Diagnostic Approach and Management of Acute Abdominal Pain

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ABSTRACT

The incidence of acute abdominal pain ranges between 5-10% of all visits at emergency department. Abdominal emergencies of hospital visits may include surgical and non-surgical emergencies. The most common causes of acute abdomen are appendicitis, biliary colic, cholecystitis, diverticulitis, bowel obstruction, visceral perforation, pancreatitis, peritonitis, salpingitis, mesenteric adenitis and renal colic. Good skills in early diagnosis require a sound knowledge of basic anatomy and physiology of gastrointestinal tract, which are reflected during history taking and particularly, physical examination of the abdomen. Advanced diagnostic approaches such as radiography and endoscopy enhance the treatment for acute abdomen including pharmacological and surgical treatment. Therapeutic endoscopy, interventional radiology treatment and therapy using adult laparoscopy are the common modalities for treating patients with acute abdomen.

Key words: abdominal pain, acute abdomen, history taking, abdominal physical examination.

INTRODUCTION

Abdominal pain is one of common problems encountered by doctors, either in primary or secondary health care (specialists). It may be mild, but it may also a life-threatening sign. It has been estimated that almost 50% adults have experienced abdominal pain and it accounts for 5–10% of all emergency visits. Cautious care should be taken when dealing with elderly patients (>65 years) who suffered from abdominal pain since they are at 6-8 times greater risk for mortality, especially if the final diagnosis cannot be established in the Emergency Department.

In general, abdominal pain is categorized based on the onset as acute or chronic pain. Sudden onset of abdominal pain that lasts for less than 24 hours is considered as acute abdominal pain. This article will have greater focus on acute
abdominal pain as it is one of gastroenterology emergencies.

**DEFINITION**

Acute abdominal pain or better known as acute abdomen is defined as tremendous severe pain (which has maximal score when being described through VAS – visual analog score scoring system) arising the abdominal area and requires immediate care. It is an abdominal emergency situation that may be caused by surgical or non-surgical problems. Therefore, as clinicians, especially those who provide primary health care must be able to identify the case as either surgical or non-surgical case.

Good skills in early diagnosis require a sound knowledge of basic anatomy and physiology of gastrointestinal tract, which are reflected during history taking and physical examination. When dealing with acute abdominal pain, a series of questions should be automatically come to our thought that will help us to establish the diagnosis, such as: what are the characteristics of pain? (Is the pain localized or diffused all over the abdomen?); which organs that possibly involved by considering the location of abdominal pain? which kind of pain receptors that probably involved? (visceral or somatic); are there any gastrointestinal dysfunction associated with the pain?; what are the possible cause of the pain? Moreover, the most important question includes whether it requires surgical intervention or only need conservative treatment.

**ANATOMY AND PHYSIOLOGY**

Generally, abdominal pain is divided into visceral and parietal components. Visceral pain is transmitted by C nerve fibers that commonly found in muscle, periosteum, mesentery, peritoneum and viscera. Most of nociception from abdominal visceral is conveyed by this type of fiber and tends to be interpreted as dull, cramping, burning sensation, poorly localized. It is also more likely to have greater variation and
duration compared to the somatic pain. Visceral pain is usually perceived to be in the epigastrium, periumbilical or hypogastrium. It occurs since the visceral organs in the abdomen transmit sensory afferent stimuli to both sides of the spinal cord (Figure 1).\(^9,10\) Moreover, visceral pain is poorly localized due to lower number of nerve endings in visceral organ than other organs such as the skin and since the innervations of viscera is multisegmental.

Parietal pain is conveyed by A-\(\delta\) fibers, which are abundantly found in the skin and muscle. The stimuli of this nerve pathway are perceived as the sharp, sudden and well-localized pain mimicking the pain that follows acute injury. The pain is often aggravated by movement or vibration. Parietal pain due to inflammation of parietal peritoneum is usually more intense and localized than visceral. For example, in acute appendicitis, the early pain is periumbilical visceral pain, which is followed by the localized somatoparietal pain at McBurney’s point produced by inflammatory process of the parietal peritoneum.

The term of referred pain is defined as the pain felt far from the involved organs. It occurs when there is a convergence of visceral afferent neurons with parietal afferent neurons from different anatomic regions on second-order neurons in the spinal cord at the same spinal segment. The abovementioned Figure 2 illustrates how the inflammatory process in diaphragm due to spleen rupture or subphrenic hematoma can be perceived as shoulder pain (the Kehr sign); while Table 1 demonstrates the common sites of referred pain that mostly have been reported.\(^9,10\)

**ETIOLOGY**

Acute abdominal pain may be caused by various etiologies as indicated by the following Table 2. A study conducted by Irvin found that the most common causes of acute abdominal pain in the Emergency Department are non-specific abdominal pain (35%), appendicitis (17%), bowel obstruction (15%), urology causes (6%), biliary disorder (5%), diverticular disease (4%) and pancreatitis (2%).\(^9\)

The most common causes of acute abdomen are appendicitis, biliary colic, cholecystitis, diverticulitis, bowel obstruction, visceral perforation, pancreatitis, peritonitis, salpingitis, mesenteric adenitis, and renal colic. Moreover, there are less common causes of acute abdomen including hepatoma necrosis, splenic infarction, myocardial infarction, diabetic ketoacidosis, inflammatory aneurysma, sigmoid, caecum or stomach volvulus and a manifestation of herpes zoster.\(^9,11\)

Occasionally, the etiology of abdominal pain can be predicted based on its location and the type of pain, which may help doctors in establishing the diagnosis. The etiologies of pain based on the location is illustrated in Figure 3 (3-1 up to 3-3) and the following Figure 4.

In addition to abdominal pain, the presence of other complaints should also be noticed. Patients may have other problems including nausea, vomiting, anorexia, bloating, watery stool or constipation. Anorexia occurs in almost all causes of acute abdomen, particularly acute appendicitis and acute cholecystitis; however, it is rarely found in urology or gynecology cases. Vomiting
is a common early complaint of acute abdominal pain. It is assumed that this condition is due to reflex stimulation of medullary vomiting center. Vomiting reflex in early acute abdomen usually is not progressive. Nevertheless, bowel obstruction should be considered when there is progressive and continuous vomiting accompanied with severe abdominal pain.

Abdominal pain, which is accompanied with abdominal distention due to excessive gas, should be considered as a sign of ileus or bowel obstruction. Other complaints of obstipation resulted from disrupted bowel passage that associated with absence of flatus and the presence of abdominal distention should increase our awareness on the possibility of ileus or bowel obstruction. In contrast, abdominal pain that accompanied with constipation but without distention, which often occur in elderly, should be considered as possible diverticulitis. If abdominal pain is accompanied with bloody watery stools, then the possibility of IBD (inflammatory bowel disease) should be considered along with differential diagnosis of mesenteric ischemia or possible thrombosis of mesenteric veins.8,9,11

PHYSICAL EXAMINATION

Besides a thorough history taking, abdominal physical examination is the main key assistance in establishing the diagnosis. We should begin physical examination by assessing the patient’s general appearance and the ABC (Airway, Breathing, Circulation) status. The patient’s ability to converse, breathing pattern, potion in bed and facial expression should be observed carefully. Obese patient should be asked about unusual abdominal enlargement. Assessment of bowel sound (auscultation) should be conducted before doing other examination maneuvers (palpation or percussion). Perform auscultation for at least two minutes and on more than one abdominal region before concluding any diminished bowel sound.

Several characteristic signs are often used to assist doctors in considering the causes of abdominal pain. For example, the Murphy’s sign, i.e. right upper quadrant tenderness during palpation produced when the patient takes a deep inspiration. It is a sensitive, but not a specific sign for acute cholecystitis. Another sign, e.g. the presence of tenderness during palpation and patient’s reaction after the palpation accompanied with rigidity at McBurney’s point (1/3 of the way between the umbilicus and spina iliaca anterior superior) is quite sensitive to indicate acute appendicitis. Corvoisier sign (a palpable gallbladder) in patient with clinical jaundice is sensitive enough to bring the suspicion for possible pancreatic periampula tumor. The presence of Cullen’s sign, i.e. periumbilical ecchymosis may
be useful to indicate hemoperitoneum. In the endemic area of tuberculosis such as Indonesia, the presence of chest board phenomenon may suggest tuberculosis peritonitis.\textsuperscript{9-11}

The pelvic organs and external genitalia should be also examined in every patient with acute abdominal pain. Rectal touché (digital rectal examination) or vaginal touché may occasionally provide additional valued information. Evaluation of gynecologic abnormality should be performed in all female patients with acute abdominal pain.

**LABORATORY TESTS**

Although meticulous history taking and appropriate physical examination have major part in establishing the etiology of acute abdominal pain, the role of laboratory tests cannot be disregarded. In fact, all patients with acute abdominal pain should have a complete peripheral blood count (including differential count of leukocytes), determination of serum electrolyte, ureum, creatinine, blood glucose and urinalysis. Pregnancy testing should be performed in all women of reproductive age with abdominal pain. Liver function tests and determination of serum amylase level should be ordered in patients with abdominal pain of upper right quadrant, either with or without clinical jaundice.\textsuperscript{9-11}

Three-position plain abdominal radiographs should be done to determine the presence of perforation signs, ileus and bowel obstruction. Plain abdominal radiographs may be helpful in evaluating pancreatic calcification, vertebral fracture and radiolucent stone of renal contour. Another routine test is abdominal ultrasonography (abdominal USG), which may reveal disrupted hepatobiliary system, urinary tract and gynecologic tract as well as the acute appendicitis.

Nowadays, other imaging tests such as colon in loop, gastrointestinal endoscopy, abdominal CT-scan, MRI CT arteriography have been increasingly used. However, those tests should be ordered appropriately and consistent with the indication considering that the cost is still relatively high.
The summary of diagnostic approach and the necessary diagnostic tests for patients with abdominal pain is presented in Figure 5.

### REFERENCES


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The treatment for acute abdomen includes pharmacological and surgical treatment. Therapeutic endoscopy, interventional radiology treatment and therapy using adult laparoscopy are the common modalities for treating patients with acute abdomen.

Several studies reported that early treatment by administering analgesics may provide pain relief and does not obscure diagnosis. The analgesics that frequently used are opioids. In addition, appropriate antibiotics should be provided in accordance with the indication, e.g. for peritonitis. In some conditions, empirical antibiotic treatment may be given when establishing the working diagnosis of abdominal pain without waiting for the results of culture tests.9

In general, the management of patient with acute abdomen ultimately includes the determination whether the case is surgical case which requires surgical treatment. Moreover, if the surgery may not be performed immediately, we should decide when the surgery will be performed.

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**Figure 4.** Summary of differential diagnosis for abdominal pain based on its location. IBD=inflammatory bowel disease.
