Case Report

IOTA Simple Rules to Discriminate Benign and Malignant Ovarian Tumours

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Abstract

Objective: Discrimation between benign and malignant ovarian mass is very important preoperatively for appropriate patient management. International Ovarian Tumour Analysis (IOTA) group in 2008 proposed a standardised method for preoperatively diagnosis of ovarian mass by its 10 simple ultrasound based rules to discriminate between benign and malignant ovarian tumour. This study was designed to evaluate the e icacy of simple ultrasound rules by IOTA group to discriminate between benign and malignant ovarian tumour. This study was designed to evaluate the e icacy of simple ultrasound rules by IOTA group to discriminate between benign and malignant ovarian tumour.

The study was a prospective case control study. Patients with adenexal mass were evaluated using simple ultrasound rules by IOTA group and classi ied as benign or malignant. Findings were correlated with histopathological examination of surgical specimen which was considered as gold standard.

Results: Out of 70 patients included in the study IOTA rules were applicable on 65 patients. The sensitivity and speci icity where IOTA rules were applicable was 90.9% and 88.37%.

Conclusion: IOTA simple rules are highly sensitive and speci ic in predicting ovarian malignancy.

Keywords: IOTA simple rules; Adnexal mass; Malignant ovarian tumour; Benign ovarian tumour

Introduction

It is very important to discrimate between benign and malignant ovarian mass preoperatively for appropriate management of the patient. Benign ovarian mass may require either careful monitoring or conservative surgery. Pre-operative recognization of benign ovarian pathology may not only result in decrease in unnecessary morbidity but also will be cost effective for the patients. On the other hand identification of malignant ovarian mass preoperatively will help in appropriate staging of ovarian cancer with surgical expertise or refer the patient to a specialised surgical centre where timely intervention can take place various parameters are used for evaluation of adnexal pathology like pelvic assessment of the mass by clinician, various tumour markers and radiological assessment of the adnexal mass by radiologists but these methods were less sensitive and specific in diagnosing ovarian pathology when used separately. To combat this various combined methods had also been emerged and among them Risk of Malignancy Index (RMI) is highly sensitive and specific to distinguish between benign and malignant ovarian masses. The Royal College of Obstetricians and Gynaecologists (RCOG) has recommended RMI for evaluating ovarian pathology. It is calculated with a simplified regression equation obtained from the product of menopausal status score, ultrasonographic score and value of serum CA-125. The predictive accuracy of RMI was less for mucinous as compare to serous epithelial ovarian cancer. Colour doppler ultrasound is also used to diagnose ovarian pathology is associated with low impedance blood flow on colour Doppler [1].

The major limitation of ultrasound in detecting ovarian malignancy is that it is highly subjective and so there are increased chances of inter observer variability. In order to minimise these shortcomings and make ultrasound examination more objective for detecting adnexal pathology, Europeans researches created the IOTA group in 2000 and developed two mathematical models. The aim was to make the ultrasound characteristics of ovarian tumour standardised

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to evaluate ovarian pathology so that it could be used in routine clinical practice by non-expert operators [2].

Timmerman et al, the IOTA group proposed a standardised method for preoperatively diagnosis of ovarian mass and it has 10 simple ultrasound based rules to discriminate between benign and malignant ovarian tumour. There are 5 M-rules and 5 B-rules.

Case Presentation

The present study was a prospective case control study and was conducted at SN medical college, Agra from January 2022 to December 2022 after ethics approval. Study population included patients with diagnosis of adenexal mass on pelvic examination or ultrasonography or both. Exclusion criteria included pregnant women and women not willing for surgery. Written informed consent was taken from all the participants and an ultrasound examination was performed by experienced radiologists. Ultrasound examination was done by using 5 MHz-7.5 MHz transvaginal and 3.5 MHz-5 MHz curved transducer for trans abdominal sonography. After analysing the characteristic of masses on basis of simple IOTA rules each patient was classified as benign or malignant. Histopathology report was collected from all patients after operation and was used as final diagnosis. Collected data was statistically analysed using *chi-square* test (Table 1) [3,4].

Table 1: Simple IOTA rules for discriminating benign or malignant tumour.

Malignant tumour (M-rules)	Benign tumour (B-rules)
Irregular solid tumour	Unilocular cyst
Presence of ascites	Presence of solid components where the largest solid component is <7 mm in largest diameter
At least four papillary structures	Presence of acoustic shadows
Irregular multilocular solid tumour with largest diameter ≥ 100 mm	Smooth multilocular tumour with largest diameter <100 mm
Very strong blood flow (color score 4)	No blood flow (color score 1)

Results and Discussion

During the study period seventy women were included in the study. Benign tumour were more common in 30-40 age group where as malignancy was more common in 60-70 years age group (Table 2) [5].

Table 2: Age distribution in benign and malignant ovarian mass (n=70).

Age group (years)	Benign number	Benign percentage	Malignant number	Malignant percentage
<20	2	4.3	0	0
20-30	10	21.7	1	4.16
30-40	25	54.34	1	4.16
40-50	4	8.69	2	8.33
50-60	2	4.3	9	37.5
60-70	2	4.3	10	41.66
>70	1	2.17	1	4.16

The above table shows age distribution in benign and malignant ovarian mass (n=70). Out of 70 patients enrolled in the study, IOTA rules were applicable in 65 patients, where as 5 cases were classified as inconclusive (Table 3).

Out of 70 patients enrolled in the study, IOTA rules were applicable in 65 patients, where as 5 cases were classified as Indeterminate where IOTA rules were not applicable [6].

Table 3: The classification of cases as per IOTA simple ultrasound rules.

Nature of the mass as per IOTA rules	No
Benign	4
Maligant	25
Indeterminate	5
Total	70

Table 4 shows comparision of results of IOTA simple rules with histopathological findings. Out of 65 patients where IOTA simple rules were applicable 25 cases were malignant and 40 cases were benign. Out of 5 cases where IOTA simple ultrasound rules were not applicable were three cases were malignant and five cases were benign. On histopathological examination out of 70 cases studied 24 cases were malignant and 46 cases were benign.

Table 4: Comparision of results of IOTA simple rules with histopathological findings.

Nature of the mass as per IOTA rules	No.	Histopathological result	
		Benign	Malignant
Benign	40	38	2
Malignant	25	5	20
Indeterminate	5	3	2

The sensitivity for detection of malignancy in cases where IOTA simple rules were applicable was 90.9% and the specificity was 88.37% (Table 5).

Table 5: Efficacy of IOTA simple rules.

Efficacy of IOTA simple rules	No.
Sensitivity	0.909
Specificity	0.8837

Ovarian cancer is the seventh most common cancer present in women worldwide. The 5 year survival associated with ovarian cancer is less than 30%. There is neither any screening test for ovarian cancer nor any test available for detection of ovarian cancer in early stage. Diagnosis of ovarian cancer can be done by pelvic examination, serum Ca-125 and ultrasound assessment. Ultrasound assessment is easily available, cost effective and does have any risk of radiation exposure to patients but are highly subjective and need high expertise. In order to overcome this limitation the IOTA group by. Timmermam et al developed the simple ultrasound rules to distinguish benign and malignant ovarian malignancy. Hartman et al in their cross- sectional study on 103 women found that majority of tumours were correctly classified by IOTA simple rules with a sensitivity of 90% and specificity of 87%. They also stated that Ca-125 when performed alone did worse than ultrasound in discriminating malignant from benign ovarian masses. Sayasneh et al in their cross-sectional study of 1165 women over a duration of 27 months found the IOTA study better than the RMI (Risk of Malignancy Index) [7].

Out of 70 patients enrolled in the study, IOTA rules were applicable in 65 patients, where as 5 cases were classified as inconclusive. Out of 65 patients where IOTA simple rules were applicable 25 cases were malignant and 40 cases were benign. Out of 5 cases where IOTA simple ultrasound rules were not applicable were three cases were malignant and five cases were benign. On histopathological examination out of 70 cases studied 24 cases were malignant and 46 cases were benign. The sensitivity for detection of malignancy in cases where IOTA simple rules were applicable was 90.9% and the specificity was 88.37%. Various studies done in the past had also shown that IOTA has high sensitivity and specificity for diagnosing ovarian pathology [8,9].

Fathallah et al conducted a study on 122 patients having adenexal masses from January 2002 to December 2005. OTA was applicable for 109 women (89.3%) with the sensitivity of 73% and specificity of 97%. Alcazar JL et al in their study conducted on 340 women with adenexal mass between January 2011 to June 2012 found that IOTA simple rules were applicable on 270 cases (79.4%) with a sensitivity of 87.9% and specificity of 97.5%. N Nunez et al in their study on 124 patients with adenexal mass found sensitivity and specificity of IOTA 97% and 69% respectively. Tantipalakorn et al in their study on 376 women with adenexal mass found that in 319 cases IOTA simple rules were applicable with a sensitivity of 82.9% and specificity of 95.3%. Sugandha Garg et al (in their study on 50 women with adenexal mass found that IOTA simple rules were applicable in 45 women (90%) with the sensitivity of 91.66% and the specificity of 84.84% [10].

Conclusion

IOTA simple ultrasound has a very good specificity and sensitivity for predicting ovarian malignancy and hence can be used preoperatively to discriminate between benign and malignant ovarian tumour. Presence of one or more M-rule in absence of B-rule and presence of one or more B-rule in absence of M-rule will classify the mass as malignant and benign respectively. In presence of both M and B rule or absence of both rule, the mass is labelled as inconclusive. In this study we evaluated the role of simple ultrasound based rules of Timmerman et al, in discriminating between benign and malignant ovarian masses.

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