



# Approach to the redo paraesophageal hernia

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**Abstract:** Recurrence following paraesophageal hernia repair is common, and the workup and surgical repair of these patients can be exceptionally challenging. The contributing factors for recurrence are numerous and may include incorrect initial technique as well as a multitude of other non-technique related factors, including incorrect diagnosis and patient related factors (such as obesity). Although many of these patients can be managed non-operatively, some will require redo surgery. A thorough pre-operative work up, including endoscopic evaluation, barium esophagram, and esophageal manometry should be performed. Other diagnostic modalities, such as gastric emptying studies, may need to be performed depending on patient symptoms/complaints. The surgical plan should be tailored to each patient's specific needs, and may include redo paraesophageal hernia repair, Roux-en-Y gastrojejunostomy (i.e., in patients with morbid obesity, significant esophageal dysmotility, or multiple failed repairs), palliative options (gastropepy and/or gastrostomy tube placement), and/or esophagectomy. It is important to pay attention to key technical principles that guide paraesophageal hernia repair in both primary and redo cases. Redo surgery is associated with increased morbidity and lower patient satisfaction compared to primary surgery and should be performed by an experienced surgeon in a high-volume center. The importance of a thorough preoperative patient evaluation cannot be overemphasized.

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## Introduction

Paraesophageal hernias are a common problem that can cause distressing symptoms for patients. Surgical repair of these hernias is associated with excellent symptom relief and significant improvements in patient quality of life. However, the recurrence rate after surgical paraesophageal hernia repair can be very high, ranging from 0–66% (1). Repair of recurrent paraesophageal hernias can be extremely challenging and requires special evaluation and technical considerations.

## Definition

There is no standardized definition of a recurrence following paraesophageal hernia repair. Recurrence can be solely based on radiographic findings, but often, a patient is asymptomatic and therefore doesn't have recurrent symptoms. A study by Lidor *et al.* correlated symptoms to radiographic findings on barium esophagram. They determined that radiographically recurrent hernias >2 cm correlated with worsening symptoms, and thus defined a recurrent hernia as >2 cm of vertical extension of gastric

mucosa above the diaphragm (2). If no wrap was performed, a more general definition of recurrence is any new evidence of paraesophageal herniation or proximal migration of the cardia, usually on a contrast barium study or CT scan (1).

### Etiologies for recurrence

The key components of a paraesophageal hernia repair are complete dissection and reduction of the hernia sac, obtaining adequate intraabdominal esophageal length, and crural closure with or without fundoplication (3). Failure to adequately perform any one of these components can lead to hernia recurrence (4). The most common causes of repair failure are hiatal hernia recurrence (50–75%), wrap migration (28%), and wrap disruption (23%) (5,6). In addition, patient factors such as high body mass index (BMI), poor nutritional status, and chronic cough or retching can contribute to a higher risk of hernia recurrence. Not all recurrences are symptomatic; causes of recurrent symptoms may also include formation of esophageal stricture and an incorrect primary diagnosis—for example an esophageal or gastric motility disorder. Identifying the reason for hernia recurrence can be helpful in designing a treatment plan.

Not all paraesophageal hernia recurrences require redo surgical repair. In fact, patients often have no difference in quality of life when comparing those with and without radiographic recurrence (1,2). In spite of a >50% recurrence rate at 5 years, only 3–10% of patients who have undergone surgical paraesophageal hernia repair will require reoperative intervention (4). Most recurrences appear as type I paraesophageal hernias. A large number of these are asymptomatic or oligosymptomatic. These small, minimally symptomatic recurrences can be observed. Even in the presence of symptoms, it is reasonable to try medical management with diet changes, weight loss (if indicated), and a proton pump inhibitor before considering redo surgery. However, refractory symptoms, or type II, III, or IV hernias can be considered for redo surgical repair as first line therapy because the likelihood of improving symptoms otherwise is low.

### Patient work-up

The work-up of patients with recurrent symptoms starts with a detailed history and physical. Reflux, dysphagia, and regurgitation are the most common symptoms of recurrent paraesophageal hernias (4,7). In addition, one must ask patients about their response to medical therapy, their initial presenting symptoms, and their response to

their initial surgery. Patients with symptoms responsive to proton pump inhibitors (PPI) tend to have greater symptom improvement with fundoplication compared to patients who do not respond to PPI therapy (8). In addition, patients with typical symptoms (i.e., heartburn and regurgitation) have better symptom improvement than patients with atypical symptoms (8). Response to initial surgery can sometimes uncover a motility disorder that may have been missed especially when the proper initial preoperative evaluation was not done (3). Blood work to evaluate nutritional status and anemia should be checked. Anemia can be the results of ulcerations and/or gastritis associated with incarcerated paraesophageal hernias (3). Smoking status and obesity should be assessed and addressed, if necessary, as both of these increase the rate of hiatal hernia recurrence (9).

A barium esophagram and an upper endoscopy should be initially performed. During endoscopy, diaphragmatic width, axial displacement of the hernia, and Hill valve grading should be assessed and documented. Prior fundoplication anatomy can also be assessed, and this may provide a clue as to the reason for the recurrence. In addition, manometry should be performed on all patients considering redo surgery, as a missed motility disorder—specifically achalasia—is the most common incorrect diagnosis leading to early failure of primary surgery (5). Gastric emptying studies and pH monitoring should be used in select patients, especially those with atypical symptoms, a history of vomiting or nausea or a failure to respond to medical therapy. Finally, review of the patient's previous operative report focusing on the details of dissection (e.g., sac removal), issues regarding axial or crural tension during closure, use of mesh, suture patterns used, and type of fundoplication is critical for redo surgical planning.

### Options/principles for revision

There are several options for surgical revision of a failed paraesophageal hernia repair. The most commonly performed is a redo operation to mobilize the esophagus and stomach out of the mediastinum, repair the hiatus and revise the fundoplication, if needed. This is an appropriate choice for patients with recurrent reflux symptoms, normal esophageal motility, and a BMI <35 kg/m<sup>2</sup> (3). For morbidly obese patients undergoing redo surgery, Roux-en-Y gastrojejunostomy (gastric bypass, RNY) is the recommended procedure; repairing the paraesophageal hernia again is often needed to access the stomach and repair the hiatus (8,10). Obesity is associated with a twofold

risk of reflux, and weight loss from an RNY helps mitigate this (11). Furthermore, the gastric pouch created in an RNY has limited acid production as the acid producing mucosa of the stomach is located in the excluded stomach, and the roux limb helps to prevent bile reflux into the pouch (12). One should also consider a Roux-en-Y gastrojejunostomy for patients with multiple failed funduplications, those with significant non-achalasia related esophageal dysmotility, and those with evidence of gastroparesis/delayed gastric emptying (12). Delayed gastric emptying and esophageal dysmotility can lead to increased gastric acid exposure at the gastroesophageal junction due to ineffective clearance (12). Furthermore, delayed gastric emptying in the setting of a recurrent hiatal hernia may indicate a missed diagnosis (that is, the patient might have had “overflow reflux” initially—and recurred because of untreated gastroparesis) or the previous surgical repair may have injured the Vagus nerve. If Vagal nerve injury is suspected, an RNY is indicated where vagal injury may actually be protective against marginal ulcers (13). Gastropexy/percutaneous endoscopic gastrostomy can be performed in patients who are too high risk to tolerate redo surgery, such as patients who are elderly, frail, or those with significant co-morbidities (14,15). Finally, esophagectomy is the final option reserved for patients with severe dysmotility, esophageal strictures or ischemia, or those with high grade dysplasia, frequently described as an “end stage esophagus” (3).

### Technique

The key technical components of redo paraesophageal hernia repair are the same as those for primary repair, with the exception of one. In revision surgery, it is essential to restore normal anatomy and then proceed with the revisional surgery. This means performing the entire dissection again to restore the normal location of the stomach and esophagus and taking down the fundoplication. This can be challenging due to adhesions, prior sutures and scar tissue. If prior mesh was used, normal anatomic planes can be especially distorted. One must take great effort not to damage the esophagus or stomach, particularly in the presence of previously placed mesh. There are still instances where permanent mesh is used at the hiatus, and this will need to be removed along with any other foreign bodies that are encountered. This can be accomplished with a combination of energy (when safe) and sharp dissection. The hernia sac should be completely reduced into the abdominal cavity. The gastroesophageal junction must be

completely reduced. The Vagus nerves should be identified and preserved if at all possible. Once the esophagus is completely mobilized and the hiatus dissected, the crura can be clearly identified. If there is a wrap, it should be completely taken down returning the fundus to its anatomic position in the left upper quadrant. As native landmarks are absent, these dissections should be performed with the assistance of flexible endoscopy to help correlate with the laparoscopic view. At the conclusion of the dissection, the patient’s anatomy should appear as close to normal as possible, and the redo surgery can proceed.

### Outcomes/conclusions

Outcomes after redo paraesophageal hernia surgery are worse than for primary surgery (5). Primary surgery has a success rate—defined as resolution of symptoms—of 85–90%, while redo surgery has a success rate of only 70% (7). Conversion from laparoscopic to open surgery can be higher, with conversion rates as high as 33% in the redo group (16). However, in high volume centers, rates of conversion to open from laparoscopic tend to be lower (but still higher than primary surgery). Some centers report conversion rates mimicking that of primary surgery, however that tends to represent the exception (17,18). Operative duration is longer as well in redo surgery (16,19). Intraoperative complication rates are high in some reports, with one report describing a 13.1% injury to the esophagus or stomach and 3.4% pneumothorax (5). Hospital length of stay is also longer for redo surgery (16,19). Data on quality of life scores comparing initial to redo surgery is variable. One study suggest that patients who have redo surgery report worse quality of life scores for fullness, belching, nausea, reflux and overall gastrointestinal quality of life compared to patients who have undergone primary surgery (16). However, another study found no difference in post-operative quality of life following initial versus redo surgery using multiple different quality of life surveys (19). Despite being more complex, literature suggests that the majority of patients are satisfied with their results after redo surgery (7,19).

The complexities associated with redo paraesophageal hernia surgery suggest that redo surgery should only be performed by experienced surgeons in high volume centers. Redo surgery should be offered only to symptomatic patients with objective evidence of repair failure (7). In addition, patient expectations should be managed up front. Patients should be counseled preoperatively that redo surgery may not result in complete resolution of

their symptoms. Thorough preoperative work up to determine the probable cause of the initial failure and to comprehensively map the patient's current physiology is critical, and careful preoperative planning and counseling is obligatory for these complex cases.

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