

SHORT COMMUNICATION



Unlocking the diagnostic potential of CA 19.9 in ovarian dermoid cysts: A new biomarker frontier

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ABSTRACT

Ovarian dermoid cysts, or mature cystic teratomas, are common benign ovarian tumours in reproductive-age women, often asymptomatic or presenting with vague symptoms. Elevated tumour markers, particularly CA 19-9, have been observed in association with these cysts. Although typically linked to gastrointestinal malignancies, CA 19-9 may help in diagnosing ovarian dermoid cysts, predicting complications such as torsion and tumour size, and guiding treatment. This short communication highlights the potential role of CA 19-9 in the clinical management of ovarian dermoid cysts, emphasizing the importance of combining tumour markers with imaging for improved diagnostic accuracy and patient outcomes.

KEYWORDS

Metagenomics;
Polymicrobial infections;
Real-time diagnostics;
Precision medicine;
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Introduction

Mature cystic teratomas (MCTs), also known as dermoid cysts, are the most common benign ovarian tumours in women of reproductive age [1]. These cysts are composed of ectodermal, mesodermal, and endodermal tissues and may contain elements such as skin, hair, teeth, fat, muscle, and occasionally thyroid and brain tissue [2]. Although typically benign, untreated ovarian dermoid cysts can lead to significant health problems such as rupture, haemorrhage, and torsion, which are considered gynaecological emergencies [3]. Studies suggest that a genetic link may exist, as individuals with a first-degree relative who has an ovarian dermoid cyst are at higher risk for developing one [4].

Tumour markers are commonly used in clinical settings to assess treatment response, detect cancer recurrence, and predict prognosis in patients with known cancers [5]. CA-19-9 antigen is primarily raised in instances of malignancy within the gastrointestinal tract, such as that of the pancreas, colorectum, and biliary tract [6]. Additionally, CA 19-9 antigen may also be increased in ovarian mucinous neoplasms, as well as in various benign conditions [6]. Elevated levels of CA 19-9 may be seen in non-cancerous ovarian tumours such as mature cystic teratoma (MCT), and it does not necessarily imply a connection with cancer or the malignant change of benign tumours [7]. This report discusses the possible role of CA 19-9 as a diagnostic marker for ovarian dermoid cysts.

Significance

Dermoid ovarian cysts, the most prevalent germ cell tumors, account for upto 70% of benign ovarian masses in the reproductive years and 20% in postmenopausal women [8]. These cysts can cause complications such as torsion, abdominal pain, infection, distension, vaginal bleeding, nausea, vomiting, rupture, and rarely, hormone production. Additionally, cancers like squamous cell carcinoma, adenocarcinoma, melanoma, and thyroid carcinoma can develop from these cysts [9]. For

asymptomatic women, transvaginal ultrasound is the preferred method of diagnosis, as used in this case [10]. Ovarian cancers rank as the second most prevalent gynaecological cancer in India, following cervical cancer [11]. The transformation into a malignant tumour is an uncommon occurrence, representing merely 1–2% of cases, with squamous cell carcinoma (SCC) making up as much as 80% of all instances [11].

Carbohydrate antigen 19-9 (CA 19-9) is a glycoprotein complex located on cell surfaces that is primarily linked to pancreatic ductal adenocarcinoma (PDAC). The possible significance of CA 19-9 in the evaluation of patients broadens its implications further outside the gastrointestinal system – encompassing gynaecological and other cancers [12]. Although generally benign, these cysts can still cause serious complications, even without a family history. Early detection lowers morbidity for the patient [13].

Discussion

The discovery of elevated CA 19-9 levels in ovarian dermoid cysts could help improve diagnostic precision, particularly in uncertain cases. A study by Sagi-Dain et al showed that in mature cystic teratomas, the average CA 19-9 levels were elevated and CA 125 levels were reduced compared to ovarian carcinoma ($p = 0.049$ and $p = 0.0012$, respectively) indicating that increased CA 19-9 levels may assist in distinguishing metastatic tumours from primary ovarian cancer [14]. In a systematic review and meta-analysis done by Prodromidou A et al, four electronic databases were examined for articles published until September 2019 which included seven studies that involved 995 patients with an ovarian MCT who were assessed with elevated ($n = 364$) or normal ($n = 631$) CA 19-9 levels were included, the average tumor size was significantly larger in patients with elevated CA 19-9 levels ($p = 0.038$) and the incidence of ovarian torsion was significantly higher in the

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elevated CA 19-9 group ($p = 0.04$) [15]. In a study by Ahmadzadeh A et al the average serum levels of the CA 19-9 tumor marker were 46.13 ± 11.65 U/ml indicating that there was a direct relationship between mass size and CA 19-9 serum levels [16]. Another study showed that CA 19-9 levels were higher in patients with dermoid cysts compared to those with cancer, while CA 125 levels were lower in the dermoid cyst group [17]. This is consistent with findings from Wang et al. At Wenzhou Medical University, where CA 19-9 was identified as the most reliable marker for diagnosing MCT [18]. Similarly, Mughir and Al-Hilli's 2019 study in Iraq, involving 50 cases of ovarian dermoid cysts and 50 controls, showed that CA 19-9 levels were about four times higher in the case group, and a direct relationship between tumor size and CA 19-9 levels was noted [19]. In Lertkhachonsuk et al.'s study, CA 125 was the best marker for diagnosing borderline and malignant mucinous ovarian tumors, followed by CA 19-9 and CEA [20].

Conclusions

In conclusion, elevated serum CA 19-9 levels may serve as a valuable marker in diagnosing ovarian dermoid cysts and predicting related complications such as torsion and tumour size. While primarily associated with gastrointestinal malignancies, CA 19-9 has shown potential in benign ovarian conditions, specifically dermoid cysts. The correlation between elevated CA 19-9 levels and tumour size, bilaterality, and tissue necrosis underscores its utility in clinical settings.

For clinicians, using CA 19-9 alongside imaging techniques like transvaginal ultrasound could enhance diagnostic accuracy, allowing for earlier detection and reducing the risk of unnecessary treatments. This is particularly significant given that dermoid cysts are often asymptomatic or present with vague symptoms, making them challenging to diagnose based on clinical presentation alone.

The ability of CA 19-9 to predict complications may also aid in deciding between conservative management and surgical intervention, especially in younger patients concerned with fertility preservation. Although the risk of malignant transformation in dermoid cysts is low, monitoring CA 19-9 levels could provide insights into malignancy potential and help guide patient care. Overall, further research into CA 19-9 may lead to more refined diagnostic and treatment approaches for ovarian dermoid cysts.

Disclosure statement

No potential conflict of interest was reported by the authors.

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