



# The Necessity of Staging Laparoscopy/Thoracoscopy in Patients Undergoing Thoracoscopic Oesophagogastric Resections for Malignancy

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**Abstract:** The benefit of thoracoscopic in the staging algorithm for patients with upper gastrointestinal malignancies is considered to be valuable. The impact of modern staging modalities on the need for staging thoracoscopic is unclear. Here we assess the possible role of diagnostic thoracoscopic in preoperative staging of oesophagogastric cancer. No pure gastric lesion included in the study. We have included 102 cases of esophagogastric junction and 86 lower esophagus. Staging thoracoscopic was carried out for 188 consecutive patients who were considered for curative oesophagogastric resection and had undergone complete set of staging invitation. In our study, 188 patients with oesophagogastric cancer had staging thoracoscopic. The mean operative time was 43.9 minutes. Overall staging thoracoscopic had changed treatment decision in 23/188 patients (12.2%) where no further curative resection was attempted due to involvement of peritoneum in 18 patients (9.6%), omentum in 14 patients (7.4%), liver in 11 patients (5.9%) and fixation of the stomach in 17 patients (9%). We concluded that staging thoracoscopic should be used for patients with esophageal cancer who are potential candidates for curative surgical resection based on a negative preoperative staging for lymph node or distant metastases. Staging thoracoscopic is very necessary and found to be safe and useful in detecting peritoneal, omental and liver disease despite negative staging modalities. No further curative resection was attempted due to involvement of the peritoneum, omentum, liver, and fixation of the stomach.

**Keywords:** Thoracoscopic, Oesophagectomy, Staging

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## 1. Introduction

The advent of videosurgery had moved us from the era of open to that minimally invasive surgery revolution [1].

The use of laparoscopic techniques has primarily occurred over the last two decades, the span of their development is 3 centuries [2].

The main advantage of diagnostic laparoscopy over traditional open laparotomy is reduced morbidity, decreased postoperative pain, and a shortened length of hospital stay. Diagnostic laparoscopy is useful for making a definitive

clinical diagnosis whenever there is a diagnostic dilemma even after routine diagnostic workup, including patients who are hemodynamically stable and have nonspecific abdominal pain, with suspected intra-abdominal pathology, or critically ill intensive care unit patients with suspected intra-abdominal sepsis or pathologies [3].

Esophageal cancer often presents with locally advanced tumors, lymph node and/or distant metastases, and are associated with an overall poor prognosis. However, as with

other gastrointestinal malignancies, preoperative imaging may suggest resectable disease, although a significant percentage of esophageal cancers (20-65%) are found to be unresectable at the time of exploration. Diagnostic laparoscopy is particularly valuable in staging of esophageal cancer as it helps to identify patients who may or may not benefit from preoperative chemotherapy and thus avoid Laparotomy and/or Thoracotomy with negative findings [4].

Staging laparoscopy is useful in the evaluation in the following aspects: accurate staging of the tumor,

avoidance of non therapeutic intervention in patients with metastatic diseases, exclusion of metastatic disease or obtaining tissue biopsy prior to the initiation of neoadjuvant chemotherapy, obtaining tissue for diagnosis or performing peritoneal lavage cytology to exclude the presence of occult peritoneal metastasis, identification of patients with locally advanced disease (fixed tumor or vascular invasion) when there is no evidence of distant metastasis, selection of appropriate palliative treatment in patients with advanced or metastatic disease prior to definitive intervention after completion of neoadjuvant chemotherapy to assess treatment response or disease progression [5].

Absolute contraindications for staging laparoscopy include the following:

- a- Known or obvious indications for therapeutic intervention as perforation or peritonitis.
- b- Known intra-abdominal injury, complications of previous surgery, shock, evisceration, or abdominal wall dehiscence.
- c- Acute intestinal obstruction associated with a massive bowel dilatation (> 4 cm), which may obscure the laparoscopic view and increase the likelihood of bowel injury.
- d- Uncorrected coagulopathy.
- e- Tense or distended abdomen (with suspected intra-abdominal compartment syndrome).
- f- Trauma with hemodynamic instability or a clear indication of bowel injuries, such as presence of bile or evisceration [6]

Relative contraindications for diagnostic laparoscopy include the following:

- a- Intensive care unit patients who are too ill to tolerate pneumoperitoneum,
- b- Potential hypercarbia or general anesthesia [7].
- c- Presence of anterior abdominal wall infection (cellulitis or soft tissue infection).
- d- Recent laparotomy (within 4-6 weeks) or extensive adhesions secondary to previous abdominal surgery.
- e- Aortoiliac aneurysmal disease (may be associated with increased risk of vascular rupture).
- f- Pregnancy (may be associated with injury to gravid uterus or fetal distress).
- g- Cardiopulmonary compromise and morbid obesity [8]

Regarding thoracoscopy the major contraindications are related to the ability to perform the procedure. As long as no contraindication exists for the ability to insert instruments into the pleural space, it can be performed safely. Even when

the lung is adherent to the chest wall, the use of transthoracic ultrasound by interventional pulmonologists can allow identification of safe areas to insert the trocar and pleuroscope.

A pleural separation of at least 10 mm is recommended to minimize injury to the lung. In patients with small effusions, a pneumothorax may need to be induced by cannulating the pleural space and asking the patient to inspire deeply while the catheter is open to the atmosphere. The presence of a pneumothorax can then be confirmed with either chest radiograph or thoracic ultrasound at the bedside. This procedure is limited by the ability of the patient to tolerate a pneumothorax. In patients who already have an effusion, the concern regarding tolerance of a pneumothorax is not as worrisome because an equal volume of fluid would be replaced by air.

The following relative contraindications may be corrected and accounted for:

- Refractory cough
- Hypoxia
- Coagulopathy
- Thrombocytopenia[9]

## 2. Method

All patients were subjected to (CBC, LFT, KFT, HIV and HCV screening, upper endoscopy with biopsy, CXR, CT chest and abdomen). No pure gastric lesions were included in the study. Cases included in the study were 102 cases of esophagogastric junction and 86 cases of lower esophagus lesions. Staging thoracoscopic laparoscopy was carried out for 188 consecutive patients who were considered for curative oesophagogastric resection and had undergone complete set of staging invitation

The patients are placed in the supine position, and pneumoperitoneum is established. A 30-degree laparoscope is recommended for optimal visualization. Additional ports in the left upper quadrant and epigastric area can be placed as needed. Full inspection of the peritoneal cavity helps evaluating for peritoneal or liver metastases. If no distant metastases are discovered, then the left lateral lobe of the liver is elevated to expose the gastroesophageal junction, and the patient is placed in steep reverse Trendelenburg position. The tumor is inspected for extension into the surrounding area. Lymph nodes in the gastrohepatic ligament or celiac axis suspected to be malignant are biopsied. An optional laparoscopic feeding jejunostomy can be placed when neoadjuvant therapy is planned [9].

In addition, combined thoracoscopic/laparoscopic staging has been described to improve staging for esophageal cancer by increasing the number of positive lymph nodes identified compared with conventional staging (level II) Specifically for the thoracoscopic evaluation, the patient is in full, left lateral decubitus position with single-lung ventilation. Two to three thoracic trocars are placed, and the mediastinal pleura overlying the esophagus is incised to identify and biopsy lymph nodes as needed [10].

### 3. Results

188 patients with oesophagogastric cancer had staging thoracolumbaroscopy. The mean operative time was 43.9 minutes. Overall staging laparoscopy had changed treatment decision in 23/188 patients (12.2%) where no further curative resection was attempted due to involvement of peritoneum in 18 patients (9.6%), omentum in 14 patients (7.4%), liver in 11 patients (5.9%) and fixation of the stomach in 17 patients (9%). Most patients had more than a lesion detected upon staging laparoscopy. No positive finding was recorded during thoracoscopy.

*Table 1. Demographic data.*

Age and sex	No. Of patients	Percentage
40 years	28	14.8 %
40-50 years	42	22.3 %
50-60 years	51	27.1 %
60 years	67	35.6 %
Males	131	69.6 %
Females	57	30.3 %

*Table 2. Intraoperative data.*

Operative events	Time and occurrence	Mean and percent
Operative time	185-265 min	Mean 210 min
Staging time	55 – 80 min	Mean 65 min
Change in staging by laparoscopy	23	12.2 %
Change in staging by thoracoscopy	0	0 %
Vascular injury	0	0 %
Visceral injury	0	0 %

*Table 3. Post operative findings.*

Findings	No of patients and LOS	Percent and mean
Chest infection	12/165	7.2%
Pulmonary embolism	8/165	4.8%
Leak	6/165	3.6%
LOS	11 - 23 days	Mean 13

*Table 4. Causes and number of plan change.*

Causes of plan change	Peritoneal involvement	Omental nodules	Hepatic metastasis	Gastric fixation
Number	18	14	11	17

### 4. Discussion

Diagnostic thoracolumbaroscopy is an extremely useful staging tool in patients with intra-abdominal cancers (esophageal, gastric). By enabling accurate staging, diagnostic thoracolumbaroscopy permits patient selection for curative resection or a neoadjuvant chemotherapy while avoiding non therapeutic laparotomy, which is associated with a delay in initiation of chemotherapy. [4]

In our work we could detect 23 cases among 188 cases, 18 with peritoneal nodules, 14 with omental metastasis, 11 with hepatic secondaries and 17 cases with fixed stomach. All the diagnostic tools failed in detecting these lesions despite the

highly advanced technology. Staging thoracolumbaroscopy in this aspect was able to avoid unnecessary intervention, decreasing the risk that the patient could face, in case of failure to detect such lethal lesion. From the financial point of view the treatment become cost effective.

We found that 12.2% of our case with lesions could not be diagnosed. This finding goes hand in hand with that of many who stated that a significant percentage of intra-abdominal cancers prove to be inoperable due to metastatic or locally advanced disease despite a preoperative workup that suggests a likely resectable disease [11, 3, and 4]

Chua et al [12] stated that as with other gastrointestinal malignancies, preoperative imaging may suggest resectable disease, although a significant percentage of esophageal cancers (20-65%) are found to be unresectable at the time of exploration. Diagnostic laparoscopy is particularly valuable in staging of esophageal cancer as it helps to identify patients who may or may not benefit from preoperative chemotherapy and to avoid interventions with negative findings. This goes hand in hand with our finding that led to change in the strategy of treatment from curative resection to palliative interventions.

From the financial point of view, this has become cost effective. Proponents for the routine use of SL cite the high incidence of imaging occult metastatic disease found during thoracolumbaroscopic examination leads to avoidance of unnecessary operations and thus benefits patients. Proponents for the selective use of SL argue that when high quality imaging is used, only a small percentage of patients benefit from SL, and under these circumstances the procedure is not cost-effective [13, 14].

A significant percentage of intra-abdominal cancers prove to be inoperable due to metastatic or locally advanced disease despite a preoperative workup that suggests a likely resectable disease. Historically, these patients would have undergone morbid negative laparotomies with associated complications and resultant delay in the initiation of adjuvant or palliative chemotherapy. Diagnostic laparoscopy for accurate staging of intra-abdominal malignancies is referred to as staging laparoscopy, and is performed as a standard part of the staging workup for an increasing number of cancer subtypes [15].

In esophageal cancer, staging laparoscopy has a reported accuracy of 75-80% in identifying peritoneal metastasis with a staging sensitivity and specificity of 64% and 70% compared to ultrasound (40-50%) and CT scan (45-60%). The utility of diagnostic laparoscopy in esophageal cancer is shown to improve with the addition of laparoscopic ultrasound and video thoracoscopy [16].

When all preoperative imaging indicates no metastatic disease, SL with or without laparoscopic ultrasound has a sensitivity of 71% in finding peritoneal metastases, 78% for nodal metastases, and 86% for liver metastases (level II) [2]. This compares with ultrasound sensitivities of 14%, 11%, 86%, respectively, and CT scan sensitivities of 14%, 55%, 71%, respectively (level II) [2]. The accuracy has been reported to be 75-80% (level III) [3]. However, several

reports indicate that only 0.08-10% of patients actually had a change in their management based on the results of laparoscopy [17], this is in agreement with our study in which 12.2% of our patients had lesions that could not be detected with other diagnostic tools and upon doing staging laparoscopy positive findings were there and the strategy of intervention had been changed. This was the same outcome in the work of Krasna et al [18].

## 5. Conclusion

Staging thoracoscopic laparoscopy should be used for patients with esophageal cancer who are potential candidates for curative surgical resection based on a negative preoperative staging for lymph node or distant metastases. Staging thoracoscopic laparoscopy is very necessary to avoid surgery in non operable cases. It was found to be safe and useful in detecting peritoneal, omental and liver disease despite negative staging modalities. There was no further curative resection attempted due to involvement of the peritoneum, omentum, liver, and fixation of the stomach

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