

Ventral Hernias in the Bariatric Patient

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Introduction

Ventral hernia, a collective term for incisional, umbilical, and other anterior abdominal wall defects, is quite common in obese population. With almost 40 % of the population considered obese, and nearly two-thirds are overweight, today's general surgeons will encounter this disease process often. Management of these hernias, especially in the morbidly obese population, poses multiple dilemmas and challenges, and requires a careful and holistic approach to the patient.

Epidemiology, Etiology, and Risk Factors

Over one-third of adult the US population is now considered obese, and by some accounts, over six is considered morbidly obese [1, 2]. As prevalence of obesity and morbid obesity increases, general surgeons will encounter this and related disease processes quite often. The morbidly obese patient group is thought to be at a particularly high risk of development and progression of abdominal wall defects because of increased intra-abdominal pressure and poor wound healing potential. Additionally, comorbidities often associated with obesity, such as type 2 diabetes mellitus, sleep apnea, previous incisional hernias, obesity hypoventilation syndrome, and wound infections, can play a role in the development of hernias [3]. It is also important to mention that smoking is another important risk factor for development of incisional hernias as well as hernia recurrences, as smoking has been clearly associated with altered surgical wound healing [4].

Ventral hernias are more common in the older population, with mean age 51 [5] and a male-to-female ratio of 1.6:1. Umbilical hernias are also relatively common and will most likely occur in the fifth and sixth decades of life [5, 6]*. Primary hernias, like umbilical hernias, tend to be an

acquired defect in over 90 % of adults [7]. About 8 % of these are recurrent, with omental incarceration in 30 %. The average size of the hernia defect in this population is 25.4 cm² with multiple defects in 5 % [8].

Incisional hernias complicate 3–13 % of laparotomies in the general surgical population [9]*. This number is much higher in the bariatric population; this was especially noted in the group of patients who have undergone open bariatric procedure [3]. As open bariatric surgery is falling out of favor, many hernias are now detected when patients undergo another procedure. Nassar et al. report a 12 % incidence of umbilical or periumbilical defects in patients undergoing laparoscopic cholecystectomy [10]. Eight percent of bariatric patients will have a ventral hernia discovered during their bariatric procedure and these may create additional treatment dilemmas [11].

Clinical Presentation

While most patients with a ventral hernia present with a bulge on the abdominal wall, this may not be the case in the morbidly obese patient where the diagnosis may present a challenge [12]. Occasionally, the obese patients may present for the first time with abdominal pain, nausea, or small bowel obstruction. It should be noted that due to patient body habitus, it may be difficult to feel the hernia defect due to a thick abdominal wall, and a computed tomography (CT) scan of the abdomen may be warranted [13]. Often, even large ventral hernias may go unnoticed, and the diagnosis is first made intraoperatively during other procedures.

Treatment

Appropriate management of obese patients with ventral hernias is a complex and controversial topic with lack of consensus among the surgical community on the ideal approach to treating this condition. Those controversies range from the

need for concomitant repair at the time of a bariatric procedure as opposed to a delayed treatment following weight loss to the appropriate approach to use in cases that violate the intestinal tract to appropriate mesh and procedure selection. With the understanding that the literature provides little guidance regarding the ideal method to address hernias in obese patients or in conjunction with bariatric surgery, we present the approach we utilize at our institution.

The question that needs to be immediately answered is whether the patient is symptomatic or asymptomatic. This could aid in the selection of method as well as timing of ventral hernia repair in this patient population. As a good proportion of these defects are noted during bariatric procedures, an important consideration is whether to place mesh into a clean-contaminated field encountered during bariatric procedures that violate the gastrointestinal tract, such as laparoscopic Roux-en-Y gastric bypass or laparoscopic sleeve gastrectomy, as opposed to performing a primary hernia repair. On the other hand deferring surgical repair may result in significant morbidity. In our experience, 36 % of patients whose hernia repair was deferred at the time of gastric bypass developed small bowel obstruction due to incarceration in the post-operative period. The time interval for this complication is an average of 63 days (range 10–150 days) from the bariatric procedure [8]. The risk of infecting a prosthetic mesh by contamination with enteric contents is also well documented, and the authors of this text do not recommend using these meshes if the defect repair is concomitant with a bariatric procedure which violates the gastrointestinal system.

The basis of our approach is the notion that all hernias are not created equal, and that every bariatric patient with an abdominal wall defect should be approached individually. Certain factors, such as the patient's past medical history, body mass index (BMI), body habitus, defect size and location, level of operative field contamination, and the presence or absence of symptoms, should always be taken into consideration while developing a surgical plan.

In our opinion, the most important factors to consider when planning a hernia repair are body habitus based on fat distribution (android versus gynecoid), BMI, hernia location, and reducibility. During the work-up, computer tomography is used for a precise evaluation of the defect size, contents, and abdominal wall thickness. The above criteria are then used to divide patients into favorable and unfavorable anatomy groups. If the defect is located centrally or in the upper half of the abdomen, it allows for easier accessibility and laparoscopic port placement; it is considered favorable. Lower abdominal defects are considered unfavorable. Android body habitus is considered unfavorable due to less compliant abdominal wall and intra-abdominal fat distribution causing increased technical difficulty, as opposed to favorable gynecoid fat distribution. Patients with abdominal wall thicker than 4 cm are placed in the unfavorable group, as thicker abdominal wall tends to cause greater torque on laparoscopic instruments, leading to increased surgical difficulty

of the hernia repair. Patients with a thinner abdominal wall were considered to have favorable anatomy. Hernia reducibility is considered a favorable feature, as incarcerated contents may be more difficult to reduce intraoperatively. Hernias of 8 cm or less in greatest diameter were also considered favorable, because they allow the surgeon to approximate the edges of the defect with primary sutures under reduced pneumoperitoneum. Finally, a BMI of 50 kg/m² or greater was considered unfavorable due to the elevated operative risks associated with super-obese patients [14].

Our algorithm divides the patients into four treatment subgroups (Fig. 1):

1. Symptomatic patients with favorable anatomy: Here we recommend that these patients undergo ventral hernia repair as an initial and separate procedure. This repair may be followed by bariatric procedure of choice at a later date. Generally this group qualifies for laparoscopic hernia repair which is described later in this text.
2. Asymptomatic patients with favorable anatomy: These patients are good candidates to undergo concomitant bariatric surgery and ventral hernia repair. We recommend that after performing laparoscopic bariatric procedure, the surgeon addresses the hernia defect. If possible abdominal wall is repaired primarily with the placement of nonabsorbable sutures using a suture-passing device through the abdominal wall and fascia to decrease rate of recurrence (Fig. 2, photo 1). The approximated defect was then reinforced using biologic mesh (Fig. 2, photo 2). The mesh was introduced through the abdomen via one of the port sites and secured in place with both sutures and circumferential tacks.
3. Symptomatic patients with unfavorable anatomy present the biggest challenge from surgical standpoint. In this population we recommend a medically supervised very low calorie diet for up to 12 weeks. Dietary supplements, including daily multivitamins as well as ursodiol treatment to prevent gallstone formation during rapid weight loss, should be given to these patients. This group requires careful monitoring with qualified medical staff to ensure no adverse health changes. Once appropriate weight loss is achieved these patients are candidates to undergo a hernia repair either with concomitant or deferred bariatric procedure.
4. Asymptomatic patients with unfavorable anatomy are best treated with bariatric surgery first, followed by a ventral hernia repair at a later date, only after significant weight loss had occurred. At our institution laparoscopic gastric bypass and sleeve gastrectomy are the preferred options, given the more likely early rapid weight loss. This would allow a timely repair of the abdominal wall hernia. Nevertheless, the decision for which procedure to perform should be made jointly by the patient and the surgeon after thorough discussion and counseling.

Next consideration is the choice of surgical modality. Ventral hernia repairs have evolved considerably over the

FIG. 1. Algorithm for ventral hernia repair in the morbidly obese patient.

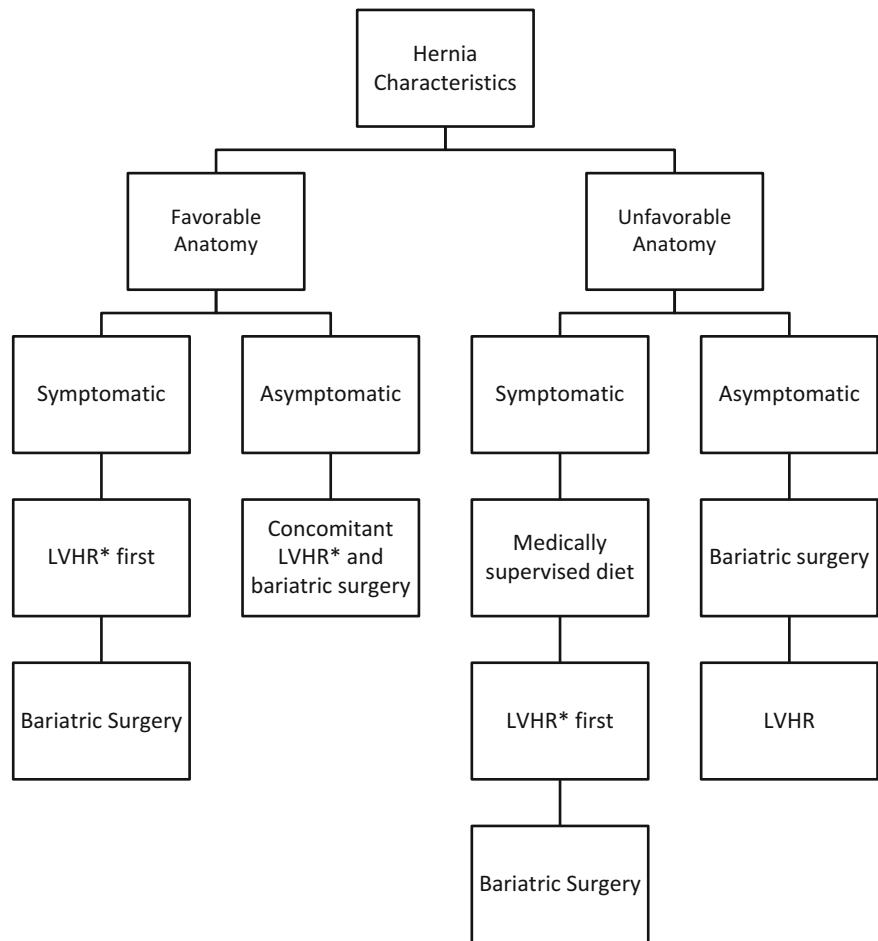


FIG. 2. Ventral hernia repair at time of bariatric surgery with follow-up laparoscopy 1 year later. (a) Suture repair of the hernia defect at the time of a laparoscopic Roux-en-Y gastric bypass (step #1). (b) Subsequent placement of biologic mesh as a reinforcement of the primary suture repair during a laparoscopic Roux-en-Y gastric bypass (step #2). (c) Anterior abdominal wall of the patient above who was undergoing an elective laparoscopic cholecystectomy at the 24-month time mark. Note the absence of the hernia defect and visible partially peritonized surgical tacks.

years. Traditional open primary suture repairs are falling out of favor especially in the obese population, as the reported recurrence rates have been over 50% [15]. Open tension-free mesh repairs, including separation of components procedure, have considerably lower recurrence estimated at 20–30%. Unfortunately, large abdominal incisions in the morbidly obese patients with wide tissue dissection and flap creation

result in a fairly high incidence of postoperative morbidity and wound complications [15]. Nevertheless the latter still remains a good option in some patient groups and is still widely used.

Laparoscopic ventral hernia repair was first reported about 20 years ago. Application of this method in certain situations might be advantageous, as it is associated with

fewer complications and faster recovery [15–17]. It appears that this advance in hernia repair might benefit the bariatric patient as well, just as recent studies have demonstrated an advantage of the laparoscopic approach over open bariatric surgery [18]. Similarly, shorter hospital stays, decreased pain, lower wound complications, lower recurrence rates, and quicker return to work are reported for laparoscopic ventral hernia repair patients [15–19].

The technique we have chosen to use in our patient population is based on the modified Rives-Stoppa technique. This involves reduction of the hernia and, under laparoscopic vision, outlining the hernia defect on anterior abdominal wall skin using a marker pen. A further outline adds an extra 4-cm overlay margin. An appropriate mesh, depending on the level of contamination during the case, is placed and then tailored to size using the outline on the abdominal wall. Nonabsorbable sutures are placed onto the corners of the mesh, which is then rolled up and introduced into the abdomen through a trocar. Using a Carter-Thomason device, the mesh is anchored into the desired position using the previously placed sutures. The mesh is further anchored with several rows of titanium helical tacks placed circumferentially at about 1-cm intervals. Through several small stab incisions, the mesh is secured in place using nonabsorbable sutures at 3-cm intervals along its circumference. This is also done with the Carter-Thomason device.

Weight loss surgery may be an important adjunct treatment in the management of ventral hernia. Unfortunately, laparoscopic gastric bypass as well as sleeve gastrectomy both require division of the gastrointestinal tract, which results in at least some contamination of the surgical field. In such cases, there is a general lack of acceptance within the surgical community of concomitant bariatric surgery and hernia repair with permanent mesh, due to risk of mesh infection. However, limited data has been reported demonstrating the feasibility of such an approach. A small trial in which ventral hernias were repaired with prosthetic dual meshes in conjunction with laparoscopic gastric bypass has been reported. No mesh infections and two recurrences were seen in this study [20]. While such data does exist, it is by no means considered a standard of care, as it only involves small series with lack of long-term follow-up. Mesh infection, necessitating subsequent mesh removal, is a very morbid and costly problem in an already high risk bariatric patient population, not to mention the high recurrence rates associated with mesh infections and the potential medical-legal implications. For those reasons, we do not favor this approach.

High recurrence rates have been encountered when bio-absorbable mesh is used as a bridge to close the hernia defect in a similar fashion to permanent mesh. Although initial data reported zero recurrence rates at short-term follow-up using this technique concomitantly with laparoscopic gastric bypass, unfortunately, majority of patients will present with a recurrence when followed for over 2 years. While some surgeons

routinely use the above technique as a temporary fix with the main goal of avoiding bowel strangulation, clearly it cannot be considered a permanent repair. The reasoning behind this is that deferring repair of the defect carries a significant risk of bowel incarceration and possibly even strangulation, especially when the surgeon reduces an omental incarceration without addressing the underlying hernia [8]. Based on our experience, we believe that the use of bio-absorbable mesh with concomitant laparoscopic gastric bypass can only be effectively utilized as reinforcement for suture repair. On the other hand, concomitant bariatric surgery and hernia repair in patients with unfavorable hernia and body habitus characteristics as described above can be challenging and time consuming. Performing a bariatric procedure at the time of the hernia repair not only adds considerable operation time and risk, but also introduces contamination with subsequent risk for mesh infection as previously mentioned.

As mentioned above, it is not unusual to find incidental hernias during laparoscopy which have remained asymptomatic while performing bariatric surgery. Most of these defects, missed during preoperative work-up, are small and have greatest diameter less than 2 cm. These defects should be repaired primarily with the use of permanent sutures using a Carter-Thomason suture-passing device with simple or figure-of-eight stitches (Fig. 3). It is also important to mention that these small hernias need to be addressed as they are more likely to lead to potential bowel strangulation requiring emergent surgery with potential poor outcomes [5, 8].

Clinical Pearls

Hernias still present a therapeutic challenge in the morbidly obese and as the prevalence of obesity increases, so does the incidence of ventral hernias in the obese population. Those patients require a complex and thought-out approach, devised on a case-by-case basis. It is also important to make the morbidly obese patient aware of the potential intraoperative discovery of incidental hernias and the high risk of recurrence associated with their repair. It is also strongly encouraged to repair all incarcerated incisional hernias in the morbidly obese population, that required reduction to complete the bariatric procedure, because of the high risk of strangulating bowel obstruction in the postoperative period [8].

Concomitant hernia repair with bariatric procedure versus a staged approach should be based on patients' symptoms and the hernia characteristics. Our suggested algorithm has been helpful in our practice with the selection of timing, mesh, and type of repair. All decisions are made on individual case basis. In cases of concomitant repair, reinforcing defects that are >2 cm in diameter with biomaterial mesh as an underlay following primary repair may help reduce the incidence of hernia recurrences [5].

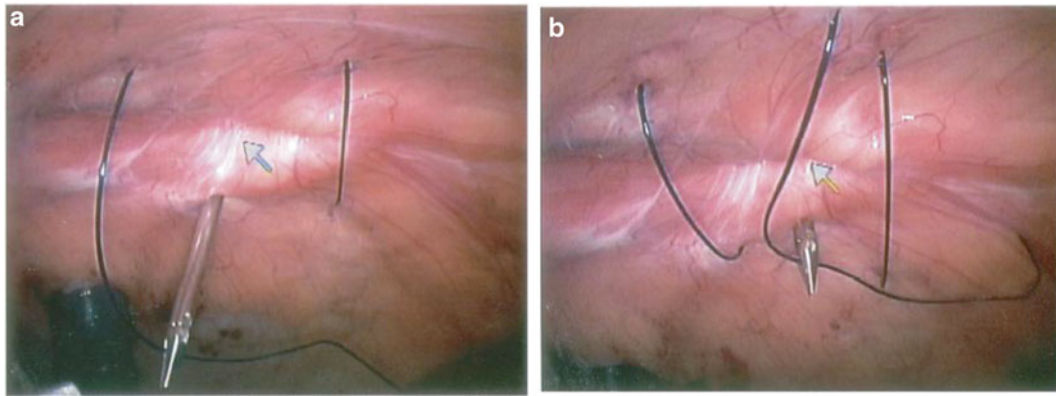


FIG. 3. (a) Sutures are placed across the fascial defect (arrow) with a Carter-Thomason device. (b) All sutures are tied once the pneumoperitoneum has been released.

Review Questions and Answers

Question 1

Bariatric patients are thought to be at increased risk of incisional hernia development because of:

- (a) Increased intra-abdominal pressure.
- (b) Poor wound healing potential in the morbidly obese.
- (c) Respiratory issues such as sleep apnea and obesity hypoventilation syndrome commonly seen in the morbidly obese population.
- (d) Comorbidities such as diabetes mellitus.
- (e) All of the above.

Answer: E. All of the mentioned answers are thought to play a role in increased risk of incisional hernia development in the obese patients.

Question 2

One of the major advantages of laparoscopic hernia repair in the bariatric population is:

- (a) Better cosmetic outcome.
- (b) Better visualization of the defect.
- (c) Decreased risk of postoperative wound complications.
- (d) All of the above.

Answer: C. Decreased risk of wound complications is considered one of the major advantages of laparoscopic over open repair.

Question 3

The best treatment option for an incidental periumbilical hernia encountered during a laparoscopic gastric bypass which contains omentum and with greatest diameter of 4 cm is:

- (a) This defect will never need to be addressed and therefore should be left alone.
- (b) This defect should be left alone for now and repaired at a later time with the use of permanent mesh.
- (c) The omentum should be reduced to prevent incarceration, but the defect itself should be repaired at a later time.
- (d) This defect should be repaired at the time of the bariatric surgery.

Answer: D. We suggest that the best treatment option for such defects is to perform the repair at the time of the initial bariatric surgery. This is done to prevent strangulation of bowel.

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