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REMOTE THERMOMETRIC STUDY OF CHANGED SKIN COATS IN PATIENTS WITH PURULENTLY NON-HEALING WOUNDS

Abstract. *The aim of this study was to determine the activity of inflammation in the lesions in patients with purulent long-term non-healing wounds of the lower extremities using a remote thermometric study. Materials and research methods. A study of healthy and altered skin was carried out using the method of infrared thermometry in patients with focal scleroderma who were hospitalized in the surgical department of the Regional Clinical Hospital - Center for Emergency Medical Aid and Disaster Medicine. Results and its discussion. The calculated value of the Student's criterion exceeds its critical value, indicating the presence of significant differences in the compared subgroups, and our earlier hypothesis about the existence of a relationship between the size of the inflammatory focus and the value of the temperature reaction of the skin to the presence of a lesion of the skin area should be considered confirmed. Conclusions. Remote thermometric study of the changed skin in patients with purulent long-term non-healing wounds of the lower extremities allows one to judge the activity of the inflammatory process or the processes of sclerosis in the lesions.*

Key words: *purulent long-term non-healing wounds, diagnostics, remote thermometric examination.*

Introduction. In many countries, thermographic examinations are successfully used for early diagnosis and timely treatment of various diseases. The technique allows to determine the surface temperature of the studied anatomical area, changes in which may be a clinical symptom of the pathological process [1].

Remote thermographic examination using modern thermographs is an effective non-invasive diagnostic method for various diseases [2].

Thermogram processing and diagnosis is not particularly difficult [3].

The use of remote infrared thermography as an additional method of diagnosis also allows to detect a number of pathological changes in the human body. The availability of thermographic examination of a patient with purulent long-term non-healing wounds allowed not only to quickly, without any consequences for the patient, to diagnose vulvar and perivulvar pathological changes of the purulent long-term non-healing wounds, but also to assess the dynamics of the disease and the effectiveness of comprehensive treatment.

The aim of this study was to determine the

activity of inflammation in the lesions in patients with purulent long-term non-healing wounds of the lower extremities using a remote thermometric study.

Materials and research methods. A study of healthy and altered skin was carried out using the method of infrared thermometry in patients with focal scleroderma who were hospitalized in the surgical department of the Regional Clinical Hospital - Center for Emergency Medical Aid and Disaster Medicine.

The study group included 26 patients with purulent long-term non-healing wounds of the lower extremities aged 39 to 65 years, of whom 24 (92.3%) were men and 2 (7.7%) were women. Remote thermography in the projection of wounds in 24 (92.3%) patients of the examined group, in the stage of edema and compaction, areas of hyperthermia were revealed, which indicated the presence of inflammation in these foci. Also in 2 (7.7%) patients in the stage of epithelialization with foci of skin atrophy, areas of hypothermia were revealed in the projection of wounds, which indicated the presence of sclerosing processes in these foci. Remote

infrared thermography as an additional method of diagnosis also allows to detect a number of pathological changes in the human body. The availability of thermographic examination of a patient with purulent long-term non-healing wounds allowed not only to quickly, without any consequences for the patient, to diagnose vulvar and perivulvar pathological changes of the purulent long-term non-healing wounds, but also to assess the dynamics of the disease and the effectiveness of comprehensive treatment. The results obtained were processed by the method of variation statistics using the Student's test.

Results and its discussion. In the clinic, the dependence of the temperature in the area of the inflammatory process on the area of damage to the skin of the periulnar area was studied purulent long-term non-healing wound. By processing the obtained thermograms, we established the presence of a temperature reaction in response to the lesion and the dependence of its magnitude on the extent of the inflammatory focus of the skin. In particular, paying attention to the size of the pathologically altered skin and the degree of temperature rise in this area, we noticed visually the presence of a clear correlation between these values. With relatively small lesions, often not accompanied by the presence of subjective manifestations and complaints from the patient, we did not observe a violation of the symmetry of the temperature distribution relative to the vertical axis of the body.

Also, in 2 patients (7.7%) at the stage of epithelialization, in the projection of inflammatory foci with remote thermography, areas of hypothermia were revealed, which indicated the presence of epithelialization and sclerosis processes in these foci.

Also, in 2 patients (7.7%), with regression of visual manifestations on the skin during remote thermography, areas of hyperthermia were revealed, which indicated the presence of inflammatory processes in the projection of these foci and required complex therapy for these patients. At the same time, with a slightly larger size of the inflammatory focus, the appearance of soft tissue edema in its zone, subjective pain of the affected lower extremity, the changes on the thermogram were quite clear and unambiguous.

Thus, assuming the existence of a relationship

between the size of skin lesions and the degree of temperature change, we will test this hypothesis by comparing lesions that differ in their dimensional characteristics, but are absolutely identical in localization.

Taking into account the above, two subgroups of patients were formed: subgroup A (small lesion) with the presence of an inflammatory lesion area of no more than 2 cm² without the presence of soft tissue edema and subjective manifestations in the form of patient complaints of pain in his area; subgroup B (large lesions) - the presence of an inflammation focus with an area of at least 16 cm² without edema of soft tissues or with the presence of such and with the patient's complaints about pain in his area at rest or on palpation. The distribution of data in the formed groups was characterized by a normal type (Tabl. 1).

When checking the equality of variances, the calculated value of the F-criterion was 1.449, which, with the number of observations equal to 20 and the established critical value F, equal to 2.850 for P > 95, indicates the fulfillment of this condition and the possibility of using the Student's criterion for comparative analysis (Table 2).

The calculated value of the Student's criterion exceeds its critical value, indicating the presence of significant differences in the compared subgroups, and our earlier hypothesis about the existence of a relationship between the size of the inflammatory focus and the value of the temperature reaction of the skin to the presence of a lesion of the skin area should be considered confirmed.

Conclusions. On the basis of the conducted thermographic study of patients with purulent long-term non-healing wounds of the lower extremities, a direct relationship was revealed between clinical manifestations and areas of hyperthermia in 15 patients of the examined group, which amounted to 57.7%. Also, 11 (42.3%) patients of the study group showed a direct relationship between clinical manifestations and areas of hyperthermia. In 2 (7.7%) patients of the examined group of patients, a direct relationship was established between clinical manifestations in the form of skin atrophy in the lesions and areas of hypothermia on thermograms. Remote thermometric examination of the altered skin in

Table 1

Characteristics of data distribution in patient subgroups

Skin lesion area Asymmetry Excess	Skin lesion area Asymmetry	Skin lesion area
Minor skin lesion	0,372	0,652
Large defeat	-0,118	0,396

Table 2

Average values of differential temperature in subgroups and the results of their comparative analysis

Skin lesion area	At, °C	SD	Error mean	n
Small skin lesion	0,378	0,162	0,057	8
Large defeat	1,784	0,195	0,056	12
Student's criterion	17,507	critical value t		2,09

Note: At, °C – average value of the differential temperature, °C;
SD - is the standard deviation; Error mean - error of mean value
At; n - number of observations

the area of wounds allows one to judge the activity of periular inflammation or the processes of epithelialization and sclerosis in the lesions in patients with purulent long-term non-healing wounds of the lower extremities.

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