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Original Article

The Risk of Malignancy Index in Differentiating Malignant from Benign Ovarian Tumor

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ABSTRACT

Background: *To solve the issues of preoperative diagnosis of ovarian tumors, risk of malignancy index (RMI) is a suitable index for evaluation of ovarian tumors before surgeries.* ***Objective:*** *In this study our main goal is to evaluate the risk of Malignancy Index in Differentiating Malignant from Benign Ovarian Tumor.* ***Method:*** *This cross sectional study was carried out at Department of Obstetrics and Gynaecology, Shaheed Suhrawardy Medical College Hospital, Dhaka from January 2013 to December where a total of 60 women who diagnosed with ovarian tumor were included as a sample size.* ***Result****: During the study, majority of the patients belong to 21-30 years age group, 26.7% and according to histopathology findings (63.3%) cases were benign tumors. Besides that, risk malignancy index (RMI) ≥200 was in 19 (86.4%) cases and RMI <200 was in 32 (53.3%) cases. Of the benign ovarian tumours 34 (89.5%) cases had RMI <200 and 4 (10.5%) cases had RMI ≥200; while of the malignant ovarian tumours 19 (86.4%) cases had RMI ≥200 and 3 (13.6%) cases had RMI<200. In addition, risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours, there were true positive (TP) in 19, false negative (FN) in 3, true negative (TN) in 34 and false positive (FP) in 4. Apart from that, sensitivity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 86.4% whereas predictive value of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 82.6%. Also, specificity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 89.5%.* ***Conclusion:*** *RMI can be use as a diagnostic tool to discriminate between malignant and benign ovarian tumours. Hence the RMI is an appropriate method in diagnosing ovarian tumours with high risk of malignancy and guide the gynaecologist for further evaluation and effective management accordingly.*

Keywords: *Risk malignancy index (RMI), ovarian tumor, malignant tumor.*

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INTRODUCTION

Most of the patients with ovarian cancers remain asymptomatic until the late stage or present only with vague, non-specific abdominal complaints. It is crucial to have a fairly good idea regarding the nature of tumour - benign or malignant at the preoperative stage so that primary surgery can be optimally planned and undertaken [1]

But the problem of preoperative diagnosis of ovarian tumors has not yet been completely solved [2].

Differentiation of benign versus malignant ovarian tumors before surgery was difficult, therefore, various combined methods of evaluating the risk of ovarian cancer have been proposed. Jacob et al [3] developed a Risk of Malignancy Index (RMI) based on serum level of CA125, menopausal state and ultra sound findings. Risk of Malignancy Index (RMI) is calculated with a simplified regression equation obtained from the product of menopausal status score (M), ultrasonographic score (U) and absolute value of serum CA-125.

The RMI is a suitable index for evaluation of ovarian tumors before surgeries and confirms previous studies indicating that RMI improves the differentiation between nonmalignant and malignant ovarian tumours [3,4,5].

However there are little study has been document in this regard among Bangladesh. In this study our main goal is to evaluate the risk of Malignancy Index in Differentiating Malignant from Benign Ovarian Tumor.

OBJECTIVE

To evaluate the risk of Malignancy Index in Differentiating Malignant from Benign Ovarian Tumor.

METHOD

Study design: This was a cross-sectional observational study.

Place of study: This study was conducted in theDepartment of Obstetrics and Gynaecology, Shaheed Suhrawardy Medical College Hospital, Dhaka.

Study period: This study was conducted during the period from January 2013 to December 2013.

Study population: The study population were consisted of 60 women who got admitted in the Department of Obstetrics and Gynaecology, Shaheed Suhrawardy Medical College Hospital, Dhaka with diagnosed ovarian tumour, detected clinically or by ultrasound and fulfilling the inclusion and exclusion criteria.

Sampling method: Purposive sampling was employed as sampling technique in this study.

Inclusion Criteria

- Women of all age who were admitted in the Department of Obstetrics and Gynaecology, Shaheed Suhrawardy Medical College Hospital, Dhaka for management of ovarian tumour.

Exclusion Criteria

- Patients suffering from Pelvic inflammatory disease and Intrauterine and ectopic pregnancy.
- Patients not underwent laparotomy.
- Patients underwent re-laparotomy following previous treatment for malignant ovarian tumour.
- Patients not interested to enroll in this study.

Data collection tool: Pre-designed structured questionnaire.

Procedures of collecting data

Sixty patients with ovarian tumour those who were admitted in different

units of Department of Obstetrics and Gynaecology, Shaheed Suhrawardy Medical College Hospital, Dhaka, and fulfilled the inclusion were enrolled as study population in this study.

The procedure was explained to the patients. An informed and written consent was taken from those who agreed to participate in the study.

Detailed history was taken as per the pre-tested questionnaire.

General physical and systemic examination and investigations including the necessary preoperative investigations were carried out.

Procedure of data analysis and interpretation:

Data were processed manually and analyzed with the help of SPSS (Statistical package for social sciences) Version 21.0.

Quantitative data were expressed as mean and standard deviation; and comparison were done by "Z" test.

Qualitative were expressed as frequency and percentage and comparison was carried by Chi-square (χ^2) Test.

A probability value (p) of less than 0.05 was considerate to indicate statistical significance.

RESULT

In Table-1 shows age distribution of the patients where majority of the patients belong to 21-30 years age group where as 15-20 group lower cases were observed. The following table is given below in detail:

Table-1: Age distribution of the patients

Age group	N	%
15-20 years	3	5
21-30 years	16	26.7
31-40 years	12	20
41-50 years	13	21.7
51-60 years	10	16.7
61-70 years	6	10

In figure-1 shows distribution of patients by histopathological nature of the ovarian tumors. Of 60 hisopathologically confirmed ovarian tumors, 38 (63.3%) cases were benign tumorsand 22 (36.7%) cases were malignant tumors. The following figure is given below in detail:

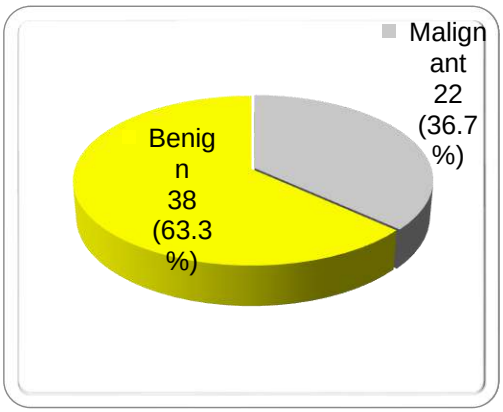

Figure-1: Distribution of patients by histopathological nature of the ovarian tumour (n=60)

In table-2 shows distribution of patients by risk malignancy index where risk malignancy index (RMI) ≥200 was in 19 (86.4%) cases and RMI <200 was in 32 (53.3%) cases. Of the benign ovarian tumours 34 (89.5%) cases had RMI <200 and 4 (10.5%) cases had RMI ≥200; while of the malignant ovarian tumours 19 (86.4%) cases had RMI ≥200 and 3 (13.6%) cases had RMI<200. The following table is given below in detail:

Table-2: Distribution of patients by risk malignancy index

Risk malignancy index	Histopathological nature of ovarian tumours		Total
	Malignant	Benign	
≥200	19 (86.4)	4 (10.5)	23 (38.3)

<200	3 (13.6)	34 (89.5)	37 (61.7)
Total	22 (100.0)	38 (100.0)	

In table-3 shows cross tabulation of risk malignancy index and histopathological nature of ovarian tumours (n=60) where risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumours, there were true positive (TP) in 19, false negative (FN) in 3, true negative (TN) in 34 and false positive (FP) in 4.

Table-3: Cross tabulation of risk malignancy index and histopathological nature of ovarian tumours (n=60)

Risk malignancy index	Histopathological nature of ovarian tumours		Total
	Malignant	Benign	
≥200	19 (TP)	4 (FP)	23
<200	3 (FN)	34 (TN)	37
Total	22	38	40

Sensitivity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumours:

$$\text{Sensitivity} = \frac{\text{True positive}}{\text{True positive} + \text{False negative}} \times 100$$

Sensitivity =19/ (19+3) X 100=86.4%

In this study sensitivity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumours was 86.4%.

Besides that according to specificity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumours

$$\text{Specificity} = \frac{\text{True negative}}{\text{False positive} + \text{True negative}} \times 100$$

Specificity = 34/ (4+34) X 100=89.5%

In this study specificity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors was 89.5%.

In addition, positive predictive value of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors:

$$\text{Positive predictive value} = \frac{\text{True positive}}{\text{True positive} + \text{False positive}} \times 100$$

Positive predictive value = 19/ (19+4) X 100=82.6%

In this study positive predictive value of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors was 82.6%.

Whereas negative predictive value of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors:

$$\text{Negative predictive value} = \frac{\text{True negative}}{\text{True negative + False negative}} \text{ X } 100$$

Negative predictive value = 34/ (34+3) X 100=91.9%

In this study negative predictive value of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors was 91.9%.

Apart from that, accuracy of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors:

$$\text{Accuracy} = \frac{\text{True positive + True negative}}{\text{True positive+Falsepositive+Falsenegative+True negative}} \text{X } 100$$

Accuracy of the Test = (19+34)/ (19+4+3+34) X 100=88.3%

In this study accuracy of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors was 88.3%.

DISCUSSION

In the present study 63.3% cases were hisopathologically confirmed benign ovarian tumours and 36.7% cases were malignant ovarian tumours. This result was similar to the study of Clarke et al.[5] that 63.4% of ovarian tumours were benign tumours and 35.6% of cases were malignant tumours. Torres et al [6]. found 57.6% of patients had benign disease and 42.4% of patients had malignant disease.

In this study the risk malignancy index (RMI) ≥200 was in 86.4% cases and RMI<200 were in 53.3% cases. Of the benign ovarian tumours 89.5% cases had RMI <200 and 10.5% cases had RMI ≥200; while of the malignant ovarian tumours 86.4% cases had RMI ≥200 and 13.6% cases had RMI<200. Different authors used this cut off value and found similar findings consisted with the present study [7-8].

In the current study risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours, there were true positive in 19, false negative in 3, true negative in 34 and false positive in 4. This result was correlated with the study of Terzić et al [9] that there were 3 patients with benign tumours and RMI higher than 200. Those were false positive cases. On the other hand, 5 patients with malignant tumours had RMI less than 200. Those were false negative cases. In the group of premenopausal women false positive results were 2 and false negative 1,

while in the group of postmenopausal women there was 1 false positive result and 4 false negative results. Similar findings were observed in several other studies.

In this study sensitivity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 86.4%. This result was correlated with the study of Terzić et al. that the sensitivity of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 83.33%. Different authors found the sensitivity of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours were 71.0-91.3%.

In the present study specificity of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 89.5%. This result was consistent with the study of Bouzari et al.[1]that the specificity of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 88.0%. Different authors found the specificity of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours were 85-96.6% [7-8].

In the current study positive predictive value of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 82.6%. This result was supported by Ma et al. that the positive predictive value of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 82.1%. Different authors found the positive predictive value of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours were 89-96% [8,10]

In this study negative predictive value of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 91.9%. This result was supported by Terzić et al. that the negative predictive value of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 90.6%. Different authors found the negative predictive value of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours were 83.6-96.6% [10,11].

In this study accuracy of risk malignancy index (RMI) at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumours was 88.3%. This result was supported by Terzić et al. that the accuracy of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumours was 90%. van den Akker et al.[11] also supported this result that the accuracy of risk malignancy index at a cut off value of ≥200 in differentiating malignancy from benign ovarian tumors was 89.3%; while at a cut off value of ≥200 Anderson et al.[12] found an accuracy of 85% and Clarke et al found of 80% in differentiating malignancy from benign ovarian tumors.

CONCLUSION

Findings of the present study showed that the sensitivity, specificity,positive predictive value,negative predictive value and overallaccuracy of risk malignancy index at a cut off value of ≥200 in differentiating malignant from benign ovarian tumors was 86.4%, 89.5%, 82.6%, 91.9% and 88.3% respectively. So, this study reconfirmed the ability of the RMI to correctly discriminate between malignant and benign ovarian tumors. Hence the RMI is an appropriate method in diagnosing

ovarian tumors with high risk of malignancy and guide the gynaecologist for further evaluation and effective management accordingly.

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