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Look under the sheets – a case report of diabetic foot

Marcin Makuch[1], Marcelina Makuch[2]

[1] Chair and Department of Internal Medicine, Medical University of Lublin, Poland

[2] Chair and Department of Pneumonology, Oncology and Allergology, Medical University of Lublin, Poland

Corresponding author:

Marcin Makuch

ul. S. Staszica 16,

20-081 Lublin, Poland,

e- mail: marcinm45@gmail.com

ABSTRACT

Diabetic foot is a long-term complication of diabetes mellitus that results directly from peripheral arterial disease or sensory neuropathy affecting the feet in diabetes mellitus. Diabetic foot is rare, but potentially lethal complication associated with the diabetes. The management of diabetic foot infections requires assessing the microbial etiology, attentive wound management, good nutrition, antimicrobial therapy and glycemic control. In several clinical circumstances, surgical resection is preferable.

A 65-year-old patient with 2-month necrosis of the second toe of the left foot and recurrent fever is presented. Diabetic foot developed. Citrobacter koseri was isolated from bone cultures. Intravenous treatment with amoxicillin + clavulanic acid and metronidazole was administered for 2 weeks and the wound was poorly recovered. After a surgical consultation, the patient was qualified for the amputation of the second toe of the left foot.

Key words: diabetic foot, *Citrobacter koseri,* infection

CASE REPORT

A 65-year-old patient was admitted to the Department of Internal Diseases with a history of 2-month necrosis of the second toe of the left foot, recurrent fever and high parameters of inflammation. The patient was diagnosed with type 2 diabetes mellitus fifteen years ago. The diagnosis was accompanied by peripheral neuropathy with no signs of diabetic arthropathy. Diabetes was not under control in spite of using metformin 1500 mg orally and insulin therapy (isophane insulin and insulin lispro – the dosages according to glycemia). In the last 5 years patient needed several admissions in hospital due to recurrent infections.

Physical examination on the day of admission revealed fever (38°C), elevated blood pressure (145/90 mmHg), tachycardia (110 beats per minute), and saturation of 95% at ambient air. The patient presented redness and sole ulcer on left feet: 1,5x2,5 cm wide with exudation and bad smell. Wound was painful and spreading in nature. Physical examination also revealed thin skin, lack of skin hair, and bluish skin color of all left foot fingers. Aspiration culture from wound and bone revealed *Citrobacter koseri.* ABI testing was performed: the result was acceptable.

Laboratory investigation showed leukocytosis (white blood count of 13,54 x 10^3/L), anemia (hemoglobin of 11,5 g/dl) and hyponatremia (126 mmol/L). Furthermore, urinalysis demonstrated ketonuria (ketones of 20 mg/dl), glucosuria (glucose in the urine of 1000 mg/dl) and proteinuria (protein in the urine of 50 mg/dl). An electrocardiogram revealed no acute ischemic changes. Chest x-ray showed no abnormalities.

Left foot radiograph (Figure 1 and Figure 2) detected:

Finger II: loss of tuberosity and distal part of the distal phalanx shaft, subluxation of the proximal interphalangeal joint, areas of brightening corresponding to the presence of gas visible in the projection of soft tissues. The remaining bone structures within the normal radiograph.

Taking into account the clinical picture, diabetic foot was diagnosed. Antibiotic therapy and local treatment were applied. The patient was treated with amoxicillin + clavulanic acid, metronidazole, metformin, isophane insulin and insulin lispro, ramipril, amlodipin, allopurinol, sulodexide, and fluid therapy.

Figure 1 and Figure 2: Loss of tuberosity and distal part of the distal phalanx shaft is seen in the finger II. It is also noticeable that there is subluxation of the proximal interphalangeal joint. Areas of brightening corresponding to the presence of gas are visible in the projection of soft tissues.

After a surgical and angio-surgical consultation, the patient was qualified for the amputation of the second toe of the left foot. The patient was transferred to the SPSK 1 Trauma Surgery Clinic for surgical treatment.

DISCUSSION:

Diabetic foot is an important cause of foot amputations and morbidity in patients with diabetes. Diabetic foot is a long-term complication of diabetes mellitus that results directly from peripheral arterial disease or sensory neuropathy affecting the feet in diabetes mellitus.
The most important risk factors of ulcers and foot amputation among diabetic patients are:

- ✓ neuropathy (loss of protective sensation)
- ✓ previous foot ulceration
- ✓ the effects of chronic ischemia, typically due to peripheral artery disease or another vascular disease
- ✓ foot deformity leading to excess pressure
- ✓ infection
- ✓ external trauma [1, 2].

There are several prophylactic foot care recommendations:

- ✓ systematic feet examination: assessment of pedal pulses, examination of sensory disorders, identifying problems with nail care, poorly fitting footwear, fungal infections and callus formation
- ✓ regular podiatry treatments (removal of calluses and hyperkeratosis)
- ✓ avoidance of smoking
- ✓ avoidance of going barefoot, especially on hot decks and hot sands
- ✓ testing water before stepping into bath
- ✓ trimming toenails to shape of the toe, and remove sharp edges with a nail file
- ✓ washing i lukewarm water, dry thoroughly and check feet daily
- ✓ shoes should be snug, but not tight, and customized if feet are misshapen or have ulcers, socks should fit and be changed daily [3].

The evaluation of an existing diabetic foot ulcer includes careful examination and classification of the wound. The presence of a diabetic foot infection is likely if there is erythema, warmth, tenderness, swelling, or pus coming out of an ulcer site. The definitive diagnosis of osteomyelitis is made through histologic and microbiologic evaluation of a bone biopsy sample. What findings make you suspect a diabetic foot during a physical examination?

- ✓ lesions between adjacent toes due to pressure from tight shoes cramming them together
- ✓ "athlete's foot" – macerated lesions between the toes, often painless – these areas may be the source of bacterial infection
- ✓ bunions (callused areas)
- ✓ when the tissue is damaged: erythema, warmth or fissures might be observed [4].

Patients with clinical evidence of diabetic foot should be assessed for peripheral artery disease: checking pedal pulses and temperature is advisable. If pedal pulses are absent, popliteal and femoral pulses shall be assessed. In case of doubt, ankle-brachial pressure index (ABI) testing is decisive. ABI is calculated by measuring the systolic blood pressure (by Doppler probe) in the brachial, posterior tibial, and dorsalis pedis arteries. Moreover, loss of protective sensation should be assessed. Semmes-Weinstein 10g monofilament might be used to detect loss of sensation in the foot. Laboratory testing should evaluate leukocytosis, glycemic control, electrolyte, renal function and acid base status. C-reactive protein (CRP) can be useful for monitoring the inflammation status. Conventional plain radiographs can evaluate structural foot deformities, soft tissue gas, and foreign bodies and may be able to detect osteomyelitis. The management with diabetic foot includes assessing the microbial etiology. The microbiology of diabetic foot wounds varies with the severity of involvement. Aerobic gram-positive cocci often are associated with superficial infections whereas deep, chronically infected ulcers are more likely to be polymicrobial [5, 6].

In our patient *Citrobacter koseri* was isolated from the wound. *C. koseri* is aerobic, Gram-negative non-spore-forming bacillus belonging to *Enterobacteriaceae*. *C. koseri* is considered an opportunistic infection that rarely causes musculoskeletal infections. The most common sites that *Citrobacter* species cause infections are urinary tract, gastrointestinal tract, wound or decubitus and other sites respectively. *Citrobacter* infections are usually found in neonates, immunocompromised and old patients. *C. koseri* is an important cause of neonatal meningitis and brain abscess formation. *C. koseri* can be a cause of osteomyelitis in patients

with underlying predisposing factors. *Citrobacter* osteomyelitis in the older patients often results from direct spread of a soft tissue infection because of vascular compromise such as diabetes mellitus, and bone cultures may yield mixed microorganisms [7].

Management of diabetic foot infections requires attentive wound management, good nutrition, antimicrobial therapy, glycemic control, and fluid and electrolyte balance. Wound management includes attentive local wound care including debridement of callus and necrotic tissue, wound cleansing, and relief of pressure on the ulcer. Extensive surgical debridement or resection is preferable in the following clinical circumstances:

- ✓ persistent sepsis without an alternate source
- ✓ inability to receive or tolerate appropriate antibiotic therapy
- ✓ progressive bone deterioration despite appropriate antibiotic therapy
- ✓ chronic lower limb ulcers (infected or not) due to peripheral neuropathy or vascular disease
- ✓ mechanics of the foot are compromised by extensive bony destruction requiring correction
- ✓ surgery is needed to achieve soft tissue wound or primary closure [8, 9].

LITERATURE:

1. Lipsky BA, Berendt AR, Cornia PB, et al. 2012 Infectious Diseases Society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. Clin Infect Dis 2012; 54:e132.
2. Shakil S, Khan AU. Infected foot ulcers in male and female diabetic patients: a clinico-bioinformative study. Ann Clin Microbiol Antimicrob 2010; 9:2.
3. https://www.niddk.nih.gov/health-information/diabetes/overview/preventing problems/foot-problems
4. American Diabetes Association. 11. Microvascular Complications and Foot Care: Standards of Medical Care in Diabetes-2020. Diabetes Care 2020; 43:S135.
5. Wu L, Norman G, Dumville JC, et al. Dressings for treating foot ulcers in people with diabetes: an overview of systematic reviews. Cochrane Database Syst Rev 2015; :CD010471.
6. Elraiyah T, Tsapas A, Prutsky G, et al. A systematic review and meta-analysis of adjunctive therapies in diabetic foot ulcers. J Vasc Surg 2016; 63:46S.
7. Yaggi S, Arslan K, Tufan Z, et al. Osteomyelitis Due to Citrobacter koseri Infection in a Diabetic Patient. J Endocrinol Metab 2011; 1(3): 146-148.
8. Lipsky BA, Berendt AR, Cornia PB, et al. 2012 Infectious Diseases Society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. Clin Infect Dis 2012; 54:e132.
9. Musuuza J, Sutherland BL, Kurter S, et al. A systematic review of multidisciplinary teams to reduce major amputations for patients with diabetic foot ulcers. J Vasc Surg 2020; 71:1433.