

The Solution to the Problem Lies in Diabetic Foot Care Team: Case Report

Sorunu Diyabetik Ayak Timi Çözer

İlgin YILDIRIM ŞİMŞİR,^a
Lamia ÇİMEN,^a
Serhat UYSAL,^b
Anil Murat ÖZTÜRK,^c
Meltem İŞIKGÖZ TAŞBAKAN,^b
İlgen ERTAM,^d
Şevki ÇETİNKALP^a

^aDivision of
Endocrinology and Metabolism,
Departments of

^bInfectious Diseases and
Clinical Microbiology,

^cOrthopedics and Traumatology,

^dDermatology,
Ege University Faculty of Medicine,
İzmir

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Yazışma Adresi/Correspondence:

İlgin YILDIRIM ŞİMŞİR

Ege University Faculty of Medicine,

Division of Endocrinology and Metabolism,

İzmir,

TÜRKİYE/TURKEY

ilginyildirim@hotmail.com

ABSTRACT Diabetic foot care/treatment requires mechanical, microbiological, vascular and metabolic risk assessment. We would like to share the process of a patient with diabetic foot infection and peripheral arterial disease through a multidisciplinary diabetic foot care team. Debridement was performed to the patient who presented with complaints on a wound in diameter of 20x10 cm on the right leg, Wagner stage 3. Discharge, redness and swelling were decreased with daily medical dressings. On the follow-up of patient was observed with significant improvement in diabetic foot ulcers, existing granulation tissue on their leg sores. However, wound depth was so wide and deep. So an autograft was performed after application of growth factors. The patient was brought into the social life with closing all the wounds.

Key Words: Diabetic foot; amputation; foot ulcer; peripheral arterial disease

ÖZET Diyabetik ayak bakımı/tedavisi mekanik, mikrobiyolojik, vasküler ve metabolik risk açılardan değerlendirilme gerektirir. Biz burada, diyabetik ayak enfeksiyonlu ve periferik arter hastalığı olan bir hastanın multidisipliner diyabetik ayak bakımı timi tarafından ele alınma sürecini paylaşmak istedik. Sağ bacağına 20x10 cm çapında, Wagner evre 3 yara şikayeti olan hastaya debridman yapıldı. Günlük pansumanlarla akıntı, kızarıklık ve şişlik azaltıldı. Hastanın takibinde, diyabetik ayak ülserlerinde belirgin iyileşme, yaralar üzerinde granülasyon dokusu gelişmesi gözlemlendi. Ancak yara çok derin ve geniş idi. Bu nedenle, büyüme faktörleri uygulandıktan sonra otogreftleme yapıldı. Yaraları kapanan hasta sosyal yaşamına geri döndü.

Anahtar Kelimeler: Diyabetik ayak; amputasyon; ayak ülseri; periferik arteriyel hastalık

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About 15% of people with diabetes experience a foot ulcer at some point in their entire lives. Foot problems are associated with 20% of all hospital admissions among people suffering from diabetes. Approximately 40-60% of all non-traumatic lower extremity amputations are associated with diabetes. The rate of contralateral amputation within 2 years after the first amputation has been reported to be 50%. This is the most common complication resulting in hospitalization. It is also associated with loss of work, disability and psychosocial trauma. The rate of amputation is 22 times higher in people with diabetes compared to those without.¹ The

costs related to the treatment of foot wounds have been reported to be above 6 billion dollars whereas treatment-related costs for those undergoing amputation reach 1.6 billion dollars annually in the USA.²

Diabetic foot care/treatment in all stages requires a multidisciplinary approach. An evaluation should include mechanical, microbiological, vascular and metabolic aspects of the disease. Education is of primary importance in all stages for appropriate foot care. A good metabolic control of blood glucose, lipids and blood pressure is important in each stage. A good glycemic control can help eradication of the infection and promotion of wound healing.³ The DCCT study demonstrated that neuropathy was reduced clinically and electrophysiologically by 50% with an intensive insulin therapy. The UKPDS study showed that the control of blood glucose was associated with improvement in vibration perception.

In cases of poorly controlled diabetes, neuropathy results in loss of sensation and reduction of sweating in the feet. Post-traumatic changes in the feet may remain unnoticed. Reduced sweating results in dry and crack skin, thus compromising skin integrity and protection. Changes in the vessels result in reduced blood flow, impaired blood supply and delayed wound healing. The deformities resulting from irregularities in the muscles prevent the load on the sole distributed evenly. Due to the increased pressure on certain areas, wounds occur or the body forms calluses with the thickening of the skin to protect itself.

We present this case to share our experience with the treatment process of a case with diabetic foot infection and peripheral artery disease who survived amputation with the help of diabetic foot care team.

CASE REPORT

A 48 year old male patient with a 20-year diagnosis of type 2 diabetes mellitus who had been receiving insulin treatment for 15 years had initially acne-sized wounds gradually becoming open and large wounds in both legs. He reported to have re-

ceived several treatments including oxygen therapy. He did not present a doctor for social reasons within the last 6 months and discontinued the application of wound dressing and the treatment for DM.

The patient who was admitted to our hospital with complaints of wound with purulent discharge, swelling, redness, and pain in the right leg, fever, and elevated blood glucose was hospitalized with the diagnoses of DM, diabetic foot, hypertension (HT), coronary artery disease (CAD) and peripheral artery disease (PAH).

On physical examination, he had a fever of 38.5°C, a weak pulse in the lower extremities and Wagner grade 3 wounds with purulent discharge, with the largest 20x10 cm in size, on both posterior and anterior compartments of both legs and feet (Figure 1). A wound culture was obtained and antibiotherapy was initiated for the patient with high levels of acute phase reactants. Insulin infusion was initiated for macrophage activation in the patient who was documented to have elevated blood glucose. The patient was evaluated in the diabetic foot council and was planned to undergo debridement. The patient who was found to have iron deficiency was transfused with a total of 8 units of



FIGURE 1: One of the Wagner grade 3 wounds.

RBC. The transfusions were arranged in a way to achieve a hemoglobin value of 10 mg/dL. An upper GI endoscopy, performed to look for etiology, revealed endoscopic erythematous antral gastritis and an ulcerated area measuring 15 mm in the longest diameter in the second duodenal segment in the direction of the posterior wall. Colonoscopy revealed normal findings. An arterial Doppler ultrasound (US) performed to check for PAH showed no blood flow signal in the superficial femoral artery of the right leg and distal part of the popliteal artery of the left leg, but collateral flow signals in the distal part of the right dorsalis pedis artery and areas of complex fluid collections were detected in the right calf. Thus, lower extremity computed tomographic (CT) angiography was performed, revealing chronic total occlusion in the right superficial femoral artery and popliteal artery, short segment stenosis and chronic occlusion in the below-knee segment, focal aneurysmatic dilatation in the above-knee segment of the left popliteal artery and occlusion in the distal segments of the bilateral posterior tibial arteries at the level of ankle joint. The cardiovascular surgical team was consulted and it was decided to continue current antiaggregant treatment with no additional surgical intervention. Debridement was performed by the orthopedic service. The growth of *Klebsiella oxytoca* and *Morganella morganii* was detected in the culture obtained from debridement specimen, and his antibiotherapy was adjusted accordingly. During the follow up period, with compression bandaging performed daily, the purulent discharge was reduced, anaerobic smell disappeared, swelling and redness resolved and spontaneous pain was considerably relieved, occurring only with movements of the leg. The algology department was consulted for the palliation of pain that occurred with the patient standing on feet and the patient who was evaluated to identify if there is a need for sympathetic nerve block was not deemed to require nerve block. To enable mobilization, the patient was given exercise training for rehabilitation by the physiotherapist. During the follow up period, the patient achieved considerable improvement of the foot ulcer and the granulation tissue continued to develop on the

wounds in the legs (Figure 2). On the other hand, since the wound defect in the right leg was considerably large and deep, after the achievement of infection control, the tissue on the medial side was made to undergo hypertrophy through the administration of growth factor. The hypertropic tissue was excised and extended towards the lateral margin, thus performing an autograft (Figure 3). With the administration of antibiotherapy, the regulation of blood glucose, appropriate antiaggregant therapy, debridement, use of regular and appropriate wound dressing and growth factor therapy performed, all wounds in the patient healed (Figure 4) and the patient returned to his normal life.

DISCUSSION

Diabetic foot infections require a coordinated approach with specific attention to local (foot) or systemic (metabolic) issues.

A lot of diabetic foot infections in diabetic patients are accompanied by chronic pathologies. Peripheral artery disease is one of them.⁴ The degree of arterial stenosis affects the likelihood of amputation. In our case, multiple stenosis and obstruction in the lower limb arteries is noteworthy.



FIGURE 2: Partially healed wound.



FIGURE 3: A wound after autograft application.



FIGURE 4: Almost healed wound.

Anemia and hypertension were a challenge in the treatment.

Another issue in diabetic patients is that, the immune system is affected by increased blood glucose levels. High blood sugar affects several stages of the immune system, such as reduction in neutrophil granulation.⁵ Because of this, insulin infu-

sion was initiated in the patient for improving the neutrophil/macrophage function.

With a multidisciplinary foot-care unit, or diabetic foot care team, the incidence of infection-related morbidity and mortality, hospitalization time and the rate of extremity amputations are reduced.

REFERENCES

1. Frykberg RG. An evidence-based approach to diabetic foot infections. *Am J Surg* 2003;186(5A):44S-54S; discussion 61S-64S.
2. Frykberg RG, Zgonis T, Armstrong DG, Driver VR, Giurini JM, Kravitz SR, et al.; American College of Foot and Ankle Surgeons. Diabetic foot disorders. A clinical practice guideline (2006 revision). *J Foot Ankle Surg* 2006;45(5 Suppl):S1-66.
3. Rubinstein A, Pierce CE Jr, Bloomgarden Z. Rapid healing of diabetic foot ulcers with continuous subcutaneous insulin infusion. *Am J Med* 1983;75(1):161-5.
4. Albayati MA, Shearman CP. Peripheral arterial disease and bypass surgery in the diabetic lower limb. *Med Clin North Am* 2013;97(5):821-34.
5. Uysal S, Arda B, Saygılı F, Taşbakan MI, Ardeniz FÖ, Şimşir İY, et al. A case with recurrent pyogenic infections and neutrophil hypogranulation; caused by uncontrolled diabetes. *ANKEM Derg* 2013;27(4):213-6.