Original Article

Ovarian Malignancy

Role of Malignancy Index in Prediction of Malignancy in Ovarian Masses Preoperatively

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ABSTRACT

Objectives: To determine the diagnostic accuracy of risk of malignancy index (RMI) in the preoperative prediction of malignancy in ovarian masses by taking histopathological findings as gold standard.

Study Design: Cross-sectional survey

Place and Duration of Study: This study was conducted at Gynae Unit 111, Lady Willingdon Hospital Lahore and duration was one year from 1.1.2013 to 31.12.2013.

Materials and Methods: 140 cases were recruited for the study. Blood drawn for serum Ca-125 level and sent to hospital laboratory and pelvic ultrasound was done. For each risk of malignancy index was calculated value of RMI $\geq$ 200 was taken as positive.

Results: Patients were having the mean age 55.8±7.6. Comparison of malignancy index vs. histopathology for prediction of malignancy in ovarian masses showed 64 malignant cases on histopathology and 69 on RMI. Sensitivity rate: 89.0%, specificity: 84.2%, diagnostic accuracy: 86.4%, PPV: 82.6% and NPV: 90.1%.

Conclusion: The menopausal status, serum CA125 levels and ultrasound reports accumulated together can give us risk of malignancy index which can provide the odds of development of ovarian malignancies.

Key Words: Risk of malignancy index, ovarian malignancies, ovarian cancers

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INTRODUCTION

Among all the gynaecological malignancies, ovarian cancer is the third most commonly treated cancer and highest mortality rate even in developed countries. [1]. For every 7 out of every 10 cases the diagnosis takes place at late stage, which means the prognosis is poor, usually 70% patients die within 2 years and almost 90% die within 5 years of diagnosis. It is due to above mentioned facts that has stimulated researches to find screening procedures for ovarian cancer. This cancer is symptomatic and can be detected early if proper screening methods are in place. Constant pelvic and abdominal pain with continuing bloating and loss of appetite are most common symptoms .Among other symptoms urinary complaints and change of bowel habits are more important [2].The PPV is <1% for all symptoms except abdominal distention. However if symptoms are frequent and persistent, it helps to pinpoint patients of ovarian malignancy [3]. If malignancy is suspected, pelvic ultrasound and Ca-125 level is ordered but for further details highly specific diagnostic tests are needed and it is important that the disease is diagnosed at a manageable stage.50% of suspected malignancy patients are not directly referred to gynaecological cancer clinics [4]. A recommendation of malignancy before operation can escort the gynaecologist to refer the patient with alleged pelvic mass to oncological unit for suitable therapy.

Abdominal or Vaginal ultrasound, colored Doppler ultrasound and markers of tumors can be used to assess pelvic masses but none of these tests separately has shown meaningful performance for detection of malignancy form clinically restrictor ovarian masses. The malignancy index is a score which is obtained by the formula which takes into account the menopausal status, serum level of glycoprotein Ca-125 and results of ultrasound[5]. A risk of malignancy index of > 200 is an indication for referral to central oncology unit. According to one study in Turkey sensitivity of RMI is 85.4% and specificity 96.9% for determination of malignancy in adnexal masses. Another study indicates RMI of 200 has sensitivity of 81% and specificity of 86% in the detection of ovarian malignancy [6]. An extremely high specificity is a requirement of a screening strategy for ovarian cancer.

Objective of this study was to determine diagnostic accuracy of RMI (Risk of malignancy index) in the pre-operative prediction of malignancy in ovarian masses as there is controversies regarding exact sensitivity and specificity of RMI.

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MATERIALS AND METHODS

This cross sectional study was conducted at unit 111 Lady Willingdon Hospital Lahore for a period of one year from 1.1.2013 to 31.12.2013. 140 cases were recruited for the study by non probability sampling technique taking expected percentage of ovarian masses 45% with sensitivity 85.4%, specificity 96.9% of RMI in the detection of malignancy in patients with ovarian masses by taking histopathology as gold standard.

Inclusion criteria was patients age 35 years and above, Simple or complex cyst more than 5cm on ultrasound. However, patients presenting with cyst accidents e.g. rupture/torsion presented as acute abdomen, Pregnancy with ovarian cyst, ovarian cyst with co-existing uterine fibroid assessed on pelvic ultrasound were excluded from the study. Patients were recruited from outpatients department after approval from ethical committee of hospital. Each patient was explained the purpose of the study and only those who give an informed consent were included. A detailed history was taken and complete general physical, systematic and pelvic examination was done. Blood was drawn for serum Ca-125 level and sent to hospital laboratory; pelvic ultrasound was done by hospital senior radiologist. For each patient risk of malignancy index was calculated value of RMI ≥200 was taken as positive. All patients were undergone Laparotomy and a specimen of cyst was sent for histopathological examination.

The data analysis was computer based. SPSS version 16 was used for analysis. Initially, descriptive statistics was calculated. The sensitivity, specificity, PPV, NPV and accuracy of RMI in the prediction of malignancy in ovarian masses was calculated by generating 2x2 contingency table taking histopathological findings as gold standard.

RESULTS

Majority of the patients, 73 (52.1%) were between 46-55 years old and minimum patients 27 (19.3%) were between 35-45 years of age. Mean age of the patients was 55.8±7.6 (Table-1).

Table No.1: Age distribution n = 140

Age (Year)	Number	Percentage
35-45	27	19.3
46-55	73	52.1
56-60	40	28.6
Total	**140**	**100.0**
Mean±SD	**55.8±7.6**	

Table No.2: Comparison of malignancy index vs histopathology for prediction of malignancy in ovarian masses n = 140

Risk of Malignancy index (RMI)	Histopathology (Gold Standard)		Total
	Malignant	Benign	
Malignant	57 (TP)	12 (FP)	69
Benign	07 (FN)	64 (TN)	71
Total	64	76	140

Key:

TP = True positive
FP = False positive
FN = False negative
TN = True negative`

Table No.3: Sensitivity, Specificity and accuracy of RMI

Sensitivity rate	$\frac{\text{True Positive}}{\text{True Positive + False Negative}}$	x 100 =	
	$\frac{57}{57 + 7}$	x 100 =	89.0%
Specificity rate	$\frac{\text{True Negative}}{\text{True Negative + False Positive}}$	x 100 =	
	$\frac{64}{64 + 12}$	x 100 =	84.2%
Diagnostic Accuracy	$\frac{\text{True Positive + True Negative}}{\text{True Positive + False Negative + True Negative + False Positive}}$	x 100 =	
	$\frac{57 + 64}{57+64+12+7}$	x 100 =	86.4%

Table No.4: Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of RMI

Predictive value of Positive test	$\frac{\text{True Positive}}{\text{True Positive + False Negative}}$	x 100 =	
	$\frac{57}{57 + 12}$	x 100 =	82.6%
Predictive value of Negative test	$\frac{\text{True Negative}}{\text{True Negative + False Positive}}$	x 100 =	
	$\frac{64}{64 + 7}$	x 100 =	90.1%
	$\frac{57 + 64}{57+64+12+7}$	x 100 =	86.4%

Comparison of malignancy index vs. histopathology for prediction of malignancy in ovarian masses showed 64 malignant cases on histopathology and 69 on RMI. True positive cases were 57, false positive 12, false negative 7 and true negative cases were 64 (Table-2).
Sensitivity rate was 89.0%, specificity was 84.2%, diagnostic accuracy was 86.4%, PPV was 82.6% and NPV was 90.1% (Table 3 & 4).

DISCUSSION

Seventh most common cancer in women worldwide is ovarian malignancy approximately accounting for four percent of all cancers and with incidence rate of 200,000 each year [7]. Ovarian cancer has 35% five year survival rate which makes it the worst among gynaecological cancers in terms of prognosis [8]. The prognosis is remarkably better if cancer is at early stage (stage 1 or 2) with survival rate of 80-90% while survival rate is reduced to 25% in late stage cancer(stage 3 or 4)[9]. The problem is that only 3 out of every 10 patients are diagnosed at early stages. There is lack of screening tests, so the earlier diagnosis is usually due to improved identification of symptoms [10]. Before lately, this cancer was considered a silent killer because of very few symptoms. The newly applied guidance in UK mentions critical investigation only for abnormal vaginal bleeding and palpable masses, but these recommendations are not obligatory [11]. Many of recent studies show that this cancer is highly symptomatic and symptoms go unacknowledged by patients as well as physicians [12].

Pain in the abdomen, abdominal distension, pain in the pelvic region, frequency of urine, constipation or diarrhea, abnormal vaginal bleeding, loss of weight, abdominal bloating, and fatigue have all been reported [13].

Malignancy index is suitable for discriminating malignant form benign masses in those females who have no sign of advanced stage ovarian cancer. This index was more accurate in present population. The strength of the index relays on the number of early and advance stages of cancer and also on number of malignant neoplasm and benign processes [14].

In present study, sensitivity was 89.0%, Specificity 84.2%, diagnostic accuracy 86.4%, PPV: 82.6% and NPV: 90.1%.

In two studies conducted by Jacobs et al[15] and Tingulstad et al [16], in the first study they found a sensitivity of 73% and a specificity of 91%. In the second study they found a sensitivity of 76% and specificity of 82% in 1996, and 74% and 91% respectively in 1999. The index showed itself useful in referring patients with advanced neoplasia to a more complex healthcare unit. These results are comparable with our findings.

The risk of malignancy index plays a crucial role in deciding which cases should be referred to oncological units and it also allows the surgeon to select the certain surgical procedure.

In another study done by Leelahakorn et al [17], demonstrated the role of ultrasound reports, CA 125, menopausal status, and one type of the RMI in discriminating benign from malignant ovarian tumors. For the RMI, the sensitivity, specificity, PPVand NPV were88.6%, 90.7%, 70.5%, and 97%, respectively. These figures are comparable with our study.

CONCLUSION

In conclusion, when ultrasound profile, patient menopausal status and serum CA 125 levels are combined then the risk of malignancy index (RMI) is calculated. This simple index can be useful in clinical practice and can be an important tool in the assessment of adnexal mass preoperatively .The usefulness of this index extends to referrals of patients with advanced neoplasia to suitable intricate healthcare units, while this index does not give the prognostic assessment. But, the performance of the existing index must be tested in other studies in the same population by using validation samples.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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