

CASE REPORT

Chemical Peritonitis following Spontaneous Rupture of an Ovarian Dermoid Cyst: A Case Report

Krupa H Shah¹, Saritha Raase², Shruti Borkar³

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ABSTRACT

Introduction: Dermoid cysts are the most common ovarian tumors found during reproductive life. The majority of dermoid cysts are asymptomatic; symptoms appear because of large size and pressure effect, infection, torsion, and rupture of the cyst wall. The present case describes a case in which a dermoid cyst ruptured in a young woman, resulting in chemical peritonitis, which is a rare complication.

Case Description: The patient was 25 years old and presented with abdominal pain for 2 days and fever for 1 day. Examination revealed mild pallor, tenderness, and guarding in the right quadrant of the abdomen. Her ultrasound and computed tomography (CT) scan suggested a right dermoid cyst with an inflamed omentum and a normal appendix. Emergency laparotomy for possible ruptured dermoid cysts and peritonitis was planned. The sebum was present on the cyst wall and in the peritoneal cavity. Dermoid cystectomy and generous peritoneal irrigation were performed. She recovered well and was discharged on the 3rd postoperative day.

Conclusion: Acute abdomen patients need a multidisciplinary team approach to reach a definitive diagnosis. Chemical peritonitis due to rupture of the dermoid cyst requires prompt operative treatment to prevent further complications.

Clinical significance: Despite the thick wall of a dermoid cyst, rupture can occur as a rare complication, and patients can present with features of acute abdomen. Prompt diagnosis and management of ruptured dermoid cysts can prevent future complications such as abscess and intestinal obstruction due to adhesions and chronic pelvic pain.

Keywords: Acute abdomen, Adnexal mass, Case report, Chemical peritonitis, Dermoid cyst, Ruptured dermoid cyst.

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INTRODUCTION

Dermoid cysts, also known as mature cystic teratomas, are a type of germ cell tumor (GCT) accounting for nearly 95% of GCTs.¹ It is slowly growing, and the majority of cases are detected accidentally in the asymptomatic phase. Complications, such as massive size, infection, malignant transformation, and rupture, are rare.¹ The clinical presentation of complications may mimic a perforated appendix and inflammatory/infective conditions of the gastrointestinal or urinary tract. The present case reports spontaneous rupture of the dermoid cyst, resulting in acute abdomen due to chemical peritonitis. This case is reported according to the Case Report guidelines.

CASE DESCRIPTION

A 25-year-old student who had been married for 2 months but had not consummated, presented to a family physician with complaints of sudden abdominal pain for 2 days, which had become severe in the past few hours. The pain was more in the right lower quadrant and was not associated with nausea, vomiting, or bowel/bladder complaints. However, she had a low-grade fever for 1 day. She was informed of the possibility of appendicitis or gastrointestinal infection/inflammation. Primary treatment in the form of analgesics and antibiotics was given, and the patient was further referred. Her previous menstrual cycles were regular, but she had heavy flow and dysmenorrhea for the past 6 months. Her past and family history were unremarkable. Her examination revealed a fair general condition, mild pallor, and stable vital signs. Upon abdominal palpation, rebound tenderness, rigidity, and guarding in the right iliac fossa were elicited. No mass or distension was noted. Vaginal examination was not permitted, the hymen was intact, and

¹Department of Obstetrics and Gynecology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India

^{2,3}Department of Obstetrics and Gynecology, Dr TMA Pai Hospital, Udipi, Karnataka, India

Corresponding Author: Krupa H Shah, Department of Obstetrics and Gynecology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, India, Phone: +91 9741736024, e-mail: hikrupa12@gmail.com

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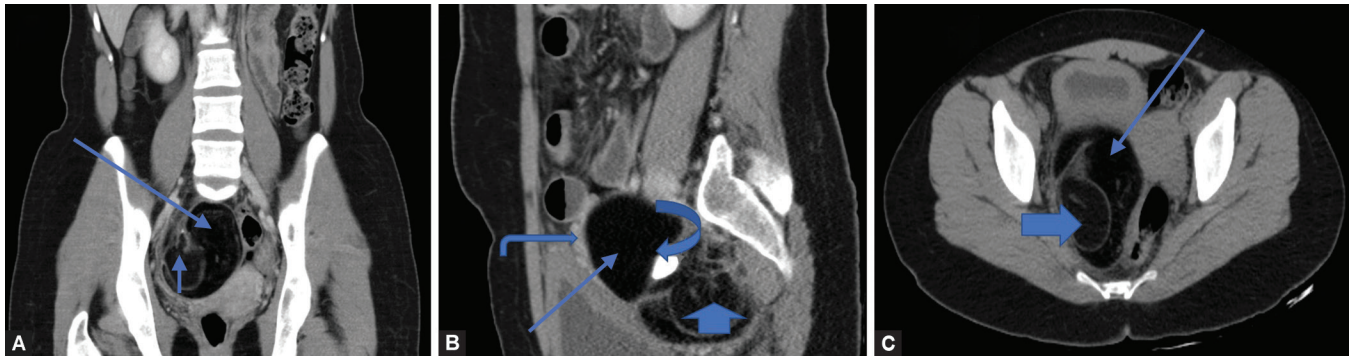
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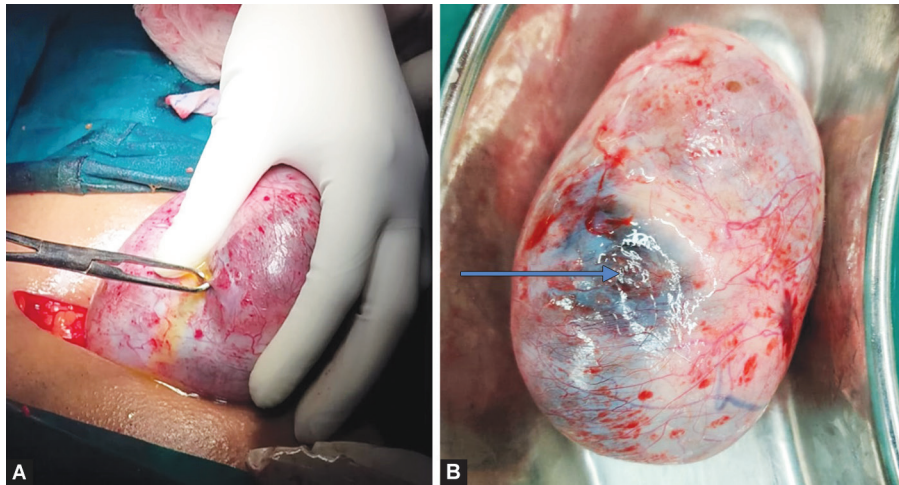
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no signs of vulvar infection were found. Peristalsis was appreciated, and other systems were unremarkable. She was admitted for further management.

Her blood investigations revealed mild anemia (hemoglobin 9 gm/dL) and leukocytosis (total count, 13,400/mm³) with mild neutrophilia, and C-reactive protein (211 mg/L) level was increased. Serum bilirubin level was 0.8 mg/dL. Her peripheral smear suggested microcytes, and anti-Mullerian hormone level was low (0.6 ng/mL). The tumor marker assessment revealed elevated carbohydrate antigen (CA) 125–193 U/mL and carcinoembryonic



Figs 1A to C: Computed tomography scan showing a complex pelvic mass. Coronal (A), sagittal (B), and axial (C) images having well-defined large pelvic thick-walled cystic lesion, predominantly fat content. A Rokitansky nodule with a calcified area (curved blue arrow), soft tissue nodules (thick blue arrow), and inflamed fat around the cyst wall (L-shaped blue arrow)



Figs 2A and B: (A) Dermoid cyst with a rent on the anterior surface near Allis forceps; (B) Discoloration due to closure of the rent with Allis forceps during surgery

antigen 7.7 ng/mL. The rest were unremarkable (CA 19-9 2 U/mL, alpha-fetoprotein 0.9 ng/mL, beta-human chorionic gonadotropin <0.2 mIU/mL, and lactate dehydrogenase 169 IU/L).

Ultrasound of the abdomen and pelvis suggested a right ovarian dermoid cyst and hyperechoic fat. The appendix was difficult to commented on due to the thick abdominal wall. Surgical opinion stated for higher imaging. The transvaginal scan did not yield consent. Computed tomography (CT) scan of the abdomen and pelvis revealed a well-defined, smooth-margined heterogeneous lesion measuring $10.4 \times 9.0 \times 7.6 \text{ cm}^3$ in the right adnexa, with a fat-attenuating lesion and minimal enhancement of soft tissue density septation with a chunk of calcification, suggestive of a dermoid cyst. An inflamed omentum in the right iliac fossa was noted (Fig. 1). The diagnosis of a ruptured ovarian dermoid was challenging.

Treatment in the form of analgesics and broad-spectrum antibiotics was continued. She was taken for an emergency laparotomy for a dermoid cystectomy and possible peritonitis. Yellow sebaceous material was found on the opening of the peritoneum. The peritoneal fluid was sent for histopathological examination. Flimsy adhesions between the peritoneum, right tube, and ovary were separated via blunt dissection. The dermoid cyst was exteriorized, and a tiny (5–6 mm) rent was found on the anterior surface, which was draining sebum (Fig. 2). The right tube was edematous, and the left ovary and tubes were normal. Due care

was taken to prevent further spillage, and ovarian cystectomy was performed. An omental biopsy was taken. Few endometriotic spots were noted on the anterior uterine wall. The appendix was normal. Thorough peritoneal lavage was provided. The patient was discharged after 72 hours. A follow-up after 6 weeks suggested normal hemoglobin and C-reactive protein levels, and a reduction in CA 125 levels.

On histopathology, the dermoid cyst specimen had pultaceous material with a hair shaft. It had a solid fibrofatty area measuring $4.5 \times 4.5 \times 4.5 \text{ cm}^3$, and a solid bony area measuring $3.5 \times 2 \text{ cm}^2$. Microscopic examination revealed stratified squamous epithelium of the cyst wall overlying the pilosebaceous unit, eccrine glands, smooth muscle fibers, and mucous cells. The contents were adipose tissue, focal mature neuroglial tissue, and cartilage without any immature elements. Her omental biopsy revealed mature adipocytes separated by fibrous septa with sparse lymphocytes, eosinophils, and congested blood vessels.

DISCUSSION

Ovarian germ cell tumors (OGCTs) arise from primitive germ cells. The exact etiology is unknown, but the parthenogenic theory is widely accepted.² It develops from a single haploid germ cell and is supported by the presence of Barr bodies in the tumor cells. It accounts for 20–30% of all ovarian neoplasms.³

The OGCT can be classified as benign or malignant. Malignant OGCTs are subclassified as immature teratomas, embryonal carcinomas, yolk sac tumors, choriocarcinomas, and dysgerminomas, accounting for 5% of GCTs.^{1,3} Teratomas can be classified as mature, immature, monodermal, or fetiform. Dermoid cysts are the most common among all teratomas and are characterized by the presence of two or more well-differentiated germ cell layers. The cyst is characterized by a pearly white thick wall. It comprises cheesy yellow-white sebaceous fluid in almost all cases (93–96%). Other components of the cysts include calcifications; hair, tooth, bone, cartilage, neural tissue; etc. The growth rate of the cyst is approximately 1.8 mm/year; hence, it remains asymptomatic for a long time before its detection.⁴ Growth factors like estrogen and progesterone increase the size of dermoid cyst after puberty and remain almost static in the postmenopausal period.⁴ Asymptomatic cysts can present with symptoms, such as abdominal pain (varied in severity), nausea, vomiting, fever, diarrhea, etc., due to complications.

Malignant transformation is reported in 1–3%.^{5,6} It occurs generally at the extremes of age, and the common malignancies are squamous-cell carcinoma, adenocarcinoma, and carcinoid tumors.⁶ Torsion is documented in approximately 16% of cases.⁶ Patients can experience pressure symptoms due to their large size, hemolytic anemia, and paraneoplastic encephalitis. In our patient, mild anemia was present without signs of hemolysis (lactate dehydrogenase and serum bilirubin levels were normal).⁵ Infection (1%) and rupture of the cyst wall (1–4%) are other rare complications.^{1,4,5}

The rupture of a dermoid cyst is triggered by infection, infarction following torsion, trauma, pressure during pregnancy, and rapid expansion of the cyst. It can be acute or chronic. Acute presentation is common, with symptoms of acute abdomen and rarely shock. The rupture of the dermoid cyst results in spillage and deposition of fatty substances (sebum) on the peritoneal surface, resulting in aseptic inflammation, peritoneal irritation, and peritonitis. Chemical peritonitis develops even after spillage of bile, blood, barium, and fat from organs such as the gall bladder, pancreas, stomach, and other viscera. Drug injection in the peritoneum (dialysis), certain disinfectants, and meconium are known to cause chemical peritonitis.⁷ In the present study, the cyst had a tiny tear (unknown inciting factor), and the spillage of the content resulted in acute chemical peritonitis. The consequences of spillage are ascites, inflammation, and thickening/nodularity of the omentum and peritoneum. If not treated, it can lead to pelvic abscess, fistula, adhesion formation, and chronic pelvic pain.^{1,5}

Ultrasound is a rapidly available imaging technique, and the characteristic features are a dermoid mesh, a Rokitansky nodule, and a tip-of-iceberg sign with an acoustic shadow. The Rokitansky nodule is a cystic lesion with a densely echogenic tubercle projecting into a cystic lumen.^{8,9} It detects ascites and helps to identify complications such as torsion and malignancy. Complex pelvic/abdominal masses and masses with diagnostic dilemma need further characterization via CT scans or magnetic resonance imaging. In cases of acute abdomen, complications such as tiny breeches in the cyst wall, torsion, peritonitis, etc., can be diagnosed.^{8,9}

The present patient had high levels of CA 125, and elevated levels are found in patients with benign conditions such as fibroids, pelvic inflammation, and endometriosis, in addition to malignancy. It decreased from 193 to 57 U/mL at the follow-up visit in nonmenstrual phase. Her borderline high carcinoembryonic

antigen level could be due to pelvic endometriosis. The use of a dermoid tumor marker panel would help to diagnose malignant GCTs.^{10,11}

Surgery is used for definitive diagnosis and treatment. Dermoid cysts greater than 5 cm are at risk of torsion; hence, they should be surgically removed. In addition, bilateral lesions, complicated dermoids, high levels of tumor markers, and the risk of malignancy all favor surgical management.¹ Surgical treatment includes laparoscopy or laparotomy; for frank rupture and peritonitis, laparotomy is preferred. We encountered a reasonably large cyst with signs of acute abdomen (suspected dermoid cyst rupture) and high levels of tumor markers, and hence, opted for laparotomy rather than laparoscopy.

Prompt treatment is required for acute abdomen in a woman with a newly diagnosed or known case of a dermoid cyst. The age of the patient and family size are the deciding factors for salpingo-oophorectomy vs cystectomy. Thorough peritoneal lavage is recommended to reduce further complications. Patients with spontaneous rupture but without obvious signs of peritonitis have a favorable prognosis.^{5,9}

CONCLUSION

The workup for acute abdomen requires a multidisciplinary approach, wherein surgical, gynecological, and radiological inputs are critical. The overlapping signs and symptoms of gynecology and surgical emergencies can be differentiated through clinical examination and appropriate imaging techniques. Once a complicated complex adnexal mass is diagnosed, laboratory tests and measurements of tumor markers constitute the cornerstone of deciding upon surgery. Laparotomy is preferable to laparoscopy for lowering the spillage of the content of the ovarian dermoid cyst.

Clinical Significance

- Although rare, dermoid cysts can rupture for multiple reasons, including trauma, sexual intercourse, rapid growth of the cyst, etc.
- Spontaneous rupture can occur in 1–2% of cases of dermoid cysts, resulting in a good prognosis with subtle signs of acute abdomen and prompt treatment.
- The rupture of the dermoid cyst requires emergency exploration to prevent ominous future complications.

AUTHOR CONTRIBUTIONS

Saritha Raase and Shruti Borkar contributed to the management and case history of the patients. Krupa Shah contributed to the management and manuscript writing of the case.

ORCID

Krupa H Shah  <https://orcid.org/0000-0001-8445-4170>

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