Editorial

Acute appendicitis: a continuing diagnostic challenge to emergency physicians

急性闌尾炎：繼續是急症科醫生的挑戰

CP Ng 吳忠波

Acute appendicitis is a common surgical emergency with a lifetime occurrence of about 7%.[1] The peak incidence occurs between the ages of 10 and 30 years.[2] Traditionally, the diagnosis of acute appendicitis is made by history and physical examination. However, with the vagaries of presentation symptoms and the variability of clinical signs, making the correct diagnosis of appendicitis remains challenging. With the elusive nature of the diagnosis, it is not surprising to find that in 20% of patients with appendicitis, the diagnosis is missed initially, and in 15-40% of those undergoing emergency operations for suspected appendicitis, the appendix is normal.[3] Although we all understand that delayed operation would lead to perforation of the appendix with the sequelae of substantially increased morbidity and mortality, it is generally accepted that unnecessary surgery should be avoided due to anaesthetic and operative risks. So, the goal of treatment is not only to remove an inflamed appendix early, but also to keep the number of negative appendectomies to a minimum. Clearly, more precision in the diagnosis is essential.

Chung's study in 2000 showed that emergency physicians did constitute a significant role in the delayed diagnosis of acute appendicitis.[4] Another study by Ng in 2003 also showed that acute appendicitis was the most frequently missed diagnosis in a local accident and emergency department (ED).[5] It is conceivable that the same problem might also occur in other EDs. So, what is the pitfall in diagnosing acute appendicitis?

Back to the basic, the most useful tools in assessing acute appendicitis are still a good history and physical examination, serial abdominal examinations,[6-8] and a high index of suspicion. Migrating pain from the epigastric or periumbilical area to the right lower quadrant is the classical and most discriminating historical feature, which has high sensitivity and specificity. It has been suggested that the presence of right lower quadrant tenderness is the most sensitive physical finding in early appendicitis.[8] It is present in nearly all patients with appendicitis. Nevertheless, it is a very non-specific finding. Common pitfalls may be due to the possibilities that the emergency physicians fail to get a typical history and elicit the right lower quadrant tenderness on abdominal examination. Moreover, we need to have a high index of suspicion. Misdiagnosis in the ED and failure to admit would lead to a delay in operation and the subsequent increase in mortality and morbidity. Thus, for emergency physicians, we may perhaps need to be more sensitive at the expense of specificity in diagnosing this condition. Nonetheless, how can diagnostic accuracy be improved further?

For a long time, radiology played little role in diagnosing appendicitis. Appendicoliths on plain films or non-filling of the appendix on barium enema were occasionally reported which were neither sensitive nor

Correspondence to:
Ng Chung Por, MRCP(UK), FRCSEd, FHKAM(Emergency Medicine)
North District Hospital, Accident & Emergency Department,
9 Po Kin Road, Sheung Shui, N.T., Hong Kong
Email: chungpor@netvigator.com

specific. In recent years, with the advance in radiology, the options for radiological evaluation of patients with suspected appendicitis have increased; thus enhancing and sometimes even replacing previous modalities of radiological studies.

Ultrasonography is an easily available, non-invasive technique, which can provide real-time imaging. The use of it in detecting acute appendicitis was first reported in 1981[9] and its use is appropriate for patients in whom the diagnosis is equivocal by history and physical examination. It is particularly useful in evaluating right lower quadrant or pelvic pain in paediatric and female patients. However, the accuracy can be affected by several factors including operator dependence, deep-seated appendix, bowel gas and obesity.[10] In this issue of the Journal, Siu and his colleague discuss the use of ultrasonography to assess patients with right lower quadrant pain in the emergency department.

Computed tomography (CT), specifically the technique of focused helical appendiceal CT, is more accurate than ultrasonography.[11,12] The beauty of CT is mainly due to its better ability to identify a normal appendix than ultrasonography.[13] Other advantages of CT include operator independency, enhanced delineation of disease extent in case of perforation, and improved patient outcomes with decreased negative laparotomy and perforation rates. However, CT is not readily available; and the procedure is more time consuming with potential radiation hazard, especially in children and pregnant women.

During pregnancy, the large gravid uterus can alter the position of the abdominal contents and thus make sonography more difficult, especially when the appendix is in a retrocaecal position. On the other hand, the use of CT involves considerable hazardous radiation exposure to the fetus. Abdominal magnetic resonance imaging (MRI) may therefore be a valuable and safe technique for the evaluation of suspected appendicitis in pregnant women.[14] The multi-planer views of MRI enable the accurate visualisation of the entire abdominal structures and the technique is free of radiation. Nevertheless, the technique is limited by its availability and the safety of its use during pregnancy has not been proven definitely.

Apart from the radiological adjuncts, various clinical diagnostic scores (some are computer-aided) such as the MANTRELS have been employed.[15] They have been proved to be useful as checklists to ensure good history taking and physical examination. However, computer analysis still depends entirely on the quality of the "input". "Input" is based on one's careful history, physical examination, and a personal evaluation of the patient's responses which are all related to one's clinical expertise.

Of course, no one will discharge a patient presenting with a typical history of appendicitis and unequivocal right lower quadrant tenderness. Unfortunately, most cases of appendicitis missed usually have very non-specific presentations. In the busy ED environment, inexperienced physicians may easily discharge these patients prematurely. Accurate diagnosis could have been made if these patients had been monitored for longer periods before being discharged. From Chung's study, diagnostic accuracy was found to increase with the seniority of emergency physicians for acute appendicitis.[4] Longer observation time with repeated examinations by senior doctors in an observation room may help to improve the diagnostic accuracy. Those patients with abdominal pain who are discharged home with a presumed 'benign' condition should be given detailed discharge instructions regarding their return if their symptoms do not improve, or an early follow up should be arranged. Besides, proper surgical training and regular targeted ED-based clinical audit should be emphasised in EDs to improve the quality of care.

To conclude, there is still no single diagnostic mousetrap to apprehend the appendiceal rodent today. The diagnosis of appendicitis depends on optimal clinical assessment. Obviously, the physician's clinical acumen remains the cornerstone in therapeutic decision-making for patients with acute abdominal pain. There is no substitute for skills in interviewing patients and eliciting physical signs. Generally speaking, the majority of acute appendicitis can be diagnosed without radiological evaluation. The use of

radiological imaging should be reserved for patients with confusing or atypical clinical findings. Emergency physicians should always keep a high index of suspicion. For surgeons, perhaps they may need to accept the reality that appendicitis is mysterious in origin, uncertain in course, and difficult in proving. A certain number of normal appendices may eventually have to be removed to avoid an increase in the number of ruptured appendices with peritonitis. Last, but not the least, the diagnosis of appendicitis will no doubt continue to present as a challenge to all emergency physicians but we have to stay vigilant. Advances in technology will provide more stimuli for us to improve our clinical acumen. Hopefully, we shall encounter fewer and fewer surprises within the abdomen in future.

References

1. Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. Am J Epidemiol 1990;132(5):910-25.
2. Schwartz SI. Appendix. In: Schwartz SI, ed. Principles of surgery. 6th ed. New York: McGraw Hill; 1994. p. 1307-18.
3. Rao PM, Rhea JT, Novelline RA, Mostafavi AA, McCabe CJ. Effect of computed tomography of the appendix on treatment of patients and use of hospital resources. N Engl J Med 1998;338(3):141-6.
4. Chung CH, Ng CP, Lai KK. Delays by patients, emergency physicians, and surgeons in the management of acute appendicitis: retrospective study. Hong Kong Med J 2000;6(3):254-9.
5. Ng CP, Chung CH. An analysis of unscheduled return visits to the accident and emergency department of a general public hospital. Hong Kong J Emerg Med 2003; 10(3):153-61.
6. Mace SE. Issues in pediatric emergency medicine. Foresight 1999;47:5-6.
7. Domeier RM. Acute appendicitis. Foresight 1996;39: 1-5.
8. Rothrock SG, Skeoch G, Rush JJ, Johnson NE. Clinical features of misdiagnosed appendicitis in children. Ann Emerg Med 1991;20(1):45-50.
9. Deutsch A, Leopold GR. Ultrasonic demonstration of the inflamed appendix: case report. Radiology 1981; 140(1):163-4.
10. Curtin KR, Fitzgerald SW, Nemcek AA Jr, Hoff FL, Vogelzang RL. CT diagnosis of acute appendicitis: imaging findings. AJR Am J Roentgenol 1995;164(4): 905-9.
11. Poortman P, Lohle PN, Schoemaker CM, Oostvogel HJ, Teepen HJ, Zwinderman KA, et al. Comparison of CT and sonography in the diagnosis of acute appendicitis: a blinded prospective study. AJR Am J Roentgenol 2003;181(5):1355-9.
12. Blebea JS, Meilstrup JW, Wise SW. Appendiceal imaging: which test is best? Semin Ultrasound CT MR 2003;24(2):91-5.
13. Rao PM, Rhea JT, Novelline RA, McCabe CJ, Lawrason JN, Berger DL, et al. Helical CT technique for the diagnosis of appendicitis: prospective evaluation of a focused appendix CT examination. Radiology 1997;202 (1):139-44.
14. Cobben LP, Groot I, Haans L, Blickman JG, Puylaert J. MRI for clinically suspected appendicitis during pregnancy. AJR Am J Roentgenol 2004;183(3):671-5.
15. Ohmann C, Yang Q, Franke C. Diagnostic scores for acute appendicitis. Abdominal Pain Study Group. Eur J Surg 1995;161(4):273-81.