

Endoscopic Miniinvasive Alternative Treatment Methods for Disseminated Cancer of the Thoracic Esophagus

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Abstract The article is devoted to the actual problem - miniinvasive surgical treatment of patients with disseminated cancer of the thoracic esophagus, discussion of modern treatment tactics for this pathology, estimation of the possibilities of new techniques. The analysis of indications, volume and minimally invasive manipulations at the treatment of esophageal cancer in accordance with the localization and the process prevalence was carried out.

Keywords Esophageal cancer, Esophageal stenting, Gullet bougienage

1. Introduction

The methods of chemotherapy and radiation therapy take a special place in the complex treatment for pathologic growth impairment and prevention of disseminated esophageal cancer's spread [1-2, 7]. In majority of cases a surgical treatment in the early stage of oncologic diseases allows to get a successful outcome in the patients with esophageal cancer for a long time [1-4, 10, 12]. Anatomical position of esophageal cancer stipulates the risk of esophageal anastomosis sutures inefficiency in the early postoperative period and the absence of adequate feeding in such cases leads to the accelerated alimentary failure. Alimentary cachexia makes any surgical intervention be impossible without the risk of severe patients' life [9, 11].

The performance of radical surgeries is provided at verified esophageal cancer. Radical surgeries are impossible at the following conditions: late stages of esophageal cancer with the signs of tumor dissemination; at the presence of esophago-organ fistulas; at the dissemination to lymph nodes; at the shift of tumor to the other organs; at the patient's cachectic physical condition with inefficiency of plastic organs-donors for performing radical surgeries [5-6].

The patients with neglected esophageal cancer mainly suffer from dysphagia and a total absence of esophageal obstruction, a chronic hunger bereaves their hope for recovery and life. From our point of view, endoscopic alternative methods can alleviate this fate and increase patients' life quality.

2. Aim

To validate a performing of endoscopic alternative methods for correction of dysphagia and recovery of esophagus patency in patients with disseminated cancer of the esophagus thoracic part.

3. Material and Methods

The total number of patients diagnosed with irresectable stages of the thoracic esophagus cancer was 91. There were 61 males and 30 females. The patients age ranged from 39 to 78 years. All the patients have been treated in our Centre between 2007 and 2018.

Esophageal cancer was diagnosed by standard diagnostics methods and histologic verification. The disease stage was defined subject to: the beginning of pathologic process, the estimation results of high-precision diagnostic methods and while performing surgical interventions.

Cancer of the thoracic esophagus and cardioesophageal area (CEA) was revealed by endoscopy results: in upper third - 9 (9.9%) cases; in middle third - in 50 (54.9%) and in low third - in 15(16.5%) patients. The extent of esophageal cancer and lumen's diameter practically in all cases made up critical digits: extent - 5-6 cm, lumen's diameter 0.5-0.8 cm - in 50% of patients. Computer tomography is characterized by higher digits of diagnostics: sensitivity - 54.5%, specificity - 72.2% and accuracy - 82.8%.

All the patients were performed MSCT or MRI because such investigations allow to determine distant metastases and invasion of the main process to the adjacent structures.

A histologic verification of biopsy materials showed that a majority of patients (84 (92.3%)) were with epidermoid esophageal cancer of varied differentiation levels: highly differentiated carcinoma - in 53 (63.1%), moderate

differentiated carcinoma – in 16 (19.0%) and low differentiated carcinoma – in 15 (17.8%). Adenocarcinoma was diagnosed in 16 (7.7%) patients.

Table 1. Randomization of patients subject to esophageal cancer location

Esophageal cancer location	Total
Cervical esophagus	1 (1.1%)
Upper third of thoracic esophagus	2 (2.2%)
Upper and moderate third of thoracic esophagus	7 (7.7%)
Moderate third of thoracic esophagus	20 (21.9%)
Moderate and low third of thoracic esophagus	30 (32.9%)
Low third of thoracic esophagus	16 (17.6%)
Low third of thoracic esophagus + cardioesophageal area (CEA)	7 (7.7%)
Low third of thoracic esophagus + cardioesophageal area (CEA) + proximal part of the stomach	2 (2.2%)
Moderate and low third of thoracic esophagus + CEA	5 (5.5%)
Moderate and low third of thoracic esophagus + CEA + proximal part of the stomach	1(1.1%)
TOTAL	91 (100%)

Patients' randomization by TNM system is presented in Table 2.

Stage III of esophageal cancer was diagnosed in 58 (63.7%) cases and stage IV – in 33 (36.26%) patients.

Table 2. Patients' randomization by TNM system

Stage	TNM	Quantity
		Total
III	T4N1M0	6(6.6%)
	T4N2M0	52(57.1%)
IV	T3N2M1	1(1.1%)
	T4N1M1	1(1.1%)
	T4N2M1	31(34.1%)
Total		91(100%)

The following conservative therapy and endoscopic alternative methods for recovery of esophagus patency were used for treating such type of patients: intravenous infusion, diathermotunelization of esophageal cancer, gullet bougienage, conduction of nasogastric probe, esophagus prosthetics at the level of cancerous obliteration.

We developed and implemented into clinical practice our own method for endoscopic bougienage (EB) with changeable metal heads. The diversity from a traditional bougienage was in the use of one bougie №28 which is installed by heads of different diameter made from stainless steel in the shape of olive and one of the tops of which is thinner and is guiding. X-ray-contrasting soft angiographic catheter is used as a conductor. A general esophageal probe with open-ended axial hole is used for the dilatation of esophageal lumen. Changeable head with a threaded hole of the same diameter is installed at the distance of 3-4 cm from the last point of the conic tip. The size of the heads acting

face varies between 8 and 18 mm. The heads with a diameter of 8 and 9 mm are made in the shape of cylinder, the heads with a diameter of more than 9 mm – in the shape of olive.



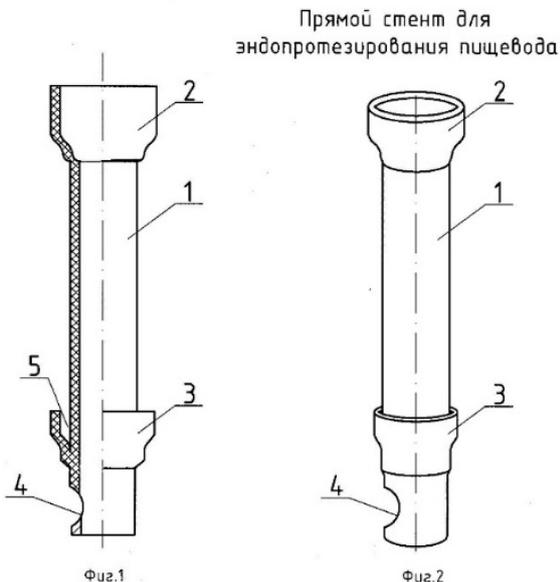
Figure 1. The set of metal olives for endoscopic bougienage

Diagnostic endoscopy is performed with the following aims: to define the stricture's diameter; to detect the peculiarities of stricture's lumen – it is important for choosing the olive's correct size. Then the string is conducting under the endoscopic control without an enforcement but with an obligatory measurement of the string which is conducted not less than 50 cm. This length is stipulated by the distance from corner teeth to the cardiac orifice – it makes up 40 cm at the average. Then the endoscope is removed with a thorough control of the string's location in order not to be out during the device's removal. Then the olive fitting to the stricture's diameter is forced on bougie-pusher and carefully without forcing the bougie with olive is introduced. Several olives of big diameter can be used simultaneously during one session subject to the resistance level of esophagus narrow part. The main advantage of endoscopic bougienage versus bougienage down the string is in the conducting of a guide under the visual control – it is extremely important at the excentric location of the opening to the constriction and at the coiled strictures. The bougienage is performed for preliminary preparation of the exact area stenting. Expensive stents which have a number of advantages are used for endoscopic stenting. But their high price not always allows to use standard stents. An advanced stent jointly developed by endoscopy department and esophagus-stomach surgery department of our Center has been successfully used for the last 12 years. The stent for esophagus endoprosthesis replacement (fig.2) has been made in the form of silicon tube (1) with the first anti-migratory cone (2) from one tail and the second anti-migratory cone (3) through the which a tube has been conducted (1).

The second anti-migratory cone (3) is situated on the opposite end of the tube perpendicularly to the tube's axis (1). There is an additional hole (4) close to the second end in the tube (1). The stent is made individually according to the stricture's length, diameter and form.

At first we perform a phased gullet bougienage by string or endoscopic bougienage with changeable olives (diameter up to 1.2-1.4 cm). The string-guide is conducted to the stomach under the endoscopic control. Preliminarily made stent is got on the bougie with a special mark fitting to the distal border of the stricture. Then the stent is introduced to the esophageal lumen with the help of bougie-pusher carefully without forcing. Control endoscopy and X-ray

contrast investigation are performed after esophageal stenting (fig.3).



- 1 – silicon tube
- 2 – the first proximal anti-migratory cone
- 3 – the second distal anti-migratory cone
- 4 – additional side hole in the stent distal part
- 5 – backlash between distal cone and silicon tube

Figure 2. The scheme of a direct stent for esophagus endoprosthesis replacement

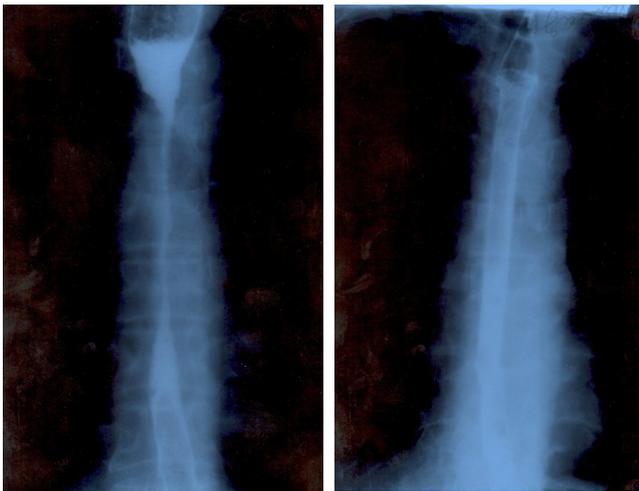


Figure 3. X-ray pattern before and after stenting

Self-expansible covered knitted nitinol esophageal stent has been widely used for the last 12 years (fig. 4). It has a range of advantages: the presence of anti-reflux clapper, special anti-migratory style, easily removable device, atraumatic ends, a flexibility and a suitable delivery.



Figure 4. Self-expansible covered knitted nitinol esophageal stent

4. Results and Analysis

All 91 patients with III - IV stage of disseminated esophageal cancer had a severe dysphagia and a part of them had a complete esophageal obstruction. 23 of patients were performed only conservative therapy (intravenous infusion) due to the undermaintenance of pathologic process and their extremely severe condition.

Endoscopic alternative interventions were not performed due to the following reasons: total absence of esophageal lumen on the cancerous lesion level, ulceration, hemorrhagic diathesis, tumor tissue destruction, evident pain syndrome, a high risk of hollow organ wall's injury.

The rest of 68 patients were performed various interventions: in 3 – shunt esophagocoloplasty; in 19 cases we carried out gastrostomy; in 28 cases the surgery was completed by exploration; 46 patients were performed diathermotunnelization, gullet bougienage and esophagus endoprosthesis replacement. Hard standard bougies in rising order and the probes with changeable olives were used. At the occurrence of evident pain syndromes and evident resistance the procedure was suspended for several days. The gullet bougienage was performed for achieving the most optimal patency before endoprosthesis replacement.

All 68 (74.7%) patients undergone endoscopic interventions were performed endoprosthesis replacement (including 28 cases with exploration). We used two types of prosthetic devices for esophageal cancer: the first device above described was developed and offered by our group of researchers and they were used in 45 (66.17%) cases.

The second type of prosthetic devices are Ni-Ti (China) and TaeWoong Medical (South Korea) was used in 23 (33.8%) patients.

Esophageal cancer prosthetics at its location in the cervical part cannot be performed because timorous strictures of esophagus cervical part are situated close to the crico-pharyngeal muscle. We carried out gastrostomy at the impossibility of performing endoprosthesis replacement.

The control with the use of X-ray contrast was carried out after endoprosthesis replacement for estimation of prosthetic device location in the esophageal lumen and its patency, the level of the device proximal and distal ends. The patients were discharged home after receiving good results to be observed by oncologist.

Hereby, from the total quantity of patients (91) in 23 cases the treatment was limited by conservative therapy due to the patients severe condition and impossibility of the surgery. In 3(3.29%) cases we performed shunt esophagocoloplasty, gastrostomy – in 19(20.8%) patients. 28(30.7%) among 46 (50.5%) patients were earlier performed exploration and then in all 46 (50.5%) patients we performed endoscopic alternative method as an adequate treatment.

5. Conclusions

Esophageal cancer of III-IV stage in 72% of cases is

disseminated and its course in all cases is complicated by severe dysphagia or a complete esophageal obstruction. Endoprosthesis replacement is effective in 50.57% of patients at unresectable disseminated esophageal cancer with a location in the moderate or low third of the esophageal thoracic part and it is a method of choice for the treatment of such patients type. Gastrostomy is the only method for enteral feeding in the patients with disseminated esophageal cancer of the upper third or esophagus cervical part.

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