CLASSIFICATION AND ANALYSIS OF FACTORS INFLUENCING WOUND HEALING RATES

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Abstract: Have you ever wondered why on some people everything heals "like a dog," but on others every scratch is a problem? It also happens that injuries do not heal for months and become chronic. We can immediately name at least two reasons for long-term non-healing wounds - age and infection. But in fact, there are many more factors influencing healing. It is traditional to divide the factors influencing wound healing into two groups - general and local.

Keywords: diabetes mellitus, regeneration, restoration, mechanical injury, trophic, patient, circulatory disorders.

Concomitant diseases, such as diabetes mellitus, severe infections, disorders in the hematopoietic system, cardiac and respiratory failure , slow down regeneration by impairing the formation and delivery of necessary substances to the wound area, as well as the removal of toxic metabolic products from the body. [3]

Regeneration (restoration) of skin and tissues is an important and complex physiological process. It depends on the area and depth of damage, concomitant diseases and many other factors. Long-term non-healing wounds bring significant discomfort to everyday life, as they are accompanied by pain, swelling, discharge of clear fluid, blood or pus from the wound, an unpleasant odor from the wound, and a feeling of fullness in the damaged area. Depending on the cause of occurrence, all long-term non-healing wounds can be divided into traumatic (appearing as a result of mechanical injury, burn, etc.) and trophic (appearing as a result of circulatory disorders in the affected area).[4]

General factors:

1. Age. The older the patient, the worse his wound healing occurs. In experiments with laboratory mice, it was clearly shown that in the cells of aged mice (18-22 months) the level of reparative cell synthesis is 2 times lower than in young mice (1.5-2 months). That is, at a young age, all injuries heal twice as quickly and with fewer complications. \

But mice are mice. At what age should a person worry about the speed of regenerative processes - after 50 years, or later? It is important to keep in mind the following factor.

2. Heredity. Each of us has our own genetically determined characteristics of the body, which affect, among other things, the process of wound healing. These features are inherited and are characterized by a certain and strictly individual rate of regeneration, content and interaction of cellular structures. Genetically, the main parameters of the functioning of organs and systems of the body are transmitted to us - the production factor of protease enzymes in the wound, the activity of growth factors, the state of hormonal and immune status.

3. The state of immunity also matters a lot for the wound healing process . Any injury is accompanied by an inflammatory process, which instantly triggers an immune response: antibodies are formed, special lymphocytes are formed, macrophages are activated, and the work of fibroblasts is activated. Decreased immunity leads to uncontrolled inflammation and suppuration, in which healing is basically impossible.

4. Comorbidities are another common factor that affects the body's ability to heal. Ailments such as diabetes, bronchial asthma, autoimmune diseases, diseases that affect blood vessels and disrupt microcirculation. Trophic ulcers of the lower extremities alone can be the result of damage to the veins or arteries against the background of diabetic neuropathy and angiopathy, or arise due to hypertension, systemic diseases of the blood, nervous system, metabolism, and so on - the list of concomitant diseases is very long. So only proper treatment of the underlying disease gives the patient a chance for rapid wound healing.[15]

5. Excess weight of the patient can become an obstacle to rapid recovery from injuries. Firstly, loose subcutaneous fat is less well supplied with blood, and secondly, it can become an attractive environment for the development of pathogenic bacteria.

6. The general nutritional status of the patient - that is, the presence or deficiency of “building materials” - proteins, carbohydrates, amino acids and microelements. An exhausted body does not have the physical ability to regenerate. Therefore, it is important to maintain a balanced diet and limit factors that adversely affect the absorption of macro- and micronutrients (alcohol, smoking, stress, etc.)

7. The psycho-emotional state of a person is also very important. Prolonged stress leads to hormonal depletion and decreased immunity, which, as we have already found out, has a detrimental effect on the body’s ability to recover from any injury.

It is obvious that the general factors that determine the body's ability to heal wounds are closely related. Thus, immunity changes with age , the state of which depends, among other things, on heredity and the level of stress. This is why a comprehensive approach is important in treating all types of wounds .[1, 5, 13]

LOCAL FACTORS:

1. **The location of the wound** is important. Different parts of the body have different thickness of skin and, most importantly, different intensity of blood

supply. Therefore, an important point is the state of microcirculation. Injuries in the head and neck area heal best, since the capillary network is best developed there. Next in increasing speed of healing are: the gluteal region, the back, the front surface of the torso, the arms and, finally, the legs. On the lower extremities, the most problematic areas are the lower third of the leg and the plantar part of the foot.

2. **Extent and depth of damage** . The larger and deeper the wound, the more difficult and long the healing process will be. That is why, in case of complex wounds, it is imperative to seek qualified medical help, when the surgeon, by properly treating the wound, creates conditions for its best healing.

3. **Inflammation and infection** (suppuration) are processes in which tissue edema develops and microcirculation is disrupted. The presence of a large number of pathogenic microbes in the wound will not allow the wound to heal. Therefore, the most important aspect in local wound treatment is the elimination of inflammation and suppuration with the help of modern broad-spectrum and long-acting antiseptics, such as hydrogel and Prontosan solution .[6]

4. **Langer lines** are a factor that is rarely talked about, and perhaps not everyone knows. In 1862, the Austrian anatomist Karl Langer first described skin tension lines, which also affect healing. Along these lines, flexion folds form on the hands and above the joints , and wrinkles appear on the face. Wounds that are located perpendicular to Langer's lines will heal longer and more difficult.[7]

External conditions that interfere with wound healing

In addition to the general and local factors described above, we can also identify external causes that interfere with rapid wound healing .[10,11,15]

- For example, **the time of year and climate** have a certain impact on human health. In winter, metabolic processes in the body often slow down, and in the cold, capillary blood supply worsens, which means the healing processes are slower.
- **microbes** actively multiply , and fighting infection in the wound becomes the main task.
- **Dry air** disrupts the skin's protective barrier and reduces local immunity, which has a bad effect on regeneration.
- **Unfavorable working conditions** , such as having to stand or sit without changing posture, or exposure to vibration.
- **Wearing uncomfortable and tight clothes** , shoes or underwear that interfere with blood microcirculation.
- It also disrupts blood flow and **is too tight bandaging** when applying a wound dressing.
- **Neglect of personal hygiene rules** for a long time overloads the immune system and leads to purulent inflammation, in which wound healing is impossible.

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