NEWSPAPER POST

TheSynapse

The Medical Professionals' Network

MEDICAL IMAGING

Diagnostic Imaging of Acute Appendicitis

by **Pierre Vassallo**
MD PhD FACA Artz für Radiologie
Consultant Radiologist

Cross-sectional imaging with ultrasonography (US) and computed tomography (CT) have proved useful for the evaluation of suspected acute appendicitis.

The principal advantages of US are its lower cost, lack of ionizing radiation, and ability to assess vascularity through colour Doppler techniques and to provide dynamic information through graded compression. The principal advantages of CT include less operator dependency than US, as reflected by a higher diagnostic accuracy, and enhanced delineation of disease extent in a perforated appendix and in obese patients. Both exams are particularly useful in detecting other conditions that may mimic appendicitis.

Acute appendicitis is the most common condition requiring emergency abdominal surgery. The condition typically develops in older children and young adults. It is rare under the age of 2 years. The lifetime risk of acute appendicitis ranges from 7% to 9%. Acute appendicitis presents a challenging problem to caregivers because it must be differentiated from a variety of other conditions that result in acute abdominal pain.

Clinical signs and symptoms associated with acute appendicitis include colicky, periumbilical or right lower quadrant pain; nausea; vomiting; point tenderness in the right lower quadrant; rebound tenderness; and leukocytosis. Although knowledge of the classic findings is important, the clinical diagnosis of acute appendicitis is not always straightforward. Approximately one-third of individuals with acute appendicitis have atypical clinical findings. Younger children are not able to clearly describe their symptoms. In addition, the presenting signs and symptoms of many nonsurgical conditions may mimic those of acute appendicitis; 5%–25% false-negative appendectomy rates have been reported for the paediatric population. Various clinical scoring systems have been proposed to aid diagnosis; the MANTRELS score has been shown to be the most useful (Table 1).

There are serious consequences to the delayed diagnosis of acute appendicitis. Reported complications include perforation, abscess formation, peritonitis, wound infection, sepsis, infertility, adhesions, bowel obstruction, and death.

The MANTRELS Score

Characteristics	Points
M igration of pain to right lower quadrant	1
A norexia	1
N ausea and vomiting	1
T enderness in right lower quadrant	2
R ebound pain	1
E levated temperature	1
L eukocytosis	2
S hift of white blood cell count to left	1
Total	10

Table 1: *The Mantrels Score*

Although abdominal radiography remains a widely used examination in patients with acute abdominal pain, it has been shown to be a relatively insensitive and non-specific means for evaluating this condition, and its use adds unnecessary cost and radiation exposure. Routine use of abdominal radiography in these individuals has little value unless bowel obstruction or perforation is suspected.

The reported diagnostic accuracy of US in the diagnosis of acute appendicitis has varied greatly, with sensitivity values ranging from 44% to 94%, and the specificity values from 47% to 95%.

An overall sensitivity of 85% and specificity of 92% has been reported for US based on meta-analysis of paediatric and adult studies published between 1986 and 1994. The clinical utility of US lies primarily in the patient subgroup in whom the clinical findings are equivocal,

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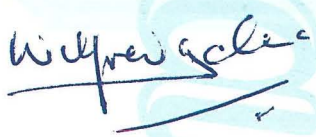
Editor's Word

Welcome to another interesting issue of *TheSYNAPSE* Magazine. In this issue we focus on Dermatology, starting with an article that looks at **Melanoma in the Maltese Islands** and another article on the **Skin and Internal Disease**.

You can also read the second parts of the articles featured in issue 4 dealing with **Stem Cells**. To add more variety, you can also have an expert insight in the **Management of Pressure Ulcers** and recent trends in **Early insulinisation of the diabetic patient**.

We also have the regular articles in the Medical Imaging Section, dealing this time with the **Diagnosis of Acute Appendicitis** whereas we continue to follow trends in the **Dow Jones in the MoneyWise** section as well as the progression of **Avian Influenza**.

October is a special month for *TheSYNAPSE* as we celebrate our Tenth Year since the launch of our rapidly growing Internet Portal on *www.thesynapse.net*. We encourage you to participate actively by joining our rapidly growing community and benefiting from the range of services and benefits available for all members.



TheSynapse Magazine is published by Medical Portals Ltd. The Professional Services Centre, Guzi Cutajar Street, Dingli, Malta.

Editor: Dr Wilfred Galea
Scientific Editor: Ian C. Ellul
Designer: Conrad Bondin

Diagnostic Imaging of Acute Appendicitis

Figure 1: *US scan showing a normal appendix (between crosses) in the longitudinal section.*

both to establish the diagnosis of appendicitis and to aid in the diagnosis of other abdominal and pelvic conditions that may mimic the disorder, particularly gynaecologic diseases.

The graded-compression technique of US is performed with a high-resolution, linear array transducer. Gentle, gradual pressure is used to compress the anterior abdominal wall, resulting in displacement and compression of normal

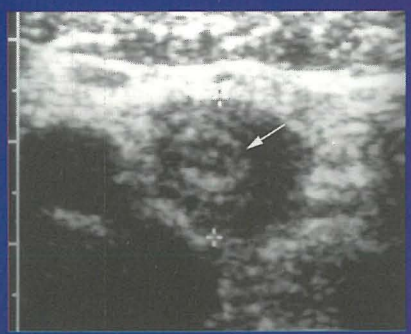


Figure 2: *US scan showing a thickened inflamed appendix (>6mm) in the cross-section. Note central submucosal ring (arrow).*

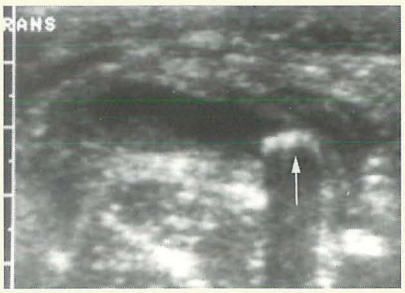


Figure 3: *US scan of an inflamed appendix in longitudinal section containing an appendicolith (arrow).*

bowel loops. Adequate compression has been achieved if the iliac vessels and psoas muscle are visualized, since the appendix will be anterior to these structures. Scanning should identify the ascending colon, a nonperistaltic structure containing gas and fluid. More inferiorly to the terminal ileum is seen, which is easily compressible and displays active peristalsis. The caecal tip where the appendix arises is approximately 1–2 cm below the terminal ileum; this appears as a tubular structure with a diameter measuring 6mm or less (Figure 1). A technically adequate examination can be achieved in over 95% of patients. Technical failures are due to the presence of severe pain or patient obesity that precludes satisfactory graded-compression.

On ultrasound, the inflamed, nonperforated appendix appears as a fluid-filled, noncompressible, blind-ending tubular structure (Figure 2) with a maximal diameter greater than 6 mm. In early nonperforated appendicitis, an inner echogenic lining representing submucosa can be identified (Figure 3). Other findings of appendicitis include an appendicolith (Figure 4), pericaecal or periappendiceal fluid, increased periappendiceal echogenicity representing fat infiltration and enlarged

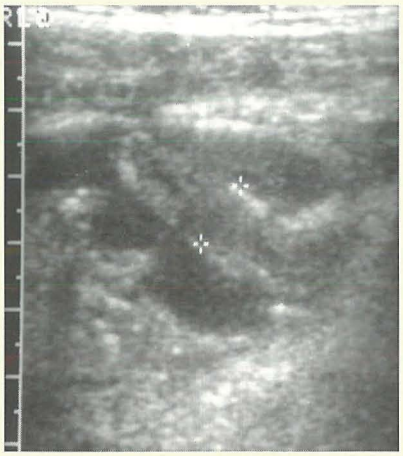


Figure 4: *US scan of an inflamed appendix (between crosses) in longitudinal section with adjacent free fluid.*

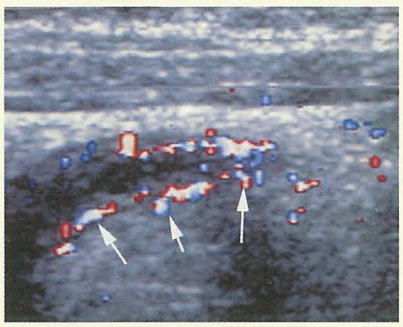


Figure 5: *Colour Doppler US scan of an inflamed appendix in longitudinal section showing abundant blood flow (arrows).*

mesenteric lymph nodes. The only US sign that is specific for appendicitis is an enlarged, noncompressible appendix measuring greater than 6 mm in maximal diameter.

Perforation occurs in 23%–73% of children with acute appendicitis and US features include loss of the echogenic submucosal layer and presence of a loculated periappendiceal (Figure 5) or pelvic fluid collection or abscess.

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Figure 6: *CT scan showing a normal appendix in cross-section (arrow).*

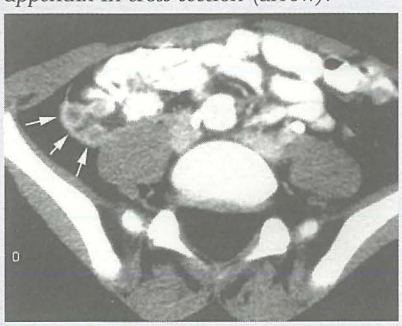

Figure 7: *CT scan showing an inflamed appendix in cross-section measuring <7mm in diameter (arrows).*

Colour Doppler US of nonperforated appendicitis typically demonstrates peripheral wall hyperaemia, reflecting inflammatory hyperperfusion (Figure 6). Colour flow may also be absent in gangrenous appendicitis.

Helical CT has been shown to be a highly sensitive and specific modality for the diagnosis of acute appendicitis in children and adults. The reported sensitivity of CT for the diagnosis of acute appendicitis has ranged from 87% to 100%, and the specificity has ranged from 89% to 98%. The advantages of CT over US are reduced operator dependence, superior contrast sensitivity, and the capability for viewing the entire range of air, soft-tissue, fat, and bone attenuation values inherent to the abdomen.

The normal appendix can be identified at CT. The appendix arises from the posteromedial aspect of the caecum, approximately 1–2 cm below the ileocaecal junction (Figure 7). The relationship of the base of the appendix to the caecum is constant, but the free end of the appendix is mobile and can be directed medially, caudally, laterally, or retrocaecally. The maximal normal appendiceal diameter measured on CT is quite variable; although it usually is 7 mm or less, it may occasionally be larger.

CT features of acute appendicitis include a distended appendix greater than 7 mm in maximal diameter, appendiceal wall thickening and enhancement an appendicolith (Figure 8), pericaecal fat stranding, adjacent bowel wall thickening, free peritoneal fluid, mesenteric lymphadenopathy, intraperitoneal phlegmon, or abscess.

Clinical studies have shown a significant decrease in the negative appendectomy rate in children with suspected acute appendicitis who underwent CT before surgery compared with those who did not (7% vs 13%). A decrease in the perforation rate has been observed in patients who underwent CT compared with those who did not (15% vs 23%). Another study showed that the number of days required for inpatient observation prior to surgery is reduced by CT assessment, therefore reducing the cost of care per patient.

In summary, both graded-compression US and helical CT have been shown to have potential utility in the evaluation of suspected acute appendicitis. Both US and CT have there advantages and disadvantages, with CT being more accurate, particularly in obese patients.

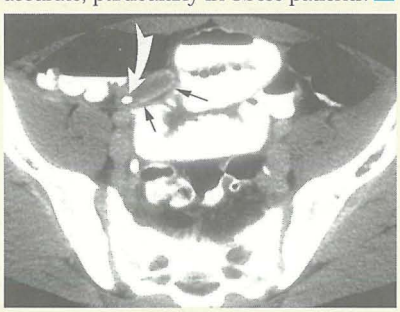

Figure 8: *CT scan showing an inflamed appendix in longitudinal section (straight arrows) which contains an appendicolith (curved arrow).*

Dr Pierre Vassallo can be reached at the Medical Imaging Centre on 21 491 200 or by email on pvassallo@mic.com.mt

Update on Avian Influenza

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transfer the blood of a recovered patient to a sick one, giving the latter antibodies against the pathogen.

Transfusions were also tried in the 1918 flu pandemic but hadn't been studied extensively. Analysis done suggests that patients with Spanish influenza pneumonia who received transfusion may have experienced a clinically important reduction in the risk for death and improvements in clinical signs and symptoms[1]

Update on Seasonal Vaccine

Seasonal vaccination should start in October. The government this year is offering the vaccine free of charge to the following categories:

- All health care professionals working in governmental hospitals, health centers and governmental institutions/homes;
- All persons residing in an institution;
- All persons aged 55 years and over;
- All persons of all ages suffering from: chronic respiratory disease, chronic heart disease, chronic liver disease, chronic kidney disease, diabetes mellitus, any chronic immunodeficiency state including AIDS;
- All essential workers including police, armed forces, civil protection, security services, Food and Veterinary Regulation Division, cleansing department, veterinary surgeons and their assistants, cargo handlers and custom officials involved in border control;
- Other workers at high risk: poultry farmers and their workers, Corradino staff and inmates.

Encourage your patients to take the seasonal vaccine.

References

1. Luke TC, Kilbane EM, Jackson JL, Hoffman SL. Meta-analysis: convalescent blood products for Spanish influenza pneumonia: a future H5N1 treatment ? *Ann Intern Med* 2006; 145(8).