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## Laparoscopic Repair of Diaphragmatic Hernia Not Involving the Hiatus

The most common diaphragmatic hernia in the adult involves the esophageal hiatus. Unless otherwise specified, diaphragmatic hernia in this chapter will refer to a hernia not involving this hiatus. Diaphragmatic hernia in adults can be congenital or acquired (e.g., from trauma). Traumatic diaphragmatic hernia can be acute or chronic. Acute traumatic diaphragmatic hernia traditionally was approached via a laparotomy, and chronic traumatic diaphragmatic hernia was approached via thoracotomy. It now is feasible to approach both acute and chronic traumatic diaphragm hernias through the laparoscope. Congenital diaphragmatic hernias, though uncommon in adults, typically occur from incomplete fusion of the posterolateral foramina of the diaphragm (Bochdalek hernia) or at anterior midline through the sternocostal region of diaphragm (Morgagni hernia) (Fig. 30-1). The Bochdalek hernia is the more common of the two, and it occurs on the left side in 90% of the cases. Operative management of diaphragmatic hernia is not altered by the specific cause of the hernia. The benefits of laparoscopic repair of diaphragmatic hernia include improved operative visualization, less postoperative pain and narcotic requirement, shorter hospital stay, and quicker recovery.

### OPERATIVE INDICATIONS

The presence of a diaphragmatic hernia typically is indication for repair in the patient who can tolerate a general anesthetic, because these hernias have a high risk of developing a complication. The timing of operation usually is dictated by the patient's symptoms. For patients who have obstructive symptoms such as nausea, vomiting, or pain, urgent repair is necessary. For those patients in whom the hernia is found incidentally, an elective repair can be performed. Any patient with a diaphragmatic hernia who will be observed should be followed carefully, with immediate repair undertaken if signs or symptoms of strangulation or obstruction occur.

### PREOPERATIVE EVALUATION, TESTING, AND PREPARATION

A symptomatic hernia presents with nausea, vomiting, pain, or difficulty breathing. In patients who have traumatic

diaphragmatic hernias, a history of trauma may or may not be obvious. There may be a vague history of trauma years before the diagnosis of the diaphragmatic hernia. The asymptomatic hernia typically is incidentally found on a radiologic examination performed for some other indication. The first diagnostic test should be an upright chest x-ray. Air-fluid levels above the diaphragm may be apparent. If the chest x-ray is nondiagnostic, then a computed tomography (CT) scan can be obtained. In addition, upper or lower gastrointestinal radiologic studies may diagnose a diaphragmatic hernia. A contrast study should be performed with water-soluble medium if a diaphragmatic hernia is suspected. After diagnosis, typical preoperative testing will depend on the patient's overall medical condition. A bowel preparation may be performed if there is a concern of colon involvement. If there is evidence of a subacute colonic obstruction secondary to the hernia, then standard bowel preparation may be risky secondary to the risk of colonic perforation.

### PATIENT POSITIONING AND TROCAR PLACEMENT

The patient is placed in the low lithotomy position with the addition of reverse Trendelenburg positioning. A bean bag and straps are helpful in securing the patient to the operating room table. The surgeon stands between the patient's legs, while the camera operator stands on the patient's right and the first assistant stands on the patient's left. In addition to the laparoscopic equipment and instrumentation, a thoracostomy tube or thoracic decompression needle should be available in case a tension pneumothorax develops. The patient's abdomen and thorax are sterilely prepared and draped from the neck to the groin in case a thoracostomy tube is required.

The placement of the trocars resembles that for a Nissen fundoplication (Fig. 30-2; see also Chapter 3). All trocar incisions are made after infiltration of local anesthetic at the port site. The camera is placed in the more caudad midline trocar (trocar 5). The liver retractor (if needed) is placed in the subxiphoid trocar (trocar 4). The surgeon utilizes the right upper quadrant trocar (trocar 2) for the left hand and the more medial left upper quadrant trocar (trocar 1) for the right hand. The assistant utilizes the most lateral left upper quadrant trocar (trocar 3). Either the assistant or camera operator can retract the liver.