



## CASE REPORT

# Hybrid Laparoscopic and Video-assisted Thoracoscopic Surgery Repair of Recurrent Traumatic Diaphragmatic Hernia: A Case Report and Literature Review

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## ABSTRACT

**Introduction:** A case of recurrent traumatic diaphragmatic hernia (TDH) is presented in whom hybrid laparoscopic and video-assisted thoracoscopic surgery (VATS) was carried out.

**Case report:** A 38-year-old male with a history of emergency laparotomy for repair of traumatic diaphragmatic injury and left thoracotomy and repair of dissected descending thoracic aorta with plication and interposition graft repair presented to us 1-year postsurgery with chronic vomiting, electrolyte imbalance, and malnourishment. Diagnosis was established with contrast-enhanced computed tomography (CECT) of thorax and abdomen which showed a left hemi-diaphragm mid-part defect, measuring 5.1 cm in diameter, with stomach herniation. He underwent laparoscopic and left VATS repair of diaphragmatic hernia. Herniated stomach was adherent to the lower lobe of left lung and descending thoracic aorta.

**Conclusion:** In the age of minimally invasive surgery, hybrid laparoscopic and thoracoscopic surgery is an innovative, safe, and feasible option in managing recurrent diaphragmatic hernia.

**Keywords:** Recurrent diaphragmatic hernia, Thoracic surgery, Traumatic diaphragmatic hernia, Video-assisted thoracoscopic surgery.

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## INTRODUCTION

Traumatic diaphragmatic hernia occurs in approximately 1 to 6% of major thoracic injuries, most commonly after high-velocity blunt trauma.<sup>1</sup> It is a rare entity that presents a diagnostic and therapeutic challenge which may lead to significant mortality and morbidity in general. Around 80

to 90%<sup>2-4</sup> will have major associated thoracoabdominal injuries involving liver, spleen, small bowel, and mesentery as well as lung contusions and rib fractures. Thoracic aorta injury occurs in up to 7.7% of patients with TDH.<sup>2</sup> Late presentation and recurrences can present with gastrointestinal and respiratory complications. Misdiagnosis can occur, resulting in delay in treatment and with consequent poor outcome.<sup>5,6</sup> Furthermore, in dealing with chronic and recurrent diaphragmatic hernia, in anticipation of significant adhesions to intrathoracic structures, selection of surgical approach for repair is of paramount importance. This report describes a case of recurrent TDH in which repair was performed using hybrid laparoscopic and video-assisted thoracoscopic surgery.

## CASE REPORT

A 38-year-old Malay male presented with chronic vomiting and epigastric pain for a 6-month duration. He had a history of trauma after a fall from height in which he sustained a blunt left diaphragmatic injury, dissection of descending thoracic aorta, and fractures of left iliac crest, proximal third femur, and superior pubic rami. He underwent emergency laparotomy for repair of traumatic diaphragmatic injury, left thoracotomy, and repair of dissected descending thoracic aorta with plication and interposition graft repair and external fixation of the pelvic fracture. He recovered well after the surgeries and rehabilitations. After 1 year, he came back with chronic upper gastrointestinal symptoms, electrolyte imbalance, and malnourishment with body mass index of 14.7 kg/m<sup>2</sup>.

Initial chest X-ray done showed an elevated left hemi-diaphragm, with no apparent herniation (Figs 1A and B). Upper GI endoscopy showed a deformed elongated stomach and retracted pylorus with no evidence of gastric outlet obstruction. Barium meal study revealed abnormal stomach configuration with partial obstruction at level of pylorus (Figs 1C and D). Diagnosis was finally established with CECT of thorax and abdomen which showed a left hemi-diaphragm mid-part defect, measuring around 5.1 cm in diameter, with stomach herniation.

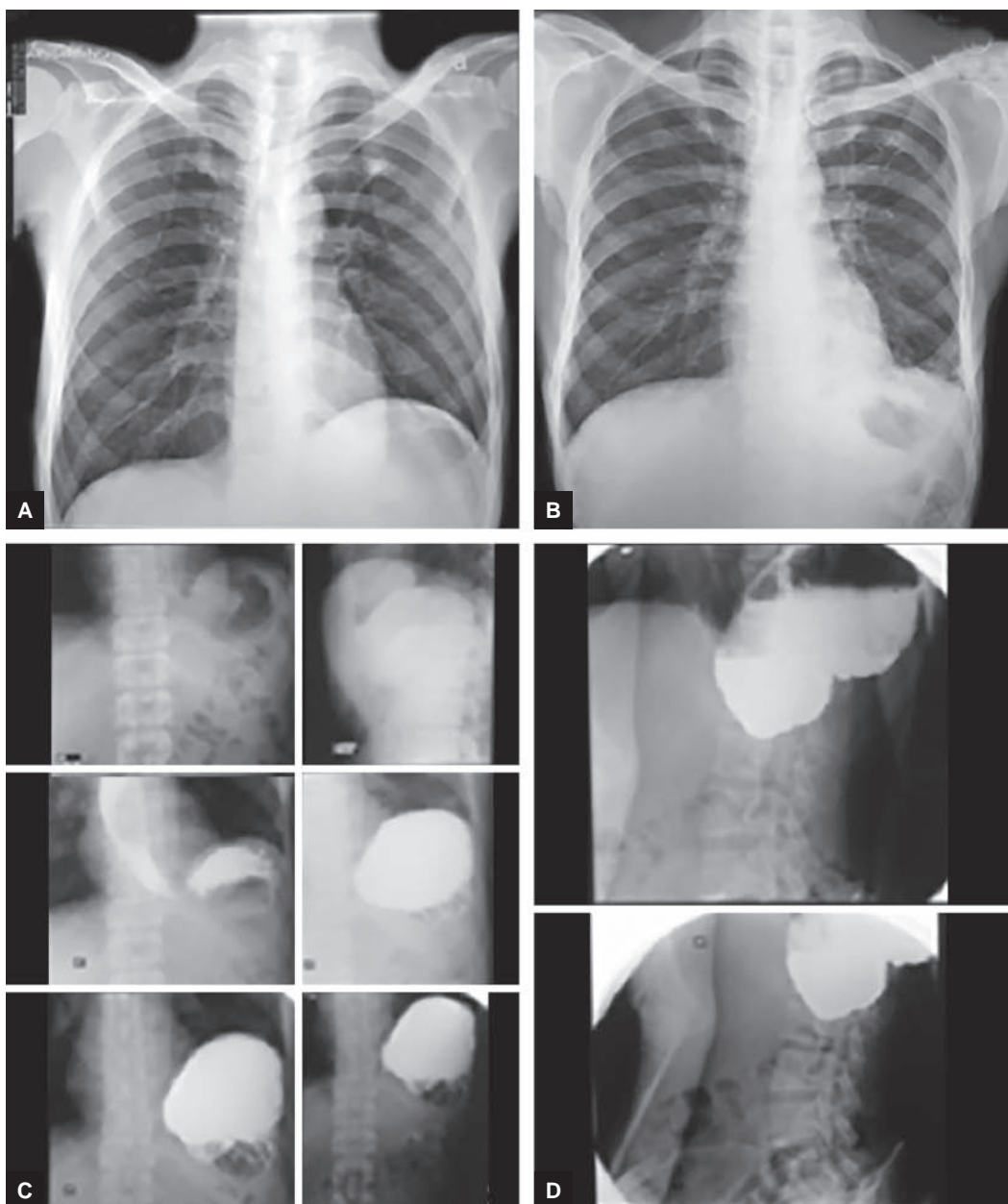
He underwent a laparoscopic and left VATS repair of diaphragmatic hernia. Operation was done using four laparoscopic ports (10, 10, 5, and 5 mm) with one

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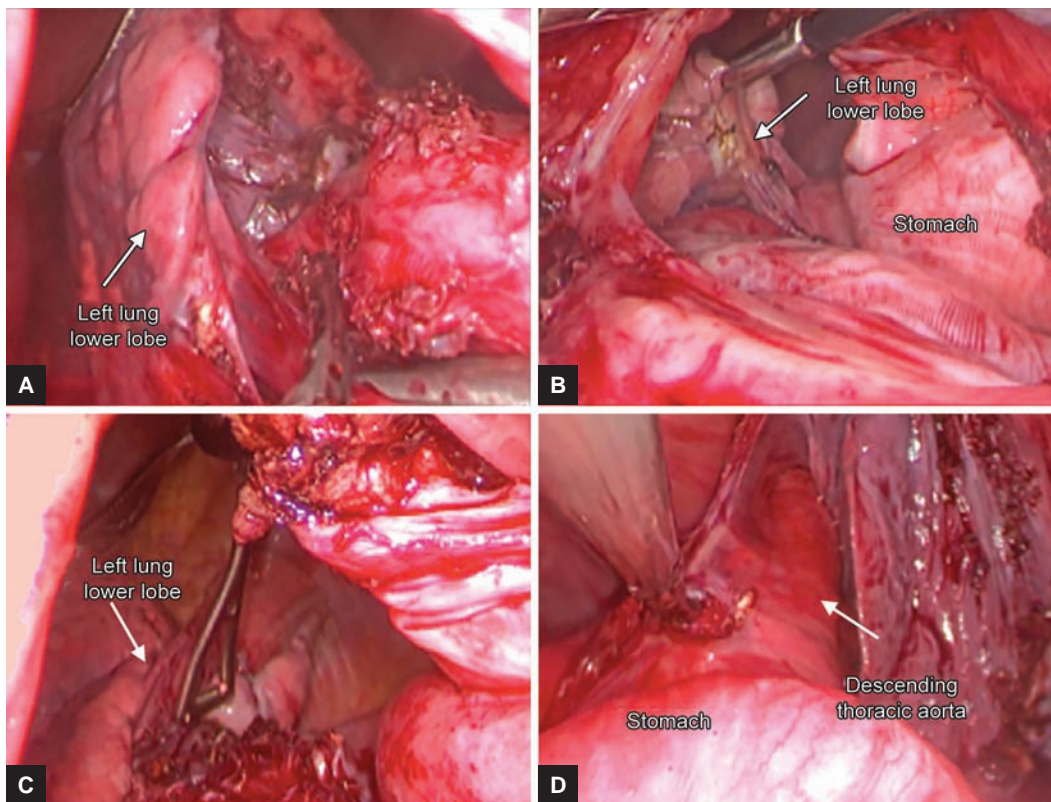


**Figs 1A to D:** (A) Chest X-ray showing elevated left hemi-diaphragm, (B) postoperative chest X-ray, (C and D) fluoro-barium meal study showing obstruction at pylorus level

thoracoscopic port (10 mm). Intraoperatively, the herniated stomach was adherent to the left lower lobe of left lung and descending thoracic aorta. Adhesions were released successfully by VATS (Fig. 2). In view of dense adhesions around the cardio-esophageal junction to the diaphragm, a mini upper midline laparotomy was done to aid adhesiolysis and diaphragmatic hernia repair with prolene mesh. Postoperatively, he was nursed in intensive care unit for 1 week and because of hypercapnic respiratory failure, weaning off ventilator was slow. Being malnourished preoperatively, his nutrition was carefully managed to avoid refeeding syndrome. He recovered well subsequently and was discharged to home. At our follow-up after 2 weeks, he had gained 6 kg in weight and was symptom-free.

## DISCUSSION

Hybrid laparoscopic and VATS repair represents a minimally invasive technique sparing patients from morbidity and invasiveness of open thoracoabdominal surgery which requires a large and extensive incision and long postoperative recovery period. This patient had an eventful postoperative period in which ventilation weaning was difficult in view of hypercapnic respiratory failure. His arterial blood gases showed persistent respiratory acidosis with  $\text{CO}_2$  retention. Effect of  $\text{CO}_2$  insufflation in thoracoscopic surgery has not been widely documented in the current literature; however, a concern has been raised in a few publications that it can cause hypercarbia and acidosis<sup>7</sup> which can lead to prolonged ventilation in the postoperative period. Refeeding syndrome should also always be considered in



**Figs 2A to D:** Intraoperative finding; herniated stomach densely adhering to the left lower lobe and descending thoracic aorta

at-risk patients with chronic symptoms and malnutrition. Proper nutrition support plan and care are quintessential to avoid its catastrophic complications and morbidity.

### CONCLUSION

Recurrent diaphragmatic hernia repair is an arduous task and the right approach in repair is fundamental to ensure the best outcome in surgery. In the age of minimally invasive surgery, hybrid laparoscopic and thoracoscopic surgery is an innovative, safe, and feasible option in managing recurrent diaphragmatic hernia.

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