

Continuous Negative Pressure Wound Therapy in the Treatment of a Gigantic Trophic Leg Ulcer

Z. Crăniceanu¹, S. Olariu², V. Bloancă¹, I. Farca², F. Bodog³, P. Matusz¹, T. Bratu¹

¹Plastic and Reconstructive Surgery Department, Casa Austria, Emergency County Hospital University of Medicine and Pharmacy "Victor Babeș", Timișoara, Romania

²First Surgery Department, Emergency County Hospital, University of Medicine and Pharmacy "Victor Babeș", Timișoara, Romania

³Plastic and Reconstructive Surgery Department, University of Oradea, Romania

Rezumat

Utilizarea presiunii negative continue în tratamentul leziunilor trofice gambiere gigante

Obiectiv: elaborarea unui protocol de tratament în insuficiența venoasă cronică complicată cu ulcer varicos, asociind tratamentul patogenetic cu folosirea presiunii negative continue înainte și după efectuarea plastiei cu piele liberă despicată.

Material și metodă: aducem în discuție cazul unui pacient în vârstă de 59 ani cu o leziune trofică gambiera gigantă, circumferențială. Etiologia a fost mixtă, prin insuficiență venoasă cronică și posttraumatică iar evoluția desfășurată pe o perioadă de 30 de ani.

Rezultate: tratamentul s-a efectuat în 2 etape chirurgicale. În prima s-au întrerupt refluxurile patologice, iar în a doua s-a acoperit defectul cu grefă de piele liberă despicată, folosind tratamentul cu presiune negativă continuă atât înainte cât și după grefare, până la integrarea acesteia.

Discuții: evoluția pacientului a fost favorabilă cu vindecarea în totalitate a defectului tegumentar, la distanță a dezvoltat un limfedem secundar.

Concluzii: 1. Particularitatea terapeutică constă în asocierea tratamentului patogenetic cu folosirea presiunii negative

continue înainte și după acoperirea defectului cu grefă de piele. 2. Dezvoltarea limfedemului secundar s-a datorat leziunii circumferențiale a gambei. 3. Terapia prin presiune negativă continuă și-a dovedit importanța în rezolvarea leziunilor cronice, cu reducerea duratei și costurilor tratamentului.

Cuvinte cheie: ulcer trofic gambier, reflux patologic, presiune negativă continuă

Abstract

Aim: to present a therapeutic algorithm for chronic venous insufficiency complicated with ulceration, using etiologic treatment combined with local treatment by negative pressure wound therapy (NPWT) before and after skin grafting.

Material and method: we are discussing a 59 years-old patient with a lower leg gigantic, circumferential trophic lesion. The aetiology was combined, post-traumatic and chronic venous insufficiency, with 30 years of evolution.

Results: the treatment was applied in two surgical steps. Initially the pathological refluxes were interrupted; secondarily a skin graft was applied, preceded and followed by NPWT until graft intake. The wound healed completely; patient developed secondary foot lymphoedema.

Conclusions: 1. Case treatment particularity consists in using a combination of etiologic and local treatment, combined with adjuvant NPWT. 2. Secondary lymphoedema developed due to circumferential location of the lesion. 3. Continuous NPWT has proven its efficiency in chronic ulcer before and after skin grafting, reducing costs and duration of treatment.

Corresponding author:

Associate Professor Sorin Olariu, Ph.D
"Victor Babeș" University of Medicine
and Pharmacy, Timișoara
First Surgery Department
Emergency County Hospital, Timișoara
I. Bulbuca Bvd., no. 10, 300736, Romania
E-mail: srnolariu@yahoo.com

Key words: trophic leg ulcers, pathologic reflux, negative pressure wound therapy.

Introduction

Fleischmann introduced in 1993 the negative pressure therapy for open fractures with soft tissue injuries (1). Since then, numerous experimental and clinical studies have proven the validity of this principle. It consists of creating a negative pressure environment, in order to improve the healing process. Applicability is wide, including injuries both acute and chronic (2), and the benefits are the control of excess exudate and bacterial flora, and improvement of the receptor bed for skin graft intake.

Case presentation

A 59 years-old patient was hospitalized in the general surgery clinic for a highly exudating ulceration of the lower limb, with circumferential disposition and occupying the whole length of the lower leg.

The patient had a history of diabetes mellitus type II treated with oral medication, but also a complex injury at the same level, with a tibia fracture 30 years ago. In this clinical context, associated with chronic venous insufficiency of the left lower limb, he had developed a trophic lesion initially at the internal malleolus, then with extensive spreading.

Physical examination on admission reveals an ulcer covering the whole surface of the left lower leg circumferentially, with irregular margins, granulation tissue, moderate purulent discharge, massive oedema of the leg and foot (Fig. 1). Contralateral leg is without clinical signs of chronic venous insufficiency.

Laboratory findings show signs of systemic inflammation and positive culture from the wound with an *Escherichia coli* strain. Eco Doppler examination reveals transverse and longitudinal venous reflux that maintains and favours the lesion (3,4).

Results

Treatment was performed in two stages, first in the general surgery clinic, and then in the plastic surgery clinic.

The first surgical step was performed under regional anaesthesia: pathological refluxes were interrupted by ligation and stripping of the saphena magna vein, with the ligation of the perforators and phlebectomy. In the second stage skin defect coverage was achieved by means of a skin graft; adjuvant NPWT was used both to prepare the recipient bed (Fig. 2) and after surgery.

The patented VAC system is ideal, but costs are high. What we use is an adaptation of the classical version, consisting of an adhesive film impregnated with povidone-iodine, gauze dressings, a suction tube and the central aspiration system of



Figure 1. Initial lesion, after 30 years of evolution



Figure 2. After the negative pressure dressing



Figure 3. Final aspect, after graft intake

the hospital. Pressure was kept to about minus 180-200 mmHg. Dressing changes were accompanied by abundant irrigation and wound debridement for a period of two weeks, with a mean of 4 days between two dressings.

After obtaining a suitable recipient bed, the defect was covered with meshed split thickness skin graft harvested from the right thigh using an electrical dermatome, also under regional anaesthesia. Dressing of the grafted area was carried out using the same method of continuous NPWT, this time with values of minus 75-100 mmHg, and changed 3 times, at a mean interval of 5 days. Donor area through by spontaneous epithelization.

Postoperative course was favourable, with graft intake up to 95%, coverage of the skin defect (Fig. 3) and remission of oedema. Grafted areas and donor site were treated with anti-septic ointments, and compressive dressing was used. The result is stable over time, without flaws of the skin graft in evolution. At about 1 year postoperatively the development of secondary lymphoedema was observed in the left leg.

Discussion

This particular case is characterized by the presence of a trophic lesion of giant size, with an evolution of approximately 30 years, infected with a resistant strain of *Escherichia coli* and a confounding aetiology: post-traumatic (5,6), due to Sddeck-Leriche syndrome and chronic venous insufficiency (7). As a

consequence, microcirculatory disorders of the skin were more pronounced, with the progressive development of a giant trophic lesion in the absence of adequate therapy. The patient was even proposed a lower limb amputation at thigh level.

Sequential treatment was applied to target both the pathogenic mechanism of injury and the local defect (8,9,10). We believe that the two therapeutic steps are particularly important and are interdependent; applying only one sequence is doomed to failure. Interruption of venous reflux is mandatory because it suppresses microcirculatory disturbances, thus providing conditions for a sustainable skin grafting.

Use of continuous NPWT has been useful both before coverage, in order to decrease the volume of secretions and hence the swelling, and after grafting, with double effect: as dressing method of a large skin graft and to improve graft integration rate (11,12,13). Effects of continuous NPWT can be observed at macroscopic and microscopic level. Effective insulation provides a good environment, aspirates local secretions, reduces bacterial colonization and brings wound edges closer. Microscopic changes are increase in local blood perfusion, reduction of swelling, and stimulation of granulation tissue formation (14,15,16,17). In this case, continuous NPWT has again demonstrated its benefit in the treatment of chronic lesions, by increasing patient comfort (less pain) and reducing costs (decreased number of dressings and hospitalization days).

Subsequent development of lymphoedema was due to circumferential extension of the lesion, with implicit destruction of the entire subcutaneous tissue and lymphatic drainage. In order to diminish the effects of secondary lymphoedema we used a gravitational drainage, massage and elastic-compressive external contention (18).

NPW therapy don't exclude but complete any kind of debridement applied (surgical debridement, mechanical debridement, autolytic debridement, enzymatic debridement, chemical debridement and biological debridement). (19)

The complex treatment applied to solve extensive chronic ulcerative lesions of the lower leg comprises the following steps:

1. etiopathogenic treatment with interruption of blood reflux by ligation of the perforators and stripping of the saphena magna;
2. local preparation through NPWT, in order to control excessive exudate, oedema, and bacterial contamination and to ensure a quality recipient bed;
3. coverage of the skin defect with a meshed free split thickness skin graft;
4. assisting and improving graft intake with continuous NPWT;
5. gravitational drainage, massage and elastic-compressive external contention.

Conclusions

1. Case treatment particularity consists in using a combination of etiologic and local treatment, combined with adjuvant NPWT.
2. Secondary lymphoedema developed due to circumferential location of the lesion.

3. Continuous NPWT has proven its efficiency in chronic ulcer before and after skin grafting, reducing costs and duration of treatment.

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