

A fatal case of acute appendicitis

急性闌尾炎的一個死亡個案

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Appendicitis continues to be the most common acute surgical emergency. We report a fatal case of acute appendicitis, illustrating that the early presentation of appendicitis is non-specific and that serial examination is the key to the diagnosis to avoid a fatal outcome. We also present an evidence-based approach to the diagnosis of acute appendicitis in the emergency department and highlight the pearls and pitfalls of diagnosing acute appendicitis. (*Hong Kong j.emerg.med.* 2007;14:179-182)

闌尾炎仍然是最常見的外科急症。我們報告一個急性闌尾炎的死亡個案，說明闌尾炎早期的徵狀是不明確的，而連串檢查是診斷的關鍵以避免死亡的結果。我們並描述以證據為本的方法在急症室診斷急性闌尾炎，及強調診斷急性闌尾炎的至理名言及易犯錯誤。

Keywords: Abdominal pain, appendicitis, diagnosis, fatal outcome

關鍵詞：腹痛、闌尾炎、診斷、死亡的結果

Introduction

Although the mortality of acute appendicitis has been reported to be less than 1%, we report a case of fatal acute appendicitis and discuss the pearls and pitfalls of diagnosing acute appendicitis.

Case report

A 46-year-old male with a background history of hypertension, end-stage renal failure on haemodialysis, and intracranial haemorrhage with craniotomy and ventriculo-peritoneal shunt performed with good recovery, was found unconscious in the toilet at home.

On arrival to our emergency department, he was in a collapsed state. He was gasping. The blood pressure was 41/26 mmHg and the pulse rate was 40/min. The physical examination revealed generalised abdominal distension with peritonism and reduced air entry at the right lung base. He had presented to another hospital two days earlier for abdominal pain and was treated and discharged.

He was intubated immediately and put on mechanical ventilation. Faecal matter was seen in the endotracheal and nasogastric tubes. Fluid challenge and inotropic support together with broad spectrum antibiotics were given to the patient. Abdominal X-ray showed generalised small bowel dilatation with suspected appendicolith in the right lower quadrant (Figure 1). Chest X-ray showed right lower lobe consolidation with pleural effusion (Figure 2).

After resuscitation, he was admitted to the intensive care unit for further management of the septic shock secondary to peritonitis and aspiration pneumonia. He

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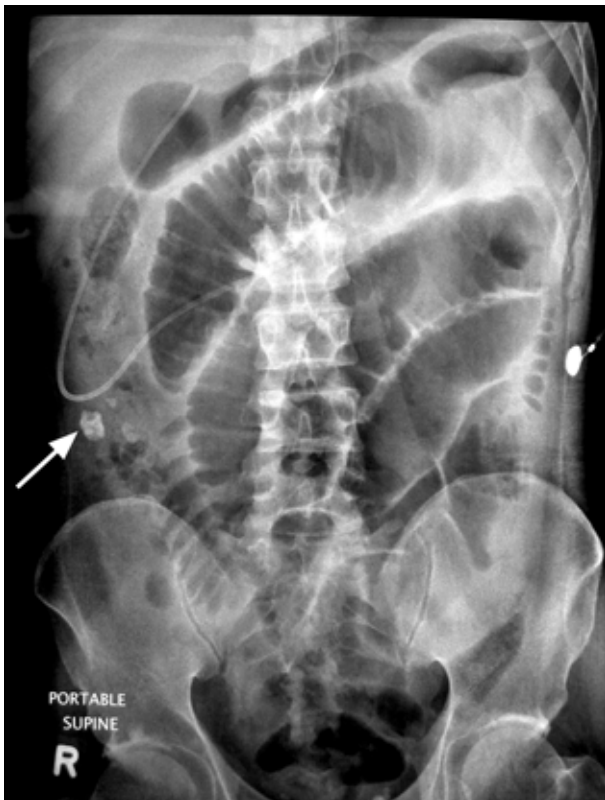


Figure 1. Appendicolith (arrow) in right lower quadrant with bowel dilatation.



Figure 2. Right lower zone consolidation suggestive of aspiration pneumonia.

required large amounts of inotropes including adrenaline, dobutamine and vasopressin for circulatory support. He was also put on haemodialysis. Emergency laparotomy revealed gross soiling of the peritoneal cavity with faecal matter. The appendix was perforated with abscess formation. A faecolith was found inside the appendix. There were grossly dilated small bowels and ischaemic ascending and transverse colons.

He underwent right hemicolectomy with ileostomy and exteriorisation of the ventriculo-peritoneal drain. His stormy postoperative course was complicated by cardiac ischaemia, shock, gram-negative bacilli bacteraemia and cerebrovascular accident with poor neurological recovery. He eventually succumbed two weeks later.

Discussion

Acute appendicitis continues to be the most common cause of acute abdomen. The estimated lifetime risk of acute appendicitis is approximately 7% in the western population.¹ Both genders are affected with nearly equal frequency. The peak incidence occurs in the second and third decades of life and is less common in extremes of age. In the past two years, our tertiary hospital had 900 cases of acute appendicitis. The incidence rate of peritonitis was 15%. The mortality rate was about 1% (hospital audit). This case highlighted the importance of not missing appendicitis with the eventual outcome of death.

The goals in the management of acute appendicitis are early diagnosis and prompt operative intervention. However, diagnosis may be delayed because of diagnostic difficulties in the extremes of age, non-specific early signs and symptoms, delay in seeking treatment or wrong initial diagnosis. Early pain may be vaguely localised to the epigastrium which makes diagnosis difficult. In addition to pain, most patients will have nausea, vomiting and anorexia. More than 90% of patients with appendicitis will have anorexia.² Right lower quadrant pain with involuntary guarding and migratory pain from the umbilicus to the right lower quadrant have been found to have a positive likelihood ratio of 8.4 and 3.1 respectively for

appendicitis.³ Retrocaecal appendix, due to its "hidden" position, is thought to result in delayed diagnosis of acute appendicitis and increased rate of perforation. A post-mortem analysis of 10,000 cases showed that the most common variant was retrocaecal (65%).⁴ One study showed that 69% of perforated or gangrenous appendices were associated with the retrocolic position.⁵

This case highlights the difficulty of early diagnosis and the increased mortality rate due to missing the diagnosis. Acute appendicitis is in essence a clinical diagnosis. No laboratory test can confirm or refute the diagnosis. In one series of nearly 500 patients with appendicitis, 37% had a white cell count of less than 11,000. The overall sensitivity and specificity of leucocytosis for diagnosing appendicitis have been estimated to be 76% and 52% respectively.⁶ Urinalysis should also be interpreted with caution in view of the close proximity of the appendix to the ureter; appendiceal inflammation may result in changes in urine sediment resulting in the false diagnosis of urinary tract infection. Plain film also lacks sensitivity and specificity. However, right lower quadrant faecolith, scoliosis of the lumbar spine away from the appendix, and obliteration of the right psoas shadow are some radiological features suggestive of appendicitis.⁷ Thus, diagnostic imaging should be considered in patients with suspected acute appendicitis in whom the diagnosis is unclear.

Reported sensitivity (Sn), specificity (Sp), positive likelihood and negative likelihood ratios (LR) for

computed tomography (CT) are 94%, 95%, 13.3 and 0.09 respectively which are far superior to those of ultrasound 86% (Sn), 81% (Sp), 5.8 (+ve LR), 0.19 (-ve LR).⁸ Ultrasound is especially useful in children as it does not involve radiation but is operator dependant. Despite its good attributes, CT is expensive and involves ionising radiation and risks of contrast allergy, contrast-induced nephropathy and delayed time to diagnosis if oral contrast is used.

Flum's study involving 4,058 patients from 1980-1999 showed the use of CT or ultrasound tripled after 1990s, but the overall negative appendectomy rate remained similar at 15%.⁹ Another study however showed preoperative imaging resulted in lower negative appendectomy rate in women (8% vs. 28%) but not in men.¹⁰ Recently, diagnostic laparoscopy is gaining popularity as an approach to evaluate right iliac fossa pain in women. Laparoscopic utilisation will vary depending on individual surgeon preference and case specific factors.

By far, Alvarado or MANTRELS score proposed by Alvarado in 1986 has been the most widely used scoring system (Table 1).¹¹ Through a retrospective analysis of 305 patients, Alvarado found the mean score for acute appendicitis was 7.71 and the missed appendicitis rate was about 5.8%. No specific cut-off was recommended. However, other studies using a cut-off value of 6 showed the missed appendicitis rate was as high as 35%.¹² Although the scoring system showed some potential value, there is no single reliable scoring system at present.

Table 1. Alvarado or MANTRELS score as an aid for diagnosing acute appendicitis

Component	Criteria	Score
3 Symptoms	Migratory pain to the right iliac fossa	1
	Anorexia	1
	Nausea / vomiting	1
3 Signs	Tenderness in right iliac fossa	1
	Rebound in right iliac fossa	2
	Elevated temperature >37.3°C	1
2 Laboratory findings	Leucocytosis >10,000	2
	Left shift of polymorphs >75%	1

Observation units located in main emergency departments are becoming popular to evaluate equivocal cases. Serial examinations and repeat laboratory studies with appropriate scoring system are used whilst the patient is in the observation unit.¹³ A retrospective review of appendicitis-related malpractice showed that missed acute appendicitis had been attributed to patients who were less acutely ill and had atypical features (not localised to the right lower quadrant) at the time of presentation.¹⁴ The most common misdiagnosis was gastroenteritis. As acute appendicitis is an evolving process, the clinical picture will become clearer during observation. With additional time, the observation unit allows the physician to evaluate patients better with undifferentiated abdominal pain.

Conclusion

The diagnosis of early appendicitis continues to be a challenge for physicians. Delayed diagnosis results in morbidity and mortality. Acute appendicitis in essence remains a clinical diagnosis. However, diagnostic imaging and serial examinations are recommended in equivocal cases. Emergency physicians must be aware of the atypical presentations and cognizant of the limitations and advantages of each diagnostic test.

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