



## Ovarian Mucinous Cystadenoma—Benign Tumor, Dramatic Ca 19-9 Numbers

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### Abstract

Mucinous ovarian cystadenomas are common benign epithelial tumors, but when they reach a giant size they may mimic malignancy and create significant diagnostic and management challenges, especially in postmenopausal women. We present the case of a 55-year-old postmenopausal woman with progressive abdominal distension, early satiety, epigastric discomfort, and exertional breathlessness. Imaging revealed a multiloculated abdominopelvic cystic mass measuring 22 cm with features suggestive of a mucinous neoplasm. Tumor markers showed markedly elevated CA 19-9 (>1000 U/mL) with normal CA-125 levels. Her Risk of Malignancy Index (RMI) score was 281, indicating high risk. She underwent staging laparotomy with total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, lymph node dissection, and appendectomy. Histopathology confirmed a benign mucinous cystadenoma with no malignant deposits. This case underlines the diagnostic dilemmas of giant mucinous ovarian cysts in postmenopausal women and emphasizes the role of RMI in guiding preoperative evaluation and appropriate surgical management.

**Keywords:** Mucinous ovarian cystadenomas, Risk of Malignancy Index (RMI), CA 19-9

### Introduction

The ovary is a vital organ of the female reproductive system, not only for its role in reproduction but also because it is a common site for malignancies that can significantly impact women's health. Among gynecological cancers, ovarian cancer holds particular importance as it is the sixth most common cancer in women worldwide and remains the leading cause of death from gynecological malignancies[1].

Ovarian tumors are broadly classified into three major categories: epithelial tumors, stromal tumors, and germ cell tumors. Of these, epithelial ovarian tumors are the most common, accounting for nearly 90% of all ovarian malignancies. While ovarian tumors can occur at any age, the majority of malignant epithelial tumors are seen in the perimenopausal and

postmenopausal age groups, whereas germ cell tumors are more common in younger women.

The etiology of ovarian cancer is multifactorial, with genetic, hormonal, and environmental factors playing important roles. Mutations in genes such as BRCA1 and BRCA2, as well as hereditary non-polyposis colorectal cancer (HNPCC), are well-established genetic risk factors. Other factors include nulliparity, infertility, and prolonged ovulation, whereas protective factors include multiparity, oral contraceptive use, and breastfeeding. Given its asymptomatic progression in early stages and late presentation, ovarian cancer is often diagnosed at an advanced stage, making early detection and timely management critical to improving survival outcomes.

## Case Presentation

A 55-year-old postmenopausal woman presented to the outpatient department with complaints of progressive abdominal distension, which had significantly worsened over the past 10 days. She also reported early satiety, mild epigastric pain, and exertional breathlessness during walking.

She initially consulted at another center, where an ultrasound of the whole abdomen revealed a large multilocular cystic mass measuring  $20 \times 18 \times 20$  cm, predominantly cystic with homogeneous fluid content and no obvious soft-tissue component. The mass was noted to arise from the pelvis and extend up to the umbilical region. The cyst wall appeared smooth with variable thickness and internal septations, without calcification. Both ovaries could not be visualized separately. The impression was of a large abdominopelvic multilocular cystic lesion with septations, most likely of ovarian origin, possibly a mucinous cystadenoma, with a note of focal adenomyosis of the uterus. She was subsequently referred to our institution for further management. On per-abdomen examination, the abdomen was distended and tense. A cystic mass corresponding to approximately a 34-weeks gravid uterus size was palpated.

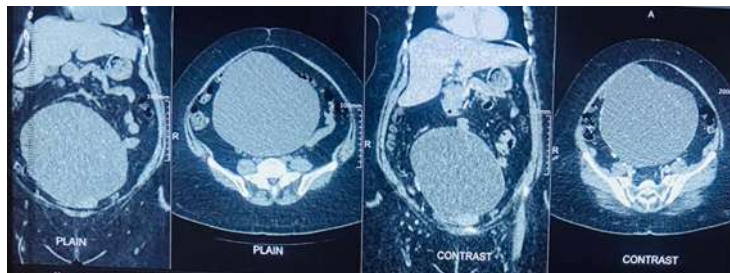
Tumor marker profile was as follows:

1. CA 19-9:  $>1000$  U/mL (markedly elevated)
2. CA-125: 31.3 U/mL (within normal range)
3. CEA: 3.73 ng/mL
4. Inhibin B: 15.87 pg/mL
5. Alpha-fetoprotein: 3.20 ng/mL
6.  $\beta$ -hCG:  $<2.0$  mIU/mL

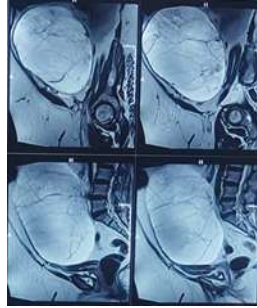
## Imaging Findings:

In view of the above findings, a contrast-enhanced CT (CECT) abdomen with MR angiography screening was performed. It demonstrated a large, well-defined, thin-walled, multiloculated cystic lesion arising from the right adnexa, measuring  $18.2 \times 18.8 \times 22.1$  cm with an estimated volume of approximately 4 liters. On T1-weighted MRI, the locules exhibited variable hyperintense signals, imparting a classic “stained-glass” appearance. No areas of diffusion restriction were noted. On T2-weighted MRI, the septations and cyst walls appeared hypointense with homogenous internal fluid signal. CECT confirmed a multiloculated cystic mass with thin, avidly enhancing septa and peripheral walls, without any enhancing solid nodules or papillary projections. The lesion caused mass effect by displacing the urinary bladder and uterus (uterine size:  $7.4 \times 2.2$  cm, postmenopausal), as well as adjacent small bowel loops. These findings were highly suggestive of a mucinous cystadenoma of the ovary.

**Fig 1. MRI showing big cyst in coronal view**



**Fig 2. MRI showing huge cyst in sagittal view**



**Menstrual history**

Menopause 10 years ago

**Obstetric history**

P1L2 by LSCS

**Management**

In view of the imaging and biochemical findings, the patient was planned for a staging laparotomy. She underwent a total abdominal hysterectomy with bilateral salpingo-oophorectomy (TAH-BSO), bilateral pelvic lymph node dissection, infracolic omentectomy, and appendectomy.

**Fig 3. Mass excised of 2.60kgs**



**Fig 4. Omentum, appendix, Pelvic nodes and other specimens**



Postoperative period was uneventful, and the patient recovered well.

Histopathological examination (HPE) of the excised specimen revealed:

- A benign mucinous cystadenoma of the right ovary.
- The uterus and contralateral adnexa showed no evidence of malignancy.
- The omentum, appendix, and lymph nodes were free of tumor deposits

## Discussion

Ovarian tumors are often slow-growing and may remain asymptomatic for long periods, leading to late diagnosis in many cases. However, timely evaluation and access to well-organized gynecological services can significantly improve early detection and outcomes. Among ovarian neoplasms, epithelial tumors are the most common, accounting for more than 90–95% of all ovarian cancers. They are further classified into serous, mucinous, endometrioid, and clear cell types. Of these, mucinous tumors constitute approximately 20% of all epithelial ovarian tumors[2]. They are most frequently reported in middle-aged women and are uncommon in adolescents, teenagers, or during pregnancy.

Mucinous tumors have the capacity to grow to an enormous size before discovery. Tumor size alone does not necessarily indicate malignancy, as even benign mucinous cystadenomas can reach dimensions of more than 50 cm in diameter and weigh over 100–150 kg[3]. These tumors are subclassified into benign, borderline, and malignant categories. Benign mucinous tumors represent nearly 40% of all benign ovarian neoplasms and carry an excellent prognosis with nearly 100% survival rate following complete surgical excision.

Ovarian mucinous carcinoma is classified into non-invasive (intraepithelial) and invasive forms. The non-invasive type shows pronounced epithelial atypia but lacks stromal invasion. In contrast, invasive mucinous carcinoma is diagnosed when stromal invasion exceeds 5 mm in depth or 10 mm<sup>2</sup> in area. Two growth patterns of invasive carcinoma are recognized. The expansile (confluent) type is defined by crowded, back-to-back glands forming broad sheets without intervening normal ovarian tissue. The infiltrative type, on the other hand, is marked by small, irregular

glands, clusters, or single tumor cells dispersed within the stroma, often accompanied by a fibrotic (desmoplastic) reaction. The infiltrative pattern is generally associated with a less favorable outcome compared to the expansile type[4].

The common complications associated with benign ovarian cysts include torsion, hemorrhage, and rupture. Rupture, in particular, may lead to pseudomyxoma peritonei if mucinous material spills into the peritoneal cavity, which can complicate management. In postmenopausal women, CA 125 should be used for primary evaluation because it allows the Risk of Malignancy Index of ovarian cysts to be calculated [8]. However, CA 125 should not be used in isolation, because it is nonspecific for ovarian cancer. There is not enough evidence to suggest that panels including multiple tumor markers will offer any further advantage in the initial assessment of ovarian cysts in postmenopausal women, because all the markers show low sensitivity and wide variation in specificity when used in isolation or in combination with CA 125[5]. Currently, the tumor markers CA125 and human epididymis protein 4 (HE4) as well as the risk ovarian malignancy algorithm (ROMA) and risk malignancy index (RMI) values are used as tools for differentiating between low- and high-risk patients with ovarian cancer[6].

The Risk of Malignancy Index (RMI) is calculated as:

$$\text{RMI} = \text{postmenopausal X USG findings X CA-125}$$

### Where:

- U (Ultrasound score): 3 (multiloculated cyst with septations, >10 cm)
- M (Menopausal score): 3 (postmenopausal)
- CA-125: 31.3 U/mL

$$\text{RMI} = 3 \times 3 \times 31.3 = 281.7$$

An RMI score >200 is considered high risk for malignancy. Thus, although histopathology revealed a benign tumor, the elevated RMI justified the extensive surgical staging in this postmenopausal woman.

The Risk of Malignancy Index (RMI) is a very useful preoperative tool to assess whether an adnexal mass is likely to be benign or malignant, even before invasive investigations are considered. It combines simple and widely available parameters such as ultrasound

features, menopausal status, and serum CA-125 levels, making it practical for routine clinical use.

The RMI is one of the most widely adopted diagnostic algorithms in the United Kingdom and is recommended by the Royal College of Obstetricians and Gynaecologists (RCOG) for preoperative evaluation of ovarian masses. By stratifying patients into low- and high-risk groups, it guides clinicians in deciding between conservative management, referral to a gynecologic oncologist, or the need for a full staging laparotomy.

CA 19-9, as noted elevated in this patient, is a glycoprotein antigen primarily secreted by ductal cells of the pancreas and biliary tract, as well as by epithelial cells of the stomach, colon, uterus, and salivary glands. Although it is most widely recognized as a biomarker for pancreatic ductal adenocarcinoma (PDAC), its expression is not specific to this malignancy. Elevated CA 19-9 levels can also be observed in a broad range of both malignant and non-malignant conditions affecting the gastrointestinal and extra-gastrointestinal systems. Non-neoplastic causes of increased CA 19-9 include pancreatitis, pancreatic cysts, diabetes mellitus, liver fibrosis, benign cholestatic disorders, as well as certain urological, pulmonary, and gynecological diseases[7].

The management of ovarian cysts depends on the patient's age, menopausal status, cyst size, and histopathological features. The gold standard of treatment of any suspected ovarian mass includes intact removal of the involved adnexa with intraoperative pathological evaluation, typically laparotomy, total hysterectomy, bilateral salpingo-oophorectomy, and staging procedure, including lymphadenectomy[8]. For young women with small, benign-appearing lesions, conservative surgery (such as cystectomy or unilateral salpingo-oophorectomy) is often sufficient. However, in postmenopausal women, or in cases where the cyst is large with a suspicion of malignancy, staging laparotomy following oncologic protocols is recommended. This includes careful intraperitoneal exploration, omentectomy, pelvic and para-aortic lymph node assessment, and biopsies from peritoneal surfaces and suspicious areas.

In our patient, given the postmenopausal status, large cyst size, and raised tumor markers, a total abdominal hysterectomy with bilateral salpingo-oophorectomy, infracolic omentectomy, pelvic node dissection, and

appendectomy was performed in line with standard oncological principles. Histopathology confirmed a benign mucinous cystadenoma, with all biopsy specimens free of malignant deposits.

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