

Case Report

Revascularization – A Key Element for Obtaining Granulation Tissue in a Patient with Diabetes and Arteriopathy

Mihaela Vîlcu, Z. Filipovski, I. Brezean, T. Pătrașcu

“I. Juvara” Department of Surgery, “Dr. I. Cantacuzino” Clinical Hospital, UMF “Carol Davila” Bucharest, Romania

REZUMAT

Revascularizarea - element cheie în obținerea patului granular la pacientul diabetic arteriopat

Prezentăm cazul unui pacient de 50 ani, cu diabet zaharat complicat, boală ocluzivă arterială infrainghinală formă distală și ischemie critică stadiul IV, internat în serviciul de chirurgie cu leziune de gangrenă extensivă a degetelor membrului pelvin și sepsis. Intervenția chirurgicală în focar, amputația de degete, urmată de o procedură angioplastică au permis evitarea unei amputații majore, ducând la granularea plăgii și ulterior la acoperirea defectului rezultat cu piele liberă despicată.

Cuvinte cheie: diabet zaharat, gangrenă degete, boală ocluzivă arterială infrainghinală, plagă granulată, revascularizare, grefare

ABSTRACT

We present the case of a 50-year old patient with complicated diabetes mellitus, occlusive infrainguinal arterial disease in distal form and stage IV critical ischemia, hospitalized in the department of surgery with extensive gangrene of the toes of the pelvic limb and sepsis. The surgical intervention into the focus, the amputation of the toes, followed by an angioplasty made it possible to avoid a major amputation, leading to the granulation of the wound and, subsequently, in covering the resulting defect with a free split-skin graft.

Key words: diabetes mellitus, toe gangrene, occlusive infrainguinal arterial disease, fully granulating wound, revascularization, grafting

Corresponding author: Assistant Lecturer Mihaela Vîlcu, Ph.D
The “I. Juvara” Department of Surgery, The “Dr. I. Cantacuzino” Clinical Hospital
5-7, Ion Movila Street, District 2, Bucharest, Romania
e-mail: mprunaiche@yahoo.com

The morbidity of the patients with diabetes is generated – besides the renal, ocular, cerebral, cardiac impairment – to a great extent by the diabetic foot infections. The infection develops due to the ulcerations whose etiology (neuropathy or arteriopathy) is particularly important for the approach of the therapeutic algorithm, which often involves an interdisciplinary collaboration. Diabetes mellitus is the risk factor associated with the highest rate of critical ischemia of the lower limbs. [1]

The association of peripheral arterial disease with infection represents the determining binomial of major amputations in the patient with diabetes and, in 80% of the cases, the gateway is an ulceration of the foot. [1].

The poor local blood supply is undoubtedly a determining factor for the delayed healing of the diabetic foot lesions, with major consequences for the viability of the lower limb. The revascularization procedure, whose purpose is to improve the local circulatory status, is followed – when it is successful – by the amendment of the pain syndrome and the aiding of the healing of the wounds resulting from the various surgical interventions into the focus (amputations of the toes, transmetatarsal amputation, etc.)

The success of the revascularization procedures associated with the interventions for the removal of the septic focus is the only combination which can decrease the rate of major amputations (leg, thigh) in diabetic patients with a peripheral arterial disease.

To exemplify the above mentioned, we present the case of a 50-year-old male with type 2 diabetes mellitus, requiring insulin, complicated with arteriopathy and diabetic neuropathy, hospitalized in the department of surgery for a wet gangrene lesion of the toes I, II of the left foot. The treatment of the gangrene was neglected and it led to sepsis and secondary anemia. The gateway of the infection was a left plantar ulceration. The patient presented with chronic obstructive bilateral infrainguinal arteriopathy in distal form, and stage IV critical ischemia.

The Doppler echocardiography reveals a 75% stenosis at the level of the posterior tibial artery and the left fibular artery in the median third.

The X-ray of the leg reveals significant edema of the soft tissues, with gas bubbles, encompassing the protection area of the metatarsophalangeal articulations of the toes I, II of the left foot, as signs of infection.

The arteriography reveals a normal flow of the left anterior tibial artery and the stop of the contrast



Figure 1. Arteriography



Figure 2. Radiological aspect after toes amputation

medium at the level of the median third of the fibular and posterior tibial left artery (**fig. 1**).

As a first step, surgery is performed to remove the septic focus, carrying out the amputation of toes 1 and 2 of the left foot (**fig. 2**) and the wide excisional debridement, followed by a difficult postoperative evolution, with an atonic wound and the tendency to extension of the ischemic phenomena, which can be explained within the context of the tissular hypoperfusion caused by the obstruction of the left fibular and posterior tibial arteries.

The indication of revascularization is established and a peripheral balloon angioplasty and stent placement is performed (in a department of vascular surgery) at the level of the left posterior tibial artery and left fibular artery, 10 days after the initial surgical intervention.



Figure 3. Radiological aspect after transmetatarsal amputation

The local evolution after revascularization is slowly favourable, requiring also the removal of the three remaining toes, thus leading to a transmetatarsal amputation of the foot (**fig. 3**), leaving the bone stumps uncovered by skin (open stump) (**fig. 4**). The amputation segment granulates slowly (**fig. 5**) so that after four months from the first presentation, the skin defect is covered with a free split-skin graft (**fig. 6**), with a favorable outcome. (**fig. 7**)

The free-split skin grafting surgery involved the completion of the following standardized stages: harvesting the skin fragment from the anterior side of the homolateral thigh, its expansion and fitting onto the granulated wound with suture threads followed by the use of a compression dressing and the immobilization of the lower limb.

The donor area at the level of the thigh healed through reepithelization 14 days after grafting.

The functional recovery of the lower limb was achieved two weeks after grafting.

DISCUSSIONS

The free-split skin graft surgery is the last surgical stage, as well as a satisfactory alternative to an initially disabling surgical intervention (major amputation). The revascularization procedure was the essential element for obtaining an optimal recipient area for the graft.

The surgical control of the infection delayed for a few days the angioplasty, without compromising the stages preceding the grafting. The initial sepsis could not be totally treated prior to the vascular procedure, so that the need for further debridments and a total transmetatarsal amputation was maintained, all of these being complemented by



Figure 4. Healing open stump



Figure 5. Wound granulation



Figure 6. Free skin graft



Figure 7. Healed stump

treatment with antibiotics and anticoagulant and vasodilating medication. The acceleration of the granulation process was achieved by applying topical medication to the postoperative wound, thus reducing the local microbism.

The optimum conditions for the success of the graft are: a well vascularized and uninfected recipient area and a good adhesion of the graft to the recipient area. The adhesion is achieved both by using compression dressings and by immobilizing the respective lower limb, in order to cancel the scissoring forces between the recipient area and the graft. It is also important to avoid orthostatism and taking support on the respective foot for 7 days post-operatively. [3]

The free split-skin graft surgery aimed to close the skin defect and to heal the wound faster. Thus, the functionality of the lower limb was preserved and a major amputation was postponed.

CONCLUSIONS

Besides the good result due to vascular and general surgery (granulation of the wound, coverage of the defect with a free split-skin graft), the disappearance of pain recommends this manner of approaching the patients with a complicated diabetic foot and infrainguinal occlusive disease.

A better understanding of the pathophysiological mechanisms of arteriopathy, the control of the infection, the improvement of the distal circulatory status can lead to the increase of the percentage of saved „diabetic feet”.

The skin defect could be grafted after the revascularization procedure, thus avoiding a major amputation.

This case confirms that healing cannot occur until the circulatory bed is optimized. [4]

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