

Concomitant Umbilical Hernia Mesh Repair with Gastrointestinal Endoscopy A Three-Case Series and Review of the Literature

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1. Introduction

Umbilical hernias represent a prevalent clinical entity, estimated to occur in about 2% of the adult general population [1]. Surgical repair for umbilical hernias comprises 5-10% of all adult abdominal wall hernia repair cases [2]. Mesh infection is one of the most feared complications of hernia repair. Infected mesh can lead to chronic suppuration, require re-operation, and increase the risks of hernia recurrence and long-term morbidity [3]. Infection rates can be as high as 8-10% in open mesh repairs, with *Staphylococcus aureus* being the most common causative infectious agent [4-6]. Use of synthetic mesh is generally avoided in contaminated cases with active infection or gross contamination. It has traditionally been also avoided in clean-contaminated cases, where the gastrointestinal tract is entered under controlled conditions without gross spillage. Conventionally, synthetic mesh is avoided in hernia repairs where concomitant bowel resection is performed. The evidence for this practice is mainly based on case series and retrospective data [7]. More recent evidence, however, advocates the safety of synthetic mesh repair, even with concurrent enteric resection, when utilizing lightweight microporous mesh and no gross contamination is present [8].

Gastrointestinal endoscopies are known to result in transient bacteremia [9,10]. The incidence of bacteremia following gastroscopy is approximately 4.4%, even in procedures involving biopsies, with the episode typically persisting about 30 minutes [11-13]. For colonoscopy, reported rates of bacteremia range up to 25%, although the mean incidence is around 4.4% [14-16]. Bacteremia associated with flexible sigmoidoscopy is less infrequent, occurring in approximately 1% of cases [17]. Flexible sigmoidoscopy and gastroscopy are the two endoscopic procedures associated with the lowest rate of bacteremia [8]. While clinically overt infections stemming from this are exceedingly rare, the risk of prosthetic infection, when inserted concurrently with such bacteremia, remains unknown; to date, no definitive evi-

dence exists to suggest an increase in the risk of mesh infection, hernia recurrence, or other adverse outcomes.

Another factor is that gastrointestinal endoscopies are usually performed under sedation and very rarely require general anesthesia. In the absence of clear data, most clinicians remain averse to combining hernia repair, particularly using mesh, with gastrointestinal endoscopic procedures [18-20]. This caution is justifiable given the grave ramifications of mesh infection. The only documented reports of mesh implantation concurrent with gastrointestinal endoscopy derive from hiatal and paraesophageal hernia repairs, where intraoperative gastroscopy is performed to facilitate procedural guidance and exclude perforations [21,22]. To date, no evidence exists in the literature documenting the safe execution of analogous procedures in alternative hernia contexts. Herein, we describe three cases of emergency open umbilical hernia repair with mesh, performed concomitantly with gastrointestinal endoscopy for bleeding.

2. Case Presentations

2.1. Case 1

A 66-year-old male is referred for repair of an increasingly symptomatic umbilical hernia of 3 years duration with no episodes of incarceration or strangulation. He had not had any abdominal surgeries in the past. The patient concomitantly presented with a positive FIT test and iron deficiency anemia but denied any blood per rectum, family history of colorectal cancer, or other worrisome clinical features. The patient's past medical history includes non-insulin dependent diabetes mellitus, ischemic heart disease with angiographic interventions, hypertension, and glaucoma. Laboratory assessment showed Hb of 8.7 g/dL, low MCV and MCH, high RDW, normal INR and aPTT, and albumin 31 g/L, and serum glucose 12.1 mg/dL. The patient was deemed to be an acceptable operative candidate and was estimated to be ASA class II.

The patient had a combined open umbilical hernia with mesh as well as a gastroscopy and colonoscopy under general anesthesia

with LMA airway. Prophylactic Cefazolin 2 g was given intravenously 21 minutes prior to skin incision. Local anesthesia was used and an open umbilical hernia repair using a 4 cm BARD synthetic mesh secured to the fascia by horizontal mattress #1 Prolene sutures. The skin incision was closed with a running 3-0 Vicryl subcuticular suture. Gastroscopy showed distal gastritis and biopsies were obtained with cold forceps from the gastric antrum and first portion of the duodenum. The colonoscopy identified sigmoid colon diverticulosis and a 2.1 cm polyp in the descending colon. Snare polypectomy with electrocautery was performed with tattooing of the bowel wall.

The procedure went well, and the patient was discharged home the same day. There were no complications during the procedure or on 6 week and 6 month follow ups in the clinic.

2.2. Case 2

An 86-year-old male presented to the Emergency Department with the main complaint of a 2-day history of a melena and bright red blood per rectum with bowel movements. The patient also complained of vague central abdominal pain, and nausea. On physical examination, the patient was hemodynamically stable and had an obvious incarcerated umbilical hernia with signs of possible early strangulation. Digital rectal examination found hemorrhoids with melena stools and intact anal sphincter function.

The patient's past medical history was significant for ischemic heart disease, hypertension, previous gastrointestinal bleed from diverticulosis 8 years ago, cancer of left cheek bone which required multiple surgeries and radiation, and alcohol abuse. His past surgical history consisted of bronchoscopy, colonoscopy, and coronary angioplasty. The patient required both urgent umbilical hernia repair for the incarcerated hernia as well as a gastroscopy and a colonoscopy for the hematochezia and melena. The patient was started on intravenous Pantoprazole and a CT of the abdomen and pelvis was performed in the Emergency Department which showed, a small hiatus hernia and a 1.4 x 1.9 x 0.8 cm umbilical hernia with incarcerated omentum. A thorough discussion with the patient and family was had regarding the priorities as well as options for timing for his recommended procedures.

After pre-anesthetic assessment, the patient was taken to the operating room the next day for an open umbilical hernia repair with mesh combined with a gastroscopy and colonoscopy. The hernia was repaired with a 4 cm BARD mesh placed in the sub-fascial plane secured with interrupted Prolene sutures. Gastroscopy and colonoscopy were performed immediately following the repair while the patient was still under general anesthesia. The gastroscopy showed a hiatus hernia and an area suspicious for Barrett's esophagus in the distal esophagus but no gastroduodenal ulceration or other underlying etiology for upper gastrointestinal bleeding. A colonoscopy followed which showed angiodysplasia in the cecum, with no active bleeding at the time of endoscopy. Sigmoid colon diverticulosis was also seen without any stigmata of current or recent bleeding. The rest of the colon

and the terminal ileum were otherwise normal. Since argon plasma coagulation was not available at the time, the angiodysplasia was coagulated with bipolar electrocoagulation.

The patient tolerated the procedures well with no adverse events or complications. He was observed for 3 days postoperatively and developed an episode of asymptomatic bradycardia which was successfully managed medically. In-hospital Physiotherapy and Occupational Therapy consultation and treatments were initiated in the postoperative period.

The pathology report was negative for a Barrett's esophagus, but positive for chronic inflammation and a dysplasia of gastric type mucosa in the esophagus. The patient was seen in clinic for follow up 6 weeks after discharge and was doing well; no post-surgical complications or repeat bleeding episodes occurred within the follow up period.

2.3. Case 3

A 95-year-old female presented to the Emergency Department with complaints of general weakness, confusion and lethargy worsening over the last 48 hours. Her history was also significant for 8 days of melena and repeat ground coffee emesis over the last 24 hours. Her past medical history includes atrial flutter, ischemic heart disease, congestive heart failure, hypertension, restless leg syndrome, gastroesophageal reflux disease (GERD), hypothyroidism, and chronic back pain. The patient was on daily aspirin and Xarelto. The patient's past surgical history consists of open cholecystectomy, open appendectomy, bilateral cataract removal, and pacemaker insertion. Her last colonoscopy was performed 10 years ago and found only sigmoid colon diverticulosis.

On physical examination, the patient was found to have an incarcerated umbilical hernia with no signs of strangulation or overlying skin changes. There was no evidence of bowel obstruction, and the patient remained hemodynamically stable. On digital rectal examination, internal hemorrhoids were noted with a mixture of melena and small amounts of bright red blood. CT scan of the abdomen and pelvis with IV contrast showed panniculitis with enlarged mesenteric lymph node, a benign-appearing cystic lesion in the right ovary, and a fat-containing incarcerated abdominal wall hernia at the level of the umbilicus.

The patient's hemoglobin level was 6.1 g/dL and WBC was 13.3 but had no other significant abnormalities on blood work. The patient was admitted and transfused with one unit of packed red blood cells and started on intravenous fluids and twice daily intravenous Pantoprazole. The patient had gastroscopy and colonoscopy the next day combined with surgical repair of the incarcerated umbilical hernia with mesh. After general anesthesia, gastroscopy identified a 1.5 cm healed duodenal ulcer in the first portion of the duodenum with no stigmata of recent bleeding (Forrest IIc). There was also evidence of gastritis and duodenitis. No therapeutic endoscopic interventions or biopsies were performed. Other than internal hemorrhoids and non-bleeding sigmoid colon diverticulosis, the colonoscopy was clear.

The incarcerated umbilical hernia repair was then performed using synthetic mesh and permanent monofilament sutures. The patient recovered well with no further gastrointestinal bleeding and remained hemodynamically normal with stable Hemoglobin and Hematocrit levels. She was started on a regular diet immediately postoperatively and worked with physiotherapy to improve her ambulation. The patient was discharged to a skilled nursing facility 10 days after her date of admission. On 6 week follow up, the hernia repair remained intact, and the wound had healed well with no signs of abnormalities.

3. Discussion

This paper presents three cases of umbilical hernia repair with synthetic mesh performed concurrently with gastrointestinal endoscopy. Although both the hernia repair and endoscopy were performed on an urgent or semi-urgent basis, none met the criteria for true emergent status. None of the patients exhibited evidence of bowel strangulation nor any signs of sepsis or shock. In all three cases, the indication for endoscopy was non emergent gastrointestinal bleeding, with no signs of hemodynamic instability or hemorrhagic shock. All patients were elderly and had multiple medical comorbidities including hypertension and ischemic heart disease. Each patient passed preoperative medical clearance for general anesthesia. This series does not encompass patients requiring truly emergent interventions for either procedure, those in extremis, or those with a more prohibitive comorbidity burden. The lessons gleaned, therefore, may not be applicable to those situations. Certain patients, in fact, such as those with cirrhosis and ascites, are unlikely to be suitable candidates for this combined approach.

The usual evidence-based precautions for infection prevention, including sterile technique and antibiotic prophylaxis, were taken in all three cases. It should also be noted that all three patients underwent open hernia repair and synthetic mesh was utilized. Had the repair been a primary repair without mesh, an appropriate option for hernias < 1-2 cm in diameter, the specter of mesh infection would have been eliminated, albeit without eliminating the risk of wound infection. Also, laparoscopic umbilical hernia repairs with mesh have generally been associated with lower risks of mesh infection compared to open repair [23]. Whatever conclusions or hypotheses one may draw from these cases, therefore, may not apply to hernia repairs performed laparoscopically.

These cases illustrate that gastrointestinal endoscopy can be safely performed under the same anesthetic as umbilical hernia repair with synthetic mesh. Post-operative follow-up extended to six weeks, revealing no evidence of complications such as infection, hematoma, seroma, or hernia recurrence. One of the main potential advantages of combining the two procedures is

the minimization of repeat anesthetic sessions. That said, gastrointestinal endoscopies are typically performed under monitored anesthetic care (MAC) rather than general anesthesia. Also, any potential benefit of minimizing anesthetic risk may be negated if combining the procedures results in a single operative session where the duration under general anesthesia is substantially prolonged [24]. Additional advantages of this combined approach may include enhanced patient convenience through the reduction of perioperative preparations, clinic and hospital visits, as well as recovery downtime; overall cost reduction, and efficiency of healthcare resource utilization [25-28].

Several legitimate concerns warrant consideration regarding concomitant hernia repair with gastrointestinal endoscopy. The most evident concern is the potential for synthetic mesh infection in the context of the bacteremia induced by gastrointestinal instrumentation. This concern is heightened by the potential for unrecognized colonic perforation or microperforation, which could further elevate the risk of mesh infection. Colonoscopy-induced perforation, typically not recognized until after the procedure, has been reported to occur in up to 0.3% of colonoscopies [29]. In contrast, microperforation rates have not been clearly delineated in the literature, owing to inconsistencies in definitions and documentation; they may reach up to 1.2% as inferred from studies on post-polypectomy syndrome [30]. This scenario may significantly elevate the risk of infection and could necessitate major surgical interventions, including bowel resection. In the presented cases, the benefits of combining the two procedures under a single anesthetic session were deemed to outweigh the associated risks for each patient. Furthermore, recent evidence suggests that synthetic mesh placement is likely safe even in infected surgical fields [31,32]. There is evidence that concurrent intraabdominal surgical procedures during ventral hernia repair may increase the risk of hernia recurrence [28]. This concern is likely of less relevance with gastrointestinal endoscopy, as endoscopic procedures impose considerably less traumatic insult compared to other surgical interventions.

In conclusion, in rare scenarios, wherein a patient presents with concurrent gastrointestinal bleeding and an incarcerated or strangulated hernia, the option of performing both gastrointestinal endoscopy and hernia repair under a single anesthetic should be considered in carefully selected candidates. This combined approach may prove advantageous in select circumstances, provided that fully informed consent is stringently adhered to. Examples include patients with poor follow up compliance or patients whose repeat medication interruption (such as anticoagulants) poses very high risk. Ultimately, a definitive verdict on the merits of combining these procedures, and under which conditions, hinges on further evidence.

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