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Treatment of Elderly Patients with Varicose Trophic Ulcers

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ABSTRACT

Background. At present, researchers do not have a consensus on the hemodynamic significance of individual blood refluxes in ulcer formation, although a large number of works are devoted to the study of macrohemodynamic factors for the development of trophic disorders in chronic venous insufficiency.

Material and methods. The work is based on the results of a comprehensive examination and surgical treatment data of 167 patients with varicose veins of the lower extremities who were treated in the multidisciplinary clinic of the Tashkent Medical Academy during 2012-2022.

Results. The triggering mechanism for the development of trophic varicose ulcers is high venous hydrostatic pressure, but the transition from tissue lipodermosclerosis to open venous ulcer of varicose origin occurs as a result of impaired microcirculation in the soft tissues of the extremity, and not an additional change in hemodynamics in the large great vessels. As a result of the research, it was revealed that changes in microcirculation in chronic venous insufficiency are characterized by local tissue hypoxia in the lower third of the tibia, manifested by a significant decrease in the partial oxygen tension of tissues in the area of trophic ulcers, despite an increase in blood in the microcirculatory bed. Changes in the microcirculation of the skin and subcutaneous tissue in this category of elderly patients are also general, associated with hemorheological disorders and detected in various segments of the extremities.

Conclusion. As a result of ultrasound examinations, various variants of the prevalence of blood refluxes in the venous system of the lower extremities were found, leading to the development of phlebohypertension in elderly patients with venous trophic ulcers.

Keywords: Trophic ulcers, phlebohypertension, chronic venous insufficiency

INTRODUCTION

Venous trophic ulcers occur in 1.01-2.13% of the European population. In the working population, venous trophic ulcers of varicose origin are significantly less common (0.1%) than in elderly patients, and in more than half of them, ulcers do not heal from 1 to 5 years. The total cost of treating venous trophic ulcers is extremely high. The cost of treat-

ment of one patient in Europe and the USA reaches \$10,000 [3, 12, 15].

Currently, researchers do not have a consensus on the hemodynamic significance of individual blood refluxes in ulcer formation, although a large number of studies have been devoted to the study of macrohemodynamic factors for the development of trophic disorders in chronic venous insufficiency [2, 4].

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Changes in the microcirculation of the soft tissues of the lower extremities are the main link in the response of pathophysiological disorders in chronic venous insufficiency. However, active study of the state of microcirculation in patients with venous trophic ulcers has become possible only in recent years, which, first of all, is associated with the introduction into clinical practice of clinical and metric methods of studying the measurement of partial oxygen tension in tissues and laser Doppler flowmetry [5].

Hemodynamic substantiation of complex treatment of elderly patients with venous trophic ulcers of varicose origin will allow us to approach the solution of this problem at a new qualitative level and make it possible to predict the timing of healing of trophic ulcers

Our study aimed to study the peripheral macrohemodynamics and microcirculation of the tissues of the distal segments of the lower extremities in chronic venous insufficiency for the formation of tactics for the complex treatment of elderly patients with trophic varicose ulcers.

MATERIAL AND METHODS

The work is based on the results of a comprehensive examination and surgical treatment data of 167 patients with varicose veins of the lower extremities who were treated in the multidisciplinary clinic of the Tashkent Medical Academy during 2012 - 2022.

All patients were divided into two groups. The main group consisted of 102 patients (118 limbs) with venous trophic ulcers of varicose origin (CEAP class C6) over the age of 60 years. Several other provisions were also included in the criteria for inclusion in the main group: 1) the absence of obliterating diseases of the arteries of the lower extremities and diabetes mellitus with ABI D 0.85, 2) a compensated state of central hemodynamics, 3) the absence of atypical ulcer degeneration, 4) the absence of systemic connective tissue and blood diseases, 5) the absence of an inflammatory process of any localization that could mask the changes associated with venous pathology.

The comparison group included 65 patients (72 limbs) with varicose veins with chronic venous insufficiency of SZ-5 classes according to CEAP of the same age group. The comparison group was dominated by patients with cutaneous trophic changes of the extremities (69.4 %) in the form of edema, hyperpigmentation, lipodermatosclerosis (C4 - 56.9 %) and with healed trophic ulcer (C5 - 12.5 %). The main group of patients and the comparison group were quite homogeneous, while there were no significant differences ($p>0.05$) in age, lobe,

duration of chronic venous insufficiency and the incidence of concomitant diseases.

In all patients, the ulcer existed without complete epithelialization for an average of 18.1 ± 2.9 months (confidence interval 6.8-72.1 months). In most cases, the ulcers were localized to the medial malleolus. In 14 (13.7%) patients, their location was atypical (circular ulcers, anterolateral and lateral surfaces of the lower third of the tibia). In 16 (15.7%) patients, venous trophic ulcers were localized on both lower extremities.

The size of the ulcer defect was estimated by calculating the surface area of the elliptical wound according to the V Schubert formula. In the presence of several ulcers on the extremity, the total area of the wound surface was assessed. In most cases (72.9%), the area of the ulcer defect was less than 6 cm² and averaged 1.5 ± 0.3 cm² (confidence interval 1.0 - 2.1 cm²).

RESULTS

An integral analysis of the state of venous hemodynamics of the lower extremities revealed that in 86.2% of patients with venous trophic ulcers, the post-occlusive venous pressure on the ankle exceeded the normal values by 2.0-2.5 times and averaged 55.6 ± 4.5 mm Hg.

In the group of patients with chronic venous insufficiency without trophic ulcers, phlebohypertension in a horizontal position was recorded only in 35.4% of cases and, as a rule, did not exceed 45 mm Hg.

Ultrasound examination of venous hemodynamics of the lower extremities to determine the causes of phlebohypertension in elderly patients with venous trophic ulcers revealed the presence of a combination of pathological refluxes in the venous system of the lower extremities in 78.8% of cases.

In 51.6% of cases, the triggering mechanism for the development of ulcers was the formation of venous reflux in the superficial and perforating venous systems. Deep vein valve failure in elderly patients with varicose trophic ulcers was visualized only in 18.2% of cases, and in the comparison group, deep vein failure was observed even less frequently (9.5% of cases), and isolated reflux in the superficial venous system in 21.2% of cases caused the development of chronic C6 venous insufficiency according to CEAP.

Based on laser Doppler flowmetry data, an increase in basal blood flow at rest was revealed in 88.2% of patients in the area of trophic ulcers of more than 4.0 pf units (average 7.1 ± 1.0 pf units).

In 47.0% of patients, a significant increase in basal blood flow was determined to an average of 5.1 ± 0.48 pf

units and was associated with the phenomenon of blood stagnation in the venules and the venular link of the microvasculature.

In 41.2% of patients with venous trophic ulcers, the increase in basal blood flow in the area of trophic ulcers averaged 14.9 ± 1.6 pf units (confidence interval 8.9-20.9 pf units), which indicated the presence of an aseptic inflammatory reaction around the trophic ulcer and was associated with metabolic disorders and hypoxia in the area of venous trophic ulcer.

Basal blood flow in other compared areas on the affected side (upper third of the tibia, foot) and the other lower extremity in elderly patients with chronic C6 venous insufficiency according to CEAP during LDF was normal and did not exceed 3.0 pf units.

In 70.6% of patients in the paraulnar zone, a low functional reserve of microcirculation was determined (MPIC=3.0-5.5 pf units, PIPC = 43.3-125.1 %). The low functional reserve of microcirculation of the lower extremities reflected gross disturbances in the regulatory capabilities of tissue blood flow of ischemic genesis. In 27.8% of cases from the group of patients with the low functional reserve in the zone of trophic ulcers, microcirculation depression (MPIC = 1.5-2.5 pf units, PIP = 0-63.0%) characteristic of ischemic parabioc states was revealed.

During the orthostatic test, basal blood flow in an upright position in patients with venous trophic ulcers and patients from the comparison group in all studied areas changed directionally with the norm, which indicated the preservation of the precapillary vasoconstrictor response in the microcirculatory bed of tissues.

The registered venous-arterial response of $71.8 \pm 4.0\%$ (confidence interval 62.9-80.6%) in the paraulnar zone indicated a pronounced venous stasis of blood in the zone of trophic changes in tissues, which was 1.5 - 2 times higher than in other studied areas.

When studying the partial oxygen tension of tissues in the zone of venous trophic ulcers, it turned out that in 85.8% of cases, the TsrO₂ values were significantly lower than normal and averaged 4.3 ± 0.5 mm Hg (the confidence interval of the sign is 1.7-12.0 mm Hg).

The obtained data indicated pronounced tissue hypoxia directly in the zone of trophic ulcers, close to anoxia, and reflected the absence of conditions for independent regeneration of trophic ulcers.

When assessing the partial tension of oxygen in the tissues of the foot and on the contralateral limb, higher values of this parameter were revealed with statistical significance ($W=-47.0$, $p=0.0053$), similar to the values

of partial oxygen tension of tissues in patients with chronic venous insufficiency SZ-5 according to CEAP. In the study of microcirculation of lower extremity tissues in elderly patients with venous trophic ulcers and patients from the comparison group, the assessment of TCPCO₂ tension did not reveal any abnormalities.

Using nonparametric methods to assess changes in gas tension during positional tests in elderly patients with venous trophic ulcers, it turned out that during the elevation of the limb above the heart axis, there was a tendency to increase TcO₂ in the tissues of both limbs (although not statistically significant). The partial pressure of oxygen in the tissues around the trophic ulcer in the orthostatic position was statistically significantly increased ($W = -26.0$, $p = 0.032$), but remained at extremely low values characteristic of pronounced tissue hypoxia (average 16.3 ± 1.8 mm Hg).

DISCUSSION

In all patients with chronic venous insufficiency, the «lipid peroxidation» syndrome was accompanied by a decrease in the activity of the antioxidant defence system. In patients with venous trophic ulcers, depletion of enzymatic and non-enzymatic antioxidant defence systems in both capillary and venous blood was found.

In patients with trophic venous ulcers, an average twofold increase in the content of proinflammatory cytokine IFN-7 (average 70.4 ± 6.7 pg/ml, confidence interval 56.4-84.4 pg/ml) was detected in the venous blood serum compared to the level of IFN-7. In patients with chronic venous insufficiency, but without trophic ulcers, a five-fold increase in the level of IFN-7 in the venous blood serum (average 100.9 ± 8.4 pg/ml, confidence interval - 80.7 - 121.1 pg/ml) indicated a cytokine-mediated damaging effect on tissues in the distal segments of the limb and the attraction of an excess of effector cells to the focus of inflammation.

This was manifested by an imbalance of oppositional cytokine pools. The cytokine balance index (INF-7/IL-4) was on average 6.2 ± 0.6 , which is 2.5 times higher than the normal values and values of the cytokine balance index in patients with varicose veins from the comparison group. This level of IFN-7 in venous blood serum corresponded to pronounced hypoxia in the tissues of the paraulnar zone, equal to TsrO₂ 10 mm Hg and below.

The cytokine profile of TNF-a in serum venous blood in patients with chronic venous insufficiency of the compared groups, as a rule, did not change and was comparable to normal values. Such TNF-a values in patients

with venous trophic ulcers indicated the absence of an infectious process and active necrosis of soft tissues in the area of venous trophic ulcers [8-11].

In all patients with chronic venous insufficiency, there was a statistically insignificant increase in the level of anti-inflammatory cytokine IL-4 in the venous blood serum (13.3 ± 1.1 and 19.2 ± 1.7 pg/ml, respectively, in patients with and without trophic venous ulcers), which indicated the absence of an increase in humoral-mediated response [11-16].

CONCLUSION

Trophic disorders in elderly patients with chronic venous insufficiency are based on phlebohypertension, which manifests itself in a horizontal position ($45.6-70.1$ mm Hg) and increases in orthostasis. In 51.6% of cases, the triggering mechanism for the development of venous ulcers is a combination of venous reflux in the superficial and perforating venous systems. Isolated reflux in the superficial venous system, which is the cause of chronic venous insufficiency, is detected in 21.2% of patients.

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Consent for publication - The study is valid, and recognition by the organization is not required. The authors agree to open the publication.

Availability of data and material - Available

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VARIKOZLI TROFIK YARALAR BILAN OG'RIGAN KEKSA BEMORLARNI DAVOLASH

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Toshkent tibbiyot akademiyasi

ABSTRAKT

Dolzarbligi. Hozirda tadqiqotchilar yara hosil bo'lishida alohida qon reflyukslarining gemodinamik ahamiyati to'g'risida konsensusga ega emaslar, garchi ko'p sonli asarlar surunkali venoz etishmovchilikda trofik buzilishlarning rivojlanishi uchun makrohemodinamik omillarni o'rganishga bag'ishlangan.

Material. Ish 2012 - 2022 yillarda Toshkent tibbiyot akademiyasining ko'p tarmoqli poliklinikasida davolanagan pastki ekstremitalarning varikoz tomirlari bilan og'rigan 167 nafar bemorning kompleks tekshiruvi va jarrohlik davolash ma'lumotlari natijalariga asoslangan.

Natijalar. Trofik varikoz yaralar rivojlanishining qo'zg'atuvchi mexanizmi yuqori venoz gidrostatik bosim, lekin to'qima lipodermosklerozdan varikoz kelib chiqishining venoz yarasini ochishga o'tish ekstremitening yumshoq to'qimalarida mikrokirkulatsiyaning zai-flashuvi oqibatida sodir bo'ladi, katta katta tomirlarda

gemodinamikada qo'shimcha o'zgarish emas. Tadqiqotlar natijasida surunkali venoz yetishmovchilikda mikrosirkulatsiyaning o'zgarishi xarakterli ekanligi ma'lum bo'ldi tibiyaning pastki uchdan bir qismidagi mahalliy to'qimalarning gipoksiya bo'lib, mikrosxema to'shagida qonning ko'payishiga qaramay, trofik yaralar sohasidagi to'qimalarning qisman kislorod tangligining sezilarli darajada pasayishi bilan namoyon bo'ladi. Ushbu toifadagi keksa bemorlarda teri va teri osti to'qimalarining mikrosikulyatsiyasining o'zgarishi ham umumiy xususiyatga ega bo'lib, gemoriologik buzilishlar bilan bog'liq bo'lib, ekstremitalarning turli segmentlarida aniqlanadi.

Xulosa. Ultratovush tekshiruvlari natijasida pastki ekstremitalarning venoz tizimida qon reflyukslarining tarqalishining turli xil variantlari topildi, bu esa venoz trofik yaralar bilan og'rigan keksa bemorlarda flebohipertenziya rivojlanishiga olib keldi.

Tayanch iboralar: Trofik yaralar, flebohipertenziya, surunkali venoz insofsizlik