

RESEARCH COMMUNICATION

Evaluation of Diagnostic Value of CT Scan, Physical Examination and Ultrasound Based on Pathological Findings In Patients with Pelvic Masses

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Abstract

Objective: Because benign and malignant cervical and ovarian masses occur with different percentages in different age groups, the importance of primary diagnosis and selection of a suitable surgical procedure is underlined. Diagnosis of pelvic masses is carried out using ultrasound, physical examination, CT scan and MRI. The objective of this study is to evaluate the diagnostic value of CT scan in pelvic masses in comparison with physical examination-ultrasound based on pathology of the lesion in patients undergoing laparotomic surgery. **Methods:** This analytic-descriptive study focused on age, sonographic findings, physical examinations, CT scan and pathological findings in 139 patients with pelvic mass, gathered with questionnaires and statistically analyzed using the SPSS software programme. **Results:** Of 139 patients with pelvic mass (patients aged from 17 to 75 years old), 62 (44%) cases were diagnosed as benign and 77 (55.4%) as malignant; among them malignant teratoma serocyst adenocarcinoma with 33 (23.7%) cases and benign myoma with 21 (15.2%) cases comprised the most frequent cases. The sensitivity and specificity of sonography-physical examination were 51.9% and 87.9% respectively and the sensitivity and specificity of CT scan images were 79.2% and 91.6% respectively. It was shown that CT scan images were more consistent with pathological findings in predicting appropriate surgical procedures than do sonography-physical examinations. **Conclusion:** The sensitivity of CT scan is far higher than that of sonography-physical examination in the diagnosis of pelvic mass malignancy.

Keywords: CT scan - physical examination - sonography - pathology - surgical procedures - pelvic masses

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Introduction

Probable causes of pelvic masses in women which may be found during physical examinations or radiological checking are very divergent in different age groups. A pelvic mass may have gynecologic origin or arise from urinary tract or intestines and since pelvic and ovarian masses with benign or malignant types might occur with different percentages at different ages, the importance of primary diagnosis and choosing appropriate surgical procedure is highly emphasized.

Pelvic masses can be diagnosed through ultrasound, physical examination, CT scan and MRI (Breen et al., 1977). Vaginal sonography is also of value in determining malignancy of ovarian tumors; but due to overlap between benign and malignant lesions, adding pelvic sonography to physical examination can increase the sensitivity and specificity of diagnosis (Varras et al., 2004). Regarding five-year survival of malignant pelvic and reproductive masses, assessing characteristics of these masses before laparotomy is necessary for

planning throughout the surgery and continuation of the treatment (Stringini et al., 1996). In an study conducted by Bucksheet et al. (1998) the diagnostic value of pelvic examination, transvaginal ultrasound and transvaginal doppler sonography for diagnosis of ovarian masses were compared and it was reported that vaginal sonography had the highest sensitivity among them. The aims of this study are the evaluation of diagnostic value of CT scan in pelvic masses compared to physical examination-sonography based on pathological findings of the lesions in patients undergoing laparotomic operation and defining efficacy of CT scan in changing surgical procedure.

Materials and Methods

This is an analytic-descriptive study with diagnostic study method. The studied society was all women hospitalized in Yazd Shahid Sadoughi Hospital who were to undergo laparotomic surgery due to pelvic mass from September 2006 to September 2008. Sampling was carried out through census and obtaining written

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informed consent. The required sample size regarding previous similar studies and considering confidence level of 95% and accuracy of d: 0.01 was at least 120 cases. In this study 145 cases were introduced of whom 6 patients were excluded due to unclear sonographic and CT scan results and in the end 139 patients remained in the study. At first patients 'history and age, sonographic and CT scan results, physical examination findings, pathologic results (benign and malignant) and suggested procedure based on each mentioned method and surgical method carried out for each patient were registered in questionnaires. In this study all sonographic and CT scan images were taken with Hitachi and Shimatzo Spiral 7800 apparatus respectively. Taking into account that all imaging, physical examinations and interpretations of them were carried out by different people, it is likely that some minor personal errors have occurred. In the end all findings were statistically analyzed using SPSS software.

Results

In this study 139 patients suffering from pelvic mass were included. All these women were hospitalized in the Yazd Shahid Sadughi Hospital for laparotomic surgery. They aged from 17 to 75 years old with the mean age of (41.16+-15.21). According to pathologic findings from these 139 patients, 62(44%) cases had benign and 77(55.4%) cases had malignant pelvic tumors, among them malignant teratoma serocyst adenocarcinoma with 33(23.7%) cases and benign myoma with 21(15.2%) cases, benign teratoma with 15(10.8%) cases, leiomyosarcoma with 12 (8.6%) cases were the most frequent types. Prediction of both sonography-physical examination and CT Scan as of benign or malignant tumors is reported in the Table 1.

Using chi-square statistic trial and P value=0.001, the correlation between sonography-physical examination, CT Scan findings and pathologic results was found to be significant. Based upon this, the sensitivity and specificity of ultrasound-physical examination were 51.9% and 87.9% respectively and the sensitivity and specificity of CT Scan images were 79.2% and 91.6% respectively. In order to assess the role of CT Scan and ultrasonography, suggested surgical method based on their results was compared to the accurate surgical method based on pathologic results.

In distinction between surgical methods, it was revealed that in 44.6% of cases assessed by pathologic results the correct measure was mass removal, while this measure was adopted in 61.2% of sonography-physical examination cases and in 36.4% of CT Scan cases. The appropriate therapeutic measure based on pathologic results in 40.3% of patients was oophorectomy with staging, while this measure has been taken in 9.45% and 30.9% of sonography-physical examination and CT Scan cases respectively. Hysterectomy with oophorectomy without staging was not necessary in any cases based on pathologic results but regarding the age and clinical conditions of patients, 10.8% of them underwent such procedure whereas this measure was suggested in 14.6% of sonography-physical examination cases and 12.9% of CT Scan cases. Mass removal and staging based on

Table 1. Comparison of CT Scan, Sonography-Physical Examination and Pathological Results

	CT scan		Sonography-physical		Pathological	
	No.	percent	No.	percent	No.	percent
benign	70	50.4	91	65.5	62	44.6
malignant	69	49.6	48	34.5	77	55.4
total	139	100	139	100	139	100

Table 2. Suggested Surgical Methods Based on Sonography, Physical Examination, CT Scan and Accurate Surgical Method Based on Pathological Results

Surgical Method	Physical Sonography	CT Scan	Accurate Pathology	Carried Out
Mass removal	85 (61.2)	51 (36.7)	62 (44.6)	45 (32.4)
Bilateral oophorectomy & hysterectomy & staging	13 (9.45)	43 (30.9)	56 (40.3)	50 (35.9)
Hysterectomy & bilateral oophorectomy	20 (14.4)	18 (12.9)	0 (0.0)	15 (10.8)
Mass removal & staging	15 (10.8)	22 (15.8)	22 (15.1)	21 (15.1)
Hysterectomy	6 (4.3)	5 (3.6)	0 (0.0)	8 (5.8)

pathological results was shown to be mandatory in 15.1% of patients; with the CT Scan being more efficient in accurate prediction. Hysterectomy was not necessary in any cases but 5.75% of cases were subjected to this method due to their age and physical conditions and this method was supposed by sonography-physical examination and CT scan in 4.3% and 3.6% of cases respectively.

Discussion

The aims of this study are the evaluation of diagnostic value of CT scan in pelvic masses compared to physical examination and sonography based on pathologic findings of the lesions in patients undergoing laparotomic operation and defining efficacy of CT scan in changing surgical procedure. Vaginal sonography has been evaluated as a method in malignancy risk determination. CT Scan is rarely used as a primary diagnostic method in pelvic masses but when a malignancy is firmly suspected or a non-gynecologic disorder is encountered, it can be useful in planning of treatment (Varras et al., 2004). In cases that the diagnosis is uncertain or sonographic results are not helpful or another extra-reproductive system disease is suspected, CT Scan or MRI could be useful.

In this study depending on pathologic results as the gold standard, 55.4% of masses were malignant and 44.6% benign which were in accordance with previous studies results. In similar studies such (Schutter et al., 2004) from all pelvic masses being assessed, 41.7% were malignant and 55.7% were benign (Practice committee of the American society for Reproductive Medicine., 2004). In Mousavi et al study, from all pelvic masses 52.5% were reported as malignant and 47.5% as benign (Mousavi et al., 2006). In comparison between sonography-physical examination and CT Scan it is revealed that the results of CT Scan are more similar to pathologic results from percentage of malignancy point of view and can more

accurately be used in diagnosing malignant pelvic masses. Comparing the sensitivity of these two methods shows that the sensitivity of CT Scan is higher than that of physical examination-sonography in diagnosing the malignancy of pelvic masses, so CT Scan can be prescribed in all suspected malignant cases. In this study the sensitivity of physical examination-sonography was 51.9% which is much less than that of previous studies(80%). Low quality of the sonography devices and the level of sonographer's proficiency might have a role in this regard. In this study the specificity of both CT Scan and sonography in determination of the characteristics of pelvic masses were relatively the same, but since the sensitivity of CT Scan is higher, it has more accuracy in ruling out benign cases and is also capable of detecting benign cases which do not need to further costly and extensive procedures. In a study conducted by Stringini et al it was showed that the accuracy of vaginal sonography in diagnosing malignancy in women undergoing laparotomy for pelvic mass is high so that when in both vaginal sonography and physical examination the malignancy is ruled out, it is accurate in 70% of cases(Stringini et al.,1996);but doing further tests besides this diagnostic method especially in menopausal women is useful(Mousavi et al., 2006). Hata.K et al showed in their study that vaginal Doppler sonography can yield more useful diagnostic information for differentiation malignant from benign lesions than vaginal sonography(Hata et al., 1992).

In six most prevalent pathologic types of this study,the sensitivity of sonography and physical examination in detecting malignant masses was averagely 54%. While sensitivity in malignant dysgerminoma is around 72%, it is calculated to be around 33% in leiomyosarcoma.It can be concluded that sonography has less sensitivity in detecting malignant pelvic masses with uterine origin(leiomyosarcoma)than in malignant pelvic masses with ovarian origin. Regarding the relatively small sample size of lesions, the obtained sensitivity for overall estimate is not much valuable. In these six pathologies the sensitivity of CT Scan in determination of pelvic mass malignancy was calculated as around 89.3% which for malignant leiomyosarcoma was around 75%.Although the sensitivity of CT Scan in detecting malignant pelvic masses with uterine origin is also low, but at the same time it is double that of sonography and is more useful in detecting uterine malignant pelvic masses. It is necessary to mention that in this study the CT Scan has very high sensitivity(in the order of 90%)in detecting malignant pelvic masses with ovarian origin. The specificity of sonography - physical examination and CT Scan in accurate diagnosis of benign lesions was calculated as 93.3% and 97.7% respectively, so both the diagnostic measures have a specificity of above 90% in ruling out benign lesions. The least specificity calculated in both measures was for benign teratoma because of its radiologic feature(possessing internal echo) making diagnostic mistake more likely.In separation between mentioned surgical methods,in all methods including mass removal,oophorectomy with staging,mass removal with staging,hysterectomy,prediction of surgical method based on CT Scan rather than sonography-physical examination

had more consistency with accurate surgical method based on pathologic results. The precision of CT Scan is even higher than that of vaginal sonography in the estimation of the malignancy of pelvic masses.In malignant masses such as dysgerminoma,CT Scan has a diagnostic sensitivity of 90.9% which may influence selecting of therapeutic measure.The sensitivity index of sonography is much lower in cases such as krokenburg(regarding its sample size)being around 16%.All the same,the sensitivity of sonography was around 100% in diagnosing benign masses like endometrioma and leiomyoma.If the sensitivity of physical examination-sonography is considered valuable(with the regard to the relatively small sample size of the study),this method is useful in ruling out some benign lesions from surgical operation list.

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