

# The impact of decongestive physical therapy and elastic bandaging on the control of pain in patients with venous ulcers

## *O impacto da terapia física descongestiva e da bandagem elástica no controle da dor de pacientes com úlceras venosas*

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### ABSTRACT

**Objective:** to evaluate pain in individuals with venous ulcers treated with elastic bandage and decongestant physical therapy. **Methods:** we studied 90 patients, divided into three groups with 30 patients each: a group treated with elastic bandage and decongestant physical therapy; a group treated with elastic bandage; and a group treated only with primary dressing according to tissue type and presence of exudate. We used the Pain Numerical Scale to quantify pain intensity and the McGill Pain Questionnaire for pain qualitative assessment. **Results:** in the first evaluation, all patients who participated in the study reported intense pain. In the fifth evaluation, the majority of patients treated with elastic bandaging and decongestant physical therapy did not report pain; the majority of patients in the elastic bandage group reported mild pain; and most patients treated only with primary dressing reported mild to moderate pain. During all five assessments using the McGill questionnaire, most patients in the elastic bandaging and primary dressing groups used descriptors of the sensory, affective, evaluative and miscellaneous groups to describe their pain. However, in the fourth and fifth evaluations, most patients who received decongestant physical therapy combined with elastic bandaging treatment did not use any of the descriptors. **Conclusion:** patients treated with decongestant physical therapy and elastic bandage presented pain improvement from the third evaluation performed on.

**Keywords:** Leg Ulcer. Varicose Ulcer. Compression Bandages. Physical Therapy Modalities. Pain Measurement.

### INTRODUCTION

Currently, chronic wounds are considered a worldwide epidemic, reaching about 1% of the general population<sup>1</sup>. In Western countries, they affect approximately 5% of the adult population. In Brazil, on average 3% of individuals have this type of wound<sup>2,3</sup>. According to Körber *et al.*<sup>4</sup>, 80% of chronic wounds are found in the lower limbs. The most frequent causes of such wounds include venous and arterial insufficiency, followed by neuropathy, lymphedema, trauma, rheumatoid arthritis, vasculitis, sickle cell anemia, osteomyelitis, cutaneous tumors and infectious diseases.

The tissue repair process, especially of venous ulcers, is time-consuming and has a high rate of recurrence<sup>5</sup>, which leads to physical, social, psychological and economic changes that interfere with patients' daily lives. These changes have a negative impact on their quality of life, especially when caused by venous ulcers<sup>5-8</sup>. As a consequence, anxiety and depression may occur,

which further delay the ulcer healing process<sup>9-14</sup>.

The treatment of venous ulcers is based on the appropriate evaluation of the patients and the wound, and the correct choice of dressing type according to the wound margin, size, location, tissue type and presence of exudate. Compressive and decongestant physical therapies associated to dressing have been shown to optimize therapeutic results. It should be emphasized that the choice of the type of primary dressing also depends on the evaluation of cost-benefit and time of use<sup>15,16</sup>.

Compression therapy involving the application of pressure to the lower extremities is a key component for the treatment of chronic venous and lymphatic disease. Its main function is to neutralize gravity, which is a key factor for the disturbance of the venous and lymphatic return from the lower extremity and that results in pain improvement<sup>17</sup>. The decongestant physical therapy aims to create pressure differentials to promote the displacement of lymph and interstitial fluid, aiming at its reallocation into the bloodstream, reabsorbing the

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edema and treating different pathologies. This is achieved by gentle movements in circles with the hands, applied over the area to be treated, rhythmically and slowly, which result in edema decrease and pain improvement<sup>18</sup>.

This study aims to evaluate pain in individuals with venous ulcer treated with elastic bandage and decongestant physical therapy.

## **METHODS**

We conducted a controlled, randomized, analytical and prospective study at the São João Outpatient Clinic of the University of Sapucaí Valley and at the wound clinic of the County Diabetes Education Center, after approval by the Ethics in Research Committee, opinion number 689,079.

We studied 90 patients, divided into three groups with 30 patients each: a group treated with elastic bandage and decongestant physical therapy; a group treated with elastic bandage; and a group treated with primary dressing according to tissue type and presence of exudates, without elastic bandage. Inclusion criteria were age equal to or greater than 18 years, ankle / arm ratio between 1.0 and 1.4, patients who were not taking medication for pain. Exclusion criteria were wounds with clinical signs of infection. During the study, we excluded patients who missed outpatient care visits, those who started taking medication for pain and those whose wounds presented with signs of allergy or infection.

We carried out the study from September 2015 to July 2017. We performed the first data collection at the time of inclusion of the patient in the study, and then every eight days, totaling five visits. In these consultations, the wound was evaluated and the primary dressing changed, but the patients were instructed to change the secondary dressing whenever saturation occurred.

We randomized patients by process of sealed and opaque envelopes stored in the central of randomization. An independent individual generated a sequence of random numbers by placing them one by one in the sealed envelopes. Patients were drawn consecutively, through withdrawal of the envelope and allocation in one of the groups. All groups were evaluated daily by the researchers, and the indication of the dressing was made according to clinical evaluation, i.e, presence and amount of exudate, tissue type, signs of infection.

In the groups treated with elastic bandage, it was used daily, and withdrawn only for bathing. In the group treated with elastic bandaging and decongestant physical therapy, the latter was performed three times a week on alternate days, each session lasting 40 minutes, always performed by the researcher himself. The therapy was performed in this order: lower limb elevation at 30°, manual lymphatic drainage, compression with elastic bandages down to the knee region and myolymphokinetic exercises, which are exercises performed under elastic compression of the limb, with flexion-extension of the ankles, knees and hips, three times with 30 repetitions.

The manual lymphatic drainage of the lower limbs began with the evacuation of the inguinal, popliteal and malleolar lymph nodes, followed by movements with slow and smooth rhythmic pressure, around 30 to 40 mmHg, directing the lymph to a group of closer lymph nodes, in the caudal-cranial direction. Before lymphatic drainage, the ulcer was cleaned and the lesion was left undressed; ulcer coverage was placed only after the end of lymphatic drainage. In cases where the ulcer had devitalized tissue, we performed enzymatic debridement with a 10% papain gel, varying the concentration when necessary, according to the need of each patient, until the total removal of the devitalized tissues. After this removal, papain application was suspended. Importantly, dressing technique was identical for all groups.

Participants answered the questionnaire on socio-demographic data. To quantify the intensity of pain, we used the Numerical Pain Scale, graded from 0 to 10, where 0 means no pain and 10, the worst pain ever felt. Pain intensity was classified as: absence of pain (0), mild pain (1-3), moderate (4-6) and intense (7-10)<sup>19,20</sup>. We performed qualitative evaluation of the pain with the application of the McGill Pain Questionnaire. This questionnaire consists of words known as descriptors, which describe the sensation of pain that the patient may be feeling. The descriptors are organized into four major groups and into 20 subgroups. Each set of subgroups evaluates a group. The descriptors cover the areas: sensory (subgroup 1 to 10), affective (subgroup 11 to 15), evaluative (subgroup 16) and miscellaneous (subgroup 17 to 20)<sup>19,20</sup>. The sensorial-discriminative group (subgroups 1 to 10) refers to the mechanical, thermal and spatial properties of the pain; the affective-motivational group (subgroups 11 to 15) describes the affective dimension

in the aspects of tension, fear and neurovegetative responses; the descriptors of the cognitive-evaluative component (subgroup 16) allow the patient to express the overall assessment of the pain experience. Subgroups 17 through 20 comprise miscellaneous items. Each subgroup consists of two to six qualitatively similar descriptors, but with nuances that make them different in terms of magnitude. Thus, for each descriptor a number indicates its intensity<sup>19,20</sup>.

The McGill questionnaire enabled measuring the number of descriptors selected and the pain index. The number of descriptors chosen corresponds to the words that the patient chose to explain the pain. The highest possible value is 20, since the patient can only choose at most one word per subgroup. The pain index is obtained with the sum of the intensity values of the

chosen descriptors. These indices can be obtained in total and for each of the four components of the questionnaire: sensitive, affective, evaluative and miscellaneous<sup>19,20</sup>.

We performed the statistical analysis with the SPSS 11.5 software. Were used the Friedman and the Chi-square tests, with significance levels of 5% ( $p=0.05$ ).

## RESULTS

The socio-demographic variables of the participants can be seen in Table 1. Most of the participants were white, female, older than 60 and literate. Regarding lesion time, the majority of patients in all groups had the wound for over 11 years. There was no statistical difference between the variables.

**Table 1.** Socio-demographic variables.

Variables	Bandage + Therapy		Group		Primary dressing		Total		p value
	n	%	n	%	n	%	n	%	
Schooling									
Literate	13	43.3	12	40.0	13	43.3	38	42.2	0.981
Complete Elementary school	9	30.0	8	26.7	8	26.7	25	27.8	
Complete high school	8	26.7	10	33.3	9	30.0	27	30.0	
Total	30	100	30	100	30	100	90	100	
Age Group									
<50 years	5	16.7	7	23.3	06	20.0	18	20.0	0.941
50-59 years	5	16.7	6	20.0	3	10.0	14	15.6	
60-69 years	17	56.7	15	50.0	18	60.0	50	55.6	
≥70 years	3	10.0	2	6.7	3	10.0	8	8.9	
Total	30	100	30	100	30	100	90	100	
Gender									
Male	9	30.0	12	40.0	13	43.3	34	37.8	0.541
Female	21	70.0	18	60.0	17	56.7	56	62.2	
Total	30	100	30	100	30	100	90	100	
Smoker									
Yes	24	80.0	24	80.0	26	86.7	74	82.2	0.735
No	6	20.0	6	20.0	4	13.3	16	17.8	
Total	30	100	30	100	30	100	90	100	
Time of wound									
<12 months	1	3.3	0	0	0	0	1	1.1	0.683
1-5 years	4	13.3	6	20.0	7	23.3	17	18.9	
6-10 years	12	40.0	13	43.3	15	50.0	40	44.4	
≥11 years	13	43.3	11	36.7	8	26.7	32	35.6	
Total	30	100	30	100	30	100	90	100	

Bandage= elastic bandage; therapy= decongestant physical therapy; Primary dressing= primary wound dressing without elastic bandage. Pearson's Chi-square test; \* Level of statistical significance ( $p<0.05$ ).

Table 2 shows that in the first evaluation the patients who participated in the study reported intense pain. In the second, the majority of patients treated with elastic bandaging and decongestant physical therapy

reported mild to moderate pain. Patients treated with elastic bandage reported moderate pain and the majority of patients treated with primary dressing without elastic bandage reported severe to moderate pain.

**Table 2.** Results of the Numeric Pain Scale.

Evaluation	Pain intensity	Bandage + Therapy		Group		Primary dressing		Total		p value
		n	%	n	%	n	%	n	%	
First assessment	Absent	0	0	0	0	0	0	0	0	0.010*
	Mild	0	0	0	0	0	0	0	0	
	Moderate	13	43.3	17	56.7	18	60.0	48	53.3	
	Intense	17	56.7	13	43.3	12	40.0	42	46.7	
	Total	30	100	30	100	30	100	90	100	
Second assessment	Absent	0	0	0	0	0	0	0	0	0.001*
	Mild	11	36.7	9	30.0	7	23.3	27	30.0	
	Moderate	14	46.7	20	66.7	16	53.3	50	55.6	
	Intense	5	16.7	1	3.3	7	23.3	13	14.4	
	Total	30	100	30	100	30	100	90	100	
Third assessment	Absent	0	0	0	0	0	0	0	0	0.001*
	Mild	23	76.7	14	46.7	12	40.0	49	54.4	
	Moderate	7	23.3	16	53.3	18	60.0	41	45.6	
	Intense	0	0	0	0	0	0	0	0	
	Total	30	100	30	100	30	100	90	100	
Fourth assessment	Absent	16	53.3	2	6.7	7	23.3	25	27.8	0.001*
	Mild	14	46.7	16	53.3	4	13.3	34	37.8	
	Moderate	0	0	12	40.0	19	63.3	31	34.4	
	Intense	0	0	0	0	0	0	0	0	
	Total	30	100	30	100	30	100	90	100	
Fifth assessment	Absent	24	80.0	6	20.0	4	13.3	34	37.8	0.001*
	Mild	6	20.0	19	63.3	11	36.7	36	40.0	
	Moderate	0	0	5	16.7	15	50.0	20	22.2	
	Intense	0	0	0	0	0	0	0	0	
	Total	30	100	30	100	30	100	90	100	

Bandage= elastic bandage; therapy= decongestant physical therapy; Primary dressing= primary wound dressing without elastic bandage. Friedman and Pearson's Chi-square tests; \* Level of statistical significance ( $p < 0.05$ ).

In the third evaluation, the majority of patients treated with elastic bandaging and decongestant physical therapy reported mild pain; in the elastic bandage group, most reported moderate pain; and the majority of patients treated with primary dressing without elastic bandage reported moderate pain.

In the fourth evaluation, the majority of patients

treated with elastic bandages and decongestant physical therapy did not report pain; in the elastic bandage group, most reported mild pain; and the majority of patients treated with primary dressing without elastic bandage reported moderate pain.

In the fifth evaluation, the majority of patients treated with elastic bandaging and decongestant physical

therapy reported no pain; in the elastic bandage group, most reported mild pain; and the majority of patients treated with primary dressing without elastic bandage reported mild to moderate pain.

Table 3 shows that most of the patients in the elastic bandage and primary dressing groups in the first to fifth evaluation, when answering the McGill

questionnaire, reported sensory, affective, evaluative and miscellaneous descriptors. However, in the fourth and fifth evaluations, the majority of patients in the elastic bandage and decongestant physical therapy group reported none of the descriptors. All variables were statistically significant.

**Table 3.** Results of the McGill Pain questionnaire.

Assessment/Group	Descriptors of the McGill Pain questionnaire											
	None		Sensory		Affective		Evaluative		Miscellaneous		Total	
	n	%	n	%	n	%	n	%	n	%	n	%
First assessment												
Bandage + Therapy	0	0	14	46.7	13	43.3	9	30.0	5	16.7	30	100
Bandage	1	3.3	22	73.3	19	63.3	8	26.7	14	46.70	30	100
Primary dressing	7	23.3	18	60.0	14	46.7	8	26.7	10	33.3	30	100
p value	0.005*											
Total	8	8.9	54	60.0	46	51.1	25	27.8	29	32.2	90	100
Second assessment												
Bandage + Therapy	0	0	16	53.3	5	16.7	6	20.0	4	13.3	30	100
Bandage	0	0	21	72.4	13	44.8	4	13.8	9	31.0	29	100
Primary dressing	7	23.3	19	63.3	19	63.3	4	13.3	7	23.3	30	100
p value	0.001*											
Total	07	7.9	56	62.9	37	41.6	14	15.7	20	22.5	89	100
Third assessment												
Bandage + Therapy	0	0	16	53.3	5	16.7	5	16.7	4	13.3	30	100
Bandage	0	0	21	70.0	7	23.3	4	13.3	6	20.0	30	100
Primary dressing	7	23.3	19	63.3	18	60.0	4	13.3	7	23.3	30	100
p value	0.001*											
Total	7	7.8	56	62.2	30	33.3	13	14.4	17	18.9	90	100
Fourth assessment												
Bandage + Therapy	18	60.0	08	26.7	1	3.3	1	3.3	2	06.7	30	100
Bandage	3	10.0	18	60.0	4	13.3	3	10.0	3	10.0	30	100
Primary dressing	6	20.0	20	66.7	19	63.3	4	13.3	7	23.3	30	100
p value	0.001*											
Total	27	30.0	46	51.1	24	26.7	8	8.9	12	13.3	90	100
Fifth assessment												
Bandage + Therapy	25	83.3	3	10.0	0	0	0	0	2	6.7	30	100
Bandage	04	13.3	21	70.0	4	13.3	2	6.7	3	10.0	30	100
Primary dressing	6	20.0	20	66.7	18	60.0	4	13.3	6	20.0	30	100
p value	0.001*											
Total	35	38.9	44	48.9	22	24.4	6	6.7	11	12.2	90	100

Bandage= elastic bandage; therapy= decongestant physical therapy; Primary dressing= primary wound dressing without elastic bandage. Friedman and Pearson's Chi-square tests; \* Level of statistical significance ( $p \leq 0.05$ ).

## **DISCUSSION**

The increase in the number of ulcer patients in the population is a fact known to health professionals and subject of several discussions. Wound care is a great challenge to be faced daily, by both the patient and the caregivers and family members. Often the family and the health team are not prepared to help and understand all the aspects and difficulties that arise for the patient<sup>21-23</sup>.

Among the participants of this study, women and the elderly were predominant. It is inferred that the occurrence of venous ulcer in females is associated with hormonal factors, pregnancy, puerperium and increased incidence of varicose veins, which may favor the onset of chronic venous insufficiency<sup>24-26</sup>. Most study participants were smokers. Smoking is known to impair tissue oxygenation, decrease the body's resistance, increase susceptibility to infections, and slow healing. In addition, smoking alters the synthesis of collagen, making it difficult to heal wounds. Nicotine produces vasoconstriction, which increases the risk of ischemia and ulcer development; when already present, ulcers present difficulties in healing. In these cases, the cellular process is interrupted and abnormal functions derive from systemic or local factors or both in the healing process<sup>27</sup>.

Pain should be evaluated considering the characteristics of each individual or group of patients that meet the same clinical conditions. In addition, the clinical status and cause of pain, such as trauma, ulcers, and burns, require careful evaluation so that the interventions required for each case are properly implemented<sup>28</sup>. In this study, patients in all groups reported severe pain in the first evaluation. In the fifth evaluation, however, the majority of patients treated with elastic bandage and decongestant physical therapy reported no pain, while the majority of patients with elastic bandage reported mild pain and most patients treated with primary dressing without elastic bandage reported mild to moderate pain. Wound pain results from tissue injury and the perception of pain depends on numerous factors related to the patient, wound type, the amount and intensity of external stimuli. The skin is richly innervated, which gives it the ability to capture various types of stimuli, and the presence of infection and necrosis

aggravates the wounds' painful process. Chronic pain can be considered as the perpetuation of acute pain, has no biological alert function and generates suffering. In general, neurovegetative responses such as those found in acute pain do not occur, resulting from the adaptation of neuronal systems<sup>29-32</sup>.

Pain causes discomfort, influences adherence to the treatment and interferes in the quality of life of the patient with venous ulcer. The pain can cause difficulty of locomotion, change of mood and sleep alterations. Pain is a very common symptom in patients with venous ulcers and its prevalence varies between 80 and 96% in this group. It may be persistent and / or exacerbated during dressing changes. Pain can also negatively influence healing because painful stimulation is associated with the release of inflammatory mediators that potentially reduce tissue repair and regeneration<sup>33,34</sup>.

In the present study, most patients, when evaluated through the McGill questionnaire in all five evaluations, described pain using descriptors of the sensory, affective, evaluative and miscellaneous groups. However, in the fourth and fifth evaluation, the patients in the elastic bandage group and the decongestant physical therapy did not report any descriptors, in contrast to the patients in the other groups.

The McGill Pain Questionnaire evaluates the sensory, affective and evaluative aspects of pain, describing the painful experience that the patients present. The sensory-discriminative dimension evaluates the temporal-spatial, mechanical and thermal aspects of pain; the affective-motivational dimension involves aspects of tension, fear, self-punishment and neurovegetative responses; and the cognitive-evaluative dimension assesses the overall situation of the individual and represents a judgment based on sensory and affective characteristics, previous experience and the significance of the situation.<sup>29,30</sup>

The compressive therapy available on the market is elastic bandages made of elastic fibers that provide compression during movement and rest. During ambulation, the calf muscles contract, the bandage expands, dissipating the force exerted by the contraction of this muscle and favoring the venous return. The effects of compression on the microcirculation include accelerating blood flow in the capillaries, reducing capillary filtration

and increasing resorption by increasing tissue pressure, improving drainage, resulting in decreased edema, improved pain and ulcer healing<sup>35-40</sup>.

Manual lymphatic drainage, as a technique to aid venous return, is essential for the use of compression therapy. It increases the healing rate of venous ulcers when compared to uncompressed treatment, since it acts both in micro and in the macrocirculation, reducing pathologic reflux during ambulation and increasing ejection volume during the activation of the calf muscles, which favors reabsorption of edema and improves lymphatic drainage<sup>24</sup>.

A study verified the effects of the decongestant physical therapy on the healing of venous ulcers. Twenty patients were divided into two groups: the control group

(n=10) and the intervention group (n=10). Patients of the first group were treated only with conventional dressing and those from the second group, with conventional dressing and decongestant physical therapy (combination of techniques: manual lymphatic drainage, compression bandaging, lower limb elevation, myolymphokinetic exercises and skin care). Both groups were treated for six months. The Patients who underwent decongestant physical therapy presented a significant reduction of edema and pain, as well as an improvement in the healing process<sup>24</sup>.

The results of this study allowed us to conclude that the patients treated with decongestant physical therapy and elastic bandage presented improvement of pain in the fifth evaluation performed.

## R E S U M O

**Objetivo:** avaliar a dor em indivíduos com úlceras venosas tratadas com bandagem elástica e com terapia física descongestiva. **Métodos:** foram estudados 90 pacientes, divididos em três grupos com 30 pacientes cada: grupo tratado com bandagem elástica e terapia física descongestiva; grupo tratado com bandagem elástica; e grupo tratado sem bandagem elástica e com curativo primário conforme o tipo de tecido e exsudato. Utilizou-se a Escala Numérica de Dor para quantificar a intensidade da dor e o Questionário de Dor de McGill para a avaliação qualitativa da dor. **Resultados:** na primeira avaliação, todos os pacientes que participaram do estudo relataram dor intensa. Na quinta avaliação, a maioria dos pacientes tratados com bandagem elástica e terapia física descongestiva não relatou dor; a maioria dos pacientes do grupo da bandagem elástica relatou dor leve; e a maioria dos pacientes tratados apenas com curativo primário relatou dor leve a moderada. A maioria dos pacientes dos grupos bandagem elástica e curativo primário, nas cinco avaliações realizadas através do questionário de McGill, utilizou descritores dos grupos sensorial, afetivo, avaliativo e miscelânea para descrever a dor. Porém, na quarta e quinta avaliações, a maioria dos pacientes do grupo bandagem elástica e terapia física descongestiva não utilizaram nenhum dos descritores. **Conclusão:** os pacientes tratados com terapia física descongestiva e bandagem elástica apresentaram melhora da dor a partir da terceira avaliação realizada.

**Descritores:** Úlcera da Perna. Úlcera Varicosa. Bandagens Compressivas. Modalidades de Fisioterapia. Medição da Dor.

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Received in: 10/12/2017

Accepted for publication: 09/01/2018

Conflict of interest: none.

Source of funding: Capes Post-Doctorate Grant.

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