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In-hospital rehabilitation in the treatment of multiple myeloma

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Abstract

Introduction: Multiple myeloma (MM) is one of the most common malignant bone neoplasms. The primary treatment procedure for multiple myeloma is chemotherapy combined with autologous stem cell transplantation. Surgical treatment, consisting in tumor resection, is indicated when there is a risk of pathological bone fracture or the tumor pressing on nerve roots. It is necessary to create an individual treatment plan in interdisciplinary cooperation. An important element of treatment is assistance in the field of rehabilitation. The aim of this study was to indicate rehabilitation procedures in the treatment of multiple myeloma after endoprosthesis reconstruction in the hospital period.

Materials and methods: The work was written based on the medical history of a patient diagnosed with multiple myeloma in the proximal part of the right femur. The entire treatment procedure was carried out at the Department of Orthopedics, Traumatology and Oncology of the Musculoskeletal System, located at Unii Lubelskiej 1 in Szczecin.
Results: Rehabilitation in the treatment process of patients after resection of the tumor in the proximal part of the femur and arthroplasty is implemented as early as 1 day after the surgery in order to activate the patient as soon as possible. The rehabilitation program was as individualized as possible to the patient and included modern techniques such as osteopathy and manulana therapy.
Conclusion: Rehabilitation is an indispensable element of the treatment of cancer patients. The introduction of modern techniques to rehabilitation, has a positive effect on the effectiveness of therapy. Early initiation of rehabilitation brings tangible benefits during treatment and the patient's return to active participation in social life.

Key words: multiple myeloma; therapy; alloplastic

Introduction:

Multiple myeloma (MM) is one of the most common malignant bone neoplasms. It is derived from the β-lymphoid cells of the marrow. It is classified as a small-round-cell tumor, and its presence is mainly observed in richly vascularized bones containing significant amounts of red marrow [1, 2, 3]. According to the classification according to the World Health Organization (WHO), multiple myeloma is a cancer of plasma cells which, as a result of mutation and transforming into malignant cells, began to produce significant amounts of an abnormal monoclonal protein, also known as the M protein [4]. It is usually diagnosed in the elderly, over 40 years of age, more often in men [5]. The incidence of multiple myeloma worldwide ranges from 6-7 / 100,000, which is 1% of all neoplasms [4]. The main symptoms of multiple myeloma include: bone pain, pathological fractures associated with progressive bone destruction, kidney problems and anemia, as a result of which the patient may experience excessive fatigue and shortness of breath during exercise [6, 7]. Despite significant progress in the diagnosis and treatment methodology of this type of cancer, multiple myeloma is still a difficult disease in the management [8, 9]. One of the basic procedures performed in the diagnosis of multiple myeloma is radiological examination, as a result of which numerous osteolytic lesions can be noticed. Additionally, laboratory tests are performed on the serum, which usually reveal an increased amount of monoclonal proteins. Urinalysis is used to determine the presence of pathological Bence-Jones protein. The key element in the diagnosis, however, is to perform a bone marrow smear, in which an increased number of plasmocytes will indicate the presence of multiple myeloma in the body [1, 2]. The basic procedure in the treatment of multiple myeloma is chemotherapy combined with autologous stem cell transplantation from peripheral blood [2, 4, 10]. Radiation therapy, applied locally to damaged bones, is also applicable. A very important aspect in orthopedics is the ability to recognize disturbing symptoms of multiple myeloma. Surgical treatment, consisting in tumor resection, is indicated when there is a risk of pathological bone fracture or the tumor pressing

on nerve roots. As a result of already existing pathological fractures, surgical treatment is also used - osteosynthesis, usually with arthroplasty [2, 3]. In many cases, the disease is resistant to treatment, it returns many times, and thus remains incurable [10, 11]. The average survival time is about 3-4 years, and only 20% of patients survive over 5 years [2, 10]. Rapid diagnosis, appropriate selection of treatment procedures and control of the obtained effects improve the prognosis of patients and reduce the risk of possible disease recurrence [12]. Several factors such as age, general health, laboratory and cytogenetic test results, and the symptoms and complications of the disease can affect the treatment of multiple myeloma. It is necessary to create an individual treatment plan in interdisciplinary cooperation. An important element of treatment is assistance in the field of rehabilitation, which affects not only physical fitness, but also mental health, quality of life, participation in social life and return to work. The concept of patient rehabilitation depends on the rehabilitation needs, abilities and goals of each patient, but above all on their medical condition [13, 14, 15].

The aim of this study was to indicate rehabilitation procedures in the treatment of multiple myeloma after endoprosthesis reconstruction in the hospital period.

Materials and methods:

The work was written based on the medical history of a patient diagnosed with multiple myeloma in the proximal part of the right femur. The entire treatment procedure was carried out at the Department of Orthopedics, Traumatology and Oncology of the Musculoskeletal System, located at Unii Lubelskiej 1 in Szczecin. In the first stages of treatment, which began on October 21, 2016, the patient underwent high-dose chemotherapy assisted by autologous stem cell transplantation (autoHSCT). Additionally, radiotherapy treatments were performed, applied locally to the affected bones. As a result of a pathological fracture of the right proximal femur, the patient underwent hip arthroplasty (Figure 1).

Figure 1. Radiological image in the A-P projection after right hip arthroplasty [own source].

Due to the metastasis of multiple myeloma to the proximal segment of the left hip bone and the risk of pathological fracture in this segment, on July 5, 2017, the patient was admitted to the clinic again. During his stay, which lasted 6 days, an en block tumor resection was performed along with the proximal part of the left femur. A post-resection left hip arthroplasty was also performed using a Mutars prosthesis (Figure 2).

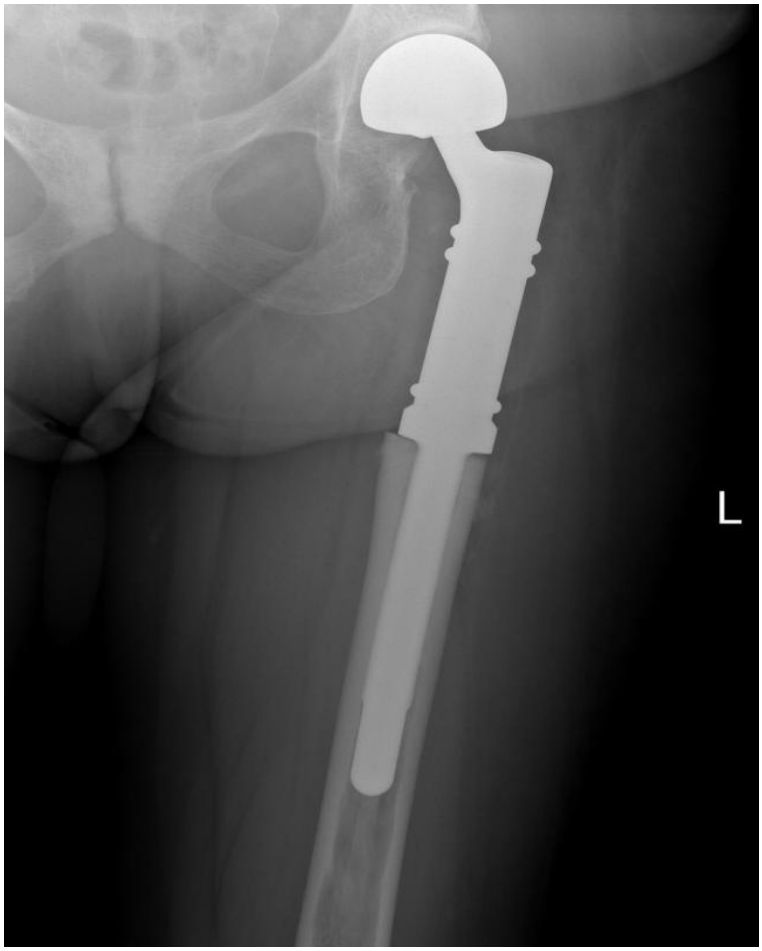

Figure 2. Radiological image in the A-P projection after tumor resection and left hip arthroplasty [own source].

The entire operation was carried out under general anesthesia. By placing the patient on the right side, anterolateral access to the hip joint was obtained. After the articular capsule was cut and the labrum was cut, the joint was dislocated and the proximal part of the femur was separated, cutting off the adjacent muscles. After measuring the resection level - 10 cm, the bone was cut off at this level. The entire specimen, along with the specimens from the medullary canal, which were then taken with a bone spoon, were sent for histopathological examination. After abundant irrigation of the wound with saline solution, a bed was cut out and a cementless Mutars femoral stem was implanted. The next step was to try on the implants and perform an intraoperative coherence test. After mounting the target Mutars implants: proximal thigh, extension, head and bipolar head, a final alignment test was performed, which was correct. The last stage of the operation was suturing previously cut

muscle tendons, applying Redon suction drainage and suturing the wound with a sterile dressing and an elastic bandage. The patient was instructed to walk with a gradual load, in the early days with the elbow crutches or a four-wheel support, and to perform exercises learned during his stay at the clinic. As part of anticoagulant prophylaxis, the patient should take Fraxiprane for 40 days and, in case of pain symptoms, painkillers. About 14-16 days after the surgery, the patient should visit the primary health care center in order to remove the skin sutures. After 2-3 weeks, a follow-up visit should take place at the attending physician, together with the previously obtained result of the histopathological examination. The patient is undergoing a check-up at the Orthopedic and Oncology Clinic.

Results:

Rehabilitation is an indispensable element in the treatment process of cancer patients. It is implemented already from 1 day after surgery in order to activate the patient as soon as possible. It is carried out by specialized medical personnel with extensive knowledge and experience in the field of oncological rehabilitation. The patient described above, during his stay in the hospital, was provided with comprehensive rehabilitation care already in the first day after the operation. On the same day, he was also vertically activated, which was aimed at faster activation of the patient and allowed to avoid adverse changes resulting from too long immobilization in bed, such as circulatory disorders or edema. It was recommended to walk with a gradual load, initially with belaying with crutches or a four-wheeled support to teach the correct gait pattern. This procedure also had a positive effect on stabilization and proprioceptive feeling, which determines the proper maintenance of the body's balance, and thus reduces the risk of falling. The rehabilitation program was as individualized as possible to the patient and included modern techniques such as osteopathy and manulana therapy. Exercises have been implemented to restore and maintain the proper range of motion in the hip joint. For this purpose, a knee and hip flexion pattern was performed, assisted by a therapist. Osteopathic techniques were also included in the therapy, improving the drainage of the lymph, thus affecting the lymphatic stagnation of the system (Figure 3). An important element of rehabilitation was also the therapy of the thigh soft tissues, in particular the development of the iliopsoas muscle attachment. The therapy also used stabilization exercises in line with the PNF concept (Figure 4). The physiotherapist informed the patient how to perform exercises with the operated leg so that they would not adversely affect his health and gave recommendations on how to sit down and get up safely. After completion of hospital treatment, the patient was self-sufficient enough to be able to perform the necessary daily activities. He was recommended to follow medical recommendations, exercise regularly and appear at the Orthopedic Outpatient Clinic.

Figure 3. Techniques according to the PNF concept [own source].

Figure 4. Osteopathic techniques [own source].

Discussion:

Multiple myeloma is a malignant neoplasm of plasma cells, the presence of which often leads to skeletal destruction, osteolysis, osteopenia and pathological fractures. At diagnosis, as many as 80% of patients show signs of bone destruction. Although MM in most cases responds to chemotherapy and radiotherapy, bone changes may still progress, leading to pathological fractures. In order to maintain fracture stability, surgical intervention is often

required, involving internal fixation or arthroplasty [16, 17, 18]. The aim of this study was to provide guidelines for inpatient rehabilitation in the treatment of pathological fractures resulting from the course of multiple myeloma.

In the available literature, no specific guidelines regarding a safe and effective rehabilitation process in the course of MM treatment have been found. Treatment plans and decisions on therapeutic management should be based on individual clinical circumstances [19].

According to the literature, surgery is performed in patients with bone metastases, as well as as a result of pathological fractures. Tumor resection along with arthroplasty or fracture stabilization gives better treatment results. The research confirms that in patients after orthopedic surgery a decrease in pain was observed and functional parameters improved. Patients tolerated the procedure well, which contributed to the improvement of their quality of life [20-22].

In the case of patients after hip arthroplasty, the main goal of rehabilitation was to maximize functionality and minimize complications such as infection, deep vein thrombosis, pulmonary embolism or dislocation. According to the literature, an early physical rehabilitation program should include 4 aspects: therapeutic exercises, transfer training, gait training and daily life activities instruction (ADL). In the early postoperative period, efforts should be made to achieve normal ranges of joint motion, reduce pain and eliminate disturbances in soft tissues. According to the latest literature, patient activation on the day of surgery shortens the hospitalization time [23-27].

Conclusion:

Rehabilitation is an indispensable element of the treatment of cancer patients. The introduction of modern techniques, such as manual therapy and osteopathy to rehabilitation, has a positive effect on the effectiveness of therapy. Early initiation of rehabilitation brings tangible benefits during treatment and the patient's return to active participation in social life.

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