

Hybrid Ivor Lewis esophagectomy with robotic assisted gastric mobilization and thoracoscopic esophageal dissection and anastomosis

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Introduction

Minimally invasive Ivor Lewis esophagectomy (ILE) is one of the most commonly adopted technique which can be performed a variety of ways for the anastomosis. We developed a hybrid Ivor Lewis esophagectomy with robotic system and thoracoscopy.

Operative techniques

Gastric mobilization with robotic system

The patient is positioned supine. The robot was positioned on the head side, with one assistant on the patient's left. A transumbilical approach was used for insertion of the trocar for camera. The two robotic instrument arms 1 and 2 were placed two sides of the flanks for operation, and another one arm 3 on the right midaxillary line for tissue grasped. A 10 mm port was placed on the left flank for suction or other instruments (*Figure 1*). Carbon dioxide insufflation was used for pneumoperitoneum to a pressure of 15 mmHg.

Then we proceed with gastric mobilization. A harmonic scalpel was used to mobilize the greater curvature of the stomach while carefully preserving the right gastroepiploic arcade, followed by the short gastric vessels. The gastrohepatic ligament was divided, and the right crura of the diaphragm is identified. The left gastric artery was clipped with hemlocks by assistant and divided by harmonic scalpel. Then the right and left cruras of the diaphragm are dissected to enlarge the hiatus (*Figure 2*).

Esophageal dissection and anastomosis with thoracoscopy

The patient was then placed in the left lateral decubitus position. A 4 cm major port in the 4th intercostal space was made on the median axillary line. A 1-cm port in the 7th intercostal space on posterior axillary line for observation. The division of the azygos vein followed by the esophagus was dissected free circumferentially (*Figure 3*). A single circular stapler endo-GIA anvil was placed into the proximal esophagus. The specimen was free to pulled up into the chest carefully to avoid any rotation.

A port was made around the cardia to allow the stapler inserted into stomach. The anvil at the esophageal stump was stabilized while the anastomoses was completing. Transthoracic anastomoses was done followed by the gastric conduit constructed using multiple fires of staplers (*Figure 4*).

Comments

Esophageal cancer has becoming one of the most common malignancy that related to death worldwide. Esophageal resection can provide a curative treatment. With the development of surgical techniques, esophagectomy have continued to evolve with an increasing trend toward the minimally invasive approach. Robot-assisted thoracoscopic esophagectomy has been published. In the current study and practice, a hybrid Ivor Lewis esophagectomy with robotic system and thoracoscopy can be performed safely. Unconventional laparoscopic procedures, gastric

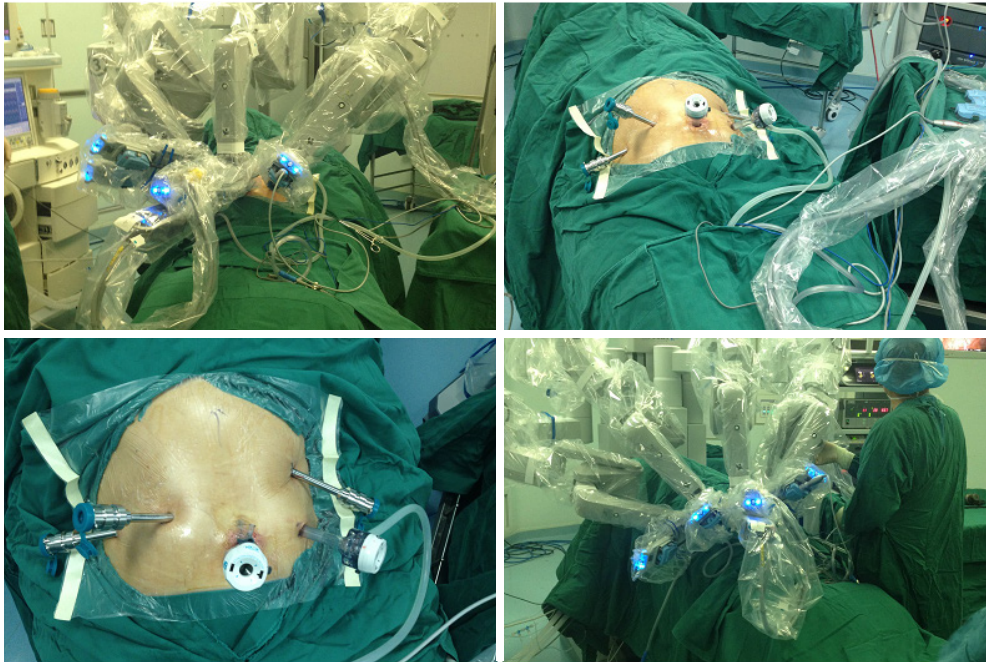


Figure 1 The robot position and trocars arrangement.

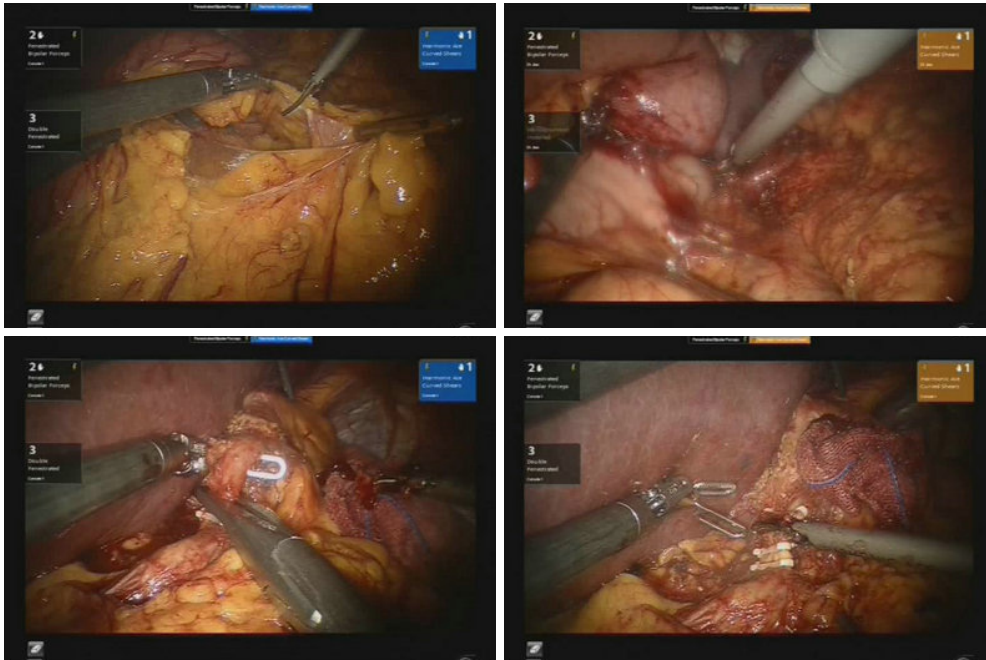


Figure 2 Robotic assisted gastric mobilization and clipping of the left gastric artery.

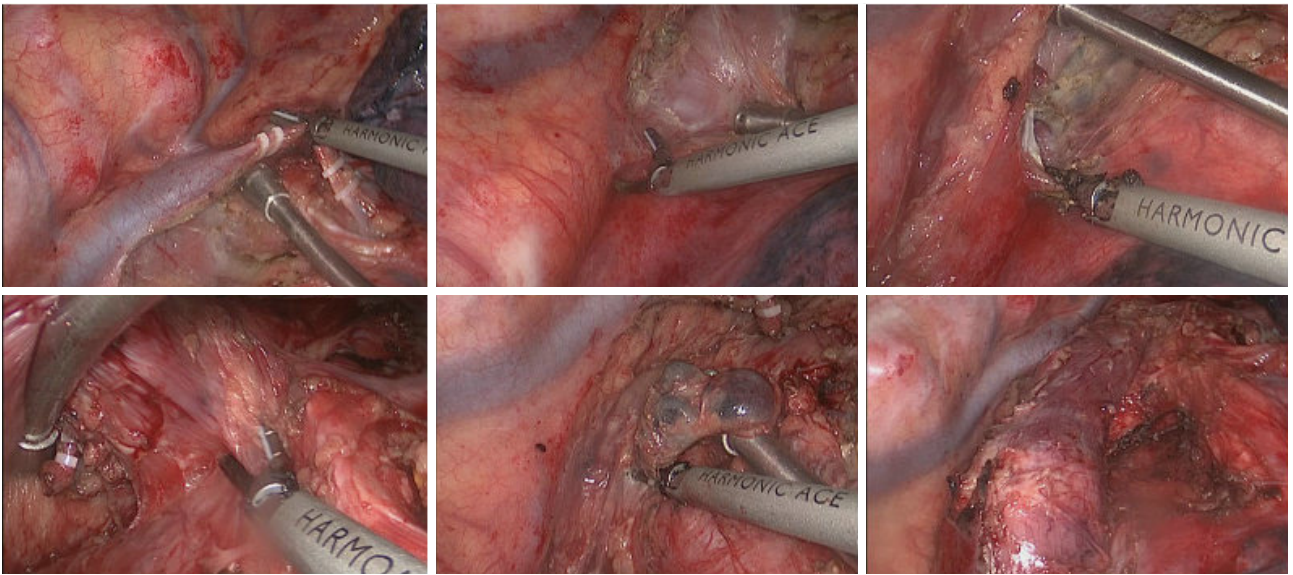


Figure 3 Thoracoscopic esophageal dissection.

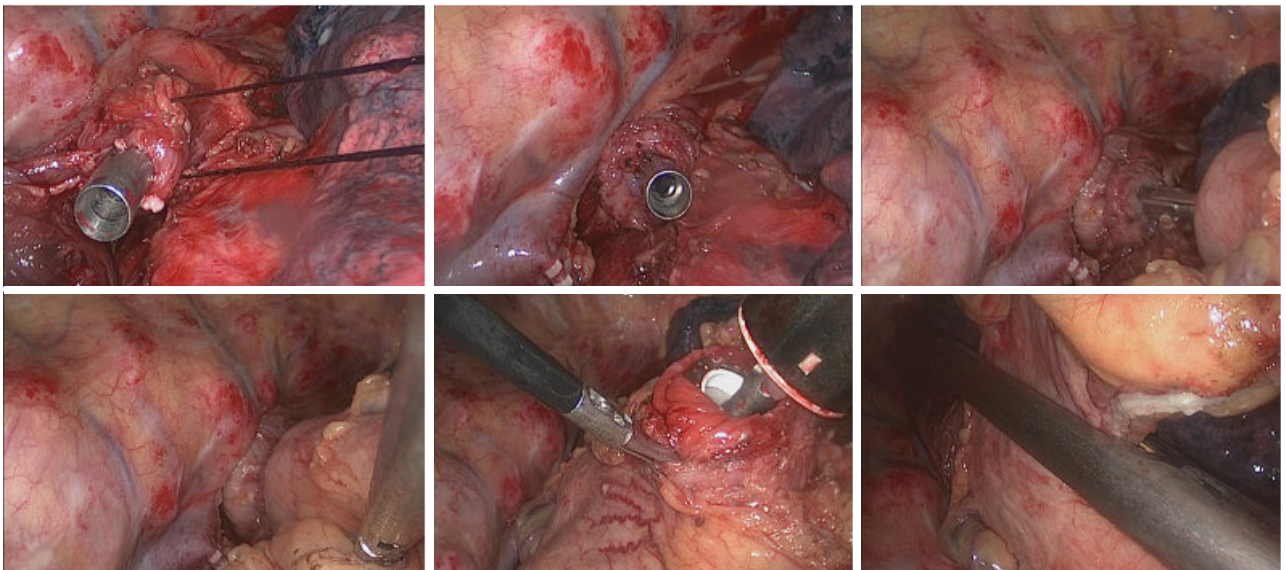


Figure 4 Transthoracic anastomoses and gastric conduit constructed.

mobilization is technically hindered by a two-dimensional view. The robot system offers a three-dimensional vision and articulating instruments, which avoids the limitation of a narrow vision and the rigid instruments. The precise dissection of the short gastric vessels and the left gastric artery is helpful to protect the spleen and the gastroepiploic arcade. We can find that the approach has the potential to improve safety and reduce postoperative complications.

The hybrid procedure is a complex surgical operation. The thoracoscopy portion can be performed in variety of ways using different techniques. However, it's technically demanding for there are technical challenges of transthoracic anvil placement. The major advantages of anastomosis is tension-free. And we chose a 25-mm stapler

for utility of placement through the subaxillary major port. A pilot study has covered two cases and the morbidity was acceptable. The precise data of the hybrid technique needs more deep investigation.

Acknowledgements

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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