Iatrogenic uterine perforation with intra-endometrial bowel entrapment managed through minimally invasive surgery: An interesting case

Mary Carmel O. Yu[1], Adonis A. Blateria[1]

Abstract:

This is a case of a 35-year-old Gravida 5 Para 5 (5005) who underwent curettage for retained placental fragments after delivering her fifth child. Within 16-month postpartum, the patient had nonspecific occasional abdominal pain and oligomenorrhea. Imaging studies revealed a uterine defect with a bowel segment passing through. A referral to a tertiary-level hospital was made. Hysteroscopy was attempted; however, an obliterated cervical canal was encountered. Laparoscopy revealed a 10 cm ileal segment completely herniating into a 2.5 cm uterine defect at the posterior uterine wall. Laparoscopic enterolysis followed by hysterectomy, extracorporeal resection, and anastomosis of the involved ileal segment was performed. This is an uncommon case of an iatrogenic uterine perforation following curettage after a term pregnancy. Its unique clinical presentation and intraoperative findings resulted in an equally unique array of surgical approach.

Keywords:

Dilatation and curettage – adverse effects, hernia, minimally invasive surgical procedures, pregnancy, uterine perforation

Introduction

Dilatation and curettage (D and C) have long been a widely accepted approach in the management of obstetric hemorrhage. Its convenience, safety, and efficacy have led to its universal usage. Its complications include infection, hemorrhage, cervical lacerations, intrauterine adhesions, and uterine perforation.[1] Among these, uterine perforation is an immediate potentially life life-threatening complication with a very low incidence of 0.8–6.4/1000 procedures.[2] However, when D and C are done to manage postpartum hemorrhage, the prevalence of uterine perforation increases to up to 5%.[2] Among those with a perforated uterus, involvement of adjacent pelvic organs such as the bowel, leads to increased morbidity and potential mortality. In a published review from 1972 to 2022 on reports of uterine perforation with concomitant bowel obstruction, only 12 cases have been reported.[2] This signifies the uncommon nature and potential underreporting of this complication.

This report will discuss a case of postcurettage uterine perforation with small bowel herniation that presents with an indolent and chronic course of more than a year with no apparent bowel obstruction and development of oligomenorrhea – A rather unique progression to other reported cases wherein acute abdomen, torrential vaginal bleeding, and fatal bowel obstruction are the norm.

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Case Report

This is a case of a 35-year-old, multiparous, Filipina who sought consult for occasional vague abdominal pain associated with decreased menstrual flow. She is a Gravida 5 Para 5 (5005); with all pregnancies delivered vaginally.

Sixteen months before the consult, she experienced postpartum hemorrhage during the home delivery of her fifth child. She was brought to a secondary-level government hospital and underwent completion curettage due to retained placental fragments. Correction of severe anemia with transfusion of 5 units packed red blood cell was done and was discharged improved after 7 days. In the succeeding 11 months postcurettage, the patient had no return of normal menstrual flow; however, noted vaginal spotting occurred 1 day of every month. This was associated with intermittent hypogastric numbness. She sought to consult with a general physician wherein transvaginal sonogram [Figure 1] requested showed right fundal uterine perforation with an intramyometrial bowel loop. She was then referred to a tertiary government hospital wherein further imaging studies with magnetic resonance imaging (MRI) [Figure 2a and b] revealed a 2.5 cm defect at the uterine fundus with small bowel passing through; and three-dimensional (3D) transvaginal ultrasound [Figure 3] done showed an irregular fundal contour defect at the right posterofundal area measuring 3.8 cm × 2.8 cm. Within the defect is a hyperechogenic structure suggestive of a segment of a bowel. She was subsequently referred to the section of minimally invasive gynecologic surgery (MIGS) for surgical management. In the interim, the patient only complained of occasional hypogastric pain with a pain score of 4–5/10 and decreased menstrual flow. Throughout the course of her symptomatology, she had regular bowel movement and tolerated oral diet well, with no episodes of vomiting and no abdominal bloating. On bimanual pelvic examination, an anteverted corpus measuring 8 cm, with irregular contour was palpated. At this juncture, the working impression was of a postcurettage iatrogenic uterine perforation with intra-endometrial herniation of bowel loops; to consider Asherman syndrome secondary to intra-endometrial entrapment of bowel; abnormal uterine bleeding – not otherwise classified due to oligomenorrhea probably secondary to Asherman syndrome; and obese Class II.

A multidisciplinary case conference [Figure 4] composed of the OBGYN department, MIGS section, general surgery, and minimally invasive surgery (MIS) surgical section was conducted to plan out the minimally invasive approach. Patient's consent was obtained for a combined
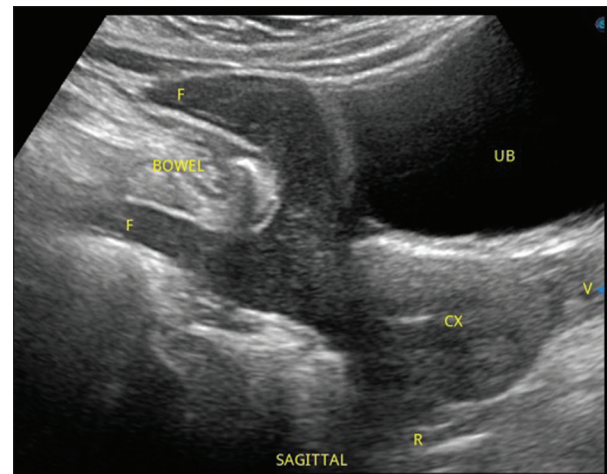

Figure 1: Transabdominal sonogram showing the urinary bladder, vagina, and rectum are intact. The cervix measures 3.0 cm × 2.7 cm × 3.0 cm with distinct endocervical canal. The uterus is anteverted with irregular contour and homogeneous echo pattern measuring 8.0 cm × 7.9 cm × 4.9 cm with a defect at the fundal area, more to the right measuring 2.0 cm. A hyperechogenic structure measuring 4.0 cm × 2.4 cm (l × h) demonstrating peristalsis suggestive of a segment of bowel (BOWEL) is seen insinuating into the defect. UB: Urinary bladder, CX: Cervix, R: Rectum, V: Vagina, F: Fundal
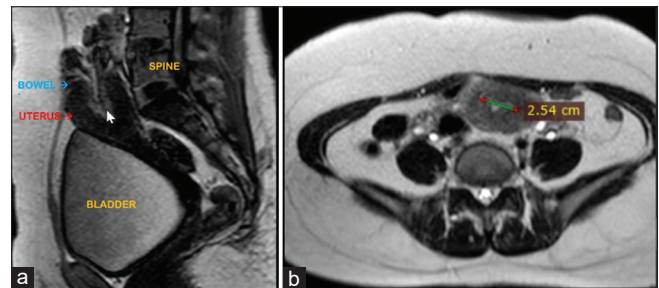

Figure 2: (a) Sagittal view of abdominal magnetic resonance imaging (MRI) showing bowel (blue) herniation (arrow) into the uterine fundus (red). (b) Transverse view of abdominal MRI showing uterine defect of 2.54 cm
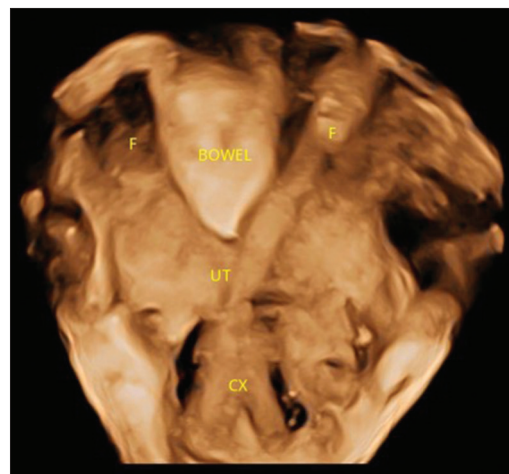

Figure 3: Three-dimensional sonogram/the coronal view of the uterus shows an irregular external fundal contour with a defect at the right posterofundal area measuring 3.8 cm × 2.8 cm (l × h). Within the defect is a hyperechogenic structure suggestive of a segment of a bowel. CX: Cervix, F: Fundal, UT: Uterus

Figure 4: Multidisciplinary conference composed of the OBGYN minimally invasive gynecologic surgery section, general surgery, and minimally invasive surgery surgical section to plan out the surgical approach

hysteroscopy and laparoscopy in freeing the entrapped bowel segment, laparoscopic repair of the uterine defect, possible hysterectomy, and possible bowel repair or resection with anastomosis.

Intraoperative course was as follows: Hysteroscopy was initially attempted. There was initial ease of insertion of the diagnostic sheath and scope intracervically; however, on gradual advancement, resistance was felt and adhesions were visualized at the endocervical os. The internal os was completely obstructed by dense fibrotic adhesions, rendering it impassable to the diagnostic hysteroscope [Figure 5]. Dilation with Hegar dilators was not attempted due to potential injury of the entrapped bowel segment. Thus, hysteroscopy was abandoned, and the team proceeded with laparoscopy. Abdominal entry was made with an umbilical primary port and 4 secondary ports at the lateral abdominal walls. On exploration, abdominal organs were grossly normal with no ascites nor hemoperitoneum. The pathology was then exposed [Figure 6]: An entire segment of the small bowel – About 10 cm in length–was noted to invaginate through a 2.5 cm × 2.5 cm myometrial defect at the posterior midcorpus. The bowel loop was noted to be adherent to the endometrial walls, completely obliterating the endometrial cavity up to the level of the internal os. Because of the degree of bowel herniation and adhesion within the endometrial cavity, an extension of the already present uterine defect to adequately visualize the plane of dissection was the only safe route to separate the bowel from the endometrium and prevent bowel injury. Since the enlargement of the already present 2.5 cm × 2.5 cm uterine defect would make uterine repair surgically difficult, potentially lead to more blood loss, and increase patient's morbidity, coupled with the patient's grand multiparity, and completed family size, the surgical team decided to abandon conservative management through uterine repair and proceed with total hysterectomy through laparoscopy.

To limit intraoperative blood loss, bilateral uterine artery isolation, coagulation, and transection were done with the use of smart bipolar forceps. This was followed by infiltration of dilute vasopressin solution into the myometrium with an injector until a pale uterine corpus was achieved. The uterus was then cut bivalve at the midline [Figure 7] using smart bipolar forceps until the entrapped bowel was adequately visualized. Careful enterolysis was done using sharp and blunt dissection. Counter traction of the adherent bowel loop and the uterine musculature was done to adequately visualize the plane of dissection. Vascular areas were further coagulated using smart bipolar forceps. Once the entire segment of the entrapped bowel was separated from the uterus, bleeding areas were coagulated. The involved bowel segment was examined for any perforation, and none was discovered. Total laparoscopic hysterectomy with bilateral salpingectomy was then completed. Thereafter, the general surgery team explored the entire length of the bowel [Figure 8a and b]. There was a note of a compromised blood supply of the 10 cm segment of the ileum. However, there was no bowel strangulation or perforation. Because of the compromised blood supply of the involved ileal segment coupled with the chronic 16-month history of intra-endometrial bowel entrapment, the general surgery team could not assure the integrity of the involved bowel if conservatively left for observation; thus, decided to perform extracorporeal resection of the involved bowel segment with anastomosis of healthy bowel tissue [Figure 9]. Specimen [Figure 10] were sent to histopathology and revealed unremarkable biopsy findings.
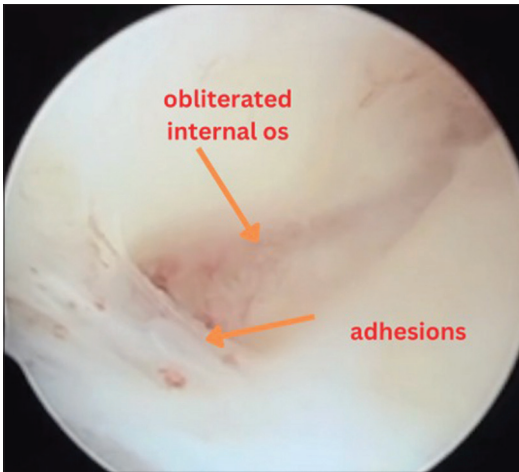
Figure 5: Attempted hysteroscope. Fibrotic adhesions were noted at the endocervical os, completely obstructing the cervical canal
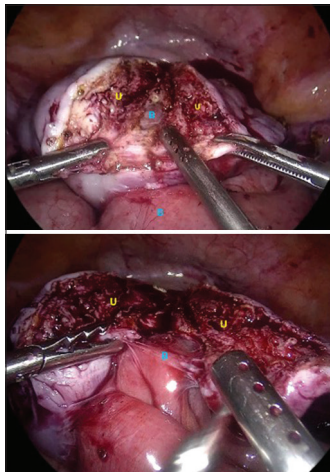

Figure 7: Laparoscopy. Incising the uterus (U) longitudinally at the midline to extend the uterine defect, allowing adequate visualization of the plane of dissection between the bowel wall and the endometrial wall (U). U: Uterus, B: Bowel

Figure 6: Laparoscopic visualization of the pathology: The uterine perforation defect was approximately 2.5 × 2.5cm with a 10cm ileal loop herniating within. Yellow arrow: uterine defect, B: Bowel

Figure 8: (a) Laparoscopy view of ileal segment postenetrolysis with compromised blood supply. (b) Extracorporeal view of ileal segment postenetrolysis with compromised blood supply

Postoperatively, the patient had an adequate return of bowel function with good tolerance to diet progression until able to tolerate a full diet. She was discharged on the seventh postoperative day.

Case Discussion

The first reported case of small bowel obstruction after uterine perforation dates back to 1864. A review by Augustin *et al*. covers a literature search from 1900 to 2012 and a second review by Zorilă *et al*. covers 1972–2022. The former review reports 30 cases, whereas the latter reports 12 cases of such complication. However, both reviews excluded reports on uterine perforation caused by D and C done after labor and delivery.[2,3] A 16-year review by O'Brien and Pillai covers a literature search from 2000 to 2015 on uterine perforation after insertion of intrauterine devices postpartum and reported an annual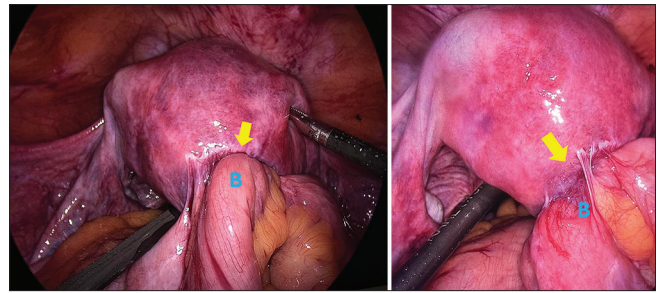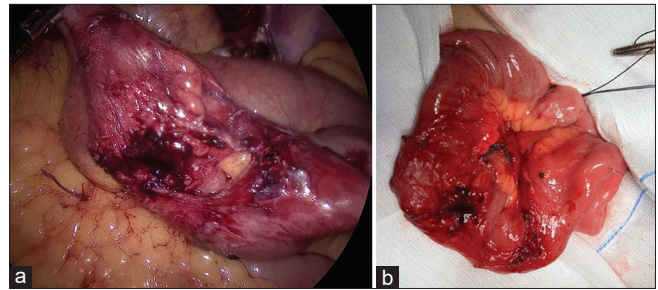 perforation rate of 0–4.3/1,000 insertions.[4] There are no reviews on uterine perforation specifically following D and C done after labor and delivery. There are, however, two case reports of uterine perforation following D and C specifically for retained placental fragments.[5,6] Both reports cited that although this complication is not rare in a postpartum uterus, the true incidence has not yet been established. The lack of review and/or reports of uterine perforation following D and C done after labor and delivery may be due to spontaneous healing of uncomplicated uterine perforations, immediate surgical intervention upon recognition intraoperatively, and prehospital maternal mortalities, especially in undeveloped countries such as the Philippines.[3]

According to the Royal College of Gynecologists, risk factors for uterine perforation can be divided into having a (1) high-risk uterus and cervix, a (2) high-risk surgery, and a (3) high-risk surgeon. High-risk uterus and cervix include a gravid uterus, especially at advanced gestations, evacuation of retained products of conception, a parous uterus, recent pregnancy in the last 6 months, small postmenopausal uterus, atrophic postmenopausal cervix, distorted uterine architecture by leiomyomas or congenital uterine malformations, presence of intrauterine adhesions, presence of infections, position, and attitude of the uterus (retroverted, acutely anteverted, and retroflexed), and having a scarred uterus.[7] The index case is considered to have a high-risk uterus and cervix since she has a postpartum uterus in hemorrhage due to retained products of conception. In

Figure 9: Extracorporeal end-to-end anastomosis of ileal segment

Figure 10: Cut sections of post-hysterectomy with bilateral salpingectomy specimen with the following measurements: Cervix 3×2 cm; uterus 9× 6×3 cm; Endocervical canal 4 cm; Uterine cavity 5 cm; Endometrium 0.3 cm; Myometrial thickness 1 cm; Right fallopian tube 6×1 cm; Left fallopian tube 4×1 cm.
C: Cervix, U: Uterus, yellow line: Endocervical canal, green line: uterine cavity, blue line: endometrium, purple line: myometrial thickness, RFT: right fallopian tube, LFT: left fallopian tube

this scenario, the hemorrhagic postpartum uterus is made up of a soft and boggy myometrial wall. This decreased muscular tone leads to a weakened myometrial barrier prone to perforation by a rigid metal curette.

High-risk surgeries include cases of evacuation of retained products of conception for postpartum hemorrhage, surgeries for division of intrauterine adhesions, surgeries for elective abortions, and hysteroscopic procedures to investigate postmenopausal bleeding.[7] The index case underwent a high-risk procedure with completion curettage for retained placental fragments, hours after the home vaginal delivery of her 5th child.

High-risk surgeon refers to a surgeon's experience and techniques. It has been suggested that perforation rates increase when the procedure is performed by junior trainees.[7] In this case, the level of training of the surgeon could not be determined. However, the procedure was done in a secondary-level government hospital in a developing country. It can be inferred that more than the surgeon itself, other external factors such as completeness and efficiency of operating room supplies, availability of appropriate medications, presence of emergent surgical protocols, and competence of overall hospital staff may have significantly contributed to this high risk scenario.

Uterine perforation following evacuation of retained products of conception for postpartum hemorrhage occurs in 5.1%–5.70% of cases.[7] However, this incidence mostly covers uncomplicated uterine perforation without adjacent pelvic organ involvement. The incidence of uterine perforation complicated with bowel herniation has not been reported. The mechanism of small bowel obstruction is described in four ways. The first and most common mechanism is the prolapse of a small bowel through the uterine defect due to inadvertent aspiration or pulling of the small bowel into the uterine defect.
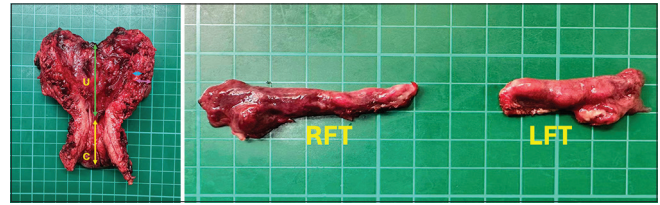
The second mechanism is when a band attached to the herniated omentum strangulates an extrauterine segment of the small bowel causing obstructive symptoms. The third mechanism is when the adhesions that formed at the site of the uterine defect entrap the adjacent small bowel and cause obstruction or strangulation. The fourth mechanism, which is the most uncommon, is the richter type of hernia when only the antimesenteric border of the bowel prolapses inside the uterine defect, loses blood supply, and causes obstruction.[3] For the index case, the first mechanism of bowel obstruction occurred since an entire circumference of a 10 cm length of ileal segment prolapsed into the uterine defect forming a U-shaped bend within the endometrial cavity. It can be deduced that during curettage, the rigid curette pierced through the posterior myometrial wall, inadvertently pulling the small bowel inside the uterine cavity.

Unlike the other mechanisms that cause outright strangulation with subsequent loss of blood supply, leading to necrosis, compromised bowel function, and finally an obstruction, the first mechanism has the potential to maintain the peristaltic flow of the bowel within the endometrial cavity such as seen in the index case. Because of the relatively large uterine defect of 2.5 cm × 2.5 cm, the entire herniated bowel segment was able to maintain its blood supply and peristaltic motion, averting bowel obstruction and/or incarceration. This is in contrast to the similar case reports by Lin and Lee[5] wherein a 1 cm × 1 cm uterine defect caused a Richter's type of hernia causing the patient to experience symptoms of small bowel obstruction more acutely within 2 h postcurettage and report by Matthys et al.[6] wherein a 1.7 cm uterine defect at the right uterine wall caused signs of small bowel obstruction acutely within 2 days postcurettage. The index case presented with a unique indolent and chronic course of 16 months postcurettage without any sign of bowel obstruction. Although the size of the uterine defect has not been correlated to the occurrence of small bowel obstruction, it can be deduced from this discussion that a larger uterine defect can accommodate an entire bowel segment to herniate through, maintaining appropriate blood

flow and peristaltic activity, evading strangulation and incarceration.

Another significant clinical presentation of uterine perforation reported in the reviews is the presence of a torrential hemorrhage from the uterine defect, leading to an acute abdomen and severe anemia.[2,3] Although small and uncomplicated uterine perforations are known to resolve spontaneously,[2,7] large uterine defects are expected to cause life-threatening hemorrhage. Such is not observed in the index case despite having a relatively large uterine defect. This might be probably due to the pressure created by the entire 10 cm ileal bowel segment herniation that may have caused tamponade to the compromised myometrial wall. In addition, subsequent adhesion formation may have reinforced this tamponade effect, eventually obliterating the entire myometrial defect.

This theory also helps to explain the unique presentation of oligomenorrhea in the index case. Oligomenorrhea has not been reported as a complication of intra-endometrial bowel herniation.[2,3] It is rather an unusual presentation as torrential hemorrhage is the expected outcome and normal menstrual flow usually follows a completion curettage. The mechanism of oligomenorrhea may be due to the extensive denudation of the endometrial lining by the herniated bowel segment. Pressure from the intestinal wall may have caused anoxia to the adjacent endometrial glands causing a marked inflammatory reaction with subsequent atrophy and extensive adhesion formation. Intraoperatively, this was evidenced by the impassable hysteroscope upon the attempt of intrauterine hydrodissection. Three mechanisms are at play with (1) intrauterine tamponade created by the herniated bowel; (2) intrauterine adhesions between the bowel wall and endometrium; and (3) an obliterated endocervical canal. The first two mechanisms lead to endometrial dysfunction, whereas the last mechanism leads to physical obstruction of menstrual flow, both resulting in oligomenorrhea.

Diagnostic modalities used in identifying uterine perforation depend on the clinical presentation. Acute symptoms such as profuse hemorrhage or acute abdomen, render imaging studies unnecessary. In contrast, nonspecific and chronic symptoms mandate imaging studies such as abdominal X-ray, abdominal or transvaginal sonograms, computed tomography (CT) scan, and MRI.[2,3] The index case presented with vague and chronic symptoms that warranted further workup. Transvaginal and abdominal ultrasounds, abdominal CT scan, pelvic MRI, and a 3D sonogram were done not only to establish a diagnosis but more so to map out the appropriate surgical approach.

Because of low reports along with varied clinical presentations, the management of uterine perforation with bowel involvement has not been established and is tailored to fit the patient's case. Because uterine perforation without complications is known to resolve spontaneously, it could be managed conservatively. Kaali *et al.* managed conservatively 22 perforations after 7114 elective abortions with positive results.[8]

Uterine perforations accompanied by complications such as bowel injury should be managed surgically and most oftentimes mandate an emergency laparotomy or laparoscopy to prevent progressive bowel distention and resultant ischemic necrosis and bowel perforation. There are no studies comparing laparotomy versus laparoscopy in the management of uterine perforations. Factors that would determine the surgical route include the acuteness of the clinical presentation, the stability of the patient, the medical and surgical history of the patient, the surgeon's skill, and the institution's capability of performing minimally invasive surgeries. When presented with an acute case and an unstable patient, an open laparotomy may be preferred as it may offer a faster surgical route in addressing the pathology intraoperatively. A patient with a history of pelvic surgery especially one that is prone to dense adhesions will likely lead to an open laparotomy route. The surgeon's skill and hospital's capability of performing minimally invasive surgeries is of prime importance in the selection of surgical route as a competent endoscopic surgeon with adequate equipment, can efficiently manage acute and complicated cases such as seen in Lin and Lee's case.[5] Moreover, the presence of contraindications to laparoscopy such as the inability to tolerate pneumoperitoneum or Trendelenburg position, a patient with increased intracranial pressure, cardiac abnormalities, hepatomegaly, and splenomegaly would definitely lead to an open surgery.[9] In the index case, a minimally invasive route was performed due to proper patient selection as shown by the patient's indolent symptomatology and stable condition, the gynecologic surgeon's endoscopic skillset, the hospital's capability for minimally invasive surgeries, and the absence of absolute contraindications to a laparoscopic surgery.

A conservative route to preserve the uterus and repair the defect was initially sought as lesser intraoperative trauma would lead to decreased patient morbidity and increased patient satisfaction. However, intraoperative findings of extensive bowel herniation with dense fibrotic endometrial adhesions up to the level of the internal os deemed the hysteroscopic approach unattainable in this case. Although hysterectomy is not necessary in all cases of uterine perforation with bowel involvement,[2,3] it was performed in this case due to the extensive bowel adhesion. It was necessary to extend the uterine defect to provide adequate exposure of the plane of dissection.

The limited surgical space that was offered by the 2.5 cm uterine defect with obliterated endometrial cavity posed the threat of iatrogenic bowel perforation upon enterolysis. Thus, a bivalve dissection of the uterus was thought as the safest surgical approach for this case. Since copious hemorrhage was anticipated, hemostasis was obtained through bilateral uterine artery ligation and infiltration of dilute vasopressin into the myometrial wall which led to an intraoperative blood loss of 400 mL for this case.

Bowel resection with end-to-end anastomosis of healthy bowel segment was performed in this case as bowel integrity cannot be assured due to (1) chronic intra-endometrial bowel entrapment of 16 months and (2) devascularization of the involved bowel segment after enterolysis. This is in congruence with Augustin *et al.*'s review,[3] wherein bowel resection with end-to-end anastomosis was the preferred management in patients without peritonitis. For the index case, postoperative bowel function progressed satisfactorily.

Uterine perforation with bowel herniation reports an excellent prognosis with a survival rate of 93%.[2,3] The reported deaths were caused by grave intestinal injuries such as massive, small bowel necrosis and the presence of an additional sigmoid colon laceration.[2] These complications were averted from the index case as the devascularized bowel segment was resected, offering optimum survival potential.

Although conservative management with the preservation of the uterus cannot be achieved in this case, a minimally invasive approach was still pursued due to the benefits of lesser intraoperative blood loss, shorter hospital stay, better postoperative pain control, and faster patient recovery.[10] All of these benefits were experienced by the index case, amplifying the advantage of MIS even in complicated cases.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Authorship contributions
Mary Carmel O. Yu - Conceptualization, Resources, Writing- Original Draft, Writing- Review and Editing, Visualization.

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Conflicts of interest
There are no conflicts of interest.

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