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Correlation Of Risk Of Malignancy Index With Etiology Of Adnexal Mass: A Comprehensive Evaluation

[1]Dr. Mini, [2]Dr. Sandhya Jain , [3]Dr. Rashmi Khatri,
[1]MBBS, DNB OBGY, Medical Officer, [2]MBBS, MS , Head Of Department, [3]MBBS, MS, Specialist,
[2,3]Department Of Obstetrics And Gynaecology ,
[2,3]Dr. Baba Saheb Ambedkar Medical College And Hospital, New Delhi
[1]Mata Gujri Hospital,Tilak Nagar ,Mcd Delhi

***Corresponding Author:**
Dr. Mini
DNB, OBGY, Medical Officer, Mata Gujri Hospital,Tilak Nagar , Mcd Delhi

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Abstract

Objective: This study aimed to evaluate the utility of the Risk of Malignancy Index (RMI) in distinguishing benign and malignant adnexal masses, emphasizing its potential role in improving patient outcomes. The study also investigated the clinical significance of adnexal masses across different age groups and the factors influencing their management.

Method: A prospective observational study was conducted at the Department of Obstetrics and Gynaecology, Baba Saheb Ambedkar Medical College and Hospital. The study included 150 patients with confirmed adnexal masses diagnosed through clinical examination or ultrasonography. Data was collected through comprehensive history, physical examinations, and a combination of ultrasound findings and serum CA-125 concentrations. The Risk of Malignancy Index (RMI) was calculated for each patient, and an RMI cutoff of 200 was used to classify patients into high-risk or low-risk categories.

Results: The study found that the majority of patients (80.7%) had benign adnexal masses, while 19.3% had malignant masses based on histopathological reports. The RMI proved to be a valuable tool, with 63.6% of patients with RMI >200 found to have malignant masses. Factors such as the presence of a solid component, multilocularity, ascites, and lymph node enlargement on ultrasound were significantly associated with malignancy.

Conclusion: This study highlights the significance of the Risk of Malignancy Index (RMI) in distinguishing between benign and malignant adnexal masses. It emphasizes the importance of early and accurate diagnosis in improving patient outcomes. The study also underlines the diverse clinical characteristics and management considerations of adnexal masses in different age groups, providing valuable insights for clinical practice.

Keywords: Adnexal masses, Risk of Malignancy Index (RMI), benign, malignant, ultrasound, histopathological report, ovarian cancer, patient outcomes

Introduction

Adnexal masses are a common concern in gynecology, affecting women of all ages. These masses can occur in the ovaries, fallopian tubes, or surrounding connective tissues and can have various causes. Their true prevalence is difficult to determine because some adnexal cysts develop and resolve without clinical notice. Understanding the clinical significance of adnexal masses is crucial, and it varies across different age groups.[1]

In girls younger than 9 years, a striking 80% of ovarian masses are malignant, often presenting as

germ cell tumors. Adolescents, on the other hand, may encounter mature cystic teratomas or dermoid cysts in around 50% of cases. Endometriosis is rare among adolescent women but can be found in up to 50% of those with painful masses.[2] For sexually active adolescents, considering a tubo-ovarian abscess as the cause of an adnexal mass is essential. Among reproductive-age women undergoing surgical removal of adnexal masses, the majority are benign, but approximately 10% are malignant, with a significant proportion being low malignant potential tumors in patients under 30.[3]

The management of adnexal masses depends on various factors, including the type of mass, its urgency, and the suspicion of malignancy. Ovarian cancer has become one of the most common malignancies among females. Women in the United States facing surgery for suspected ovarian neoplasms have a 5 to 10 percent lifetime risk. The peak incidence of invasive epithelial ovarian cancer occurs around the age of 60, with a higher percentage of malignancies in postmenopausal women.[4]

Ovarian cancer is challenging to treat, often requiring surgical debulking followed by chemotherapy. It has a high fatality-to-case ratio among gynecological malignancies, with a high mortality rate despite a relatively low lifetime risk of developing the disease. In India, ovarian cancer is the fourth most common cancer, and its subtle symptoms have earned it the nickname "silent killer."[5]

Differentiating between benign and malignant ovarian masses is crucial for planning management. Some adnexal masses have characteristic sonographic features that make surgical exploration unnecessary. When necessary, minimally invasive procedures can be used for most benign tumors. However, in cases with a high risk of ovarian cancer, referral to a tertiary oncology center is recommended for optimal treatment outcomes.[6]

Survival rates in ovarian malignancy are significantly influenced by the stage at diagnosis, with early-stage diagnoses resulting in higher survival rates. Detecting ovarian cancer at an early stage is essential, emphasizing the need for precise evaluation of adnexal masses as early as possible. While various methods such as pelvic assessment, tumor markers, and radiological investigations have been proposed, their sensitivity and specificity may be limited.[7]

The Risk of Malignancy Index (RMI) is a scoring system that incorporates menopausal status, ultrasound findings, and serum CA-125 concentrations to differentiate between benign and malignant adnexal masses. This cost-effective tool outperforms individual parameters and holds promise in enhancing patient outcomes by improving the accuracy of diagnosis and surgical planning. The present study aims to evaluate the utility of RMI in distinguishing benign and malignant lesions in patients with adnexal masses, emphasizing its potential role in improving patient outcomes.[8]

Materials And Methods

Study Setting: This prospective observational study was conducted at the Department of Obstetrics and Gynaecology, Baba Saheb Ambedkar Medical College and Hospital.

Study Population: The study included patients residing in the catchment area of Dr. Baba Saheb Ambedkar Hospital, Rohini, Delhi.

Study Design: A prospective observational study was conducted.

Sample Size: A total of 150 patients with confirmed adnexal masses of any age were included.

Inclusion Criteria: All women with confirmed adnexal masses diagnosed either through clinical examination or ultrasonography.

Exclusion Criteria:

- Women with adnexal masses not requiring operative treatment (functional ovarian cyst).
- Patients with adnexal masses presenting as acute emergencies (e.g., ectopic pregnancy, torsion of any ovarian mass).

Methodology: This study obtained ethical and scientific clearance from the institute. Women diagnosed with adnexal masses through clinical and/or ultrasonographic examination were included after obtaining informed consent. A comprehensive history and physical examination were conducted to determine the nature and cause of the mass.

History:

1. Chief presenting complaints
2. Duration

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3. Progression
4. General symptoms of malignancy (e.g., weight loss, loss of appetite, continuous malaise)
5. Menstrual history
6. Obstetric history
7. Family history (ovarian cancer, breast cancer, GIT cancer, endometrial cancer)
8. Past medical surgical history
9. Personal history (sleep, appetite, bladder bowel habits, drug addiction, drug allergies)

Clinical Examination:

1. General physical examination
2. Systemic examination to rule out underlying systemic diseases
3. Gynecological examination to assess mass origin, size, shape, consistency, mobility, laterality, tenderness, and relation to surrounding structures.

Investigations: In addition to routine tests, CA-125 and ultrasound were performed. The Risk of Malignancy Index (RMI) was calculated based on history, ultrasound findings, and CA-125 values. RMI = ultrasound score x menopausal score x CA-125. The ultrasound score ranged from 1 to 4, based on the number of abnormal ultrasound features. Menopausal status was scored as 1 for premenopausal and 4 for postmenopausal women. CA-125 values in IU/ml were directly used in RMI calculation. An RMI cutoff of 200 was used to classify patients as high risk or low risk for ovarian malignancy.

Follow-up: All patients were followed up postoperatively, and their intraoperative findings and histopathology results were collected from their records. The histopathologic findings were analyzed and correlated with preoperative RMI values.

Outcome: The outcome was determined by the histopathology report of the adnexal mass, categorizing it as benign or malignant, and specifying the type of benign or malignant mass (e.g., follicular cyst, endometriotic cyst, serous cystadenoma, serous cystadenocarcinoma, mucinous cystadenoma, mucinous cystadenocarcinoma). The findings were then correlated with preoperative RMI values.

Results

Table 1. Distribution of patients according to age groups.

Sr. No	Age group	Benign *n* (%)	Malignant *n* (%)	Total
1	≤30	57 (47.1 %)	0	57 (38 %)
2	31-40	61 (50.4 %)	18 (62 %)	79 (52.7 %)
3	>40	3 (2.5 %)	11 (38 %)	14 (9.3 %)
	Total	**121 (80.7 %)**	**29 (19.3 %)**	**150 (100 %)**
Mean ± SD - 33.1 years ± 6.74				

In our study, the mean age of the presentation of adnexal mass was 33.1 years and maximum number of the women (52.7%) were in the age group of 31 – 40 years.

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Table 2. Distribution according to parity

Parity	Benign *n* (%)	Malignant *n* (%)	Total
1	30 (24.8 %)	0	30 (20 %)
2	62 (51.2 %)	16 (55.2 %)	78 (52 %)
3	24 (19.8 %)	8 (27.6 %)	32 (21.33 %)
4	5 (4.1 %)	5 (17.2 %)	10 (6.67 %)
Total	**121 (80.7 %)**	**29 (19.3 %)**	**150 (100 %)**
	Mean ± SD - 2.15 ± 0.81		

In current study, 80% of the women were multiparous out of which 52% had parity 2.

Table 3. Patient distribution according to chief complaints.

Sr. No.	Chief Complaint	Benign *n* (%)	Malignant *n* (%)	Frequency
1	Lower abdomen pain	67 (44.7 %)	15 (10 %)	82 (54.7 %)
2	Menstrual irregularity	54 (36 %)	11 (7.3 %)	65 (43.3 %)
3	Abdominopelvic mass	0	3 (2 %)	3 (2 %)
	Total	**121 (80.7 %)**	**29 (19.3 %)**	**150 (100 %)**

In our study, lower abdominal pain (54.7%) was the most common presenting symptom. Abdominopelvic mass (2%) was present only in malignant cases in our cohort.

Table 4. Patient distribution according to serum CA–125 levels

Sr. No.	Value (IU/ml)	Frequency	Percentage
1	<35	63	42.0 %
2	35-100	81	54.0 %
3	101-200	6	4.0 %
	Total	**150**	**100 %**

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Mean ± SD	**-**	**42.6 ± 24.4**

We divided this cohort into three groups on the basis of serum CA-125 levels. The mean CA125 level was 42.6 IU/ml and maximum number of patients belonged to the group with CA125 levels ranging from 35 to 100 IU/ml.

Table 5. Abnormal parameters on ultrasound

Abnormal parameters on ultrasound	Benign *n* (%)	Malignant *n* (%)	Total	p value
Solid Component Present	53 (35.3 %)	27 (18 %)	80 (53.3 %)	<0.0001
Absent	68 (45.3 %)	2 (1.3 %)	70 (46.7 %)	
Unilocular/multilocular Unilocular	90 (60 %)	9 (6 %)	99 (66.0 %)	<0.0001
Multilocular	31 (20.7 %)	20 (13.3 %)	51 (34.0 %)	
U/L or B/L U/L	104 (69.3 %)	14 (9.3 %)	118 (78.7 %)	<0.0001
B/L	17 (11.3 %)	15 (10 %)	32 (21.3 %)	
Ascites Yes	12 (8 %)	15 (10 %)	27 (18.0 %)	<0.0001
No	109 (72.7 %)	14 (9.3 %)	123 (82.0 %)	
LN enlargement Yes	0	20 (13.3 %)	20 (13.3 %)	<0.0001
No	121 (80.7 %)	9 (6 %)	130 (86.7 %)	
Total	**121 (80.7 %)**	**29 (19.3 %)**	**150 (100 %)**	

In our study, more than half of the patients had solid mass on ultrasound picture. 21 % of the adnexal masses were bilateral and 18% had ascites and 13.3% had Lymph Node enlargement. Majority of the adnexal masses (66%) were unilocular without internal septations. Chi-square test was applied for the subgroup analysis which was statistically significant with all of them having p value <0.0001.

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Table 6. Patient distribution according to histopathological report

HPE report	Frequency	Percentage
Benign	121	80.7 %
Malignant	29	19.3 %
Total	**150**	**100 %**

80.7% of the patients in our study had benign tumours and 19.3% of the tumours were malignant as per the histopathological report.

Table 7. Distribution of patients according to Risk of Malignancy Index 2 and HPE report

HPE report	RMI 2		Total	p value
	≤200			
Chocolate cyst	8 (5.3 %)		8 (5.3 %)	<0.0001
Complex cyst	1 (0.7 %)	0	1 (0.7 %)	
Corpus luteal cyst	25 (16.7 %)	0	25 (16.7 %)	
Dermoid cyst	12 (8 %)	0	12 (8.0 %)	
Follicular cyst	5 (3.3 %)	1 (0.7 %)	6 (4.0 %)	
Haemorrhagic cyst	6 (4 %)	0	6 (4.0 %)	
Serous cystadenoma	24 (16 %)	9 (6 %)	33 (22.0 %)	
Mucinous cystadenoma	28 (18.7 %)	2 (1.3 %)	30 (20.0 %)	
Borderline tumour	1 (0.7 %)	0	1 (0.7 %)	
Serous cystadenocarcinoma	3 (2 %)	16 (10.7 %)	19 (12.7 %)	
Mucinous cystadenocarcinoma	4 (2.7 %)	5 (3.3 %)	9 (6.0 %)	
Total	**117 (78 %)**	**33 (22 %)**	**150 (100 %)**	

In current study, preoperatively we calculated the risk of malignancy index for every patient and correlated this value with histopathological report postoperatively. We concluded that the group with RMI score ≤200 had 117 patients, out of which 8 (6.8%) were malignant. In the group with RMI >200, 21 out of 33, which is 63.6%, were malignant and this difference was found to be statistically significant (p<0.0001).

Discussion

The study focused on 150 women with adnexal masses attending an outpatient department in Delhi. Researchers aimed to evaluate the effectiveness of Risk of Malignancy Index 2 (RMI 2) in distinguishing between benign and malignant masses. The dilemma in managing adnexal masses lies in accurately diagnosing their nature, as it influences disease management. The majority of participants

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were in the 31-40 age group, with 79 out of 150 falling in this category. The mean age for benign cases was 31.2 years, while malignant cases averaged 40.7 years. This contrasted with previous studies, possibly due to the small sample size and referral to specialized oncology centers.[9]

The study explored factors like parity, socioeconomic status, family history, and symptoms. The most common symptom was lower abdominal pain (54.67%), followed by menstrual irregularities (43.33%). The majority (90.7%) were premenopausal. Socioeconomic status didn't show a clear correlation with malignancy. Preoperative CA-125 levels and ultrasound findings were analyzed. CA-125 levels were divided into three groups (<35, 35-100, 100-200), with the highest number falling in the 35-100 range. However, CA-125 levels in malignant cases did not align with previous studies, possibly due to differences in patient referral patterns.[10]

Ultrasound scores were assigned based on abnormal ultrasound parameters. A higher score correlated with a higher likelihood of malignancy. The presence of a solid component, multilocular cysts, bilateral lesions, ascites, and lymph node metastasis were associated with malignancy.[11] The study compared its results with previous research, showing variations in the prevalence of malignancy and sensitivity/specificity of CA-125, ultrasound scores, and postmenopausal status. RMI 2 demonstrated 75% sensitivity and 90.2% specificity, comparable to previous studies. The prevalence of malignancy (19.3%) was lower than in some studies, possibly due to the institution not being a tertiary care cancer referral center.[12]

The most common benign tumor was serous cystadenoma, and serous cystadenocarcinoma was the most common malignant tumor. Premenopausal women comprised 78.7% of benign cases and 13.2% of malignant cases, while postmenopausal women had 21.43% benign and 78.6% malignant cases. The study calculated the Area Under the Curve (AUC) for RMI, yielding a value of 0.826, which was statistically significant. The study concluded that RMI 2 effectively differentiated between benign and malignant adnexal masses, showcasing its potential as a preoperative tool.[13]

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