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Case Report

A closed loop obstruction through mesh defect in a ventral hernia: a surgical rarity

Supreet Kumar*, Aishwarya S. Bhalerao, Sonam Gupta, Vivek Tandon, Deepak Govil

Department of Surgical Gastroenterology and GI Oncology, Indraprastha Apollo Hospital, New Delhi, India

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***Correspondence:**
Dr. Supreet Kumar,
E-mail: supreet.mvj@gmail.com

ABSTRACT

Closed loop obstruction is a surgical emergency marked by localized entrapment of bowel loops between two obstructive points. While common in internal hernias and adhesions, its occurrence within a recurrent ventral hernia, particularly via a contracted mesh defect, is exceedingly rare. This case highlights the diagnostic and surgical complexities of such a presentation and underscores the need for heightened awareness in patients with prior mesh repair. A 67-year-old diabetic female with a prior history of obstructed ventral hernia repair and mesh placement presented with acute abdominal pain, vomiting, and obstipation. Imaging revealed small bowel loops herniating through a focal mesh defect with associated mesenteric twist-suggestive of closed loop obstruction. Emergency laparotomy revealed dense adhesions, herniated ileal segment with compromised vascularity, and a mesh-induced fibrotic plane. Resection and anastomosis of the involved segment was performed with primary closure of the fascial defect. The patient had an uneventful postoperative course and was discharged on day six. This case exemplifies a rare but critical complication following ventral hernia mesh repair. Mesh contraction and tissue ingrowth can inadvertently create new hernia defects. Internal herniation through such defects, especially with twisting of the mesentery, can rapidly lead to ischemia. A high index of suspicion, timely imaging, and prompt surgical exploration are crucial to prevent morbidity. This case underscores the delayed but dangerous potential of mesh-related internal herniation—a late mesh complication demanding surgical vigilance. Recurrent ventral hernias with closed loop obstruction through mesh-related defects, though rare, demand urgent recognition. This case reinforces the significance of individualized surgical planning in reoperative fields and the potential for catastrophic sequelae in the absence of timely intervention.

Keywords: Recurrent ventral hernia, Closed loop obstruction, Mesh defect, Internal herniation, Bowel ischemia, Emergency laparotomy, Late mesh complication

INTRODUCTION

Ventral hernias remain among the most common sequelae of abdominal surgery, with recurrence rates reported between 10% and 30% despite the widespread use of mesh reinforcement techniques.[1] While mesh implantation significantly reduces the recurrence rate, it introduces a unique set of long-term complications including chronic pain, infection, migration, shrinkage, and mesh-induced fibrosis.[2] These complications can manifest years after the initial surgery, sometimes in the form of anatomical distortions that predispose to secondary internal herniation a phenomenon infrequently described in literature. Closed loop obstruction is a particularly hazardous subset of mechanical small bowel obstruction, characterized by occlusion at two fixed points along the bowel, leading to progressive luminal distension, venous congestion, ischemia, and if left untreated, gangrene.[3] While internal hernias, adhesions, and volvulus are well-known culprits, mesh-related internal herniation through a contracted or deformed prosthetic field is a rare and often overlooked etiology.

Recent registry-based data suggest that mesh-related complications requiring re-intervention occur in 5–10% of patients, particularly with large-pore polypropylene meshes and in cases where lateral fixation is suboptimal.[4] Additionally, emerging evidence underscores that late mesh contraction may create occult defects that serve as pathways for internal bowel migration-raising the index of suspicion in patients presenting with unexplained subacute obstruction after mesh repair.[5] Given the increasing number of abdominal wall reconstructions performed globally and the expanding arsenal of mesh types and fixation strategies, it is imperative for surgeons to remain vigilant for delayed complications. Early diagnosis often reliant on cross-sectional imaging and prompt surgical intervention remain the cornerstones of favourable outcomes. This report presents a diagnostically challenging and surgically complex case of recurrent ventral hernia with closed loop obstruction, arising through a mesh-induced defect-a rare entity that tests surgical judgment, anatomical understanding, and intraoperative adaptability.

CASE REPORT

A 67-year-old female with a longstanding history of type 2 diabetes mellitus on oral hypoglycaemic agents presented with complaints of intermittent abdominal discomfort persisting for one month. The pain, initially mild and dragging in nature, was aggravated by straining and relieved with rest, and bore no relation to food intake. Over the three days preceding presentation, the patient developed acute worsening of symptoms with increased pain severity, progressive abdominal distension, and repeated episodes of bilious, voluminous vomiting containing partially digested food matter. Oral intake was minimal due to persistent nausea, and she had not passed flatus or stools for the preceding 24 hours.

The patient had undergone an emergency surgery for obstructed ventral hernia five years prior at another facility, where 15 cm of mid-ileum had been resected and a side-to-side stapled ileo-ileal anastomosis performed. The hernia defect had been closed with mesh reinforcement. She also had a remote history of spinal surgery, details of which were unavailable. On arrival to the emergency department, she appeared dehydrated and pale. Abdominal examination revealed a 4×4 cm irreducible swelling adjacent to a midline laparotomy scar in the infraumbilical region. The swelling was tender, exhibited an impulse on coughing, and was doughy in consistency without overlying skin changes. A provisional diagnosis of recurrent incisional hernia with suspected bowel obstruction was made. Initial laboratory investigations revealed anemia (Hb 9.2 g/dl), leukocytosis (TLC 17,300/mm³), azotemia (urea 70 mg/dl, creatinine 2.1 mg/dl), hyponatremia (Na 131 mmol/l), and mild hyperkalemia (K 5.5 mmol/l). The patient was found to be in diabetic ketoacidosis and was managed with intravenous fluids, electrolyte correction, and insulin infusion, under the guidance of a multidisciplinary team including nephrology and endocrinology. A plain abdominal radiograph revealed multiple air-fluid levels with dilated jejunal loops (Figure 1). A nasogastric tube was placed, draining approximately 500 ml of feculent content. A non-contrast CT scan, performed due to elevated renal parameters, demonstrated dilated small bowel loops herniating through a focal defect near the prior mesh site, with twisting of mesenteric vessels and features consistent with a closed loop obstruction (Figure 2) (Figure 3). The findings were independently corroborated by two senior radiologists.

Figure 1: Plain abdominal radiograph demonstrating multiple air-fluid levels and dilated jejunal loops, suggestive of small bowel obstruction.

Figure 2: Non-contrast axial CT image showing dilated small bowel loops with herniation through a defect adjacent to the prior mesh placement.

Figure 3: Coronal CT image highlighting twisted mesenteric vessels (swirl sign) and a C-shaped closed loop configuration consistent with internal herniation and closed loop obstruction.

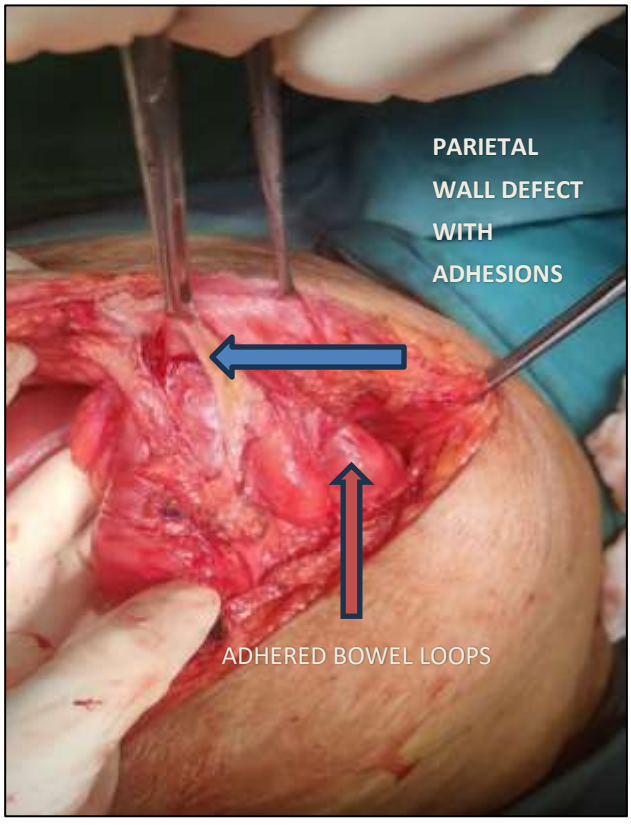

Figure 4: Intraoperative image revealing dense adhesions between bowel loops and the parietal wall near the site of previous mesh placement.

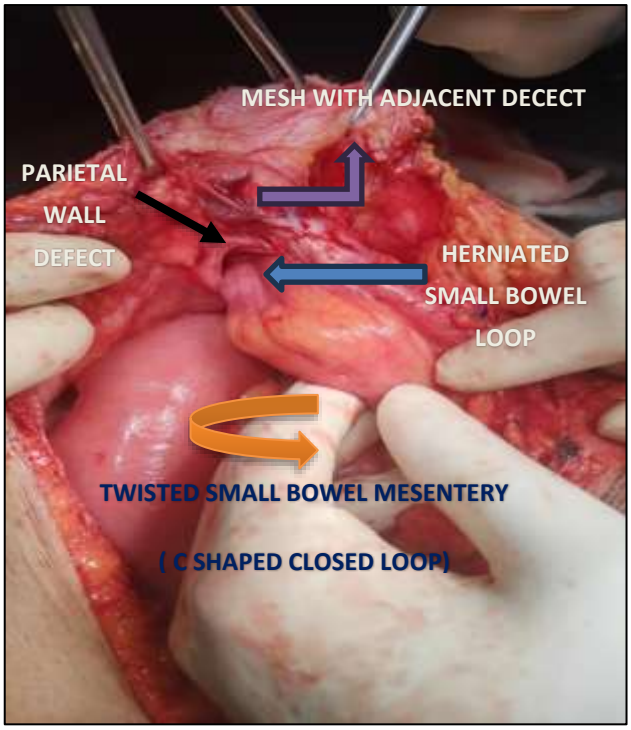

Figure 5: Herniated and congested ileal loop passing through a 3×3 cm defect adjacent to the contracted mesh, with visible twisting of mesentery.

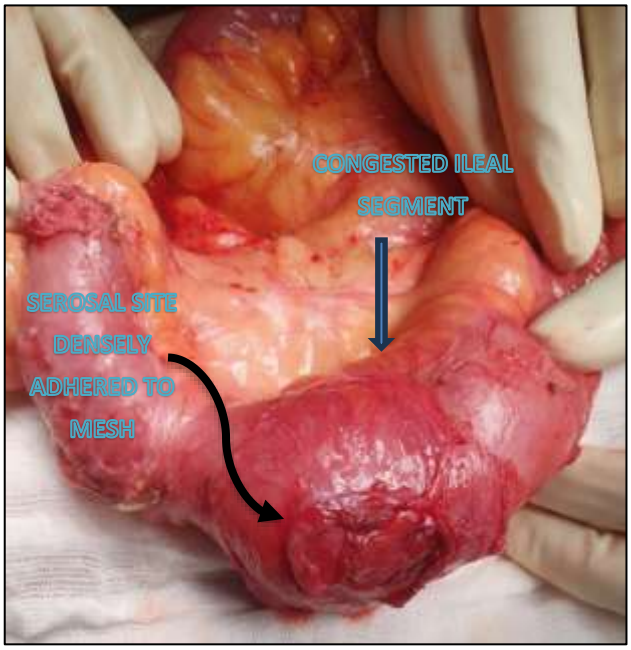

Figure 6: Isolated, congested ileal segment after adhesiolysis, prior to resection and hand-sewn ileo-ileal anastomosis.

An emergency laparotomy was undertaken via the previous midline incision. Intraoperatively, extensive dense adhesions were encountered in the intraperitoneal plane, particularly between the bowel loops and the parietal wall (Figure 4). A 3×3 cm fascial defect was

identified along the left infraumbilical region, adjacent to the prior mesh. The previously implanted polypropylene mesh had contracted, creating a potential space through which a proximal ileal loop-approximately 8 cm in length-had herniated along with its mesentery (Figure 5). The involved bowel segment exhibited congestion and early vascular compromise, with serosal adhesions to the mesh and evidence of mesenteric twist (Figure 6).

Following meticulous adhesiolysis, the entrapped ileal segment was isolated and its viability assessed using 100% oxygen and warm saline-soaked mops. Due to persistent dusky discoloration and mesenteric torsion, resection of 10 cm of ileum was undertaken. A hand-sewn, isoperistaltic, side-to-side ileo-ileal anastomosis was performed. This choice was guided by the edematous nature of the bowel and the presence of significant anatomical distortion from previous surgery, where a stapler-based anastomosis was deemed suboptimal due to concerns of incomplete doughnut formation and increased leak risk.

The fascial defect was repaired from the peritoneal side. Given the extensive fibrosis and strong adherence of the mesh to the posterior rectus sheath and surrounding tissues, complete mesh explanation or reconstruction was deferred. The sheath was closed en masse using loop PDS in a tension-free manner. The patient was extubated immediately postoperatively and monitored in the intensive care unit. She experienced transient paralytic ileus, which resolved by postoperative day three. Oral liquids were initiated on day four, followed by soft diet on day five. She passed flatus and stool on postoperative day five and was discharged on day six in stable condition. At two-week follow-up, the patient was asymptomatic with a healing incision and no recurrence of hernia symptoms.

DISCUSSION

Ventral hernia repair with mesh reinforcement has become a cornerstone in contemporary abdominal wall reconstruction. Despite reducing recurrence rates, synthetic meshes are not free from long-term complications. Mesh-related adverse events such as infection, erosion, and adhesion formation are well established; however, the evolution of a secondary internal herniation through a mesh-induced defect remains an exceedingly rare and under-recognized phenomenon.[6]

Mesh contraction and the hostile abdomen

Polypropylene mesh, while biologically inert, incites a chronic inflammatory response that fosters tissue ingrowth and fibrosis. Over time, this reaction can lead to mesh contraction or deformation, creating unexpected tension vectors and narrow interfacial spaces between mesh and fascia.[7] In our case, the mesh contracted and left a potential space that eventually served as a path for bowel herniation. This internal defect, shielded from clinical detection, was only discovered at the stage of acute obstruction.

Mesh-induced internal herniation is difficult to predict. Risk factors may include inadequate lateral fixation, low-tension placement without sufficient overlap, and postoperative changes in intra-abdominal dynamics. Recent evidence indicates that mesh failure, including shrinkage and detachment, is emerging as a cause of late small bowel obstruction and internal herniation sometimes years after the initial hernia repair.[8] Importantly, the reoperative abdomen adds further complexity. Dense adhesions from prior surgeries distort tissue planes and create a "hostile abdomen," significantly elevating the risk of bowel injury and limiting reconstructive options. In such scenarios, attempted mesh explantation or re-repair may increase morbidity, making staged reconstruction the safer choice.

Preventive measures include ensuring wide mesh overlap, securing lateral borders with either trans fascial sutures or self-gripping meshes, and using adjuncts like biological scaffolds in high-risk patients. Surgeons must remain vigilant for signs of contraction or mesh deformation during follow-up and, if suspected, consider cross-sectional imaging even in asymptomatic individuals.

Closed loop obstruction: a surgical time bomb

Closed loop obstruction is a critical entity in surgical emergencies due to its unique pathophysiology. It results from dual-point occlusion of a bowel segment, leading to progressive intraluminal pressure, compromised venous return, and rapid ischemia. The addition of mesenteric twist exacerbates perfusion loss, making early detection crucial.[9]

Although contrast-enhanced CT remains the gold standard for diagnosis, our case demonstrates that non-contrast CT can still be highly informative, especially when renal dysfunction limits contrast use. Signs such as radial configuration of loops, the mesenteric swirl sign, and C-shaped transition loops are pathognomonic and should prompt immediate surgical action.[10]

Surgical judgment and technical nuance

This case demanded a nuanced intraoperative strategy. Meticulous adhesiolysis minimized the risk of inadvertent enterotomy. Although the entrapped loop showed borderline viability, the presence of mesenteric torsion and compromised peristalsis necessitated resection. A hand-sewn isoperistaltic anastomosis was performed, favored over stapled options due to the edematous bowel and limited operative space. Given the hostile field, primary mesh removal or abdominal wall reconstruction was deferred, aligning with the principles of damage-control surgery. The sheath was approximated with loop PDS in a tension-free manner, and the patient was

planned for elective hernia reconstruction in the future, once tissue planes normalize and infection risk abates.

Implications for practice

This case reinforces the importance of recognizing that mesh itself can become the culprit in recurrent or atypical hernia-related presentations. Surgeons must maintain a high index of suspicion, especially in patients with previous mesh repair who present with features of bowel obstruction even years after the initial procedure.

CONCLUSION

Recurrent ventral hernias following mesh repair can present insidiously, yet harbour the potential for catastrophic complications such as closed loop obstruction. This case underscores the rare but real phenomenon of mesh contraction leading to secondary internal herniation with life-threatening bowel compromise. A high index of clinical suspicion, careful radiological interpretation even in the absence of contrast and timely surgical exploration are pivotal for favourable outcomes.

Equally important is surgical judgment: choosing safe fascial closure over aggressive mesh explantation in a hostile abdomen, while planning for definitive reconstruction later. As the use of synthetic mesh continues to grow, this case highlights an emerging complication that warrants both vigilance and long-term follow-up.

This report serves as both a surgical cautionary tale and a practical roadmap for managing late-onset mesh-related closed loop obstruction meriting its place in the annals of surgical literature.

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