

Pneumoperitoneum in a Patient with Endometriosis and Bilateral Salpingectomy after Sexual Activity

Rachid Kaddoura¹, Karim Abdalbari^{1*}, Mohammad Ayach², Abdul Kader Weiss²

¹College of Medicine, Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai, United Arab Emirates

²Clemenceau Medical Center, Dubai

*Correspondence should be addressed to Karim Abdalbari, Karim.abdalbari@students.mbru.ac.ae

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Abstract

Pneumoperitoneum commonly occurs due to perforated viscus, yet a minority of cases can occur due to gynaecological causes, particularly following sexual activities. While not yet established, various hypotheses have been posited to explain the development of a spontaneous pneumoperitoneum after sexual intercourse. We herein present a unique case of a woman with a history of endometriosis and bilateral salpingectomy who presented with sudden abdominal pain that started after sexual activity. Subsequently, an emergent diagnostic laparoscopy was deemed necessary yielding no signs of perforation. However, an endometrial island was identified on the stump of the previous right salpingectomy during the procedure. Finally, the most likely cause of the patient's spontaneous pneumoperitoneum was determined to be secondary to sexual activity and subsequent air transmission through an opening caused by her endometriosis. In conclusion, this report will showcase the importance of considering gynaecological pathologies as potential causes of spontaneous pneumoperitoneum, particularly following sexual activity. We intend to diminish the stigma associated with using sexual history as a diagnostic tool when faced with ambiguous cases of abdominal pain presentations.

Keywords: Surgery, Pneumoperitoneum, Sexual activity, Gynaecology, Perforation

Introduction

Pneumoperitoneum is a surgical emergency defined as the entrapment of either air or gas in the peritoneal cavity. Its presentation is frequently encountered in the emergency department, and it usually presents with sudden abdominal pain with varying degrees of severity [1]. It has a wide range of aetiologies, including intestinal perforation, peritoneal dialysis, vaginal aspiration, and mechanical ventilation, with perforated viscus being the most common. Pneumoperitoneum is usually detected with an upright chest X-ray where subdiaphragmatic free air can be visualized or a computed-tomography (CT) scan if only a small amount of air is present [2]. Once pneumoperitoneum is confirmed, invasive measures such as early surgical laparotomy are usually indicated to close the perforation.

In a minority of cases, gynaecological causes have

been identified as the cause of pneumoperitoneum [3]. Endometriosis is one of the most described gynaecological conditions in the literature and affects around 10% of women in their reproductive age. It is defined as the presence of endometrial tissue in ectopic locations outside the uterus and presents with symptoms such as dysmenorrhea, dyspareunia, irregular uterine bleeding, and in rare cases, it could cause infertility [4]. In recent years, a minute number of pneumoperitoneum cases directly after sexual activities have been reported worldwide. Although not clearly proved, different hypotheses have been proposed as to the cause of pneumoperitoneum after sexual intercourse [5].

Thereby, we report herein a very rare case of a patient with endometriosis who presents with spontaneous pneumoperitoneum after sexual intercourse. To the best of our knowledge, this is the first case highlighting such a presentation.

Case Report

A female in her mid-thirties presented to the emergency department due to severe sudden onset abdominal pain of around eight hours duration. The pain had increased in severity since its onset and was described as a sharp-like generalized pain. The pain was continuous, with no aggravating or relieving factors identified. The patient reported feeling nauseous with no vomiting, fever, chills, or any other associated symptoms. Furthermore, the pain was not associated with any urinary or bowel symptoms, and she reported no history of abnormal vaginal bleeding or discharge. The patient reported a history of endometriosis, of which she had to undergo a bilateral salpingectomy and partial sigmoidectomy for intra-luminal endometriosis. She is currently using over the counter non-steroidal anti-inflammatories (NSAID). She reported having regular menstrual cycles with her last menstrual period being

two weeks ago. The patient has no known family history of any chronic medical conditions, and her social history was not significant.

On her initial presentation to the emergency department, she was hemodynamically stable and afebrile. Abdominal physical examination revealed generalized tenderness, involuntary guarding, and rigidity across all quadrants of the abdomen.

Lab tests were ordered, and the only abnormality was an elevated c-reactive protein of 42 mg/L. An enhanced CT scan of the abdomen and pelvis was performed and revealed evidence of pneumoperitoneum around the liver and below the right hemidiaphragm, with a significant amount of air along the hepatic and duodenal ligament (**Figures 1 and 2**). Additionally, the CT scan revealed surgical sutures along the rectal vault due to her past surgery.



Figure 1. Axial view of computed tomography demonstrating evidence of pneumoperitoneum around the liver and below the right hemidiaphragm.



Figure 2. Coronal view of a computed tomography demonstrating evidence of pneumoperitoneum around the liver and below the right hemidiaphragm.

Subsequently, an emergent diagnostic laparoscopy was deemed necessary due to the high suspicion of a perforated viscus. Surgical exploration revealed gastric plication (**Figure 3**), which was not declared by the patient on pre-operative assessment due to personal reasons. On further inspection, adhesions between the gastric plication and transverse colon as well as the abdominal wall were identified and have been taken down easily allowing further exploration of the digestive tract from the cardia onwards. The duodenum was inspected after complete mobilization and was found intact with no signs of ischaemia, perforation, or any other inflammatory changes. Inspection was continued from the ligament of Treitz and the small bowel up to the ileocecal junction which were vital and intact. The large bowel including the right colon, transverse colon, descending colon, and the sigmoid colon down to the rectum were also checked out with no obvious abnormalities noted. During the pelvis inspection, a

rim of bloody dark fluid was found in the Douglas pouch and contained between the anterior right side of the uterus and the abdominal wall. Few adhesions between the posterior aspect of the uterus and the anterior rectal wall were taken down easily for proper pelvis inspection with no obvious signs of perforations or pathological signs appreciated. While examining the pelvic region, the ovaries appeared normal. Notably, an endometriosis island was detected on the stump of the right salpingectomy (**Figures 4 and 5**), positioned adjacent to the fluid collection that had been identified during the pelvic inspection. As the digestive tract did not reveal any signs of perforations and to side with an air of caution, a methylene blue dye injection was performed through the gastric bougie, and the test did not reveal any leakage from the gut after adequate waiting time. A final inspection was performed on the entire intrabdominal digestive tract with no pathologies found. The pelvis was washed with normal saline

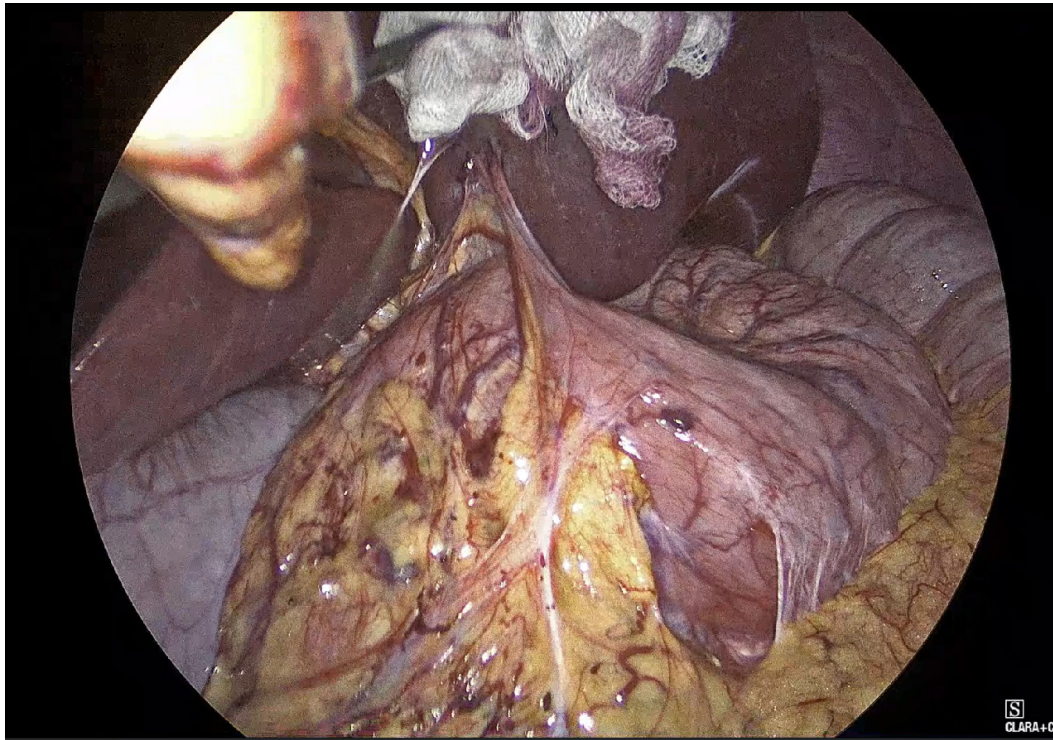


Figure 3. The plicated stomach visible during the laparoscopy procedure.

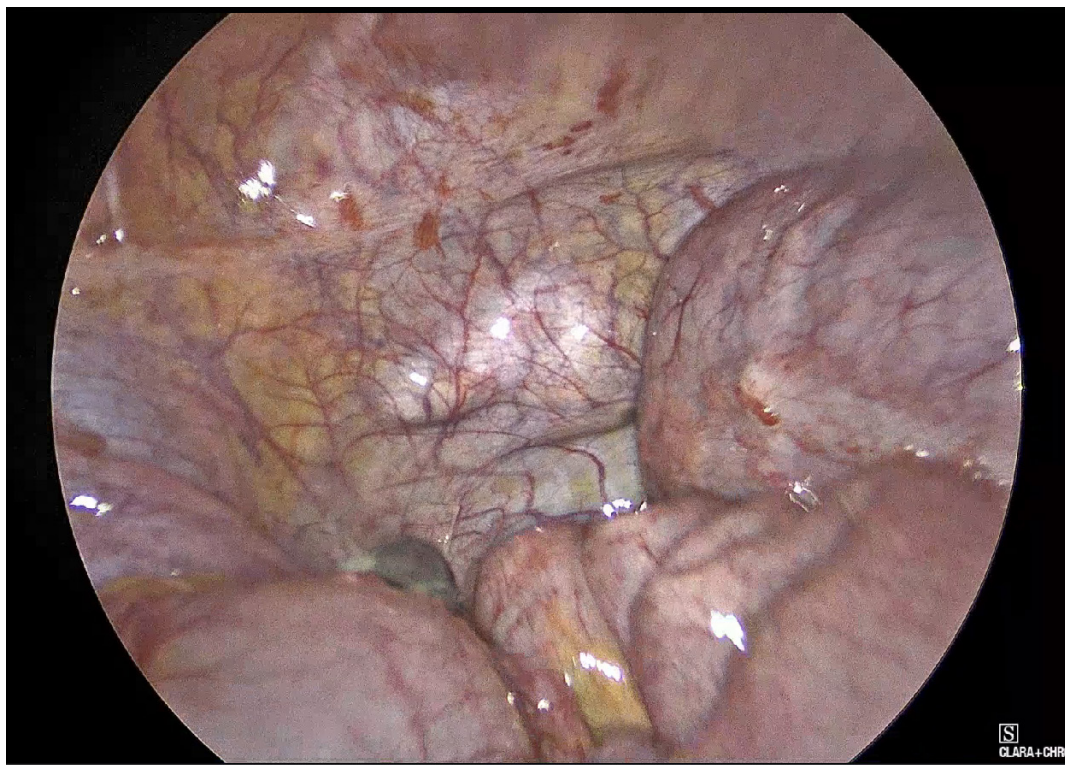


Figure 4. An island of endometriosis on the stump of the previous right salpingectomy.

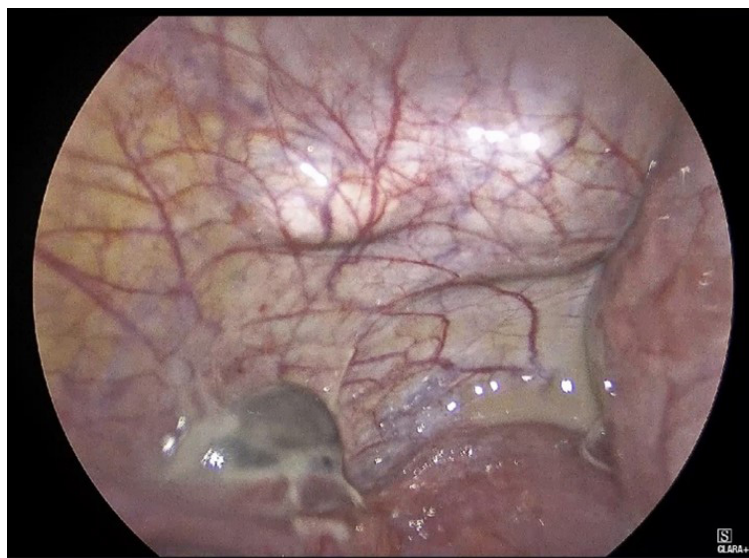


Figure 5. Close photoshoot of the endometriosis on the stump of the previous right salpingectomy.

and aspirated accordingly, and a drain was left close to the duodenum. The total time of surgery was one hour and a half.

Initially, given the patient's clinical findings, imaging, as well as the long-term history of NSAID use, a diagnosis of a perforated duodenal ulcer was the most likely diagnosis. However, after the exploratory laparotomy showed no signs of any intestinal perforations, the diagnosis was therefore ruled out. Furthermore, given the presence of fluid in the pelvic cavity as well as the endometrial island that was visualized during the procedure on the right salpingectomy stump, a gynaecological cause was considered. Post-surgery and on further questioning, the patient reported being sexually active, and particularly, she recalled that her abdominal pain started just after her sexual activity.

Due to the peculiar presentation of the described patient with no definite cause identified during surgery, a multidisciplinary team meeting including the gynaecological and surgical teams was done to identify a probable explanation after a perforated viscus was ruled out during surgical laparoscopy. It was finally agreed that the most likely cause of the patient's pneumoperitoneum was secondary to sexual activity and subsequent air transmission through an opening on the endometrial island in the previous right salpingectomy stump.

During the surgical exploration, a tube was placed to drain any excess fluid. Following the procedure, the patient was kept nil per os (NPO) and received intravenous fluid. The patient's pain was managed conservatively, and the patient was admitted for further monitoring and a follow-up CT scan scheduled for the next day to reassess her findings.

Following the surgery, the patient was hemodynamically stable and tolerating the pain better. She passed flatus and had normal bowel movements. CT scan of the chest, abdomen, and pelvis with oral and IV contrast in 24 hours postoperatively was performed. The CT scan showed no evidence of contrast extravasation, no acute intraabdominal process, and a significant decrease in the previously described air. Therefore, in view of the negative findings and nil by drain, the patient started oral feeding after 36 hours. She eventually made a good and prompt post-operative recovery with complete resolution of her initial presenting symptoms.

The patient was discharged home three days following the diagnostic laparoscopy and was planned for routine follow-up in the general surgery and gynaecology department at our institution. She remains stable throughout with no recurrence of her symptoms.

Discussion

This is a rare case of a patient who presents with spontaneous pneumoperitoneum after sexual activity. The available literature on our patient's presentation is limited, with only a few reported cases of spontaneous pneumoperitoneum occurring after sexual activity.

Pneumoperitoneum is classified into surgical and non-surgical pneumoperitoneum. Surgical causes, like a perforated viscus, are frequently encountered, and they are often caused by prolonged NSAID usage. [6]. Non-surgical causes, on the other hand, such as gynaecological aetiologies have been described in previous reports [3]. Although rarely reported,

pelvic inflammatory disease, pelvic examination, and vaginal insufflation have been found to cause spontaneous pneumoperitoneum in patients, especially females that are in their peak reproductive age. Moreover, a previous history of gynaecological surgery also was reported to be a risk factor for the development of spontaneous pneumoperitoneum. A distinct subset of patients who had undergone hysterectomy constituted a minority portion of instances involving pneumoperitoneum where no intraabdominal pathology was evident [7].

Reports have investigated different mechanisms explaining the pathophysiology behind the gynaecological conditions that could predispose to spontaneous pneumoperitoneum. Although relatively rare, patients with no gynaecological history could suffer from pneumoperitoneum during sexual intercourse if sufficient air is pushed through the vagina, uterus, and fallopian tubes reaching the abdominal cavity [5]. Regarding the occurrence of pneumoperitoneum subsequent to sexual activity in individuals with a history of hysterectomy, it should be noted that air generated during such activities has the potential to traverse through lacerations at the vaginal stump, ultimately gaining access to the peritoneal cavity. The likelihood of pneumoperitoneum following hysterectomy usually peaks shortly after the surgical procedure, making it advisable for patients to abstain from sexual activity for a period of 6 to 8 weeks after undergoing such high-risk gynaecological surgeries [5]. Furthermore, two cases reported the presence of spontaneous pneumoperitoneum following sexual activity, one of which was for a patient with bilateral salpingectomy [5,8]. Although many reports have documented the presence of pneumoperitoneum due to gynaecological causes, none have reported perforation due to endometriosis, further highlighting the rarity of the patient described in this report. The likely rationale behind this phenomenon was that the presence of both the residual stump and the adjacent endometriosis island established a delicate region, rendering the patient susceptible to a spontaneous rupture. This rupture subsequently facilitated an open connection between the uterine space and the abdominal cavity. In most cases, non-surgical causes of pneumoperitoneum are conservatively managed unless the patient is hemodynamically unstable [9]. This further highlights the importance of being aware of the non-surgical causes of pneumoperitoneum in order to identify them and avoid unnecessary invasive procedures.

There is a lack of awareness and poor pathophysiological understanding of the mechanism behind the development of spontaneous pneumoperitoneum following sexual activity. The stigma and social taboo related to this topic cause physicians and health care providers to not carefully inquire about the sexual history of the patient during the initial consultation. Careful consideration of patient risk factors is vital to identify the most probable cause of pneumoperitoneum in unclear cases of abdominal pain. Moreover, further research is required to enhance the understanding of spontaneous

pneumoperitoneum following sexual intercourse in patients with endometriosis and select gynaecological surgeries.

Conclusion

In conclusion, the presentation of pneumoperitoneum due to sexual activity although rare, is not a bizarre condition and can have serious consequences. Gynaecological conditions such as endometriosis and gynaecological surgeries could potentially increase the risk of developing spontaneous pneumoperitoneum after sexual activity. Therefore, it is vital for physicians to be aware of gynaecological causes that could predispose to spontaneous pneumoperitoneum following sexual activity to decrease stigma related to sexual history as a diagnostic tool in cases of unclear abdominal pain presentations.

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Authors' Contribution

All authors contributed to the study manuscript and design.

RK: manuscript writing

KA: manuscript writing

MA: data collection

AW: manuscript editing and data collection

Consent to Participate

Informed consent was obtained from all individual participants included in the study.

Consent to Publish

The authors affirm that human research participants provided informed consent for publication of the image 1, 2, 3, 4, and 5.

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