

The effect of oncological treatment in breast cancer patients on functional efficiency of the upper limb and the principles of physiotherapeutic management

Metody leczenia onkologicznego i chirurgicznego oraz postępowanie fizjoterapeutyczne u kobiet z rakiem piersi

Anna Opuchlik^{1,2 (A,B,D,E,F)}, Anna Włoch^{1,3 (B,D,F)}, Małgorzata Biskup^{1,3 (B,D,F)}, Tomasz Ridan^{4 (E,F)}, Piotr Wróbel^{5 (B,F)}, Robert Jonak^{2 (B,F)}, Mateusz Curyło^{4 (F)}

¹ Department of Rehabilitation, Holy Cross Cancer Centre in Kielce, Poland

² Department of Physiotherapy, Faculty of Physical Education and Tourism, Holy Cross University in Kielce, Poland

³ Institute of Physiotherapy, Faculty of Medicine and Health Sciences, Jan Kochanowski University in Kielce, Poland

⁴ Department of Physiotherapy, Kinesiotherapy Unit, University of Physical Education, Krakow, Poland

⁵ Faculty of Medicine and Health Sciences, Krakow A. F. Modrzewski Academy, Poland

Key words

mastectomy, segmental mastectomy, mammoplasty, physical therapy and rehabilitative medicine

Abstract

Introduction: Breast cancer is the most common malignant tumour and the second cause of death among women in Poland following lung cancer. Its therapy includes a number of procedures, including surgical treatment, the choice of which depends, among others, on the histological form of the cancer and disease severity. In recent years, radical surgical techniques have been replaced by conserving ones, and in the context of routine resection of the axillary lymph nodes (lymphadenectomy), biopsy was introduced, i.e. sentinel lymph node biopsy (SNB). Also, wide access to reconstructive treatments carried out with various techniques, using patients' own tissues or artificial materials (breast implants) have been applied.

Study aim: The aim of the work is to present the current state of knowledge on the principles of breast cancer treatment and its undesirable consequences, as well as the selection of physiotherapeutic methods depending on the type of upper limb dysfunction as a result of the performed surgery.

Research materials: The research materials consist of patients treated using various surgical and oncological methods as well as physiotherapeutic procedures at the Holy Cross Oncology Centre in Kielce, from 2014 to 2016. The written consent of the Clinic Chief and patients for the publication of their image was obtained. The authors of the work do not indicate any conflict of interest.

Research Methods: The research methodology was based on the presentation of selected patients treated using various oncological and surgical methods for breast cancer treatment, as well as characterization of the physiotherapeutic methods necessary in restoring expected functional upper limb status in these patients.

Conclusions: Modern methods used in breast cancer treatment should be conditioned by good cooperation of an entire team of specialists from various clinical areas and physiotherapists. The purpose of this procedure is to cure the patient, minimize the occurrence of complications and adverse side effects, and restore functional capacity. An integral part of such breast cancer treatment patients is, among others, their effective rehabilitation.

Słowa kluczowe

mastektomia, leczenie oszczędzające, rekonstrukcje piersi, fizjoterapia

Streszczenie

Wstęp: Rak piersi jest najczęściej występującym nowotworem złośliwym i drugą, po nowotworach płuc przyczyną zgonów u kobiet w Polsce. Jego terapia obejmuje szereg działań, w tym także leczenie chirurgiczne, których wybór zależy między innymi

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mi od postaci histologicznej raka i stopnia zaawansowania choroby. W ostatnich latach radykalne techniki chirurgiczne zostały zastąpione oszczędzającymi, a w odniesieniu do rutynowej resekcji węzłów chłonnych pachowych (limfadenektomii) wprowadzono biopsję tzw. węzła chłonnego wartowniczego (SNB). Nastąpił również szeroki dostęp do zabiegów odtwórczych przeprowadzanych różnymi technikami, z wykorzystaniem tkanek własnych lub materiałów sztucznych (implantów piersi).

Cel pracy: Celem pracy jest przedstawienie obecnego stanu wiedzy na temat zasad postępowania w leczeniu onkologicznym nowotworów piersi oraz jego niepożądanych następstw, a także doboru metod fizjoterapeutycznych w zależności od rodzaju dysfunkcji kończyny górnej w wyniku przeprowadzonej operacji.

Materiał badań: Materiał badań stanowią chore leczone różnymi metodami chirurgicznymi i onkologicznymi, a także fizjoterapeutycznymi w Świętokrzyskim Centrum Onkologii w Kielcach, w latach od 2014 do 2016 roku. Uzyskano pisemną zgodę Kierownika Kliniki i chorych na opublikowanie ich wizerunku. Autorzy pracy nie wskazują na istnienie konfliktu interesów.

Metoda badań: Metodologię badań oparto na prezentacji wybranych chorych leczonych różnymi metodami onkologicznymi i chirurgicznymi z powodu raka piersi, a także scharakteryzowanie metod fizjoterapeutycznych niezbędnych w przywracaniu u tych chorych oczekiwanego stanu funkcjonalnego kończyn górnych.

Wnioski: Współczesne metody leczenia nowotworów gruczołu piersiowego powinno być uwarunkowane dobrą współpracą całego zespołu specjalistów z różnych dziedzin klinicznych oraz fizjoterapeutów. Celem takiego postępowania jest uzyskanie leczenia chorego, zminimalizowanie występowania powikłań i następstw niepożądanych oraz przywrócenie sprawności funkcjonalnej. Integralną częścią tak pojmowanego leczenia chorych z rakiem piersi jest między innymi ich skuteczna rehabilitacja.

INTRODUCTION

Breast cancer is the most common malignancy in women in the world. In Poland, in 2014, 17,379 (21.7%) cases of this disease and 5,975 (13.9%) deaths were reported¹. The proportion of breast cancers in the incidence of the human population shows a steady upward trend. The cause of the cancer is unknown, but there are many risk factors that increase its occurrence. These include sex, age above 50, hereditary factors, early menstruation and late menopause, the adoption of exogenous sex hormones, dietary factors, low physical activity and exposure to ionizing radiation or chemical agents². The symptoms of breast cancer include, among others, the presence of a tumour, skin retractions and warts, nipple leakage, skin changes around the nipple, as well as a change in the shape and size of the breast, enlarged lymph nodes of the axillary cavity, dilation of skin veins and ulcerations³. In non-advanced cases, the tumour may be undetectable. However, it is already visible on the mammogram image, which makes this method useful in early diagnosis.

STUDY AIM

The aim of the work is to present various treatment methods and their consequences in women with breast cancer, including physiotherapeutic procedures affecting upper limb functional status.

RESEARCH MATERIALS

The research material consists of patients treated with various surgical, oncological as well as physical therapeutic methods at the Oncological Surgery Department of the Holy Cross Cancer Centre in Kielce, from 2014 to 2016.

RESEARCH METHODS

The research methodology was based on the presentation of selected patients treated with various oncological and surgical methods used in the case of breast cancer, as well as characterization of physiotherapeutic methods necessary in restoring the expected upper limb functional status of these patients.

RESULTS – PRESENTATION OF TREATED PATIENTS

Surgical treatment of breast cancer

Despite early diagnosis, not every patient qualifies for conserving treatment. Radical treatments concern patients with a diagnosed tumour exceeding a diameter of 3 cm, in which there are contraindications to the performance of conserving treatment⁴. Among breast amputations, there is simple amputation, modified radical amputation according to the Madden method as well as the Patey method, and radical breast amputa-

tion according to the Halsted method⁵. Simple amputation means a procedure with the removal of the entire breast including the fascia of the pectoralis major muscle along with the nipple-areola system without the axillary lymph nodes being affected. One of the forms of this procedure is subcutaneous amputation consisting in the removal of gland tissue leaving the skin and the nipple-areola unremoved, along with SNB biopsy. This is preparation for later breast reconstruction^{6,7}. Madden's amputation method is performed by surgically removing the breast gland and leaving the breast muscles intact⁴ (Photo 1).

Patey's amputation method is currently performed rarely. The scope of this operation includes the mammary gland, the fascia of the large and minor pectoral muscles and the axillary lymph nodes. Indication for performing amputation is invasion of the Rotter's lymph nodes into the smaller pectoralis muscle, which is removed during the procedure. The Rotter nodes cover the area between the larger and smaller pectoral muscles, through which lymph flows from the upper breast quadrants and its central part, from where it is directed to the nodes of the upper floor. The indication for radical breast amputation according to the Halsted method is neoplastic infiltration of the larger pectoral muscle, which should be removed even when clear tumour reduction occurs after initial chemo- or hormone therapy^{4,5,8}. The conventional way of dealing with patients suspected of metastasis to the axillary lymph

nodes is their removal within the first and second floors (lymphadenectomy, ALND). Biological features determined in order to establish prognosis and indications for adjuvant therapy are the degree of malignancy, expression of estrogen receptors (ER), *progesterone* receptors (PR), the HER2 receptor and the extent of proliferation (KI67 expression)⁹. Radical breast amputation is no longer standard local treatment in breast cancer. The choice of procedure in reconstruc-

tive treatments includes both simultaneous and deterred modes depending on the appearance and size of the other breast, indications or contraindications to the use of the patients' own tissue or silicone implants, as well as patient preferences¹⁰. Currently, the most popular autologous technique is reconstruction using the latissimus dorsi muscle (LD). Most often, mixed reconstruction is performed, in which the LD lobe is used as a covering for the breast implant (Photo 2)¹¹.

The last stage of breast reconstruction is opening nipple-areola syndrome (Photo 3), which is carried out after its final formation^{7,10}. Breast reconstruction with the use of a silicone implant itself consists in placing an expander under the greater pectoral muscle, which is then supplemented with physiological saline, and after obtaining the expected volume, it is replaced with a permanent implant. A similar solution is the use of an expandable prosthesis, which



Photo 1
Patient during the first 24 hours following radical, modified left breast amputation for cancer using the Madden method – frontal view



Photo 3
Patient after reconstruction of the right breast using an expander, prosthesis and reconstruction of the nipple-areola syndrome – frontal view



Photo 2
Patient after left breast amputation and its deferred LD reconstruction using a silicone implant – frontal view



Photo 4
Patient after left breast reconstructive surgery using a Becker type expander and the right breast with expander-prosthesis implantation – frontal view

**Photo 5**

Patient with breast asymmetry after quadrantectomy and lymphadenectomy and left breast radiation therapy, with slight lymphoedema of the left upper limb – frontal view

allows one-stage reconstruction without the need for re-operation in order to replace the expander with a permanent prosthesis (Photo 4)^{7,12}.

In women with large asymmetry between the healthy and treated breast (Figure 5), treatments that restore their symmetry, including breast lifts, reduction or enlargement, are recommended¹⁰.

Side-effects and adverse consequences of surgically treating breast cancer

Surgical treatment of breast cancer provides the best chance of full recovery but, at the same time, can entail the possibility of adverse reactions that may occur already during or immediately after surgery, or even many years later. Early complications are rare and mainly include local surgical wound infections. They also include, *inter alia*, necrosis of the skin flaps, dehiscence of the wound and hematoma or lymphorrhoea. Late complications include hyperaesthesia and paresthesia in the area of operated skin, neuropathies, hypertrophy of the postoperative scar, fibrosis and contractures limiting mobility in the glenohumeral joint, loss of some muscle group function, permanent deformities in the shoulder girdle, postural defects and upper limb edema^{5,13}. An early undesired symptom result-

ing from axillary lymphadenectomy is lymphorrhoea, which affects more than half of the operated patients. The pathophysiology regarding presence of an alleged cyst is not fully elucidated. The type of surgery used has significant influence on their production. They rarely occur following saving operations - BCS from SNB, rather than after radical ones. This complication tends to be self-limiting, and drainage, chest bandaging as well as puncture are considered effective treatment. This process very rarely evolves into chronic nature. The very formation of the lymphatic cyst is not a threat to the health or life of the operated patients, although it may cause necrosis of the lobes, unsealing of the surgical wound, and also significantly hinders the possibility of subsequent breast reconstruction. In extreme situations, infection of the lymphatic cyst may lead to an abscess or sporadically, systemic infection, especially in patients undergoing chemotherapy. Other problems associated with the surgical treatment of breast cancer, including those intraoperative, include damage to the neurovascular bundle of the axillary cavity, long thoracic nerve, scapular ganglion, thoracic dorsal nerve, abnormal exteroceptive sensation and pain of diverse clinical expression¹⁴. The precision of the surgical technique is of primary importance in the surgical preparation of the axillary cavity.

Nerves and vessels should be sought in this area, reducing the incidence of complications and adverse reactions, including poor healing of the surgical wound and preventing the occurrence of functional as well as sensory disorders. The structure particularly vulnerable to damage during removal of axillary lymph nodes is the long thoracic nerve. Its damage causes paralysis of the anterior toothed muscle, which is manifested by the formation of so-called winged scapula (Photo 6) and a high degree of limitation in joint mobility range of the shoulder girdle (Photo 7)^{14,15}.

Incision during resection of axillary lymph nodes of the intercostobrachial nerve (ICBN) leads to disturbances of skin sensation on the inner side of the arm and shoulder. The SNB operation is associated with the lowest percentage of sensory disturbances and is the safest of all the treatments performed in the axillary region. ICBN conserving prevents sensory deficits and should be used as standard procedure¹⁶. Post Breast Therapy Pain Syndrome (PBTSP) is defined as typical neuropathic pain with associated symptoms such as burning with bursts of laceration and radiation, allodynia, numbness, sensory disorders and edema. PBTSP is located in the chest wall on the side of surgery, underarm and upper limb. These symptoms are the result of stretching the shoulder plexus during surgery but they are transient. Some patients report finger tingling on the operated side immediately after the procedure, paresthesia and callousness in the region of the arm and forearm. This pain may persist for a period of 3 months after surgery or longer and usually subsides spontaneously. Phantom pains, however, expressed by the feeling of the presence of the amputated breasts, accompany women for many years after the surgical procedure^{17,18}. In the early postoperative period in the axillary cavity, the so-called "web"/"cord" syndrome (Axillary Web Syndrome, AWS, Cording) can occur, which is characterized by pain running down towards the medial surface of the arm and limitation in the mobility of the glenohumeral joint. In the clinical image of these

patients, the tense subcutaneous tissue, which stretches from the armpit to the shoulder, is observed during arm abduction. This syndrome may appear in the period after radical surgery but also after SNB¹⁹. The limited functional capacity of the upper limb after surgical treatment for breast cancer is a fundamental problem resulting from the radical nature of oncological procedures. Functional disorders can even accompany the patient for many months after surgery. Long-lasting pain, immobile scar, muscle and/or nerve damage and limitation of physical activity are the most common causes of these disorders²⁰. The decrease in muscle strength is a consequence of reduced energy supply, which is related to normal blood circulation. The type of anastomosis of major venous vessels also determines efficient drainage of the whole limb²¹. The limitation of glenohumeral joint mobility on the side of the treated breast mostly relates to horizontal exten-

sion, abduction and external rotation of the arm. The significant causes of this are postoperative pain, extensive scar tissue and prolonged healing, or radiation fibrosis of the soft tissues, especially around the armpit. The Patey method has smaller influence on the occurrence of movement restrictions than the Halsted method²². The effects of radical surgery with these surgical techniques also include weakening of the flexor muscles, adductors and internal rotators of the arm, which occurs most frequently after Halsted surgery with subsequent radiotherapy. The Patey method, together with postoperative radiotherapy, leads to weakening of the muscle groups responsible for abduction, extension and arm rotation²³. In women after radical breast amputation, postural disorders may occur. Photogrammetry tests show limitation of spine mobility in all planes. There was lack of correlation between right and left movements of the trunk in the frontal and trans-

verse planes. There is also a tendency to maintain kyphosis and significant asymmetries may occur, especially in the first years after surgery, despite undergoing rehabilitation²⁴. Likewise, numerous works have demonstrated the low physical capacity of women after breast amputation, especially in the older age groups^{25,26}. Extensive surgical procedures, induction and systemic treatment associated with them cause many of the operated women to reduce or abandon physical activity in everyday life. The consequences of such behaviours are asthenia, cachexia, decreased respiratory and cardiovascular fitness, myopathy and muscular atrophy, as well as weight gain, insomnia, nausea or vomiting^{27, 28}. After unilateral mastectomy, the so-far symmetrical body system changes, which may be related to changes in parameters characterizing body posture and statics. Altered body posture affects the occurrence of spinal pain, as well as appearance, which is important for the mental comfort of patients^{29,30}. Unfavourable changes in body posture can be avoided by using simultaneous breast reconstructive surgery, which effectively eliminates body asymmetry and disturbances in body statics³¹.



Photo 6
Patient after radical left breast amputation using the Madden method, with positive symptoms of left winged scapula – rear view



Photo 7
Patient after radical right breast amputation using the Madden method, with significant reduction in mobility of the right glenohumeral joint – frontal view

Radical removal of the axillary lymphatic system is associated with the risk of secondary lymphedema in the upper limb area (Photo 8).



Photo 8

Patient with lymphedema of the left upper limb after radical treatment for left breast cancer – frontal view

Lymphatic edema affects 24% to 49% of women following radical breast amputation and 4% to 28% of women after BCS. The diversity of reports referring to the incidence of this complication results from the use of different breast cancer treatment regimens. Other risk factors for lymphedema include limb trauma, infection, obesity with a high BMI, irradiation resulting in fibrosis of the vessels and lymph nodes and genetic predisposition. There is no agreement regarding the influence of various factors on the incidence of edema in women after treatment for breast cancer. Most authors emphasize the importance of age, the type of surgical incision used, obesity and infectious complications, and whether the operated breast is on the side of the dominant limb³². In patients for which edema constantly increases and reaches significant volume, one should expect limitation of mobility in the upper limb joints, which contributes to a decrease in patients' quality of life³³. The greatest impairment of motor function of the glenohumeral joint during horizontal extension, adduction and external rota-

tion of the arm was observed in the group of women after radical treatment for breast cancer Woźniowski³⁴. In slight and moderate edema, the author did not notice an increase in mobility disorders of the glenohumeral or the other shoulder joints³⁴. In another study in patients with lymphedema, pain of the upper limb and operated breast were found, limitation of joint mobility of the limb, its tingling and numbness and swelling in the area of the operated breast. These women assessed their health worse and more often had to limit daily physical activity due to their disability³⁵. After breast amputation, there are often adverse changes in the mind of patients undergoing physical changes. Often, these patients are affected by the syndrome referred to as the so-called 'half woman complex'. Despite the possibility of fitting an external prosthesis, the patients cannot come to terms with their appearance, they feel unattractive, therefore, they decide to undergo a reconstructive procedure in deferred mode³⁶. After breast reconstruction, the patients feel more freedom in their lives and return psychophysical balance faster. Thanks to this treatment, they also experience positive changes in the intimate spheres of life, which is the re-

sult of acceptance of themselves and their illness. The quality of life is rated higher by women after breast reconstruction than after radical amputation, especially in the aspect of physical functioning, fulfilling social roles and emotional behaviour^{36,37}. Like every surgery, breast reconstructions are also fraught with the risk of some side effects. Popular reconstruction with implants can cause early complications such as excessive bleeding with subsequent hematoma, seroma, bacterial infection and skin necrosis with implant unveiling. Late complications are associated with the healing process, including the formation of pseudocapsule scarring, displacement of the implant in various directions in the chest area (Photo 9), including expander or implant rupture³⁸.

After reconstruction using the patient's own tissues, problems usually arise from incorrect qualification and from bad habits of the patient (smoking, obesity) or too intensive work of the abdominal prelum during rehabilitation or daily activities. Characteristic complications include tissue necrosis, abdominal wall necrosis, fluid reservoirs arising in the lamellar or placental layers, abdominal wall deformations in the form of

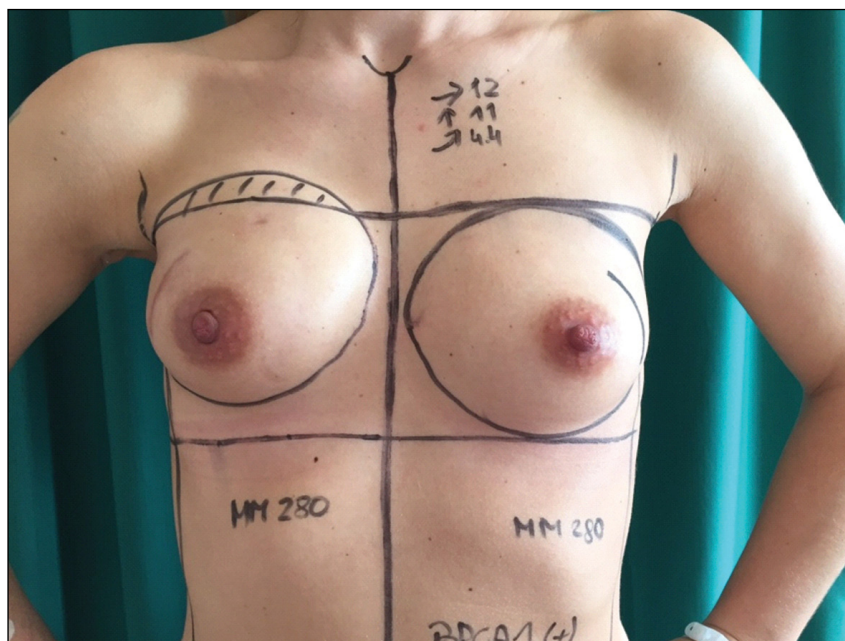


Photo 9

Patient with prosthesis displacement after radical, subcutaneous right breast amputation – frontal view

**Photo 10**

Patient after radical treatment for right breast cancer, with recurrence on the anterolateral thoracic wall, secondarily treated with irradiation and hyperthermia – right frontal-lateral view

**Photo 11**

Patient with local reaction of the right breast after BCS, following irradiation using the APBI technique – right lateral view

hernias or hernias in areas of the displaced rectus abdominal muscle, as well as bacterial infections³⁸. Similarly, after reconstructions, combined methods may lead to the occurrence of undesirable symptoms. Breast reconstruction using LD as the implant cover is accompanied by a small number of complications resulting from damage to the muscle vascularization or its excessive tension (necrosis of the flap). The most common consequence of this technique is the formation of fluid reservoirs in the back area. Another problem regards shoulder mobility disturbances on the operated side, its periodic stiffness and weakness. Formation of the so-called capsule and its shrinkage is another side effect of the procedure. Implant displacement towards the armpit area occurs less often³⁸. In patients with locally advanced breast cancer as well as tumour dissemination, chemotherapy, hormonotherapy and anti-HER treatment^{39,40} play an important role. During chemotherapy, most com-

monly occurring symptoms are nausea and vomiting, diarrhea, oral mucositis, menstrual disorders, hair loss, taste disturbances, lack of appetite, bleeding, increased susceptibility to infection, impaired urination, fever, constant feeling of fatigue, cardiovascular disorders⁴¹. Chemotherapy-induced polyneuropathy (CIPN) is an also commonly occurring syndrome. Symptoms of CIPN in the form of numbness, tingling, burning and stinging sensations are a common feature of all drug-induced pain syndromes. These symptoms lead to impaired performance of the patients and worsen their ability to cope and significantly reduce quality of life⁴². In hormonal therapy of breast cancer, selective estrogen receptor modulators are used to block estrogen receptors. These agents lead to a reduction in bone density - osteopenia and even osteoporosis⁴³. Complementary systemic treatment, but also induction treatment, consist in the use of radiation therapy. In the treatment of

local recurrence or inoperable breast cancer, irradiation prevents or alleviates the symptoms of a locally developing cancer process (ulceration), which includes pain, bad odour and bleeding (Photo 10)⁴⁰.

A different method of radiation therapy that allows a favourable dose distribution on the surface of the chest wall is contact brachytherapy. Accelerated partial breast cancer irradiation (APBI) techniques lead to an equivalent percentage of local control along with lower toxicity of treatment, compared to irradiation of the whole breast with external beams after BCS treatment⁴⁴. However, local treatment may also occur after this treatment (Photo 11). Adverse reactions following radiation therapy are divided into early and late. The early ones appear during irradiation and can last up to 3 months. Early cutaneous reactions can be located both at the entrance and exit of the ionizing radiation beam. The occurrence of early skin reactions usually takes

place 10-14 hours after the first fraction of irradiation and is of erythemic nature. Other complications include flaking, swelling and skin necrosis, ulceration and fibrosis. The peak of reaction intensity most often occurs in the 1-2 week after administration of the final fraction. Late skin changes appear within months or years after the completion of treatment. They usually occur in the form of skin hypermobility or hyperpigmentation (Photo 12), hyperkeratosis, dryness, telangiectasia, atrophy and disruption of skin continuity⁴⁰.



Photo 12

Patient after radical treatment of right breast cancer, after chest radiation therapy with skin hyperpigmentation and telangiectasias – frontal view

These changes may be recurrent, accompanied by inflammation and radiation pneumonitis, inflammation of the esophagus mucous membrane and edema lymphatic system of the upper limb. Necrosis of breast fat tissue is quite common, especially after brachytherapy. It affects almost $\frac{1}{4}$ of patients following surgical breast-conserving treatment and adjuvant radiotherapy⁴⁰. If radiation therapy is considered shortly after the surgery, reconstructive procedures with the use of silicone implants are not recommended. This is mainly associated with the risk of tissue damage as a result of irradiation. Such complications were observed in women with expanders and implants, whose age exceeded 50 years, and for whom the BMI was greater than 30⁴⁵. Also, exposure to ionizing radiation in the chest area increases the risk of ischemic heart disease. Women with cardiac dysfunctions diagnosed before radiation therapy are significantly at greater risk of possible coronary artery disease due to irradiation compared to other patients⁴⁶. In patients after radical surgery, due to the high degree of bodily injury, various reactions may occur such as fear, anger, feelings of helplessness or anxiety about the future and fatigue. Can-

cer fatigue syndrome (CFS) is a persistent feeling of exhaustion due to the disease, cancer treatments, the severity of which is not proportional to the current activity and affects daily functioning. Symptoms of fatigue do not subside after having a rest or after a night's rest. The multidimensionality of CFS causes it to be often overlooked and neglected by doctors and, therefore, not subject to any therapeutic action⁴⁷.

Physical therapy in treating breast cancer

During the first 24 hours after surgery, to prevent the occurrence of undesirable side effects, early movement rehabilitation was introduced. Its role is to accelerate the healing of scars and return full motor function of the upper limb. In the case of patients at risk of lymphedema, and thus after ALND, decongestants are introduced – early mobilization of the muscle pump, limb elevation and protection against overload and traumatic lesions as well as self-massage^{48,49,50,51}. It is also recommended to use a special compression class I sleeve. These types of products worn on the limb during the day are a safe and effective

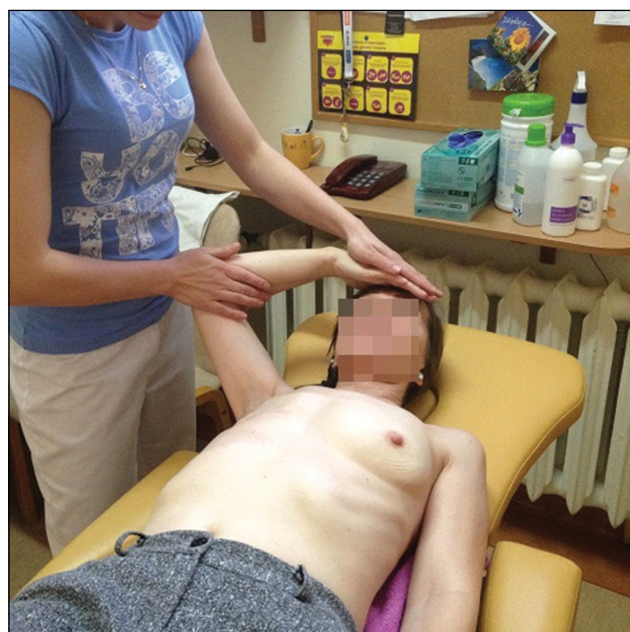


Photo 13

Patient after radical right breast amputation, with excessive mobility of the glenohumeral joint during manual loosening of the joint capsule (oscillation) – frontal view

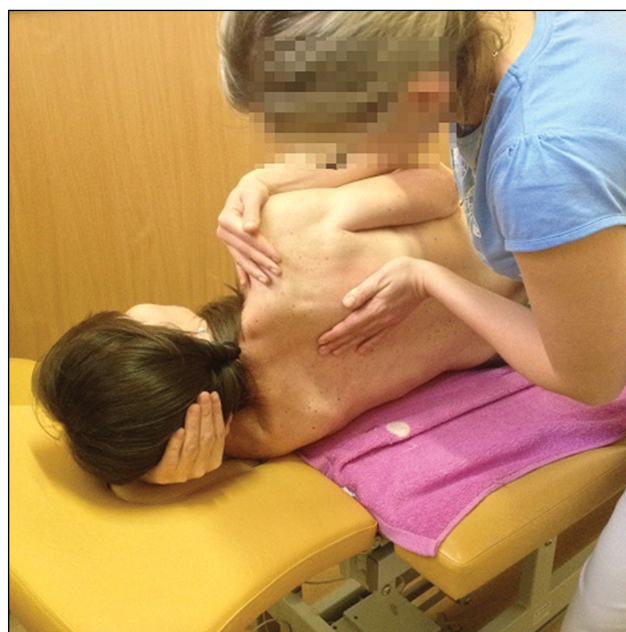


Photo 14

Patient after right breast amputation with excessive mobility of the right glenohumeral joint during the application of right shoulder mobilization techniques – rear view

method in preventing the formation of edema⁵². The SNB procedure, on the other hand, does not cause significant risks because it induces low incidence of this complication⁵³. After removing the sutures and healing of the wound, the patient can start out-patient physical therapy. Before its commencement, it is advisable to have a breast prosthesis, appropriately tailored to the patient's body shape, to support the symmetrical positioning of the shoulder girdle and trunk. At this stage of physiotherapy, the patient is most often qualified for relieving (unloading) and self-support exercises, self-massage education and individual exercises which use manual therapy techniques, as well as specialized kinesiotherapy methods (Photo 13 and 14)^{50,54,55}.

The terminal period of cancer is not a reason to resign from treatments, especially in the case of lymphatic edema of the upper limb. Its symptoms should be regularly subjected to Complete Decongestive Therapy (CDT), with the frequency depending on the severity of the disease – on average, once every ½-1 year. After reducing the limb volume in phase I (Photo 15), systematic use of the therapeutic pressure cuffs is recommended – phase II therapy (Photo 16) and the use of self-massage and exercise at home. This method involves simultaneous introduction of manual lymphatic drainage, skin care, compres-

sion therapy (multilayer bandaging) and patency-restoring exercises⁵⁶. Depending on the severity of edema, CDT may be combined with physical treatments such as whirlpool massage and vibration, intermittent pneumatic compression and deep oscillation⁵⁷. The application of lymphatic Kinesiology Taping (Photo 17) removes lymph stasis, reduces lymphatic swelling⁵⁸ and can be used both as an independent method of treatment or as one complementary to CDT⁵⁹.

During motor rehabilitation, patients are often subjected to adjuvant treatment. Therefore, periodic limitations on the ability to perform significant physical efforts, especially continuous training, should be considered. Temporary withdrawal from kinesiotherapy is the result of nausea and vomiting, weakness of the body and poor general condition of the patient^{28,50,54}. Regularly undertaking activity during treatment with cytostatics positively influences the assessment of quality of life and reduces the perception of side effects resulting from therapy⁶⁰. Non-pharmacological methods are standard in the CFS procedure – including physical exercises that reduce the severity of symptoms⁶¹. During and after the completion of radiation therapy, individual and/or group kinesiotherapy should be implemented in order to prevent joint-muscle contractures formed under irradiation. It is not recommended to be used as a substitute to irradiation or throughout its duration, intense stretching exercises, resistance and manual therapy treatments that can damage the weakened tissues. During this period, thermal treatments, massages and mobilization of the exposed areas are contraindicated. After the end of radiation therapy, manual procedures are performed gently due to fibrosis³⁵. Another scope of rehabilitation concerns patients after reconstructive surgery. Before the procedures in deterred mode, they depend on the local condition after radical breast amputation and the anticipated method of its reconstruction. The main goal of physical therapy in this period is to provide elasticity to the post-



Photo 16
Patient after radical treatment of breast cancer and radiation therapy with lymphoedema of the right upper limb during the 2nd phase of treatment with CDT – frontal view



Photo 17
Patient after BCS breast cancer procedure and radiation therapy during the treatment of right upper limb lymphedema using the Kinesiology Taping method – frontal view



Photo 15
Patient after BCS and radiation therapy with lymphedema of the left upper limb during the 1st phase of treatment with CDT – frontal view

operative scar, which is achieved by using massage, mobilization and iodine iontophoresis, as well as maintaining or improving ranges of mobility in the arm. In the earlier period, limiting limb elevation movement range from the front and side to a 90° angle of in the glenohumeral joint is necessary due to the risk of implant displacement. Placing belts above

the reconstructed breast for the duration of expander filling ensures that this complication does not occur. In outpatient settings, 3 months after surgery, general and isometric exercises of the abdominal muscles are performed without the participation of the abdominal prelum, and after wound healing – massage of the scarred area⁶². The occurrence of functional limitations of the upper limb and reduced efficiency after reconstructive operations in both simultaneous and deterred modes indicate the need for rehabilitation using manual therapeutic methods.

SUMMARY

Despite advances in oncoplastic surgical techniques used in the treatment of breast cancer, there are still health problems requiring rehabilitation in this group of patients. The used anti-cancer treatment has significant impact on functional efficiency of women after treatment for breast cancer, reducing their quality of life. Modern treatment of breast cancer should be conditioned by good cooperation of a whole team of specialists in order to obtain the least amount of complications and dysfunctions. Therefore, physical therapy is an integral part of breast cancer treatment. It is necessary to motivate the patients to systematically undertake physical activity and to undergo physiotherapy to eliminate undesirable consequences associated with this type of treatment.

CONCLUSIONS

Modern methods of breast cancer treatment should be conditioned by good cooperation of an entire team of specialists from various clinical areas as well as physiotherapists. The purpose of this procedure is curing the patient, minimizing the occurrence of complications and adverse side effects, and restoring functional capacity. An integral part of such treatment of patients with breast cancer is, among others, their effective rehabilitation.

Photographs from compilations: Holy Cross Cancer Centre, Faculty of Rehabilitation in Kielce and Holy Cross Cancer Centre, Department of Brachytherapy and Hyperthermia in Kielce (author: Dr. Robert Matys, M.D. – photographs 10-11); (author: Dr. Artur Bocian, Dr.M.Sc. – photograph 9).

Conflict of interest: none

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Address for correspondence

Anna Opuchlik
Department of Rehabilitation, Holy Cross Cancer
Centre in Kielce
S. Artwińskiego 3, 25-734 Kielce, Poland
mobil: 606 713 588
e-mail: annaop@onkol.kielce.pl