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ORIGINAL ARTICLE

Evaluation of the Scoring Systems to Differentiate between Benign and Malignant Adnexal Masses in a Tertiary Care Center, Pune

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ABSTRACT

Objective: The aim of this study was to evaluate the scoring systems to differentiate between benign and malignant adnexal masses.

Methods: It is a prospective study carried on 60 women at a tertiary care center. Transabdominal ultrasonography and color Doppler was done and women were followed till resolution of symptoms. Gold standard for diagnosis of adenexal masses was histopathological examination of specimen or fluid cytology.

Results: Efficacy of Sassone scoring system for diagnosing malignant tumors sensitivity 75%, specificity 90.91%, positive predictive value 75%, negative predictive value 90.91% and an accuracy of 86.67%. Efficacy of De Priest scoring system sensitivity 66.67%, specificity 100%, positive predictive value 100%, negative predictive value 92.31% and an accuracy of 93.33%. Efficacy of Ferrazzi scoring system sensitivity 75%, specificity 100%, positive predictive value 100%, negative predictive value 91.67%, and an accuracy of 93.33%. Efficacy of alcazar scoring system sensitivity 100%, specificity 100%, Positive predictive value 100%, negative predictive value 100%, and an accuracy of 100%.

Conclusion: Alcazar scoring system was found to be more sensitive and specific than other available scoring systems.

Keywords: Adnexal mass, Alcazar system, Color Doppler, Scoring systems.

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INTRODUCTION

Adnexal mass is an enlarged structure in the uterine adnexa (ovary, tubes or broad ligament) which can either be palpated on a bimanual pelvic examination or visualized using sonongraphic imaging. Pelvic pathology can present with several distressing symptoms and a varied clinical presentation which include infertility, pain in abdomen, menstrual disorders, backache, dyspareunia and many times there are no symptoms at all.[1] Adnexal mass usually represents a specific pelvic pathology at specific age (like malignant tumors being more common in prepubescent and postmenopausal women) and sometimes may create difficulty as far as diagnosis and management is concerned.[1]

One of the first sonographic descriptions of ovary was given by Kratochwil et al[2] in 1972. After describing the normal sonographic appearances of the ovary, they also discussed the possibility of improved imaging with the transvaginal approach). In the mid 1970s, many authors described the sonographic features of pelvic masses and those parameters that could be used to differentiate benign from malignant lesions. Various scoring systems have been used since then to differentiate preoperatively, benign from maliganat ovarian masses. Among the sonological scoring systems are Alcazar,[3] Sassone,[4] De Priest,[5] Ferrazi[6] to name a few. Any palpable mass in a postmenopausal woman has been considered abnormal, the 'palpable postmenopausal ovary syndrome'[7] Adnexal masses presents diagnostic difficulties, partly because benign adnexal masses are more common than malignant ones. Determination of a degree of suspicion for malignancy is very important and is based much on sonographic appearance.[8] Since ovarian cancer presents in a later stage and carries the worse prognosis among gynecological cancers, it is extremely important for every gynecologist to differentiate between a benign and malignant adnexal mass. Use of color Doppler in conjunction with ultrasonography improves the sensitivity of detecting an adnexal masses.

METHODOLOGY

The present prospective study of 60 cases was conducted at Padmashree Dr DY Patil Medical College, Hospital and Research Centre, Pimpri, Pune from July 2010 to August 2012 in women of reproductive (20 to 40) and perimenopausal (40 to 50) age group. Fifteen women were assigned to each scoring system.

On admission, a detailed history was taken and complete examination was done. All patients were subjected to transabdominal ultrasonography and color Doppler examination with the use of GE machine. They were then followed up till resolution of signs or symptoms with conservative management or surgical intervention. The gold standard for the diagnosis was histopathological examination of specimen obtained from laparotomy or cytology of ascitic fluid.

Scoring Systems

The sonographic parameters of the scoring system included thick papillary projections and solid areas. The color Doppler parameters included blood flow (present or absent), blood flow location (central or peripheral), resistance index, peak systolic velocity (PSV) and velocimetry (high velocity/low resistance).

CA-125 was sent in all cases where malignancy was suspected or ultrasonography score was high.

RMI I (Risk of malignancy index) score was calculated for all cases using the formula:

RMI = menopausal status (M) × ultrasound score (US) × serum CA-125.

The results were analyzed using the following statistical tests evaluation of the scoring systems to differentiate between benign and malignant adnexal masses in a tertiary care center.

- Sensitivity, specificity, negative predictive value, positive predictive value.
- Proportionality – Z test.

RESULTS (TABLES 1 TO 5)

Out of 60 patients laparotomy was done for 37 cases. Criteria for laparotomy were: sonographically diagnosed large tumors, malignant tumors, no response to drugs, broad ligament myomas. Laparotomy was done in 37 cases to reach final diagnosis. Majority of them were benign ovarian tumors (22 cases). All the operable malignant adnexal masses underwent laparotomy.[12] Final diagnosis was achieved by Histopathological examination of the specimen after laparotomy, cytology of fluid from the mass or ascitic fluid. Majority of them were benign ovarian tumors 55%.

Efficacy of Sassone scoring system for diagnosing malignant tumors sensitivity 75%, specificity 90.91%, positive predictive value 75%, negative predictive value 90.91%, and an accuracy of 86.67%. Efficacy of DePriest scoring system sensitivity 66.67%, specificity 100%, positive predictive value 100%, negative predictive value 92.31%, and an accuracy of 93.33%. Efficacy of Ferrazzi scoring system sensitivity 75%, specificity 100%, positive predictive value 100%, negative predictive value 91.67% and an accuracy of 93.33%. Efficacy of Alcazar scoring system sensitivity 100%, specificity 100%, positive predictive value 100%, negative predictive value 100% and an accuracy of 100%.

Table 1: Diagnosis after transabdominal USG

Sr. no.	Diagnosis	USG diagnosis	Final diagnosis
1	Benign ovarian tumors	34	33
2	Malignant ovarian tumors	08	14
3	Polycystic ovarian disease	06	06
4	Hydrosalpinx	07	04
5	Tubo-ovarian mass	04	02
6	Broad ligament myoma	01	01
	Total	60	60

Table 2: Laparotomy diagnosis

Sr. no.	Diagnosis	No. of cases	%
1	Benign ovarian tumors	22	59
2	Malignant ovarian tumors	12	32
3	Tubo-ovarian mass	02	5
4	Broad ligament myoma	01	4
	Total	37	100

Table 3: Final diagnosis

Sr. no.	Diagnosis	No. of cases	%
1	Benign ovarian tumors	33	55
2	Malignant ovarian tumors	14	23
3	Polycystic ovarian disease	06	10
4	Hydrosalpinx	04	6.7
5	Tubo-ovarian mass	02	3.6
6	Broad ligament myoma	01	1.7
	Total	60	100

DISCUSSION

Sassone et al[4] devised a scoring system using traditional gray scale transvaginal ultrasonography to characterize ovarian lesion. The scoring system was based on determining the wall thickness, inner wall structure, characteristics of septa and echogenecity of lesion. DePriest et al[5] developed a scoring system based on volume, cyst wall structure, and septal structure of adnexal mass assessed by sonography. Ferrazzi et al[6] developed a scoring system based on wall thickness, septa, vegetations and echogenecity. Color Doppler parameters were not included in their scoring systems by Sassone, DePriest and Ferrazzi. After introduction of color Doppler, RI and PSV were not used as independent predictors of malignancy because considerable overlapping was found between benign and malignant tumors in spite of statistical difference.[3] To overcome this limitation, in the scoring system of Alcazar et al[3] tumors were classified in four velocimetric categories according to the best RI and PSV cut off values. Only those variables were used which were independent predictors of malignancy in multivariate logistic regression analysis. This scoring system may yield a total score of 0 to 12. Score of 6 or more was taken as malignant.

Using Sassone scoring system and taking >8 as cut off value for malignancy, we found that out of 15 cases, 11, i.e. 73.3% had a score of <8 and out of these 11 cases, all were benign on histopathology. Only 1 case with a score of >8 was benign. In this patient, tumor was cystic with no solid areas but had

Table 4: Comparison of efficacy of Alcazar scoring system as with other 3 scoring systems

Sr no.	Scoring system utility	Sassone	DePriest	Ferrazzi	Alcazar
1	Sensitivity	75	66.67	75	100
2	Specificity	90.91	100	100	100
3	Positive predictive value	75	100	100	100
4	Negative predictive value	90.91	92.31	91.67	100

Table 5: Univariate analysis of variables used in assessment of adnexal mass by Alcazar system

	Diagnosis based on histopathology		p-value
	Malignant (n = 14)	Benign (n = 46)	
Thick papillary projection	8	4	<0.05
Solid element	5	2	<0.05
Central flow	7	2	<0.05
Velocimetry	1	2	>0.05

irregular inner wall structure with wall thickness <3 mm and septae >3.5 mm. Her final diagnosis came out to be tubo-ovarian mass. Only one case with a score of <8 was malignant. In this patient the cyst wall structure was smooth with walls < 3 mm in thickness, no septae and it was sonoluscent. Her final diagnosis was serous cystadenocarcinoma.

Using DePriest scoring system and taking >6 as cut off value for malignancy, we found that out of 15 cases, 13, i.e. 86.6% had a score of <6 and out of these 13 cases, 12 were benign on histopathology. Only one case with a score of <6 was malignant. She had a smooth wall structure which was <3 mm and a tumor volume of 50 to 200 cc.[3] Her final diagnosis was serous cystadenocarcinoma.

Using the Ferrazzi scoring system and taking >8 as cut off value for malignancy, we found out of 15 cases, 11, i.e. 73.3% had a score of <8 and out of the 11 cases all were benign on histopathology. Only one case with a score of <8 was malignant. She had an irregular solid wall, no septa and it was sonoluscent. Her final diagnosis was adenocarcinoma of ovary.

The scoring system by Alcazar gave better results because of the use of color Doppler measurements.[3] The use of color Doppler decreased false-positive results. The efficacy of a morphologic scoring system alone was hampered by overlap between malignant and benign appearing masses.

Following points should be considered while using Alcazar scoring system. Utrasonographic and color Doppler technique is highly operator dependent leading to high interobserver variation. Also the flow within the tumor varies greatly. So the whole mass should be adequately scanned by only an expert sonologist.

In our study using Alcazar scoring system, it was found that thick papillary projections (≥3 mm) was statistically significant ($p < 0.05$) in the differentiation of benign from malignant ovarian mass. Singh et al[9] in their study found on scoring systems to differentiate between benign and malignant masses found papillary thickness ≥3 mm was found to be significant ($p < 0.02$). Alcazar et al[3] in their study showed that thick papillary projections were significant ($p < 0.0001$).

In our study using Alcazar scoring system, it was found that solid component was statistically significant ($p < 0.05$) in the differentiation of benign from malignant ovarian mass. Brown et al[10] found that a solid component is the most statistically significant predictor of a malignant ovarian mass ($p < 0.001$). Schelling et al[11] found papillary structure in cysts had a sensitivity of 67% and a specificity of 81%, while detection of solid area had sensitivity of 95% and specificity of 68% for the detection of malignancy.

Also, central flow was statistically significant ($p < 0.05$) in the differentiation of benign from malignant ovarian mass. Carter et al[12] in their study concluded intratumor color flow to be more common in malignant tumors than benign ones. It was statistically significant ($p < 0.001$).

Singh et al[9] showed that presence of central vascularization was significant ($p < 0.001$). Merce et al[13] in their study on 213 women using B-mode transvaginal ultrasonography color Doppler characteristics concluded that vascularization was seen in 100% of the malignancies, in central areas, mostly (90% in his study) and by stark contrast, only 52% of the benign tumors showed vascularity, mostly in peripheral areas (98% in his study). Alcazar et al[3] concluded central blood flow was found to be a predictor of malignancy ($p < 0.0001$). Brown et al found that central flow has a stronger association with malignancy than does solely peripheral flow, which has a stronger association than no flow.

In our study, velocimetry (high velocity/low resistance) was not of statistical significance ($p > 0.05$) consistent with Kurtz et al[14] who in their study found the thresholds for malignancy were a pulsatility index of <1.0 and a resistive index of >0.4. Szpurek et al[15] found statistically significant differences in PSV (peak systolic velocity) median values when considering histological grade ($p = 0.01$) and also when considering clinical stage of disease according to International Federation of Gynecology and Obstetrics (FIGO) ($p = 0.001$). However, they found no significant difference in the median values of the blood flow parameters of PI and RI.

The false-positive result in the scoring systems of Sassone and DePriest and Ferrazzi were basically due to high scoring of benign lesions like teratoma, endometrioma and ovarian fibroma.

Alcazar scoring system was tested with three scoring systems and found the best diagnostic performance was achieved by Alcazar scoring system with 100% sensitivity, 100% specificity and the highest accuracy, which was significantly higher than for the scoring systems of Sassone et al,[4] DePriest et al[5] and Ferrazi et al.[6]

CONCLUSION

Use of transabdominal and transvaginal gives a better assessment of larger masses and extraovarian disease. Use of color Doppler in conjunction with ultrasonography improves the sensitivity of detecting an adnexal masses. CA-125 assay was not shown to be useful because of its poor specificity. However, values more than 200 IU/ml have a high prediction with malignancies.

The use of color Doppler decreased the false-negative results. Presence of central vascularization ($p = 0.000$) and high velocity/low resistance ($p = 0.000$) were most consistently associated with malignancy. Addition of color Doppler increases the specificity and diagnostic performance of Alcazar scoring system. Alcazar scoring system was found to be more sensitive and specific than other available scoring systems. However, considering the small sample size of the present study further studies need to be conducted for a conclusive proof.

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