patient, surgery was proposed. After obtaining the patient's informed consent it was carried out. After preparation of the surgical site with Betadin's solution, local anesthesia according to Oberst-Lukashevich (injection of 3 ml 2% Lidocaine solution on each side into the lateral surfaces of the I finger of the right hand from the place of harness application, proximal to the

intervention area) was provided. Extraction of the nail plate with dissection of soft tissues along the phalanx and along the projection of the nail bed and rotation of tissues downwards to expose the bone destruction focus. Then necrectomy of the damaged bone was provided followed by sanitization and returning of soft tissues to their place without suturing.

It was prescribed to continue antibacterial therapy (Linkomycin 250 mg 2 tablets 3 times a day for 10 days), bandages with Levomecol ointment (chloramphenicol + methyluracil) and Betadin solution (povidone iodine). On the control radiograph image of the first finger of the right hand a defect of the nail phalanx, the remaining base of the phalanx was determined. Contours were unclear, structure is heterogeneous, soft tissues are infiltrated. Conclusion: phalangeal osteomyelitis. Condition after surgical treatment (Fig. 1).

For the first time during the surgery shape and size of the finger were maximally preserved (Fig. 2). In addition, the novelty is closure of the postoperative scar with a growing nail plate, and therefore the traumatization of the working surface of the finger will be eliminated in future. Application of the proposed technique made it possible to reduce duration of pain syndrome in postoperative period, to carry out prevention of risk of disturbance of sensitivity of surgical site, development of scar deformation and limitation of mobility. The obvious advantages of this operation are the cosmetic effect which allows to preserve the aesthetic function of the hand, which is especially important for the female sex. In addition, the support function of the finger is preserved due to the nail plate, as well as the preservation of all types of sensitivity of the skin of the finger.



Fig. 1.



Fig. 2.

CONCLUSION

The given example of surgical treatment of finger osteomyelitis has undeniable advantages due to a number of reasons: elimination of traumatization of finger's working surface, achievement of cosmetic effect, preservation of aesthetics and hand function,

as well as all types of sensitivity of finger skin. It is worth noting that this method of surgical treatment of osteomyelitis has a more favourable course in the postoperative period due to a shorter duration of pain syndrome and the general body reaction.

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