# Laparoscopic management of esophageal gunshot trauma with gastric transposition

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Case Report

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**BACKGROUND**. Esophageal trauma by gunshot to the neck is a rare condition, however its initial management is an esophagectomy and jejunostomy in a trauma setting, leaving the stomach intact for a second surgical stage which consists of a restoration of the upper intestinal transit with gastric ascent, esophagectomy is a complex surgical procedure associated with high mortality and morbidity rates depending on the type of approach, being reported in the literature an improvement of these in minimally invasive approaches such as laparoscopic esophagectomy.

We present a case of a 38 year old male with a history of gunshot wound in the neck with esophageal and tracheal injury with management in the external medical unit where esophageal exclusion was performed with esophagostomy plus protective tracheostomy plus feeding jejunostomy presenting esophageal stoma necrosis on the third day, so esophageal exclusion was performed with closure of the proximal stump. The patient was evaluated and a decision was made to restore the high intestinal transit, so laparoscopic transhiatal esophagectomy with gastric ascent was performed.

Laparoscopic surgical management of esophagectomy plus gastric transposition is a challenge for the surgeon, the laparoscopic trashiatal approach for esophagectomy and reconstruction has proven to be safe and to give good results.

**KEY WORDS**: Esophageal trauma, gunshot trauma, laparoscopic surgery.

## Introduction

Esophageal injury due to external trauma is a rare condition, representing less than 15% of all esophageal injuries. They are classified according to the anatomical location, i.e., cervical, thoracic, or abdominal, and according to the mechanism of injury, i.e., penetrating trauma where firearm injury is reported to account for 1%.[3]

Due to the anatomical situation of the esophagus, they are usually associated with injuries to neighboring organs, occur mainly in young men and the most frequent presentation is that of a cervical penetrating injury.[3]

The management of penetrating esophageal trauma is the performance of esophagostomy; however, esophageal exclusion with jejunstomy could be a treatment option as a way of preserving the integrity of the stomach with gastric ascent as definitive treatment.

The restitution of high intestinal transit in case of esophageal trauma is a great challenge since it consists in performing esophagectomy plus ascent of an intestinal portion such as the stomach or colon, depending on the integrity of the stomach.

Esophagectomy is a complex surgical procedure associated with high mortality and morbidity rates, there are different approaches and options, which have expanded with the laparoscopic approach surgery that allows short hospital stays, with reduced surgical trauma, less infection, eventrations, less pain.[1]

However, esophagectomy remains associated with high postoperative morbidity (30-50%), mainly dominated by pulmonary complications, which occur in 10% to 40% of patients and account for 50% of postoperative deaths.[2]

Minimally invasive approaches have been developed to decrease postoperative morbidity, including minimally invasive esophagectomy (MIE) and hybrid esophagectomy in which one surgical step is achieved by either laparoscopy or thoracoscopy and the other step by open approach.2 Hybrid esophagectomy is associated with improved outcomes compared to the open approach, and similar outcomes compared to fully MIE.[5]

The reasons for this improvement are multifactorial, including improved patient selection,

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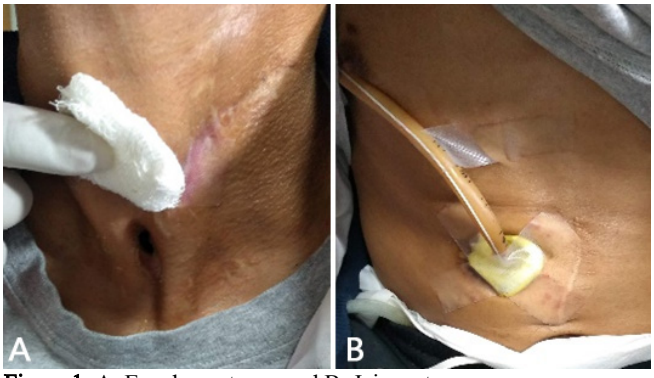

**Figure 1.** A. Esophagostomy and B. Jejunostomy.

preoperative nutrition, improvements in perioperative care, and advances in surgical techniques such as minimally invasive approaches like laparoscopic esophagectomy, as well as hospital experience.[4]

## Case report

Thirty-eight-year-old male patient with a history of gunshot wound in the neck with esophageal and tracheal injury with management in the outpatient medical unit where esophageal exclusion was performed with esophagostomy plus protective tracheostomy plus feeding jejunostomy presenting esophageal stoma necrosis on the third day, so esophageal exclusion was performed with closure of the proximal stump. The patient was evaluated and a decision was made to restore the high intestinal transit, so laparoscopic transhiatal esophagectomy was performed with gastric ascent esophago-gastroanastomosis.

Pre-surgical preparation with total parenteral nutrition (TPN) was performed for 3 days prior to surgery until serum albumin levels > 4mg/dl pre albumin >20mg/dl transferrin >180mg/dl and TPN was continued for 7 days post-surgery.

The abdominal approach was performed using five trocars. Most proponents of this procedure use a 5-port laparoscopy with the patient in varying degrees of anti-Trendelenburg position. Although techniques continue to be refined, most proponents describe the operator position between the patient's legs, with the camera holder and instrument nurse at the patient's side and the second assistant to the right.

Diagnostic laparoscopy was performed with evidence of multiple adhesions, jejunostomy was dismantled, the stomach was released by cutting short sockets with ultrasonic energy, the gastrocolic ligament was cut, the esophagus was dissected circumferentially in an upward direction, esophageal dissection began at the esophagus using harmonic scissors with en bloc excision of any locally involved tissue.

The posterior mediastinum is entered and adequate circumferential mobilization of the esophagus is achieved by a combination of blunt dissection and sharp harmonic dissection. A tape may be passed around the esophagus to aid retraction, the stomach is mobilized in the usual manner freeing the entire greater and lesser curvature only preserving the right gastric artery and the right gastroepiploic vascular arcade, the stomach is tubulated with a laparoscopic linear stapler and reinforcement stitches are placed on the stapling line, Heineke Mikulicz type pyloroplasty is performed, the gastroesophageal junction is cut with a stapler and the gastric fundus is fixed to the nasogastric tube for its subsequent traction and ascent.

Although intrathoracic anastomoses have been described for the transhiatal approach, a cervical anastomosis is preferred after gastric traction. For this, the open access of the left lateral neck dissection is used, the proximal and distal esophagus is identified, the latter is dissected in its entirety and the esophagus is extracted through the abdomen, then the gastric conduit is delivered to the neck, the cervical anastomosis is performed manually in one plane using an interrupted technique, and the reconstruction is completed by means of an esophago-gastro-terminal end-to-end anastomosis. The surgery was performed with a surgery time of 4:45 hours, trans-surgical bleeding of 300cc, without complications during the trans-surgical or post-surgical period, started diet at 10 days without complications, with contrasted radiographic control without evidence of fistula at 2 weeks.

## Discussion

Esophagectomy is an operation with high morbidity and mortality. Its adoption as a minimally invasive operation worldwide has been slow, but the potential benefits of reducing the trauma of surgery must be taken into account.[8]

Traditionally, esophagectomy has been performed by 1 of 3 routes: a thoracoabdominal approach, a 3-stage procedure that also includes a neck anastomosis, or a transhiatal. The transhiatal approach was first described by Denk in 1913, but was later popularized by Orringer.1 However, all 3 methods have high intraoperative and postoperative morbidity intraoperative and postoperative morbidity,2-5 as well as mortality rates in published series of up to 23%.[8]

Laparoscopic trashiatal esophagectomy was first described by DePaula et al. in 1995, and since then, many others have made similar publications. DePaula et al. have reported minimal morbidity in terms of blood loss, hoarseness, and thoracic complications and no mortality in a small series of 12


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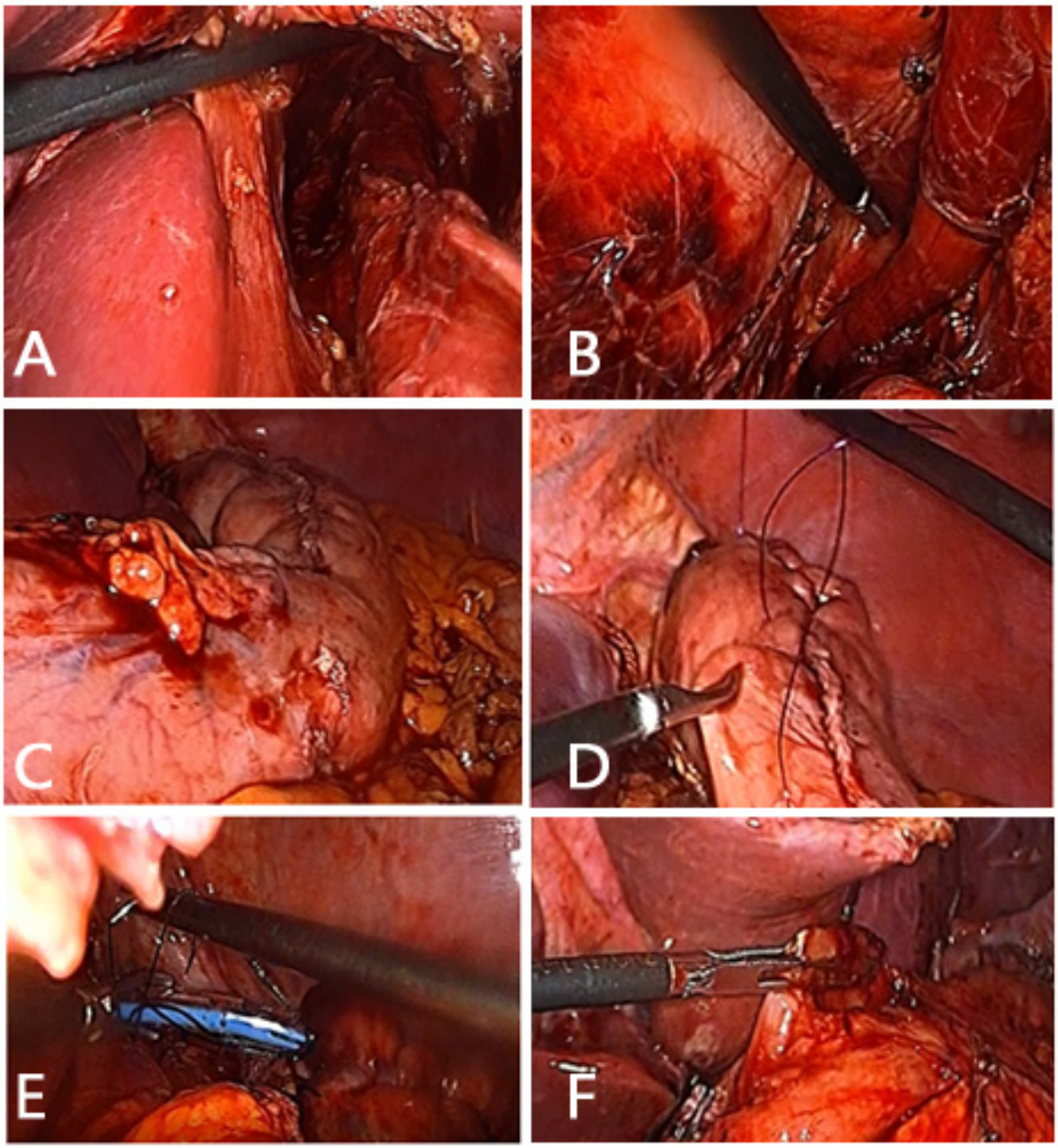


**Figure 2.** A. Esophageal hiatus dissection. B. Release of thoracic esophagus. C. Released tubular gastric pouch. D. Invagination of stapled gastric pouch with monofilament polyprolilene 3-0. E. Anchoring of stomach to NG tube. F. Pylorotomy.

patients. Laparoscopic trashiatal esophagectomy avoids thoracotomy. Therefore, this approach is preferred as thoracotomy is not necessary since pulmonary complications can be avoided and recovery is easier. The decreased complication rate may be due to magnification and better anatomical visualization during the procedure.[7]

Open trashiatal esophagectomy has a higher incidence of morbidity with more chance of intraoperative complications. This may be due to poor visualization of the thoracic structures. Orringer et al. have reported 12 cases of massive intraoperative bleeding (including four cases resulting in death) that occurred during transhiatal mobilization of the esophagus in a series of 2000 patients. They have also reported eight cases (incidence <1%) of tracheobronchial tears, 91 cases (4.5% incidence) of RLN injury (manifested postoperatively with hoarseness), chylothorax in 25 (1%), clinically significant pneumonia or atelectasis in 2%, anastomotic leaks of 12%, and an overall mortality of 3%.[6]

The immediately obvious negative aspects of laparoscopic trashiatal esophagectomy are the requirement for experience, the need for advanced skills and equipment, and the increased operative time. However, it has better recovery rates and fewer days of hospital stay.[9]

Depending on the type of EIM used, conversion rates have been reported in the literature. Conversion rates between 3 and 18% have been reported in the literature, however there was no need


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to perform it in this case it is reported that the main causes of conversion are bleeding problems due to blunt dissection associated with the transhiatal approach, we have not had these hemostasis problems, Other causes of conversion are aberrant anatomical considerations, adhesions, inadequate length of the duct10 Other series have excluded patients from LTE based on previous upper abdominal surgery, in this case being an exception since our patient had a derivative jejunostomy.

## Conclusion

Laparoscopic surgical management of esophagectomy plus gastric transposition is a challenge for the surgeon, the laparoscopic trashiatal approach for esophagectomy and reconstruction has proven to be safe and give good results, so it should be considered as an option, the restitution of high intestinal transit with the use of the gastric camera continues to prove to be a good alternative and easily accessible, however there are few centers in our country where this approach and type of management is carried out.

## Conflicts of interests

There was no conflict of interest during the study, and it was not funded by any organization.

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