

## Local microbiologic profile in venous leg ulcer and topic treatment with natural or pharmaceutical products

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### Abstract

Venous leg ulcers represent a major clinical problem, because of chronic evolution and difficulties to achieve healing. The ulcer is the most undesirable consequence of chronic venous insufficiency and requires a complex treatment (general and local). Local wound care depends on many factors, including infection of the ulcer. The aim of this study was to evaluate the bacterian presence in lesion and the impact of various germs on clinical evolution. Our study aims to assess the opportunity of antibiotherapy (systemic or local) or another antimicrobial agents. We studied 40 patients (admitted in Surgical Clinic I Timisoara) with infected leg ulcers. The microbiologic samples were collected to identify types of germs and sensibility to antibiotics. We considered that very useful to evidence multiresistant-germs (like methicilino-resistant stafilococ). Systemic antibiotherapy is recommended in infected ulcers, not in bacterian colonisation. Topic antibiotic did not prove the efficacy. Worldwide, patients receive local antibacterial products (like medical honey or herbs extracts) for wound care. The results depends on many factors, but especially on pathogenic treatment of venous chronic disease.

**Keywords:** venous leg ulcer, germs, antibacterial therapy

### 1. Introduction

It is Venous leg ulcers are a type of chronic wound affecting up to 1% of adults at some point during their life and the incidence of pathology increases among the elderly population. This ulceration is the most severe and debilitating outcome of chronic venous insufficiency (from varicose disease or post-thrombotic syndrome). Ulcers often take years to heal and treatment includes compression, surgical interventions, general medication and local wound care [1].

Many of these wounds are colonized by bacteria and show signs of clinical infection. The presence of infection may delay ulcer healing. The strategies for local treatment may include the use of various wound dressings, bandages and antimicrobial agents (antibiotics, antiseptics, but also natural products).

The aim of our study was to evaluate the bacterial presence in venous leg ulcer and the impact of microbiologic profile on clinical evolution. Another purpose was to estimate the opportunity of antibiotherapy (systemic or local), because antibiotic resistance is a widespread phenomenon.

Various pharmaceutical products, mainly broad-spectrum agents, are frequently and sometimes inappropriately prescribed, which often leads to the selection of antibiotic-resistant bacteria strains [2].

The alternative medicine brings treatments based on natural products, like honey or herbal extracts, with results depending of the others parts of therapeutically regimen (pathogenic treatment of venous chronic disease).

## 2. Material and methods

Our study was performed on a group of 40 patients with infected venous ulcer, admitted in Surgical Clinic I of County Hospital Timisoara (on a five year period). Clinical evaluation assessed the location of the ulcer, the depth (superficial, deep), the quantity (single, multiple) and the area. Additional information includes the appearance of the ulcer bed, the amount and character of drainage, the appearance of the lower limb (edema, erythema, dermatitis) and the degree and character of discomfort. We described the aspect of the ulcer in all group of patients admitted in hospital (in 10 years) .

The skin breakdown provides easy entry for bacteria. We performed bacteriological examination from wounds samples, in order to identify the germs and the sensibility to antibiotics. We tried to establish the role of systemic and topical antimicrobial agents in the complex treatment of venous leg ulcer.

## 3. Results and discussions

Venous leg ulcers are usually described like loss of substance in different skin areas, especially around the malleolar region. Ulceration may be discrete or circumferential. The ulcer bed is often covered with a fibrinous layer mixed with granulation tissue, surrounded by an irregular, gently sloping edge. Ulcers occurring above the mid-calf or on the foot are likely to have other origins. Local oedema is usually present and it is often worse towards the end of the day. Evolution of chronic venous disease brings skin changes (pigmentation, lipodermato-sclerosis).

In Surgical Clinic I of Emergency County Hospital Timisoara, we studied patients with venous leg ulcer admitted in a 10 years period(1996-2005).From medical records of 230 patients, we described the amount and the aspect of wound exudate.

**Table 1.**The amount and the aspect of ulcer secretion

The amount and the aspect of secretion	Number of cases	Percentage
Ulcers with minimal secretion(or absent)	98	42,6%
Ulcers with moderate exudate	106	46,1%
Ulcers with abundant infected secretion	26	11,3%

The presence of infection is an important element in venous leg ulcer. Clinical evidence is the aspect of lesion, the characteristics of secretion, the inflammation around the ulcer, even secondary inguinal adenopathy. A massive infection leads to persistence of lesion and the ulcer becomes larger and deeper.

A macroscopic description of the ulcer contains two elements:

1.The wound bed -with four categories depending o proportion between different components:

- The necrotic form-with black crusts, usually well delimited
- The fibrinopurulent form-tough and adherent fibrinous layer, associated with abundant infected secretion
- The granulative form-aspect of red granulation tissue, with minimal secretion
- The epithelisant form-the ulcer is covered spontaneously or after surgical interventions

2.The perilesional skin –with presence of inflammation and various aspects of ulcer edges(irregular or well defined)[3].

Leg ulcer can be an open gate for many pathogenic germs, with development of a dermatitis, a dermo-epidermitis, a sepsis or even a tetanus. In fact, severe infections are not so frequently, besides of a high rate of venous leg ulcers [4].

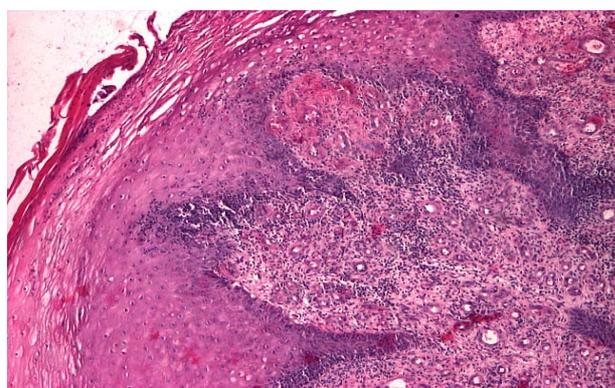
Many studies were dedicated to the microbiology of leg ulcer and all of them studied the aerobe flora. The repartition of germs depends on region, climate and local evolution in time. There are significant differences in germs profile from hospitalized patients at different times. Usually, an ulcer contains many differentiated types of germs [4,5]. In our study, we selected 40 patients with infected leg ulcer. In these cases, we took samples from wound bed for bacteriological examination. The most frequent germs are presented in the next table.

We can identify some multiresistant pathogen germs(methicilino-resistant Stafilococ, Piocianic) and these bring in discussion a nosocomial infection. Some germs, like Escherichia coli, are more frequently in vicious healed ulcers and can represent a prognostic index. We present a microscopic image from an infected leg ulcer with E.coli. The image reveals an inflammatory chronic reaction under epithelium, with intraepithelial extension. (Image 1)

**Table 2.** The presence of pathogen germs in venous leg ulcer

The name of germ	Frequency
Staphylococcus aureus	64%
Enterococcus	20%
Enterobacteriaceae (Klebsiella, Proteus, E.coli, Enterobacter)	19%
Staphylococcus epidermidis	18%
Pseudomonas	15%
Streptococ B-haemolytic	14%
Piocianic	5%
Others	9% *

\*Addition of percentages reveals the concomitant presence of many germs in the same lesion.



**Image 1.** HE coloration

The presence of bacteria do not delay the healing if the proliferation isn't excessive. Usually, the microbiologic flora is homogenous in multiples ulcers of the same patient, but germs are different from the flora of the surrounding skin.

There are special connections between the activity of related bacteria: Staphylococcus aureus can raise the tisular toxicity of Proteus; Streptococcus hemolytic provides in vitro inhibition of Staphylococcus, Pseudomonas and Proteus.

A positive role of bacteria can be proved in debridement of necrosis or a fibrinous wound. The example is the action of larva Wohlfarthia magnifica, with efficacy in wound cleaning [4]. This "bio-surgery" comes back between items of present interest and the procedure is applied in some medical centers, to eliminate the necrosis and to stimulate rapid granulation. A recent randomized controlled trial (VenUSII-2009) proved that larval therapy significantly reduced the time to debridement, but increased ulcer pain [6].

Systemic antibiotherapy is recommended in cases of defined infections and not for bacterial colonization. From our experience, general antibiotics are useful in presence of Streptococcus B-haemolytic (group A), in cases with extension of

lesion and appearance of local or regional complications.

Topological analysis of venous leg ulcer show some notable differences in bacterial populations across the surface of the wounds highlighting the importance of sampling techniques during diagnostics. Metagenomics provide a preliminary indication [7] that there may be protozoa, fungi and possibly an undescribed virus associated with these wounds (Wolcott 2009).

Topic treatment of venous leg ulcer includes preparations applied directed to the wound, with or without dressings. Local antibiotics (like neomycin, neosporin) cannot prove the efficacy, because of sensitization and of the risk to select resistant germs. The role of contact sensitizers is presented in various studies, like Lim (2007) about topical traditional chinese medicaments [10].

Topical antiseptics are preparations with cadexomer iodine, povidone iodine, peroxide-based, mupirocin, ethacridine lactate. Our experience was good using products with povidone iodine and recent review (O'Meara 2008)

showed benefits for cadexomer iodine [2]. For good results, patients have a dressing to cover the wound and a bandage with adequate compression.

Numerous herbs and their extracts are used worldwide for local effects in wound healing, including the antibacterial, antifungal or astringent potential. These effects were studied in many countries and there is no consensus about the best topical treatment. Our experience is limited with these natural products, but the acceptance of them conduct us to make a short literature review.

Rivera-Arce (2007) studied the therapeutic effect of a Mimosa tenuiflora cortex extract in venous leg ulcer treatment [11]. The same plant was described by Zippel (2009) for wound healing properties, through enhancement of dermal fibroblast activity [12].

Duran studied in 2005 the effects of ointment with extract of Calendula Officinalis, treatment with result in acceleration of healing [9].

The results of Binic study (2009) demonstrate good effects of herbal therapy on non-infected venous leg ulcers [8].

A special place in topic treatment of leg ulcer is occupied by honey and medical derivatives. Many years ago, people used honey in local care of chronic

wounds for its antibacterial effect and to stimulate granulation. We have today pharmaceutical products obtained from honey:

- antibacterial wound gel (Medihoney)-studied by Sare (2008-United Kingdom) [13].
- honey-impregnated dressings-studied by Jull (2008-Australia) [14].

The results support the previously reported positive effects: reduction in the incidence of infection, pain relief, odor control and high patient acceptance.

#### 4. Conclusions

Venous leg ulcers are a type of wound that can take a long time to heal. These ulcers can become infected and this might cause further delay to healing. Microbiologic study is important to assess the opportunity of antibiotics. Systemic antibiotherapy is recommended in cases of defined infections and not for bacterial colonization. Topical antibiotics should be avoided owing to the risk of increasing bacterial resistance and contact dermatitis. There are some natural products (herbal extracts, honey and medical honey) with antibacterial effects and many studies continue to evaluate them. In terms of topical antiseptics, we have good results if the others pathogenic treatments were applied (compression, surgery, medication).

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