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Case Report

Gangrenous torsion of a giant benign mucinous ovarian cystadenoma mimicking malignancy in a postmenopausal woman: a rare case report

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ABSTRACT

Giant mucinous cystadenomas are rare in postmenopausal women and may mimic ovarian malignancy, particularly when complicated by torsion or ischemic necrosis. Conventional tools such as the risk of malignancy index (RMI) and ovarian-adnexal reporting and data system (O-RADS) can be misleading in these situations. Although accurate distinction is desirable, when preoperative evaluation suggests high malignant potential, comprehensive staging surgery is justified to ensure oncologic safety, even if the lesion proves benign. A 75-year-old postmenopausal woman presented with 10 days of progressive abdominal distension, dull diffuse abdominal pain, anorexia, and weight loss. Examination revealed a large abdominopelvic mass corresponding to a 32-week gravid uterus. Tumor markers were normal (CA-125:32.1 U/ml< 35; CEA: 1.85 ng/ml<3). Ultrasonography and CT demonstrated a 20 cm multiloculated complex cystic adnexal mass with irregular mural nodules but no ascites or lymphadenopathy. Risk assessment suggested high malignant potential (elevated RMI score and O-RADS 4 category). A staging laparotomy was performed. Intraoperatively, a 30 cm torsed, gangrenous mucinous cystadenoma of the left ovary with intact capsule was identified. Surgical management included total abdominal hysterectomy, bilateral salpingo-oophorectomy, pelvic lymphadenectomy, and omentectomy. Frozen section and final histopathology confirmed a benign mucinous cystadenoma with extensive gangrenous changes. This case highlights the diagnostic dilemma of differentiating complicated benign adnexal tumors from malignancy in elderly women. It emphasizes the limitations of preoperative risk models when torsion or necrosis distorts imaging features and supports comprehensive surgical staging in high-risk profiles, even when pathology is benign, thereby ensuring oncologic safety.

Keywords: Mucinous cystadenoma, Ovarian torsion, Post menopause, Gangrenous changes, Staging laparotomy

INTRODUCTION

Evaluation of adnexal masses in postmenopausal women carries particular clinical importance, as the baseline probability of malignancy is higher than in women of reproductive age.[1] Ovarian tumors represent a heterogeneous group of gynecologic neoplasms, and the lifetime risk of ovarian cancer in women is estimated at around 1.3%.[2] Nearly 90% of ovarian cancers arise from the surface epithelium.[3] Surface epithelial tumors include benign, borderline, and malignant subtypes. Among the benign variants, mucinous cystadenomas account for approximately 10-15% of all ovarian tumors.[4] These lesions are typically unilateral, multilocular, and capable of attaining very large size; however, they are rarely seen after menopause and often remain clinically silent until substantial enlargement occurs.[4]

Adnexal torsion refers to rotation of the ovarian pedicle that compromises vascular supply and constitutes about 2-3% of gynecologic emergencies.[5] Although more common in younger women, it may also arise in postmenopausal patients and should be considered in the evaluation of large adnexal masses.[6] In this setting, giant mucinous cystadenomas present a particular diagnostic challenge, especially when complicated by torsion or ischemic changes that resemble malignancy.[6]

Preoperative tools such as the RMI and the O-RADS assist in triaging adnexal masses, but their diagnostic accuracy declines when necrosis or torsion alters the morphology.[7,8] In such circumstances, intraoperative frozen section serves as a valuable guide for surgical decision-making, though its reliability may be limited in large mucinous tumors due to sampling difficulties and histologic heterogeneity.[9]

We describe the case of a 75-year-old woman with a giant (30 cm) mucinous cystadenoma complicated by torsion and gangrene. Despite preoperative risk models and imaging features suggestive of malignancy, final histopathology confirmed a benign lesion, underscoring the importance of cautious evaluation and timely surgical management in elderly patients with complex adnexal masses.

CASE REPORT

A 75-year-old postmenopausal woman (para 3, live 3), menopausal for 25 years, presented to the gynecology outpatient clinic with a 10-day history of progressively worsening abdominal distension accompanied by diffuse, non-radiating abdominal pain. She also reported early satiety, bloating, anorexia, dyspepsia, and unintended weight loss. There were no complaints of fever, vomiting, gastrointestinal or urinary symptoms, or abnormal vaginal bleeding. Her medical history was notable only for hypertension, controlled with regular antihypertensive medication over six years. She had no prior surgeries or significant family history.

On general examination, the patient was thin built and pale, with features of poor nourishment; her body mass index (BMI) was 21.6 kg/m^2. Vital signs were stable. Abdominal examination revealed marked distension and a firm, non-tender abdominopelvic mass, corresponding in size to a 32-week gravid uterus. On bimanual pelvic examination, a large mass was palpated anterior to the uterus, though the uterus and adnexa could not be distinctly separated. Vaginal and cervical examinations were unremarkable, and rectal examination revealed no mucosal abnormalities.

Laboratory studies showed mild anemia with hemoglobin at 8.8 g/dL. Renal and liver function tests, serum electrolytes, and urinalysis were normal. Electrocardiography revealed sinus tachycardia, and echocardiography showed mild left ventricular hypertrophy, aortic sclerosis with mild stenosis, and preserved ejection fraction (71%). She was transfused one unit of packed red blood cells preoperatively.

Pelvic ultrasonography demonstrated a large multilocular cystic mass measuring approximately 18.1×18.8×19.0 cm with internal solid components and septations; the uterus and ovaries were not clearly visualized. These features suggested a large pelvic cystic lesion, possibly a serous cystadenoma. A contrast-enhanced computed tomography (CECT) scan of the abdomen revealed a well-defined hypodense cystic mass measuring 20×19×16 cm (volume: 3422 CC) in the pelvis, likely originating from the right adnexa. The lesion had smooth margins without calcifications but showed multiple cysts with irregular mural nodules along the left lateral wall; no ascites, lymphadenopathy, or distant metastases were detected. The liver, spleen, and other abdominal organs were unremarkable. The lesion extended superiorly to the ascending colon and inferiorly to the right adnexa and anterior myometrium (Figure 1).

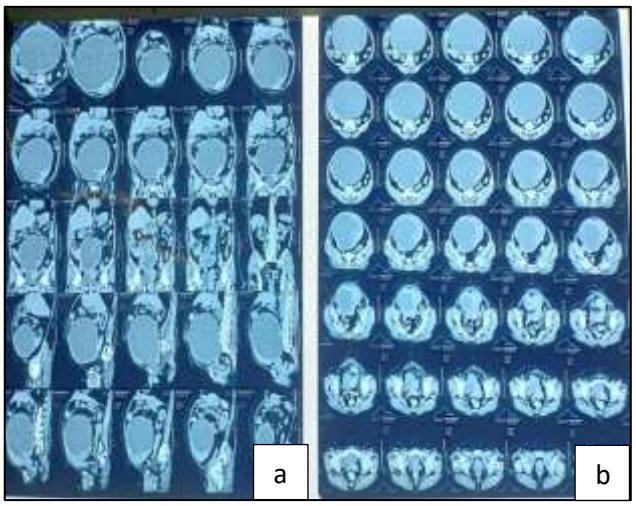

Figure 1 (a and b): Contrast-enhanced CT scan of the abdomen showing a large cystic mass occupying the abdominopelvic cavity.

Risk assessment placed the mass in the high-risk category (O-RADS 4: intermediate risk of malignancy; RMI-4: 1027, high risk, cutoff >450 considered high risk), both suggesting a strong likelihood of malignancy.

Tumor markers were within normal ranges (CA-125: 32.1 U/mL; CEA: 1.85 ng/mL). The surgical oncology team was consulted for preoperative planning. The acute onset of pain on a background of chronic distension raised suspicion for secondary complications such as adnexal torsion or rupture, while the lesion's mixed solid-cystic nature with mural nodules further heightened concern for malignancy.

Given the patient's age, the large tumor size, high-risk profile (O-RADS 4, RMI-4=1027), and ambiguous imaging findings, a staging exploratory laparotomy was planned after thorough counseling and obtaining high-risk informed consent.

Intraoperatively, a giant multiloculated cystic mass measuring 30×30×30 cm was found originating from the left ovary, contrary to preoperative imaging suggesting a right adnexal origin, highlighting limitations of imaging in large pelvic masses. The encapsulated cystic tumor occupied the entire abdominal cavity (Figure 2). The vascular pedicle was twisted twice, confirming adnexal torsion, and the left fallopian tube was congested and

stretched (Figure 3). The uterus appeared atrophic, and the right adnexa was grossly normal. No ascites was present. Peritoneal washings were collected for cytology, and inspection of the peritoneal surfaces, liver, spleen, diaphragm, and bowel loops was unremarkable.

Figure 2: Intact ovarian cyst after laparotomy showing external surface.

Figure 3: Twisted left ovarian pedicle with two complete turns and congested fallopian tube, indicative of adnexal torsion with vascular compromise.

A left salpingo-oophorectomy was performed, and a frozen section revealed a benign gangrenous ovarian lesion. However, gangrenous changes can reduce the accuracy of frozen sections, as necrotic tissue and hemorrhage may obscure typical tumor architecture, increasing the risk of underdiagnosis in large, heterogeneous mucinous tumors (Figure 4).

Figure 4: Gross specimen of the left ovarian cyst, fixed in 10% neutral buffered formalin, showing a gangrenous wall and multilocular cavities filled with hemorrhagic and mucinous material, consistent with torsion-induced necrosis.

Despite this, considering the patient's age, high-risk profile, large tumor size, and intraoperative findings, comprehensive staging surgery was performed-including total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, and pelvic lymphadenectomy, acknowledging the limitations of frozen section in large mucinous tumors with heterogeneous architecture (Figure 5).

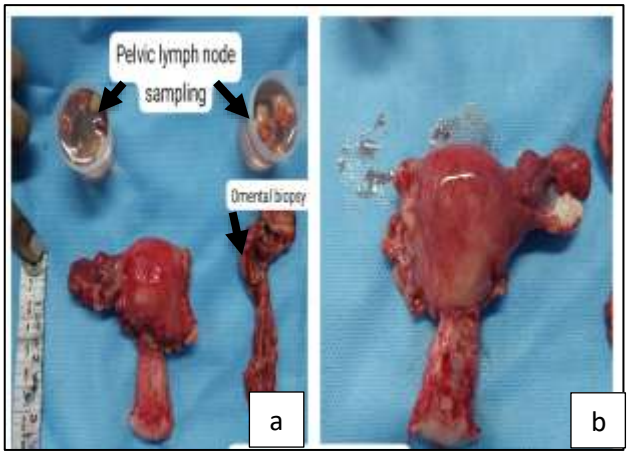

Figure 5 (a and b): Gross photograph of the surgical specimen showing an atrophic uterus, normal-appearing right adnexa, omental biopsy, and excised pelvic lymph nodes

The patient tolerated the procedure well and had an uneventful postoperative course. She received thromboprophylaxis, and her hemoglobin on postoperative day 2 was 10.2 g/dL. She was discharged in stable condition on the fifth postoperative day.

Final histopathology revealed a mucinous cystadenoma of the left ovary and tube with gangrenous changes. The right fallopian tube showed hydrosalpinx; the endometrium had cystic atrophy, and the myometrium showed adenomyosis. Pelvic lymph nodes exhibited reactive changes, and the omentum showed mesothelial hyperplasia. Cytology from peritoneal washings was negative for malignant cells.

At the four-week follow-up, the patient was asymptomatic, hemodynamically stable, and had resumed daily activities without complications.

This case is notable for the rare occurrence of a giant gangrenous mucinous cystadenoma with adnexal torsion in a postmenopausal woman, an uncommon presentation given both the low incidence of torsion and mucinous cystadenomas in this age group. The tumor's large size, multilocular architecture with septations, solid components, and mural nodules closely mimicked malignancy on imaging, underscoring the diagnostic challenges in distinguishing benign from malignant ovarian masses in elderly patients. This case highlights the importance of timely surgical intervention, cautious interpretation of frozen section in gangrenous lesions, and comprehensive histopathological evaluation to guide appropriate management in the complex adnexal masses.

DISCUSSION

This case highlights a rare but important diagnostic challenge: a giant mucinous cystadenoma with torsion in a post-menopausal woman which clinically and radiologically mimicked ovarian malignancy. Combination of advanced age, large tumor size and gangrenous transformation further complicated preop assessment and raised strong suspicion for cancer.

Mucinous cystadenomas are benign epithelial tumors that typically present in women aged 30-60 years and are uncommon after menopause.[10] They often remain asymptomatic until reaching considerable size, when they may produce pressure-related symptoms such as abdominal distension, early satiety, or urinary complaints. While these tumors are benign, complications like torsion, rupture, hemorrhage, or bowel obstruction are more likely in lesions exceeding 15 cm.[11] Anatomical factors, such as a long or narrow pedicle, may predispose even large tumors to torsion.[11]

Ovarian torsion represents roughly 2.5-7.4% of gynecologic emergencies, with a lifetime risk of 2-3%.[12] In postmenopausal women, ovarian masses are identified in 5-17% of cases, and up to 30% of these may be malignant.[12] Given this elevated baseline risk, torsion in this age group raises concern for underlying malignancy, despite its relative rarity. Reported incidences of torsion in postmenopausal women vary from 2-35%.[12] Diagnosis is frequently delayed because symptoms are often nonspecific, unlike the sudden severe pain seen in younger patients. Even very large tumors, sometimes considered relatively immobile, can undergo torsion with cases reported in masses up to 30 cm.[13] Prolonged torsion leads to vascular compromise, ischemia, and gangrene, which may distort imaging appearances and mimic malignancy, particularly patients with increased baseline cancer risk.[14]

Laboratory tests may be nonspecific. Leukocytosis or anemia can occur in gangrenous torsion, though values often remain within normal limits, as observed in our patient. Color Doppler findings do not reliably exclude torsion, since venous or partial arterial flow can persist in early stages, while complete absence typically reflects advanced ischemia or gangrene.[14] CT and MRI are useful adjuncts to exclude alternative diagnoses or further characterize complex adnexal masses.[15]

Imaging plays a pivotal role in evaluating complex adnexal lesions. Transvaginal or pelvic ultrasonography is the preferred initial modality, with a reported sensitivity of around 84%.[16] Characteristic features of ovarian torsion include an enlarged ovary, peripheral cystic structures, a twisted vascular pedicle ("whirlpool sign"), free pelvic fluid, and ovarian edema.[17,18]

Benign mucinous cystadenomas generally appear as large multilocular cystic masses with thin septations, variable echogenicity, and absence of solid components or papillary projections.[15] In contrast, malignant mucinous cystadenocarcinomas frequently present as complex cystic lesions with thick septations (>3 mm), mural nodules, papillary projections, and solid enhancing areas. CT/MRI may further demonstrate heterogeneous enhancement, septal thickening, ascites/peritoneal implants.[15]

In torsed mucinous cystadenomas, ischemic and necrotic changes may mimic malignancy, as necrotic areas can appear as mural nodules or heterogeneous echogenic regions, and Doppler flow may be reduced or absent.

Our patient's imaging-both ultrasonography and CECT-revealed a large multilocular cystic mass with septations, solid areas, and irregular mural nodules, explaining the high-risk impression despite the final diagnosis of a benign tumor. The RMI 4, which incorporates menopausal status, ultrasound features, tumor size, and CA-125 levels, is a validated tool for distinguishing benign from malignant ovarian lesions, particularly in resource-limited settings.[19] Among the four RMI models, RMI-4, which includes tumor size as an additional parameter, demonstrates superior diagnostic performance, with high specificity and negative predictive value-especially useful for large tumors, as in our patient.[19]

In our case, the mass was classified as O-RADS US 4, which, according to recent multicenter U. S. data, carries an 11.6% malignancy risk, with high sensitivity (90.6%) and negative predictive value (99%) for ovarian cancer detection. Malignancy risk is higher in postmenopausal women (13.8% vs. 5.2% in premenopausal women), supporting the decision for comprehensive surgical

evaluation.[20,21] O-RADS classification generally offers higher specificity than sensitivity; however, ischemia, necrosis, or torsion can lead to overestimation of malignancy risk, as seen in our patient.

Combined with an RMI-4 score of ~1029 and O-RADS 4 classification, these imaging findings strongly suggested malignancy; however, an intraoperative frozen section identified a benign mucinous cystadenoma with gangrenous changes.

Frozen section remains a valuable intraoperative tool, with high specificity for differentiating benign from malignant ovarian lesions. Its sensitivity is lower in mucinous tumors, especially large masses, due to histologic heterogeneity and sampling limitations. Park et al reported sensitivities and specificities of 99.1% and 82.2% for benign mucinous tumors, 74.6% and 96.7% for borderline tumors, and 72.5% and 98.8% for invasive carcinomas. Tumor size >12 cm, multilocularity, solid components, and mixed histology were independent predictors of final pathology upgrade.[22,23]

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In our patient, tumor's extreme size (>30 cm), multilocular configuration, solid areas increased risk of underdiagnosis. Consequently, despite benign frozen section result, comprehensive staging laparotomy was performed, emphasizing need to balance diagnostic uncertainty with oncologic safety in complex adnexal masses.

Reports of torsed mucinous cystadenomas in postmenopausal women are scarce, and few describe tumors of such extreme size with gangrenous transformation. This highlights the rarity of our case and underscores the diagnostic pitfalls when ischemia and necrosis obscure typical benign imaging features.

Clinical implications

Large adnexal masses in elderly women should be evaluated comprehensively, integrating risk scoring systems, imaging, and intraoperative findings. Ischemic or necrotic changes from torsion can significantly distort imaging features and closely mimic malignancy. Frozen section is a valuable intraoperative adjunct, but its sensitivity is reduced in large mucinous tumors with heterogeneous architecture; findings should therefore be interpreted with caution. Surgical management should be individualized, taking into account patient age, tumor size, preoperative risk assessment, and intraoperative judgment, even when a frozen section suggests benign pathology. Timely recognition and surgical intervention are critical to prevent complications such as necrosis, sepsis, or delayed treatment when malignancy is suspected.

Limitations

This case report is limited by its single-patient design, which restricts generalizability. Preoperative imaging did not include Doppler assessment, which may have aided in earlier recognition of torsion. The radiological appearance of torsed adnexal masses is often nonspecific, particularly in large multilocular cystic lesions, adding to diagnostic difficulty. Although intraoperative frozen section was valuable, its accuracy is inherently limited in giant mucinous tumors due to sampling constraints, which may risk underdiagnosis of focal borderline or malignant areas.

Future directions

Future research should focus on collecting larger, multicenter case series to characterize the clinical course and outcomes of giant mucinous cystadenomas in postmenopausal women. Prospective studies assessing added value of Doppler and advanced MRI sequences could clarify how best to distinguish ischemic or necrotic benign lesions from malignancy preoperatively. Work is also needed to optimize intraoperative sampling protocols and complementary techniques to improve frozen section accuracy in large heterogeneous mucinous tumors. Finally, development of decision-support tools that combine clinical, imaging, and biomarker data-alongside multidisciplinary care pathways-may help guide surgical planning and informed consent in elderly patients with complex adnexal masses.

CONCLUSION

This case demonstrates a diagnostically complex presentation of a giant gangrenous mucinous cystadenoma with adnexal torsion in a postmenopausal woman-an uncommon clinical entity that closely simulated ovarian malignancy. The discordance between elevated risk scores, suspicious imaging, and ultimately benign pathology highlights the limitations of relying solely on preoperative investigations, particularly when ischemic changes distort tumor morphology.

Surgical exploration remains the definitive diagnostic and therapeutic step in such ambiguous cases. Intraoperative frozen section, while useful, must be interpreted cautiously in large mucinous tumors. The decision to perform comprehensive staging surgery, despite benign frozen section results, reflected a balance between diagnostic uncertainty and oncologic safety in an elderly patient.

Ultimately, this case underscores the rarity of torsed giant mucinous cystadenomas in postmenopausal women and

emphasizes need for individualized, evidence-informed surgical strategies. It also reinforces the importance of timely intervention and cautious interpretation of diagnostic tools in managing complex adnexal masses.

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