Section: OBGYN

Original Research Article

ACCURACY OF CA 125, USG, CECT, RMI 1 SCORE IN DIAGNOSIS OF OVARIAN TUMOUR

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Received : 05/03/2024
Received in revised form : 23/04/2024
Accepted : 08/05/2024

Keywords:
CA 125, USG, CECT, Ovarian Tumour.

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DOI: 10.47009/jamp.2024.6.3.60

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (3); 284-288

Abstract

Background: Of all the Gynaecological malignancies ovarian cancer is the 3rd most frequent and fatal malignancy. It is the 5th most common cancer of the females. Most of the malignancies are diagnosed at the later stages, which are mostly asymptomatic in early stages. Late diagnosing leads to poor outcomes. Ovarian tumours are divided into three major categories according to the anatomic structures from which they arise. Through clinical examination, Carbohydrate antigen 125, Ultrasound, CECT, Risk malignancy index score may helps in the early detection and staging of malignancy. **Materials and Methods:** It is a Retrospective study conducted in NRI medical college and general hospital in Department of OBGYN in collaboration with surgical oncology. Data collected from 58 patients who underwent surgery for ca ovary from jan 2018 to jan 2023.Predictive variables such as serum CA125 value, USG & CECT features, RMI 1 SCORING SYSTEM has been taken in this study. Histopathology report has been taken as gold standard. **Result:** Continuous variables in the study are analysed and presented with frequencies & percentages. Receiver operating characteristic curve (ROC) is used to analyse and calculate the positive predictive values of different-variables under the study. Multiple logistic regression analysis is used to calculate odds ratio and to identify significant predictors. Of the 58 ovarian Histopathological specimens examined, 32 (55.17%) were benign, and 26 (44.82%) were malignant. The sensitivity for the RM1 SCORE in predicting malignancy was 73.08%, specificity was 93.75%, positive predictive value (PPV) was 90.5%, negative predictive value (NPV) was 81.1%. The sensitivity for the CA125 serum concentration in predicting malignancy was 84.62%, specificity was 84.37%, positive predictive value (PPV) was 81.5%, negative predictive value (NPV) was 87.1%. **Conclusion:** RMI 1 score was more effective in excluding ovarian malignancies and had a higher specificity of 93.75%, PPV of 90.5%.CA 125 which is also effective following RMI 1 score in conforming Ovarian Malignancy with Sensitivity of 84.62%, improving overall specificity in sonographically malignant tumours.

INTRODUCTION

Ovarian cancer is a prevalent gynaecological malignancy, occupying the third position in terms of occurrence following cervical and endometrial cancers.[1,2] It constitutes around 3.4% of all diagnosed cancer types in women. Ovarian cancer exhibits a bleak prognosis and surpasses all other gynaecological cancers in terms of fatality rate.[3,4] Most patients receive their diagnosis at an advanced stage, with around 60% exhibiting metastatic foci upon initial diagnosis.[5-8] India has the second-highest estimated incidence of ovarian cancer globally, following China. India is responsible for 76.5% of the occurrence and 77.5% of the death rate of individuals diagnosed with Ovarian Cancer in the south-central Asian region.[4]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Carbohydrate antigen 125, aka called cancer antigen 125 (CA-125), is a constituent of mucin glycoproteins, a class of proteins including 22,000 amino acids. Ovarian epithelial tumours, as well as the normal epithelium of the female reproductive system, gastrointestinal mucosal cells, and the luminal surface of mesothelium covering the peritoneum, pleura, and pericardium, have a considerable expression of this gene.[9,10] The primary emphasis of clinicians in the first assessment and examination of females with unexplained abdominal complaints or an adnexal tumour has been CA-125.[11-18]

USG, in recent times, there has been a growing use of ultrasonography in evaluating women who exhibit a diverse array of gynaecological issues. Thick irregular walls, papillary projections, solid echogenic locules, bilaterality, Multiloculated, Ascites are considered signs of malignancy.[19-23] Addition of colour Doppler imaging with pulsed Doppler spectral analysis improves the characterisation of ovarian masses by means of quantitative blood flow measurements obtained from tumour vessels.[24-27] 92% of malignant tumours show blood flow; conversely the absence of blood flow is equally important that suggests benignity of tumour.[28]

Contrast-enhanced computed tomography (CECT) is a widely accessible, non-invasive diagnostic modality that proves valuable in detecting ovarian cancer. Numerous articles have demonstrated significant disparities,[21] in the outcomes of the sensitivity and specificity of CT scans for the identification of ovarian cancer. Findings predictive of malignancy are presence of papillary projections in a cystic lesion, Necrosis in a solid mass, Peritoneal metastasis, Lymph node involvement.

Risk malignancy index (RMI), a scoring system that combines demographic and ultrasound data with blood CA125 measurement. This approach is used to simplify the process of triaging women with ovarian tumours and referring them to tertiary gynaecological oncology centres.[22] While the RMI is a straightforward test in clinical settings, its rates of false negatives and false positives are substantial.[23,24] RMI Score greater than 200 is highly specific for Malignancy.

This study aimed to demonstrate the efficacy of CA 125, USG, CECT, RMI 1 SCORE as a diagnostic tool for assessing women with suspected ovarian tumours who were receiving care in Department of Obstetrics &Gynaecology, Department of Surgical Oncology, NRIGH, Chinnakakani, Andhra Pradesh, during the study period.

MATERIALS AND METHODS

Study design: Medical Record.

Study Setting: Department of Obstetrics & Gynaecology, Department of Surgical Oncology, NRIGH, Chinnakakani, Andhra Pradesh.

Study Population: Women Who Underwent Surgery Assuming as Ca Ovary from CA 125, USG, RMI SCORE and CECT.

Sample Size: A Total of 58 Eligible Subjects.

Inclusion Criteria

All cases who were assumed to be carcinoma ovary clinically and CA 125, USG, CECT & RMI SCORE.

Exclusion Criteria

Cases that are proven benign clinically and by CA 125, USG, CECT & RMI SCORE.

Procedure

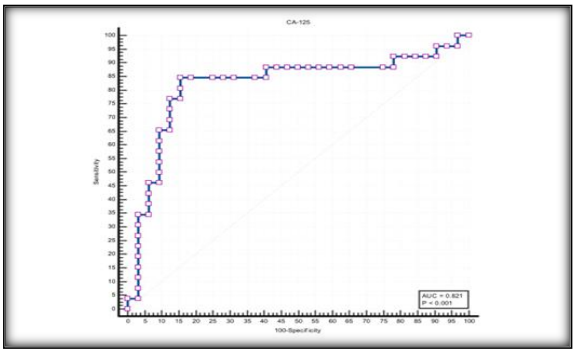
Patient data collected as per inclusion and exclusion criteria.

Statistical Analysis

Statistical data will be expressed in terms of percentages. Quantitative variables will be expressed in terms means and standard deviations. Data will be presented with suitable graphical methods. Continuous variables in the study are analysed and presented with frequencies & percentages. Receiver operating characteristic curve (ROC) is used to analyse and calculate the positive predictive values of different-variables under the study. Multiple logistic regression analysis is used to calculate odds ratio and to identify significant predictors.

RESULTS

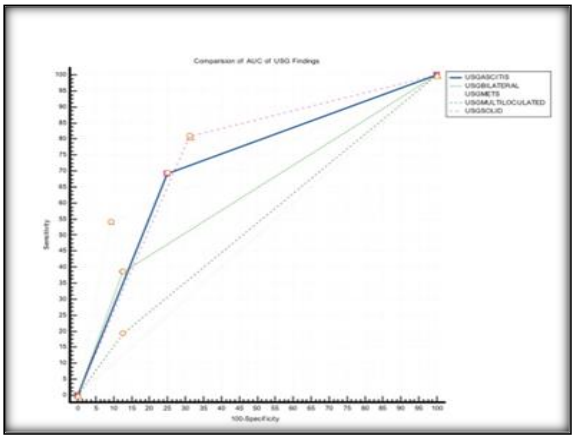
The total number of ovarian biopsies/surgeries in the study period was 78. However, only 58 cases had complete data that included CA-125, USG, CECT report prior to the intervention and only these were included in this evaluation study.



The receiver operating characteristic (ROC) curve and area under the curve (AUC) for CA-125 and RMI in the studied patients.

The sensitivity for the CA125 serum concentration in predicting malignancy was 84.62%, specificity was 84.37%, positive predictive value (PPV) was 81.5%, negative predictive value (NPV) was 87.1%.

ISSN (O): 2687-5365; ISSN (P): 2753-6556



The sensitivity for the USG- ASCITIS in predicting malignancy was 69.2%, specificity was 75%, positive predictive value (PPV) was 69.2%, negative predictive value (NPV) was 75%. In USG-BILATERAL in predicting malignancy was 38.5%, specificity was 87.5%, positive predictive value (PPV) was 71.4%, negative predictive value (NPV) was 63.6%. In USG- METS in predicting malignancy was 53.85%, specificity was 90.62%, positive predictive value (PPV) was 82.4%, negative predictive value (NPV) was 70.7%. In USG-MULTILOCULATED in predicting malignancy was 19.2%, specificity was 87.5%, positive predictive value (PPV) was 55.6%, negative predictive value (NPV) was 57.1%. In USG- SOLID in predicting malignancy was 80.8%, specificity was 68.7%, positive predictive value (PPV) was 67.7%, negative predictive value (NPV) was 81.5%.

Sensitivity, Specificity, Predictive values and diagnostic accuracy of contrast enhanced computed tomography for the detection of ovarian cancer

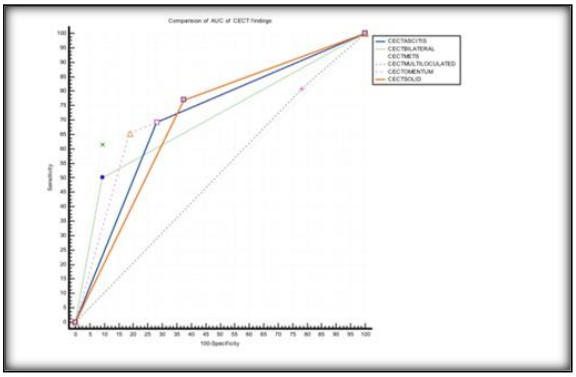
Sensitivity: Multiloculated (80.77) > Solid (76.92) > Ascitis (69.23) > Omentum (65.4)> Mets (61.5) > Bilateral (50)

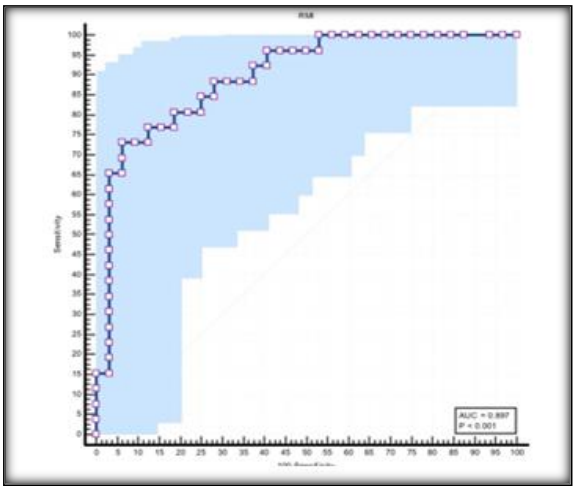
Specificity: Mets (90.6) & Bilateral (90.6) > Omentum (81.2) >Ascitis (71.87) > Solid (62.5) > Multiloculated (21.87).

Positive predictive value: Mets (84.2) & Bilateral (84.2) > Omentum (73.9) > Ascitis (66.7) > Solid (62.5) > Multiloculated (45.7)

Negative predictive value: Mets (74.4) & Bilateral (74.4) > Omentum (74.3) >Ascitis (74.2) > Solid (73.2) > Multiloculated (58.3)

ODDS Ratio :11.4861 for metastasis.





The sensitivity for the RMI 1 SCORE in predicting malignancy was 73.08%, specificity was 93.75%, positive predictive value (PPV) was 90.5%, negative predictive value (NPV) was 81.1%.

Table 1

Variable	Sensitivity	Specificity	PPV	NPV	AUC	P-value
USG- ASCITIS	69.2	75	69.2	75	0.724	0.0002
USG-BILATERAL	38.5	87.5	71.4	63.6	0.63	0.02
USG- METS	53.85	90.62	82.4	70.7	0.722	0.0001
USG- MULTILOCULATED	19.2	87.5	55.6	57.1	0.534	0.49
USG- SOLID	80.8	68.7	67.7	81.5	0.748	0.0001

Table 2

Variable	Sensitivity	Specificity	PPV	NPV	AUC	P-value
CECT- ASCITIS	69.23	71.87	66.7	74.2	0.706	0.0008
CECT- BILATERAL	50	90.6	84.2	74.4	0.761	0.0001
CECT- METS	61.5	90.6	84.2	74.4	0.761	0.0001
CECT- MULTILOCULATED	80.77	21.87	45.7	58.3	0.513	0.807
CECT-OMENTUM	65.4	81.2	73.9	74.3	0.733	0.0001
CECT- SOLID	76.92	62.5	62.5	73.2	0.697	0.001

ISSN (O): 2687-5365; ISSN (P): 2753-6556

DISCUSSION

Of the 78 ovarian specimens examined, 32 (55.17%) were benign, and 26 (44.82%) were malignant.

The malignant tumours included epithelial tumours (39.2%), in which serous cystadenocarcinoma (20.0%) was predominant, followed by borderline epithelial tumors (15.9%). Germ cell tumor (18.6%) was the second common malignant type followed by sex cord tumor (12.8%). In contrast, the most common benign lesions were epithelial types (44.5%) followed by germ cell types (33.5%). Among these, the most common benign lesions were teratoma (32.7%) followed by endometriotic cysts (28.4%) and serous cystadenoma (14.1%).

This study evaluated various modalities of investigations in ovarian masses mainly to determine malignant nature, extent of local tumour spread and extraovarian dissemination. The diagnostic abilities of each were analysed and correlated with one another, considering final histopathological report as gold standard. The results indicated that combined parameters were superior in detection of ovarian malignancy and its spread than individual modalities taken independently.CA125 biomarker is most often used for ovarian lesions. Its upper limit is 35 U/mL in pre and post-menopausal patients. However, this measurement is not very sensitive in the early phases of ovarian cancer.[29] In addition, elevated serum CA125 levels may be observed in other physiological orpathological conditions (menstruation, pregnancy, endometriosis, inflammatory diseases of the peritoneum) In practice, CA125 is often measured in cases of ovarian cysts, but according to its low specificity and the observed increased levels in different physiological situations, it is not considered as a very good differentiating biomarker for ovarian tumours.[29] RMI was proposed in 1990 by Jacobs et al, using CA125, ultrasound findings and menopausal status according to the formula: RMI = U x M x CA125 with U = ultrasound score (U = 0 if ultrasound score = 0, U = 1 if ultrasound score = 1, U = 3 if ultrasound score 2 to5), M = menopause status (M = 1 for pre-menopausal women, M = 3 for post-menopausal women).This study demonstrates the ability of RMI to correctly identify benign and malignant adnexal masses. It shows the high specificity of risk of malignancy indices at an optimal cutoff of 200. The specificity for RMI 1 was 91%, which is similar to previous studies.[30] A high specificity is important because it reduces the number of surgical procedures performed for benign cases in tertiary gynaecological oncology centre's , therefore optimising resources for patients with malignant pelvic masses. Using a cutoff of 200, the preoperative RMI the sensitivity for the RM1 SCORE in predicting malignancy was 73.08%, specificity was 93.75%, positive predictive value (PPV) was 90.5%, negative predictive value (NPV) was 81.1%.

Our study showed sensitivity for the USG- ASCITIS in predicting malignancy was 69.2%, specificity was 75%, positive predictive value (PPV) was 69.2%, negative predictive value (NPV) was 75%, in detection of ovarian carcinoma when compared to other studies in literature.[31] Thismay be because of theinter-observer variation in results ofultrasonography and also the failure of USG in assessment of the involvement of retroperitoneal area.

Study	Sensitivity %	Specificity %
IOTA (2012).[33]	90	88
Hafeez S et al.(2013),[34]	91	91
Current study	69.2	75

Results of CT in our study showing high number of false positives which may be due to non-specific inflammatory changes within the tumour, reactive lymphadenitis appearing as enlarged lymph nodes on CT,[32] which were reported as possible malignancy, which changes the stage of disease. And also lack of extensive retroperitoneal and paraaortic lymph node dissection also would have contributed to the low specificity.

Study	Sensitivity %	Specificity %
Mubarak et al. (2011),[35]	97	91
Firoozabadi et al. (2011),[36]	79	92
Current study	80.7	90.6

CONCLUSION

In our study, out of all variables RMI 1 score was more effective in excluding ovarian cancer and had a higher specificity of 93.75%, PPV of 90.5%.

CA-125 might be more valid for the diagnosis of malignant ovarian cancer while RMIis more valid for excluding the diagnosis of these tumors.

CA125 further improves the precision. It is difficult to suggest a single investigative modality for evaluation of women with suspected ovarian malignancy. All the modes, though not inferior by themselves, are complimentary to each other in their diagnostic performances.

The inclusion of USG and CECT features could improve the predictive values and decrease the chances of false positives and false negative results.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556

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ISSN (O): 2687-5365; ISSN (P): 2753-6556