Physiotherapeutic methods supporting the treatment for gastric cancer

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Abstract

Cancer incidence rates are increasingly high worldwide. Lung, breast, colon, stomach and liver cancers predominate. Nevertheless, advances in cancer treatment have recently been observed. Effective physiotherapy helps to improve the quality of life, reduce pain, dyspnea and prevent bedsores.

Key words: physiotherapy, gastric cancer

Introduction

Physiotherapy involves various therapeutic interventions based on reactivity to stimuli, which are employed to alleviate the symptoms of a particular disease, eliminate its effects and prevent its sequels. Rehabilitation provided by experienced physiotherapists leads to quicker recovery after treatment.

There is a myth that therapy with an electric current or a magnetic field and phototherapy may stimulate or reactivate the neoplastic disease that has already been cured. Physiotherapists are erroneously reluctant to deal with oncologic patients. Rehabilitation following oncologic treatment has been found essential for restoration of body balance and for acceleration of complete recovery.

Gastric cancer is a primary malignant neoplasm of the stomach originating from the gastric mucosa. Histopathologically, adenocarcinoma accounts for about 90% of all malignant tumours in humans [1]. In 2012 in Poland, the gastric cancer incidence rate was 5000 cases, including 3330 men and 1700 women. Gastric cancer is the fifth most common neoplasm in men and the eighth most common cancer in women. Men are twice as likely to be affected compared to women [2]. The incidence and mortality associated with stomach cancer are increasingly low both in Poland and worldwide, yet their rates in our country are still among the highest ones in Europe [3].

Gastric cancer

The first cases of gastric cancer were mentioned in the Ebers Papyrus dated about 1550 BC. [4]. The concepts of cancer and neoplasm were introduced

by Hippocrates, who described several neoplastic diseases, including gastric cancer [5]. Hippocrates analysed only tumours manifesting themselves through the abdominal integuments as autopsies were considered unethical and were banned.

In 1975, Correa designed an experimental model of gastric cancer based on pre-cancerous lesions. The model starts with chronic gastritis followed by atrophic gastritis, intestinal metaplasia, dysplasia and invasive cancer [3].

Nowadays, it is well known that environmental and genetic factors are vital for the pathogenesis of gastric cancer. Long-term exposure to risk factors leads to initiation, promotion and progression of the disease [6]. One of the essential factors in the carcinogenesis of gastric cancer is chronic atrophic gastritis caused by *Helicobacter pylori*, which is likely to be involved in the development of 60% of stomach cancer cases in humans [7].

Adenocarcinoma is the most common malignant gastric tumour and accounts for 90-95% of all gastric cancers in humans [1]. Gastric lymphomas are the second most frequent type of gastric cancer and constitute 3-5% of all gastric cancers.

Two major types of gastric cancer are distinguished:

- early gastric cancer defined as carcinoma limited to the mucosa and submucosa without lymph node metastases, irrespective of tumour size [8]. Its size is usually 2-5 cm. The differentiation of early gastric cancer and high-grade neoplasia (dysplasia) can be difficult when only the lesional mucosa is available for histopathological examinations [8]

- advanced gastric cancer invading deeper

than the submucosa and infiltrating the muscularis propria. This type is associated with much worse prognosis, as compared to early gastric cancer. Advanced gastric cancer shows higher differentiation of histopathological patterns; macroscopically, it can manifest itself as a fungal, ulcerative or diffuse polyp.

In its early stages, gastric cancer usually presents with no characteristic symptoms. After numerous ineffective attempts of conservative treatment (symptomatic), diagnostic examinations are broadened to include endoscopy and imaging tests and the diagnosis is established based on their results.

The symptoms suggestive of the pathology within the stomach include dyspepsia – persistent epigastric pain exacerbating after meals and decreasing on an empty stomach, which is not relieved with anti-acid drugs, the post-meal feeling of fullness, belching, nausea and vomiting, lack of appetite and heartburn. Tumours of the cardia precluding the passage from the oesophagus to the stomach may induce vomiting. Long-term neoplastic processes are likely to lead to anaemia associated with bleeding from the tumour manifesting as tarry stools or coffee-ground vomits. Weight loss and progressing wasting are connected with ingestion difficulties. In the later stage of the disease, subfebrile states and nocturnal sweats can occur. In cases of secondary invasion of the lymph nodes and remote organs, the Troisier's sign (the enlarged Virchow's node in the left supraclavicular fossa) and enlarged liver accompanied by ascites are observed.

One of the most important diagnostic methods is gastroscopy, which enables preliminary evaluation of the oesophagus, the gastric cardia and the remaining segments of the stomach as well as the horizontal part of the duodenum located behind the pylorus. With gastroscopic forceps, the tumour is biopsied for histopathological assessment.

Diagnostic laparoscopy, which enables the evaluation of metastases to the liver, or peritoneum and infiltrations to the adjacent organs, is not a routine examination. The examination is used to qualify patients for inductive chemotherapy or intraperitoneal perfusion chemotherapy with gastrectomy.

Neoplastic markers are specific substances present in the blood, urine or tissue biopsy specimens, whose identification is considered essential. Their types and concentrations help to establish the diagnosis, evaluate the risk and facilitate long-term monitoring of the patient's condition.

The main treatment options for stomach cancer are surgery and chemotherapy. In Europe, perioperative chemotherapy is standard for the treatment of localized gastric cancer [9], which consists of neoadjuvant (preoperative) and adjuvant (postoperative) chemotherapy. The perioperative management is to destroy micrometastases and to reduce the tumour mass, enabling radical surgery with tumour-free resection margins.

In the United States, adjuvant chemoradiotherapy is the standard of care. In Europe, due to late toxicity of chemoradiotherapy, perioperative chemotherapy is preferably used. Chemoradiotherapy is a method in which chemotherapy is combined with tumour radiation. According to the ESMO guidelines, in patients with stage IB disease without earlier pre-operative chemotherapy, chemoradiotherapy can be applied as a method equivalent to perioperative chemotherapy.[9].

Postoperative physiotherapy

Physiotherapeutic methods after abdominal surgical procedures are tailored to the patient's capacities and depend on the extent of surgery as well as possible postoperative complications. In all cases, prevention of respiratory and cardiovascular complications is essential.

The respiratory system can be supported using the thoracic and diaphragmatic breathing exercises.

Thoracic breathing exercises

Exercises start in the dorsal decubitus position. The patient's knees should be bent while the upper limbs placed along both sides of the thorax. The patient inspires through the nose maximally expanding the thoracic cavity sideward and expires through the nose maximally diminishing the volume of the thorax, which is additionally supported by pressing the ribs with hands.

Diaphragmatic breathing exercises

Exercises start in the dorsal decubitus position. The patient's knees should be bent and the upper limbs placed along both sides of the thorax. Subsequently, a book should be placed between the umbilicus and the costal arch. The patient inspires through the nose pushing the book dynamically towards the ceiling and expires through the nose to lower the abdomen to a maximum.

After surgery, the patient should be helped to assume the semi-reclining position. High positioning, i.e. the thorax and the headrest supported with pillows, facilitates activities and unaided eating and relieves dyspnoea. The patient should be

protected against slipping down. The upper limbs can be supported using an over-the-bed table with pillows. The lower limbs hanging from the bed are placed on a stool and covered with a blanket. The patient can remain in this position for some time. However, it should be remembered that this position favours bedsores.

Electrotherapy is used to relieve pain, improve the blood supply to the stimulated tissues and accelerate the absorption of intraarticular oedemas and effusions. It is concerned with symptomatic treatment of locomotor and neurological diseases using various therapeutic currents. Direct currents, modulated medium-frequency currents and impulse low- and medium-frequency currents are applied.

Laser therapy involves therapeutic interventions with medical lasers working in a constant or impulsive mode. Such lasers are used for blood-less surgical procedures, in which they replace scalpels. They are predominantly employed in neurological, ophthalmic and dental procedures to coagulate the tissues, destroy the affected tissues and for photodynamic therapy with the use of photosensibilizers. Conservative treatment with low-energy lasers is called biostimulation. In biostimulation, the laser does not contact with the patient's tissues, which prevents the risk of infection. Moreover, the precision of interventions is significantly higher, as compared to classic treatment methods.

Magnetic therapy is a form of non-conventional medicine, in which static magnetic fields and extremely low- frequency fields are applied. Despite great hopes pinned on magnetic therapy, scientific studies did not confirm its efficacy [10]. In 2012, the American Cancer Society (ACS) declared that there was no evidence proving the efficacy of magnetic therapy in the treatment of cancer. It has been emphasized that magnetic fields have been known and used in conventional medicine, e.g. in magnetic resonance imaging; moreover, some other applications of this therapy are being studied. In Poland, Aleksander Sieroń has suggested the use of magnetic therapy with variable magnetic fields [11], simultaneously implying the efficacy of magnetic therapy with static fields. Magnetic therapy should not be confused with impulse electromagnetic field therapy applied in orthopaedics.

Manual or instrumental lymphatic drainage is one of the physiotherapeutic interventions. Manual lymphatic drainage was devised by Emil Vodder. Using hands or devices designed for this purpose,

the lymph circulation is improved and the diseases resulting from retention, inflammatory, oncotic and lymph oedemas are prevented. The rate of massage is extremely slow (about 10-15 movements per minute) and the techniques used are fluent and delicate; lymphatic drainage can be applied even several times a day. It is successfully used not only as a general massage but also as a cosmetic facial procedure and a supportive treatment option after mastectomy, quadrantectomy and in cases of lymph oedemas. Lymphatic drainage can be applied manually by a qualified massage therapist or physiotherapist; alternatively, special massage devices or kinesiotapping can be used.

Whirl massage of limbs is a gentle modality of therapy, based on the mechanical effects of whirl movements of warm water. It relaxes the tissues, reduces the muscle tension, improves blood supply and alleviates the pain. The temperature of water used for baths ranges from 32°C to 40°C, depending on indications.

Postoperative diet

Gastrectomy is performed under general anaesthesia. The gastrointestinal tract interference can lead to disorders of digestion and absorption.

On the first postoperative day, intravenous infusion is administered; the patient's lips should be moistened with boiled water.

On the second postoperative day, peristaltic movements should improve and fluids can be administered (e.g. 500ml of unsweetened tea/24h).

On the third postoperative day, the amount of tea is increased up to 1 litre.

On the fourth postoperative day, a soft diet should be started (rice gruel, soaked rusks). During the next three days, fruit and vegetable purees are added.

After 7 days, the patient should be on a protective pulp diet.

The post-gastrectomy diet should include suitable amounts of proteins (1.5–2 g per kg of body weight), with high-quality animal protein constituting half of this amount (lean meat, fish, eggs or dairy products). Products containing proteins should be included in each meal. Otherwise, heavy fats, such as lard, pork fat and bacon, should be avoided. Fruits and vegetables ought to be peeled to contain as little fibre as possible; preferably boiled and liquidized fruits and vegetables have to be consumed. It is recommended to consume small-grained cereal products, e.g. semolina, white rice or wheat bread. The diet should consist of 5-7 small-volume meals,

starting with 100-150 ml and increasing the amount gradually by 50 ml. Fluids should be drunk half an hour before or after the meal and not during the meal, as it dilutes digestive juices and impairs digestion. After the meal, it is advised to lie down for 20 minutes. Bloating products (pulses, garlic, onion, cabbage) or those lying heavy in the gastrointestinal tract (fried, spicy, roasted) should be avoided. Meals should be steamed, boiled in water, stewed or roasted in foil. The intake of coffee, strong tea, cocoa or alcohol should be reduced.

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