



Sassone Scoring System in Differentiating Benign and Malignant Adnexal Masses.

KEYWORDS

adnexal mass, benign, malignant, Sassone scoring system.

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ABSTRACT *BACKGROUND: Pelvic adnexal masses are seen among women of all age groups. An adnexal mass may be benign or malignant. Ultrasound is the first imaging study performed in female patient with pelvic symptoms. High operator dependence and extreme variability of macroscopic characteristics of ovarian tumor make a precise diagnosis difficult by sonography alone. To overcome these limitations, use of a sonographic scoring system has been advocated.*

AIM: To evaluate the usefulness of Sassone scoring system in differentiation of benign from malignant adnexal mass.

METHOD(S): a prospective cohort study was done from November 2013 to November 2015 on 56 patients admitted with adnexal mass. Preoperative sonography was done in all the patients. The data was used for calculation of Sassone score for probability of benignity and malignancy. The efficacy of the scoring system was evaluated by histopathological examination of the mass.

RESULTS: Detailed sonographic examination with Sassone scoring system was able to identify all the benign and malignant adnexal masses as diagnosed by histopathological examination as a gold standard. The sensitivity and specificity of the Sassone scoring system was 94% and 88%. The positive and negative predictive values were 94% and 88% respectively.

CONCLUSION: Sassone scoring system using gray scale ultrasonography is useful in differentiating a benign from a malignant adnexal mass and should be followed in routine practice.

INTRODUCTION

Pelvic adnexal masses are seen among women of all age groups. It presents a common problem in clinical practice. An adnexal mass may be benign or malignant. The differential diagnosis of an adnexal mass varies from functional cysts to benign tumors to malignant tumors of various abdominal and pelvic organs ⁽¹⁾. Ovarian cancer is the commonest cause of death from gynecologic malignancy, and is the fifth commonest cause of cancer deaths in women ⁽²⁾. Surgery is often required solely to exclude the possibility of malignancy and about 1/3rd of tumors operated upon for suspected ovarian cancer turn out to be benign ⁽³⁾. Risk of malignancy propels us for early, accurate and prompt diagnosis to lessen the mortality and morbidity.

Ultrasound (USG) is the first imaging study performed in female patient with pelvic symptoms and suspected adnexal mass by physical examination ⁽⁴⁾. It is easily accessible and a reliable method for detecting pelvic adnexal masses. Transabdominal (TAS) and transvaginal sonography (TVS) are complementary techniques; both are used extensively in evaluation of female pelvis ⁽⁵⁾. USG correlates morphologic images with macroscopic pathologic features of tumors such as nonfatty solid tissue, thick

septations and papillary projections. Transvaginal sonography has currently replaced transabdominal sonography for evaluation of female pelvis however few situation still merit transabdominal sonography as in paediatric or unmarried patient and in assessment of large pelvic masses. The sensitivity and specificity of vaginal sonography in identifying benign and malignant tumor is 82% and 92% respectively ⁽⁶⁾.

High operator dependence and extreme variability of macroscopic characteristics of ovarian tumor make a precise diagnosis difficult by sonography alone. To overcome these limitations, use of a sonographic scoring system has been advocated ⁽⁷⁾.

Sassone et al devised a scoring system using traditional gray scale ultrasonography to characterize ovarian lesion with high diagnostic value ⁽⁸⁾.

The present study was conducted utilizing USG in patients with adnexal masses. The objective was to evaluate the Sassone scoring system in differentiation of benign from malignant adnexal mass.

ULTRASOUND PROTOCOL SCANNING TECHNIQUE:

Transabdominal sonogram: The transabdominal sonogram is performed with distended urinary bladder which provides an acoustic window to view the pelvic organs and serves as a reference standard for evaluating cystic structures. The urinary bladder is considered ideally filled when it covers the entire fundus of the uterus.

Imaging of the uterus and adnexa is performed, in both sagittal and transverse planes. The long axis of the uterus is identified in the sagittal plane, and a somewhat oblique angulation is often necessary to visualize the entire uterus and cervix. The adnexa may be imaged by scanning obliquely from the contralateral side, although in many instances visualization can be achieved by scanning directly over the adnexal. Gentle pressure on the transducer may be necessary to bring the area of interest within the focal zone.

Transvaginal sonogram: For transvaginal sonography, the bladder must be empty to bring the pelvic organs into the focal zone of the transvaginal transducer. An empty bladder also provides patient comfort during the examination. It is important to explain the procedure to the patient and relieve any anxiety, she may exhibit prior to initiating the examination. Verbal consent should be obtained. The transducer is prepared with ultrasound coupling gel and then covered with a protective sheath, usually a condom. An external lubricant is then applied to the outside of the protective covering. The transducer is inserted into the vagina with the patient supine, knees gently flexed and hips elevated slightly on a pillow. The elevated hips allow free movement of a transducer by the operator. (Figure 1)

Standard views are obtained: Sagittal Plane: 1. Cervix, endocervical canal, posterior cul-de-sac. 2. Uterus and endometrium. 3. Right ovary and adnexa. 4. Left ovary and adnexa, **Coronal Plane:** 1. Vagina. 2. Cervix and posterior cul-de-sac. 3. Uterine corpus and endometrium. 4. Uterine fundus and endometrium. 5. Right ovary and adnexa. 6. Left ovary and adnexa.

METHODOLOGY

The study was conducted in 2 years period from November 2013 to November 2015 in Ultrasonography section of Department of Radiology of Smt Kashibai Navale Medical College and General Hospital. 56 patients with adnexal masses were recruited from OPD and IPD of this institute after satisfying following inclusion and exclusion criteria.

Inclusion criteria: Female of all age groups with suspected pelvic adnexal masses referred by clinician for the first time. Female of all age groups having pelvic adnexal mass found incidentally on USG.

Exclusion criteria: Any follow-up USG of proven pelvic adnexal mass. Patient not willing for ultrasonography and not giving consent for transvaginal sonography.

Institute's permission to carry out the study was taken and a informed consent was obtained from all study participants. At the time of registration, a detailed history was taken and complete examination done. All of the study participants were subjected to transabdominal ultrasonography with full bladder technique with 2-6 MHz curvilinear transducer and whenever necessary transvagi-

nal sonography with empty bladder technique was done with EC 9-4 MHz transducer. Sassone scoring system was applied to differentiate benign and malignant ovarian tumours. This scoring system takes into account for the inner wall structure, wall thickness, septa and echogenicity giving a scoring ranging from 4-15. (TABLE1)

Criterion used to define adnexal masses is cystic lesion within pelvis with its largest diameter of at least 25 mm or solid parts in any lesion regardless of size.

The patients were followed up till surgical intervention. The gold standard for diagnosis was histopathological examination of specimen obtained during surgery. All the cases were evaluated by the same radiologist by TAS or TVS.

Statistical Analysis:

Total records analysed (n=56).

Chi square test was applied and significance level of 0.05 was used.

Sensitivity, specificity, positive and negative predictive values of the Sassone scoring system were calculated.

We used Epi info version 7 statistical software for the analysis.

TABLE 1: SASSONE SCORING SYSTEM

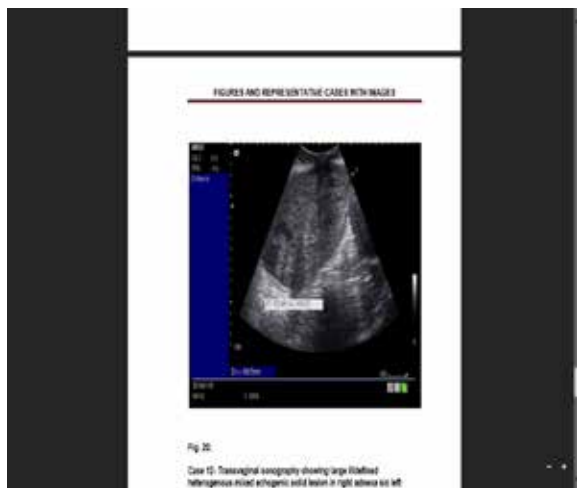
VARIABLES	FINDINGS	SCORE
INNER WALL STRUCTURE (mm)	SMOOTH	1
	IRREGULAR \leq 3mm	2
	PAPILLARITIES > 3mm	3
	NOT APPLICABLE MOSTLY SOLID	4
WALL THICKNESS (mm)	THIN \leq 3mm	1
	THICK > 3mm	2
	NOT APPLICABLE MOSTLY SOLID	3
SEPTA (mm)	NO SEPTA	1
	THIN \leq 3mm	2
	THICK > 3 mm	3
ECHOGENICITY	SONOLUCENT	1
	LOW ECHO-GENICITY	2
	LOW ECHO-GENICITY WITH ECHOGENIC CORE	3
	MIXED ECHO-GENICITY	4
	HIGH ECHO-GENICITY	5

Maximum score= 15

Minimum score = 4

Score > 9 indicates malignant

FIGURE 1: Transvaginal sonography showing large ill-defined heterogenous mixed echogenic solid lesion in right adnexa suggestive of left ovarian malignancy.



RESULT

The patients' ages range from 11-76 years. In present study the majority of cases belong to age group 41-50 years in which 22 cases (39.28 %) were found out of 56 cases. Majority of benign cases belong to 21-30 year age group (38 %) while almost 70 % cases of malignant masses were in 40-60 yrs age group. So prevalence of benign adnexal masses increases with age with maximum number of cases in 21-30 age group. Prevalence of malignant adnexal masses also increases slowly with age with maximum number of cases in 41-50 and 51-60 yrs age group. P value obtained is 0.0124 ($X^2=6.2491$). So there is a significant association between age and type of adnexal masses.

Majority of patients had multiple symptoms. Most common symptom with which maximum number of patients presented was pain/tenderness followed by lump in pelvis. Out of 56 cases, pain/tenderness was present in 44 cases (78.57 %). All 18 malignant cases presented with pain while pain was present in only 30 benign cases (78.94 %) out of 38 total benign cases. P value is 0.035 ($X^2=4.4211$) indicating there is a significant association between pain and type of adnexal masses.

Majority of adnexal masses were of low echogenicity. Out of 56 cases, 34 masses (60.71 %) were of low echogenicity, 3 masses (5.35 %) were sonoluculent and 19 masses (33.92 %) showed mixed echogenicity. 14 malignant masses had mixed echogenicity (77.77 %). Benign masses were mostly with low echogenicity. Out of 38 benign masses, 30 masses (78.94 %) were with low echogenicity, 3 masses (7.89 %) were sonoluculent and 5 masses (13.15 %) were with mixed echogenicity. P value is 0.000002 ($X^2=22.75$). Suggestive of a highly significant association between echogenicity and type of adnexal mass.

Out of 38 benign adnexal masses, septa was absent in 25 masses (65.78 %), thick septa was seen in 3 masses (7.89 %) and thin septa was seen in 10 masses (26.31 %). Out of 18 malignant adnexal masses, thick septations was seen in 4 masses (22.22 %), while 14 masses (77.77 %) did not show any septa in our study. P value obtained is 0.3621 ($X^2=0.8303$). So no significant association seen between septations and type of adnexal masses.

Out of 38 benign masses, 33 masses (86.84 %) had

smooth inner wall, 5 masses (13.15 %) had irregular inner wall. Solid inner wall structure was seen in all 18 malignant masses. P value is $<0.000001(X^2=38.059)$. So there is highly significant association seen between inner wall structure and type of adnexal masses.

All 18 malignant masses were solid with solid wall. Out of 38 benign adnexal masses, 27 masses (71.05 %) had thin (≤ 3 mm) wall, 10 masses (26.31 %) had thick wall and solid wall seen in only 1 benign mass (2.63 %). Thus malignant masses were solid with solid wall, and majority of benign masses had thin wall. P value is 0.000001 ($X^2=24.69$) indicating there is a highly significant association between wall thickness and type of adnexal masses.

Out of 18 malignant masses, 17 masses (94.44 %) had solid appearance, and 1 mass had mixed appearance. So malignant masses were mostly having solid or mixed appearance. Out of 38 benign adnexal masses 32 masses (84.21 %) were cystic, 5 masses (13.15 %) were mixed and one benign mass was solid. P value is $<0.000001(X^2=35.36)$. So there is a highly significant association between appearance and type of adnexal masses.

Out of 38 benign adnexal masses, 34 masses (89.47 %) had size between 5 to 9 cm. 3 masses (7.89 %) had size in between 10-14 cm and one mass (2.63 %) had size > 15 cm. Out of 18 malignant adnexal masses, 14 masses (77.77 %) had size in between 10-14 cm, 3 masses had size in between 5-9 cm (16.66 %) and 1 mass (5.55 %) had > 15 cm size. Thus majority of benign adnexal masses had size between 5-9 cm and malignant adnexal masses had size between 10-14 cm.

TABLE 2: Sassone sonographic score for benign and malignant adnexal masses.

SCORE	NO. OF CASES	PERCENTAGE (%)
BENIGN (<9)	38	67.85%
MALIGNANT (>9)	18	32.14%

All benign adnexal masses had Sassone score ≤ 9 .

All malignant masses had Sassone score > 9 .

P value is $<0.000001(X^2=39.16)$. So there is a highly significant association between the Sassone score and type of adnexal masses.

Thus according to Sassone scoring system, score > 9 indicates malignancy; while score ≤ 9 indicates benign nature of mass.

DISCUSSION

Study by Sassone on transvaginal sonographic characterization of ovarian disease concluded that sonographic scoring system was useful in distinguishing benign from malignant masses with sensitivity of 100%, specificity of 83% and positive and negative predictive values of 37% and 100% respectively. This scoring system takes into account for the inner wall structure, wall thickness, septa and echogenicity of the lesion giving a scoring ranging from 4-15⁽⁶⁾. De Priest et al developed a scoring system based on volume, cyst wall structure and septal structure of adnexal mass assessed by sonography⁽⁷⁾. Color Doppler parameters were not included by both the scoring systems. Kurjack et al used various color doppler parameters and showed significant association between central vascularisation and high velocity/low resistance flow with adnexal malignancy⁽⁹⁾. In our study, detailed sonographic examination with Sassone scoring system was able to identify all the benign and malignant adnexal masses as diagnosed

by histopathological examination as a gold standard. The sensitivity and specificity of the Sassone scoring system in our study was 94% and 88% respectively. The positive and negative predictive values were 94% and 88% respectively. In our study no significant association was seen between septations and type of adnexal masses. The Sassone scoring system could not differentiate between primary and metastatic malignant ovarian tumors.

CONCLUSION

Our study concluded that masses less than 9 cm were mostly benign (92.1%) as compared to only 16.66% of malignant masses with size less than 9 cm. Majority of masses greater than 9 cm in size were malignant.

The differentiation of benign and malignant adnexal masses was done on basis of Sassone scoring system on ultrasonography. Score > 9 were diagnosed as malignancy while score less than or equal to 9 were diagnosed as benign masses.

Following sonographic features were used to calculate Sassone score.

1. Inner wall structure,
2. Wall thickness,
3. Septa and
4. Echogenicity.

Our study concluded that all malignant masses had solid inner wall with score 4 and majority of benign masses (86.84 %) had smooth inner wall with score 1. Also all malignant masses had solid wall and majority of benign masses had thin wall.

Majority of adnexal masses (benign and malignant) had no septa. As majority malignant masses were solid, they had no septa (77.77 %).

Majority of benign masses were reported with low echogenicity (78.94 %) while 77.77 % malignant masses had mixed echogenicity.

Malignant masses were mostly solid and had solid component within. Benign masses were rarely solid.

Out of 56 cases with adnexal masses, 38 cases (67.85 %) were diagnosed as benign and 18 cases (32.14 %) were diagnosed as malignant.

USG is highly operator dependent leading to high interobserver variation so the whole mass should be adequately scanned by only an expert sonologist.

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