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Rehabilitation and physical activity during treatment of various types of cancer

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Abstract:

Introduction and aim:

Cancer is a health challenge for the entire human population. The number of oncological patients is increasing every year. Health challenges include not only prevention, diagnosis, treatment, but also rehabilitation. It is essential for patients to recover as much as possible. An analysis of numerous articles aims to demonstrate the validity of rehabilitation among oncology patients.

Review methods:

More than 15 articles, searched and available in Google Scholar, PubMed database, were analyzed. Through their analysis, it is possible to demonstrate the impact of rehabilitation and physical activity on the functioning of patients during cancer treatment.

Brief description of state of the art:

The negative effects of treatment can affect any system in the human body, so rehabilitation is necessary to assist the patient in the process of cancer therapy, which can have a significant positive impact on treatment. In breast cancer rehabilitation, the main focus is on anti-edema treatment, in gastrointestinal cancers on ensuring an adequate respiratory track, while in lung cancers on restoring the patient's respiratory capacity as much as possible.

Conclusion:

Doctors and physiotherapists emphasize the positive consequence of movement on the process of cancer treatment. However, it should be remembered that the type of rehabilitation should be selected individually for each patient, given the needs, limitations and goals of rehabilitation. An important aspect of conducting rehabilitation is to integrate it with the treatment process and the work of the multispecialty team.

Keywords: rehabilitation, exercise cancer, breast cancer, lung cancer, gastrointestinal cancer

1. Introduction

Cancer is a significant health problem in the human population in Poland and around the world. Cancer is one of the leading causes of death, and its incidence is increasing every year, despite advances in prevention, diagnosis and the treatment process. During the course of treatment, in addition to the treatment administered, many factors such as mental state, diet, supportive treatment and appropriate physical activity and rehabilitation influence the general condition of patients. The main goals of oncology rehabilitation include: reducing the negative consequences of the therapeutic process, increasing the ability to cope with disability, a consequence of the disease, and supporting the ongoing treatment[1].

Review methods:
More than 15 articles, searched and available in Google Scholar, PubMed database, were analyzed. Through their analysis, it is possible to demonstrate the impact of rehabilitation and physical activity on the functioning of patients during cancer treatment.
Keywords: rehabilitation, exercise cancer, breast cancer, lung cancer, gastrointestinal cancer

2. Rehabilitation during breast cancer treatment

Breast cancer is the most common cancer among women in Poland, resulting in a large number of patients requiring rehabilitation.
Physical impairments resulting from cancer or treatment include amputation or change in the appearance of one or both breasts, restriction of movement in the shoulder joint caused, for example, by damage to the pectoralis major and pectoralis minor muscles during surgery, secondary lymphedema resulting from the removal of lymph nodes postural pain and post-mastectomy pain syndrome.
In women who have mastectomy surgery, rehabilitation should begin even before the operation, properly preparing and educating the patient. On the first day after surgery in patients with an increased risk of lymphedema, anti-oedema management is introduced by placing the limb in an elevated position, preventing trauma, avoiding overloading, self-massage and using a compression sleeve on the upper limb on the side of the surgery performed. One treatment method is Complete Decongestive Therapy (CDT), which consists of manual lymphatic drainage, compression therapy, skin care, exercise and breathing. CDT has been shown in numerous studies to be effective in reducing limb volume, improving limb appearance, reducing symptoms, improving quality of life and reducing infections in swollen limbs. Depending on the severity and location of the edema, the duration of therapy can vary from a few days to several months. Some patients may need to undergo therapy for the rest of their lives. In response to the growing number of patients, more and more new technologies are being developed to enable more effective rehabilitation [2,3,4,6].
An example of such a solution is Mobiderm ® Autofit, is a system that enables mobilization of swollen tissue. It comes in the form of an easy-fitting garment; for the upper limb, it is a sleeve with a glove that can be customized and easily tightened. A study was conducted to evaluate the effectiveness of the above device, which showed a reduction in limb volume of at least 25% relative to the pre-therapy condition [7]. Once the post-operative wound has healed, patients can be qualified for weight-bearing and self-assisted exercises, manual therapy, as well as specialized methods of kinesitherapy .Studies have shown that physical activity of even low intensity suggested by physiotherapists improves the fitness and performance of the studied mastectomy patients. An additional benefit of increased exercise is weight reduction in women with increased BMI. As part of rehabilitation, upper limb exercises, especially on the operated side, are introduced to improve movements in individual joints. To prevent postural defects, isometric trunk exercises such as Pilates are used to help maintain balance and prevent secondary postural defects, which are often accompanied by pain [2,3,4,6].

3. Rehabilitation of patients during treatment of gastrointestinal cancers

3.1 Physical rehabilitation of patients during treatment of gastrointestinal cancers

Causal treatment of malignant tumors of the gastrointestinal tract includes surgery, chemotherapy and radiation therapy. The choice of treatment method depends on the patient's general condition, location and stage of the tumor. Unfortunately, each of the aforementioned treatment methods is associated with complications that can significantly limit the patient's independent functioning. During surgery for malignant intestinal tumors, it is very often necessary to remove a stoma.
Patients who have undergone abdominal surgeries should begin rehabilitation immediately after surgery through the use of breathing exercises, using thoracic track breathing and thrombosis prophylaxis - high bandaging, elevation of the lower extremities. In addition to

abdominoperineal surgery, early verticalization of patients is recommended. In the initial period after surgery, exercises using abdominal crowding should not be used, and abdominal hamstrings should be recommended to prevent abdominal hernias. Initially after surgery, the patient is advised to walk in a stooped position and to put a roller under the legs while sleeping to reduce the effect of abdominal crowding. Full uprightness should be achieved about a month after surgery. After the postoperative period, patients are advised to perform general and specialized exercises under the supervision of a physiotherapist [1,5].

3.2 Sexual rehabilitation

Sexual rehabilitation is an important aspect in post-operative rehabilitation especially for patients with an emergent stoma. Sexual dysfunction can result from patients' impaired self-esteem, lack of acceptance of the disease, damage to the innervation or vascularization of the genital organs during surgery. The consequences resulting from the aforementioned reasons are decreased sexual desire, restriction or abstention from sexual intercourse. It should be remembered that sexual rehabilitation should be undertaken after the recovery period.
Men may develop erectile dysfunction after radical colon resection surgery. In such situations, injections into the intercostal space can be used to induce an erection or a penile prosthesis can be implanted.
In women, as a result of damage to the innervation of the genitals, vaginal wetness may be reduced and difficulty in achieving orgasm, and the absence of a rectocele may cause painful intercourse and disorders of the statics of the reproductive organs. Greater severity of the aforementioned discomforts occurs in women who have received chemotherapy, resulting in menopause. In such situations, the help of a urogynecological physiotherapist or a gynecologist specializing in regenerative gynecology may be helpful.
Appropriate sexual rehabilitation should be a combination of psychotherapy, pharmacotherapy, physiotherapy and, in special cases, surgical treatment [1,5,19].

4. Rehabilitation in lung cancer patients

Lung cancer is one of the most common cancers occurring in the world. In Poland, it is the cause of the highest mortality among cancer patients in both men and women. Despite educational campaigns on the factors that cause lung cancer - mainly exposure to tobacco smoke, still patients with malignant lung cancer make up a significant percentage of oncology patients. Lung cancers significantly impair the functioning of the respiratory system. [1] They manifest themselves, among other things: hoarse cough, which in smokers can change its character, shortness of breath, chest pains and weight loss, which can lead to deterioration not only of the respiratory system, but also of the whole body. Due to the aforementioned symptoms, patients often require respiratory support such as chronic oxygen therapy. Respiratory rehabilitation is also extremely helpful and should be given to patients at any stage of surgical, radio- and chemotherapy treatment. The main goals will include: correcting pre-treatment respiratory disorders that existed prior to treatment, resulting, for example, from COPD or asthma, treating the negative consequences of the treatment process.
Respiratory rehabilitation involves not only the use of a variety of both exercise and strength training, but also proper nutrition, hygiene of daily life, and smoking cessation. [1,8]

4.1 Assessing the patient's respiratory capacity

To assess exercise capacity, a cardio-pulmonary exercise test (CPET), also known as ergospirometry, should be performed. It is performed on a treadmill or ergospirometer, which

allows assessment of the body's response to stress induced by exercise and the body's respiratory capacity. Among the parameters of greatest clinical importance when assessing fitness are maximal oxygen consumption and peak oxygen consumption. To improve the above parameters is aerobic training. [10,11]
A useful parameter for assessing the body's respiratory capacity can be the 6-minute walk test. During this test, the patient's task is to walk as far as possible in 6 minutes. The test is conducted on a 30-meter marked corridor. During the test, we measure the maximum distance covered by the patient and the distance at which the patient begins to feel pain in the limbs [17].

4.2 Preoperative rehabilitation

The use of preoperative rehabilitation helps reduce postoperative complications, which often involve the removal of a segment, lobe or entire single lung. The consequence is a decrease in lung function and a deterioration in quality of life. Preoperative rehabilitation has been proven to reduce postoperative infections in patients, speed up recovery and shorten hospital stay[8]. In a 2007 study by Jones and colleagues, patients scheduled for lung resection for malignant lung cancer were subjected to training on an ergometer. Such training consisted of 5 sessions of endurance exercise at an intensity ranging from 60% to 100% of peak oxygen consumption. With the training sessions, the patients' peak oxygen consumption increased, and after surgery it decreased, but not below the value before the ergometer training began. In a 2011 study by Benzo and colleagues, patients performed 10 pulmonary rehabilitation sessions in the preoperative period, consisting of upper and lower limb exercises, strength training, stretching and respiratory muscle training. Based on the results of the patients' performance, they deduced that the above rehabilitation made it possible to shorten the length of hospital stay and had a positive effect on the ilo of infectious complications after surgery [12]. Pehlivan and colleagues conducted a study during which 60 patients were divided into two groups. Patients in the study group received intensive preoperative physiotherapy. In both groups, post-operative surgery was applied. The following results were obtained: patients in the study group stayed shorter in the hospital, achieved higher postoperative saturation values[13].

4.3 Postoperative rehabilitation

Surgical treatment is the most important method of management for stage I, II and some stage III non-small cell lung cancer patients. The recommended method of treatment is videothoracoscopic lobectomy[1,9]. This makes it difficult for patients to breathe and reduces their respiratory capacity - a decrease in peak oxygen uptake of 15-20% after lobectomy and 30% after pneumectomy [11] Cesario and colleagues conducted in-hospital rehabilitation in 25 patients after thoracic surgery; the control group was patients who did not receive pulmonary rehabilitation. In patients, subjected to physiotherapy, a reduction in dyspnea on the Borg scale was obtained once the 6-minute walking distance increased, as well as an increase in saturation[11,14]. Jones et al [11,15] conducted a study of patients who performed aerobic training on an ergometer twice a week for 14 weeks after surgery; an increase in peak oxygen consumption, quality of life scores and fatigue scores were obtained. A study conducted at the University of Rzeszow[16] used postoperative rehabilitation, and half of the patients received subpleural anesthesia with bupivacaine. They concluded that thoracic spine mobility decreased in both groups of patients immediately after surgery, with subsequent improvement, to a greater extent in patients who received anesthesia.

Discussion

Along with advances in cancer therapies, the care and rehabilitation of cancer patients is also evolving. A holistic approach to the patient makes it possible to keep the patient in the best possible overall condition and to counteract the negative effects of treatment. In breast cancer patients, thanks to rehabilitation including compression therapy, the severity of postoperative swelling (after mastectomy) is reduced. In the course of physiotherapy in patients after surgery for abdominal cancers, the performance of breathing exercises to reduce the contribution of the abdominal respiratory track reducing the number of postoperative hernias. Among patients with lung cancer scheduled for surgery, preoperative rehabilitation allows less loss of lung capacity after surgery, and postoperative rehabilitation allows at least partial improvement of respiratory capacity lost due to surgery.

Conclusion

Rehabilitation and physical activity among breast, gastrointestinal and lung cancer patients show positive effects on the patient's condition. Compression therapy is particularly beneficial in patients after mastectomy with lymph node removal. CDT significantly reduces post-operative edema, resulting in a significant improvement in patient performance. Among patients after abdominal surgeries for gastrointestinal cancers, respiratory exercises that reduce the contribution of the abdominal track to the breathing process, which significantly reduces the incidence of postoperative hernias. Respiratory rehabilitation of patients scheduled for pneumectomy or lobectomy conducted before surgery significantly reduces the reduction in capacity after surgery. On the other hand, postoperative rehabilitation achieves higher saturation values, reduces dyspnea and improves respiratory capacity. All the above arguments confirm the positive impact of rehabilitation on the condition of patients during oncological treatment.

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References

1. Krzakowski M, Potemski P, Wysocki P, red. Clinical Oncology. 2. wyd. Gdańsk: VM Media Group (Grupa Via Medica); 2023
2. Zabojszcz M, Opuchlik M, Opuchlik A, Włoch A, Ridan T. Influence of Complex Physical Therapy on Physical Fitness and Balance in Women After Unilateral Mastectomy

Due to Cancer Treatment. Med Rehabil. (2022);26(4):28-35. https://doi.org/10.5604/01.3001.0016.1383.

3. Opuchlik A, Włoch A, Biskup M et al. The effect of oncological treatment in breast cancer patients on functional effi ciency of the upper limb and the principles of physiotherapeutic management. Med Rehabil. (2018);22(1):38-48. https://doi.org/10.5604/01.3001.0012.0912.
4. Mieszkowski J, Pastwik M, Stejbach K, Przybyłowicz M, Pijankowska E. Comprehensive therapeutic treatments methods of mammary gland carcinoma. Journal of Education, Health and Sport. 13 lipiec 2015;5(7):314–42.
5. Ławnik A. Rehabilitation of patients with intestinal stoma. Med Og Nauk Zdr. 2015;21(1):84-87. doi:10.5604/20834543.1142365.
6. Devoogdt N, De Groef A. Physiotherapy management of breast cancer treatment-related sequelae. J Physiother. 2024;70(2):90-105. doi:10.1016/j.jphys.2024.02.020.
7. Mazur S, Szczęśniak D, Tchórzewska-Korba H. Effectiveness of Mobiderm Autofit in the Intensive Phase of Breast Cancer-Related Lymphedema Treatment: A Case Series. *Lymphat Res Biol*. 2023;21(6):608-613. doi:10.1089/lrb.2022.0079
8. Rivas-Perez H, Nana-Sinkam P. Integrating pulmonary rehabilitation into the multidisciplinary management of lung cancer: A review. *Respir Med.* 2015;109(4):437-442. doi:10.1016/j.rmed.2015.01.001
9. Wnuk D, Hansdorfer-Korzon R, Żuralska-Wnuk J, Chwirot P, Barna M. Physiotherapy in Patients After Lung Parenchyma Resection
10. . *Advances in Respiratory Medicine*. 2014; 82(1):46-54. https://doi.org/10.5603/PiAP.2014.0008
11. Kurpesa M, Jerka K, Bortkiewicz A. Cardiopulmonary stress test – its application in cardiology and occupational medicine. Med Pr Work Health Saf. 2014;65(5):665-674. doi:10.13075/mp.5893.00029.
12. Jastrzębski D, Ziora D, Hydzik G, et al. Pulmonary rehabilitation of lung cancer patients. *Adv Respir Med.* 2012;80(6):546-554.
13. Benzo R, Wetzstein M, Novotny P, et al. Randomized trial of pulmonary rehabilitation before lung cancer resection in severe COPD. *Am J Respir Crit Care Med.* 2011;183(1_MeetingAbstracts):A3973. doi:10.1164/ajrccm-conference.2011.183.1_MeetingAbstracts.A3973.

14. Pehlivan E, Turna A, Gurses A, Gurses HN. Effects of preoperative short-term intensive physiotherapy in patients with lung cancer: a randomized controlled trial. *Ann Thorac Cardiovasc Surg.* 2011;17(5):461-468. doi:10.5761/atcs.oa.11.01663.
15. Głogowska O, Szmit S, Głogowski M. Rehabilitation of respiratory cancer patients. *OncoReview.* 2012;2(4):236-243.
16. Jones L.W., Eves N.D., Peterson B.L. i wsp. Safety and feasibility of aerobic training on cardiopulmonary function and quality of life in postsurgical non-small cell lung cancer patients: a pilot study. Cancer 2008; 113: 3430–3439
17. Bal-Bocheńska M, Wyszyńska J, Kołodziej M. Effects of early rehabilitation on changes in spinal and thoracic range of motion in patients after thoracotomy for lung cancer depending on the anesthesia used. Med Rehabil. (2023);27(1):33-40. https://doi.org/10.5604/01.3001.0016.1385.
18. Kowalewska-Twardela, T., Wnuk, B., Urbanek, T., Ziaja, D., Kuczmik, W., Szaniewski, K., ... & Nowakowski, P. (2005). Diagnostic value of the 6-minute corridor walk test in patients qualified for vascular surgery. *Chirurgia Polska*, *7*(3), 146-151.
19. Reese JB, Finan PH, Haythornthwaite JA, et al. Gastrointestinal stomas and sexual outcomes: a comparison of colorectal cancer patients by stoma status. *Support Care Cancer.* 2014;22(2):461-468. doi:10.1007/s00520-013-1998-x
20. Łukasiewicz S, Czeczelewski M, Forma A, Baj J, Sitarz R, Stanisławek A. Breast cancer—epidemiology, risk factors, classification, prognostic markers, and current treatment strategies—an updated review. *Cancers (Basel).* 2021;13(17):4287. doi:10.3390/cancers13174287.4o