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TREATMENT OPTIONS FOR PRESSURE ULCERS - REVIEW ARTICLE

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Abstract

Pressure ulcers are a significant medical problem due to their frequency and high treatment cost. An important task is to prevent their formation, but very often, despite great efforts, if a large number of risk factors are present, pressure sores appear and develop. Therefore, the treatment of pressure sores is interdisciplinary and multi-specialised. The treatment process involves nurses and doctors as well as many different specialists, e.g. dieticians or physiotherapists. Many new treatment methods have been developed in recent years. The aim of this article is to characterize the latest methods of treating bedsores as presented in various scientific studies from recent years. Material and methods: The work was based on medical articles collected in PubMed, Google Scholar, Via Medica Journals, websites and medical books. The research was conducted through the analysis of keywords such as: "pressure ulcers", "wound care", "wound management", "pressure ulcers treatment".

Key words: apressure ulcers, pressure ulcers treatment, wound care, wound management

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Introduction

Recent years have seen advances in both the prevention and treatment of pressure sores. Nevertheless, they are a significant problem among patients and constitute a major medical problem not only in Poland but also in other countries of the world [1]. Patients at risk of pressure sores include those in intensive care units (ICU), neurology, internal medicine, geriatrics, palliative care but also home care [2, 3, 4]. The incidence of pressure ulcers varies. Many patients, are admitted to hospital or care and social care institutions already with an existing problem of pressure sores. There are also patients who do not have bedsores yet, but they are in the group at risk. In the first week of care, bedsores appear in 30-40% of patients and in 70% in the following weeks. [5] In Poland, there are no reliable epidemiological data to detail the incidence of pressure sores.[6] The treatment of pressure sores, after prevention measures, is an equally serious problem in contemporary health care [7].

Classification of pressure sores

A decubitus ulcer arises primarily as a result of two fundamental processes: closure of the lumen of blood vessels by pressure acting from the outside and intraepithelial damage to the microcirculation by shear forces. The indicated processes in practice very often occur simultaneously which results in pathophysiological changes that lead to skin damage and, consequently, to the appearance of pressure sores [8]. Cwajda-Błasiak et al. points out that the highest pressure values are generated by the sitting position, in a small area, under the ischial tuberosities, there is an accumulation of almost the entire body weight [6].

Several classification systems are described in the literature that relate to the assessment of the depth of tissue damage that is associated with a pressure ulcer wound. In Poland, many centres to date prefer different wound assessment systems, including the Torrance classification [9].

- Grade I – fading redness – the use of slight finger pressure causes the area of redness to fade reversibly.
- Grade II – non-fading redness – redness persists despite finger pressure.
- Grade III – skin damage up to the border with subcutaneous tissue, a well-demarctaed wound edge, bottom filled with red granulation tissue or yellow masses of disintegrating tissue.
- Grade IV – the lesion reaches the fascia, the wound margin is usually well demarcated, the wound floor may be covered with dry or moist black and/or brown necrosis.
- Grade V – advanced necrosis crosses the fascia and reaches bone, joints, ligaments, tendons, muscle tissue; the wound contains decaying tissue masses and black necrosis.

However, the Polish Wound Healing Society recommends a clinical assessment classification, the international pressure ulcer classification system according to the EPUAP/NPIAP (European Pressure Ulcer Advisory Panel/National

Pressure Injury Advisory Panel) advisory group guidelines This classification does not include the early stage of the disorder, i.e. non-fading redness, which in other clinical classifications is often treated as already the first stage of decubitus ulcers [10]. Krasowski and Kruk define fading redness as a high-risk condition rather than an accomplished lesion[7]. Therefore, when classifying a disorder, it is important to emphasise which tool was used for this classification. Kucharzewski emphasises that it is worth standardising assessments and using the same international criteria in all centres [11].

Factors influencing the healing process of a pressure ulcer wound

The course of healing of pressure sores is determined by a number of factors. First and foremost, the type and severity of factor(s) that influence the findings of healing and regeneration processes are indicated (Figure 1). All factors vary primarily in strength and quality as demonstrated by scientific evidence [12, 13 ,14, 15]. Selected evidence on the influence of factors on the wound healing process based on a systematic review by Coleman S. et al. considering 54 studies [12] and the EPUAP/NPIAP 2019 guidelines is presented below [1].

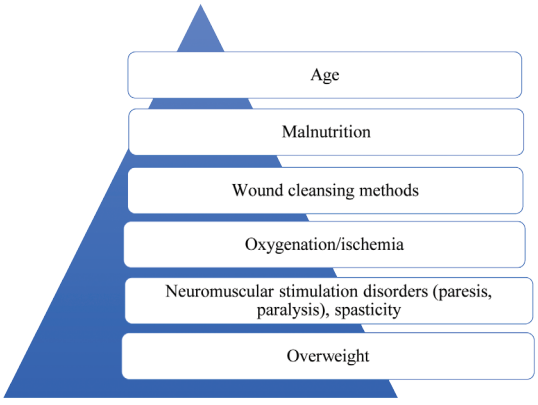

Fig. 1. Factors affecting the healing process of a pressure ulcer wound [1, 10, 12].

Advanced age is important in the treatment of pressure sores. This is because the regenerative capacity of tissues is a personal, individual characteristic having to do with repair mechanisms at the cellular level, but also at the tissue level. Ageing (medications, co-morbidities), the associated limitations that arise in relation to self-care, can cause disturbances in wound healing processes, increasing the risk of tissue destruction [16]. Szewczyk et al. point out that old age promotes disturbances in the protective and regenerative function of the epidermis. This is also an important aspect of the treatment of pressure sores. Healing processes are definitely slowed down or impaired as a result of comorbidities and frequent malnutrition. [10]

Disorders related to neuromuscular stimulation (paresis, paralysis) and spasticity are disorders that also affect the healing process of a decubitus wound. The problem is also evident in people with core function dysfunction. [10]

Tissue oxygenation/ischaemia can result from local factors (infection, inflammation, necrosis) as well as general factors (anaemia, dehydration, increased blood viscosity and thickening) [1]. Ischaemia, which is the result of permanent soft tissue deformation, very often causes tissue hypoxia and malnutrition and, as indicated by Kucharzewski et al., the accumulation of metabolic products and free radicals. This results in impaired wound healing [11].

Cwajda-Błasiak, Szewczyk., Mościcka. et al. emphasise that nutrition plays an important role in the prevention, formation and treatment of pressure sores. This is because all organ systems require macro- and micro-elements to meet nutrient requirements for growth, development and the repair of body tissues. Malnutrition, or its extreme form which is cachexia, can interfere with the healing process of pressure sores [6].

Another important factor is the presence of pain. It is defined as a subjective unpleasant sensory as well as emotional sensation that is associated with actual or potential tissue damage or the perception of such damage. The estimated prevalence of decubitus pain is in the range of 37% - 66% of patients, indicating the significance of the problem. Most often, it is mild pain of a burning nature [17].

Obesity is a factor that significantly increases the incidence of pressure sores in patients [18]. The skin folds contain microorganisms that thrive in moist areas, contributing to infection and tissue breakdown [19]. The important thing to note is that diabetes often coexists with obesity, results in wounds that are difficult to heal, due to diabetic neuropathy [20].

The use of maggot therapy in the treatment of pressure sores

For a wound to heal effectively, first it should be effectively cleansed and stimulated to granulate by eliminating necrosis and minimising metalloproteinases and pro-inflammatory cytokines found in the wound bed [6]. One method of wound debridement is the use maggot debridement therapy (MDT). Accepted treatment standards (Food and Drug Administration – FDA 2004) indicate the use of the larva of Lucilia sericata (Phaenicia sericata). Immature as well as incapable of reproduction maggots feed in a very active and aggressive manner, ingesting about 25 mg of necrotic tissue from the wound in 24 hours [21]. The residence time as well as the feeding time in the wound at temperatures above 20°C should not be longer than four days. Mature larvae, ready to metamorphose, leave the wound on their own and settle in a protective dressing that protects the wound. Two methods are used for larvae application. The first is the biobag (Biophenicia), a ready-made polyester dressing containing larvae. It is a simple and less time-consuming solution. The second method is to introduce larvae "in bulk", applying about 5 to 10 pieces per 1 cm² of wound, covering with a fibrous dressing soaked in 0.9% NaCl solution [10]. The downside of this method is fear and psychological resistance to insects among patients and medical staff [22].

Electrostimulation in the treatment of pressure sores

Electrostimulation of decubitus ulcers usually involves the use of high-voltage current (>100 volts). High-voltage electrostimulation should be performed for 45-60 minutes once a day for 3-7 days a week. Therapy can be carried out for as long as the healing process requires [23]. The study by Polak et al. examined the evaluation of the effectiveness of high-voltage electrostimulation in the treatment of grade II – IV pressure sores. The authors observed a reduction in wound size after 6 weeks of approximately 82 and 70% in the anode and anode-cathode group, respectively [24]. We can use direct current or pulsed current. Using direct current, the current flows in one direction, while the pulsation current is separated by the lack of current flow. The devices have many settings, including frequency, polarity, impulse type, stimulation duration, and amplitude. In many publications, the parameters used vary, making it impossible to present one optimal setting for each patient. Electrostimulation causes a tingling sensation and may induce muscle spasms [25, 26]. A review paper considering 20 studies concluded that electrostimulation probably increases the percentage of healed sores and accelerates healing compared to no electrostimulation. [25] A review considering 16 publications indicates the effectiveness of high-voltage monophasic pulsed current in treating pressure sores. The authors also point out that the advantage of this treatment method is that it can be carried out at the patient's home [27].

Controlled negative pressure in the treatment of pressure sores

Negative pressure wound therapy (NPWT) is a physical, minimally invasive method endorsed by many authors. It supports the local treatment of open wounds having different etiologies [10, 11, 28]. Positive outcomes are determined by four main mechanisms: macrodeformation, microdeformation, fluid removal and changes in the wound environment. Additional mechanisms include: neurogenesis, angiogenesis, the modulation of inflammation and changes in biological burden. The use of this method represents a significant breakthrough in wound healing not only in hospital but also in the home setting with regard to pressure sores [29]. Deep, penetrating, EPUAP grade III and IV decubitus ulcers, which are most commonly located in the sacral and gluteal regions, are eligible for NPWT treatment [10]. Local treatment of pressure sores with NPWT will not be an effective method if proper nursing care and adequate dressing protection are lacking [30].

Hyperbaric oxygen therapy

The therapeutic use of pressurised oxygen, known as hyperbaric oxygen therapy, is not a new method and has been used for decades to promote wound healing and even longer to treat other conditions [31]. It is now considered an adjunctive therapy for certain types of wounds. Patients with chronic wounds are qualified for hyperbaric therapy on an individual basis. In contrast, there is a lack of evidence on the effectiveness of hyperbaric therapy in treating bedsores [32].

Ultrasound (sonotherapy)

Ultrasound (sonotherapy) is an acoustic therapy where mechanical vibrations are transmitted in the form of a wave at a specific frequency [33]. Wounds are stimulated using ultrasound with a frequency in the range of 0.75-3 MHz and a power density in the range of 0.5- 3 W/cm2 . There is a relationship between frequency and tissue penetration – as frequency increases, penetration into deeper tissue decreases [34]. The size of the decubitus ulcer influences the duration of the treatment [10]. The treatment takes 5 minutes and can be applied daily or several times a week. The initial treatment time is 1 week, while it can be extended, up to 12 weeks or until the wound is healed [24, 34, 35, 36]. Studies show that even in clinically superficial I-II degree pressure sores, deeper tissues can be damaged. Thus, a 1 MHz ultrasound wave is a more favourable choice for the treatment of pressure sores than a 3 MHz wave [6]. This thesis was confirmed by two randomised studies with consistent results showing a positive effect of 1 MHz sonotherapy on the healing of the resulting wounds. Polak et al. compared the degree of healing of pressure ulcer wounds in the following groups: control, those using ultrasound and those using electrostimulation. After 6 months, a reduction in the ulcer area of 77.48% in the sonotherapy group, 76.19% in the electrostimulation group and only 48.87% in the control group was observed [24, 36].

Phototherapy

Phototherapy can be a good addition in the treatment of decubitus ulcers. Among phototherapy, we distinguish between linear polarized light therapy and polychromatic light therapy. The treatment uses visible rays, as well as infrared A and B rays. The effect is a biostimulatory action of increasing ADP synthesis, mitotic activity of cells, electrolyte exchange with the environment, changing the structure of cell membranes and the activation of enzymes, thus causing accelerated wound healing. Phototherapy is a safe form of treatment, and there are no absolute contraindications to this type of therapy. In addition to the potential benefits for accelerating the wound healing process, it additionally causes a reduction in inflammation and pain [37, 38, 39]. Also, there are new forms of therapy that use low-energy light, or led therapy. The effects of LED light (Light Emitting Diode) are widely documented. LED light stimulates biological processes that take place in cells by improving microcirculation, increasing cell metabolism and also have the effect of stimulating regeneration-related processes [40].

Surgical treatment

Several types of surgical procedures are used to treat pressure sores. They primarily involve removing the inflamed and dead tissue that is in the wound and then using fatty tissue or muscle tissue and skin, from other parts of the patient's body,

to fill the cavity [10]. Procedures that use upper-muscular dermal flaps are the reconstructive strategy of choice for the vast majority of patients [11]. The flap provides well vascularised tissue for healing, fills the spaces left by the excised tissues and forms an excellent padding over the bony protrusion to allow reasonable pressure distribution [41].

Conclusions

A chronically bed-ridden patient is at risk of developing bedsores. In the treatment of bedsores, proper care is extremely important. Appropriate treatment regimens and procedures as well as the latest treatment methods are of great importance. Prompt medical intervention and taking appropriate steps can definitely reduce the risk and frequency of pressure sores. The analysis of the literature shows that the treatment of decubitus wounds is interdisciplinary and multispecialty in nature. The treatment process involves the actions of not only a nurse, but also a doctor, physiotherapist or nutritionist. In recent years, many innovative methods of treating bedsores have been developed, with satisfactory results. The treatment plan must be modified and established according to the individual needs of the patient and also adapted to the effectiveness of the measures taken. In the treatment process, all possible and available methods should be considered that will complete the wound healing process successfully.

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