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Comparing Diagnostic Accuracy of Ultrasound and CT in Diagnosing Pelvic Masses.

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ABSTRACT

Background: Early treatment is important in decreasing mortality and improving outcome of patients with pelvic masses. The present study was aimed to diagnose pelvis mass lesions using transabdominal (TAS), transvaginal sonography (TVS) and computed tomography (CT) scan and to compare their diagnostic accuracy. **Methods:** We included patients referred to us for suspected pelvic masses and underwent TAS, TVS and CT scan imaging. The final diagnosis was confirmed by histopathological examination. **Results:** We included a total of 50 patients with suspected pelvic masses in the present study. Of these, 33 had ovarian masses (19 benign and 14 malignant), 11 had uterine masses (8 benign and 3 malignant) and 6 had non-ovarian adnexal masses. Both USG and CT identified 7 patients who had their mass extending to abdomen. Both USG and CT identified 14 patients with ill-defined margins. Majority of the lesions were found to be cystic (19 by USG and 18 by CT). For benign and malignant ovarian lesions, TVS was 94% and 92% accurate respectively, while for uterine benign and malignant conditions TVS accuracy was 100% and for adnexal masses accuracy was 83%. TAS had an overall diagnostic accuracy was 88%. Highest accuracy was for malignant uterine lesions (100%) and least accuracy was for adnexal mass (67%). CT scan had an accuracy of 78% overall. Highest accuracy was for benign ovarian lesions (89%) while for benign uterine lesions CT was least accurate (63%). **Conclusion:** The results of our study show that TVS has the highest overall accuracy for diagnosing pelvic masses.

Keywords: computed tomography; pelvic mass; ultrasonography.

INTRODUCTION

A pelvic mass is a swelling or an enlargement in the pelvic region, which may originate from either the gynecologic organs (the uterus, cervix, and uterine adnexa) or other pelvic organs (the bladder, intestines, ureters, and renal organs). The risk of an ovarian tumor being malignant is estimated to be 7–13% in premenopausal and 8–45% in postmenopausal women. The risk of ovarian malignancy in women undergoing laparoscopy for preoperatively benign appearing ovarian tumors ranges from 0.1 to 4.2% and increases in elder patients. Therefore, early and proper therapy are important in decreasing the death, such as surgery, chemotherapy, hormone therapy, and targeted therapy, as well as radiation therapy. In order to have patients treated by optional way, a correct preoperative diagnosis of pelvic masses is very important.

Imaging techniques for gynecological and obstetric pathology include ultrasonography (transabdominal and transvaginal), computed tomography (CT), magnetic resonance imaging (MRI) and others. Ultrasound scan is used commonly for gynaecological and obstetric pathology due to its ease of use and cost-effectiveness. For ovarian lesion, it appears to have high sensitivity (89–100%) and specificity (73–83%). Qureshi et al reported that transvagival sonography (TVS) is superior to transabdominal sonography (TAS) in most cases of pelvic pathology. CT scans can give detailed information regarding tumour extent and metastatic disease. Contrast-enhanced CT (CECT) studies have an added advantage compared to low dose non-enhanced CT scans, as they enable improved delineation of anatomical structures, and increased sensitivity for detection of pathological lesions. The present study was aimed to diagnose pelvis mass lesions using TAS, TVS and CT scan and to compare their diagnostic accuracy.

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MATERIALS & METHODS

Study Design and Sampling

The present observational study was conducted in the Department of Radiodiagnosis of a tertiary care teaching hospital, in which patients referred from the Department of Obstetrics and Gynecology for suspected pelvic masses during a period of 1 year were included. Patients eligible to participate were explained the purpose of the study and an informed

written consent was obtained from them. The study was approved by the Institutional Ethics Committee.

Data Collection and Data Analysis

All patients in the study were asked about their medical history and relevant clinical examination was conducted. Demographic information of the patients was obtained from their medical records. All patients underwent ultrasonography (USG), both transabdominal and transvaginal. USG was done on GE LOGIQ V5/GELOGIQ 400 PRO Series/Philips Clear Vue 350/Toshiba Power Vision 6000 machines. Grey scale and color Doppler ultrasound assessments were performed by an experienced operator and interpreted by the investigators of the study. CT scans were performed on Bright Speed GE 16 slice Elite CT scanner by an experienced operator and interpreted by the investigators. All interpretations were done under the supervision of senior radiodiagnosis consultants of our department. The final diagnosis was confirmed by histopathological examination of the masses. The data were collected using a pre-designed semi-structured study proforma. Data thus collected were presented descriptively.

RESULTS

We included a total of 50 patients with suspected pelvic masses in the present study. Of these, 33 had ovarian masses (19 benign and 14 malignant), 11 had uterine masses (8 benign and 3 malignant) and 6 had non-ovarian adnexal masses. Most common age group was 25 to 34 years [Table 1]. TVS could not be performed in one case of uterine lesion dn four cases of ovarian lesions. Majority of the lesions were sized 5 to 10 cms. The most common presenting complaint was lower abdominal pain (44%), abdominal distension (30%) and abnormal vaginal bleeding (28%). Other less common complaints were bowel disturbances, vaginal discharge, loss of weight, urinary complaints, primary amenorrhea and infertility. Table 2 describes the imaging findings in all patients included in the study. Both USG and CT identified 7 patients who had their mass extending to abdomen. Both USG and CT identified 14 patients with ill-defined margins. Majority of the lesions were found to be cystic (19 by USG and 18 by CT). Lesions were interpreted as solid in 18 and 14 patients using USG and CT respectively. While, mixed and necrotic interpretation was made more commonly by CT. The interpretation of patients according to their septae and solid area was similar by both USG and CT. Histological evaluation of ovarian masses revealed serous cystadenoma (n=3), serus cystadnocarcinoma (n=4), mucinous cystadenoma (n=3), mucinous cystadnocarcinoma (n=4), benign teratoma (n=4), germ cell malignancy (n=2), metastatic tumor (n=2), fibroma, malignant teratoma (n=2), hemorrhagic cyst (n=5) and endometrial cyst (n=3). Histological evaluation of uterine lesions revealed uterine leiomyoma (n=5), congenital uterine lesion with hematometra (n=2), uterine malignancy (n=3) and endometrial polyp (n=1). Histological evaluation of adnexal masses revealed broad ligment leiomyoma (n=1), tubal abscess (n=4) and peritoneal inclusion cyst (n=1). On comparing the diagnostic accuracy, we found that overall TVS had the highest accuracy for any type of pelvic lesion (93%) and clinical examination had the lowest accuracy (48%) [Table 3].

Table 1: Baseline characteristics of the patients included in the study

Variables	Ovarian mass (n=33)	Uterine mass (n=11)	Non-ovarian adnexal mass (n=6)
Age groups (in years)			
15 to 24	4	4	3
25 to 34	20	4	1
35 to 45	9	3	2
Size of mass (in cm)			
Less than 5	8	5	2
5 to 10	21	5	4
More than 10	4	1	0

Table 2: Description and comparison of lesion characteristics on USG and CT scan

Imaging findings	USG	CT
Extend of mass		
Limited to pelvis	43	43
Extending to abdomen	7	7
Margins		
Well defined	36	36
Ill defined	14	14
Consistency		
Cystic	19	18
Solid	18	14
Mixed	13	18
Calcification	7	7
Necrosis	14	22
Septae (for ovarian lesions)		
No septae or papillae	10	10
Thin septae or papillae < 3mm	4	4
Septa > 3mm	1	1
Solid area (for ovarian lesions)		
Less than 1/3rd of mass	2	2
1/3rd to 1/2 of mass	10	10
More than 1/2 of mass	6	6

Table 3: Comparative accuracy of various diagnostic modalities for pelvic masses

Type of mass	Modality used for diagnosis											
	Clinical			TAS			TVS			CT		
	N	C	A	N	C	A	N	C	A	N	C	A
Benign ovarian	19	9	47%	19	18	95%	16	15	94%	19	17	89%
Malignant ovarian	14	6	43%	14	12	86%	13	12	92%	14	11	79%
Benign uterine	8	5	63%	8	7	88%	7	7	100%	8	5	63%
Malignant uterine	3	2	67%	3	3	100%	3	3	100%	3	2	67%
Adnexal	6	2	33%	6	4	67%	6	5	83%	6	4	67%
Total	50	24	48%	50	44	88%	45	42	93%	50	39	78%

N: total patients; C: correctly diagnosed; A: accuracy

DISCUSSION

In our study, TVS had an overall diagnostic accuracy of 93%. For ovarian benign and malignant accuracy was 94% and 92% respectively, while for uterine benign and malignant conditions accuracy was 100% and for adnexal masses accuracy was 83%. For TAS, we observed that the overall diagnostic accuracy was 88%. Highest accuracy was for malignant uterine lesions (100%) and least accuracy was for adnexal mass (67%). TAS utilises a low frequency (3.5–7 MHz) convex probe to characterise adnexal lesions that have grown beyond the pelvic brim. TVS uses a higher frequency (7.5–12 MHz) endocervical probe and gives better spatial resolution as it is placed closer to the ovaries; and is the first line modality of choice for small masses. Nevertheless, a smaller field of view, leading to a possibility of overlooking a larger pelvic mass, is one of its limitations. Therefore, TAS is usually performed first followed by a TVS as a standard scan procedure. Theodoridis et al compared the diagnostic accuracy of ultrasound examination with laparoscopic findings and both with the gold standard (histology) in the management of benign ovarian lesions. They found that TVS's diagnostic performance for borderline ovarian tumors was quite satisfactory (sensitivity 50%, specificity 92%, positive predictive value 11%, and negative predictive value 99%).

In our study CT scan had an accuracy of 78% overall. Highest accuracy was for benign ovarian lesions (89%) while for benign uterine lesions CT was least accurate (63%). Conventional CT has a limited and variable sensitivity of 40–93% and specificity of 50–98% for detection of recurrent disease. Spiral CT can improve the detection of peritoneal lesions and implants, in particular in those with concurrent ascites. Obtaining a CT before secondary debulking may aid in surgical planning and to assess the feasibility of achieving maximum resectability. Firoozabadi et al reported that the sensitivity and specificity of CT scan images were 79.2% and 91.6%, respectively. Liu et al found the sensitivity, specificity, and accuracy of CT scan to be 80.3%, 90.3%, and 85%, respectively, which are significantly higher than those of ultrasound ($P < 0.05$). Combined use of USG and CT has been suggested by Liu et al.13 They reported the sensitivity, specificity, and accuracy of combined application of ultrasound and CT to be 89%, 94.7%, and 91.7%, which were higher than those of either ultrasound or CT.

There are a few limitations. First, results of ultrasonography are operator dependent. Therefore, the results of the present study might not be generalizable to other imaging centres. Second, early and accurate diagnosis of pelvis masses using imaging studies is aimed at improving the long term outcome and prognosis of these patients. This could not be assessed in the present study. Future studies are required which can evaluate the role of these imaging studies on the long term prognosis of these patients.

CONCLUSION

Pelvic masses have a heterogeneous spectrum. Early diagnosis and accurate staging using diagnostic imaging can help improve the prognosis of this condition. The results of our study show that TVS has the highest overall accuracy for diagnosing pelvic masses. CT on the other hand reported about lower overall accuracy than TAS. Future studies are needed to support our findings.

REFERENCES

1. Wakayama A, Inamine M, Kudaka W, Nagai Y, Nakamoto T, Ooyama T, Ariga T, Kasuya G, Toita T, Aoki Y. Concurrent chemoradiotherapy for non-bulky stage IB/II cervical cancer without pelvic node enlargement. Anticancer research. 2013 Nov 1;33(11):5123-6.
2. Parker WH, Berek J (1994) Laparoscopic management of the adn- exal mass. Obstet Gynecol Clin North Am 21:79–92
3. Marana R, Muzii L, Catalano GF et al. Laparoscopic excision of adnexal masses. J Am Assoc Gynecol Laparosc 2004;11:162–166
4. Cohen JG, White M, Cruz A, Farias-Eisner R. In 2014, can we do better than CA125 in the early detection of ovarian cancer?. World journal of biological chemistry. 2014 Aug 26;5(3):286.
5. DePriest PD, Shenson D, Fried A et al. A morphology index based on sonographic Wndings in ovarian cancer. Gynecol Oncol 1993;51:7–11.
6. Qureshi IA, Ullah H, Akram MH, Ashfaq S, Nayyar S. Transvaginal versus transabdominal sonography in the evaluation of pelvic pathology. Journal of the College of Physicians and Surgeons--Pakistan: JCPSP. 2004 Jul;14(7):390-3.
7. Antoch G, Freudenberg LS, Beyer T, Bockisch A, Debatin JF. To enhance or not to enhance? 18F-FDG and CT contrast agents in dual-modality 18F-FDG PET/CT. Journal of Nuclear Medicine [Internet]. 2004;45(Suppl. 1):56S-65S.
8. Gupta D, Lammersfeld CA, Vashi PG, Braun DP. Longitudinal monitoring of CA125 levels provides additional information about survival in ovarian cancer. Journal of Ovarian Research. 2010;3:22.
9. Theodoridis TD, Zepiridis L, Mikos T, Grimbizis GF, Dinas K, Athanasiadis A, Bontis JN. Comparison of diagnostic accuracy of transvaginal ultrasound with laparoscopy in the management of patients with adnexal masses. Archives of gynecology and obstetrics. 2009 Nov 1;280(5):767-73.
10. Marcus CS, Maxwell GL, Darcy KM, Hamilton CA, WP MG. Current approaches and challenges in managing and monitoring treatment response in ovarian cancer. Journal of Cancer [Internet]. 2014;5(1):25-30.
11. Funt SA, Hricak H, Abu-Rustum N, Mazumdar M, Felderman H, Chi DS. Role of CT in the management of recurrent ovarian cancer. American Journal of Roentgenology [Internet]. 2004;182(2):393-398.
12. Firoozabadi RD, Zarchi MK, Mansurian HR, Moghadam BR, Teimoori S, Naseri A. Evaluation of diagnostic value of CT scan, physical examination and ultrasound based on pathological findings in patients with pelvic masses. Asian Pacific Journal of Cancer Prevention. 2011 Jan 1;12(7):1745-7.
13. Liu Y, Zhang H, Li X, Qi G. Combined application of ultrasound and CT increased diagnostic value in female

patients with pelvic masses. Computational and Mathematical methods in Medicine. 2016;2016.

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