

Clinical features of patients with cancer of the thoracic esophagus and results of their surgical treatment

Características clínicas de los pacientes con cáncer de esófago torácico y resultados de su tratamiento quirúrgico

Fariz Jamalov¹, Rauf Agayev², Idris Akhundov³, Tarana Jamalova⁴, Shahin Huseynov⁵,
*Lale Lyatifova⁶

SUMMARY

Esophageal cancer takes one of the first places in the structure of morbidity and mortality among malignant diseases. The development of anesthesiology and thoracic resuscitation provided the evolution of the surgical method. Resections of the esophagus with locally disseminated and complicated forms of cancer have become possible. But even today, the long-term results of surgical treatment don't satisfy clinicians. Often this is due to the dissemination of the tumor process in most patients at the time of treatment. For this purpose, an analysis of clinical material was carried out, including 89 patients with cancer of the thoracic part of the esophagus, who underwent reconstructive surgeries (extirpation of the thoracic part of esophagus with simultaneous retro

mediastinal plasty by stomach tube) in the surgical unit of Republican Clinical Hospital (RCH), n.a. academic M.A.Mir-Gasimov, Baku city, Azerbaijan. Interventions on the esophagus were performed either of two approaches – upper median laparotomy and left-sided cervicotomy (76 patients – 85.4 %) or from three with the addition of a right-sided lateral thoracotomy in the fifth intercostal space (13 patients – 14.6 %). There were no deaths due to surgical complications. The fundamental possibility and reasonableness of performing expanded radical interventions have been detected, considering the technical resectability of the tumor, which is especially important in working with a group of patients with “late” esophageal cancer criteria, such as the age of the patient, the size of the primary tumors, its local dissemination is not a contraindication to radical surgery.

Keywords: Cancer of the thoracic part of the esophagus, simultaneous radical operation, surgical treatment.

DOI: <https://doi.org/10.47307/GMC.2023.131.3.7>

ORCID: <https://orcid.org/0000-0001-7872-3223>¹
ORCID: <https://orcid.org/0000-0003-0954-1439>²
ORCID: <https://orcid.org/0000-0002-1913-5701>³
ORCID: <https://orcid.org/0000-0003-4657-6657>⁴
ORCID: <https://orcid.org/0000-0001-9784-3458>⁵
ORCID: <https://orcid.org/0000-0002-4875-945X>⁶

Department of Surgical Diseases, Azerbaijan Medical University,
Baku, Azerbaijan

*Corresponding author: lal-n@yandex.ru

Recibido: 4 de mayo 2023
Aceptado: 22 de junio 2023

RESUMEN

El cáncer de esófago ocupa uno de los primeros lugares en la estructura de morbilidad y mortalidad entre las enfermedades malignas. El desarrollo de la anestesiología y la reanimación torácica proporcionaron la evolución del método quirúrgico. Se ha hecho posibles resecciones del esófago con formas de cáncer diseminadas localmente y complicadas. Pero incluso hoy en día, los resultados a largo plazo del tratamiento quirúrgico no satisfacen a los médicos. A menudo, esto se debe a la diseminación del proceso tumoral en la mayoría de los pacientes en

el momento del tratamiento. Para este propósito, se llevó a cabo un análisis de material clínico, incluidos 89 pacientes con cáncer de la parte torácica del esófago, que se sometieron a cirugías reconstructivas (extirpación de la parte torácica del esófago con plastia retromediastinal simultánea por sonda estomacal) en la unidad quirúrgica del Hospital Clínico Republicano (RCH), n. a. académico M. A. Mir-Gasimov, ciudad de Bakú, Azerbaijan. Las intervenciones en el esófago se realizaron mediante dos enfoques: laparotomía de la mediana superior y cervicotomía del lado izquierdo (76 pacientes, 85.4 %) o de tres, con la adición de una toracotomía lateral del lado derecho en el quinto espacio intercostal (13 pacientes, 14.6 %). No hubo muertes por complicaciones quirúrgicas. Se ha detectado la posibilidad fundamental y la razonabilidad de realizar intervenciones radicales expandidas, teniendo en cuenta la reseccabilidad técnica del tumor, que es especialmente importante para trabajar con un grupo de pacientes con criterios de cáncer de esófago «tardío», como la edad del paciente, el tamaño de los tumores primarios, su diseminación local no son una contraindicación para la cirugía radical.

Palabras clave: *Cáncer de la parte torácica del esófago, operación radical simultánea, tratamiento quirúrgico.*

INTRODUCTION

Esophageal cancer takes one of the first places in the structure of morbidity and mortality among malignant diseases (1-3).

A variety of approaches to treatment and a significant degree of risk of surgical interventions in patients with esophageal cancer, determine the increased interest in this important section of modern surgery. The main strategic goal of surgeons—oncologists is to increase survival and improve the quality of life of patients (4-6).

The development of anesthesiology and thoracic resuscitation provided the evolution of the surgical method. Resections of the esophagus with locally disseminated and complicated forms of cancer have become possible. The tasks of preventing lethal complications and improving the quality of life of patients are successfully solved (7-9). But even today, the long-term results of surgical treatment don't satisfy clinicians, five-year survival, according to many authors, doesn't exceed 4 %-25 % (10-12). Often this is

due to the dissemination of the tumor process in most patients at the time of treatment (3-4 stages in 65 %-75 % of patients) (13,14).

Based on the foregoing, the main goal of our study was to identify the possibilities of implementing expanded combined and associative radical operations in a group of patients with locally disseminated and complicated forms of esophageal cancer, their influence on immediate clinical results in this severe category of patients.

MATERIALS AND METHODS

Clinical studies were carried out considering the requirements of the regulation “on the legal and ethical principles of biomedical research in humans” with the approval of the Local Ethical Committee at Azerbaijan Medical University (Baku city) based on written voluntary consent. The work is based on the analysis of clinical material, which included 89 patients with cancer of the thoracic esophagus, who underwent reconstructive surgery in the surgical department of the Republican Clinical Hospital (RCH), n.a. academic M.A. Mir-Gasimov, in the period from between 2005 and 2017 years.

The age of the patients ranged from 42 to 70 years, on average 54.3 ± 0.8 years. 39.9 % of patients were over 60 years old. The male-to-female ratio was 2:1. The diagnosis of a malignant tumor was confirmed by histological examination in all patients at the stage of examination and preparation for reconstructive surgery.

The localization of the tumor (the level of malignant lesions) of the esophagus and stomach was determined before surgery, using routine diagnostic instrumental techniques, and later clarified by microscopic and histological examination of the surgical material. In most cases (63.0 %) the tumor of the esophagus was localized in the middle or lower thirds of its thoracic region (Figure 1). In 19 patients (21.3 %), the lesion extended to the distal 2/3.

The length or diameter of esophageal tumors was in the range of 1.0 to 12.0 cm. The average tumor size was 5.1 ± 0.2 cm. Primary lesions 5.0 cm and more in length were detected in 59.1 % of patients, i.e., more than half.

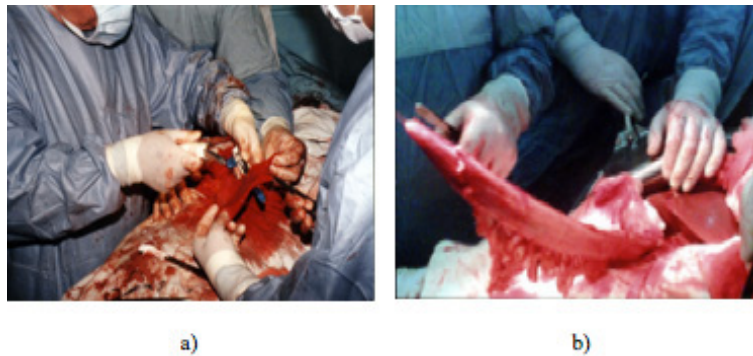


Figure 1. Cancer of the mid-thoracic esophagus: a) front view; b) side view.

Among the tumors of the esophagus traditionally dominated differentiated forms of squamous cell carcinoma in 64 (71.9 %) patients.

By depth of tumor invasion (pT), the patients were divided as follows: superficial cancer of the esophagus (pT1) was diagnosed only in 6 (6.7 %) patients. “Early” cancer, i.e., cancer which is located within the mucous membrane was detected only in 2 (2.2 %) patients. The remaining 98 % detected “late” esophageal cancer. About one-third of all tumors (32.6 %) went out of the organ and grew into the surrounding tissues.

According to postoperative histological examination out of 29 patients with tumor invasion into adjacent organs and structures (pT4), invasion of mediastinal pleura was detected in 21 (23.4 %) patients, lungs in 4 (4,5 %) patients, pericardium in 3 (3.4 %), diaphragm crura in 2 (2.2 %) patients, that in none of the cases was the reason for refusal from a radical operation. Tumor embolus in mediastinal fat tissues detected in 16 of them, which amounted to 18 % of the total number of patients.

This indicates that the operated patients in most cases had locally disseminated tumors, signifying the late stages of the oncological process.

The distribution of operated patients according to the stages of cancer of the esophagus and stomach was made in accordance with the current TNM – classifications of the International Anticancer Union (UICC) 1997 year which includes the criteria of local (T), regional (N), prevalence of the process and distant metastasis

(M). More than half of the operated patients (52.8 %) with a tumor of the esophagus had III and IV stages of the disease, the latter occurred in a quarter of them (27.0 %).

A significant proportion of patients in the group with IV-stage of esophageal cancer had celiac metastases, which were classified according to TNM classification as distant.

The common regional metastasis rate due to esophageal cancer has amounted – 44.7 %. At the time of admission to the hospital, only 11.9 % of patients had no complaints, in which tumors of the esophagus were detected accidentally, during endoscopic or X-Ray examination. The remaining 88,1 % of patients are hospitalized with expressed clinical symptoms, the appearance of which, as a rule, was the cause for the initial visit to the doctor.

Thus, the most frequent complaints – weight loss (60.6 %), pain while swallowing (51.8 %), and dysphagia (51.3 %) – are typical for the late stage of malignant disease of the esophagus. Unfortunately, dysphagia, which was presented in most patients with esophageal cancer, served as a late symptom or “an early symptom of the late stage” of a tumor lesion.

The duration of the anamnesis was taken as the period that passed from the moment of the appearance of the first complaints and deterioration of well-being up to admission to the hospital. The duration of anamnesis of the disease was in the range from 1 to 15 months, on average 4.2 ± 0.2 months. In the first three months

CLINICAL FEATURES OF PATIENTS WITH CANCER OF THE THORACIC ESOPHAGUS

from the appearance of signs of the disease, 50 % of patients are hospitalized, that is only half of all patients.

Anamnesis with a duration of 6 months and more was noted in 28.5 % of patients, i.e., every fourth patient was admitted to the hospital six months after the complaints have appeared. The intervention performed due to cancer of the thoracic part of the esophagus was its subtotal (extirpation of thoracic part) resection with simultaneous retro mediastinal plasty by gastric tube.

The volume of esophageal resection due to cancer of its intrathoracic region was, as a rule, standard. In all cases, the thoracic part was removed completely, i.e., a subtotal resection of the esophagus was performed. Total esophagectomy is preferable for cancer of the upper thoracic part of the esophagus, based on considerations of oncological radicalism,

but there were no patients with such tumor localization in the studied groups.

Interventions on the esophagus were performed either of two accesses – upper median laparotomy and left-sided cervicotomy (so-called abdominocervical access), or out of three – with the addition to the previous right-sided lateral thoracotomy in the V intercostal space.

The gastric graft was formed according to the developed technique using special surgical instruments and stapler devices. The stomach has always been preferred as a plastic material. At the same time, after its mobilization, the isoperistaltic tube up to 40-45 cm in length and up to 3.5 cm in diameter was cut out from the greater curvature with blood supply from the right gastroepiploic artery. The graft formed in this way was passed through the bed of the removed esophagus in the posterior mediastinum to the neck, where a two-row anastomosis with the stump of its esophagus was applied “end-to-end” (Figure 2).

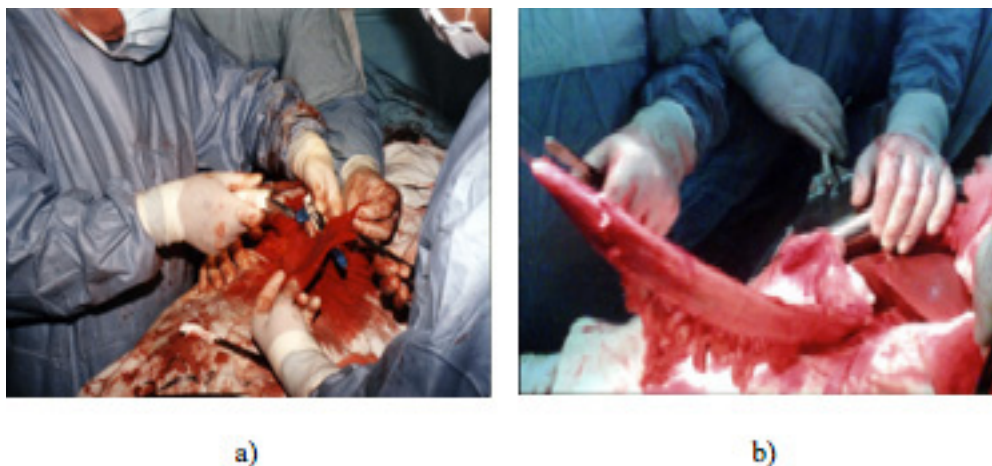


Figure. 2. Cancer of thoracic part of esophagus – stages of operation: a) separation of the stomach from the esophagus using a stapler device by “Johnson@Johnson” company to create a graft from the greater curvature of the stomach; b) view of the formed graft.

The processing of clinical data and obtained results was carried out using the methods of variation statistics and the calculation of the average quadratic deviation, average errors of the medium arithmetic ($M \pm m$), and relative magnitude ($P \pm p$). The assessment of the

reliability of the results of the study was carried out with the establishment of confidence limits with the probability of an unmistakable forecast (P), equal to 95.5 % and more, and corresponding confidence Student's coefficient equals 2. The difference between two medium

or relative magnitudes was considered reliable if the probability of error (P) was less or equal to 0.05, and if $p > 0.05$ was considered unreliable.

RESULTS

More often it was possible to resect the esophagus from abdomino-cervical access (trans hiatal resections) – for 76 (85.4 %) patients. At the same time, the esophagus was mobilized trans hiatally, i.e. from the abdomen through the diaphragm. Access to the posterior mediastinum from the abdominal cavity was carried out using sagittal diaphragmotomy. With the help of special mediastinal hooks with illumination under vision control, the esophagus has been isolated in the mediastinum, if possible, in a block with mediastinal tissue and lymph nodes.

In 13 (14.6 %) patients, resection of the esophagus was performed out of three accesses (transthoracic resections), in 7 (7.9 %) of the patients, operations started with thoracotomy.

For the remaining 6 (6.7 %) patients during surgery required a transition to a thoracotomy after celiotomy. The necessity for additional access was more often due to difficulties in mobilizing the affected segment of the esophagus. An operation was considered as combined if, due to the main disease – cancer, was performed resection of adjacent organs and structures. The volume of combined resection was determined by the local prevalence of the tumor process-by invasion of neighboring organs and anatomical structures of the mediastinum abdominal cavity and retroperitoneal space, i.e. the transition of the tumor from the esophagus to the pericardium, mediastinal pleura, lungs, diaphragm and so on. Combined interventions also include cholecystectomy, performed within lymph dissection of the D2 volume. This category didn't include resections of the greater and lesser omentum, the peritoneum of the omental bursa of the abdominal and lower thoracic parts of the esophagus.

We also included resection of mediastinal pleura to combined interventions – 20 cases, of which in 4 it was excised on the left, in 22 – on the right side. In 11 patients the mediastinal pleura was removed from both sides. In 3 out

of 4 cases of lung resections, the right lung was resected, in one patient – both. All resections were marginal and were performed trans hiatally with the help of mechanical staplers.

The execution time of 60 % of all interventions was between 3 and 5 hours. The execution of 1/3 (36.8 %) of the operations in the control group didn't take more than 3 hours.

The volume of total blood loss during surgery, according to the anesthesiological protocols, ranged from 200 to 840 mL, on average – 534.8 ± 31.5 mL.

The cases of the greatest blood loss (about 1 000 mL) during the operation were not due to technical errors in the performance of standard techniques because of the bleeding from mediastinal vessels and diffuse bleeding of mediastinal tissues that occurred during trans hiatal blunt mobilization of the esophagus, as well as a large operating surface of the involved three anatomical zones (abdomen, mediastinum, neck). The given data of intraoperative blood loss on average about 500 mL, corresponds to the best world indicators fixed during such interventions. It should be noted that in the whole series of interventions, there wasn't a single case of death on the operating table.

Intraoperative bleeding has occurred in 7 patients at the stage of mobilization of the esophagus in the mediastinum. Their sources, as a rule, were bronchial arteries, small branches of the thoracic aorta, and the edges of the resected mediastinal pleura. In 2 patients, the trachea and main bronchi were injured. Superficial rupture of the stomach has occurred in one patient. The bleeding didn't require splenectomy and was stopped by coagulation. During the abdominal stage of extirpation of the esophagus, there were no cases of profuse bleeding, as well as damage to the main arterial trunks, the portal and splenic veins, pancreas. The number of discharges during all the time of the presence of drainages, hesitated in the interval 50-3 350 mL, on average 779.5 ± 39.8 mL. From the whole group, only 20.2 % of patients had more than 1 000 mL of serous-hemorrhagic discharge. No cases of severe and persistent lymphorrhea have been registered in patients. It is important to note that the applied technique of lymphdissection with gentle preparation, careful coagulation,

and ligation of transected small lymphatic and blood vessels reliably prevents postoperative lymph leakage.

We present the observation of a patient with a smooth period after extirpation of the thoracic part of the esophagus from 3 accesses:

The 54-year-old patient, hospital file No. 167, was admitted on January 7, 2015 to the I surgical unit of Republican Clinical Hospital (Baku city) with complaints of retrosternal pain, the difficulties in passing liquid food through the esophagus. The patient had considered himself sick for about 6 months when he first felt difficulty in passing food. The patient didn't go to the doctor. He associated this phenomenon with the cold. Over time, the dysphagia began to grow, and for the last two months, the patient could eat only liquid food. Recently he has lost – 12 kg. The patient was treated in the outpatient department (OPD) – without any effect. Admitted to the clinic for examination and treatment. On X-Ray examination, there is an uneven stenosis of the mid-thoracic part of the esophagus at the level of Th₆ on 1/3 of its initial lumen, 6 cm in length. The contours of the narrowed area are uneven. There is a slight suprastenotic dilatation of the esophagus. Starting from the Th₈ level, the contrast mass freely passes through the esophagus and enters the stomach. The stomach gas vesicle is preserved at the endoscopic examination: after 26 cm from upper jaw incisors, a concentric narrowing of the esophagus is determined. The mucous membrane in the area of stenosis is infiltrated. The endoscope didn't pass through the narrowed area. Taken biopsy. Histological examination of biopsy material revealed epidermoid cancer. Ultrasound examination didn't reveal pathological changes in the liver and free fluid in the abdominal cavity. The patient is prepared for surgical treatment. January 9, 2015 was performed surgery: extirpation of the esophagus with simultaneous plasty by isoperistaltic gastric tube. Atypical resection of the upper lobe of the right lung. A right-sided thoracotomy in the V intercostal space was performed. Unpaired vein ligated. During the revision it was detected that there is a tuberous tumor, starting from the aortic arch, 7-8 cm in length. Enlarged regional lymph nodes are noted. The esophagus together with surrounding

fatty tissue and the thoracic lymphatic duct was mobilized. Lymphadenectomy was performed in the mediastinum.

At the same time, bifurcated peribronchial, paratracheal, and paraaortic lymph nodes, as well as lymph nodes were removed in the aortic window area. Resection of the thoracic part of the esophagus with the tumor was performed. The proximal and distal ends are sutured by a thick thread for the subsequent conducting of a graft to the neck. In the upper lobe of the right lung, a cyst with a diameter of 8×5 cm, which was resected by a stapler device was detected. The pleural cavity was drained through a separate puncture after it was sutured tightly. Upper median laparotomy was performed. During revision, enlarged lymph nodes were detected in the region of the lesser curvature of the stomach. A sagittal diaphragmotomy was performed. The stomach was mobilized along the greater and lesser curvatures with the performance of expanded lymphadenectomy in volume D2. A graft which is 34 cm in length, was cut off from the greater curvature of the stomach, using a linear stapler. Parallel to the left sternocleidomastoid muscle, the esophagus was isolated out of cervical access, after that, the graft was passed through the posterior mediastinum and was conducted to the neck. “End to end” anastomosis was performed with two-row sutures, by vicryl thread – 4/0. The area of the anastomosis was drained by two drainages and the neck wound was tightly sutured. Drainage was additionally introduced into the pleural cavity, through the abdomen, abdominal cavity was drained in the area of the spleen through a separate puncture and sutured tightly.

The postoperative period has passed without any complications. Blood transfusions and blood substitutes, protein preparations, vitamin therapy, etc. were carried out. At the control X-Ray examination with water-soluble contrast, on the fifth day, there were no signs of anastomosis and graft failure (Figure 3).

In satisfactory condition, the patient was discharged after 12 days for outpatient treatment and observation. At the control X-ray and computed tomography examinations – 6 months after the surgery, pathological changes and signs of metastasis were not detected.

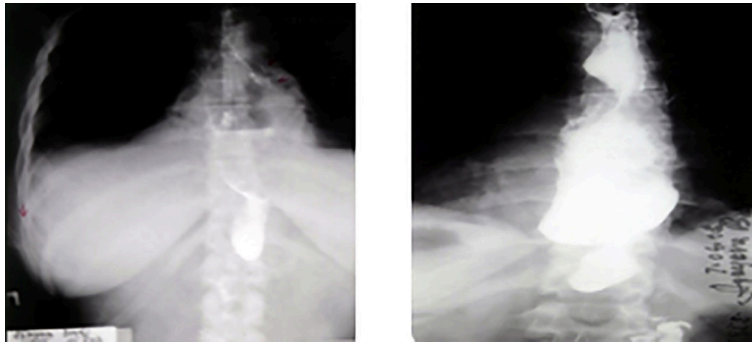


Figure 3. The condition after extirpation of the esophagus with simultaneous retromediastinal plasty by gastric tube due to cancer of the thoracic part of the esophagus.

Despite the large volume of surgical intervention (extirpation of the esophagus with plastic surgery and atypical resection of the upper lobe of the right lung), the postoperative period has passed smoothly.

We present the observation of a patient with a complicated postoperative period. The 55-year old patient, hospital file No. 568 was admitted on January 23, 2017 to the I surgical unit of Republican Clinical Hospital (Baku city) with complaints of general weakness, retrosternal pain, the difficulties in passing rough food through the esophagus. The patient had considered himself sick for about 3 months and was treated in the outpatient department (OPD). The food was exclusively in liquid form. The patient was admitted to the hospital for further examination and treatment. On X-Ray examination, there is uneven stenosis of the midthoracic part of the esophagus at level Th_8 , 6 cm in length. Below the Th_{10} level – the esophagus is passable, the folds of the mucous membrane of the esophageal-gastric junction are not changed, and the gas vesicle of the stomach is preserved. The evacuation of barium from the stomach is normal. The heart is expanded to the left, the waist is preserved. During the endoscopic examination, in the middle third of the esophagus, there is a stenosis of its lumen due to thickening and infiltration of the mucous membrane. Computed tomography of the chest reveals a thickening of the wall in the middle third of the esophagus.

Analysis of the clinical picture and results of X-Ray examination, including CT, made it

possible to determine the diagnosis of cancer of the thoracic esophagus.

The patient is prepared for surgical treatment. To carry out antibiotic-prophylaxis intravenously was introduced amoxiclav – 1 000 mg during induction narcosis.

January 26, 2017 was performed surgery: extirpation of the esophagus with simultaneous plasty by isoperistaltic gastric tube out of three accesses. A right-sided thoracotomy in V intercostal space was performed and an unpaired vein was ligated. During the revision it was detected, that there is a tuberous tumor, starting from the aortic arch, 7-8 cm in length. Enlarged regional, probably metastatic, lymph nodes are noted. The esophagus was mobilized together with the thoracic lymphatic duct. Lymphadenectomy was performed along its all length, and paratracheal lymph nodes were also removed. The esophagus together with the tumor, was resected and removed. Its distal and proximal ends are connected by a thick thread. The pleural cavity was drained through a separate puncture, after was sutured tightly.

Upper median laparotomy was performed. During revision enlarged lymph nodes were detected in the region of the lesser curvature of the stomach. The stomach was mobilized along the greater and lesser curvatures with the performance of expanded lymphadenectomy in volume D_2 . A graft, 34 cm in length, was cut off from the greater curvature of the stomach, using a linear stapler. Parallel to the left sternocleidomastoid muscle,

the esophagus was isolated out of cervical access and additionally resected, after that, the graft was passed through the mediastinum and was conducted to the neck. "End-to-end" anastomosis was performed with two-row sutures. The area of anastomosis was drained by two drainages and the wound was tightly sutured. Drainage was additionally introduced into the pleural cavity, through the abdomen.

The abdominal cavity was drained in the area of the spleen through a separate puncture and sutured tightly. In the early postoperative period was noted moderate heart failure: tachycardia, and a decrease of blood pressure to 90/60 mm. Hg, dyspnea, a decrease of diuresis. Intensive cardiotropic therapy gave a tangible effect: the pulse slowed down, and blood pressure increased to 110-120/70 mm. Hg, dyspnea decreased, and diuresis increased to 1 500 mL per day. 150 mL of serous-hemorrhagic fluid was released from the drainages of the abdominal cavity, and 200 mL from the pleural cavity.

January 30, 2017 because breathing on both sides was weakened, a chest X-Ray was performed. Fluid was detected in both pleural cavities. With thoracocentesis – 500 mL serous-hemorrhagic fluid was obtained.

February 03, 2017, a yellowish liquid began to leak from the area of the stitches on the neck. Partial failure of the sutures of the cervical anastomosis was suspected.

In this regard, antibiotic therapy and intensive infusion therapy were prescribed, including a transfusion of packed red blood cells, and plasma, as well as complete parenteral nutrition. March 13, 2017 the nasogastric tube was removed. X-Ray examination with water-soluble contrast didn't reveal anastomosis insufficiency on the neck. Mouth feeding started.

In march 19, 2017, the patient was discharged from the hospital in satisfactory condition.

After 3 months, the patient began to complain of a feeling of obstruction during swallowing in the neck area. X-Ray examination revealed a stricture of the cervical anastomosis. Within 2 months anastomosis bougieurage was performed in the outpatient clinic. At the control X-Ray examination, possibility of the cervical anastomosis was satisfactory.

During the analysis of this hospital's file, it should be noted that the patient had signs of heart failure even before the reconstructive operation, which was confirmed by increased heart size. Intensive therapy, including dopamine, Lasix, and correction of water and electrolyte disorders, allowed me to cope with arisen complications. Later, partial insufficiency of the cervical anastomosis sutures was developed, which was limited and was stopped rapidly.

The subsequent narrowing of the anastomosis at the neck may have been related to its previous failure.

Due to intraoperative complications, thoracotomy was required only in two cases, for suturing defects in the membranous part of the trachea and main bronchus, formed during the mobilization of a tumor, tightly soldered to them (favorable outcome).

It's important to note that in all groups of 89 operated patients, there was one fatal outcome, not due to purulent-septic complications. It's about a 73 year -old female patient with esophageal cancer. She underwent extirpation of the esophagus by cervical-abdominal access with plasty by graft cut off from the stomach.

The early postoperative period in a patient was complicated by an extensive insult. The wounds healed without complications and the patient was fed through a nasogastric tube. Despite the intensive treatment, it wasn't possible to cope with the complication and the patient died 3 weeks after surgery.

DISCUSSION

The presented results of operations prove the fundamental possibility and validity of expanded radical interventions, if technical resectability of the tumor is possible, which is especially important in working with patients with "late" cancer of the esophagus and stomach. Criteria, such as the age of the patient, and the size of the primary tumor, were not a contraindication to radical surgery which is confirmed by the studies of other authors (15).

Summarizing the above, we note that the perfection of surgical intervention for cancer of

the esophagus consists of the anatomically and physiologically adjusted volume of resection, corresponding to the principles of oncological radicalism. Modern technical training of surgeons – oncologists, and the level of anesthesiological and resuscitation services allow safe to perform expanded combined and associative operations. The tactics of simultaneous application of the most radical operations correspond to the modern principles of an aggressive surgical strategy in oncology (16).

The cases of the greatest blood loss (about 1000 mL) during the operation were not due to technical errors in the performance of standard techniques, but they occurred due to bleeding from mediastinal vessels and diffuse bleeding of mediastinal tissues that occurred during trans hiatal blunt mobilization of the esophagus, as well as a large operating surface of the involved anatomical zones (abdomen, mediastinum, neck). Intraoperative blood loss data, on average about 500 mL, corresponds to the best world indicators, fixed during similar interventions (17). Due to intraoperative complications, thoracotomy was required only in 2 cases – for suturing of defects in the membranous part of the trachea and main bronchus, formed during the mobilization of a tumor tightly soldered to them (favorable outcome).

It's important to note that among the 89 patients, who underwent esophagoplasty, there were no cases of graft necrosis and insufficiency of its longitudinal suture, which indicates, first of all, the developed methodology for the selection of operational material and the technique for implementation all its stages (18). Thus, based on the accumulated operational experience and obtained results, it can be concluded that with the accurate and methodical implementation of all technically developed stages of reconstructive operations on the esophagus, the operation time, the volume of the blood loss, and the frequency of intraoperative complications don't increase.

The risk of damage to large vessels or other structures during extirpation of the esophagus is low, that's consistent with the data of other researchers (11).

CONCLUSIONS

The presented results of operations prove the fundamental possibility and reasonableness of extended radical interventions, considering the technical resectability of the tumor which is especially important in working with a group of patients with "late" esophageal cancer. Criteria, such as the age of the patient, the size of the primary tumors, and their local dissemination are not a contraindication to radical operation.

Perfection of surgical intervention for cancer of the esophagus consists of the anatomically and physiologically adjusted volume of resection, corresponding to the principles of oncological radicalism. Modern technical training of surgeon–oncologists, the level of anesthesiology, and resuscitation services allow safe to perform expanded combined and associative operations. The tactics of simultaneous application of the most radical operations correspond to the modern principles of an aggressive surgical strategy in oncology.

REFERENCES

1. Napier KJ, Scheerer M, Misra S. Esophageal cancer: A review of epidemiology, pathogenesis, staging workup, and treatment modalities. *World J Gastrointest Oncol.* 2014;6(5):112-120.
2. Torre LA, Siegel RL, Ward EM, Jemal A. Global cancer incidence and mortality rates and trends – an update. *Cancer Epidemiol Biomarkers Prev.* 2016;25(1):16-27.
3. Zhang Y. Epidemiology of esophageal cancer. *World J Gastroenterol.* 2013;19(34):5598-5606.
4. Napier KJ, Scheerer M, Misra S. Esophageal cancer: A review of epidemiology, pathogenesis, staging workup and treatment modalities. *World J Gastrointest Oncol.* 2014;6(5):112-120.
5. Svetanoff WJ, McGahan R, Singhal S, Bertellotti C, Mittal SK. Quality of life after esophageal resection. *Patient Relat Outcome Meas.* 2018;9:137-146.
6. Xia X, Liu Z, Qin Q, Di X, Zhang Z, Sun X, et al. Long-term survival in nonsurgical esophageal cancer patients who received consolidation chemotherapy compared with patients who received concurrent chemoradiotherapy alone: A systematic review and meta-analysis. *Front Oncol.* 2021;10:604657.

CLINICAL FEATURES OF PATIENTS WITH CANCER OF THE THORACIC ESOPHAGUS

7. Cuellar SL, Carter BW, Macapinlac HA, Ajani JA, Komaki R, Welsh JW, et al. Clinical staging of patients with early esophageal adenocarcinoma: Does PDG-PET/CT have a role? *J Thorac Oncol.* 2014;9(8):1202-1206.
8. Lv L, Hu W, Ren Y, Wei X. Minimally invasive esophagectomy versus open esophagectomy for esophageal cancer: A meta-analysis. *Onco Targets Ther.* 2016;9:6751-6762.
9. Ma GW, Situ DR, Ma QL, Long H, Zhang LJ, Lin P, et al. Three-field vs two-field lymph node dissection for esophageal cancer: A meta-analysis. *World J Gastroenterol.* 2014;20(47):18022-1830.
10. Van Workum F, Berkelmans GH, Klarenbeek BR, Nieuwenhuijzen GAP, Luyer MDP, Rosman C. McKeown or Ivor Lewis totally minimally invasive esophagectomy for cancer of the esophagus and gastroesophageal junction: Systematic review and metaanalysis. *J Thorac Dis.* 2017;9(Suppl 8):S826-833.
11. Yoshida N, Watanabe M, Baba Y, Iwagami S, Ishimoto T, Iwatsuki M, et al. Risk factors for pulmonary complications after esophagectomy for esophageal cancer. *Surg Today.* 2014;44(3):526-532.
12. Zhou C, Ma G, Li X, Li J, Yan Y, Liu P, et al. Is minimally invasive esophagectomy effective for preventing anastomotic leakages after esophagectomy for cancer? A systematic review and meta-analysis. *World J Surg Oncol.* 2015;13:269.
13. Yacoub AT, Frants R, Bank L, Sidhu JS, Nicholson P. Unusual presentation of esophageal cancer: A case report and review of literature. *J Med Cases.* 2016;7(2):60-65.
14. Then EO, Lopez M, Saleem S, Gayam V, Sunkara T, Culliford A, et al. Esophageal cancer: An updated surveillance epidemiology and end results database analysis. *World J Oncol.* 2020;11(2):55-64.
15. Ding W, Yang M, Jiang W, Ge X, Sun X, Zhou B, et al. Postoperative radiotherapy for the young-old patients with thoracic esophageal squamous cell carcinoma: A 2-center experience. *Medicine (Baltimore).* 2020;99(17):e19453.
16. Schröder W, Gisbertz SS, Voeten DM, Gutschow CA, Fuchs HF, van Berge Henegouwen MI. Surgical therapy of esophageal adenocarcinoma - current standards and future perspectives. *Cancers.* 2021;13(22):5834.
17. Solon JG, Egan C, McNamara DA. Safe surgery: How accurate are we at predicting intra-operative blood loss? *J Eval Clin Pract.* 2013;19(1):100-105.
18. Londono R, Badylak SF. Regenerative medicine strategies for esophageal repair. *Tissue Eng Part B Rev.* 2015;21(4):393-410.