

Esophagectomy in Esophageal Cancer - is there an Optimal Approach?

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Rezumat

Esophagectomia în cancerul esofagian - există o cale de abord optimă?

Introducere: Cancerul esofagian reprezintă o problemă de sănătate publică având o incidență și mortalitate în creștere în ultimii ani. Deși au fost dezvoltate o serie de tehnici chirurgicale noi inclusiv chirurgia minim invazivă, mortalitatea și morbiditatea au rămas crescute. Lucrul cel mai important ce pare să influențeze mortalitatea și morbiditatea este calea de abord.

Material și metodă: Este un studiu retrospectiv observațional desfășurat între 2003 și 2012 ce include pacienții cu neoplasm esofagian operați în Clinica I Chirurgie Spital "Sf. Spiridon" Iași. Au fost incluși 143 de pacienți dintre care numai 33 au beneficiat de intervenție chirurgicală cu viză curativă.

Tehnica chirurgicală: Au fost luate în studiu 2 tehnici: tehnica esophagectomiei transhiatale (fără deschiderea toracelui) urmată de esofagoplastie cervicală și tehnicile ce utilizează cale de abord toracotomia cu anastomoze intratoracice sau cervicale.

Rezultate: Au predominat ușor intervențiile cu abord transtoracic 57,58% (n=19) față de cele cu abord transhiatal 42,42% (n=14). Rata globală a morbidității postoperatorii a fost de 78,8% (n=26). Mortalitatea globală postoperatorie a

fost de 15,5% (n=5) cauzele fiind sepsis de etiologie pleuro-pulmonară 2 cazuri, trombembolismul pulmonar 1 caz și sepsis consecutiv fistulei 2 cazuri.

Concluzie: Esophagectomia transhiatală și esophagectomia transtoracică au indicații precise în chirurgia esofagiană, rata mortalității și a morbidității fiind influențate major de calea de abord.

Cuvinte cheie: esophagectomie transhiatală, esophagectomie transtoracică, cancer esofagian, cale de abord, mortalitate

Abstract

Introduction: Esophageal cancer is a public health problem, with increasing incidence and postoperative morbidity over the past recent years. Although a number of new surgical techniques, including minimally invasive surgery, have been developed, mortality and morbidity have remained elevated. The element that seems to influence the early postoperative morbidity and mortality is the method of approach.

Material and Methods: retrospective observational study which is carried out in the period 2003-2012 including esophageal neoplasm patients operated in the First Surgical Clinic - Hospital "Sf. Spiridon", Iași. 140 patients were included, of which only 33 have received surgery with curative aim.

Surgical technique: we consider 2 techniques in our study: transhiatal (TH) technique (without opening the chest) followed by esophagoplasty with cervical anastomosis and transthoracic esophagectomy (TT) with intrathoracic or cervical anastomosis.

Results: We performed 57.58 % (n = 19) of interventions by

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TT versus 42.42% (n = 14) by TH. The overall rate of postoperative morbidity rate was 78.8% (n = 26). Overall early postoperative mortality rate was 15.5% (n = 5) caused by pleuropulmonary sepsis (2 cases), lung emboli (1 case) and sepsis caused by anastomotic leak (2 cases).

Conclusion: TT and TH esophagectomy have precise indications in esophageal surgery for malignancies, the mortality and morbidity rate being strongly influenced by the surgical approach.

Key words: transhiatal esophagectomy, transthoracic esophagectomy, esophageal cancer, mortality, approaches

Introduction

Esophageal cancer (EC) accounts for about 1% of all cancers and 6% of digestive malignant tumors; the high mortality rate of EC rivals with pancreatic cancer and is 4 times greater than that of rectal cancers. The incidence (6.6 to 100,000 inhabitants/year) and mortality (3.8 per 100,000 inhabitants/year) are increasing in the European Union; the average age is 67 years and it is rarely encountered the age of 25 (1).

At the time of diagnosis, most patients in our series are in stage III or IV, with a poor chance for curative surgery.

Surgery is the most important element in the multimodal therapeutic approach of EC and represents the best chance for healing (local control) and palliation of dysphagia (2).

In terms of surgical treatment several surgical techniques have been developed, which are differentiated mainly by the way of approach. Such techniques include TT (with the opening of the chest) and TH (without opening the chest). The choice of approach is made based on some variables:

- The location of the tumor;
- The patient's pathological history;
- A neoadjuvant treatment (radiotherapy and chemotherapy);
- Type of lymph node dissection;
- Last but not least, experience and preference of the surgical team (3).

TT technique involves right thoracotomy (usually for upper and middle esophageal tumors) or left thoracotomy (for tumors of the lower esophagus).

The most common techniques are:

- Ivor-Lewis technique, which combines a median laparotomy with right thoracotomy to permit resection of the esophagus with the upper gastric pole associated with lymphadenectomy in two fields (thoracic and abdominal) and reconstruction with stomach (4).
- McKeown technique, involving laparotomy with mobilization of the stomach, right thoracotomy with dissection of the esophagus and mediastinal lymphadenectomy: finally left cervicotomy and esophago-gastric cervical anastomosis (5).

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TH technique was used originally by Gray Turner then popularized by Orringer. It involves median laparotomy with mobilization of the stomach, celiac and mediastinal lymphadenectomy, esophageal blunt dissection performed by transhiatal approach, left cervicotomy followed by oesophageal cervical anastomosis after esophageal removal (6).

In the present study we intend to compare the advantages and disadvantages of TT versus TH approach in patients with EC.

Material and Methods

The present paper is an observational retrospective study on 143 patients conducted between 2003 and 2012 which includes patients with EC operated in the First Surgical Clinic of "St. Spiridon" Hospital, Iasi. We selected patients who received surgical treatment with curative intent, studying the following parameters: age, sex, TNM stage, associated pathology and neoadjuvant treatment. We divided the patients into two groups: patients who benefited from TH approach and those who benefited from TT approach. Blood loss during surgery, operatory time, postoperative fistula, postoperative cardiopulmonary complications, and mortality at 30 days postoperatively were analysed and compared. The hospitalization period time was excluded because some of the patients with both approaches were operated in 2 stages: first time oesophageal resection and during the second stage after 48-72 hours, esophagoplasty.

For TH approach we used the Orringer technique with median laparotomy, celiac lymph node dissection, left cervicotomy, blunt finger dissection of the mediastinal lymph node and the esophagus with esophagectomy, followed by esophagoplasty with stomach or colon with cervical anastomosis. For the TT approach we used both Ivor-Lewis and McKeown technique. For the lower esophageal tumors we used left thoracotomy and for the rest of the patients we used right thoracotomy. In all patients who had esophagoplasty with the stomach we performed plicoroplasty. Cervical anastomosis was carried out with separate stiches in one layer. Drainage was carried out routinely in the cervical wound and with multiple peritoneal silicones tubes in the abdomen, mediastinum or pleura.

Results

In the period 2003-2012 in the First Surgical Clinic "St. Spiridon" Hospital Iași a total of 143 patients with confirmed EC were hospitalized. Of these, 33 received surgical treatment with curative intent (esophagectomy by TH or TT approach), while the remaining 110 had palliative interventions for dysphagia (gastrostomy, jejunostomy, bypass surgery or esophageal endoprosthesis). With regard to approach, TT approach showed slight prevalence with 57.58 % of interventions (n = 19) versus TH approaches 42.42%

of interventions (n = 14). The mean age of patients in the studied group was 61.5 ± 3.54 years (range 43-74 years). Preoperative diagnosis was clarified with certainty through endoscopy with biopsy in all 33 patients. Protocol for diagnosis and preoperative staging included upper digestive endoscopy in addition to performing thoracoabdominal CT (which was achieved in only 31 patients) and barium esophago-gastric radiography in all patients.

Also, pulmonary preoperative tests were carried out and showed the presence of moderate respiratory dysfunction in 27.27% (n = 9), as obstructive type in 3 patients and restrictive type in 6 patients. These patients were operated through TH approach, thoracotomy being forbidden. Hospitalized patients have had the following associated pathologies: hypertension 27.2% (n = 9), chronic ischemic heart disease 24.2% (n = 8), 21.2% diabetes (n = 7), chronic liver disease, 18.1% (n = 6) and chronic kidney disease 3.03% (n = 1). Regarding the site of tumor, there were 63.6% (n = 21) of cases in the lower or esophago gastric junction, 27.2% (n = 9) in the middle esophagus and 9.2% (n = 3) in the upper third. Patients who received a neo-adjuvant treatment represent 75.7% (n = 25) of cases; of these 5 have received radiotherapy, 4 have received chemotherapy and the remaining of 16 radiochemotherapy. There has been a case of complete remission of the tumor located in the middle esophagus (squamous cell carcinoma preoperatively; after chemotherapy with Cisplatin and radiotherapy with 40 Gy, the resection specimen of esophagectomy showed no sign of malignant tumor at pathological exam). The average time waiting after neoadjuvant treatment until the surgery was 4 weeks.

The average amount of blood lost intraoperatively was 623 ± 75 ml in TT approach and 821 ± 103 ml for TH approach. With regard to the duration of hospitalization and surgery an objective appreciation cannot be made because for some of the interventions, due to the high anesthetic risk, it was preferable to perform in 2 stages: esophagectomy followed at 48-72 hours by esophagoplasty.

The overall rate of postoperative morbidity was 78.8% (n = 26), the most important being cardiorespiratory problems, with a higher frequency in patients with TT approach (Table 1).

The overall postoperative mortality rate was 15.5% (n = 5), caused by sepsis of pleuropulmonary etiology in 2 cases, 1 case of lung emboli and sepsis due to anastomotic leak in 2 cases.

We checked the anastomosis at 7 days postoperatively with hydro soluble contrast, showing a number of 11 anastomotic leaks (5 after TH esophagectomy and 6 after TT esophagectomy). In 9 cases conservative treatment has been applied with good results, the remaining 2 cases requiring reinterventions; unfortunately the patients died due to mediastinal sepsis.

The histologic tumor types were adenocarcinomas with different degrees of differentiation in 63.63% (n = 21) of the cases and the remaining 36.37% (n = 12) of the cases were squamous cell carcinomas.

The average number of resected lymph nodes was $12.7 \pm$

Table 1.

Complication	TH	TT
	esophagectomy	esophagectomy
ARDS/Pneumonia	14.28% (n=2)	42.10% (n=8)
Pleuresy	21.42% (n=3)	47.36% (n=9)
Cardio-vascular complication	14.28% (n=2)	21.05% (n=4)
Hepatic failure	7.14% (n=1)	5.26% (n=1)
Neurological complication	7.14% (n=1)	10.52% (n=2)
Anastomotic leak	35.71% (n=5)	31.57% (n=6)
Recurrent laryngeal nerve unilateral paralysis	14.28% (n=2)	15.78% (n=3)
Perioperative mortality	7.14% (n=1)	21.05% (n=4)

Table 2.

Stage	No. of patients
Stage I (T1N0M0)	1
Stage II A (T2,3N0M0)	2
Stage II B (T1,2N1M0)	2
Stage III A (T3N1M0)	8
Stage III B (T3N2M0)	15
Stage III C (T4a,4b,N1,2M0)	5

3.34 in TT approach and 8.8 ± 2.15 lymph nodes for TH approach. Histological examination of the resected specimens has shown that most cases, 84.8% (n = 28, were in stage III (Table 2).

Discussion

At the moment, in the era of evidence-based medicine, the question of whether there is an ideal approach in esophageal surgery still remains. The answer to this question is no. Surgical treatment with curative intent in esophageal cancer is associated with unsatisfactory results with the highest risk of postoperative mortality and morbidity, the overall survival rate at five years being 20% (7).

Large series of EC reported from centers with experience in surgery of EC showed an improvement in survival with a significant decrease in postoperative mortality in recent decades. (8,9). The mortality rate for open esophagectomy varies from 8% in experienced centers up to 23% less experienced centers (New England Journal of Medicine, 2002).

The management of complications is more effective in experienced centers and also the long-term prognosis is directly correlated with the number of operated cases. An experience of at least 20 esophagectomies per year is necessary to reach a mortality of less than 5% (10).

It should be noted also that the diagnosis and the therapeutic decision in cancer of the esophagus in our study were set in advanced stages when surgery with curative intent is limited. Late diagnosis is favored by poor clinical signs in early stages.

TT, TH, approaches in the surgery of EC, is an actual

problem, because there is no clear data that impose the superiority of one of these techniques (11,12).

The major advantages of TH techniques are represented by the minimum effect on the body's homeostasis and the lung parenchyma especially, with decreased risk of pulmonary complications, less postoperative pain with improved pulmonary ventilation, but with the disadvantage of a less radical mediastinal lymph node dissection (13,14).

Esophagectomy by thoracic approach allows an adequate mediastinal lymph node dissection, proper control of potential intraoperative complications from the chest, but presents higher rates of complications, often severe, related to the thoracotomy (13,14).

In terms of anastomotic leak our study confirmed the conclusions of Connors and co.' analysis of 17,395 patients with EC, that there are no significant differences between the two techniques (15).

Although there are differences in terms of lymph node dissection with an advantage of TT technique, survival studies at 5 years do not show a significant difference between the two techniques (16). The only technique that would bring advantages in terms of survival at 5 years is "en bloc" resection (17).

The current trend is to perform minimally invasive thoracic esophagectomy (MIE); this brings net benefits in postoperative morbidity and mortality. In our clinic minimally invasive surgery is still in its infancy, having no sufficient experience (only 2 cases) for communication in this area.

Conclusions

Short-term TH esophagectomy is accompanied by a lower morbidity rate.

Long-term TH esophagectomy is preferred in patients with tumors located at the GE junction, without suspect lymph nodes in the mediastinum and who received a neoadjuvant treatment, or those with a poor clinical condition due to comorbidities.

TT esophagectomy is indicated in patients presenting EC at other levels of the oesophagus or oesophageal tumour with lymphatic nodules in the upper mediastinum.

Morbidity and mortality are dependent on: the selection criteria of patients requiring curative intent surgery, the surgical technique adopted (TT, TH), and the experience of the therapeutic team.

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