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A step-by-step guide to placement of the LAP-BAND adjustable gastric banding system

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Abstract

The early promise of laparoscopic adjustable gastric banding was tempered by reports of high rates of gastric herniation or prolapse. These complications are a function of the operative technique used early on. At the time, in the early 1990s, the LAP-BAND device (INAMED Health, Santa Barbara, CA) was placed lower on the stomach, near the first short gastric vessel. The required perigastric dissection was difficult and variable in its extent, depending on the width of the stomach and where the surgeon began the dissection. To combat these problems, a new surgical method for placement of the band has evolved. Called the pars flaccida technique, it emphasizes minimal dissection and placement of the LAP-BAND out of the lesser sac. This leads to a higher position of the band, away from the body of the stomach. The technique serves to make band placement simple, safe, reproducible, and easily teachable, as well as to decrease the rate of gastric herniation or prolapse. Keeping the band out of the lesser sac, away from the peristalsing stomach, minimizing dissection of the attachments to the stomach, paying strict attention to gastric-to-gastric suturing, and leaving all fluid out of the band until at least 6 weeks after surgery appear to be the most important factors in reducing the incidence of this complication.

The technique for placement of the LAP-BAND (INAMED Health, Santa Barbara, CA) has evolved considerably since its debut in September 1993 [1,2]. The early promise of a minimally invasive procedure that actively restricts intake and controls hunger was moderated by reports of high rates of gastric herniation[†] through the band as well as the occasional erosion of the band through the stomach [3–10]. Furthermore, there has been a dichotomy of results for weight loss between Europe, Australia, and Mexico on the one hand [9,11–17] and the United States on the other [18–20].

We feel that the complication of gastric herniation through the band was a function of the operative technique used early in the experience. At the time, in the early 1990s, the device was placed lower on the stomach, near the first short gastric vessel. The required perigastric dissection was difficult and variable in its extent. It was necessary to use a pressure gauge, the gastrotenometer, to ensure the band was not placed too tightly. Usually the band was partially tightened at completion of the procedure by injecting 2 mL of sterile saline. This constellation of factors—big pouch, entry into the lesser sac, variable dissection length, and a tight band at onset—led to an unacceptably high rate of gastric herniation of 10% to 15% [3–10].

To combat these problems, a new surgical method for placement of the band has evolved. Called the pars flaccida technique, it emphasizes minimal dissection and placement of the LAP-BAND out of the lesser sac. This leads to a higher position of the band, away from the body of the stomach. The operation has been modified and developed in an attempt to make band placement simple, safe, reproducible, and easily teachable, as well as to decrease the rate of gastric herniation.

Operative technique

A multidisciplinary team sees patients preoperatively, over the 6 to 8 weeks before surgery. Patients are admitted on the day of surgery. In the operating room, the patient is placed supine in reverse Trendelenburg position, with the legs together. No stirrups are used. The surgeon stands on the patient's right side, with the monitors at the head of the

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† The phenomenon of gastric herniation or prolapse is known as "slip" and represents a complication that usually requires surgical repair.

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bed on either side. Some surgeons prefer a lithotomy position; this is also acceptable.

Visual access is gained with a 10-mm Optiview trocar (Ethicon Endo-Surgery, Cincinnati, OH), using a 0° laparoscope. The Optiview is placed laterally just below the left costal margin. The abdomen is insufflated to 15 mm Hg, and additional ports are placed under direct vision, including a 5-mm right subcostal port, a 15-mm right-upper-quadrant paramedian port (an 18-mm port may be used), and a 5-mm left-upper-quadrant midaxillary line. Although patient positioning, port location, and surgeon location will vary by surgeon preference, we recommend port placement similar to that used by the surgeon when performing laparoscopic Nissen fundoplication.

A Nathanson liver retractor (Cook Medical, Queensland, Australia) is inserted through a 5-mm skin incision in the subxiphoid location and curved up to retract the left hepatic lobe. This retractor has variably sized arms to cope with even huge hepatic lobes and is attached to a fixed arm on the table. It is inserted directly into the abdomen rather than through a port and generally needs no further attention once in place (Fig. 1).

The LAP-BAND is primed with sterile saline and inserted into the abdomen via the 15-mm port. It is pushed inferiorly on the left side, where it remains ready for later retrieval.

A long (45-cm) atraumatic grasper is placed in the groove between the greater curvature of the stomach and the spleen. Using this instrument, the omentum covering the angle of His is swept inferiorly. This maneuver places the fundus of the stomach on a stretch. The camera position in the left upper quadrant, looking cephalad, provides an unparalleled view of the angle of His. The assistant then holds the grasper retracting the omentum. When correctly positioned, the handle of the grasper lies cephalocaudal, tilted forward in a straight line (Fig. 2). The key is to sweep the omentum, not to pull it. This sweeping retraction is the first essential step in the procedure.

The surgeon places another long, atraumatic grasper through the right lateral port and a diathermy hook through the 15-mm port. The grasper pulls the fundus inferiorly and to the right to further expose the angle of His. A large fat pad precluding safe placement of the band should be excised. The peritoneum lateral to the gastroesophageal angle is incised and swept posteriorly, freeing the fundus of the stomach off the diaphragm (Fig. 3). This is well above (cephalad) the first short gastric vessel in most cases.

The 30° laparoscope is then rotated to the right to view the lesser omentum, also known as the pars flaccida. This is usually quite easily seen with the caudate lobe shining through. The surgeon retracts the stomach to the left and incises the nearly transparent pars flaccida (Fig. 4). The hepatic branch of the vagus nerve is present at the superior aspect and should be spared except in patients who have had antecedent cholecystectomy. An aberrant left hepatic artery may be encountered in this location as well and should be preserved, if possible.

After incising the pars flaccida, the right crus is seen inferomedial to the caudate lobe of the liver, curving to the right to disappear in the retroperitoneal fat (Fig. 5). We believe it is important to also identify the vena cava, which lies just to the right and parallel to the right crus. With large amounts of intra-abdominal adipose tissue, the crus and cava can be mistaken for one another.

After identification of the right crus, the peritoneum just medial to the crus is incised (Fig. 6). (This is usually at the level of the constant vein at the start of the lesser curve of the stomach.) This is the second key step. The inferolateral placement of the 5-mm port gives a flat approach of the instrument to this dissected area, free of torque or any force. The grasper is very gently inserted through the scored peritoneum into the space medial to the crus, behind the esophagus (Fig. 7). Using virtually no force, it is passed to the left and emerges at the angle of His that was previously dissected. The course of the grasper is usually a short distance, only 3 to 4 cm (Fig. 8).

The end-tag of the band is brought up to meet the now retrogastric grasper and is pulled through, encircling the stomach (Fig. 9). Given the minimal dissection performed and the shape of the LAP-BAND, it is often necessary to tease some of the peritoneal attachments medial to the crus to allow the widened portion of the band to be pulled completely around the stomach. The band is locked in place, and a 5-mm instrument is passed between the band and the stomach. It should pass freely. If it does not, the band is likely too constricting, and any fatty tissue between the band and the stomach should be removed.

The camera is placed in the 15-mm port. Suturing is done through the ports that are now on either side of the laparoscope. A permanent suture, such as 2/0 Novafil (Tyco Healthcare, Mansfield, MA) or 2/0 Ethibond® (Ethicon, Somerville, NJ), is employed to secure the band in place. Gastric-to-gastric sutures are used (Fig. 10). These should be placed so that the stomach above and below the band are approximated, but without undue tension. The suturing causes the band to be covered, but the true function is to prevent herniation of the stomach upward through the band. Even though the device is placed high up on the stomach, the mobile fundus can still migrate through the band without this proper fixation. Suturing should be carried as far posterolateral as possible because it has been our experience that this is the most likely location of a slipped band. Either a running or interrupted suture is used, based on surgeon preference. With either technique, 3 to 5 bites will usually complete the job. It is important not to evert the stomach over the buckle of the LAP-BAND, for it is here that erosions are more likely to occur (Fig. 11).

After suturing is complete, the liver retractor is removed, and the camera is again placed in the Optiview. The tubing is pulled out through the 15-mm port, and the laparoscopic part of the procedure is complete.

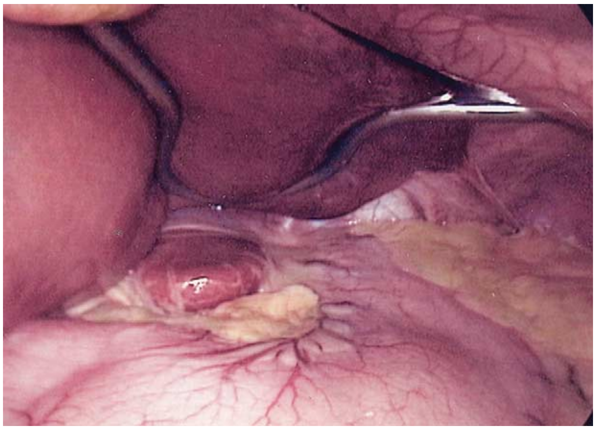

Fig. 1. A Nathanson liver retractor is inserted through a 5-mm skin incision in the subxiphoid location and curved up to retract the left hepatic lobe.

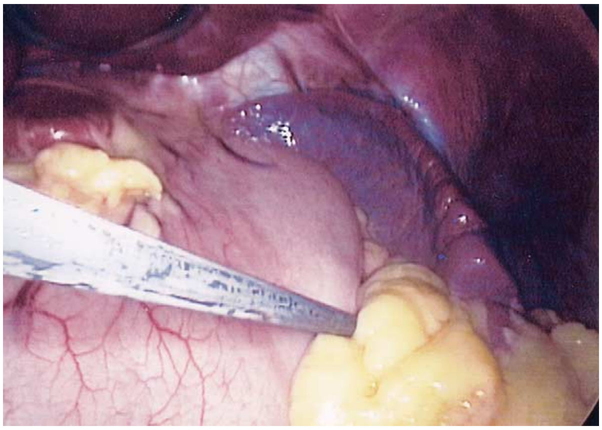

Fig. 2. A long (45-cm) atraumatic grasper is placed in the groove between the greater curvature of the stomach and the spleen. Using this instrument, the omentum covering the angle of His is swept inferiorly.

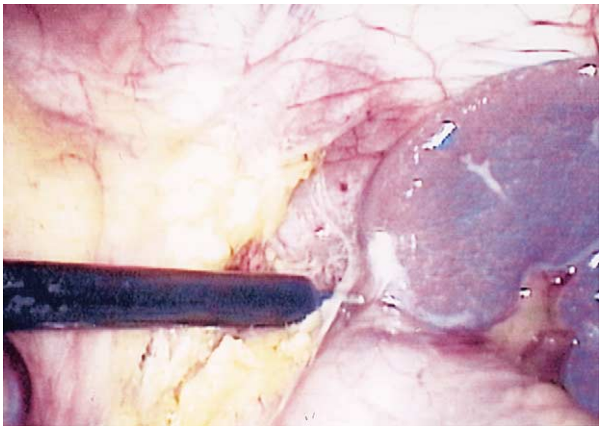

Fig. 3. The surgeon places another long, atraumatic grasper through the right lateral port and a diathermy hook through the 15-mm port. The grasper pulls the fundus inferiorly and to the right to further expose the angle of His. The peritoneum lateral to the gastroesophageal angle is incised and swept posteriorly, freeing the fundus of the stomach off the diaphragm.

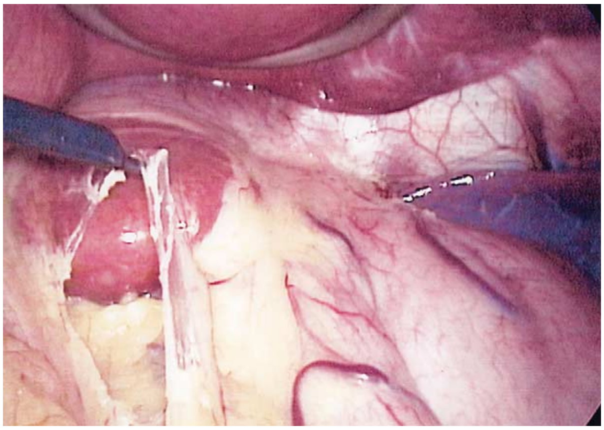

Fig. 4. The surgeon retracts the stomach to the left and incises the nearly transparent pars flaccida.

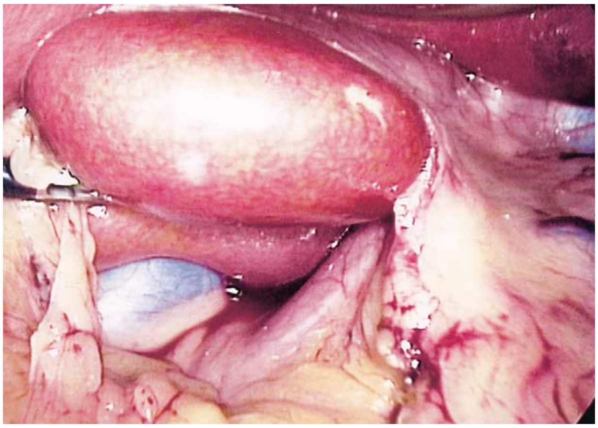

Fig. 5. After incising the pars flaccida, the right crus is seen inferomedial to the caudate lobe of the liver, curving to the right to disappear in the retroperitoneal fat.

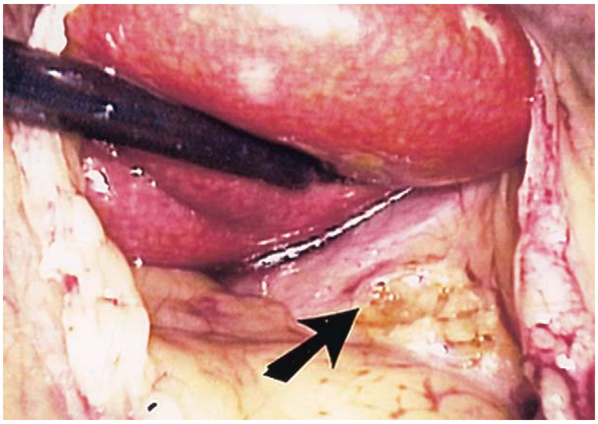

Fig. 6. After identification of the right crus, the peritoneum just medial to the crus is incised.

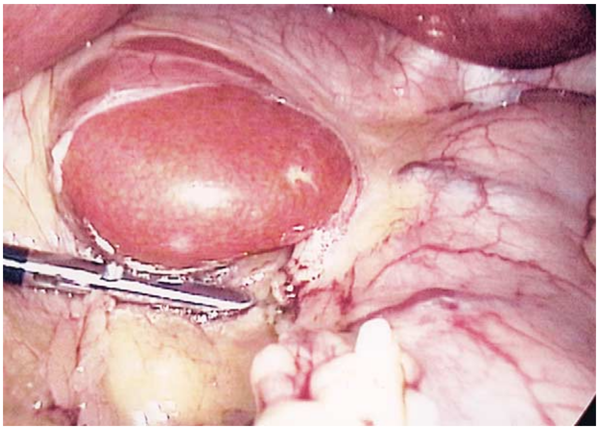

Fig. 7. The grasper is gently inserted through the scored peritoneum into the space medial to crus, behind the esophagus.

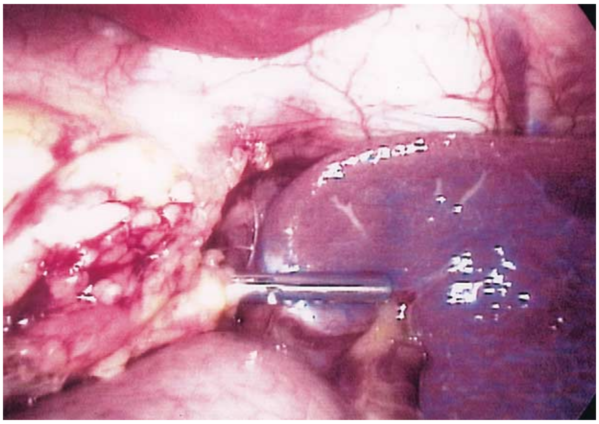

Fig. 8. Using virtually no force, the grasper is passed to the left and emerges at the angle of His that was previously dissected. The course of the grasper is usually a short distance, only 3 to 4 cm.

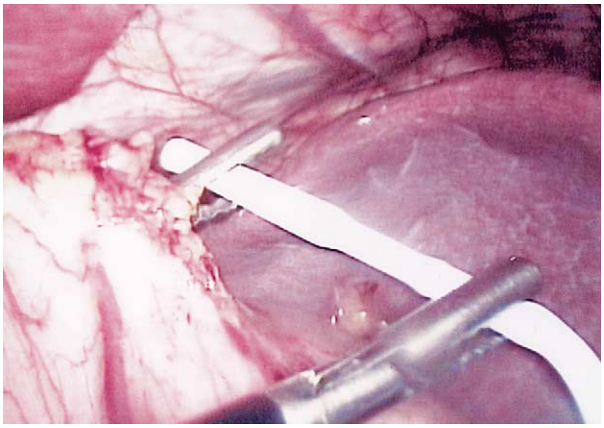

Fig. 9. The end-tag of the band is brought up to meet the now retrogastric grasper and is pulled through, encircling the stomach.

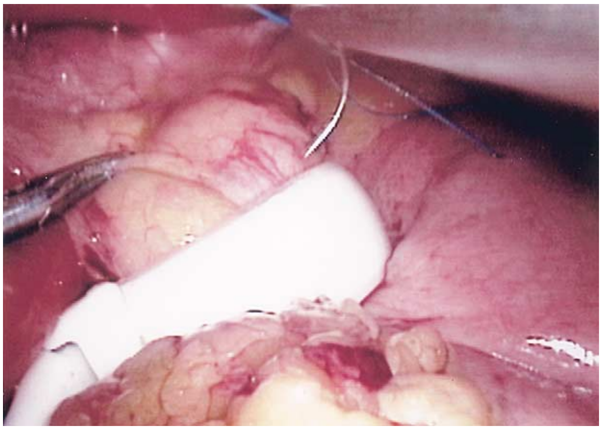

Fig. 10. Gastric-to-gastric sutures are used. These should be placed so that the stomach above and below the band are approximated, but without undue tension.

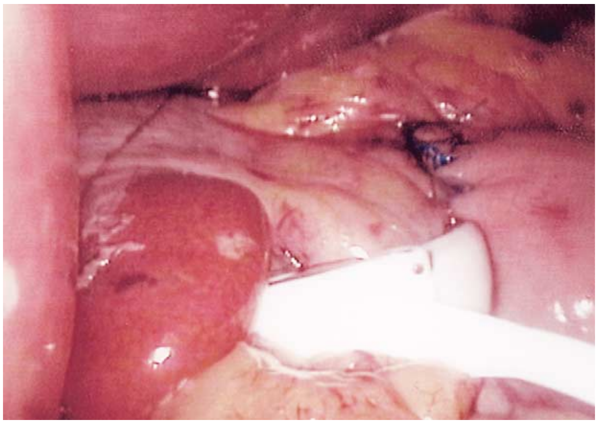

Fig. 11. Properly positioned gastric band.

The 15-mm port incision is extended lateral and deep down to the rectus sheath. Narrow Deaver retractors facilitate this, as the sheath is often farther down than anticipated. The anterior fascia is incised approximately 2 cm lateral to the fascial defect. The tubing is connected to the access port, and, in turn, the access port is affixed to the fascia. This is accomplished by placing an Ethibond suture in each corner of the incised fascia and placing these into the 4 holes on the access port. The access port is then parachuted down onto the rectus sheath. The sutures are tied. The tubing is simply slid back into the abdomen, and the wounds are closed.

The band is left empty. An upper gastrointestinal radiograph using water-soluble contrast is performed the next morning to exclude gastric perforation, malposition, and obstruction. Once this is reviewed, the patient can be discharged. A diet plan of liquids for 2 weeks, slushy food for 2 weeks, and normal food for 2 weeks is initiated.

Discussion

Working at the Wesley and Royal Brisbane Hospitals (in Australia), the senior author (GAF) has placed 1,041 LAP-BAND devices. Of these, 79 (7.6%) have been associated with gastric prolapse. With the exception of 2 patients who presented with severe pain, these have had an indolent presentation typified by reflux, increasing food intolerance, and dysphagia to solids. Management includes band deflation, barium swallow to assess pouch size and position, admission for intravenous rehydration, and surgical reposition or replacement.

Between February 1996 and December 1998, 480 bands were inserted using the older, perigastric method. To date, there have been 64 (15%) cases of prolapse, occurring at an average of 11 months (range: 4 to 52 months) after surgery.

The change to the pars flaccida technique occurred in December 1998. Using this technique, 561 bands have been inserted in Australia and 107 in the United States at Norton Hospital in Louisville, Kentucky (JWA). In this group, there have been 12 (1.8%) cases of prolapse.

The LAP-BAND offers all the well-known advantages of laparoscopy: same-day admission, early discharge, reduced pain, and early return to normal activities. The band is easily adjusted and, if necessary, easily removed.

The high rate of gastric herniation seen early in the history of the LAP-BAND is not without supporting evidence, especially from US experience [20]. The evolving technical modifications described here have markedly decreased the prolapse rate. Keeping the band out of the lesser sac, away from peristalsing stomach; minimizing dissection of the attachments to the stomach; paying strict attention to gastric-to-gastric suturing; and leaving all fluid out of the band until at least 6 weeks after placement appear to be the most important factors in reducing the prolapse rate.

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