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MODERN METHODS OF COMPREHENSIVE TREATMENT OF PATIENTS WITH POST-THROMBOPHLEBITIC DISEASE WITH OPEN VENOUS TROPHIC ULCER OF THE LOWER EXTREMITIES (Literature review)

Ulug`bek R. Hamdamov [1], Mamur M. Abdurakhmanov [2]

1 Department of Cardiovascular and thoracic surgery, Bukhara branch of the Republican Research Center for Emergency Medicine, Bukhara, Uzbekistan
E-mail: hur-surg@mail.ru

2 DSc, Professor, Bukhara branch of the Republican Research Center for Emergency Medicine, Bukhara, Uzbekistan

ABSTRACT

Chronic venous insufficiency (CVI) of the lower extremities is one of the most common chronic diseases, which is a very pressing problem both in medical and socio-economic terms. According to data presented at the XIV World Congress of Phlebologists, in the countries of North America and Europe, 25% of the working population suffer from one or another manifestation of CVI, therefore diseases of the human venous system are an economic and social problem for all industrialized countries. Cases of occlusion of the muscular veins of the leg during long-term abdominal operations under general anesthesia with the use of muscle relaxants have been described. Thrombosis and thrombophlebitis of the deep veins in the majority of patients, approximately 90–96%, lead to the occurrence of PTS. The fundamental feature of trophic ulcers, in contrast to most wounds, is the absence of a clear staging of the wound process and a pronounced inhibition of tissue reparative processes. Moreover, within one ulcerative defect, signs corresponding to all three phases of the wound process can be simultaneously determined. It is traditionally believed that the greatest radicalism in eliminating devitalized tissues and sanitizing the source of infection is inherent in the surgical method.

Key words: CVI, Postthrombophlebitic disease, thrombosis and thrombophlebitis, proteolytic enzymes.

INTRODUCTION

Chronic venous insufficiency (CVI) of the lower extremities is one of the most common chronic diseases, which is a very pressing problem both in medical and socio-economic terms. According to data presented at the XIV World Congress of Phlebologists, in the countries of North America and Europe, 25% of

the working population suffer from one or another manifestation of CVI, therefore diseases of the human venous system are an economic and social problem for all industrialized countries. Thus, in 2000, the cost of treating complicated forms of CVI in the UK amounted to just under 600 million pounds. [1,3,4]

By assessing the costs of treating patients with complicated forms of CVI over different periods of time, it can be argued that this problem is growing in the economic aspect. Postthrombophlebitic disease (PTS) belongs to the category of the most severe and common forms of CVI of the lower extremities and accounts for about 28% of all lesions of the venous system of the lower extremities. The term PTS itself indicates that pathological changes in the venous bed of the lower extremities develop as a result of previously suffered deep vein thrombosis .Among the reasons for the development of thrombosis of the main veins of the lower extremities are various types of trauma in the form of isolated muscle bruises or in combination with fractures of the bones of the limb, obesity, the use of oral contraceptives and steroid drugs, pregnancy and childbirth, malignant tumors.[5,6]

Cases of occlusion of the muscular veins of the leg during long-term abdominal operations under general anesthesia with the use of muscle relaxants have been described. Thrombosis and thrombophlebitis of the deep veins in the majority of patients, approximately 90–96%, lead to the occurrence of PTS. The localization of the thrombus in the inferior vena cava system determines the zones of their post-thrombotic complications, but the level of damage to the deep veins in PTS does not affect the phase of trophic disorders of the leg. Trophic venous ulcers are observed in this condition more often than in primary insufficiency of the superficial veins. [8,9]

The basis of the modern concept of ulcer formation in CVI is valvular insufficiency of various parts of the venous bed, including «horizontal» blood reflux along the perforating veins, especially at the level of the lower leg. The formation of trophic ulcers occurs, as a rule, in areas subject to the greatest “hydrodynamic bombardment” by pendulum-like movements of excess blood volumes caused by the failure of the valve apparatus of the perforating and superficial veins. Therefore, the most common localization of ulcers of the lower extremities is the lower third of the leg in the projection of the medial and lateral ankles. There are frequent cases of circular damage to the tissues of the lower leg. As the duration of the disease increases, patients experience not only a compensatory expansion of the saphenous vein system but also the gradual development of a pathological process in the subcutaneous tissue in the form of indurative cellulite, hyperpigmentation and ulceration. [6]

In recent years, the theory of leukocyte infiltration of tissues of the lower extremities during CVI, which triggers a cascade of sequential pathological changes in tissues, has gained recognition. According to this theory, the main cause of trophic disorders in CVI is the deposition of leukocytes in the microvasculature, adhesion to endothelial cells and migration of leukocytes into the paravasal space with their subsequent activation, resulting in the death of cells around post-capillary venules in areas with impaired blood circulation. [10]

The described changes are called the Arthus phenomenon, which can occur with the administration of various drugs and causes the migration of leukocytes into tissues as a result of sequential reactions triggered by the deposition of large molecular substances, for example, antigen-antibody complexes or endotoxins. Repeated administration of the drug causes the release of free oxygen radicals and proteolytic enzymes by leukocytes. The Arthus phenomenon clearly demonstrates the destructive power of leukocytes due to their accumulation in tissues and activation. Free oxygen radicals and proteolytic enzymes released from activated leukocytes lead to the development of inflammation and the formation of primary skin affect. Some researchers put forward the idea of impaired blood supply to tissues as a result of the development of arteriolovenular, and subsequently arteriovenous shunts, as the main factor in the development of trophic disorders. [1]

As a result of desolation of the microcirculatory bed, tissue hypoxia is aggravated, leading to necrosis and the occurrence of primary skin affect as it progresses. Any, even minimal, traumatic impact in the area of trophic changes leads to necrobiotic changes in tissue and the formation of a wound defect. Subsequently, rapid bacterial contamination of the trophic ulcer occurs. The global generalized experience of treating patients with trophic ulcers of the lower extremities shows that successful therapy requires an individual approach, skillful and rational use of the entire arsenal of existing means and methods of both local action on a trophic ulcer and those aimed at increasing the overall resistance of the body. Therapeutic tactics for trophic ulcers of the lower extremities play one of the key roles in preparing the patient for the main treatment - radical surgery, largely predetermining further treatment tactics. [7,11]

Currently, the question of the order of treatment measures in relation to trophic ulcers and pathological venous reflux remains debatable. According to a number of researchers, performing pathogenetically targeted radical operations for existing open trophic ulcers of the lower extremities is contraindicated due to the high risk of purulent-septic postoperative complications.

As a result, the condition for surgical correction of pathological venous reflux is complete epithelization of the ulcer. However, due to the low reparative activity of the ulcer tissue and periulcerous zone caused by microcirculatory disorders, the duration of treatment is delayed for a long time and is often unsuccessful.

On the other hand, radical surgery is possible in some cases in the presence of ulcerative defects. An indispensable condition for carrying out surgical treatment is thorough sanitation of the ulcerative surface as a potential source of infection, carried out as soon as possible.

Currently, in the arsenal of practical surgery there are many methods and means of sanitation of wound defects. However, none of them completely satisfies surgeons. In this regard, the search continues for new, more effective ways to influence wound microflora and methods of local treatment of purulent and infected wounds.

Any method of treating purulent wounds should be aimed at maximally reducing the duration of the alteration and exudation phases, at the early appearance of full-fledged granulation tissue and stimulating the regeneration phase.

The fundamental feature of trophic ulcers, in contrast to most wounds, is the absence of a clear staging of the wound process and a pronounced inhibition of tissue reparative processes. Moreover, within one ulcerative defect, signs corresponding to all three phases of the wound process can be simultaneously determined. It is traditionally believed that the greatest radicalism in eliminating devitalized tissues and sanitizing the source of infection is inherent in the surgical method. However, in some cases it is impossible to achieve complete removal of purulent-necrotic tissues and wound microflora using only surgical treatment. This allows us to justify the need for additional sanitizing effects on the tissue of an infected wound after surgical treatment. [10]

The local use of modern antibacterial drugs in the treatment of purulent wounds, especially in the first phase of inflammation, has been described. However, at the present stage, the local use of most antibiotics in the treatment of CVI in the stage of an open trophic ulcer is considered pointless, since these drugs practically do not contribute to the rapid cleansing of the wound from necrotic masses and, being immunosuppressants, can delay the maturation of full-fledged granulation tissue. Systemic use of antibiotics is considered appropriate in the presence of a perifocal inflammatory reaction – cellulite. [9]

The use of proteolytic enzymes in local therapy of purulent-inflammatory processes has demonstrated a number of advantages, including rapid and high-quality removal of necrotic tissue, suppression of wound infection and, to some

extent, stimulation of regenerative processes in the wound. However, it should be noted that many of them act for a short period of time in acidic pH values of the wound environment. [8]

Recently, in the practice of purulent-septic surgery, the method of ultrasonic wound cavitation has firmly occupied its “niche”. It is used as an addition to primary surgical treatment of wounds with an increased risk of developing wound infection and complicated wounds. It has been established that the sanitizing effect of ultrasound is carried out due to cavitation destruction of the cellular elements of wound discharge and the release of lysosomal enzymes, chemotactic factors, bactericidal proteins, and is enhanced when solutions of antibiotics and antiseptics are used as an acoustic medium. The successful use of nitric oxide in local therapy of trophic ulcers of venous etiology, which has a direct local bactericidal effect, stimulates phagocytosis, and improves vascular trophism, has been reported. The authors note the acceleration of the change in phases of the wound process and the healing time of ulcers on average in half the time compared to traditional methods. The reports on the use of various ozone therapy techniques in clinical activities are encouraging. The therapeutic effect of ozone is based on a universal anti-inflammatory effect, which consists in activating antioxidant protection, stimulation of energy and plastic metabolism, a fairly powerful bactericidal effect against microorganisms, including those that are multiresistant to most antibiotics and antiseptics, an immunomodeling and antihypoxic effect. It is necessary to note the ability of ozone to stimulate the processes of oxygenation and tissue regeneration in the area of trophic disorders. [8,9]

The introduction of laser irradiation methods made it possible to use a “laser scalpel” for the treatment of primary purulent wounds. The advantages of laser surgery for purulent wounds are the rapid and immediate removal of affected tissue with minor blood loss. However, the use of laser is limited in the area of neurovascular bundles and other vital structures due to the danger of their injuries [6].

After completion of the first phase of the wound process in a trophic ulcer, the primary task is to stimulate reparative processes and protect the ulcer tissue from re-infection. Traditionally used dressings with prolonged exposure on the wound surface as a result of impregnation with wound discharge tend to easily harden on the surface when dry. The developing granulation tissue grows through the fibers of the dressing material and is inevitably injured when the dressing is changed, thus slowing down the reparative processes of the ulcer tissue. Nowadays, so-called atraumatic dressings are used, often in combination with various medicinal impregnations. Each new development in the field of dressings and plastic

materials is a step towards creating an ideal wound covering that meets at least a dozen basic requirements: physiology, adequate sorption capacity, atraumatic, maintaining optimal water and temperature balance, ensuring gas exchange, etc. [1,3,6]

Despite the variety of drugs used to treat patients with trophic ulcers, the number of drugs that effectively influence the formation of granulation tissue and epithelization is small. [2,3] Therefore, the most ideal wound covering at the present time and in the foreseeable future will remain the patient's own skin.

Based on modern ideas about the pathogenesis of CVI, in most cases it is extremely difficult to achieve long-term and significant improvement in phlebohemodynamics in PTS without surgical correction. The essence of surgical treatment for PTS of the lower extremities is the separation of the superficial and deep venous systems, which leads to a significant reduction in phlebohypertension of the lower extremities. It was noted that trophic disorders occur in areas drained by the "closed type" communicating vein, i.e. not connected with any of the main trunks of the saphenous vein. Therefore, a good long-term treatment result is possible only with removal or sclerosis of the saphenous vein in combination with the elimination of reflux through incompetent perforating veins. [10]

The attitude towards superficial veins in PTS should be as careful as possible, since in its recanalized form the saphenous veins continue to play an important role in ensuring the outflow of blood from the limb, therefore removal of all saphenous veins is not necessary [9]. Only in the presence of pronounced varicose degeneration of the superficial veins and instrumental data confirming that the latter do not take part in the outflow of blood and worsen the hemodynamic parameters of the limb, surgical intervention on them is indicated. It is advisable to perform phlebectomy, pharmacological or endovasal laser obliteration on the thigh and upper third of the leg, removal of conglomerates of varicose-transformed veins, or ostial ligation of veins above the estuarine tributaries. [10,12]

The founder of scientifically based surgical access to incompetent perforating veins of the lower leg is Linton R., who proposed ligation of all incompetent veins of the lower leg. Subsequently, various methods were proposed for eliminating perforating veins of the leg, in particular operations by Felder, Cockett - dissection of perforating veins of the distal third of the leg, Sherman - selective ligation of only one incompetent perforating vein. Gross cosmetic defects after open subfascial treatment of incompetent perforating veins using the method of Linton and Felder, the high frequency of suppurative complications served as an impetus for the development of new modifications of surgical approaches, which is confirmed by numerous conferences on phlebology.

Endoscopic subfascial dissection techniques have become widely used in surgical surgery of perforating veins of the leg, making it possible to influence venous collaterals directly in the area of trophic skin disorders, without waiting for the trophic ulcer to close.

Contraindications for endoscopic interventions include the presence of large circular ulcers on the legs and severe sclerosis of soft tissues. In such cases, it is justified to perform operations using traditional open access. At the present stage, indications for surgical correction of the deep veins of the lower extremities remain very limited. Around the world, only a few centers have sufficient experience in conducting such interventions. [4,5,6]

Indications for surgery were the lack of a lasting effect of previously performed interventions on the superficial and perforating veins, the ineffectiveness of conservative therapy, severe hemodynamic disorders, such as shortening of the return time of vein filling and blood reflux during descending phlebography of grade 4 according to Kistner. [6]

There is currently no reliable evidence indicating that reconstructive surgery on venous valves reduces venous pressure. Surgical treatment of absolute valvular insufficiency in post-thrombotic lesions consists of reconstructive operations that ensure targeted discharge of blood from recanalized main veins into large tributaries that have retained full valves - transposition of valves, free transplantation of valve-containing vein segments - autotransplantation of valves and the creation of artificial valves [11]. However, the technical complexity and traumatic nature of such surgical interventions, but to a greater extent the short-term effect, do not allow us to consider reconstructive operations for post-thrombotic avalvulation of the deep veins of the lower extremities as the optimal type of treatment [9].

Thus, the problem of treating PTS of the veins of the lower extremities, complicated by a trophic ulcer of the leg, remains relevant at the present time. There is no doubt that the success of treatment of this pathology is determined by adequate correction of impaired venous outflow from the lower extremities. However, radical surgical treatment in such patients is often not possible due to the presence of an open trophic ulcer of the leg, which is a potential focus of an infectious-inflammatory process. Therefore, the effectiveness of sanitation therapy for trophic ulcers is the most important stage in the complex treatment of PTS of the lower extremities, complicated by an open trophic ulcer. [12]

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