

Results of Lower Abdominal Ultrasound as Part of Whole Abdominal Ultrasound in Patients with and without Indications Related to Lower Abdomen

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Background: Whole abdominal ultrasound sometimes shows no significant findings in the lower abdomen, especially in patients without indications related to this area. Those patients have to spend a lot of time waiting for their test and refrain from urination in order to complete whole abdominal examinations but gain no additional benefit.

Objective: To analyze the results of lower abdominal ultrasound in patients who were sent for ultrasound of the whole abdomen; to correlate the results with indications for requesting ultrasound based on diagnosis or clinical findings in the lower abdomen; and examine their associations with further management of the patients who had positive findings.

Material and Method: A retrospective analysis was performed of 440 whole abdominal ultrasound studies at the Department of Radiology, Rajavithi Hospital from January 2011 to December 2012. Indications on the request forms and reports were reviewed, focusing on lower abdominal findings. Data were recorded for indications, results, and post-examination management. Positive indications for lower abdominal study were taken as diagnoses of diseases related to the lower abdomen, symptoms and signs in the lower abdomen, and findings in the lower abdomen.

Results: A total of 440 cases were analyzed, consisting of 268 females and 172 males with mean age 56.44 years. Negative indications were recorded for 74.8% and the most common indication was checkup (37.0%). Positive results were seen in 22.3% of cases, most of which were benign conditions (78.6%). In the groups of positive and negative indications, 35.1% and 17.9% had positive results, and 15.3% and 1.2% respectively were diagnosed as having (or probably having) malignancy. Over 90.0% of the positive results in the negative indication group were benign and 62.2% had no further post-examination management, consultation, or related investigation.

Conclusion: Most of the results of lower abdominal ultrasound in the patients sent for whole abdominal ultrasound were negative, and the majority of the positive findings were benign conditions requiring no further management. More positive results, especially findings suggestive or suspicious of cancers, were seen in cases with positive clinical data. Routine use of whole abdominal ultrasound does not appear to be very helpful, especially in patients who have no symptoms in the lower abdomen.

Keywords: Whole abdominal ultrasound, Abdominopelvic ultrasound, Lower abdominal ultrasound

J Med Assoc Thai 2017; 100 (Suppl. 1): S177-S182

Full text. e-Journal: <http://www.jmatonline.com>

Ultrasound is the most commonly-used non-invasive imaging modality in radiology departments and has been employed in clinical practice since the early 1970s⁽¹⁾. It is widely accepted as a valuable tool for diagnosis and follow-up of many conditions including hepatobiliary and pancreatic disorders⁽²⁾ and for initial evaluation of renal colic⁽³⁾ and gynecologic diseases, especially ovarian masses⁽⁴⁾.

Abdominal ultrasound is one of the most

common ultrasound procedures. The abdomen may be divided into two parts for specific focus, i.e. upper abdomen and lower abdomen or pelvis, while whole abdominal or abdominopelvic ultrasound is another choice available in the request forms. There are usually justifiable indications for isolated upper or lower abdominal ultrasound requests, as the patients have symptoms or localizing signs leading to tentative diagnoses. With regard to lower abdominal ultrasound, if gynecologic conditions are being investigated, transvaginal ultrasound should be used whenever possible⁽⁵⁾. In cases of lower abdominal diseases, e.g. acute appendicitis, ultrasound is not the primary modality except in children and pregnant patients⁽⁶⁻⁹⁾. In non-pregnant adults who present with non-localized

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abdominal pain with fever and clinically suspicious signs of intraabdominal abscess, the American College of Radiology (ACR) Appropriateness Criteria suggest that computed tomography (CT) of abdomen and pelvis is more appropriate than ultrasound, which is blind to many areas, especially when there is increased bowel gas or free air⁽¹⁰⁾.

The author has noticed that patients sent for whole abdominal study sometimes have no specific symptoms, and often have no significant findings in the lower abdomen, although many of them have subtle benign lesions, e.g. small uterine myomas in female patients and mild prostatic enlargement in men, which require no treatment or even follow-up. Lower abdominal examinations in this group may be of doubtful value and result in patients having to pay more, wait unnecessarily longer, and refrain from urination to fill up the urinary bladder for clear demonstration of pelvic organs in addition to the regular required fasting for upper abdominal examination.

The aims of the study were to analyze the results of lower abdominal ultrasound in patients who were sent for ultrasound of the whole abdomen and to correlate the results with clinical indications for requesting ultrasound of the whole abdomen, focusing on the diagnosis or clinical findings in the lower abdomen and the need for further investigation, consultation, or treatment of the patients with positive findings.

Material and Method

The protocol of this research was reviewed and approved by the Ethics Committee of Rajavithi Hospital (No. 001/2557). A review was carried out of the request forms for whole abdominal ultrasound studies of 471 patients who were sent to the Department of Radiology, Rajavithi Hospital between January 2011 and December 2012, together with the results and data in medical records following examination.

The indication was considered "positive" if the patient had symptoms in the lower abdomen or was diagnosed with disease of the lower abdomen. The result was considered "positive" if there were findings in the lower abdomen. Details of further investigation, consultation, and/or treatment for the conditions in the lower abdomen following the examination were also recorded in the cases with positive findings.

All analyses were performed with the statistical program SPSS version 17.0. Baseline characteristics of patients were described as number

(%). The diagnostic statistics of clinical indication for predicting abnormal findings in the lower abdomen were calculated, including sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) with 95% Confidence Interval.

Results

The ultrasound request forms of 471 whole abdominal studies were reviewed and 31 were excluded due to incomplete data collection. Two hundred and sixty-eight of a total of 440 studies were of females (60.9%), and the patients ranged from 16 to 90 years old with a mean age of 56.44 years (Table 1).

One hundred and eleven (25.2%) cases had positive indications, mostly carcinomas in the lower abdomen (10.5%). Checkups, which were considered negative indications, were the most frequently found indication in the request forms (37.0%), as shown in Table 2.

Regardless of indication, 98 cases (22.3%) had positive findings in the lower abdomen, the majority of which were benign conditions (78.6%), including prostatic enlargement (33.7%), small uterine myomas (18.4%), and other benign conditions (26.5%). The details are presented in Table 3.

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Table 1. Baseline characteristics (n = 440)

Characteristics	Number	Percent
Gender		
Female	268	60.9
Male	172	39.1
Age (years)		
Mean \pm SD (min-max)	56.44 \pm 16.34	(16-90)

Table 2. Diagnoses or indications for requesting whole abdominal ultrasound (n=440)

Diagnoses/indications	Number	Percent
Negative indications	329	74.8
Checkups (asymptomatic)	163	37.0
Liver disease	74	16.8
Kidney disease	69	15.7
Non-specific symptoms	23	5.2
Positive indications	111	25.2
Carcinomas in the lower abdomen	46	10.5
Lower abdominal symptoms	45	10.2
Other carcinomas elsewhere	20	4.5

Table 3. Overall positive lower abdominal findings (n=98)

Results	Number	Percent
Benign conditions	77	78.6
Mild prostatic enlargement	33	33.7
Small uterine myomas	18	18.4
Other benign conditions	26	26.5
(Appendicitis, intraabdominal abscess or collections, uterine myomas, ovarian cysts, marked prostatic enlargement, vesical stone, polycystic kidney, abdominal wall cyst, pelvic hematoma, and others)		
Malignancies or probable malignancies	21	21.5
Malignancies	13	13.3
Uncertain nature	8	8.2

Table 4. Lower abdominal findings: comparison between positive and negative indications (n=440)

Findings	Positive indications (n=111)	Negative indications (n=329)
Negative	72 (64.9)	270 (82.1)
Positive	39 (35.1)	59 (17.9)
Benign conditions	22 (19.8)	55 (16.7)
Benign urologic conditions		
Prostatic hypertrophy or enlargement	1 (0.9)	30 (9.1)
Calculi	2 (1.8)	
Bladder diverticulum	-	1 (0.3)
Dilated prostatic urethra post TUR-P	-	1 (0.3)
Benign gynecologic conditions		
Uterine myomas	3 (2.7)	18 (5.5)
Benign adnexal lesions	2 (1.8)	5 (1.5)
Other benign conditions		
Hematoma or fluid collection	5 (4.5)	-
Acute appendicitis/appendiceal abscess	5 (4.5)	-
Other localized inflammation or masses	4 (3.6)	-
Malignancies or probable malignancies	17 (15.3)	4 (1.2)
Uncertain natures		
Lower abdominal or pelvic masses	3 (2.7)	2 (0.6)
Suspected bladder wall thickening or mass	1 (0.9)	2 (0.6)
Malignancies (Recurrence or metastasis)	13 (11.7)	-

Values are presented as n (%)

TUR-P = Transurethral resection of the prostate

of 111 cases were noted as positive findings (35.1%) compared to 59 cases (17.9%) in the group of 329 negative indications, and 55 (93.2%) of these had benign conditions. Most of the positive findings in the positive indication group were also benign (22 out of 39, 56.4%). Details are shown in Table 4.

In the group of 98 positive findings, 61 patients (62.2%) required no management after examination (Table 5).

The diagnostic statistical calculation by clinical indications is shown in Table 6. The specificity and negative predictive value of clinical indications for the diagnosis of lower abdominal disease were 78.9 and 82.1 respectively. The sensitivity and positive predictive value were 39.8 and 35.1 respectively.

Discussion

The results showed that most of the patients

who were sent for whole abdominal ultrasound had negative results in the lower abdomen (77.7%). In the group of positive results (98 cases, 22.3%), the number of patients with benign conditions was much higher than the number of those who had malignancies (78.6% versus 16.3%, 8.2% of uncertain nature) and 62.2% needed no further management for their positive results. These findings suggest that the number of the patients who gain benefit from the data obtained from lower abdominal ultrasound is not very high.

The most common indication for requesting abdominal ultrasound including the lower area was checkup which can be inferred as asymptomatic (37.0%). The total cases of negative indications were 329 (74.8%) of which 82.1% had negative results. The number of cases with positive results was 59 (17.9%), and most of these were benign conditions (55 in 59, 93.2%). Malignancies were detected or suspected in 21 of the total 440 cases (4.8%) and in only 1.2% of the whole negative indications group.

There have been very few studies of abdominal ultrasound checkups. Research in 2008 by Rungsinaporn K⁽¹¹⁾ reported a rate of 52.4% positive findings in people who had annual health checkups which included 3.4% malignant liver tumors, but these

checkups were of upper abdomen only. The findings in the present study appear to show that lower abdominal ultrasound is not a good routine checkup or screening test for malignancy detection in cases without positive clinical data.

Of the 111 cases with positive indications, most returned negative results (64.9%). Positive results included 22 cases of benign conditions (19.8%), 13 cases (11.7%) of malignancy, and 4 cases (3.6%) suspicious of malignancy.

A prospective study by Raman S⁽¹²⁾ in 2004 reviewed the clinical indications of abdominal ultrasound in patients with acute non-traumatic abdominal pain. He found that the yield of positive reports on ultrasound was significantly higher in patients with localized abdominal pain and tenderness and in those with a combination of abdominal pain and raised white cell count or abnormal liver function tests than in patients with diffuse or non-specific abdominal pain and with normal laboratory results. The positive diagnoses of ultrasound include diseases in the upper and lower abdomen such as biliary colic, acute pancreatitis, acute appendicitis, abdominal or pelvic mass, pelvic inflammatory disease, and acute diverticulitis.

The present study focused on lower abdominal ultrasound and also showed that more positive results were seen in cases with positive indications (35.1%). Many more cancers were detected or suspected in patients with symptoms or positive clinical findings (15.3%), more than 12 times those of patients with negative indications (1.2%).

Diagnostic statistics revealed that clinical information related to the lower abdomen had a high specificity and negative predictive value in Predicting abnormal findings in the lower abdomen while its sensitivity and positive predictive value were quite low.

The major limitation of the present study was the quality of the clinical information in the request forms which certainly affected data recording and

Table 5. Further investigation, consultation, or treatment of the patients with positive findings in the lower abdomen (n = 98)

Management	Number	Percent
None	61	62.2
Treatment	14	14.3
Further CT	11	11.2
Consultation	8	8.2
Follow-up	3	3.1
Further MRI	1	1.0

CT = computed tomography; MRI = magnetic resonance imaging

Table 6. Diagnostic statistics of clinical indication to predict abnormal findings in lower abdomen on ultrasound

Indications	Ultrasound results		Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)
	Positive	Negative				
Positive	39	72	39.8	78.9	35.1	82.1
Negative	59	270	(36.5-43.1)	(77.5-80.4)	(32.1-38.1)	(80.6-83.5)

CI = Confidence interval, PPV = Positive predictive value, NPV = Negative predictive value

analysis. In some cases, review of medical records before and after the examinations helps to reduce such problems.

Conclusion

Most of the results of lower abdominal ultrasound in the patients sent for whole abdominal ultrasound were negative and the majority of the positive findings were benign conditions. Greater numbers of positive results were seen in cases with positive clinical data, especially findings suggestive of or suspicious of cancers. Most of the benign findings did not require further investigation, consultation, or treatment.

Although ultrasound has become popular in abdominal imaging because of its low cost, ease of use and radiation-free capability, the routine use of whole abdominal ultrasound without clinical and laboratory correlation may be inappropriate. Significant increases in the number of such scans can result in a heavier workload and higher cost of medical care with no major benefit to the patients.

What is already known on this topic?

Upper abdominal ultrasound is acceptable for routine health checkup, especially in patients with chronic liver diseases, but few studies have focused on whole abdominal ultrasound, which takes more time and is more costly.

What this study adds?

The yield of lower abdominal ultrasound as part of whole abdominal ultrasound is low, as are the benefits to the patients who have no clinical indications for lower abdominal examination. The routine use of whole abdominal ultrasound without clinical and laboratory correlation should be reconsidered.

Acknowledgements

The author wishes to thank Kanya Janpol and staff of the Department of Research & Technology Assessment, Rajavithi Hospital, Bangkok, Thailand, for their statistical assistance and support.

Potential conflicts of interest

None.

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ผลการตรวจอัลตราซาวด์ช่องท้องส่วนล่างของผู้ป่วยที่มีและไม่มีข้อบ่งชี้ของการตรวจอัลตราซาวด์ช่องท้องส่วนล่างในกลุ่มผู้ป่วยที่ได้รับการตรวจอัลตราซาวด์ช่องท้องทั้งหมด

กฤษณา ดิสนิเวทย์

ภูมิหลัง: การตรวจอัลตราซาวด์ช่องท้องทั้งหมดบางครั้งไม่พบความผิดปกติที่สำคัญในช่องท้องส่วนล่าง โดยเฉพาะในผู้ป่วยที่ไม่มีข้อบ่งชี้สำหรับการตรวจบริเวณดังกล่าว ผู้ป่วยหลายรายต้องเสียเวลารอคอยนานขึ้นและต้องกลั่นปัสสาวะเพื่อให้การตรวจสมบูรณ์ครบถ้วนโดยไม่ได้รับประโยชน์เพิ่มเติม

วัตถุประสงค์: เพื่อศึกษาผลการตรวจอัลตราซาวด์ช่องท้องส่วนล่างในผู้ป่วยที่แพทย์ส่งตรวจอัลตราซาวด์ ช่องท้องทั้งหมดเทียบกับข้อบ่งชี้ที่เกี่ยวข้องกับช่องท้องส่วนล่าง ซึ่งระบุในใบส่งตรวจและศึกษาการนำข้อมูลที่ได้ออกจากการตรวจอัลตราซาวด์ช่องท้องส่วนล่างไปใช้ประโยชน์ในการดูแลผู้ป่วย

วัสดุและวิธีการ: รวบรวมข้อมูลจากใบส่งตรวจและใบรายงานผลของผู้ป่วยที่แพทย์ส่งมาตรวจอัลตราซาวด์ช่องท้องทั้งหมดที่แผนกรังสีวิทยา โรงพยาบาลราชวิถี ตั้งแต่กรกฎาคม พ.ศ. 2554 ถึง ธันวาคม พ.ศ. 2555 จำนวน 440 ราย โดยเน้นข้อมูลบริเวณช่องท้องส่วนล่าง ข้อมูลที่บันทึกได้แก่ ข้อบ่งชี้ ผลการตรวจ และการดูแลผู้ป่วยอันเกี่ยวข้องกับสิ่งที่ตรวจพบในช่องท้องส่วนล่าง โดยจะบันทึกเป็นบวกเมื่อมีการระบุข้อบ่งชี้หรือการวินิจฉัยโรคที่เกี่ยวข้องกับช่องท้องส่วนล่าง หรือผู้ป่วยมีอาการหรืออาการแสดงในช่องท้องส่วนล่าง และบันทึกผลการตรวจที่ระบุสิ่งตรวจพบในช่องท้องส่วนล่าง

ผลการศึกษา: ผู้ป่วยในการศึกษาทั้งหมด 440 คน เป็นเพศหญิง 268 คน ชาย 172 คน อายุเฉลี่ย 56.44 ปี ไม่ปรากฏข้อบ่งชี้การตรวจช่องท้องส่วนล่าง 74.8% ข้อบ่งชี้ของการตรวจส่วนใหญ่คือตรวจสุขภาพ (37.0%) ผลการตรวจช่องท้องส่วนล่างเป็นบวก 22.3% ซึ่งส่วนใหญ่ (78.6%) เป็นภาวะไม่ร้าย ผลการตรวจที่เป็นบวกคิดเป็น 35.1% และ 17.9% ในกลุ่มที่มีข้อบ่งชี้และไม่มีข้อบ่งชี้ตามลำดับ ผลตรวจน่าจะเป็นมะเร็งหรืออาจจะเป็นมะเร็ง 15.3% และ 1.2% ตามลำดับ มากกว่า 90.0% ของกลุ่มที่ผลการตรวจเป็นบวกโดยไม่มีข้อบ่งชี้เป็นภาวะไม่ร้าย และ 62.2% ของกลุ่มที่ผลการตรวจเป็นบวกไม่มีการรักษา ส่งปรึกษาต่อ หรือส่งตรวจเพิ่มเติมเพื่อการวินิจฉัย

สรุป: ผลการตรวจอัลตราซาวด์ช่องท้องส่วนล่างในผู้ป่วยที่ส่งมาตรวจช่องท้องทั้งหมด ส่วนใหญ่ไม่พบความผิดปกติ ความผิดปกติที่พบส่วนใหญ่เป็นภาวะไม่ร้าย พบผลตรวจผิดปกติมากกว่าในกลุ่มที่มีข้อบ่งชี้บริเวณช่องท้องส่วนล่าง โดยเฉพาะอย่างยิ่งผลตรวจที่น่าจะเป็นหรือสงสัยว่าจะเป็นมะเร็ง ผลการตรวจที่เป็นบวกส่วนใหญ่ไม่ได้นำไปใช้ในการดูแลรักษาผู้ป่วยต่อ การส่งตรวจอัลตราซาวด์ช่องท้องทั้งหมด จึงอาจไม่ได้ประโยชน์เท่าที่ควรในการใช้ตรวจสุขภาพทั่วไป โดยเฉพาะอย่างยิ่งในรายที่ไม่มีข้อบ่งชี้หรืออาการในช่องท้องส่วนล่าง
