REVIEW

Initial approach to the patient with abdominal pain

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Abstract

Abdominal pain is one of the most common symptoms for which patients present to the hospital. The causes of abdominal pain are diverse, so the diagnosis management often involves a multidisciplinary team. The initial evaluation of patients with abdominal pain must focus on excluding conditions that may endanger the patient's life in short time. The prognosis of patients complaining of abdominal pain proved to be different depending on age. Despite the progress registered in the field of imaging and molecular investigations in recent years, in a significant percentage of patients who present with abdominal pain, the cause is not identified.

Keywords: *abdominal pain, etiology, diagnosis, prognosis.*

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Introduction

Worldwide, an increase in the demand for emergency medical services has been observed [1]. Among the reasons suggested for this phenomenon are ageing of the population, the increase in health awareness and socio-demographic factors [2,3].

Abdominal pain is one of the most frequent symptoms that determine the patients to present to the emergency department [4]. This symptom is encountered in approximately 5-10% of emergency departments visits [5,6]. In the United States, in 2006, of the 119 million presentations in emergency departments, 8 million presentations (7%) were for abdominal pain [6]. In Western Sweden, for the year 2020, 48,311 ambulance missions were reported and in 1,747 cases the reason for the request was represented by abdominal pain [3]. Despite the progress made in the diagnosis management of abdominal pain, in approximately 25% of patients receiving medical care in emergency departments and in 35-41% of hospitalized patients no specific cause for abdominal pain is identified [7,8]. In approximately 80% of patients discharged with the diagnosis of undifferentiated abdominal pain, this symptom resolves within 2 weeks of presentation [8].

Abdominal pain is associated with a different prognosis depending on age. Thus, older patients presenting to emergency departments with abdominal pain have a 6-8 times higher mortality rate compared to younger patients presenting for the same symptom [9,10]. 20% of adults who presented

to emergency departments are aged > 65 years and in 3-4% of cases they complain of abdominal pain as the dominant symptom [9,10]. Up to two thirds of these patients required hospitalization and one third required surgical interventions [5,11].

Differential diagnosis

Conditions that can lead to abdominal pain are divided into three categories: immediate life-threatening conditions, common conditions and other conditions (Table 1) [12-15].

Table 1. Classification of conditions that cand lead to abdominal pain, depending on severity

Immediate life-threatening conditions			
1. Abdominal aortic aneurysm 2. Mesenteric ischemia 3. Acute bowel obstruction 4. Intestinal volvulus 5. Perforation of gastrointestinal tract 6. Ectopic pregnancy 7. Myocardial infarction 8. Splenic rupture			
Common conditions			
Gastrointestinal - Appendicitis - Biliary disease - Pancreatitis - Diverticular disease - Peptic ulcer disease - Incarcerated hernia - Gastroenteritis - Foodborne disease - Complications of bariatric surgery - Inflammatory bowel disease - Hepatitis - Spontaneous bacterial peritonitis - Irritable bowel syndrome	**Genitourinary** - Urinary tract infection - Pyelonephritis - Nephrolithiasis - Adnexal torsion - Ruptured ovarian cyst - Preeclampsia - Pelvic inflammatory disease - Tubo-ovarian abscess - Fitz-Hugh Curtis syndrome - Endometriosis	**Common extra abdominal diseases** - Diabetic ketoacidosis - Alcoholic ketoacidosis - Pneumonia - Pulmonary embolus - Herpes zoster	**Trauma-related**
Other conditions			
1. Toxin/drug- related (corrosives, anticholinergics and narcotics, amphetamines, etc) 2. Neoplasms 3. Sickle cell disease 4. Toxic megacolon 5. Mesenteric lymphadenitis 6. Porphyria 7. Infectious mononucleosis 8. Systemic lupus erythematosus, Immunoglobulin A vasculitis, polyarteritis nodosa, eosinophilic enteritis, hypercalcemia 9. Pheochromocytoma 10. Ovarian hyperstimulation syndrome			

Considering the diverse etiology of abdominal pain, the patient evaluation in the emergency department is a challenge. Doctors must consider multiple possible diagnoses but focus on the conditions that can threaten the patient's life and require rapid management. The cornerstone of an accurate diagnosis consists in the combination of a careful history and physical examination [14]. Thus, the physician must obtain a series of information from the patient, such as the complete description of the pain, associated symptoms, the social, medical and surgical history [14]. In elderly patients we can expect more severe conditions, with atypical symptoms [16]. According to the data from specialized literature, after 50 years of age, the risk of mesenteric ischemia, abdominal aortic aneurysm, myocardial infarction with atypical presentation and colon cancer increases [17]. In women of childbearing age who present with abdominal pain, pregnancy and its complications (ectopic pregnancy, preeclampsia, HELLP syndrome, hemolysis, etc) should be excluded. Also, the pregnant women may present common conditions such as appendicitis or cholecystitis.

Other data that can guide towards a specific etiology are medical and surgical history, as well as outpatient medication. For example, peripheral vascular disease, atrial fibrillation, coronary heart disease, arterial hypertension are common risk factors for mesenteric ischemia [18,19]. The presence of atrial fibrillation in women particularly increases the risk of thromboembolic events [20]. In patients with history of abdominal surgery, it is recommended to rule out intestinal obstruction in case of presentation to the emergency room with abdominal pain. Yang *et al.* reported several independent risk factors for early postoperative intestinal obstruction, respectively chronic obstructive pulmonary disease (COPD), hypothyroidism, duration of antibiotics therapy, and duration of postoperative feeding [21]. The use of drugs such as nonsteroidal anti-inflammatory drugs (NSAIDs) increases the risk of peptic ulcer, while the use of corticosteroids may mask some symptoms [22,23]. The use of NSAIDs is associated with an increase in the risk of peptic ulcer by approximately 9% in patients who associate other risk factors, such as older patients (>65 years), heart disease, coprescription of anticoagulants, antiplatelets or corticosteroids, Helicobacter pylori infection, history of peptic ulcer [22-24].

Obtaining data on alcohol consumption or smoking can be of great importance in diagnosis management. Thus, in the case of patients who claim chronic alcohol consumption, we can expect to identify pancreatitis, alcoholic hepatitis or spontaneous bacterial peritonitis as causes of abdominal pain. A study that followed 157,026 individuals reported that alcohol consumption >40 g/day increases the risk for both acute and chronic pancreatitis [25]. In the United States, excessive alcohol consumption is the third preventable cause of death [26]. Alcoholic hepatitis is a condition with a very poor prognosis and a 28-day mortality rate of 30-50% [27]. In addition, approximately 50% of patients with alcoholic hepatitis already have a positive diagnosis of liver cirrhosis at the time of presentation to emergency department with manifestations of acute hepatitis [28]. Patients addicted to opioids may experience abdominal pain and nausea when withdrawing from opioids [29]. Smoking has been shown to increase the risk of malignant diseases such as bladder or pancreatic cancer [31,31].

Paraclinical assessment

To increase the diagnostic accuracy, the clinical evaluation must be continued with individualized paraclinical tests depending on the risk factors and patient's symptoms. A study that included 124 patients concluded that the paraclinical evaluation in the emergency department changed the initial diagnosis, based only on clinical judgment, in 37% of cases [15]. Paraclinical investigations fall into two major categories: biological investigations and imaging investigations. In a healthy adult caution is recommended in requesting paraclinical tests. Thus, paraclinical investigations should be requested specifically to validate a clinical suspicion. In elderly patients or those with significant comorbidities,

the diagnosis management must be extensive, to avoid diagnostic errors, even life-threatening.

In patients known with type 2 diabetes mellitus, immediate evaluation of the serum glucose level is recommended to rule out diabetic ketoacidosis [32]. If hyperglycemia is identified, it is recommended to continue the investigations by evaluating acid-base balance and the serum values of electrolytes, to establish the severity of the disease [32,33].

The complete blood count is routinely required, but it rarely changes the diagnostic and therapeutic management of patients. For example, the number of leukocytes can be increased in 80% of patients with acute appendicitis, but also in 70% of patients with other causes of pain in the lower abdomen [34]. Also, immunosuppressed or elderly patients with acute abdomen may have a normal number of leukocytes, while a healthy pregnant woman may present leukocytosis [35,36].

In patients presenting with upper abdominal pain, the assessment of liver and pancreatic enzymes is recommended [37,38]. Increased serum values of lipase are more sensitive and specific than increased serum values of amylase for establishing the diagnosis of acute pancreatitis [39]. However, the positive predictive values of hyperlipasemia for acute pancreatitis does not exceed 38.1% [40]. Other diseases in which increased values of serum lipase can be found are malignancy, shock or cardiac arrest [40]. Alanine aminotransferase (ALT) is a more specific biomarker for liver damage, but elevated serum values of aspartate aminotransferase (AST) may be more specific for the diagnosis of alcoholic liver disease or some forms of autoimmune hepatitis [38].

Another paraclinical test useful to establish the etiology of abdominal pain is urine analysis. Thus, the presence of leukocytes, nitrites, proteins or erythrocytes in the urine can suggest the diagnosis of urinary tract infections (UTI) [41]. Approximately 10% of women between the ages of 16 and 35 years develop an episode of UTI annually and approximately 40-60% of women have at least one episode of UTI during their lifetime [42,43]. Urine analysis can be also misleading. For example, in 20-48% of patients with appendicitis we can identify the presence of erythrocytes and leukocytes in urine and up to 55% of patients with abdominal aortic aneurysm can present hematuria [44,45].

The imaging investigations that can be used for the initial assessment of patients with abdominal pain are abdominal X-ray, abdominal ultrasound and computed tomography (CT) scan. Abdominal X-ray should be limited to patients suspected of having a radiopaque foreign body, bowel obstruction or bowel perforation [46]. In the other cases, this investigation has a very low diagnostic sensitivity [46]. Abdominal ultrasound is a feasible imaging method, with significant diagnostic accuracy and low costs [47]. For example, a meta-analysis that evaluated 18 studies reported an overall sensitivity of 77.2% and a specificity of 60% for establishing the diagnosis of acute appendicitis [47]. Also, this investigation can contribute to the rapid diagnosis of some diseases that can put the patient's life in danger in short time. Among these are abdominal aortic aneurysm leak or rupture, traumatic hemoperitoneum or ruptured ectopic pregnancy [48]. However, the diagnostic accuracy of this investigation depends very much on the experience of the evaluator [49]. The imaging method of choice for evaluating the patient with undifferentiated abdominal pain is CT scan [50]. In approximately two-thirds of the patients who present to the emergency room with abdominal pain, CT identifies a cause of this symptom [50]. Later, depending on the risk factors, symptoms and the results of initial paraclinical investigations, the diagnostic management will adapt specifically.

Conclusions

Abdominal pain is one of the most common symptoms that patients present to the emergency room. The severity of the conditions behind the abdominal pain varies from very low to conditions that can put patient's life at risk in short time. The correct initial evaluation from a clinical and paraclinical point of view is essential for the subsequent evolution of the disease.

Author Contributions:

V.A.I and G.G. conceived the original draft preparation. V.A.I., G.G., and F.G1. were responsible for conception and design of the review. V.A.I., G.G. and F.G2. were responsible for the data acquisition. F.G2, was responsible for the collection and assembly of the articles/published data, and their inclusion and interpretation in this review. V.A.I., G.G., F.G1., and F.G2. contributed equally to the present work. All authors contributed to the critical revision of the manuscript for valuable intellectual content. All authors have read and agreed with the final version of the manuscript.

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