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Original Article

Evaluation of Adnexal Masses - Correlation of Clinical, Sonological and Histopathological Findings in Adnexal Masses

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Abstract

Introduction: Adnexal mass is a common clinical presentation in gynecologic practice and can be of gynecologic or non-gynecologic origin. The term adnexal mass is most often used for masses involving the ovary because of the high propensity of the ovary for neoplasia. Fewer neoplasms occur in the fallopian tube, which are generally involved in inflammatory process.

Materials and Methods: This study covers all patients admitted to Department of Obstetrics and Gynecology, Cheluvamba Hospital, Mysore Medical College and Research Institute, Mysore from December 2013 to May 2015 with the clinical diagnosis of adnexal masses. Selective cases underwent an ultrasound examination with color Doppler. Ca-125 was measured, and risk of malignancy index (RMI) for each tumor was calculated. Following surgery, specimens were sent for histopathological examination, and the reports were correlated with pre-operative clinical and imaging findings.

Results: The incidence of ovarian masses was 93% with the majority (84%) being neoplastic. When both clinical and sonological diagnosis were combined, the overall sensitivity, specificity, positive and negative predictive value for diagnosis and discriminating benign and malignant ovarian neoplasms were 87.5%, 96.7%, 70%, and 98.88%, respectively. Their combined accuracy was 96%. Ca-125 as a laboratory test showed a sensitivity of 62.5% and specificity of 84.25%. RMI <200 showed a sensitivity of 62.5% and specificity of 95.65%.

Conclusion: Clinical findings, sonography, and RMI levels correlate positively with histopathology in early detection of malignancy and its appropriate management.

Key words: Adnexal mass, Clinical, Histopathology, Ultrasound

INTRODUCTION

Adnexal mass is a common clinical presentation in gynecologic practice and can be of gynecologic or non-gynecologic origin. The term adnexal mass is most often used for masses involving the ovary because of the high propensity of the ovary for neoplasia. Fewer neoplasms occur in the fallopian tube, which are generally involved in the inflammatory process. Differential diagnosis of adnexal mass is complex and includes functional cysts, benign and malignant ovarian tumors, paraovarian cysts, tubo-ovarian abscesses, hydrosalpinx, ectopic pregnancies, tubal malignancy, broad ligament fibroid, fimbrial cysts, sigmoid colon or colon distended with gasses or feces, pelvic kidney, and pregnancy in bicornuate uterus. These masses pose both a diagnostic and management dilemma. Ultrasonography is the primary modality used for detection and characterization of the mass. Many screening tests are being actively investigated at present, but there is no sufficient evidence to support the routine use of pelvic ultrasound and Ca-125 to screen for ovarian cancer in the general population. Histopathology is still taken as gold standard for the evaluation of benign and malignant adnexal masses.

This study will be done to find out the diagnostic value of clinical examination, ultrasonography and its

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correlation with histopathological diagnosis in adnexal masses.

MATERIALS AND METHODS

This prospective study was undertaken in the Department of Obstetrics and Gynecology, Cheluvamba Hospital, Mysore Medical College and Research Institute, Mysore from December 2013 to May 2015 (18 months). All patients with clinical diagnosis of adnexal masses during the study period were included. Age <15 years, pregnancy with adnexal masses, mass arising from an abdominal organ on laparotomy (non-gynecologic causes) and patients who do not get operated were excluded from the study.

Method of Collection of Data

Detailed history about demographic factors, presenting complaints and menstrual histories were obtained. Complete general physical examination and bimanual examination was performed, and provisional diagnosis was made. To evaluate the adnexal mass, an ultrasound examination consisting of either transvaginal or transabdominal sonography with color Doppler for suspicious cases of malignancy were done. Sonographic findings regarding size of adnexal mass, laterality, locularity, solid elements, hemorrhage, presence of ascites, evidence of metastasis and Doppler studies with pulsatility index (PI) and resistance index (RI) were assessed. An ultrasound diagnosis was made. Standard laboratory tests consisting of complete hemogram, fasting and postprandial blood sugars, liver and renal function tests, beta-human chorionic gonadotropin (in suspicion of pregnancy) and Ca-125 with a cutoff value of 35 U/ml were taken before surgery. Risk of malignancy index (RMI) for each tumor was calculated. Laparotomy was performed. Following surgery, specimens were sent for histopathological examination, and the reports were correlated with pre-operative clinical and imaging findings. The accuracy of clinical and ultrasound diagnosis was assessed. Sensitivity, specificity, negative and positive predictive value of clinical findings, sonography, Ca-125 and RMI in predicting malignancy for each adnexal mass were noted and tabulated using SPSS for windows (v16). Data was analyzed using Epi Info software. Frequencies and percentages were calculated for categorical data. Association between groups for categorical data was calculated using Chi-square/Fischer exact test. Validity and predictive values and accuracy for the test were calculated. Interobserver variability was assessed by kappa statistics. $P < 0.05$ at 95% confidence interval was considered statistically significant.

Ethical committee clearance and patient consent were obtained for all cases in the study.

RESULTS

The total admissions to the gynecology ward were 1899 in the study. A number of cases of adnexal masses with surgical interventions were 100 with an incidence of 5.26%. The incidence of ovarian masses was 93% of which 84% were neoplastic, and 16% were non-neoplastic. The incidence of malignancy was 9.5%. The patient ages ranged from 17 to 80 with a mean age of presentation of adnexal masses being 38.11 years. There were no significant differences among tumor types regarding the age ($\chi^2 = 7.13$; $F = 5$; $P = 0.211$). There were highly significant differences among tumor types regarding the menstrual status of examined women ($\chi^2 = 5.6$; P [Fisher's exact test] = 0.021) with most belonging to postmenopausal group. The majority of patients had multiple symptoms. The most common complaint was pain abdomen in 83% of cases followed by mass abdomen in 14% of cases. Constitutional symptoms were more seen in malignant patients. 75 cases were clinically diagnosed to be benign tumors, malignancy being diagnosed in 13 cases.

Sonographically, 89 cases were diagnosed to be benign and eleven malignant with 87.5% sensitivity, 95.65% specificity, false-positive rate of 36.36% and false-negative rate of 1.12%. On color Doppler sonography, all the malignant tumors showed neovascularization. Some ($n = 4$, 5.26%) of the benign tumors also showed color signals. This difference was statistically significant by test of proportion ($P < 0.001$). The RI in malignant tumors was <0.4 in 87.5% of cases and >0.4 in 12.5% of malignant tumors. This difference was statistically significant ($P < 0.001$) by test of proportion. Thus, the general trend of lower RI and PI in malignant ovarian masses was confirmed in the present study. There is an excellent agreement between clinical and ultrasound diagnosis in diagnosing adnexal masses with kappa value 0.742. The combined use of clinical and ultrasonography for diagnosis of malignancy had a $P < 0.001$ (significant), 87.5% sensitivity, 96.7% specificity, 30% false-positive rate, 1.11% false-negative rate, 70% positive predictive value, 98.88% negative predictive value and an accuracy of 96%. Serum Ca-125 showed a sensitivity of 62.5%, specificity of 84.25% and an accuracy of 82.14% in discriminating between benign and malignant ovarian neoplasms. RMI showed a sensitivity of 62.5%, specificity of 95.65% and an accuracy of 93% in diagnosing benign and malignant tumors. RMI values more than 200 were statistically significant in diagnosing malignancy ($P < 0.001$).

On laparotomy, 78 cases were found to be benign tumors out of which 76 cases were of ovarian origin, the other 2 being broad ligament fibroid. 8 cases were found to be malignant ovarian tumors all subjected to staging. Histopathology being the gold standard, in our study

showed benign pathology in the majority of cases (76%). Malignant changes were seen in 8 cases. Endometriosis was seen in 6 cases. The rest showing changes suggestive of hemorrhage, torsion, hydrosalpinx, and tubo-ovarian mass, respectively. There is an excellent agreement between ultrasound and histopathology diagnosis in diagnosing adnexal masses with kappa value 0.897. In our study, most common histopathological type was serous type (36%) followed by mucinous cystadenoma in 18% cases and dermoid cysts in 9 cases.

DISCUSSION

Ovarian cancer carries the worst prognosis among all gynecological cancers mainly due to the lack of effective screening methods for early detection of the disease.[1] Accurate pre-operative prediction of the benign or malignant nature of an adnexal mass is essential for proper management.[1] In the present study, out of 1899 admissions in the gynecology ward, the incidence of adnexal masses undergoing surgical intervention was 5.26% of which 93% were ovarian in origin. Among the ovarian neoplasms, 90.46% were benign, and 9.54 % were malignant. These findings are comparable with Sharadha *et al*.,[2] Narula *et al*[3] and Jha and Karki[4] study.

Mean age of malignant tumors was 45 years in our study which is similar to other studies done by Mondal *et al*.[5] and Wasim *et al*.,[6] The above age of incidence is lesser than that seen in literature. The higher percentage of malignant ovarian tumors in postmenopausal women in the present study is similar to that in other studies.[1,7] This confirms the characteristic of malignant ovarian tumors being more common in postmenopausal women. On the other hand, patients in the reproductive period more often have benign lesions. Several studies have shown that women with ovarian cancer experience gastrointestinal and constitutional symptoms more as compared to those with benign tumors.[6] Our study has similar results, but was not statistically different, whereas other studies have reported more association with malignant disease. None of our cancer patients were asymptomatic while few other studies have reported 7-15% of ovarian cancer patients to be asymptomatic.[6] Targeting women with specific symptoms and possibility of development of a symptom index has been recommended by a study from the USA.[6]

Although sensitivity of clinical examination for distinguishing a malignant mass from a benign one is somewhat better, these results need to be interpreted with caution. Based on the available literature,[8,9] bimanual examination does not appear to be a sensitive test for detecting the presence of adnexal masses and appears to have limited ability to discriminate benign from malignant masses. Although specificity was somewhat better, positive predictive values will still be quite low in low prevalence settings (Tables 1-3).

Sonography (transvaginal and transabdominal) is a sensitive method for detecting ovarian cancer. Our study showed that abdominal sonography had a sensitivity of 87.5% and a specificity of 95.65% with an accuracy of 95% for predicting ovarian cancer which is similar to studies by Wasim *et al*,[6] Topuz *et al*.[10] and Pourissa *et al*.[11] Color Doppler study increases the diagnostic accuracy of plain sonography with good accuracy in identifying malignancy with cut off values of 0.4 and 1 for RI and PI[12] respectively. Although ultrasound is considered the primary diagnostic modality for ovarian imaging, there are numerous false-positive and false negative findings (Tables 2, 4, 5).[1]

Serum Ca-125 level is a valuable parameter for both diagnosis and monitoring of epithelial carcinoma. The overall sensitivity of Ca-125 screening in distinguishing

Table 1: Clinical and using diagnosis discrepancies in diagnosis of adnexal masses

Clinical diagnosis	Using diagnosis				
	Acute abdomen	Endometriosis	Benign	Malignant	Total
Acute abdomen	8	1	0	0	9
Endometriosis	0	3	0	0	3
Benign	3	1	69	2	75
Malignant	0	0	4	9	13
Total	11	5	73	11	100

Table 2: Ultrasound and histopathology diagnosis discrepancies in diagnosis of adnexal masses

Using diagnosis	HP report				
	Acute abdomen	Endometriosis	Benign	Malignant	Total
Acute abdomen	9	0	2	0	11
Endometriosis	0	5	0	0	5
Benign	1	1	70	1	73
Malignant	0	0	4	7	11
Total	10	6	76	8	100

Table 3: Clinical diagnosis versus histopathology report for malignant tumors

Clinical diagnosis	Histopathology report		
	Malignancy present	Malignancy absent	Total
Malignancy present	7	6	13
Malignancy absent	1	86	87
Total	8	92	100

benign from malignant adnexal masses reportedly ranges from 61% to 90%, specificity ranges from 71% to 93%, positive predictive value ranges from 35% to 91% and negative predictive value ranges from 67% to 90%[13] which is similar to our study with a sensitivity of 62.5% (Table 6), specificity of 84.25%. Wide variations in these figures reflect differences in cancer prevalence in the study population, the proportion of patients who are postmenopausal and the threshold of Ca-125 levels considered abnormal. Since most of the clinical conditions with elevated Ca-125 occur in premenopausal women and most epithelial ovarian cancers occur in postmenopausal women, the sensitivity and specificity of an elevated Ca-125 level in concert with a pelvic mass is highest after menopause. Sensitivity in our study is lesser when compared to other studies[14,15] compared to the high level of specificity of 84.25% in our study. RMI, based on menopausal status, ultrasound findings and serum Ca-125 is an easily applicable method in the primary evaluation of patients with adnexal masses, resulting in timely referral to gynecological oncology centers for suitable surgical operations.[1] In previous studies using RMI 2, sensitivity and specificity were 74% and 89%,[16] 71% and 89%,[17] and 76% and 82%.[18] Our values for RMI 2 had a sensitivity of 62.5% and a specificity of 95.65% which is similar to a study by Hemeda *et al.*[19] with a sensitivity of 70.5%, specificity of 93.5% but lesser when compared to other studies. However, it was found to be statistically significant with a $P < 0.001$ and an accuracy of 93%. Thus, according to our results, calculation of RMI in pre-operative triage of patients with adnexal tumors is strongly recommended (Table 7).

Table 4: Ultrasound diagnosis versus histopathology report for malignant tumors

Ultrasound diagnosis	Histopathology report		
	Malignancy present	Malignancy absent	Total
Malignancy present	7	4	11
Malignancy absent	1	88	89
Total	8	92	100

Table 5: Combined (clinical and ultrasound) diagnosis versus histopathology report for malignant tumors

Combined (clinical and ultrasound)	Histopathology report		
	Malignancy present	Malignancy absent	Total
Malignancy present	7	3	10
Malignancy absent	1	89	90
Total	8	92	100

Table 6: Ca-125 values in diagnosis of benign and malignant tumors

Ca-125	Malignant (%)	Benign (%)	Total (%)
>35 IU/ml	5 (6.0)	12 (14.3)	17 (20.2)
<35 IU/ml	3 (3.6)	64 (76.2)	67 (79.8)
Total	8 (9.5)	76 (90.5)	84 (100)

Table 7: RMI values versus histopathology report for malignant tumors

RMI (IU)	Histopathology report		
	Malignancy present	Malignancy absent	Total
<200 Malignancy present	5	4	9
<200 Malignancy absent	3	88	91
Total	8	92	100

RMI: Risk of malignancy index

Among the major histological classes, the most common type of ovarian neoplasm seen in our study was surface epithelial tumors (62%) similar to other studies with 64% and 70%[20,21] ,respectively. The most frequent subtype being serous cystadenocarcinoma followed by mucinous cystadenocarcinoma similar to other studies.[22] Germ cell tumors (GCTs) comprise the second largest group in our study in which benign tumors dominated the malignant ones. Among the benign GCTs, our study showed the highest incidence of dermoid cysts which are similar to studies by Ahmad *et al.*[20]

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