ORIGINAL ARTICLE

Necessity of full bladder for trans-abdominal ultrasound imaging of pelvis in female patients with ascites

Ateeque Ahemed Khan

Abstract:
Objective: To determine the need of full urinary bladder in trans-abdominal ultrasound imaging of female pelvic pathology in presence of ascites as doing full bladder is problematic and difficult for many patients due to various causes.
Study design: This is a descriptive study.
Setting and duration: The study was carried out from June 2006 till April 2011.
Methodology: We selected those patients came for suspected female pelvic pathology and have ascites due to different causes. Total number of patients were 1080. All were presented with ascites. We perform ultrasound of patients with both urinary bladder having residual urine and with full urinary bladder. We assess size, extent of lesion, characteristics of lesion, and diagnosis in both full bladder and with residual urine and compare if there is any significant difference that alters the diagnosis or management of patient.
Results: Our total number of patients were 1080 who presented with ascites and looked for pelvic pathologies on ultrasound. 500 cases were diagnosed as having malignant lesions among which 220 patient radiologically diagnosed as malignant ovarian carcinoma,210 patient as having uterine and cervical carcinoma, 30 cases as vesical carcinoma and 50 patients diagnosed as having vaginal carcinoma. 570 patients diagnosed as having benign lesions, 200 cases diagnosed as fibroids, 130 cases as cystic benign ovarian lesion, 70 cases as pelvic inflammatory diseases including (hydrosalpinx, pyosalpinx), 30 cases as ruptured ectopic pregnancies, 30 cases as ovarian torsion, 20 cases as vesical stones,10 cases as vesicoureteric stones ,30 cases as polycystic ovarian syndrome , 10 cases as hyperstimulation syndrome and 10 cases as endometritis, and 30 patients as having radiological evidence of bowel loops thickening.
Causes of ascites were abdominopelvic malignancies, chronic liver disease, renal failure, abdominal tuberculosis, ruptured ectopic pregnancies, and ovarian torsion.
We have compared these cases on full urinary bladder and on urinary bladder with residual urine for the parameters described above.

Key words: Transvaginal ultrasound (TVS), Transrectal ultrasound(TRUS), Ultrasound (US)

Dow University of Health Sciences, Karachi
AA Khan

Correspondence:
Dr Ateeque Ahemed Khan
165-Block-2, Gulshan-E-Iqbal
Karachi
Telephone Residence: 4960952
Cell: 03452889623, 32
email: atrafia@hotmail.com

Introduction:

Ultrasonography is playing vital role for the assessment of gynecological and obstetric patients due to its wide availability, is of low cost, good resolution, lack of ionizing radiation.[1] Ultrasound gives information about function and anatomy of pelvic organs.[2] It is widely said that full urinary bladder is necessary for trans-abdominal ultrasound of female pelvis to outline normal anatomy and pathology of uterus and adenexa as well as urinary bladder and associated pathologies even in presence of ascites. But at the same time full bladder requires drinking water up to 5-6 glass of water which is problematic for old patients, or patients with renal problems. It is also difficult to do full bladder in case of urgency, hesitancy, increase frequency of micturation, in those patients who unable to hold

urine. Hence in those patients who present with above problems and have ascites, full bladder is not required and excellent delineation of female pelvic organs and associated pathologies can be assessed with reasonable accuracy . even urinary bladder evaluation can be obtained with residual urine for vesical pathologies. Intra-abdominal evaluation is also excellent with ascites especially bowel loops and pancreas which otherwise need oral water intake at time of examination for better delineation. So many cases day to day for female pelvic ultrasound with ascites due to various causes like renal failure, hepatic failure, abdominal-pelvic malignancies, hypoproteinemia, comes in considerable numbers and we can perform trans-abdominal ultrasound in these patients without full bladder with good diagnostic accuracy. In many hospitals patient is catheterized and urinary bladder filled retrogradly which is again invasive and painful to patient and risk of complication. It is also common and routine practice to have transvaginal ultrasound following transabdominal ultrasound which need expert hand in tvs ultrasound and again not tolerable for many patients, not cost effective and need female radiologist in our setup.

In many areas transperineal and trus us is also carried out for evaluation of female pelvic pathologies but again high frequency probe and expertise is required and again female radiologist would be required.

Material and methods:

We have latest ultrasound machines name just vision, xario, with convex probe of 3 MHz with duplex Doppler option, Nemeo-XG with duplex Doppler option. We selected those patients came for suspected female pelvic pathology and have ascites due to different causes. Our study span is 5 years starting from June 2006 till April 2011. total number of patients were 1133. 53 patients lost follow up or did not underwent surgery or diagnostic procedure so 1080 came in our study. All were presented with ascites. We perform ultrasound of patients with both urinary bladder having residual urine and with full urinary bladder. We assess size, extent of lesion, characteristics of lesion, and diagnosis in both full bladder and with residual urine and compare if there is any significant difference that alters the diagnosis or management of patient. Age ranges were 15-80 years. Parameters which are assessed on full bladder and on residual scan are, Characteristics of lesion in adenexa includes cystic unilocular and multilocular with septae (thick or thin) and without septae, solid, mixed, fat, calcification, well define, and ill define, well capsulated, capsule loss, blood flow present (benign or malignant) or absent on color Doppler as well as associated local invasion, lymphadenopathy and splenohepatic metastasis. We also asses the resolution and contrast of image of normal female pelvic organs and their pathologies Ultrasound of female patients presented with ascites, was performed with or without full urinary bladder on same ultrasound machine and in same time duration. Diagnosis was confirmed on laparoscopy and or surgery with histopathology. In cases of ovarian torsion and ruptured ectopic, we also did tvs following transabdominal ultrasound.

Results:

Total number of patients having above parameters, were 1080 that presented with ascites and looked for pelvic pathologies on ultrasound. 500 cases were diagnosed as having malignant lesions among which 220 patient radiologically diagnosed as malignant ovarian carcinoma,210 patient as having uterine and cervical carcinoma, 30 cases as vesical carcinoma and 50 patients diagnosed as having vaginal carcinoma. 570 patients diagnosed as having benign lesions or diseases among which 200 cases diagnosed as having fibroids, 130 cases as cystic benign ovarian cystic lesion (including functional and non functional cysts, endometriotic cyst), 70 cases as pelvic inflammatory diseases including (hydrosalpinx, pyosalpinx), 30 cases as ruptured ectopic pregnancies, 30 cases as ovarian torsion, 20 cases as vesical stones,10 cases as vesicoureteric stones ,30 cases as polycystic ovarian syndrome , 10 cases as hyperstimulation syndrome and 10 cases as endometritis, and 30 patients as having radiological evidence of bowel loops thickening, matting , stricture and lymphadenopathy.

Causes of ascites were abdominopelvic malignancies, chronic liver disease, renal failure, abdominal tuberculosis, ruptured ectopic pregnancies, and ovarian torsion.

We have compared these cases on full urinary bladder and on urinary bladder with residual urine for the parameters described above.

In 220 patients with ovarian carcinoma, 40 patients presented with moderate ascites, multiseptated cystic mass with septae thickness of 4-6mm showing malignant blood flow on color Doppler examination. Mass size ranges from 3.8x5.7 cm in AP and TV diameter to 6x7.9 cm. 100 cases show mass in left adenexa while in 40 cases mass seen in RT adenexa. In 180 cases, severe ascites noted with solid cum cystic mass and thick septae of 8-12 mm thickness noted. Mass diameter ranges 8-14 cm and show blood flow in solid component of tumor. 69 patients show bilateral adenexal involvement. In 160 patients, local invasion to urinary bladder, uterus and cervix was seen. 154 patients show pelvic or abdominal lymphadenopathy and 169 patients presented with hepatic metastasis. Age ranges 45 to 80 years. Patients present as abdominopelvic mass, flank pain along with urinary retention, and abdominal distension. Ca125 was raised in all cases. With residual urinary bladder, anatomy, lesion characteristic and associated findings including local invasions were remain same ,only slight difference was seen in size that was 1-3 cm in case of large lesions.

In 210 patients with uterine and cervical carcinoma, tumor size ranges from 3x4 to 6x8 cm with hypoechoic appearance, necrotic areas, and irregular infiltrating margins and presented with moderate ascites. 90 patients show blood flow in mass on color Doppler examination. 40 patients show hepatic metastasis and 37 patient shows abdominal and pelvic lymphadenopathy. 155 patients show local invasion to urinary bladder, and rectum. Age ranges from 30 to 41 years for cervical and 44-51 years for uterine carcinoma. In uterine carcinoma, patient present with menhorragia, irregular pervaginal bleeding. In cervical carcinoma patients present with post coital bleeding and continuous bleeding. On residual urinary bladder, no significant change seen in parameters except in size which show slight difference that is 1.7 to 2.2 cm in large tumors.

In 30 cases with vesical tumors, tumor size was ranges from 3-6 cm with permeative irregular margins. All presented as polypoidal mass with transmural involvement and local invasion into rectum and or uterus. 10 cases also show hepatic metastasis and abdominal lymphadenopathy. In 5 cases concomitant involvement of ureter and kidneys are seen. 13 cases show vesical tumoral calcification. 10 cases show tumor necrosis and 19 cases show high blood flow. Age ranges was 45-67 years. Patients presented with painless hematuria. No change seen in parameters on residual bladder scan.

In 50 cases of vaginal carcinoma, tumor size was 4-8 cm. all cases show local invasion into cervix, uterus and or pelvic side wall. Tumor was hypoechoic with irregular margins. Tumor was showing high blood flow with hemtometra in 29 cases. Tumors were heterogeneously enhancing with necrosis seen in 19 cases. Age ranges was 55-77 years. Patients presented with pruritis, vaginal discharge, bulging and protruding mass at vagina. In 12 cases, size difference noted that was 1-3 cm. rest of parameters remains same.

In cases of 570 benign lesions, 200 cases radiologically diagnosed as fibroids. 159 cases presented as multiple fibroids while solitary fibroid are seen in 41 cases. Locations were submucosal, intramural and subserosal with multiple locations per patient seen in 140 cases. 19 cases show calcifications. 37 cases show areas of degenerations. Tumor size was ranges 1-8 cm. 79 cases show benign blood flow. Fibroids present as well define and well capsulated hypoechoic masses. Age ranges was 25-52 years. Patients were presented with dysmenhorrea and pelvic pain seen in only 69 patients. Rest of patients was asymptomatic. No significant difference was observed on residual bladder scan except in 9 cases where site of fibroids was uncertain on residual bladder scan ascertained on full bladder scan and were cornual in 4 cases and fundal in 5 cases.

In 130 cases benign ovarian lesions (solitary well define, well capsulated, multiseptated but thin septae of <3 mm or complex masses with history of benign disease along with well define mass and having benign blood flow) unilocular or multilocular cystic masses or complex masses are seen. 49cases show unilocular simple functional luteal cyst, 17 cases show hemorrhagic cysts as cystic well define lesion with septation and loculations and internal echoes. Age ranges was 15-33 years. Clinically patients were asymptomatic in functional cysts and presented with pain in hemorrhagic cysts. 64 cases are diagnosed as endometriomas, having appearance of hypoechoic mass with septation, solid cum cystic mass and cystic masses with internal echoes. Patient presented with cyclic menstrual pain. Age ranges was 22-40 years. No significant difference was observed in parameters on full bladder and residual bladder scan.

70 cases presented as pelvic inflammatory disease shows hypoechoic adenexal mass in 30 cases, hydrosalpinx in 23 cases and pyosalpinx in 17 cases. Out of 70 cases, 4 cases also show associated bowel loops adhesions and lymphadenopathy. Age ranges was 23-35 years. No significant difference was observed in parameters on full bladder and residual bladder scan. Clinically patients presented with lower abdominal pain, fever and menstrual irregularities.

In 30 cases ruptured ectopic were diagnosed. In 17 cases location was tubal, 13 cases ovarian in location. Gestational sac in 35 cases, complex mass (size range was 3.2-3.9 cm) in 31 cases associated with enlarged uterus and pseudo gestational sac in uterus with thickened endometrium. In 4 cases pseudo gestational sac with enlarged uterus was seen. Ascites was present in all cases. Clinically patients presented with amenorrhea followed by irregular vaginal bleeding and pain. Age ranges was 24-33 years. No remarkable difference was noted in parameters on full bladder and on residual bladder scan.

In 30 cases ovarian torsion was diagnosed and presented as hypoechoic mass without blood flow in ovaries with ovarian enlargement associated with ascites. In 19 cases torsion was seen unilaterally while in 11 cases torsion was seen bilaterally. Clinically patients were presented with excruciating pain in 25 cases and shock was also manifested in 5 cases. Age range was 17-37 years. Again no demonstrable difference was observed in parameters on full and residual bladder scan.

In 20 cases vesical calculus was seen. In 17 cases solitary calculus was seen while in 3 cases multiple stones are identified. Age range was 35-60 years. Clinical presentation was pain and hematuria. On full bladder and residual bladder scan no significant difference was noted in parameters.

In 10 cases vesicoureteric stone was seen with hydroureter and hydronephrosis. Left side was involved in 9 cases while in one case on right side. On full bladder and residual bladder scan no significant difference was noted in parameters.

In 30 cases polycystic ovarian syndrome was diagnosed with multiple follicle of <5 mm size and bilateral ovarian enlargement associated with hirsuitism, obesity and infertility. Age ranges was 15-30 years. On full bladder and residual bladder scan no significant difference was noted in parameters.

In 10 cases hyperstimulation ovarian syndrome was diagnosed with multiple follicles of >10 mm and ovarian enlargement. Patients have history of taking ovulation induction medications. In these cases patients presented with electrolyte disturbance and hypovolumia. On full bladder and residual bladder scan no significant difference was noted in parameters.

In 10 cases diagnosis of endometritis was made. Uterus was enlarged with thickened irregular endometrium, dirty shadows of air as well as fluid in endometrial cavity was seen. 7 cases were post postpartum in nature. Clinically patients presented with pain, fever and foul smelling vaginal discharge. Age ranges was 23-33 years. On full bladder and residual bladder scan no significant

difference was noted in parameters.

In 30 cases abdominal tuberculosis was diagnosed with or without pelvic inflammatory disease. Patient show bowel wall thickening, adhesion of bowel loops, abdominopelvic lymphadenopathy with or without associated adenexal mass or hydrosalpinx. Patient presents with fever, pain, subacute intestinal obstruction and infertility. Age ranges was 31-43 years. On full bladder and residual bladder scan no significant difference was noted in parameters.

Discussion:

Transabdominal ultrasound is widely used to evaluate female pelvis pathologies but it is said that full bladder is necessary[3]. Even with ascites many research said that full bladder still needed for proper diagnosis.[4] Many institution perform transvaginal ultrasound for evaluation of pelvic pathologies[5,6] but transvaginal ultrasound is slight invasive, gives discomfort to patients, need high frequency probe, expertise and female radiologist in our setup. Many others use transperineal or transrectal ultrasound[7] but again expertise needed, high frequency probe is required while none of these are cost-effective. Majority of radiologist do transabdominal ultrasound followed by transvaginal ultrasound which is again not cost effective. I have observed that only transabdominal ultrasound is sufficient to make diagnosis with reasonable accuracy without needing full bladder or other supplemented small part ultrasound if patient presented with ascites. No study has been published so far on this topic and need of full bladder is discussed only in comparison with transvaginal ultrasound.[8]

Total numbers of patients presented with suspected female pelvic pathology to radiology department duhs were 1080. In case of ovarian carcinoma, anatomy, lesion characteristic , morphology and associated findings including local invasions were remain same, only slight difference was seen in size that was 1-3 cm in case of large tumors both on full bladder and bladder with residual urine. In case of uterine and cervical carcinomas, no significant change seen in parameters except in size which show slight difference that is 1.7 to 2.2 cm in large tumors. In 12 cases of vaginal carcinoma, size difference noted that was 1-3 cm. rest of parameters remains same on full bladder and residual bladder scan. Resolution and contrast of images were same on both full bladder and residual bladder scan.

In case of vesical tumors no change was seen in parameters on residual bladder scan and full bladder.

No significant difference was observed in parameters in cases of fibroids on residual bladder scan except in 9 cases where site of fibroids was uncertain on residual bladder scan ascertained on full bladder scan and were cornual in 4 cases and fundal in 5 cases. No significant difference was observed in parameters on full bladder and residual bladder scan in cases of benign appearing ovarian masses. Image contrast and resolution was reasonably good on residual scan as compared to full bladder scan.

No significant difference was observed in parameters on full bladder and residual bladder scan in cases of pelvic inflammatory disease. No remarkable difference was noted in parameters on full bladder and on residual bladder scan as well as on tvs in cases of ruptured ectopic and ovarian torsion. Parameters remain unchanged on both full bladder and residual scan in cases of polycystic ovarian syndrome, hyperstimulation ovarian syndrome, endometritis, and abdominopelvic tuberculosis as well as in vesical and vesicoureteric calculi. Again resolution and contrast of images was as good on residual scan as on full bladder scan

Conclusion:

Our study clearly mentions that ascites is excellent medium in which female pelvic organ anatomy, morphology and pathologies are depicted with reasonable diagnostic accuracy with good contrast and resolution of image of normal organ and disease process obtained and full bladder is not required in cases where female patient presented with ascites and are unable to fill urinary bladder.

References:

1. Stephanie R. Wilson1, Chander Gupta1, Michael Eliasziw2, Alan Andrew3, Volume Imaging in the Abdomen With Ultrasound: How We Do It. AJR feb 2009; 193:79–85 , 0361–803X/09/1931–79
2. Shahira Wani M. D; Mohammed Kamal Hammad MRCOG London, Ph. D. Dublin. Evaluation of ultrasonography in diagnostic gynaecologic pelvic mass. JK-Practitioner 2002; 9(4): 239-241
3. Ultrasonography evaluation of gynecological and obstetrical diseases. Muhammad Asghar. Gomal Journal of Medical Sciences January-June 2010, Vol. 8, No. 1 78
4. Ultrasonography of the Adolescent Female Pelvis. Spevak, Melissa R. M. D. *; Cohen, Harris L. M. D. †. Ultrasound Quarterly: December 2002 - Volume 18 - Issue 4 - pp 275-288.
5. Pelvic ultrasound in women. Paula sivyar, world journal of surgery, 24, 188-197, 2000.
6. Transabdominal sonography comparison with transvaginal sonography Ann King Edward Med Uni Oct - Dec 2004; 10(4):444-6.
7. Gynecologic Sonography, Report of the Ultrasonography Task Force, Council on Scientific Affairs, American Medical Association. JAMA. 1991; 265:2851-2855.
8. Is a full bladder still necessary for pelvic sonography? Beryl R. Benacerraf, MD, Thomas D. Shipp, MD, Bryann Bromley, MD , J Ultrasound Med. 2000 Apr; 19(4):237-41