Achalasia is a primary esophageal motility disorder of unknown etiology. Pathologically, it is characterized by loss of ganglion cells in the myenteric plexus. The possible motility findings include the following:

1. Aperistalsis
2. Hypertensive lower esophageal sphincter (LES)
3. Impaired relaxation of the LES to swallowing

The incidence in the United States is approximately 1 per 100,000 people per year. Achalasia typically occurs in adults aged 25 to 60 years old. It is extremely rare in children (<5%), and the male:female ratio is 1:1.1,2 Dysphagia is the dominant clinical symptom. All treatment for achalasia is palliative. We cannot cure this condition. All treatment is directed toward elimination of the outflow resistance at the level of the LES, allowing food to empty the esophagus by gravity. Surgical myotomy is considered by many to be the best initial treatment for achalasia.3-6 Pneumatic balloon dilation may also give good results in some situations.7,9
Operative Technique

Figure 1 The patient is positioned supine on the operating table. The right arm is extended outwards at 45° to allow placement of the port for the liver retractor low on the right side of the abdominal wall just below the costal margin. Gastroscopy is then performed to evaluate the degree of resistance at the LES, and the scope is then left in the mid esophagus during the operation. If the stomach becomes distended during the case, then the scope can be used to evacuate the air or liquid from the stomach. Often a nasogastric tube cannot be advanced into the stomach because of the tightness of the LES, so the scope is convenient in that regard also. The surgeon stands on the patient’s right and the assistant on the left. The liver retractor will be mounted to a fix table clamp, so a second assistant is not needed.
Using an open Hassan technique, port number 1 (10 mm) is placed in the right upper quadrant just below and lateral to the falciform ligament. The level of this first port is about halfway or less between the xiphoid and the umbilicus. The next port (10 mm) is placed 3 finger breaths to the patient’s left at the same level. The third port (5 mm) is 3 finger breaths away superior and lateral to the last port and next to the left costal margin. Port number 4 (5 mm) is 3 finger breaths away superior and lateral from port number 1. Finally, port number 5 (5 mm) is placed extremely laterally on the right side just above the retroperitoneal line determined from the laparoscopic view, and just below the right costal margin. Remember that the gastroesophageal (GE) junction is often quite high under the xiphoid so place all the ports fairly superior in the upper abdomen, at least halfway between the xiphoid and the umbilicus.
Carbon dioxide is insufflated to 15 cmH₂O pressure and reverse Trendelenburg position is used to enhance exposure of the upper abdomen and GE junction. The flexible-triangular liver retractor is used to support the left lobe of the liver, thus exposing the GE junction. The liver retractor is fastened to a fix table clamp outside the patient. The assistant standing on the patient’s left side will hold the 10-mm 30-degree telescope in the left hand and a 5-mm laparoscopic grasper in the right hand. The surgeon standing on the patient’s right side will hold a grasper in the left hand and the Harmonic scalpel or other instruments in the right hand. Begin by opening up the gastrohepatic ligament using the harmonic scalpel and continue the dissection toward the GE junction and right crus of the diaphragm.
Figure 4 The dissection is continued using the Harmonic scalpel anteriorly over the GE junction opening the cardio-phrenic ligament, thus exposing the distal esophagus in the mediastinum. Care is taken to avoid injuring the anterior vagus nerve while performing this part of the dissection.
Figure 5

The dissection is continued over toward the angle of His, where the left side of the crus muscle will be encountered. The anterior GE fat pad is then removed to expose the underlying muscle of the esophagus and serosa of the stomach, ie, the area for myotomy. Do not mobilize the right and left sides of the crus as one might for a hiatus hernia repair. In fact, try to minimize the extent of hiatal dissection and keep it just anterior to the GE junction and anteriorly up into the mediastinum. This may prevent or reduce subsequent postoperative reflux. Only if there is an obvious large hiatal defect should you mobilize the crus to later close it with suture as is routine for a Nissen fundoplication. Therefore, no Penrose drain or other retracting materials are passed around the GE junction. Retraction is achieved by the assistant’s grasper holding the body of the stomach and pulling it inferiorly.
Figure 6 As the fat pad is removed, the anterior vagus nerve will come into view. It can be mobilized toward the patient’s right side with the harmonic scalpel as the dissection is continued well up into the mediastinum on the anterior surface of the esophagus.
The dissection is now complete and the GE junction and esophagus are now ready for the myotomy. The dashed line shows the planned location for the myotomy. If the vagus nerve is well mobilized, then the myotomy can extend upwards to the left side of the nerve; otherwise, the myotomy can be continued under the vagus nerve and then to its right side as it extends upwards (not shown). n. = nerve.

Figure 7
Epinephrine 1 mg (1:1000) is mixed with 40 mL normal saline. Then 20 mL is drawn up and injected into the GE junction/proximal stomach and distal esophagus using a long laparoscopic injecting needle. The saline preferentially "dissects" the plane between the submucosa and the muscularis perhaps because it is the path of least resistance. The saline may also help protect the submucosa from thermal injury as the myotomy is performed.
The easiest place to start the myotomy is on the distal esophagus. Grasp the 2 sides of the muscularis, folding the muscle into the jaws of the Harmonic scalpel. The Harmonic scalpel is then used to cut the outer layers of the esophageal wall down to the submucosa. The submucosa will often appear pouting after the first application of harmonic energy if the graspers were placed properly. The harmonic’s lower jaw can then be used to insinuate into the plane between submucosa and muscle and continue the myotomy upwards.

The myotomy can also be started 2 cm down on the stomach. This is a bit more difficult initially, but will obviate the need to work backwards (inferiorly) with an L-hook cautery or the harmonic scalpel, which is somewhat more tedious. The 2 sides of the stomach are grasped in such a way as to fold the serosa and muscularis over so as to fit into the jaws of the harmonic.
Using the Harmonic scalpel, the myotomy is continued for approximately 6 cm upwards on the esophagus. Using blunt dissection and careful countertraction, the muscle can be circumferentially mobilized. The myotomy should extend approximately 2 cm onto the stomach. When the myotomy is believed to be complete, the surgeon should scrub out and repeat the gastroscopy to evaluate the extent of the myotomy and make sure there are no perforations. Endoscopically it is quite easy to see the change in LES resistance compared with the preoperative state. If the LES does not sit wide open, then the myotomy needs to be extended further onto the stomach.
Figure 11  The fundus of the stomach is then sutured to the left side of the crus and the cut edge of the esophageal muscle, thus resuspending the angle of His, and distracting the myotomy edges from each other.
Figure 12  Bites for the first suture are taken from the fundus, through the crus, then back through the cut edge of the myotomy, and finally tied.
Figure 13  Sutures are then placed next from the fundus of the stomach to the esophageal cut muscle edge lower on the left side. Then the right side of the myotomy muscle is sutured to the right crus of the diaphragm. These sutures help to anchor the GE junction in the abdomen and separate the esophageal muscle edges from each other. Do not routinely leave a nasogastric tube. If a nasogastric tube is inserted, be very careful not to perforate the exposed mucosa. The instruments are removed and the operation is completed.
Figure 14 Only if there is an obvious hiatus hernia is a Dor anterior fundoplication performed. In this case the crus of the diaphragm is sutured together posteriorly as is routine for Nissen fundoplication. The fundus of the stomach is then sutured over the myotomy from left to right side with sutures placed into the diaphragm.
Conclusions

The goal of surgery for achalasia is to improve quality of life and this is most affected by dysphagia, not heartburn. A number of controversies exist when it comes to the surgical management of achalasia. The extent of the myotomy onto the stomach will determine the residual LES pressure and likely the degree of dysphagia relief. A 2-cm myotomy onto the stomach should be adequate to relieve the obstruction; however, this may predispose the patient to gastroesophageal reflux. There will always be a balance between the relief of dysphagia and postoperative reflux. It is my opinion that by minimizing the extent of hiatal dissection we can avoid performing a partial fundoplication and maximize the symptomatic relief of dysphagia. Moreover, some have found partial fundoplication to be associated with more dysphagia.

If the patient already has a large hiatal defect with a sliding hiatus hernia, then it seems reasonable to close the hiatus and perform a partial fundoplication such as the Dor anterior fundoplication shown in Figure 14.

If during the procedure an enterotomy is made into the esophagus or stomach, then it can be closed with a single layer of interrupted absorbable suture and buttressed with omentum. Alternatively, after closing the enterotomy, the Dor fundoplication can be used to cover the repair instead of the omentum.

A barium swallow is done on every patient the day after surgery to rule out leak. Patients are then started on a liquid diet and discharged when tolerating oral intake. The average length of stay is 2 days. The diet is advanced to regular food over the next 1 to 2 weeks as per instructions from our dieticians.

It is recommended that all patients stay on proton pump inhibitors indefinitely after surgery. It is unclear whether surveillance endoscopy needs to be performed but I send patients for a gastroscopy 1 and 5 years after myotomy.

References