Al-Azhar Med. J. *Vol. 46(4), October, 2017, 981-994*
DOI: 10.12816/0045180

ULTRASONOGRAPHY VERSUS COMPUTED TOMOGRAPHY IN DIAGNOSIS OF ACUTE APPENDICITIS

By

***Ahmed F. El-Deek and **Ibrahim M. El-Sayaad**

Departments of Radiology *and General Surgery**,
Faculty of Medicine, Al-Azhar University (New Damietta)

ABSTRACT

Background: Acute appendicitis (AA) is among the most common cause of acute abdominal pain. Imaging methods, such as ultrasonography (US) and computed tomography (CT), aimed at avoiding a misdiagnosis and facilitating earlier surgery, when necessary, have become increasingly important for decreasing the morbidity of the disease. **Objective:** This study aimed to compare the accuracy of US and CT in the diagnosis of AA. **Patients and Methods:** After local ethical approval and written consent taken, 107 patients with signs and symptoms suggesting AA, selected from emergency department of Al-Azhar University Hospital, New Damietta during the period from March, 2016 to April 2017. They were 63 males and 44 females, mean age was 17.09±3.02 years. 90 (84.11%) underwent surgery, and 17 patients (15.9%) were hospitalized for clinical observation after imaging (12 patients (11.2%) were dismissed from the hospital while 5 cases (4.7%) presented with positive CT findings underwent surgery). After history taking, full clinical examination and laboratory investigations, all patients were subjected to US and CT examination. All patients were reevaluated clinically, and a correlation was made between both sets of results. Accordingly, final decision was made. Accuracy was ascertained intra-operatively for those underwent appendectomy, and the results were compared with those found by radiological examination. The results were correlated with surgical and histopathologic findings. **Results:** Males affected more than females, and abdominal pain was present in 100%. The sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy of US in diagnosis of AA in our study were found to be 91.7 %, 77.8 %, 94.3%, 70.0% and 88.9 % respectively. The sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy of CT in diagnosis of AA were 98.8 %, 88.9 %, 98.8%, 88.9% and 97.8 % respectively. **Conclusion:** US should be the first-line imaging modality. As US sensitivity is limited, and non-confirmed US examinations, diagnostic strategies and algorithms should focus on clinical reassessment and CT examination.

Key words: Acute appendicitis, computed tomography, ultrasound**.**

INTRODUCTION

Acute appendicitis (AA) is the most common indicator for emergency abdominal surgery. Early appendicitis may present itself atypically and it is difficult to distinguish from a myriad of gastrointestinal, genitourinary and gynaecological conditions **(des Plantes et al., 2016).**

The diagnosis of AA is a constellation of history, physical examination coupled with laboratory investigations, supplemented by selective focused imaging. The role

of diagnostic imaging; ultrasound (US), computed tomography (CT) or magnetic resonance imaging (MRI) is another major controversy **(Scott, 2015).**

The applicability of US in diagnosing appendicitis is good, but the accuracy of US is operator dependent **(Lee et al., 2005).** The base of appendix is connected to the cecum, but its head can be placed in different situations. The diversity of situations is categorized into six locations: retrocecal, pelvic, subcecal, preileal, retroileal, and ectopic **(Ghorbani et al., 2014).**

Potential pitfalls in the sonographic diagnosis of appendicitis include an incomplete investigation of the appendix resulting in failure to identify segmental or tip appendicitis and overestimation of an increased appendiceal diameter leading to a false positive diagnosis. Anatomical variation can also complicate diagnosis **(Mostbeck et al., 2016)**.

Higher sensitivity, specificity and precision of CT scan is adequate, however the ionizing radiation is a disadvantage, especially in younger patients **(Kim et al., 2012).**

The present study was to compare the accuracy of US and CT in the diagnosis of acute appendicitis in patients with suspected acute appendicitis.

PATIENT AND METHODS

Of the 107 patients included, 63 males and 44 females presented with signs and symptoms suggesting AA. They were selected from Emergency Department of Al-Azhar University Hospital, New Damietta during the period from March, 2016 to April 2017. The study protocol was approved by local hospital's ethical committee for human studies.

If the history, physical examination findings and laboratory test results raised the suspicion of acute appendicitis, patients were asked to participate in this study. The patients were admitted to the hospital either for observation or for surgery.

Patients who needed to undergo urgent surgery were excluded. In these cases, no imaging was performed. Exclusion criteria were pregnancy and patients with high creatinine level.

The radiologic procedures and logistics of the study were explained to the patients, and informed consent was obtained from each patient or from a parents in cases of children.

Patients underwent US and CT examinations before undergoing surgery or during the first 24 hr of observation. The decision of whether to operate or not was based on the clinical parameters and laboratory findings. The operation strategy, i.e. laparoscopy or laparotomy, was determined and documented before US and CT were performed.

Graded-compression US was performed in a step-wise approach and aimed to optimize visualization of the appendix using 4-10–MHz linear array and 2-5–MHz curved array transducers (Voluson E6, GE Medical Systems, Germany). Curved array transducers were used in obese patients to allow deeper penetration.

Direct US signs of acute appendicitis:

- Dilation and non-compressibility of the appendix, its diameter > 6 mm, single wall thickness ≥ 3 mm (Figure 1A, 2A, 3A-B).
- Target sign: Hypoechoic fluid-filled lumen, hyperechoic mucosa/ submucosa, hypoechoic muscularis layer (Figure 6 A- B).
- Appendicolith: Hyperechoic with posterior shadowing (Figure 4A).
- Color Doppler and contrast-enhanced US: Hypervascularity in early stages of AA (Figure 6 A and B).

Indirect US signs of acute appendicitis:

- Free fluid surrounding appendix.
- Local abscess formation.
- Increased echogenicity of local mesenteric fat.
- Enlarged local mesenteric lymph nodes
- Thickening of the peritoneum.
- Signs of secondary small bowel obstruction.
- Appendicular mass formed by dilated oedematous intestinal loops with thick oedematous mesentery (Figure 5A).

All patients underwent CT examinations following a single identical protocol that had been prepared for patients referred from the Emergency Department having a complaint of acute abdominal pain. Patients were placed in the supine position and scanned from the diaphragm to the symphysis pubis by 160 slices multidetector scanner (Aquilion PRIME; Toshiba Medical System, America). Non-contrast images were routinely incorporated in the given protocol in order to make an alternative diagnosis of urinary stone. The scanning parameters were 120 kVp, reference effective 160 mAs with automatic dose modulation, detector collimation of 64 x 0.6 mm, a rotation time of 0.5 seconds, and a pitch of 1.2. CT images were reconstructed with 5-mm slice thickness in the transverse plane and 4-mm in the coronal plane, and with no overlap. In all the patients, a single-phase contrast-enhanced scan was performed and was acquired 65 seconds after starting the administration of IV contrast agent. Using an Automatic power injector, 100–120 mL (2 mL/kg of body weight) of nonionic iodinated contrast agent (iohexol, Omnipaque 350; Nycomed Amersham, Princeton, NJ, USA) was injected into the antecubital vein through an 18-gauge needle, at a rate of 3 mL/sec, followed by a 20-mL saline flush. Oral or rectal contrast material was not administered.

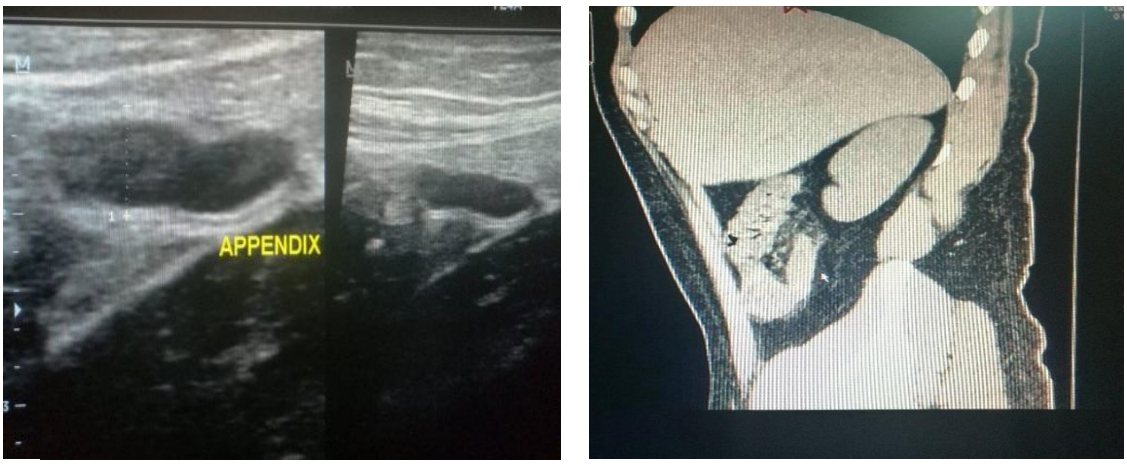
In this study, CT findings were interpreted as positive for acute appendicitis with, enlarged appendix (≥6 mm in outer diameter), appendiceal wall thickening (≥ 3 mm), appendiceal wall hyperenhancement, peri- appendiceal fat stranding (Figure 1B, 2B-C, Figure 3 C-D and Figure 6D), periappendiceal abscess which usually indicated perforated appendicitis and is associated with extraluminal air, ileocecal inflammation, and localized peritonitis in the right lower quadrant. Ancillary signs of appendicitis including right lower quadrant inflammation, appendicoliths (Figure 4B-

C), lymphadenopathy and appendicular mass which appears as complex right iliac mass composed of edematous caecal wall and loops of dilated small intestine with thickened mesentery (Figure 5B).

CT findings were interpreted as negative if the appendix was visualized with intraluminal air. An appendix less than 6 mm in outer diameter was also diagnosed as normal. If an appendix was not visualized and ancillary signs were or were not present, the findings were interpreted as negative.

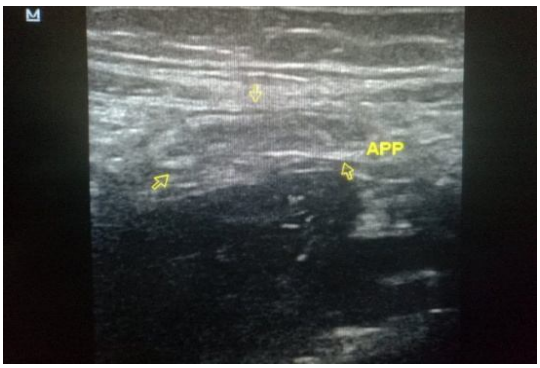
If findings other than appendicitis that had possible clinical consequences were diagnosed on US or CT, an independent surgeon was informed. The independent surgeon decided whether the radiologic diagnosis was of consequence for the surgical strategy and whether the operation should be cancelled or the type of operation should be changed, i.e. laparotomy by split-muscle incision or laparoscopy.

The diagnosis of acute appendicitis at surgery was established on the basis of macroscopic findings. All excised appendixes were microscopically analyzed by histology using paraffin sections.

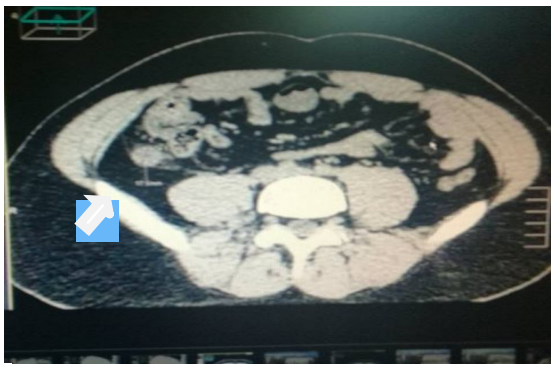


A. B.

Figure (1): A. Graded compression longitudinal ultarsound scan of acute appendecitis with dilated, non compressible, tubular appendix with thickening of the appendicular wall. B. Coronal CT cuts demonstated dilated appendix with distended lumen more than 6 mm, thicekened, enhancing wall and periappendicular inflammation including adjacent fat.



A.



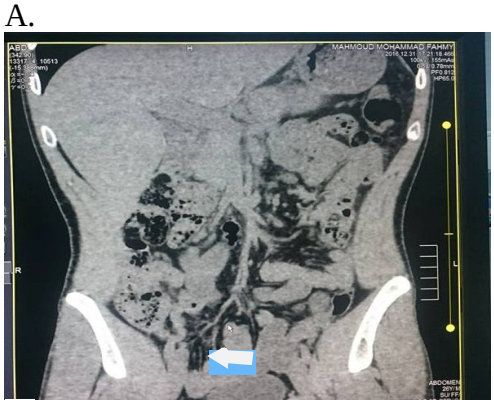
B.

C.

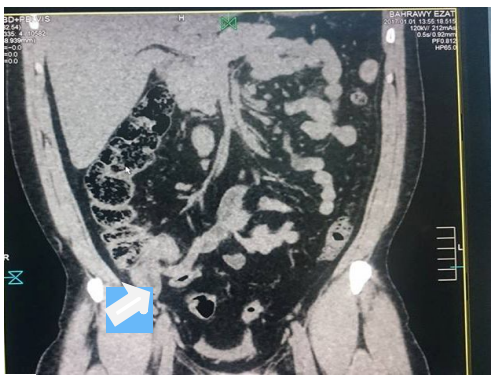
Figure (2): A. Graded compression longitudinal ultarsound scan of acute appendecitis with dilated, non compressible, bilnd end, tubular appendix with thickening of the appendicular wall. B.and C. Axial and coronal CT cuts demonstrated dilated appendix with distended lumen more than 6 mm, thicekened, enhancing wall and periappendicular inflammation including strandling of the adjacent fat.

A.

B.

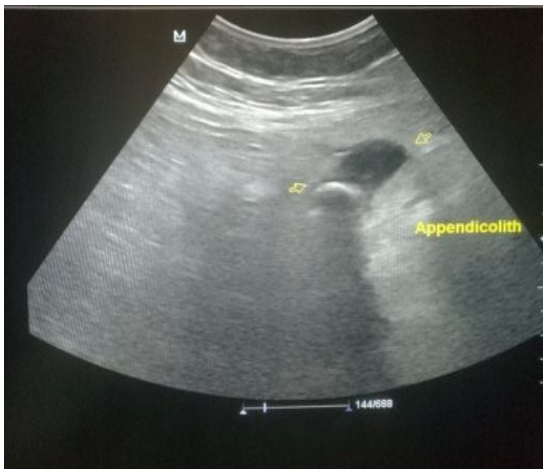


C.



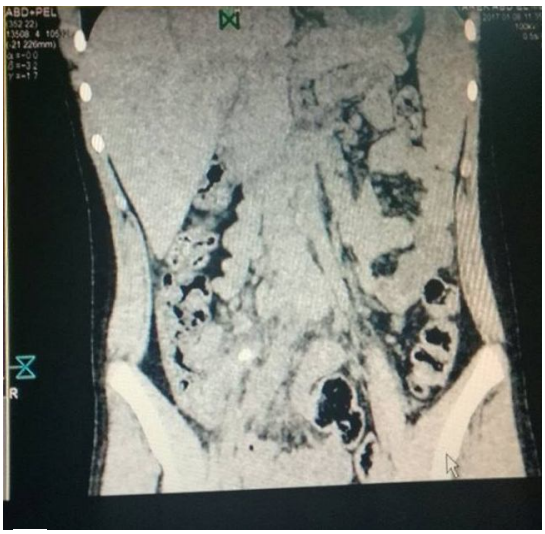
D.

Figure (3): A. and B. Graded compression longitudinal ultarsound scan of acute appendecitis with dilated, non compressible, bilnd end, tubular appendix with thickening of the appendicular wall. C. and D. Coronal CT cuts demonstrated dilated appendix with distended lumen more than 6 mm, thicekened, enhancing wall and periappendicular inflammation including strandling of the adjacent fat.



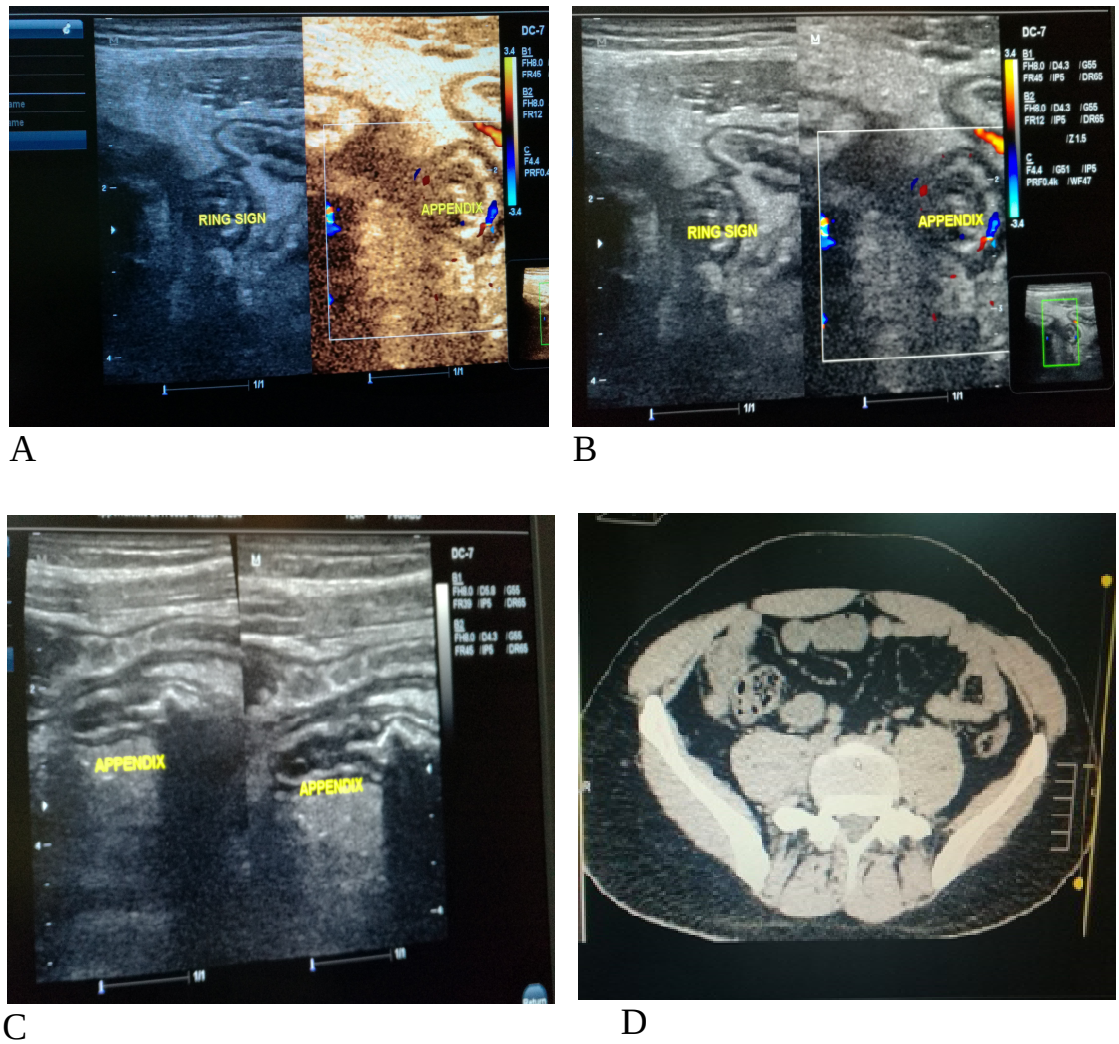
A.

B.



C.

Figure (4): A. Graded compression ultrasound showed dilated appaendix with calcified appendicolith casting an acoustic shadow. B. Axial CT scan showed calcified appendicolith in the dilated appendix with dilated, thickened caecum. C. Coronal CT of the abdomen showed thickening of the cecuma and dilated thick walled appendix with calcified appendicolith inside. Peri-appendicular inflammation with stranding of the adjacent fat was noted .



A B C D

Figure (6): A., B. and C. Color Doppler US showed dilated appendix with distinct appendicular wall layers and positive ring or target sign with echogenic prominent pericaecal fat. On color Doppler there was circumferential color flow was observed in the wall of the inflamed appendix. D. axial CT scan showed dilated appendix with distended lumen, thick enhancing wall and stranding of the adjacent fat.

Statistical analysis

The data were coded, entered and processed on an IBM-PC compatible computer using SPSS (version 20). Descriptive analysis was performed. Data are reported as frequencies and percentages, mean (SD). Significance was considered at P <0.05. Sensitivity, specificity, and negative and positive predictive values of each imaging pathway for diagnosis of appendicitis were determined by using contingency tables.

RESULTS

Of the 107 patients considered for inclusion in the study, 63 males and 44 females, ranging in age from 14 to 30

years (mean, 17.09±3.02 years). Most patients (90 [84.11%]) underwent surgery immediately or within 24 hr of observation after imaging. The clinical findings of studied cases were presented in Table (1). Seventeen patients (15.9%) were hospitalized for clinical observation after imaging. The results of US and CT in these 17 patients were presented in Table (2). Twelve patients (11.2%) were dismissed from the hospital after observation confirmed by negative US and CT findings. Five cases (4.7%) of the observed patients presented with positive CT findings underwent surgery (Table 2).

The overall number of diagnosed cases underwent surgery after imaging is 95 cases (88.8%). In 69 (72.6%) of the 95 patients with appendicitis at surgery, the US showed signs of acute appendicitis. 4 patients (4.2%) appeared to have no acute appendicitis at surgery, although US showed positive findings for appendicitis. 6 patients (6.3%) appeared to have acute appendicitis at surgery, although US showed negative findings for appendicitis. In 16 (16.8%) of the patients without signs of appendicitis at surgery, US also did not reveal appendicitis. CT results for the patients who underwent surgery are listed in Table 3. In 85 (89.4%) of the 95 patients with appendicitis at surgery, the CT showed signs of acute appendicitis. One patient (1.1%) appeared to has no acute appendicitis at surgery, although the CT showed positive findings for appendicitis. One patient (1.1%) appeared to has acute appendicitis at surgery, although the CT showed negative findings for appendicitis. In 8 (8.4%) of the patients without signs of appendicitis at surgery, CT also did not reveal appendicitis (Table 3).

Histopathologic Findings

Appendicitis was confirmed in 86 patients (90.5%) by histopathological examination in the form of acute appendicitis (n = 74), gangrenous appendicitis (n = 4), sub-acute appendicitis (n = 3), periappendicular abscess (n = 4) and acute appendicitis with oxyurius (n = 1). Out of them perforated appendix was found in 6 patients during surgery. The number of appendicectomies with negative appendicitis were 9 with a negative rate of (9.5%) (Table 4).

Diagnostic role of US and CT was evaluated by calculating sensitivity, specificity, positive predictive value, negative predictive value and overall diagnostic accuracy using standard formulae and values obtained are shown in Table 4. After appendectomy, the final situation revealed that the diagnostic accuracy of US was 88.9% success rate in diagnosis of AA while CT showed diagnostic accuracy of 97.8% success rate in diagnosis of AA. (Table 5).

Table (1): Demographic and clinical parameters of studied cases (N=107)

Parameters	Value
Age (years) mean±SD	17.09±3.02
Range	14 – 30
Gender : males	63 (58.9%)
Females	44 (41.1 %)
Outcome : Operation	90 (84.1%)
Observation	17 (15.9%)
Clinical findings	
Abdominal pain	107 (100 %)
Low grade fever	94 (87.8 %)
Leucocytosis (>10 x103 /ml)	88 (82.2 %)
Anorexia with vomiting	83 (77.6 %)
Nausea	76 (71.0 %)
Diarrhea	22 (20.6 %)

Table (2): Correlation of US and CT in the Diagnosis of Acute Appendicitis in 17 Observed Patients

CT Findings / US Findings	Positive		Negative		Total	
	No	%	No	%	No	%
Positive	3	17.6	1	5.9	4	23.5
Negative	2	11.8	11	64.7	13	76.5
Total	5	29.4	12	70.6	17	100

Table (3): Distribution of various pathological subgroups according to intra-operative gross evaluation (n=95)

Surgical findings	Pathologic findings					
	Normal n=9	AA n=74	SAA n=3	GA n=4	PAA n=4	Others n=1
Normal	9 (100%)	13 (17.6%)	1 (33.3%)	-	-	1 (100%)
Inflammation	-	57 (77%)	1 (33.3%)	-	-	-
Perforation	-	4 (5.4%)	1 (33.3%)	1 (25%)	-	-
Gangrene	-	-	-	3 (75%)	-	-
Periappendicular abscess	-	-	-	-	4 (100%)	-

AA, acute appendicitis; SAA, subacute appendicitis, GA, gangrenous appendicitis; PAA, periappendicular abscess

Table (4): Results of radiological studies in diagnosis of acute appendicitis proved by surgical or histopathological findings (no=95)

Histopathological findings / US and CT	True positive		False positive		True negative		False negative	
	No	%	No	%	No	%	No	%
US	69	72.6	4	4.2	16	16.8	6	6.3
CT	85	89.4	1	1.1	8	8.4	1	1.1

Table (5): Sensitivity, specificity and accuracy of radiological maneuvers in diagnosis of AA.

US and CT / Parameters	US	CT
Sensitivity	91.7	98.8
Specificity	77.8	88.9
Positive Predictive Value	94.3	98.8
Negative Predictive Value	70.0	88.9

DISCUSSION

Imaging techniques such as US and CT offer to improve clinical outcome by increasing the accuracy of diagnosis. US has the great advantage of being radiation free, however it is operator dependant. It may be difficult in patients with a retrocaecal appendix and has limited sensitivity. In comparison, CT can overcome these limitations and greater sensitivity in the diagnosis of AA **(Pipal et al., 2017).**

Early US detection and surgical intervention is the best way to manage AA in order to reduce complications and mortality. Use of US for the diagnosis of AA is growing and does not expose patients to radiation. However, US is highly operator dependent, with a consequently wide reported sensitivity range (44%–100%) **(Ayaz, 2009; Al-Ajerami, 2012 and Chaudhari & Jawale, 2015).** If the appendix located retrocaecally or lies deep in the pelvis or excess overlying bowel gas leading to incorrect diagnosis of AA by US **(Chaudhari and Jawale, 2015).**

CT has been considered the gold standard for diagnosis of AA with higher sensitivity and specificity than US **(Hernanz-Schulman, 2010).** Advantages of CT include less operator dependence, easier visualization of retrocecal appendix, less interference of bowel gas, obesity, or patient's pain, and tenderness with image quality **(Saito et al., 2013).**

The present study was conducted among 107 patients suspected to have acute appendicitis and observed that males (58.9%) affected than female (41.4%). The male predominance in AA is one of the notable factor which is similar to 60 - 72% in male in several reports **(Estey et al., 2013; Nshuti et al., 2014; Salwe et**

al., 2014; Chaudhari & Jawale, 2015 and Kamath, 2015).

In the literature, the peak incidence of acute appendicitis worldwide is between 10 and 30 years of age **(John & Kirkwood, 2008; Nshuti et al., 2014 and Chaudhari and Jawale, 2015).** In agreement with this, our study shows that acute appendicitis is common in young adults with a mean age of 17.09 years.

We observed in the present study that abdominal pain was present in 100%, fever present in 88% and vomiting present in 74% of the patients which is almost close to 99%, 76% and 56% respectively, a study conducted by **Kamath (2015).**

Nshuti et al. (2014) found that the predominant presenting symptoms were right iliac fossa pain (95%), nausea (80%), and vomiting (73%), with 63% of patients presenting 2 days after onset of symptoms. Fever was present in 15% and only 31% of patients gave atypical history of AA of vague peri-umbilical pain.

Pathological examination after appendectomy follows two main goals: **1)** It can confirm the diagnosis of appendicitis especially when it is not obvious at the time of surgery. The apparently normal appendices may have evidence of an inflammatory condition at microscopic observation **(Jones et al., 2007).** Similarly, we found that nearly a quarter of grossly normal appendices were pathologically abnormal. **2)** It may reveal some other pathologic conditions that substantially influence the treatment strategy. For instance, appendiceal tumors that may be distinguishable during operation. Furthermore, abnormal pathologic results which need additional examination or treatment may be missed intra-operatively (**Monajemza-deh et al., 2011**). Moreover, other pathologies such as inflammatory bowel disease, parasitic infections, endometriosis, and mycobacterial infection may be retrieved from appendectomy specimens **(Chang et al., 2010**). In the current study, pathological examination revealed specific pathologies that need additional treatment in 1% of all appendectomies.

In our study, the sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy of US in diagnosis of AA in our study were found to be 91.7 %, 77.8 %, 94.3%, 70.0% and 88.9 % respectively. While, the sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy of CT in diagnosis of AA were 98.8 %, 88.9 %, 98.8%, 88.9% and 97.8 % respectively. Our results compare well with other studies reported sensitivity 75%–98%, specificity 86%–100% with positive and negative predictive values of 91%–100% and 89%–99% **(Summa, 2007; Ayaz, 2009 and Al-Ajerami, 2012).**

Several studies have shown significantly lower sensitivity and specificity for US compared with CT scan **(Al-Khayal & Al-Omran, 2007 and Pickhardt et al., 2011).**

In 2007 a systematic review including 9121 patients of 25 studies reported a sensitivity of 83.7 %, a specificity of 95.9 %, an accuracy of 92.2 %, a positive predictive value (PPV) of 89.8 % and an NPV of 93.2 % for the US diagnosis of AA **(Al-Khayal and Al-Omran, 2007).** The overall pooled estimates for the diagnostic value of CT were: sensitivity 93.4%, specificity 93.3 %, accuracy 93.4

%, PPV 90.3 % and NPV 95.5 %. **Al-Khayal and Al-Omran (2007**) found that CT more sensitive (88.4 % vs 76 %) and a little bit more specific (90.4 % vs 89.4 %) than US**.**

In **2011, Pickhardt et al.** showed a sensitivity of 98.5 % and a specificity of 98 % for the diagnosis of AA in 2871 patients.

Pinto et al. (2013) stated that there was an extremely variable diagnostic accuracy of US with sensitivities ranging from 44 % to 100 % and specificities ranging from 47 % to 100 %**.**

Pipal et al., (2017) found that US depicted a high sensitivity of 94.4%, with a specificity of 80% and PPV and NPV of 97.7% and 61.53% respectively. While CT depicted a sensitivity of 82%, with a specificity of 83% and PPV and NPV of 98.1% and 68.4% respectively.

CONCLUSION

Although CT is the gold standard imaging tool to diagnose AA, still there are good reasons to choose US like US is non-invasive, has short acquisition time. Is relatively low cost, does not require iodinized contrast agent or oral preparation, lacks radiation exposure, can be performed on children even with some degree of motion, is considered safe during pregnancy, has high potential for diagnosis of alternative conditions mimicking acute appendicitis and is available in most institutions.

REFERENCES

1. **Al-Ajeraemi Y (2012):** Sensitivity and specificity of ultrasound in the diagnosis of acute appendicitis. East Mediterr Health J., 7:66–69.

2. **Al-Khayal KA and Al-Omran MA (2007):** Computed tomography and ultrasonography in the diagnosis of equivocal acute appendicitis. A meta-analysis. Saudi Med J., 28:173–180.

3. **Ayaz A (2009):** Diagnostic accuracy of alvarado score in the diagnosis of acute appendicitis. Pakistan Journal of Medical Sciences, 25:118–121.

4. **Chang YJ, Chao HC and Kong MS (2010):** Misdiagnosed acute appendicitis in children in the emergency department. Chang Gung Med J., 33(5):551-7.

5. **Chaudhari YP and Jawale PG (2015):** Prevalence of appendicitis at surgery inpatient department of a tertiary care hospital: a descriptive study. Int Med J., 2(11):768-70.

6. **des Plantes CMP, van Veen MJF, der Palen JV, Klaase JM, Gielkens HAJ and Geelkerken RH (2016):** The Effect of unenhanced MRI on the surgeons' decision-making process in females with suspected appendicitis World J Surg., 40:2881–2887.

7. **Estey A, Poonai N and Lim R (2013):** Appendix not seen: the predictive value of secondary inflammatory sonographic signs. Pediatr Emerg Care, 29:435–439

8. **Ghorbani A, Forouzesh M and Kazemifar AM (2014):** Variation in Anatomical Position of Vermiform Appendix among Iranian Population: An Old Issue Which Has Not Lost Its Importance. Hindawi Publishing Corporation, Anatomy Research International, Article ID 313575, 1-4.

9. **Hernanz-Schulman MCT (2010):** CT and US in the diagnosis of appendicitis: an argument for CT. Radiology, 255(1):3–7.

10. **John M and Kirkwood KS (2008):** Sabiston Textbook of Surgery. Biological Basis of Modern Surgical Practice. Pbl. Philadelphia: Saunders Elsevier, Appendix, 1333–1347.

11. **Jones AE, Phillips AW, Jarvis JR and Sargen K (2007):** The value of routine histopathological examination of appendicectomy specimens. BMC Surg., 7:17-21.

12. **Kamath P (2015):** A clinico- pathological study of appendisectomy cases in a tertiary

care hospital in South India. Indian J Applied Research, 5(9):285-6.

13. **Kim K, Kim YH and Kim SY (2012):** Low-dose abdominal CT for evaluating suspected appendicitis. The New England journal of medicine, 366 (17): 1596–605.

14. **Lee JH, Jeong YK and Park KB (2005):** Operator - dependent techniques for graded compression sonography to detect the appendix and diagnose acute appendicitis. AJR Am J Roentgenol., 184:91–97.

15. **Monajemzadeh M, Hagghi-Ashtiani MT, Montaser-Kouhsari, L, Ahmadi H, Zargoosh H and Kalantari M. (2011):** Pathologic Evaluation of Appendectomy Specimens in Children: Is Routine Histopatholgic Examination Indicated? Iran J Pediatr., 21 (4):485-490.

16. **Mostbeck G, Adam EJ and Nielsen MB (2016):** How to diagnose acute appendicitis: ultrasound first. Insights Imaging, 7(2): 255-263.

17. **Nshuti R, Kruger D and Luvhengo TE (2014):** Clinical presentation of acute appendicitis in adults at the Chris Hani Baragwanath academic hospital. Int J Emerg Med., 7(12) 1-13.

18. **Pickhardt PJ, Lawrence EM, Pooler BD and Bruce RJ (2011):** Diagnostic performance of multidetector computed tomography for suspected acute appendicitis. Ann Intern Med.,154:789–796.

19. **Pinto F, Pinto A and Russo A (2013):** Accuracy of ultrasonography in the diagnosis of acute appendicitis in adult patients: review of the literature. Crit Ultrasound J., 5(Suppl 1):S2.

20. **Pipal DK, Kothari S, Shrivastava H, Soni A and Pipal V (2017):** To evaluate the diagnostic accuracy of alvarado score, C-reactive protein, ultrasonography and computed tomography in acute appendicitis and to correlate them with operative and histological findings. Int Surg J., 4:361-7.

21. **Saito JM, Yan Y, Evashwick TW, Warner BW and Tarr PI (2013):** Use and accuracy of diagnostic imaging by hospital type in pediatric appendicitis. Pediatrics, 131(1): 1-12.

22. **Salwe NA, Kulkarni PG and Sinha RS (2014):** Study of morphological variations of vermiform appendix and caecum in cadavers of western Maharashtra region. Int J Advanced Physiology Allied Sci., 2(1):31-41.

23. **Scott AJ (2015):** Risk stratification by the Appendicitis Inflammatory Response score to guide decision-making in patients with suspected appendicitis. Br J Surg., 102(5):563–72.

24. **Summa M (2007):** Integrated clinical-ultra-sonographic diagnosis in acute appendicitis. Journal de Radiologie., 10:175–178.

[illegible]

أحمد فكرى الديك* - إبراهيم محمود الصياد**

قسم الأشعة التشخيصية * وقسم الجراحة العامة ** - كلية طب الأزهر(دمياط)

خلفية البحث: يعتبر إلتهاب الزائدة الدودية الحادة من أشهر أسباب ألام البطن الحادة .وتهدف الطرق التصويرية مثل الموجات فوق الصوتية و الأشعة المقطعية إلى تفادي التشخيص الخاطئ و سرعة التدخل الجراحي إن أمكن للتقليل من مضاعفات هذا المرض .

الهدف من البحث: مقارنة دقة الموجات فوق الصوتية بالأشعة المقطعية في تشخيص إلتهابات الزائدة الدودية الحادة.

المرضي و طرق البحث: تمت الدراسة الحالية علي 107 من المرضي الذين يعانون من أعراض إلتهابات الزائدة الدودية الحادة والذين تم إختيارهم من قسم الطوارئ بمستشفى الأزهر الجامعي بدمياط في الفترة من شهر مارس 2016 وحتى شهر أبريل 2017. و قد تم بالفعل إستئصال الزائدة الدودية لتسعين مريضا سواء جراحيًا أو عن طريق المنظار،بينما تم إحتجاز 17 مريضا بقسم الجراحة الداخلي للمتابعة وأخذ القرار المناسب (12 مريضا منهم تم صرفهم بعد المتابعة بينما تم عمل الجراحة للخمسة مرضى الباقين بعد عمل الأشعة اللازمة) . و بعد أخذ الموافقة المناسبة من المرضي وإجراء الفحص الإكلينيكي الشامل والفحوصات المعملية وتم عمل الموجات فوق الصوتية و الأشعة المقطعية لجميع المرضي.

النتائج: أظهرت النتائج التحليلية إصابة الذكور أكثر من الإناث ، وكان ألم البطن الحاد هو أكثر الأعراض التي عاني منها المرضي .وكانت الحساسية والخصوصية والقيمة التنبؤية الموجبة والقيمة التنبؤية السالبة والدقة الكلية للتشخيص بالموجات فوق الصوتية هي 91,7% ، 77,8 % ، 94,3% ، 70% ، 88,9% بالترتيب مقارنة بالتشخيص بالأشعة المقطعية 98,8% ، 88,9% ، 98,8% ، 88,9% ، 97,8% بالترتيب.

الإستنتاج: علي الرغم من أهمية الموجات فوق الصوتية في التشخيص الأولي إلا أنه في بعض الأحيان يحتاج الجراح إلى تأكيد التشخيص عن طريق إستخدام الأشعة المقطعية.