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Pneumomediastinum from vaginal cuff dehiscence four months after laparoscopic-assisted vaginal hysterectomy: A case report

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ABSTRACT

INTRODUCTION: Vaginal cuff dehiscence (VCD) is a rare post-operative complication after hysterectomy in which the approximated edges of the vaginal cuff separate. Associated presentations range from simple separation with minimal bothersome symptoms to pain, infection, and surgical emergencies such as bowel evisceration. In this report we describe a rare and delayed presentation of VCD.

CASE: A 34-year-old woman underwent laparoscopy-assisted vaginal hysterectomy (LAVH) for persistent cervical dysplasia. Four months after surgery, she presented to the emergency department with diffuse vaginal bleeding and chest and abdominal pain. Prior to symptom onset she had attempted sexual intercourse for the first time since her surgery.

On pelvic exam, she had a one centimeter VCD. Chest, abdomen, and pelvis computerized tomography (CT) imaging showed pneumoperitoneum and pneumomediastinum. She was taken to the operating room for diagnostic laparoscopy, sigmoidoscopy, and endoscopy, which were unremarkable, as well as VCD repair.

DISCUSSION: We discuss how the patient's pneumomediastinum arose secondary to air introduced into the vagina during intercourse, which then traversed the following anatomic route: abdominal cavity, diaphragmatic hiatus, retroperitoneum, and mediastinum.

CONCLUSION: We report an unusual and delayed presentation of VCD after LAVH resulting in pneumoperitoneum and pneumomediastinum. The patient was managed surgically with exploration and VCD repair and had complete resolution of symptoms. Surgeons should understand that the risk of VCD exists as long as 8–12 weeks after surgery and VCD's varying presentations due to anatomic connection between abdominal cavity and mediastinum.

1. Introduction

Vaginal cuff dehiscence (VCD) is an uncommon but potentially morbid complication after hysterectomy. VCD involves partial or full-thickness separation of the vaginal cuff edges and can put patients at risk for infection and bowel evisceration [1]. Prior studies have reported the incidence of VCD to be 0% to 7.5% after hysterectomy, with greater risk associated with laparoscopic and robotic approaches compared with vaginal and abdominal methods [2,3]. The most common patient presentations are abdominal pain, vaginal bleeding, and/or watery vaginal discharge [4]. Although coitus soon after surgery is a major risk factor for VCD, the majority of cases occur without identifiable causes [5,6].

Given VCD's relatively low incidence, most studies on VCD are retrospective cohorts or case reports. These describe VCD with variable patient presentations and timing of diagnosis. Very little information exists in the literature on the intra-abdominal and, especially, extra-abdominal sequelae of VCD. We present a case of VCD resulting in pneumoperitoneum and pneumomediastinum four months after laparoscopic-assisted vaginal hysterectomy (LAVH) at an academic institution. This case report is compliant with the SCARE criteria [7].

2. Presentation of case

A 34-year old Caucasian woman with history of LAVH for persistent cervical dysplasia four months prior to presentation presented to the emergency department with severe, diffuse abdominal pain, vaginal bleeding and discharge, chest wall tenderness, neck pain, and shortness of breath. Prior to symptom onset, the patient had engaged in consensual penetrative intercourse with her husband for the first time since her LAVH. Intercourse was aborted early due to pain and vaginal bleeding. The patient denied vaginal insertion of other foreign objects such as sex toys and lacerations from intercourse. She reported the initial sequence of her symptoms to be brown vaginal discharge, chest wall tenderness, neck pain, and

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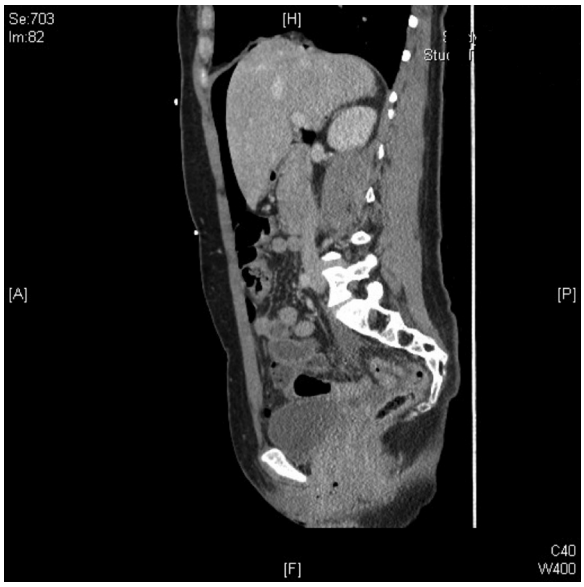

Fig. 1. Pneumoperitoneum.

Fig. 2. Pneumomediastinum and pneumoperitoneum.

finally shortness of breath. Other than well-controlled HIV with undetectable viral load and LAVH, the patient had no other medical or surgical history. She denied current smoking, alcohol, and illicit drug use. Family history was non-contributory.

Vital signs at presentation were notable for blood pressure ranging from 97/50 to 102/52 and mild tachycardia of 104 beats per minute. Physical exam revealed a well-developed and well-nourished female with a BMI of 28 in moderate distress. She was noted to have symmetric tenderness around the neck and chest wall. She was mildly tachycardic with normal breath sounds bilaterally. Her abdomen was soft and non-distended but diffusely tender to palpation without rebound tenderness. Laparoscopy sites were well healed. Pelvic exam revealed approximately 10cc of brown fluid that pooled upon speculum insertion. The vaginal cuff had a one-centimeter VCD with healthy appearing granulation tissue and without bowel evisceration. Vaginal cultures were obtained.

Laboratory findings were significant for leukocytosis of $24.2 \times 10(3)$/uL with 96.7% neutrophils. Chest and abdominal X-rays were notable for pneumoperitoneum, pneumomediastinum, andair in the soft tissue of her neck. The patient subsequently underwent computed tomography (CT) scan of the neck, chest, abdomen, and pelvis which revealed moderate pneumoperitoneum (Fig. 1) and extensive pneumomediastinum (Fig. 2) extending into bilateral neck soft tissues (Fig. 3) with concern for perforation along the aerodigestive tract.

Operative report from the patient's LAVH four months prior was overall uncomplicated and indicated that the colpotomy was made vaginally with circumferential sharp incision using a scalpel and was bluntly extended until peritoneum was palpated. The peritoneum was then entered with Metzenbaum scissors. The uterus was delivered vaginally and the vaginal cuff was closed with a series of 0-vicryl figure-of-eight sutures vaginally with peritoneum incorporated to vaginal mucosa. The patient was stable postoperatively and was discharged on postoperative day one. At her one-month post-operative visit the patient was noted to have an intact and well-healed vaginal cuff.

General surgery was consulted due to concern for aerodigestive perforation from pneumoperitoneum and pneumomediastinum. The plan was made to proceed with exam under anesthesia (EUA), exploratory laparoscopy, sigmoidoscopy, esophagogastroduodenoscopy (EGD), and closure of vaginal cuff with both general surgery and gynecology services.

Fig. 3. Bilateral extension of neck soft tissues with air from mediastinum.

Diagnostic laparoscopy was performed by general surgery and showed bowel adhesion of sigmoid colon to the vaginal cuff and no evidence of other abdominal inflammatory process or perforated viscus. Sigmoidoscopy and EGD were also performed by general surgery with negative findings. Gynecology team performed EUA and found 1.5 cm midline and 0.5 cm right lateral edge VCD sites. These were closed with interrupted 0-vicryl sutures vaginally. The patient tolerated the procedure well, extubated without difficulties, and transferred to the floor from recovery with stable vitals.

The patient's post-operative course was unremarkable. Her pain improved markedly soon after surgery and she was discharged from hospital the next day after her surgery. Vaginal cuff cultures collected at presentation were without growth. At eight-week gynecology follow-up, the patient's pleuritic chest pain had completely resolved and examination of the vaginal cuff showed no defects. A repeat chest x-ray showed resolution of pneumome-

diastinum and pneumoperitoneum. The patient was cleared to resume intercourse and for routine follow-up.

3. Discussion

Pneumomediastinum can result from intrathoracic or extrathoracic causes [8]. The mediastinum encompasses the structures and organs between the sternum anteriorly, the vertebral column posteriorly, the thoracic inlet superiorly, and the diaphragm inferiorly. The thoracic inlet and diaphragm do not, however, confine layers of connective tissue, vasculature, and organs as they communicate with vascular sheaths of the neck and retroperitoneal space, respectively [8]. Air can travel from abdominal space to mediastinum with 1.9% incidence of pneumothorax/pneumomediastinum caused by abdominal laparoscopic surgeries from CO_2 insufflation [9]. Although our patient had no iatrogenic abdominal input of air into her abdomen, her pneumoperitoneum and pneumomediastinum were most likely explained by air introduced to the abdomen during intercourse through the small vaginal cuff defects. Subsequently, the air traveled up toward the neck through the anatomic route of abdominal space through the diaphragmatic hiatus into retroperitoneum. From retroperitoneum, air finally reached to mediastinum and through bronchovascular sheaths into her neck along the connective tissues.

4. Conclusion

Pneumomediastinum is a rare and potentially serious complication from VCD that can lead to venous return obstruction causing cardiac arrest, compression of airway, and other life-threatening situations. There is no clear evidence on length of time to abstain from vaginal intercourse to prevent VCD; however, many providers recommend avoiding vaginal intercourse for 8–12 weeks after laparoscopic hysterectomy [10]. This patient presented after intercourse with VCD four months after surgery, which is a delayed presentation of VCD. The patient also presented with abdominal and extra-abdominal symptoms that are not typical for VCD. Therefore, it is important to appreciate the anatomic connection between abdominal cavity and mediastinum for surgeons to realize the diverse and delayed presentations of VCD.

Conflicts of interest

The authors have no conflicts of interest to declare.

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None.

Ethical approval

IRB committee at Weill Cornell Medical College had exempted this case report for review.

Consent

Written consent obtained from the patient.

Author contribution

Tsung Mou, MD – drafting primary manuscripts, data collection.
Tirsit Asfaw, MD – finalization of manuscript, surgeon for case.

Guarantor

Tsung Mou, MD.

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