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Incremental Value of Contrast-Enhanced Multiparametric MRI for Accurate Identification and Characterization of a Giant Multilocular Pelvic Mass in a Young Woman

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Patient: Female, 18-year-old
Final Diagnosis: Ovarian mucinous cystadenoma
Symptoms: Abdominal pain
Clinical Procedure: —
Specialty: Obstetrics and Gynecology
Objective: Rare disease
Background: Mucinous cystadenoma is a benign cystic tumor lined by mucinous gastrointestinal-type epithelium. This entity usually presents as a large multicystic mass containing mucus and fluid, predominantly in women aged 20 to 40 years. Mucinous ovarian tumors frequently manifest as large unilateral pelvic masses. Differential diagnoses include non-neoplastic conditions such as follicular cysts, corpus luteum cysts, and endometriosis. Giant ovarian tumors are rare; symptoms often result from the large size of the mass and may include pain, abdominal or pelvic fullness, and a palpable mass. We describe the incremental value of contrast-enhanced multiparametric magnetic resonance imaging (MRI) for identifying and characterizing a giant multilocular adnexal lesion in a young woman.
Case Report: An 18-year-old woman was referred to our emergency department for a giant multilocular pelvic mass incidentally discovered on transvaginal ultrasound; she presented with severe abdominal pain. Contrast-enhanced multiparametric MRI supported the adnexal origin of the mass and favored a benign diagnosis based on the absence of mural nodules, solid components, septal contrast enhancement, or restricted diffusion on diffusion-weighted images. MRI thus provided a preoperative assessment favoring a benign lesion, whereas histopathological examination confirmed the final diagnosis of benign ovarian mucinous cystadenoma.
Conclusions: This case highlights the incremental value and supporting role of contrast-enhanced multiparametric MRI when evaluating a giant pelvic mass in a young patient. MRI confirmed the origin, precisely localized the mass, and facilitated appropriate preoperative surgical planning; the definitive diagnosis was established by histopathological examination.
Keywords: Magnetic Resonance Imaging • Ovarian Cysts
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Introduction

The World Health Organization defines mucinous cystadenoma as a benign cystic tumor lined by mucinous gastrointestinal-type epithelium. Together with mucinous adenofibroma, it represents 80% of benign mucinous ovarian neoplasms [1]. Approximately 80% of mucinous tumors are benign, 10% are borderline, and 10% are malignant [2]. Benign mucinous cystadenomas typically present as large, multicystic masses filled with mucus and fluid, most commonly in women aged 20 to 40 years [3]. Mucinous ovarian tumors frequently manifest with clinical signs and symptoms associated with a large unilateral pelvic mass; the average size at presentation is > 10 cm. However, these lesions can grow even larger and fill the entire abdominal cavity [1]. Giant ovarian tumors are rare. Clinical signs and symptoms are often attributable to the large size of the mass and may include pain, abdominal or pelvic fullness, and a palpable mass [1]. Given the benign pathological features of mucinous cystadenoma, the prognosis is excellent [1].

This case report illustrates the incremental preoperative value of contrast-enhanced multiparametric magnetic resonance imaging (CE-MP-MRI) for accurately identifying and characterizing a giant multilocular adnexal lesion in a young woman.

Case Report

An 18-year-old woman with an unremarkable medical history, regular menses, and no prior obstetric history presented to the emergency department with severe pelvic and lower abdominal pain. On physical examination, the abdomen was tense and noticeably distended by a giant mass occupying the entire abdominal cavity. Abdominal ultrasound showed a right pelvic mass measuring 20 cm in maximum transverse diameter. Laboratory testing revealed serum human chorionic gonadotropin and other tumor markers, including alpha-fetoprotein, cancer antigen (CA) 19-9, CA 15-3, and CA 125, within normal ranges. Transvaginal ultrasound (TVUS) confirmed the presence of a multilocular mass most likely originating from the right ovary and displacing the uterine body anteriorly. The mass exhibited thick septa, mild vascularization, and low-resistance flow. It occupied the entire pelvis and extended cranially above the level of the umbilicus. Subsequent CE-MP-MRI confirmed the presence of a large mass occupying the entire abdominal cavity, originating from the right adnexal region, and predominantly consisting of cystic, multilocular components, with maximum dimensions of 25 × 8 cm (**Figure 1A, 1B**). The mass exhibited multiple irregular septations with mild septal contrast enhancement but no mural nodules or solid components (**Figure 2A, 2B**). Furthermore, no restricted diffusion was observed on dedicated diffusion-weighted images. A small hemorrhagic component was also present, particularly along the posterior portion of the lesion. These findings,

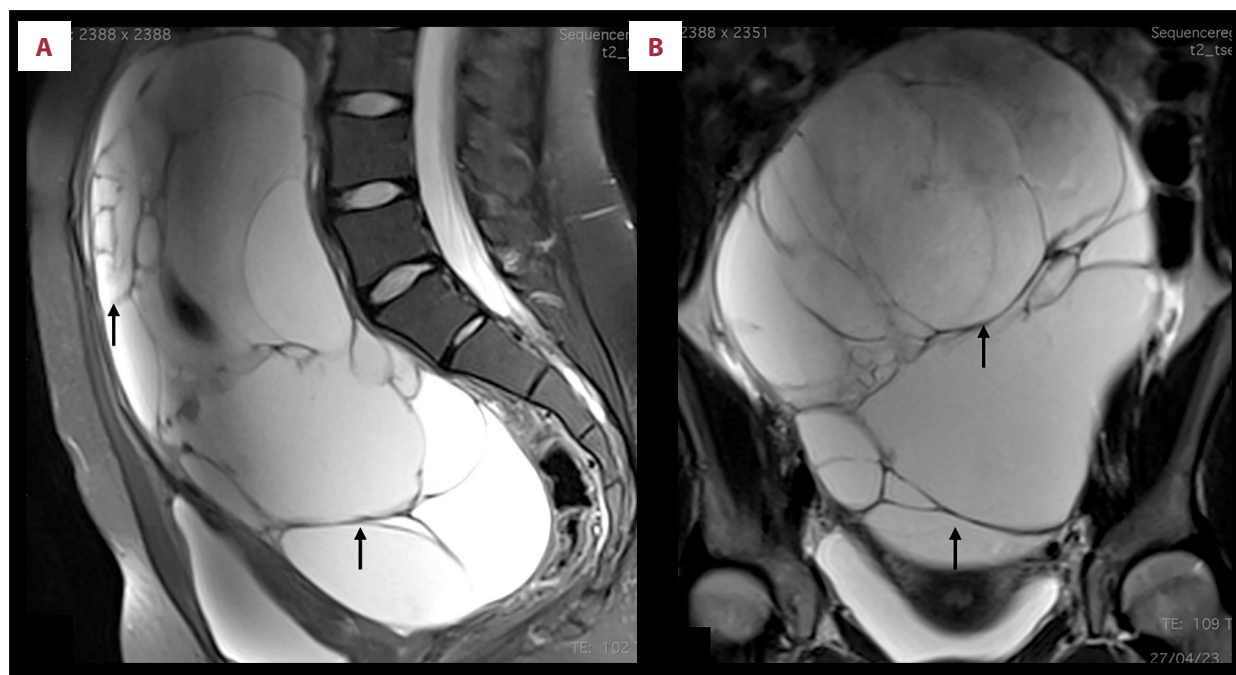


Figure 1. Sagittal (A) and coronal (B) T2-weighted magnetic resonance images demonstrating a giant multilocular cystic mass measuring approximately 25 × 8 cm and occupying the entire abdominal cavity. Internal septations are indicated by black arrows. No mural nodules are identified.

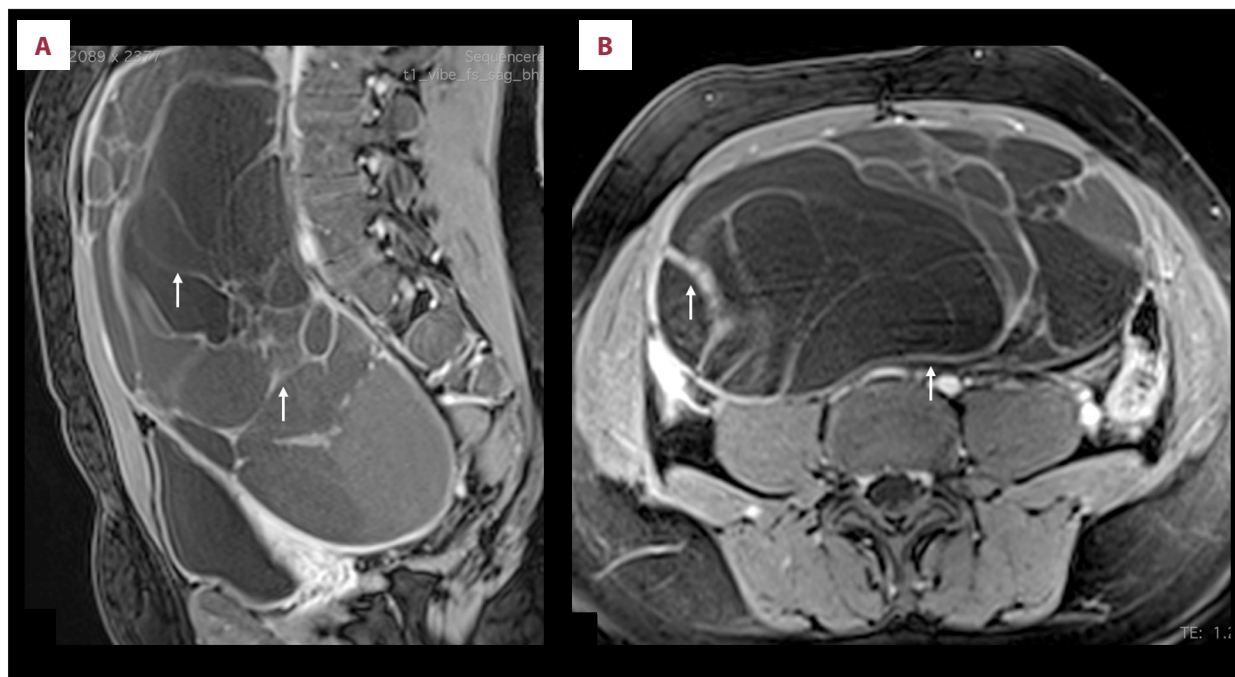


Figure 2. Sagittal (A) and axial (B) contrast-enhanced T1-weighted magnetic resonance images showing mild enhancement of the internal septa (white arrows). No enhancing mural nodules, papillary projections, or solid mural components are identified.

together with minimal inflammatory changes along the cyst walls, were considered suggestive of a benign lesion, consistent with cystadenoma. Vascular structures, particularly the aortoiliac axis, were partially compressed. Compression was most pronounced along the anterior aspect of the right common iliac artery, which remained patent.

Given the large size of the lesion, the patient underwent right adnexectomy via laparotomy, rather than a minimally invasive approach. This case-specific decision was primarily based on concerns regarding the potential risk of capsular rupture of an unsuspected ovarian malignancy during laparoscopic management, resulting in spillage of cyst contents into the peritoneal cavity and subsequent tumor seeding. Peritoneal and omental biopsies were also performed. After resection, the excised but intact mass measured approximately 26 × 7 cm. Macroscopic examination revealed a smooth, shiny surface. When sectioned, the mass appeared multilobulated, with whitish internal walls, focal papillary projections, and mucinous contents. Final histopathological examination confirmed a mucinous cystadenoma with focal epithelial proliferation. Peritoneal and omental biopsies did not show neoplasm. The patient experienced no postoperative complications and remained in good health 3 years after surgery.

Discussion

Mucinous cystadenoma is a benign ovarian tumor that typically occurs in women aged 20 to 40 years and is rare among

adolescents or during pregnancy [2]. Histologically, mucinous cystadenomas are usually composed of multiple cysts and glands lined by simple, nonstratified mucinous epithelium. The epithelium resembles gastric mucosa or intestinal epithelium with goblet cells. Gross pathological examination typically reveals a large unilateral cystic mass with a smooth outer surface. The cyst is typically multilocular but may be unilocular [1]. Cystadenomas are usually small; in rare cases, they can grow to considerable dimensions [4,5]. Giant ovarian cysts are defined as tumors larger than 10 cm in maximum diameter, and patients may present with nonspecific clinical manifestations (eg, abdominal distension, pain, nausea, and vomiting) [4]. Imaging is important for the detection, characterization, and follow-up of mucinous ovarian neoplasms [1]. Although transabdominal ultrasound is an effective method for evaluating ovarian masses, TVUS is preferable because of its higher sensitivity [6]. CE-MP-MRI is particularly useful for determining the precise origin, location, and extent of a mass and for further differentiating between benign and malignant lesions when TVUS findings are inconclusive; its sensitivity and specificity have been reported at 94% or higher [1]. In mucinous cystic neoplasms, CE-MP-MRI typically demonstrates a large, unilateral, multilocular cystic mass of varying complexity. T1- and T2-weighted images clearly demonstrate cyst wall thickness, septa, and the presence or absence of solid components or nodules. The signal intensity of individual cystic locules varies according to their internal composition. In particular, thick mucinous material may exhibit increased signal intensity on T1-weighted images and low signal intensity on

T2-weighted images [1]. In the present case, CE-MP-MRI supported the adnexal localization of the mass, clarified its origin, and provided more accurate anatomical information for surgical planning compared with ultrasound. Furthermore, CE-MP-MRI favored a benign diagnosis based on the absence of mural nodules, solid components, suspicious contrast enhancement, or restricted diffusion on diffusion-weighted imaging, suggesting low lesion cellularity. However, the definitive diagnosis required histopathological examination. Benign mucinous cystadenoma was strongly suspected because of the acute presentation, extremely large size at presentation, entirely cystic appearance, absence of metastases or lymphadenopathy, and normal serum tumor marker levels [7].

Although this condition is rare, it can be potentially dangerous when massive if not promptly diagnosed and appropriately managed [2]. The most frequent complications of benign ovarian cysts include torsion, bleeding, and rupture. Because mucinous cystadenomas contain mucinous fluid, rupture may lead to mucinous deposits in the peritoneal cavity (pseudomyxoma peritonei) [2]. Laparoscopic surgery for giant ovarian cysts, particularly those extending to the umbilicus, is associated with an increased risk of perforation during trocar insertion [3]. In rare cases, rupture has been implicated in malignant transformation, although this association is rarely documented in the literature [8-10]. In the present case, right adnexectomy was performed to remove the cyst intact for histopathological examination, without perioperative complications. The prognosis of mucinous cystadenoma is favorable when the tumor is removed without rupture. In particular, intraoperative rupture with spillage of cyst contents can increase the risk of recurrence [11].

Progressive abdominal distension in premenopausal women generally should raise suspicion for an ovarian tumor, such as mucinous cystadenoma. However, the differential diagnosis is broad and includes non-neoplastic conditions such as follicular

cysts, corpus luteum cysts, and endometriosis [12]. Additionally, pregnancy testing may be indicated in reproductive-age patients who present with an abdominal mass.

Other intra-abdominal tumors of nongynecological origin that should be considered in the differential diagnosis include Wilms tumor, neuroblastoma, lymphoma, and soft tissue sarcomas. Finally, ovarian masses often present with abdominal symptoms and severe pain that can mimic other conditions, particularly appendicitis [12].

Conclusions

Giant ovarian mucinous cystadenoma is a rare clinical entity that presents a diagnostic challenge for radiologists. The present case highlights the incremental value and supportive preoperative role of CE-MP-MRI in a young patient with a giant pelvic mass. CE-MP-MRI helped accurately determine the origin and precise localization of the lesion and facilitated appropriate preoperative surgical planning; the definitive diagnosis was established by histopathological examination.

Institution Where the Work Was Performed

Azienda Ospedaliera Universitaria Federico II, Naples, Italy.

Patient Consent

Written informed consent was obtained from the patient for the publication of this report and accompanying images.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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