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COMPARATIVE CHARACTERISTICS OF WOUND PROCESS IN PATIENTS WITH PURULO-NECROTIC FORMS OF DIABETIC FOOT SYNDROME

Proshin A.V.

Moscow State Medical- Dental University,

City clinical hospital №1,

e-mail: Lidiya.Proshina@novsu.ru

Learning peculiarities of wound process is one of the main directions in solving a problem of purulo-necrotic complications of diabetic foot syndrome and tactics of surgical treatment. There is marked growth of case rate of diabetes in the recent years. Every second patient with diabetes is underwent surgical treatment, most of which are purulo-necrotic changes on feet, which occur with 28,6-65,0% of patients with diabetes [1, 2, 3]. Nowadays there's an opinion that diabetes negatively influences on wound process [3, 4], slows down adhesion of wounds, which get long and re-

crudescent character. Peculiarities of wound process are associated by disorders of tissue blood circulation in damaged areas, disorders of all types of metabolism, leading to development of acidosis, hypoxia and metabolic intoxication [5, 6], appearance of anaerobic- aerobic microflora in AA of purulent inflammation [7].

Aim of the work is comparable morphological research of wound process in patient with purulo-necrotic affect of lower limbs against diabetes.

Material and methods of research

Clinical data is based on the material, obtained while examining patients with purulent wound on foot. The main group (1 group) was 89 patients without diabetes; control group (2 group) – 93 patients with purulo-necrotic process on foot against diabetes (D). Average age, gender, character of purulo-necrotic process on foot and other parameters were consistent in the marked clinical groups. Morphological research consisted of the following methods: histologic (48 biopsy samples), immunomorphological (25 biopsy samples).

Histologic method

Biopsy samples were fixated in 10% neutral formol and according to traditional method were concreted in wax blocks. Made from wax blocks histologic cuts, 4-5 um thick were dyed with hematoxylin and eosin. Medications were studied and taken picture with the help of microscope DM LB (Leica, Germany) – videocamera JVC (USA) – computer Pentium IV system.

Imunne-morphological method

Peculiarities of granulation tissue in two group of examination were studied with the help of immunoperoxide method using 4 monoclonal antibodies. The same biopsy samples (25 from 48) were studied with histologic method. Antibodies by NOVOCASTRA, DAKO and Lab Vision to marker of vessel endothelium, antigen CD31 (allows visualizing vessels in tissues) and to collagen I type (for collagen formation estimation), to T- lymphocyte-helper (CD4) and T- lymphocyte-suppressor and killer (CD8) were used as primary specific antibodies.

Detection system «UltraVision LP Value HRP Polymer» (goat antibodies to rabbit and mouse), Lab Vision USA was used in order to visualize results of the reaction of connecting antigen with antibody. The result of reaction with antibodies to collagen was estimated according to traditional system of semiquantitative method in grades from 0 to 3 (absence of reaction, weak, moderate and expressed reaction), with antibodies to T- lym-

phocyte-helper, suppresser/killer – according to quantity of such cells in granulation tissue within sight microscopically enlarged X400.

Visualization of wound process was fulfilled, orientating on the following criteria: extent of degree of manifestation and duration of inflammatory presentation in the zone of wound (oedema, hyperemia, wound effluent), condition of wound bottom and also there were fixed periods of granulation presentation, beginning of epithelialization and healing of wound defects. Analysis of wound process was done according to stages of its development.

Research results and discussions. During morphological study of tissue samples before the treatment it was marked that tissues in wound zone are given necrotic changes in patients of both groups, leucocytic infiltration and numerous colonies of coccal bacteria were marked.

Derma and also elements of areola tissue were in condition of destruction with formation of numerous microabscesses. Besides that expressed microcirculatory disorder was marked in wound tissues: dilatation of vessels, occurrence of stasis in them, microthrombuses, destruction of vessel wall. Destructive processes with dissociation of myofibrils spread and onto muscular tissue.

Treatment of patients of the I and II groups was traditional (patients of the II group additionally had correction of carbohydrate metabolism) together with local one, led to reduction of oedema and hyperemia of skin around the wound. This happened in patients of the I group on the $5,8 \pm 0,7$ day, while 30% of patients from the II group on the $12,5 \pm 0,3$ day and 70% – on the $14,9 \pm 1,2$ day. Wound cleansing from purulo-necrotic masses in patients of the I group happened averagely on the $7,4 \pm 0,2$ day. The period shifted in patients of the II group 20% to $16,9 \pm 1,2$ day, 58% to $19,6 \pm 1,2$ day and 22% to $19,9 \pm 0,9$ day.

Analysis of morphological research shows slowdown of wound process in the group of patients with D. The period of resorption and rejection of necrotic tissues in the wound is extended, long time there's seen oedema, which goes with data of different researchers [8].

Cytologic research of early exudates in patients of I and II groups add morphological pattern. Domination of neutrophilic leukocyte upto $69,0 \pm 2,0$ in sight in patients of the I group and upto $75,0 \pm 3,1$ in sight in patients of the II group was marked in cytograms. Number of destroyed neutrophils in this case was in the I group $8,8 \pm 0,5\%$; with properties of degenerative changes – $79,6 \pm 2,8\%$; quantity of neutrophils with saved structure was $11,6 \pm 1,7\%$. Cytologic pat-

tern of patients of the II group was alit different: degenerative and destroyed forms of neutrophils dominated ($82,2 \pm 2,4\%$ and $11,6 \pm 0,5\%$ correspondingly), while quantity of saved forms was $6,2 \pm 0,5\%$. In cytograms of patients of the II group there was significant quantity of microorganisms of coccal flora. Macrophages and polyblasts were missing. Incomplete phagocytosis in polynuclears was $78,0 \pm 2,1\%$. Type of cytogram of patients of both groups corresponded to degenerate-inflammatory, though a number of destroyed neutrophils dominated in patients of the II group. Transit to the second stage of wound process is followed by reduction of infiltration of soft tissues. Surface of the wound of patient of the I group covered granulation on the 7-10 day. Fascicles of collagen fibres dominated in granulation tissue, fusiform fibroblasts and fibrocytes were among them. The main function of these cells is apparently regulation of metabolism and mechanical stability of matrix. Angiogenesis is marked in granulation tissue. Process of regeneration is spread on muscular tissue, in which myotubes are often formed.

Process of transit to the 2nd stage is significantly slow downed in patients of the II group, in 1,5 times. Process of differentiation of fibroblasts and formation of collagen fibres is also slow-downed in comparison with the I group. Moderate quantity of newly formed vessels is marked. In histologic medications of patients with diabetes on the 14th day there's marked less content of macrophages in purulent wound (41% less than in the first group). Not enough content of macrophages, stimulating proliferation of fibroblasts and collagen synthesis, apparently, explains slowdown of processes of granulation formation. Analysis of hystograms of patients from the second group allows marking that wound process is followed by diabetic microangiopathy, expressed by derma changes, there's hyalinosis of connective tissue. Together with formation of granulation tissue after its quick cleansing from necrotic masses (II group) there may be again formed zones with necrosis and bacteria colonies. Character peculiarity of such appearances is cell reaction with weak or not expressed leucocytic infiltration. Presence of numerous microbial associations in pathologic focus, high extent of semination by tissue microbes slowdown periods of cleansing and wound healing in patients with complicated forms of diabetic foot. Changes in the system of cell and humoral immunity are often conductive to such development of wound process: fall of activity of T- and B AA lymphocytes (CD4, CD8). On the 18th day of wound process quantity of neutrophils in cytogram of patients of the 1st group was $27,3 \pm 1,7$, on the

25th day – they were not revealed. Type of cytogram corresponded to regenerative-inflammatory. However, patients of the 2nd group on the 25th day still could have changed forms of neutrophils in their cytogram, content of which was close to $30,7 \pm 1,7$. Inflammatory stage of wound process of patients of the 1st group transits to reparative one on the $10,4 \pm 0,2$ day, while patients of the 2nd group – on the 20–27 day. Sizes of wounds become less by means of epithelialization and contraction of scar tissue. Together with regeneration of connective tissue of skin derma and its derivatives: hair follicle, there's regeneration of epithelial layer.

Thus, in case with purulent wounds of different genesis, their biological essence and consequence of the developments is the same. However, wound process in patients with diabetes is followed by a number of peculiarities:

- 1) reduction of number density of vessels of granulation tissue;
- 2) significant slowdown and disorder of maturation of granulation tissue, dystrophic disorders of collagen fascicle;
- 3) appearance of purulence locus of granulation and mature connective tissue.

Morphological pattern of diabetic angiopathies and neuropathies with microcirculation disorder conduces to hypoxia of wound tissues and together with reduction of cell and humoral immunity destroy the wound process, extending periods and stages of wound healing. All above mentioned shows the necessity of complex morphological estimation for effective control of wound process. The described method will allow correctly estimate its extent in order to work out and apply reasonable algorithm of antibacterial, analgetic, antiedemic, anti-inflammatory and stimulating reparative processes of treatment of purulent wounds of soft tissues, that with no doubt will allow improving quality of patient's life without increasing or with minimal operation activity.

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**THE IMPACT OF THE EXPERIMENTAL
HEART FAILURE UPON
THE FUNCTIONAL MYOCARDIUM
MORPHOLOGY AND
THE CORRECTION OF THE
ALTERATIONS WITH BISOPROLOL**
Proshina L.G., Fedorova N.P., Antonova L.M.
Novgorod State university of Jaroslav Mudryi,
e-mail: Lidiya.Proshina@novsu.ru

Heart failure is one of the most significant medico-social problems and is followed by alterations on different levels of heart organization. A great number of questions that regard reactive, adaptive, and reparative alterations of cardiomyocytes and stromal elements of heart is controversial and need accurate definition. The need of the studying of the restoration abilities of myocar-