The Role of Ultrasound in the Diagnosis of Gynecologic/Pelvic Tumours

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Pelvic tumours are common in women. This study reviews the applications of ultrasound in the diagnosis of uterine, ovarian and metastatic pelvic neoplasms in Pakistani women. Twenty-seven patients with gynecologic pelvic masses were assessed using Trans-abdominal sonography (TAS). TAS was conducted with patient in the supine position and with full bladder techniques. Ultrasound was performed with a real time scanner with 3.5 and 5.0 MHz abdominal sector scan transducers. The mean age of the study population was 40.8 years (range, 20 to 70 years). 66.7% were premenopausal and 33.3% were postmenopausal. Overall, 22 women (81.5%) were referred for surgical investigations and treatment. 10(37%) had benign ovarian cysts, 6(22%) had malignant ovarian masses, 12 (44%) had fibroid uterus, 1 (3.7%) had carcinoma of endometrium, 1 (3.7%) had carcinoma of cervix, 2(7.4 %) had gestational trophoblastic disease and 2 (7.4%) had inconclusive pelvic masses. Therefore, correct diagnosis was reached in 25 cases (92.6%). This report concludes that ultrasound is a useful technique in the diagnosis of pelvic tumors in women. As an adjunct to papanicolaou smear and bimanual examination, it can help in the differentiation of benign and malignant pelvic tumors most of the time. Postmenopausal women with endometrial cavity fluid detected by sonography are at risk for gynecologic cancer. Ultrasound also plays an important role in the staging of ovarian, endometrial and cervical carcinoma. The technique is invaluable to provide reliable evidence to back up clinical suspicion, to classify correctly physiological cysts by serial scanning and to detect small ovarian tumors and tubo-ovarian abscesses.

Key words: Transabdominal ultrasound, gynaecological tumour, transvaginal ultrasound

Pelvic tumors are common in women. Detection of benign and malignant tumors of the cervix, uterus and ovaries is the purpose of the Papanicolaou smear and bimanual examination of the pelvis. For many years, full bladder transabdominal sonography (TAS) has been used to image symptomatic patients and investigates physical findings.

An ultrasonic examination of the female pelvis is a simple non-invasive examination. The ready availability of static scanners, or high quality real-time scanners, in most of the departments provide an initial means of conforming and localizing a clinically suspected pelvic mass and, often, a definitive diagnosis.

Screening for cervical cancer by direct inspection and smear cytology is well established. Ovarian carcinoma is the fourth most common cancer in woman after breast, GI tract and cervix, but is the most common cancer to cause death. Screening for ovarian tumours by ultrasonography has been advocated, as most ovarian tumors present clinically at a very late stage. The normal ovary is not more than 3 x 3 x 2 cm (volume 6 ml), and becomes smaller after the menopause. Ovarian enlargement picked up by ultrasonography should be further investigated, initially with a repeat scan to exclude the various retention cysts, and by laproscopy if the enlargement is persistent.

The recent development of the high resolution Transvaginal probe has increased the diagnostic sensitivity and specificity of sonography. A potential new application for this non-invasive and relatively inexpensive technique is in screening simultaneously for endometrial and ovarian carcinoma in postmenopausal women.

Color doppler, Transvaginal sonography, transrectal sonography and cystosonography are other adjuncts to TAS which can increase the sensitivity and specificity in the diagnosis of pelvic tumors in women.

The majority of CT pelvic scans are performed in the assessment and staging of neoplasms of the pelvic organs, or in the detection of nodal involvement in lymphoma and other neoplasm. CT is valuable in identifying the presence and extent of pelvic tumours, both for biopsy and radiotherapy. It is also useful in the identification and localization of a pelvic mass when the bladder is surgically absent or non-distendable.

MRI is now an important modality in the evaluation of pelvic pathology due to its ability to obtain images with a high soft tissue contrast resolution and discrimination in multiple plans. Whilst ultrasound is used in the assessment of most pathology .MRI appears to be the primary technique of choice in the staging of pelvic malignancy.

Aims and objectives

The majority of women diagnosed with gynecologic pelvic tumors have advanced disease at clinical presentation. Due to the vague symptoms and delay in presenting to the clinician, the tumours are much advanced at he time of examination. Most patients take time from a few months to more than a year before seeing a doctor. The tumors even if benign may become so large by this time, that symptoms are severe merely due to the size. In case of malignant tumors, very few will have disease confined to the primary site alone.

This study was done in order to know the clinical features at presentation; investigations carried out with emphasis on ultrasound reports obtained in each case, and the confirmation of the ultrasound finding by surgery and

histopathology where possible. The purpose is to see the role of ultrasound in the diagnosis of gynecologic pelvic tumors, especially if it has any role of early detection and how to improve the technique for early detection, so as to reduce the morbidity and mortality by these tumors.

Materials and methods

This study was carried out in Mayo Hospital Lahore. Twenty-seven patients with gynecological pelvic tumors were assessed using trans abdominal ultrasonography. An independent assessor conducted Transabdominal ultrasound and the findings did not influence clinical management. Transabdominal ultrasound was conducted with the patient in the supine position (and with full bladder techniques) ultrasound was performed with a real-time scanner with 3.5 and 5.0 MHz abdominal convex scan transducers. The abdominal examination, including transverse and sagittal images, was done with a distended bladder.

Results

The data of 27 patients was collected in Mayo Hospital over a period of four months from March. 1999 to June 1999. The age range was from 20 – 70 years. Surgical procedure and findings could be obtained in a limited number of patients due to delay in surgery in some cases and refusal to be operated in others.

Histopathology reports were also available for a limited number of patients due to failure to send specimen for histopathology or a prolonged delay in the pathology laboratory.

All the sonograms were obtained for clinical symptom, including abnormal per vaginal bleeding (ten) postmenopausal bleeding (three) lower abdominal mass (fourteen), lower abdominal pain (twenty-two), primary infertility (two), Secondary infertility (two). One patient presented with acute bowel obstruction (Table 1) Minor health problems were common among the above 35 year age group. Chest x-ray was carried out for all patients and showed no abnormality.

Table 1. Salient Features in History

History	Pre-menopausal	Post-menopausal	Total
Abnormal Bleeding P/V	10	3	13
Mass lower abdomen	6	8	14
Pain lower abdomen	15	7	22
Fertile	-	-	20
Infertility Primary	-	-	2
Secondary			2
Acute lower obstruction	-	-	1

Twenty two of the twenty seven patients had a surgery carried out of whom five had a primary laparotomy with removal of the uterus and both ovaries. Three patients had a bilateral removal of the Tubes and adenexa and another four had removal of uterus with conservation of adenexa. Two patients had an excision removal of the fibroid uterus. Four patients had removal of ovarian cysts only. Five patients had a dilatation and curettage.

Molar pregnancy was detected in two patients on ultrasound .It was confirmed by markedly raised levels of B-HCG hormone and histopathology. One case of molar pregnancy had a total abdominal hysterectomy while the other patient was treated by suction curettage. Two patients underwent laproscopy and two were managed conservatively (Table 3)

Table 2 Ultrasonographic findings

	Premeno pausal	Postmeno pausal	Total
Benign Ovarian Cyst	9	1	10
Malignant ovarian mass	1	5	6
Fibroid uterus	8	4	12
Carcinoma Endometrium		1	1
Carcinoma Cervix	-	1	1
Gestational Trophoblastic Disease	1	1	2
Inconclusive Pelvic mass	-	2	2

Table 3 Surgical Procedures

	Total
Laparotomy	14
Hysterectomy with B/L salpingoophorectomy	5
Hysterectomy with conservation of ovaries	4
Salpingoophorectomy	3
Myomectomy	2
Excision of ovarian cysts	4
D & C	5
Laparoscopy	2
Conservative Management	2
Total No. of patients who underwent surgery	22

Thirteen of the twenty seven patients had pathology reports to correlate with the ultrasound findings. There were leiomyoma of uterus (four), hydatiform moles (two), serous cystadenocarcinoma of ovary (two), endometrial type of adenocarcinoma (one), papillary cyst adeno-carcinoma (one). Two reports were inconclusive (Table 4). All the available histopathology reports correlated well with the ultrasound findings.

All the twenty seven patients were diagnosed as having gynecologic pelvic tumors on ultrasound (Table – 2). There were twenty four benign gynecologic tumors, including ten ovarian, twelve uterine and two benign gestational trophoblastic diseases. There were eight gynecologic malignancies, including six ovarian, one endometrial and one cervical carcinoma. Nine benign ovarian cysts occurred in the premenopausal age group while one was seen in the postmenopausal group. Five malignant ovarian masses were seen in postmenopausal group and one in the premenopausal group.

Fibroids uterus were seen in nine premenopausal patients and four postmenopausal patients. One postmenopausal patient was diagnosed as having CA

endometrium and one premenopausal patient had CA cervix. One case of molar pregnancy was seen in each of the pre and postmenopausal age groups.

Inconclusive pelvic masses on u/s due to ascites were seen in two patients who proved to be malignant ovarian tumors on histopathology.

Table 4 Pathology Report

Lesion	Total
Leiomyoma	4
Hydatiform mole	2
Carcinoma endometrium	-
Carcinoma cervix	1
Serous cystadenoma of ovary	2
Serous cystadenocarcinoma of ovaries with metastases	2
Endometrioid type of adenocarcinoma of ovary	1
Papillary cyst adenocarcinoma of ovary	1
Inconclusive	2
Total reports	13

Discussion

Ultrasound is an important diagnostic imaging technique for the diagnosis of gynecologic pelvic tumors. It is non-invasive and easily accessible to the general population. It can detect masses, which may have been missed on clinical examination.

In this study, out of the twenty seven patients only seven reported having a pelvic mass on presentation. On abdominal examination, fourteen had a palpable mass

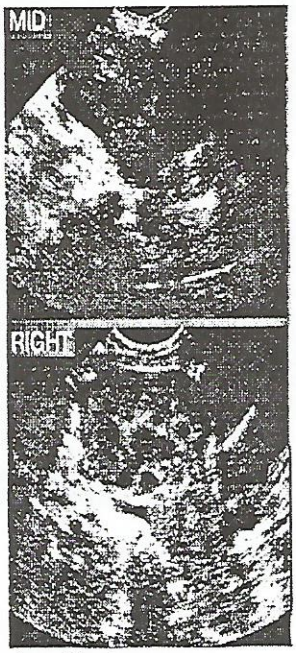

Fig 3: Ovarian Cyst

while on bimanual examination, twenty five patients were suspicion of having a pelvic mass, and these pelvic masses were picked up by ultrasound. Benign and malignant pelvic masses were differentiated in all cases except two where the site of origin of the masses was in doubt.

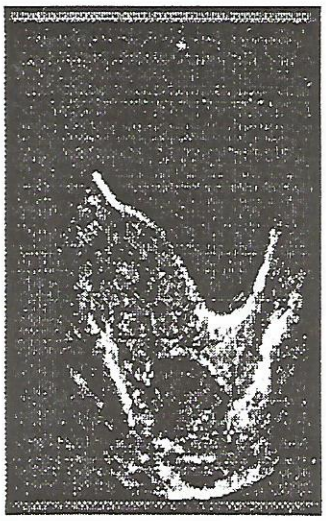

Fig 4: Ovarian Carcinoma

Ultrasound can measure the size of an ovarian mass as well as point to its cystic, solid, or mix component. It can pick up small cysts, which are usually benign. The reported prevalence of benign cysts in asymptomatic postmenopausal women ranges from 1% to 14% and there is a consensus that simple cysts less than 5 cm in diameter are not likely to be malignant and can be monitored by repeat ultrasonography.

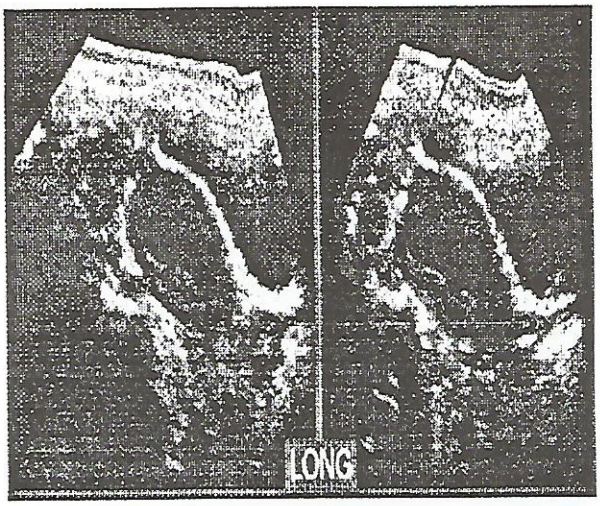

Fig 1: Endometrial Carcinoma In Longitudinal Scan

Of the ten benign ovarian cysts (Fig 3), two were dermoids. Ovarian cystic teratomas or dermoids are benign neoplasms with only two- percent risk of malignant transformation. A highly echogenic area in the adenexa with posterior acoustic shadowing seen on TAS is suggestive of a dermoid.

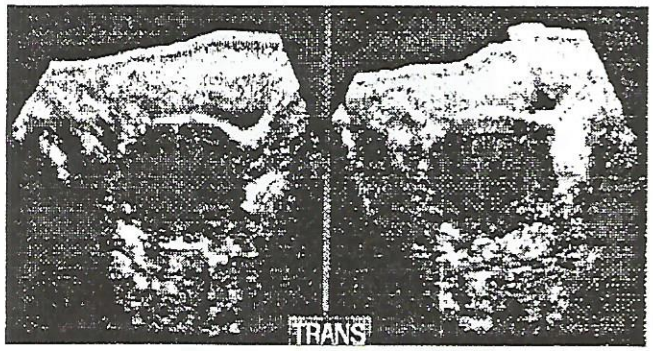

Fig 2:Endometrial Carcinoma In Transverse Scan

Bilateral ovarian cysts were detected in two cases in association with molar pregnancy. It is reported in the literature that sonography can be used to detect the often bilateral, multiloculated theca lutein cysts that flourish in response to high circulating levels of beta human chorionic gonadotropin. Such cysts were detected in these patients in association with molar pregnancy.

Young patients with benign ovarian cysts were managed conservatively and advised repeated sonography as follicular cysts is seen to undergo spontaneous regression.

Two cases of chocolate cysts of the ovaries were reported on the ultrasound as simple ovarian cysts in one case and cystadenoma of the ovary (fig 4, fig 5) in the other. They form when active functioning ectopic endometrial tissue bleeds during the menstrual cycle. Exact nature of the cysts could not be diagnosed on u/s due to a presentation as non-neoplastic complex cysts.

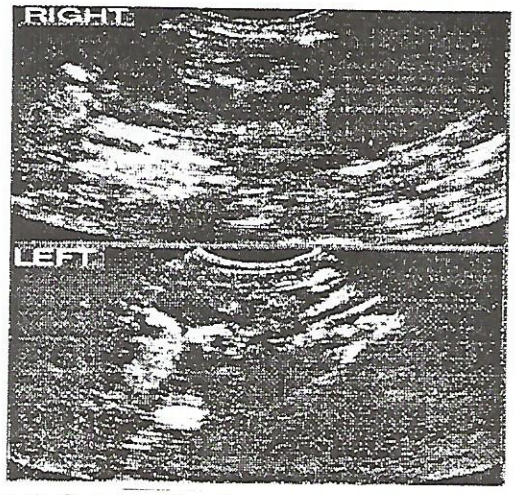

Figure 5: Ovarian Carcinoma

Six cases of ovarian carcinoma were detected by sonography. Five of these patients were postmenopausal. In two cases the ovarian carcinoma had metastasized in the abdomen. Serous cystadenocarcinoma show loss of the well defined outline, which is seen with their benign counterpart, and solid elements were identified within the tumour. The mucinous cyst-adenocarcinoma shows a highly specific well defined multi-locular appearance on ultrasonography. Loss of marginal definition of the tumour aids in establishing a final diagnosis. The most common neoplasm of the uterus is the leiomyoma. A total of twelve cases were diagnosed as having fibroid uterus on TAS (fig 6, fig 7). It is more prevalent in the adult women older than the age of 30 years. Varied sonographic findings are associated with leiomyoma. When a well-defined hypoechoic myometrial mass is seen, leiomyoma is the most likely diagnosis.

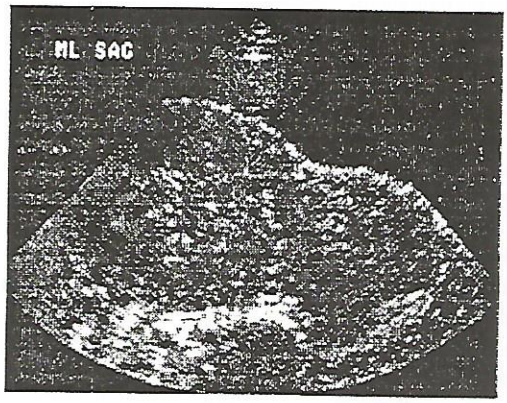

Fig 6: Uterine Fibroid

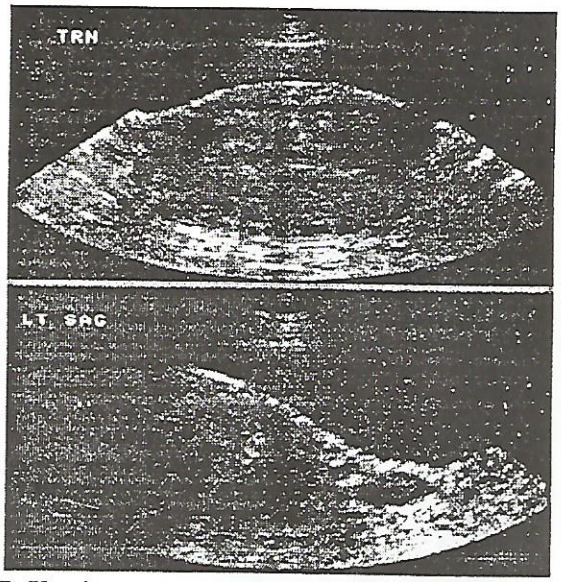

Fig 7: Uterine Fibroid

One case of carcinoma of endometrium occurred in the postmenopausal age group. The u/s showed thickening of endometrium and fluid in the endometrial cavity. (Fig 1 & 2) Postmenopausal women with fluid in the endometrial cavity are at a risk gynecologic cancer.

Carcinoma of the cervix at an advanced stage was seen in one patient only. Diagnostic imaging has little to offer in early diagnosis but can contribute to evaluation of

disease extent, with the potential for optimizing treatment for the individual patient.

Both these cases were in advanced stage of the disease and ultrasound was not helpful in early detection in these cases. However, staging of cervical and endometrial carcinoma for management purposes was possible with the help of ultrasound examination. Transabdominal ultrasound (US) may be useful to demonstrate hepatic metastases, ascites, retroperitoneal lymphadenopathy and hydronephrosis in advanced stage but cannot reliably demonstrate the primary tumor and is less accurate than computed tomography (CT) for staging. Good agreement has been demonstrated between transrectal US and surgical findings for parametrial infiltration.

Two cases had gestational trophoblastic disease diagnosed on ultrasound. Both had hydatiform mole with no malignant change. The mole typically presents as an echogenic, solid appearing mass that completely fills the endometrial cavity. In these cases the patients had reached the second trimester, and the appearance was more complex, with the grape like clusters of vesicles.

Conclusion

The study shows that ultrasonography is a useful tool in the diagnosis of pelvic tumor in women. As an adjunct to Papinocolau smear and bimanual examination, it can help in the detection and differentiation of benign and malignant pelvic tumors most of the time. Due to its non invasive method, repeat examinations are possible and well tolerated and accepted by the patients.

Ultrasonography plays an important role in the staging of ovarian, endometrial and cervical carcinomas. The ability to detect metastases, ascites, and spread to adjacent viscera help in the staging.

Transvaginal sonography with its high resolution and proximity to the pelvic organs can increase sensitivity and specificity in the diagnosis of gynecological neoplasms. In addition TVS also provides fine-detail views of non gynecologic structures such as the rectum, bladder, and urethra.

This technique is not available generally in all hospitals. If female personnel are properly trained and proper setup is provided ensuring complete privacy to the patients, and then TVS will generally increase the diagnostic capability of the radiologist.

If efforts are made to make transrectal sonography, cystosonography and transvaginal doppler sonography available in the hospitals, they will be very helpful in some cases of pelvic tumors especially where staging is required.

References

1. Richard S. Snell: Clinical Anatomy for Medical Students , 4th Ed., 1992.
2. Ellen b. Mendelson and Marcela Bohm-Velez: Transvaginal Ultrasonography of pelvic Neoplasms, Radiol-Clin-North 0Am 30:4, 1992.
3. David Sutton : gynaecological Imaging, Textbook of Radiology and Imaging , 5th Ed. Vol 2., 1993.
4. Grainger and Allison: gynaecology, Diagnostic Radiology Vol., 3, 1986
5. Paul and Juhl's : Obstetric and Gynecologic Imaging , Essentials of Radiologic Imaging , 6th Ed., 1993.
6. Carlson et al: Postmenopausal Endometrial Fluid, Obstetrics and gynaecology Vol:77, No.1 Jan 1991.
7. Johnson: Review Radiology I the Management of Ovarian Cancer, Clinical Radiology (1993) 48
8. Spencer and Kurtz: Review Diagnosing Early Ovarian Cancer with Ultrasound – Research Goal or Entity, Clinical Radiology (1993) 48
9. J.M. Hawnam : Review staging of Cervical and Endmetrial Carcinoma, Clinical Radiology (1993) 47
10. Magee, Logue, Swindell and Hugh: Tumor size as a prognostic factor in Carcinoma of the Cerix; assessment by transrectal ultrasound 1991, the British Journal of Radiology , 64.
11. Schiller VL; Grant EG : Doppler Ultrasonography of he Pelvis , Radiol – Clin-North –Am, 1992 Jul, 30(4)
12. Fleischer AC, Rodgers WH, Rao BK, Kepple DM; Worrel JA; William SL; Jones HW : Assessment of Ovarian Tumor vascularity with Transvaginal Color Doppler sonography ; J-Ultrasound Med;1991 Oct, 10(10)
13. Fleischer AC; Kepple DM:Transvaginal Color Duplex Sonography: Clinical Potentials and limitations; Semin-Ultrasound –CT-MR; 1992 Feb; 13(1)
14. Robbins – Cotran, Female Genital Tract; Pathologic Basis of Disease; 2nd Ed;1972
15. Patricia M,. Gabriel D; rogers S: The Viscera of the lower abdomen and pelvis ; Ultrasonic Sectional Anatomy;1993
16. Armstorng P; Wastie M-L, Introduction; Diagnostic Imaging; 3rd Ed; 1992.
17. Callen PW; Gynaecological and Obstetric Ultrasound