BMC Women's Health

CASE REPORT Open Access

Concurrent acute cystitis, pancolitis, and tubo-ovarian abscess following laparoscopic ovarian cystectomy: a case report

Yazan AlHabil[1*], Anas N. Owda[2], Basil J. Zaid[3], Seema Hameedi[1], Liza Saadeddin[1] and Mohammad A.A Awad[4]

Abstract

Background Inadequate surgical interventions can lead to serious complications such as tubo-ovarian abscesses in the upper female genital system, often resulting from untreated pelvic inflammatory disease. Pelvic inflammatory disease, caused by infections like *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, leads to scarring and adhesions in the reproductive organs, with common risk factors including intrauterine device use and multiple sexual partners. Pelvic inflammatory disease primarily affects sexually active young women and can manifest with varied symptoms, potentially leading to complications like ectopic pregnancy, infertility, and chronic pelvic pain if untreated.

Case presentation This case report presents a unique scenario involving a 17-year-old sexually inactive female who experienced concurrent tubo-ovarian abscess, acute cystitis, and pancolitis following laparoscopic ovarian cystectomy. Pelvic inflammatory disease and its complications are well-documented, but the simultaneous occurrence of acute cystitis and pancolitis in this context is unprecedented in the medical literature. The patient's presentation, clinical course, and management are detailed, highlighting the importance of considering diverse and severe complications in individuals with a history of gynecological surgeries.

Conclusions Our case report highlights the need for healthcare professionals to remain vigilant for atypical presentations of gynecological complications and emphasizes the value of interdisciplinary collaboration for optimal patient care. We encourage further research and awareness to enhance understanding and recognition of complex clinical scenarios associated with gynecological procedures.

Keywords Pelvic inflammatory disease, Gynecological surgeries, Pancolitis, Acute cystits, Tubo-ovarian abscess

*Correspondence:
Yazan AlHabil
yazanalhabil@gmail.com
[1]Faculty of Medicine and Health Sciences, Department of Medicine, An-Najah National University, Nablus 00970,, Palestine
[2]General Physician, School of Medicine, An-Najah National University, Nablus 00970, Palestine
[3]General Surgery, H-Clinic Specialty Hospital, Ramallah 00970, Palestine
[4]Head of Radiology Department, H-Clinic Specialty Hospital, Ramallah 00970, Palestine

Background

Inadequate surgical interventions can lead to serious complications, and tubo-ovarian abscesses exemplify such complications within the upper female genital system. These abscesses, characterized by fimbrial occlusion, intratubal pus accumulation, and enlargement of the fallopian tubes, can occur *de novo* or result from untreated or inadequately treated pelvic inflammatory disease (PID) [1, 2].

PID is an ascending polymicrobial infection of the upper female genital system, commonly caused by *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. These infections alter and impair the upper female genital system, primarily through scarring and the formation of adhesions in reproductive structures such as the endometrium, fallopian tubes, and ovaries [3]. Common risk factors for PID include undergoing intrauterine device implantation or tubal ligation, engaging in sexual activity with multiple partners, and having a history of previous PID. PID primarily affects sexually active young females, typically during late adolescence and early young adulthood. The presentation of PID varies widely, ranging from the absence of symptoms to vaginal discharge, vaginal bleeding, lower abdominal or pelvic pain, uterine or adnexal tenderness, and even sepsis [4]. Unfortunately, healthcare professionals often overlook this clinically diagnosed condition, leading to a wide array of serious sequelae. The most common sequelae include ectopic pregnancy, infertility, and chronic pelvic pain [5].

The involvement of adjacent pelvic organs, especially intra-abdominal structures, is rare in nature and can occur in uncommon forms of disseminated PID infection. Transmission usually involves the lymphatic and hematologic routes [6]. One example of such organ involvement is the development of cystitis, with symptoms revolving around urinary frequency, urgency, dysuria, hematuria, and suprapubic pain [7]. Interestingly, intra-abdominal dissemination has been linked to the development of intestinal obstruction due to the organization of fibrous tissues and adhesions following surgical interventions [6].

Ovarian cysts are benign fluid-filled ovarian spaces that manifest in about 5–15% of females during their reproductive ages. Patients are mainly asymptomatic but may present with pelvic pain or menstrual irregularities. Regardless, excision of ovarian cysts is crucial due to the potential for cyst rupture, hemorrhage, or torsion [8]. Fortunately, minimally invasive surgical interventions, such as laparoscopic ovarian cystectomy, have become the gold standard approach for managing ovarian cysts. However, it is crucial to emphasize that the ovarian reserve post-surgery may decline [9].

The current literature lacks any reported evidence for the simultaneous development of acute cystitis and pancolitis with a tubo-ovarian abscess following laparoscopic ovarian cystectomy. Therefore, reporting such possible complications is crucial for patients and healthcare professionals. Herein, we report a 17-year-old sexually inactive female who had previously undergone a laparoscopic ovarian cystectomy and presents as the first documented case of tubo-ovarian abscess with concurrent acute cystitis and pancolitis.

Case presentation

A 17-year-old female patient presented to our emergency department due to a sudden colic of four days duration. This abdominal pain coincided with non-bloody diarrhea and a decrease in appetite. Although the diarrhea and loss of appetite resolved spontaneously, the abdominal pain persisted and intensified over the four days. Additionally, she reported associated symptoms such as nausea, feverish sensations, and chills. Later in her course, she complained of hematuria and dysuria. She denied any recent upper respiratory tract infections, contact with ill individuals, antibiotic intake, hesitancy, or abnormal vaginal discharge. Notably, she is a single young adolescent with regular and smooth menstrual periods, having experienced menarche at the age of 10. Her last menstrual period was one week before her presentation.

Upon examination, the patient was conscious and cooperative but appeared ill. All vital signs were stable. A comprehensive physical examination assessing multiple systems was conducted, with cardiovascular, respiratory, and neurological examinations revealing no abnormalities. The abdominal examination indicated a soft and relaxed abdomen with mild generalized tenderness, absent masses or rebound tenderness, and a tympanic abdomen upon percussion. Furthermore, the patient's comprehensive laboratory analysis results upon admission are listed in Table 1.

The blood tests revealed elevated white blood cells, while the urine analysis showed many red blood cells and an elevated C-reactive protein (CRP) level. Her laboratory studies were otherwise unremarkable. An abdominal computed tomography (CT) scan confirmed the presence of concurrent tubo-ovarian abscess (Fig. 1), cystitis (Fig. 2), and acute pancolitis (Fig. 3). Consequently, the attending physicians sought consultations with both gastroenterologists and gynecologists. During her 30-minute stay in the emergency department, the patient received intravenous (IV) normal saline (1500 ml), oral metoclopramide (10 mg), oral omeprazole (40 mg), and oral scopolamine (10 mg) in an attempt to control her symptoms.

Subsequently, the medical team admitted the patient to the ward with a diagnosis of concurrent tubo-ovarian abscess, acute cystitis, and pancolitis. Therefore, the patient was initiated on IV ampicillin (1 g, three times a day, for three days), IV clindamycin (600 mg, three times a day, for three days), IV gentamicin (80 g, three times

Table 1 The patient's comprehensive laboratory analysis upon admission

Routine category	Parameter	Value	Normal range	Unit
Chemistry	Direct bilirubin	0.2	0-0.25	mg/dL
	Serum sodium	141	129–143	mmol/L
	Serum chloride	105	90–108	mmol/L
	Serum potassium	4.1	3–4	mmol/L
	Alkaline phosphatase	83	0-240	U/L
	Blood urea nitrogen	5	7.3–19	mg/dL
	Serum creatinine	0.80	0.55–1.2	mg/dL
	Aspartate aminotransferase	24	0–40	U/L
	Alanine transaminase	28	0–50	U/L
Serology and hematology	C-reactive protein	6.04	less than 0.5	mg/dL
	White blood cell count	11.3	4.2–10.8	x10^9 cells/L
	Neutrophils count	8.26	1.7–7.9	x10^9 cells/L
	Lymphocytes count	1.58	1.2-5	x10^9 cells/L
	Monocytes count	1.28	0.1–0.9	x10^9 cells/L
	Eosinophils count	0.075	0.02–0.55	x10^9 cells/L
	Basophils count	0.08	0-0.2	x10^9 cells/L
	Neutrophiles	73.2	39–77	%
	Lymphocyte	14.0	20–44	%
	Monocyte	11.4	1.5-9	%
	Eosinophils	0.666	0.5-5	%
	Basophils	0.711	0-1.75	%
	Red blood cell count	4.67	3.9–5.15	x10^12 cel/L
	Hemoglobin	13.7	12-15.4	g/dL
	Hematocrit	41.7	35–45	%
	Mean corpuscular volume	89.2	76–96	fL
	Mean corpuscular hemoglobin	29.3	26.5–33	pg
	Mean corpuscular hemoglobin concentration	32.8	31.5–36	g/dL
	Red cell distribution width	12.5	11.5–14.7	%
	Platelet count	198	160–358	x10^9cells/L
Stool analysis	Color	Brownish	N/A	N/A
	Mucus	Not seen	N/A	N/A
	Starch	Not seen	N/A	N/A
	Muscle fibers	Not seen	N/A	N/A
	Fats	Not seen	N/A	N/A
	Blood	Not seen	N/A	N/A
	Enterobius vermicularis	Not seen	N/A	N/A
	Entameba histolytica	Not seen	N/A	N/A
	Giardia lamblia	Not seen	N/A	N/A
	Schestosoma mansonai	Not seen	N/A	N/A
	Ascaris ova	Not seen	N/A	N/A
	Reducing sugars	Not seen	N/A	N/A
	White blood cell count	1–3	0	mg/g
	Red blood cell count	0–2	0–1	mg/g
	Consistency	Formed	N/A	N/A
	Sudan III Stain	Negative	N/A	N/A

Table 1 (continued)

Routine category	Parameter	Value	Normal range	Unit
Urine analysis	Color	Red	N/A	N/A
	Appearance	Hazy	N/A	N/A
	Potential of hydrogen (pH)	6	N/A	N/A
	Specific gravity	1.030	1.005–1.030	N/A
	Glucose	Nill	0-0.8	mmol/L
	Protein	+ 1	0–14	mg/dL
	Ketones	+ 1	Less than 0.6	mmol/L
	Urobilinogen	0.3	0.1–1.8	mg/dL
	Nitrites	Negative	N/A	N/A
	White blood cell count	2–4	0–2	HPF
	Red blood cell count	Many	0–3	HPF

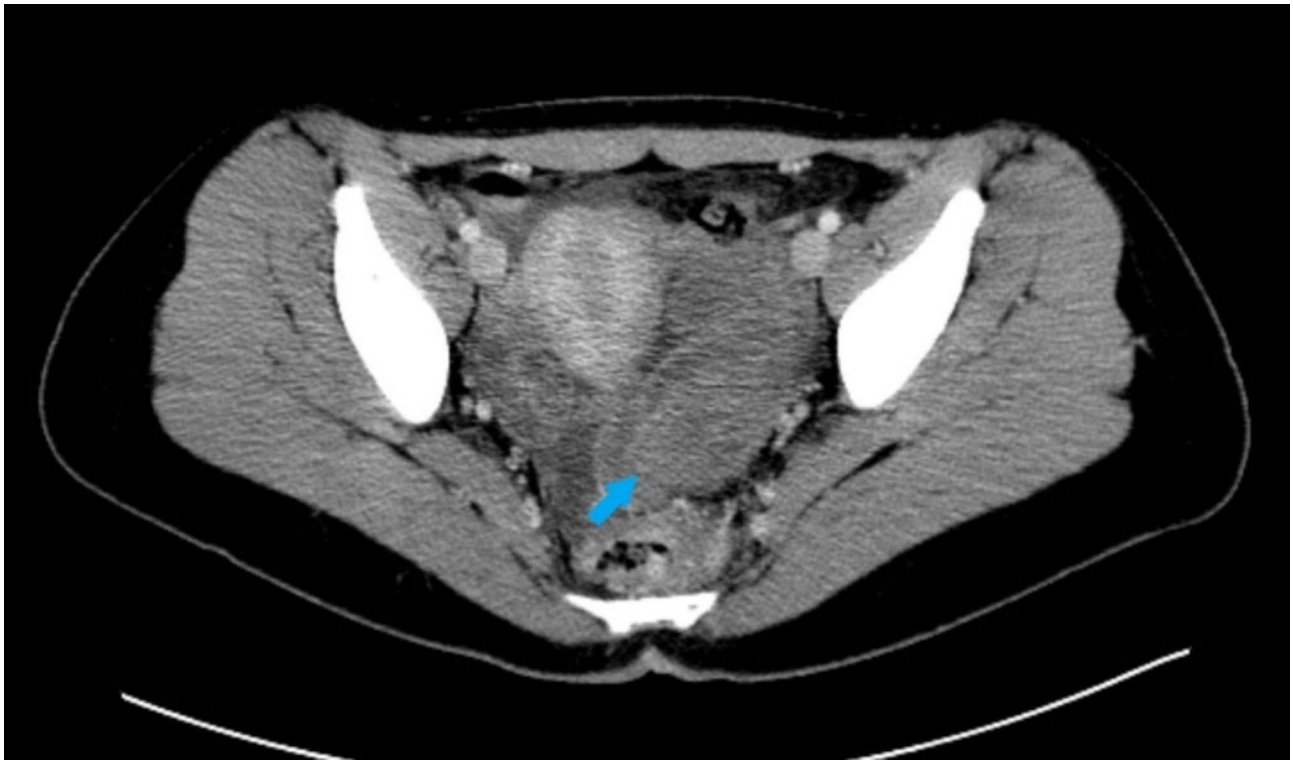

Fig. 1 Abdominopelvic computed tomography scan suggesting a left tubo-ovarian abscess. Axial view abdominopelvic computed tomography scan displaying a complex tubular multilocular enhancing structure in the left adnexa associated with regional fat stranding within the pelvis as well as a small volume of pelvic free fluid (blue arrow). These findings are suggestive of a left tubo-ovarian abscess

a day, for three days), and IV acetaminophen (1 g, four times a day, for eight days). Furthermore, the medical team sent a urinary sample for culture studies, and three days later, the microbiology results indicated the presence of extended-spectrum beta-lactamase bacteria sensitive to amikacin. Therefore, after consultation with the infectious disease specialist, the medical team adjusted the antibiotic regimen to include IV amikacin (500 mg, once daily, for five days) to address the patient's cystitis. Also, the new regimen included oral ciprofloxacin (500 mg, two times a day, for five days) and oral metronidazole (500 mg, three times a day, for five days) to cover the pancolitis and tubo-ovarian abscess.

One week later, her condition improved, and the medical team prescribed her a regimen of oral ciprofloxacin (500 mg, two times a day, for seven days) and oral metronidazole (500 mg, three times a day, for seven days). The patient's comprehensive laboratory analysis results upon discharge are listed in Table 2. She also received instructions for follow-up appointments at specialized gynecological and gastrointestinal clinics. These follow-ups were deemed crucial for monitoring her recovery and ensuring the effectiveness of the treatment regimen.

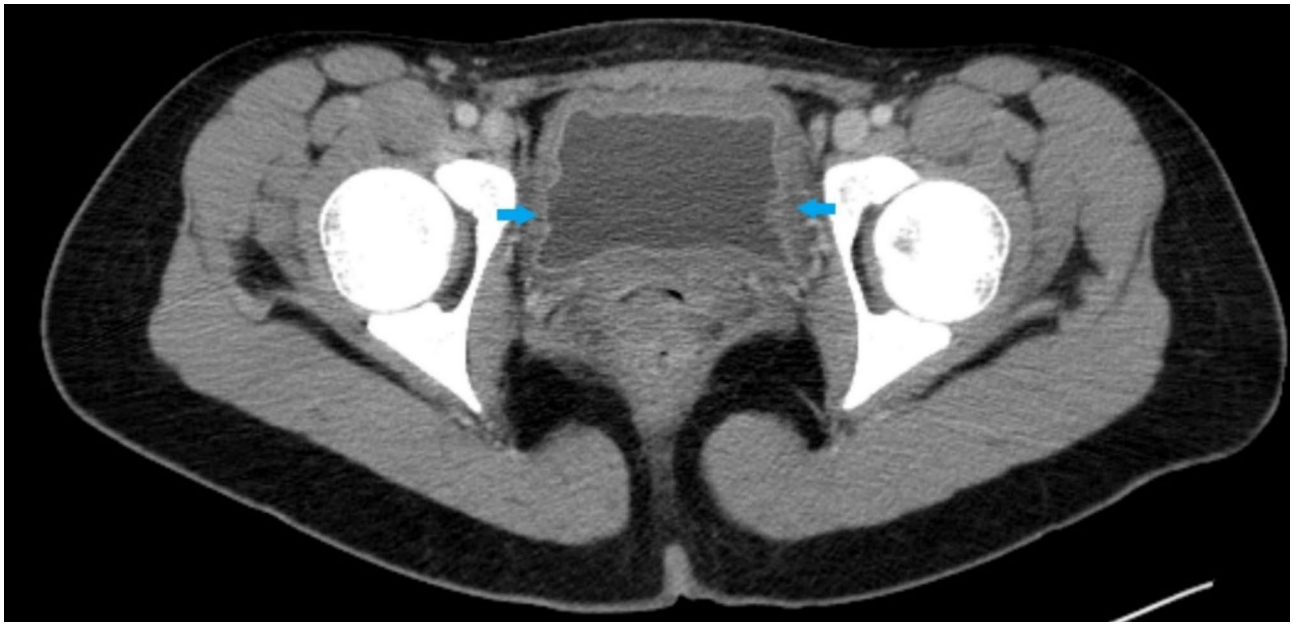

Fig. 2 Abdominopelvic computed tomography scan suggesting acute cystitis. Axial view abdominopelvic computed tomography scan displaying diffuse marked thickening throughout the urinary bladder wall associated with increased wall enhancement (blue arrows). These findings are suggestive of acute cystitis

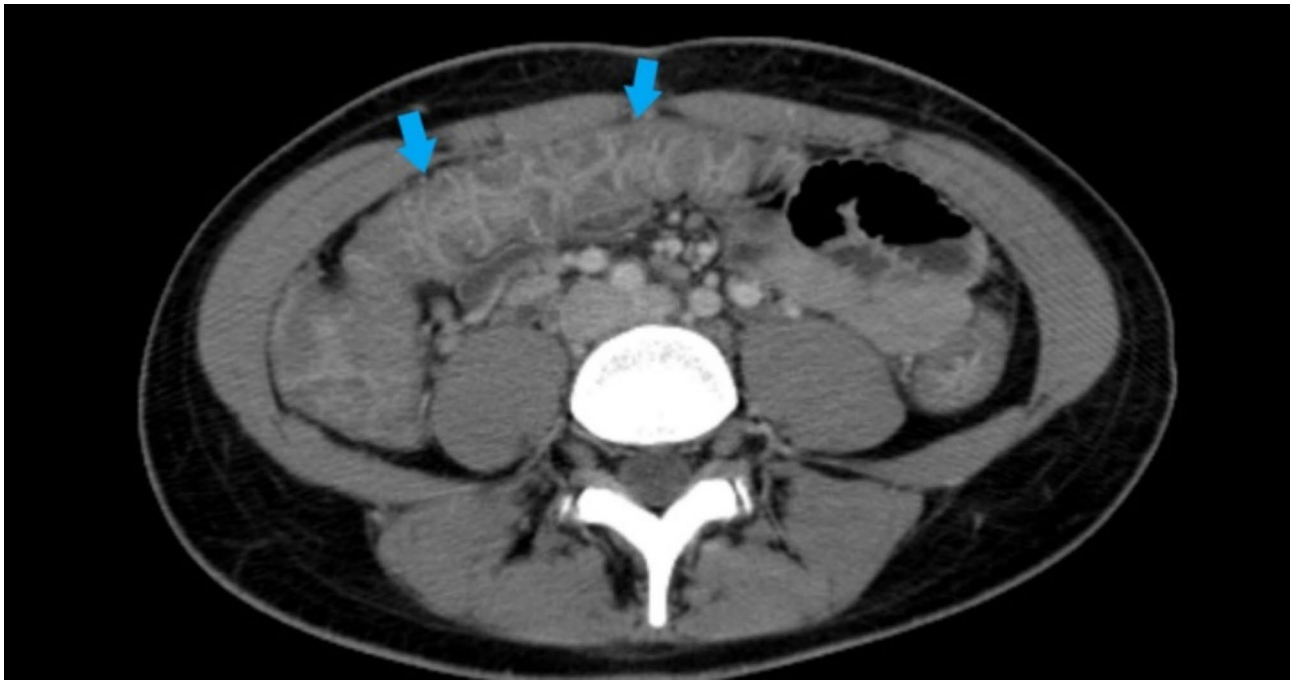

Fig. 3 Abdominopelvic computed tomography scan suggesting acute pancolitis. Axial view abdominopelvic computed tomography scan displaying a part of the transverse colon with wall thickening associated with increased mural enhancement and congested vasculature (blue arrows). These findings are seen throughout the entire colon and are suggestive of acute pancolitis

Six months before the patient's presentation to our emergency department, she underwent a laparoscopic ovarian cystectomy due to the presence of a left ovarian cystadenofibroma. In the two years leading up to her surgery, the patient experienced constant mild nausea, anorexia, and occasional dizziness, with no associated menstrual irregularities or symptoms. About one month before the surgery, new symptoms emerged, including diffuse sharp abdominal pain, distension, severe nausea, loss of appetite, and dizziness. Unfortunately, during

Table 2 The patient's comprehensive laboratory analysis upon discharge

Routine category	Parameter	Value	Normal range	Unit
Chemistry	Direct bilirubin	N/A	0-0.25	mg/dL
	Serum sodium	141	129–143	mmol/L
	Serum chloride	107	90–108	mmol/L
	Serum potassium	3.9	3–4	mmol/L
	Alkaline phosphatase	N/A	0-240	U/L
	Blood urea nitrogen	4	7.3–19	mg/dL
	Serum creatinine	0.79	0.55–1.2	mg/dL
	Aspartate aminotransferase	N/A	0–40	U/L
	Alanine transaminase	N/A	0–50	U/L
Serology and hematology	C-reactive protein	0.43	less than 0.5	mg/dL
	White blood cell count	7.77	4.2–10.8	x10^9 cells/L
	Neutrophils count	3.59	1.7–7.9	x10^9 cells/L
	Lymphocytes count	2.90	1.2-5	x10^9 cells/L
	Monocytes count	0.684	0.1–0.9	x10^9 cells/L
	Eosinophils count	0.465	0.02–0.55	x10^9 cells/L
	Basophils count	0.124	0-0.2	x10^9 cells/L
	Neutrophiles	46.3	39–77	%
	Lymphocyte	37.4	20–44	%
	Monocyte	8.81	1.5-9	%
	Eosinophils	5.98	0.5-5	%
	Basophils	1.60	0-1.75	%
	Red blood cell count	3.73	3.9–5.15	x10^12 cel/L
	Hemoglobin	10.9	12-15.4	g/dL
	Hematocrit	33.1	35–45	%
	Mean corpuscular volume	88.7	76–96	fL
	Mean corpuscular hemoglobin	29.3	26.5–33	pg
	Mean corpuscular hemoglobin concentration	33.0	31.5–36	g/dL
	Red cell distribution width	12.5	11.5–14.7	%
	Platelet count	249	160–358	x10^9cells/L
Stool analysis	Color	Brownish	N/A	N/A
	Mucus	Not seen	N/A	N/A
	Starch	Not seen	N/A	N/A
	Muscle fibers	Not seen	N/A	N/A
	Fats	Not seen	N/A	N/A
	Blood	Not seen	N/A	N/A
	Enterobius vermicularis	Not seen	N/A	N/A
	Entameba histolytica	Not seen	N/A	N/A
	Giardia lamblia	Not seen	N/A	N/A
	Schestosoma mansonai	Not seen	N/A	N/A
	Ascaris ova	Not seen	N/A	N/A
	Reducing sugars	Not seen	N/A	N/A
	White blood cell count	Not seen	0	mg/g
	Red blood cell count	Not seen	0–1	mg/g
	Consistency	Formed	N/A	N/A
	Sudan III Stain	Negative	N/A	N/A

Table 2 (continued)

Routine category	Parameter	Value	Normal range	Unit
Urine analysis	Color	Yellow	N/A	N/A
	Appearance	Clear	N/A	N/A
	Potential of hydrogen (pH)	6.4	N/A	N/A
	Specific gravity	1.005	1.005–1.030	N/A
	Glucose	Not seen	0-0.8	mmol/L
	Protein	Not seen	0–14	mg/dL
	Ketones	Not seen	Less than 0.6	mmol/L
	Urobilinogen	0.2	0.1–1.8	mg/dL
	Nitrites	Negative	N/A	N/A
	White blood cell count	Not seen	0–2	HPF
	Red blood cell count	Not seen	0–3	HPF

this period, the patient contracted coronavirus disease (COVID-19), and the symptoms were not initially considered worrisome enough to seek medical attention. Days before the surgery, the patient sought medical attention due to the progression of symptoms. Computed tomography (CT) with contrast scan revealed evidence of a large left ovarian cyst measuring 19×12×24 cm. Laboratory results were negative for tumor markers, where the cancer antigen 125 (CA-125) level was 5 U/mL (normal range: 0–35 U/mL), and the cancer antigen 19−9 (CA-19-9) level was 7 U/mL (normal range: 0–37 U/mL). Surgical management, in the form of a laparoscopic ovarian cystectomy, was performed. Post-resection, a biopsy of the ovarian cyst revealed a serous cystadenofibroma measuring 17×6 cm with a maximum wall thickness of 1.5 cm. An omental biopsy showed no malignancy. This procedure marked a significant milestone in the patient's treatment, addressing a concrete source of her symptoms. Her post-operative course was unremarkable until six months later when she presented to our emergency department, as previously described.

Discussion

Tubo-ovarian abscesses are complex infectious masses associated with pelvic inflammatory disease. These abscesses typically develop when cervical or vaginal pathogens ascend from the lower genital tract, forming enclosed masses within the peritoneal cavity. Computed tomography (CT) imaging reveals thick-walled, fluid-filled masses within the adnexa, often accompanied by symptoms such as fever, elevated white blood cell count, pelvic or abdominal pain, and potential vaginal discharge. These abscesses pose a risk of life-threatening sepsis if they rupture. Early diagnosis and treatment, typically involving antibiotics, are deemed crucial for sexually active females of reproductive age. The literature suggests percutaneous drainage under radiological guidance as a promising option [10, 11]. The integration of the Centers for Disease Control and Prevention's 2002 guidelines on sexually transmitted diseases contributed to a significant decline in their prevalence, with data indicating a decrease to a mere 2.3%. This data emphasizes the importance of guideline adherence to prevent complications [10].

Pelvic inflammatory disease involves the spread of microorganisms from the fallopian tubes to neighboring pelvic organs through lymphatic or hematologic routes. According to Munro et al., pelvic inflammatory disease may develop following intra-abdominal conditions such as pyelonephritis, diverticulitis, or appendicitis [11]. Cystitis, an inflammatory process in the bladder typically caused by an *Escherichia coli* infection, is an example of pelvic inflammatory disease dissemination to adjacent pelvic organs. Approximately 3–7% of females in the United States are affected by cystitis, which manifests with symptoms like urinary frequency, urgency, and pain [12]. Chung et al. suggested a potential link between pelvic inflammatory disease and chronic cystitis in their controlled cohort study, although documented evidence of such a connection remains limited in the existing literature [13].

In extremely severe cases, pelvic inflammatory disease may manifest with unusual and rare complications involving intra-abdominal organs. Martín-Lagos Maldonado et al. described a 24-year-old woman who presented with a tubo-ovarian abscess and intestinal obstruction due to pelvic inflammatory disease, necessitating exploratory laparoscopy, salpingectomy, abscess drainage, and ileal resection [6]. Abul-Khoudoud et al. reported a case of Fitz-Hugh-Curtis syndrome. The patient, a 51-year-old woman with a history of pelvic inflammatory disease and tubal ligation, was initially diagnosed with biliary colic. However, during laparoscopic cholecystectomy, she was found to have mechanical small bowel obstruction [14]. Harel et al. documented a 19-year-old patient with pelvic inflammatory disease experiencing high-grade partial small bowel obstruction, which resolved after conservative management [15]. Haumann et al. described a 27-year-old woman diagnosed with pelvic inflammatory disease through laparoscopy after presenting with

acute abdominal symptoms [16]. These cases highlight the diverse and potentially severe complications associated with pelvic inflammatory disease, emphasizing the importance of prompt diagnosis and appropriate management.

The ovaries and fallopian tubes are integral components of the female reproductive anatomy. These structures are susceptible to various cysts that can impact their physiological functioning. Functional cysts, such as follicular and corpus luteal cysts, are inherent to the menstrual cycle and typically resolve spontaneously. Additionally, polycystic ovary syndrome (PCOS), characterized by enlarged ovaries with small follicular cysts, affects approximatley 5–15% of females. In contrast, neoplastic cysts result from overgrowth of ovarian cells. In addition, dermoid cysts contain elements from all germ cell layers and carry a 1–2% risk of malignant transformation [8]. In this context, ovarian cystadenofibroma, a rare benign neoplasm, constitutes 1.7% of benign ovarian tumors. These tumors may present as cystic, complex with solid components, or predominantly solid. The challenge lies in the potential misdiagnosis as malignant. To address this challenge, post-resection biopsies are crucial to avoid unnecessary procedures. Ovarian cystadenofibromas occur in reproductive age groups, emphasizing the need for healthcare professionals to include it in their differential diagnoses [17].

Ovarian cysts affect approximately 6.6% of females in their reproductive years. The decision to undergo surgery is particularly critical for infertile individuals and those aspiring for future fertility. Laparoscopy is the preferred surgical approach for ovarian cystectomy due to its minimally invasive nature, offering advantages such as reduced risk for intra-abdominal adhesions and shorter hospitalization times. However, this procedure can have adverse effects on ovarian reserve, potentially leading to decreased ovarian function or premature ovarian failure [9, 18].

According to Miranda et al., gastrointestinal insults from gynecological laparoscopies affect about 0.1–0.2% of patients. The affected organs include the small bowel (52%), colon (32%), duodenum (11%), and stomach (4.5%). Urinary injuries occur at a rate of 0.34% and can typically be treated non-operatively with ureteral stenting and antibiotics. In contrast, 0.8–2.4% of patients undergoing gynecological laparoscopic surgery experience urinary tract infections. Lastly, vaginal infection is rare in the context of gynecological laparoscopies [19].

Given the complications previously discussed concerning pelvic inflammatory disease, tubo-ovarian abscesses, and laparoscopic ovarian cystectomies, our case report stands out as particularly interesting and unique. Acute pancolitis, an extensive inflammatory condition of the colonic mucosa [20], has not been documented in the context of tubo-ovarian abscesses following laparoscopic ovarian cystectomy. Additionally, acute cystitis in this context has not been documented, particularly in contrast to chronic cystitis [13]. Thus, to the best of our knowledge, our case report is the first to highlight such an unusual presentation in a sexually inactive adolescent female.

Conclusion

Our case report describes a rare presentation of a tubo-ovarian abscess with concurrent acute cystitis and pancolitis in a sexually inactive 17-year-old female post-laparoscopic ovarian cystectomy. This unique scenario highlights the need for heightened awareness of severe complications in patients with a history of gynecological surgeries, even without typical risk factors. Healthcare professionals should remain vigilant for atypical manifestations of pelvic inflammatory disease, emphasizing interdisciplinary collaboration for comprehensive patient evaluation. Timely diagnosis and management are crucial for preventing life-threatening complications and preserving reproductive health. Our case report sheds light on the importance of continuous research and increased awareness to better understand and address diverse presentations of pelvic inflammatory disease and its complications in clinical practice.

Abbreviations

PID	Pelvic inflammatory disease
pH	Potential of hydrogen
CRP	C-reactive protein
CT	Computed tomography
IV	Intravenous
COVID-19	Coronavirus disease
PCOS	Polycystic ovarian syndrome

Acknowledgements

We would like to thank the patient and her parents for their cooperation in the publication of this case report.

Author contributions

YH, AO, and BZ partook in the writing of all sections of the case report. SH and LS gathered the patient's data and partook in the writing of the case presentation. MA was responsible for writing and interpreting the radiological images. All authors read and approved the final manuscript.

Funding

Not applicable.

Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Publishing of case reports in Palestine is not required to undergo any ethical approval by a committee; consent from patients is enough.

Consent for publication

Written informed consent was obtained from the patient's parents to publish the case.

Competing interests
The authors declare no competing interests.

Received: 5 July 2024 / Accepted: 27 August 2024
Published online: 04 September 2024

References

1. Sendy S, Abuy A, Sendy W, Baradwan S. Unusual presentation of bilateral pyosalpinx mimicking an ovarian torsion: A case report. Ann Med Surg [Internet]. 2020;52:16–8. https://www.sciencedirect.com/science/article/pii/S2049080120300169
2. Afzal M, Kothari MR, Alghasham AT, Attal MM. Isolated pyosalpinx in a pre-teen with bicornuate uterus. J Pediatr Surg Case Reports [Internet]. 2021;72:101977. https://www.sciencedirect.com/science/article/pii/S2213576621001986
3. Stevens JS, Criss AK. Pathogenesis of Neisseria gonorrhoeae in the female reproductive tract: neutrophilic host response, sustained infection, and clinical sequelae. Curr Opin Hematol [Internet]. 2018;25(1). https://journals.lww.com/co-hematology/fulltext/2018/01000/pathogenesis_of_neisseria_gonorrhoeae_in_the.5.aspx
4. Frock-Welnak DN, Tam J. Identification and treatment of Acute Pelvic Inflammatory Disease and Associated Sequelae. Obstet Gynecol Clin North Am. 2022;49(3):551–79.
5. Haggerty CL, Gottlieb SL, Taylor BD, Low N, Xu F, Ness RB. Risk of Sequelae after Chlamydia trachomatis Genital Infection in Women. J Infect Dis [Internet]. 2010;201(Supplement_2):S134–55. https://doi.org/10.1086/652395
6. Martín-Lagos Maldonado A, Gallart Aragón T. Porcel Marin M del C. Pelvic inflammatory disease: An unusual cause of acute intestinal obstruction. Gastroenterol y Hepatol (English Ed [Internet]. 2019;42(9):549–50. https://www.elsevier.es/en-revista-gastroenterologia-hepatologia-english-edition--382-articulo-pelvic-inflammatory-disease-an-unusual-S2444382419302159
7. Nace DA, Perera SK, Hanlon JT, Saracco S, Anderson G, Schweon SJ, et al. The improving outcomes of UTI Management in Long-Term Care Project (IOU) Consensus guidelines for the diagnosis of uncomplicated cystitis in nursing home residents. J Am Med Dir Assoc. 2018;19(9):765–e7693.
8. Özcan R, Tekant GT. Ovarian Cyst. Pediatr Surg Dig Second Ed [Internet]. 2023 Jun 5 [cited 2024 Jan 9];527–8. https://www.ncbi.nlm.nih.gov/books/NBK560541/
9. Mansouri G, Safinataj M, Shahesmaeili A, Allahqoli L, Salehiniya H, Alkatout I. Effect of laparoscopic cystectomy on ovarian reserve in patients with ovarian cyst. Front Endocrinol (Lausanne). 2022;13:964229.
10. Kairys N, Roepke C, Tubo-Ovarian A. Contemp Ob-Gyn [Internet]. 2023 Jun 12 [cited 2024 Jan 9];44(6):108. https://www.ncbi.nlm.nih.gov/books/NBK448125/
11. Munro K, Gharaibeh A, Nagabushanam S, Martin C. Diagnosis and management of tubo-ovarian abscesses. Obstet Gynaecol [Internet]. 2018;20(1):11–9. https://doi.org/10.1111/tog.12447
12. Brossard C, Lefranc A-C, Pouliet A-L, Simon J-M, Benderitter M, Milliat F et al. Molecular Mechanisms and Key Processes in Interstitial, Hemorrhagic and Radiation Cystitis. Vol. 11, Biology. 2022.
13. Chung S-D, Chang C-H, Hung P-H, Chung C-J, Muo C-H, Huang C-Y. Correlation between bladder Pain Syndrome/Interstitial cystitis and pelvic inflammatory disease. Med (Baltim). 2015;94(46):e1878.
14. Abul-Khoudoud OR, Khabbaz AY, Butcher CH, Farha MJ. Mechanical Partial Small Bowel Obstruction in a Patient with Fitz-Hugh-Curtis Syndrome. https://home.liebertpub.com/lap [Internet]. 2004 Jul 7 [cited 2024 Jan 9];11(2):111–4. https://www.liebertpub.com/doi/https://doi.org/10.1089/109264201750162437
15. Harel Z, Tracy TF Jr, Bussey IIIJG. Small Bowel Obstruction in an Adolescent with Pelvic Inflammatory Disease due to Chlamydia Trachomatis. J Pediatr Adolesc Gynecol [Internet]. 2003;16(3):125–8. https://doi.org/10.1016/S1083-3188(03)00041-X
16. Haumann A, Ongaro S, Detry O, Meunier P, Meurisse M. Acute pelvic inflammatory disease as a rare cause of acute small bowel obstruction. Acta Chir Belg [Internet]. 2019;119(5):328–30. https://doi.org/10.1080/00015458.2018.1453438
17. Wasnik A, Elsayes K. Ovarian cystadenofibroma: A masquerader of malignancy. Vol. 20, The Indian journal of radiology & imaging. Germany; 2010. pp. 297–9.
18. Sahin C, Akdemir A, Ergenoglu AM, Ozgurel B, Yeniel AO, Taskiran D, et al. Which should be the Preferred technique during laparoscopic ovarian cystectomy. Reprod Sci. 2017;24(3):393–9.
19. Miranda CS, Carvajal AR. Complications of operative gynecological laparoscopy. JSLS J Soc Laparoendosc Surg. 2003;7(1):53–8.
20. Azer SA, Sun Y. Colitis. Colitis [Internet]. 2023 Aug 7 [cited 2024 Jan 9];1–128. https://www.ncbi.nlm.nih.gov/books/NBK541037/

Publisher's note