

Application of Esophageal Anastomoses in Malignant Tumors

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Abstract: Surgical treatment of malignant neoplasms of the esophagus remains one of the most difficult problems of oncosurgery. Of particular importance is the technique of forming esophageal anastomoses, which determines the immediate results of surgery and the quality of life of patients. Anastomosis failure is a leading postoperative complication that significantly affects mortality rates.

Keywords: *esophageal anastomosis, malignant tumors of the esophagus, surgical treatment, mechanical suture, manual suture, anastomosis failure, postoperative complications.*

Introduction

Since the development of thoracic surgery, the esophagus has been the organ where the most advanced operations are performed. There are many reasons for this: anatomical features of the esophagus, features of its syntopic arrangement with other organs, features of blood supply and innervation, etc. [4, 12].

The first operations on the esophagus were performed at the end of the 19th century. For the first time in 1969, the Austrian surgeon T. Billroth performed a resection of the esophagus in dogs and successfully reanastomized it. Two years later, he performed circular resection of the human esophagus for the first time [1, 8, 20]. The first thoracotomy interventions were noted in the works of V.D. Dobromyslov (1900) and F. Toreka (1913). They managed to remove the tumor of the middle part of the esophagus through a right-sided thoracotomy incision.

Resection of the lower esophagus and plastic surgery using various organs are considered complex operations. This is due to the histological features of the outer adventitial layer of the esophagus in the thoracic cavity and the serous layers surrounding the abdominal organs [7]. In different eras, different organs were used for plastic surgery of the esophagus. For example: Rox (1906) and S.S. Yudin recommended and used the small intestine, Roit, Cabane and Orionne recommended the large intestine, and Lewis recommended gastric plastic surgery [2, 13, 21].

For a long time, esophageal surgeries were rarely performed due to their high incidence of injury and complications. Surgical intervention in esophageal cancer involves the removal of not only the esophagus with a tumor, but also a large amount of mediastinal tissue with surrounding lymph nodes and nerve tangles, which inevitably poses a significant risk to the patient's life [3, 15, 23].

Unfortunately, due to the late detection of esophageal cancer, only a third of the total number of patients can undergo radical surgery. Since the treatment of patients at stages I-III of the disease is more effective, this is often due to the result of complex treatment in combination with chemotherapy or radiation therapy [19].

By the end of the 20th century, as a result of the development of minimally invasive surgery, thoracoscopic approaches began to be used for diagnosis and minimally invasive interventions. Due to the rapid development of surgical technologies and the advent of video systems with high-resolution image capture, the possibilities of thoracoscopic surgery have increased significantly. Due to a number of advantages over open surgeries, types of thoracoscopic surgeries have significantly expanded over the past 20 years and are widely implemented in daily practice [4, 9].

Operations performed on the esophageal thoracic region are divided into 3 main types:

- transthoracic subtotal resection of the esophagus with intrapleural anastomosis (Ivor Lyuis type surgery),
- transthoracic resection of the esophagus with the formation of an anastomosis on the neck (MsKeown type surgery)
- transchial resection or extirpation of the esophagus [6, 14, 22].

According to some data [5, 16], in the 40s of the last century, mortality after esophageal resection was approximately 70-72%, but in the 1980s, as a result of the development of thoracotomy and minimally invasive surgery, this figure decreased to 13%, and by the end of the 1990s it approached 8%[3]. It should be noted that currently, in centers with extensive experience in esophageal surgery, this figure does not exceed 6% [12]. Since the 1990s, minimally invasive endoscopic technologies have been gradually introduced into various fields of surgery. These techniques are also widely used in the surgical treatment of various diseases of the esophagus. Initially, such clinical observations were slow to appear, but later their use expanded in various esophageal resections, including oncological ones. In 1991, B. Dallemagne performed thoracoscopic resection of an esophageal tumor for the first time [10], and later the technique of such operations was adapted and improved by various authors [8, 11, 23].

There are various options for thoracoscopic resection of an esophageal tumor. These include hybrid (one stage of the operation is performed in an open manner, the other is endoscopically) and completely minimally invasive - thoracoscopic resection of the esophagus is performed in combination with laparoscopic or extracorporeal stage of gastric transplant formation. In both of these operations, esophageal anastomosis is performed in the neck or in the dome of the right pleural cavity [3, 18].

According to PS Rajan et al. [18], they performed minimally invasive resection of the esophagus in 463 patients. Of these, postoperative complications occurred in 16% of cases and postoperative mortality was 0.9%.

According to Luketich J.D. and his colleagues, they performed 222 successful thoracolaparoscopic surgeries in 2003. As a result of the development and dissemination of minimally invasive esophageal resection technology, more than 1,000 successful operations were performed at the University of Pittsburgh Clinic by 2012 [9, 17].

According to a meta-analysis conducted by RJ Verhage and co-authors [23], as a result of a comparative analysis of standard open esophagectomy and minimally invasive operations, the use of minimally invasive surgical methods led to a twofold reduction in the frequency of intraoperative and

postoperative bleeding. And the hospital stay decreased by 40%. It was also found that the incidence of pulmonary complications in such patients decreased from 22.9% to 15.1%.

In the studies of A.S.Berger et al. [11], the superiority of oncological results of minimally invasive resection of the esophagus over open operations has been proven. The average number of excised lymph nodes in the less invasive group was higher than in the rest, and such results were reflected in the studies of T. Fabian [16].

It should be noted that the thoracic stage of these operations was performed in the patient's lying position on his left side (left decubitus position). At the same time, in order to provide the operator with good visualization, the assistant must perform continuous traction of the left lung and trachea. However, at the thoracoscopic stage, placing the patient on his stomach (prone position) reduces the number of the above-mentioned redundant procedures. Because in this case, the lung is pulled down by its own weight and pneumothorax at the level of 7-8 mmHg. As a result, very favorable conditions are created for the procedure in the pleural cavity and the posterior region of the chest. Also, if the patient needs thoracoconversion, the complications of thoracotomy performed in this situation are significantly reduced. The first resection of esophageal cancer in this position was performed by Shinnusamy Palanivelu in 2006 [8, 19].

Today, when thinking about minimally invasive surgery, it is impossible not to mention robotic surgery. For the first time in 2004, Kemp Kernstine and his colleagues performed the first thoracoscopic resection of the esophagus using the DaVinci robotic system [17, 19]. There are many positive aspects of such complex equipment, and the main disadvantages are the high cost of surgical material, the long duration of the operation, and the lack of "feedback" between the operating surgeon and the patient. According to many scientists, if thoracoscopic imaging has 3D and 4K imaging capabilities, then the capabilities of robotic surgery can be implemented in thoracoscopic procedures [10, 17].

Conclusions: thus, it should be noted that, despite the development in modern medicine, the stages of operations of many laparoscopic and thoracoscopic technologies and methods performed for cancer of the middle and lower esophagus do not differ from operations performed by open methods, but have significant positive values.

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