HARRISON'S PRINCIPLES OF INTERNAL MEDICINE — 22nd Edition

Abdominal Pain

Chapter 16 | Part 2: Cardinal Manifestations and Presentation of Diseases | Part 2 – Cardinal Manifestations & Presentation | DETAILED EDITION

KEY CLINICAL POINTS

1. Pain severity does not necessarily correlate with disease severity; the mildest abdominal pain could be catastrophic.
2. Pain of parietal peritoneal inflammation is steady and aching, transmitted by somatic nerves, and accentuated by movement (coughing, sneezing).
3. Pain of hollow viscus obstruction is intermittent or colicky; distention may produce steady pain with rare paroxysms.
4. Pain of vascular occlusion (e.g., superior mesenteric artery) often presents with pain out of proportion to physical findings.
5. Referred pain from thoracic sources (e.g., myocardial infarction, pneumonia) must be considered in every patient with upper abdominal pain.
6. Immunocompromised patients may lack normal physiologic responses (fever, leukocytosis) to intraabdominal disease.
7. Leukocytosis is not a reliable indicator of surgical necessity; a count >20,000/μL can occur with pancreatitis or cholecystitis.
8. Functional disorders like IBS are diagnosed by clinical criteria after exclusion of structural abnormalities.
9. Narcotics or analgesics should not be withheld until a definitive diagnosis is made; obfuscation of diagnosis is unlikely.
10. In cases of massive intraabdominal hemorrhage, there are no absolute contraindications to operation.

FIGURES IN THIS CHAPTER

No figures extracted.

1. DEFINITION & OVERVIEW

Correctly diagnosing acute abdominal pain can be quite challenging. In every instance, the clinician must distinguish those conditions that require urgent intervention from those that do not and are best managed nonoperatively. A diagnosis of 'acute surgical abdomen' is not acceptable because of its often misleading and erroneous connotations. Although most patients who present with acute abdominal pain will have self-limited disease processes, it is important to remember that pain severity does not necessarily correlate with the severity of the underlying condition.

2. ETIOLOGY & PATHOPHYSIOLOGY

The etiologic classification provides a useful framework for evaluating patients with abdominal pain. Pain mechanisms are categorized by origin: originating in the abdomen, referred from extraabdominal sources, vascular disturbances, abdominal wall, metabolic, neurologic/psychiatric, toxic, and uncertain mechanisms.

2.1 Mechanisms of Pain Originating in the Abdomen

Pain originating in the abdomen is classified by the specific pathology affecting the peritoneum, viscera, or vasculature.

Table 1 **Table 16-2: Some Important Causes of Abdominal Pain**

Category	Specific Causes
Pain Originating in the Abdomen	Parietal peritoneal inflammation (Bacterial contamination, Perforated appendix or other perforated viscus, Pelvic inflammatory disease, Chemical irritation, Perforated ulcer, Pancreatitis, Mittelschmerz, Mechanical obstruction of hollow viscera, Obstruction of the small or large intestine, Obstruction of the biliary tree, Obstruction of the ureter, Appendicitis, Typhoid fever, Neutropenic enterocolitis or 'typhlitis')
Vascular Disturbances	Embolism or thrombosis, Vascular rupture, Pressure or torsional occlusion, Sickle cell anemia
Abdominal Wall	Distortion or traction of mesentery, Trauma or infection of muscles, Distension of visceral surfaces (e.g., by hemorrhage), Hepatic or renal capsules, Inflammation
Pain Referred from Extraabdominal Source	Cardiothoracic (Pleurodynia, Acute myocardial infarction, Myocarditis, endocarditis, Empyema pericarditis, Congestive heart failure, Pneumonia, Pulmonary embolus), Pneumothorax, Esophageal disease, Genitalia (Torsion of the testis)
Metabolic Causes	Diabetes, Uremia, Hyperlipidemia, Hyperparathyroidism, Acute adrenal insufficiency, Familial Mediterranean fever, Porphyria, C1 esterase inhibitor deficiency (angioneurotic edema)
Neurologic/Psychiatric Causes	Herpes zoster, Spinal cord or nerve root compression, Tabes dorsalis, Functional disorders, Causalgia, Psychiatric disorders, Radiculitis
Toxic Causes	Lead poisoning, Insect or animal envenomation, Black widow spider bites, Snake bites
Uncertain Mechanisms	Narcotic withdrawal, Heat stroke

2.2 Pathophysiology of Pain Transmission

• Parietal peritoneal inflammation: The pain is steady and aching in character and is located directly over the inflamed area and is transmitted by somatic nerves. The intensity of the pain is dependent on the type and amount of material to which the peritoneal surfaces are exposed. For example, the sudden release of a small quantity of sterile acidic gastric juice into the peritoneal cavity causes much more pain than the same amount of grossly contaminated pH neutral feces. Because blood is normally only a mild irritant, and the response to urine is also typically bland, exposure of blood and urine to the peritoneal cavity may

go unnoticed unless it is sudden and massive. Bacterial contamination causes low-intensity pain until multiplication causes significant amounts of inflammatory mediators to be released.

2.3 Pathophysiology of Hollow Viscus Obstruction

• Intraluminal obstruction: Classically elicits intermittent or colicky abdominal pain that is not as well localized as the pain of parietal peritoneal irritation. However, the absence of cramping discomfort can be misleading because distention of a hollow viscus may also produce steady pain with only rare paroxysms. Small-bowel obstruction often presents as poorly localized, intermittent periumbilical or supraumbilical pain. As the intestine progressively dilates and loses muscular tone, the colicky nature of the pain may diminish. With superimposed strangulating obstruction, pain may spread to the lower lumbar region if there is traction on the root of the mesentery. The colicky pain of colonic obstruction is of lesser intensity, is commonly located in the infraumbilical area, and may often radiate to the lumbar region.

2.4 Pathophysiology of Vascular Disturbances

• Vascular occlusion: A frequent misconception is that pain due to intraabdominal vascular disturbances is sudden and catastrophic in nature. Certain disease processes, such as embolism or thrombosis of the superior mesenteric artery or impending rupture of an abdominal aortic aneurysm, can certainly be associated with diffuse, severe pain. Yet, just as frequently, the patient with occlusion of the superior mesenteric artery only has mild continuous or cramping diffuse pain for 2 or 3 days before vascular collapse or findings of peritoneal inflammation appear. The early, seemingly insignificant discomfort is caused by hyperperistalsis rather than peritoneal inflammation. Indeed, absence of tenderness and rigidity in the presence of continuous, diffuse pain (e.g., 'pain out of proportion to physical findings') in a patient likely to have vascular disease is quite characteristic of occlusion of the superior mesenteric artery. Abdominal pain with radiation to the sacral region, flank, or genitalia should always signal the possible presence of a rupturing abdominal aortic aneurysm.

2.5 Pathophysiology of Abdominal Wall Pain

• Abdominal wall pain: Pain arising from the abdominal wall is usually constant and aching. Movement, prolonged standing, and pressure accentuate the discomfort and associated muscle spasm. In the relatively rare case of hematoma of the rectus sheath, now most frequently encountered in association with anticoagulant therapy, a mass may be present in the lower quadrants of the abdomen. Simultaneous involvement of muscles in other parts of the body usually serves to differentiate myositis of the abdominal wall from other processes that might cause pain in the same region.

2.6 Pathophysiology of Referred Pain

• Referred pain from thorax, spine, or genitalia: Pain referred to the abdomen from the thorax, spine, or genitalia may present a diagnostic challenge because diseases of the upper part of the abdominal cavity such as acute cholecystitis or perforated ulcer may be associated with intrathoracic complications. A most important, yet often forgotten, dictum is that the possibility of intrathoracic disease must be considered in every patient with abdominal pain, especially if the pain is in the upper abdomen. Diaphragmatic pleuritis resulting from pneumonia or pulmonary infarction may cause pain in the right upper quadrant and pain in the supraclavicular area, the latter radiation to be distinguished from the referred subscapular pain caused by acute distention of the extrahepatic biliary tree. Referred pain of thoracic origin is often accompanied by splinting of the involved hemithorax with respiratory lag and a decrease in excursion more marked than that seen in the presence of intraabdominal disease. In addition, apparent abdominal muscle spasm caused by referred pain will diminish during inspiration, whereas it persists throughout both respiratory phases if it is of abdominal origin. Palpation over the area of referred pain in the abdomen also does not usually accentuate the pain and, in many instances, actually seems to relieve it.

2.7 Pathophysiology of Metabolic Causes

• Metabolic abdominal crises: Pain of metabolic origin may simulate almost any other type of intraabdominal disease. In certain instances, such as hyperlipidemia, the metabolic disease itself may be accompanied by an intraabdominal process such as pancreatitis, which can lead to unnecessary laparotomy unless recognized. C1 esterase deficiency associated with angioneurotic edema is often associated with episodes of severe abdominal pain. Abdominal pain is also the hallmark of familial Mediterranean fever. Rarely, some patients with COVID-19 may present with severe abdominal pain in the absence of pulmonary symptoms. The pain of porphyria and of lead colic is usually difficult to distinguish from that of intestinal obstruction because severe hyperperistalsis is a prominent feature of both. The pain of uremia or diabetes is nonspecific, and the pain and tenderness frequently shift in location and intensity. Diabetic acidosis may be precipitated by acute appendicitis or intestinal obstruction, so if prompt resolution of the abdominal pain does not result from correction of the metabolic abnormalities, an underlying organic problem should be suspected. Black widow spider bites produce intense pain and rigidity of the abdominal muscles and back, an area infrequently involved in intraabdominal disease.

2.8 Pathophysiology of Neurologic/Psychiatric Causes

• Neurogenic causes: Diseases that injure sensory nerves may cause causalgic pain. This pain has a burning character and is usually limited to the distribution of a given peripheral nerve. Stimuli that are normally not painful such as touch or a change in temperature may be causalgic and are often present even at rest. The demonstration of irregularly spaced cutaneous 'pain spots' may be the only indication that an old nerve injury exists. Even though the pain may be precipitated by gentle palpation, rigidity of the abdominal muscles is absent, and the respirations are not usually disturbed. Distention of the abdomen is uncommon, and the pain has no relationship to food intake. Pain arising from spinal nerves or roots comes and goes suddenly and is of a lancinating type. It may be caused by herpes zoster, impingement by arthritis, tumors, a herniated nucleus pulposus, diabetes, or syphilis. It is not associated with food intake, abdominal distention, or changes in respiration. Severe muscle spasms, when present, may be relieved by, but are usually not accentuated by, abdominal palpation. The pain is made worse by movement of the spine and is usually confined to a few dermatomes. Hyperesthesia is very common.

2.9 Pathophysiology of Toxic Causes

• Toxic causes: Lead poisoning, insect or animal envenomation, black widow spider bites, and snake bites can cause abdominal pain.

2.10 Pathophysiology of Uncertain Mechanisms

• Uncertain mechanisms: Narcotic withdrawal and heat stroke may cause abdominal pain.

2.11 Functional Disorders

• Functional causes: Pain due to functional causes conforms to none of the aforementioned patterns. Here mechanisms of disease are not as clearly established. For example, irritable bowel syndrome (IBS) is a functional gastrointestinal disorder characterized by abdominal pain and altered bowel habits. The diagnosis is made on the basis of clinical criteria and after exclusion of demonstrable structural abnormalities. The episodes of abdominal pain may be brought on by stress, and the pain varies considerably in type and location. Nausea and vomiting are rare. Localized tenderness and muscle spasm are inconsistent or absent. The causes of IBS or related functional disorders are not yet understood, although proinflammatory cells and lipotoxic lipids likely play a role.

3. CLINICAL FEATURES

Any patient with abdominal pain of recent onset requires an early and thorough evaluation. The most common causes of abdominal pain on admission are nonspecific abdominal pain, acute appendicitis, pain of

urologic origin, and intestinal obstruction. A diagnosis of 'acute surgical abdomen' is not acceptable because of its often misleading and erroneous connotations. Although most patients who present with acute abdominal pain will have self-limited disease processes, it is important to remember that pain severity does not necessarily correlate with the severity of the underlying condition.

3.1 History Taking

A meticulously executed, detailed history and physical examination are critically important for focusing the differential diagnosis and allowing the diagnostic evaluation to proceed expeditiously. In cases of acute abdominal pain, a diagnosis can be readily established in most instances, whereas success is not so frequent in patients with chronic pain. IBS is one of the most common causes of abdominal pain and must always be kept in mind. The location of the pain can assist in narrowing the differential diagnosis; however, the chronological sequence of events in the patient's history is often more important than the pain's location. Careful attention should be paid to the extraabdominal regions. Narcotics or analgesics should not be withheld until a definitive diagnosis or a definitive plan has been formulated; obfuscation of the diagnosis by adequate analgesia is unlikely. An accurate menstrual history in a female patient is essential. It is important to remember that normal anatomic relationships can be significantly altered by the gravid uterus. Abdominal and pelvic pain may occur during pregnancy due to conditions that do not require operation. Lastly, some otherwise noteworthy laboratory values (e.g., leukocytosis) may represent the normal physiologic changes of pregnancy.

Table 2 Table 16-1: Some Key Components of the Patient's History

Component
Age
Time and mode of onset of the pain
Pain characteristics
Duration of symptoms
Location of pain and sites of radiation
Associated symptoms and their relationship to the pain
Nausea, emesis, and anorexia
Diarrhea, constipation, or other changes in bowel habits
Menstrual history

3.2 Physical Examination

• Inspection: Simple critical inspection of the patient, for example, of facies, position in bed, and respiratory activity, provides valuable clues. The amount of information to be gleaned is directly proportional to the gentleness and thoroughness of the examiner. Once a patient with peritoneal inflammation has been examined brusquely, accurate assessment by the next examiner becomes almost impossible.

3.3 Physical Examination: Palpation and Rebound Tenderness

• Palpation: Eliciting rebound tenderness by sudden release of a deeply palpating hand in a patient with suspected peritonitis is cruel and unnecessary. The same information can be obtained by gentle percussion of the abdomen (rebound tenderness on a miniature scale), a maneuver that can be far more precise and localizing. Asking the patient to cough will elicit true rebound tenderness. The forceful

demonstration of rebound tenderness will startle and induce protective spasm in a nervous or worried patient in whom a reasonably accurate diagnosis can be made before any further true rebound tenderness is not present. A palpable gallbladder will be missed if palpation is so aggressive that voluntary muscle spasm becomes superimposed on involuntary muscular rigidity.

3.4 Physical Examination: Auscultation

• Auscultation: Much attention has been paid to the presence or absence of peristaltic sounds, their quality, and their frequency. Auscultation of the abdomen is one of the least revealing aspects of the physical examination of a patient with abdominal pain. Catastrophes such as a strangulating small-intestinal obstruction or perforated appendicitis may occur in the presence of normal peristaltic sounds. Conversely, when the proximal part of the intestine above obstruction becomes markedly distended and edematous, peristaltic sounds may lose the characteristics of borborygmi and become weak or absent, even when peritonitis is not present. It is usually the severe chemical peritonitis of sudden onset that is associated with the truly silent abdomen.

3.5 Physical Examination: Pelvic and Rectal Examination

• Pelvic and Rectal Examination: Abdominal signs may be minimal but, nevertheless, if accompanied by consistent symptoms, may be exceptionally meaningful. Abdominal signs may be virtually or totally absent in the cases of pelvic peritonitis, so careful pelvic and rectal examinations are mandatory in every patient with abdominal pain. Tenderness on pelvic or rectal examination in the absence of other abdominal signs can be caused by operative indications such as perforated appendicitis, diverticulitis, twisted ovarian cyst, and many others.

3.6 Referred Pain Characteristics

• Thoracic origin: Referred pain of thoracic origin is often accompanied by splinting of the involved hemithorax with respiratory lag and a decrease in excursion more marked than that seen in the presence of intraabdominal disease. In addition, apparent abdominal muscle spasm caused by referred pain will diminish during inspiration, whereas it persists throughout both respiratory phases if it is of abdominal origin. Palpation over the area of referred pain in the abdomen also does not usually accentuate the pain and, in many instances, actually seems to relieve it. Thoracic disease and abdominal disease frequently coexist and may be difficult or impossible to differentiate. For example, the patient with known biliary tract disease often has epigastric pain during myocardial infarction, or biliary colic may be referred to the precordium or left shoulder in a patient who has suffered previously from angina pectoris.

3.7 Referred Pain from Spine

• Spinal origin: Pain arising from spinal nerves or roots comes and goes suddenly and is of a lancinating type. It may be caused by herpes zoster, impingement by arthritis, tumors, a herniated nucleus pulposus, diabetes, or syphilis. It is not associated with food intake, abdominal distention, or changes in respiration. Severe muscle spasms, when present, may be relieved by, but are usually not accentuated by, abdominal palpation. The pain is made worse by movement of the spine and is usually confined to a few dermatomes. Hyperesthesia is very common.

3.8 Referred Pain from Genitalia

• Genital origin: Pain referred to the abdomen from the testes or seminal vesicles is generally accentuated by the presence or absence of various degrees of 'hunger' is unreliable as a sole indicator of the severity of intraabdominal disease.

3.9 Metabolic Pain Characteristics

• Metabolic: The pain of uremia or diabetes is nonspecific, and the pain and tenderness frequently shift in location and intensity. Diabetic acidosis may be precipitated by acute appendicitis or intestinal

obstruction, so if prompt resolution of the abdominal pain does not result from correction of the metabolic abnormalities, an underlying organic problem should be suspected. Black widow spider bites produce intense pain and rigidity of the abdominal muscles and back, an area infrequently involved in intraabdominal disease.

3.10 Immunocompromised Patients

• Immunocompromised: Evaluating and diagnosing causes of abdominal pain in immunosuppressed or otherwise immunocompromised patients is very difficult. This includes those who have undergone organ transplantation; who are receiving immunosuppressive treatments for autoimmune diseases, chemotherapy, or glucocorticoids; who have AIDS; and who are very old. In these circumstances, normal physiologic responses may be absent or masked. In addition, unusual infections may cause abdominal pain where the etiologic agents include cytomegalovirus, mycobacteria, protozoa, and fungi. These pathogens may affect all gastrointestinal organs, including the gallbladder, liver, and pancreas, as well as the gastrointestinal tract, causing occult or overtly symptomatic perforations of the latter. Splenic abscesses due to Candida or Salmonella infection should also be considered, especially when evaluating patients with left upper quadrant or left flank pain. Acalculous cholecystitis may be observed in immunocompromised patients or those with AIDS, where it is often associated with cryptosporidiosis or cytomegalovirus infection. Neutropenic enterocolitis (typhlitis) is often identified as a cause of abdominal pain and fever in some patients with bone marrow suppression due to chemotherapy. Acute graft-versus-host disease should be considered in this circumstance. Optimal management of these patients requires meticulous follow-up including serial examinations to assess the need for more surgical intervention, for example, to address perforation.

3.11 Neurogenic Pain Characteristics

• Neurogenic: Diseases that injure sensory nerves may cause causalgic pain. This pain has a burning character and is usually limited to the distribution of a given peripheral nerve. Stimuli that are normally not painful such as touch or a change in temperature may be causalgic and are often present even at rest. The demonstration of irregularly spaced cutaneous 'pain spots' may be the only indication that an old nerve injury exists. Even though the pain may be precipitated by gentle palpation, rigidity of the abdominal muscles is absent, and the respirations are not usually disturbed. Distention of the abdomen is uncommon, and the pain has no relationship to food intake.

3.12 Toxic Pain Characteristics

• Toxic: Lead poisoning, insect or animal envenomation, black widow spider bites, and snake bites can cause abdominal pain.

3.13 Uncertain Mechanisms

• Uncertain: Narcotic withdrawal and heat stroke may cause abdominal pain.

3.14 Functional Disorders

• Functional: Pain due to functional causes conforms to none of the aforementioned patterns. Here mechanisms of disease are not as clearly established. For example, irritable bowel syndrome (IBS) is a functional gastrointestinal disorder characterized by abdominal pain and altered bowel habits. The diagnosis is made on the basis of clinical criteria and after exclusion of demonstrable structural abnormalities. The episodes of abdominal pain may be brought on by stress, and the pain varies considerably in type and location. Nausea and vomiting are rare. Localized tenderness and muscle spasm are inconsistent or absent. The causes of IBS or related functional disorders are not yet understood, although proinflammatory cells and lipotoxic lipids likely play a role.

4. DIFFERENTIAL DIAGNOSIS

The location of the pain can assist in narrowing the differential diagnosis. The chronological sequence of events in the patient's history is often more important than the pain's location. Careful attention should be paid to the extraabdominal regions. Systematic questioning and examination directed toward detecting myocardial or pulmonary infarction, pneumonia, pericarditis, or esophageal disease (the intrathoracic diseases that most often masquerade as abdominal emergencies) will often provide sufficient clues to establish the proper diagnosis.

4.1 Differential Diagnoses by Location

The location of the pain can assist in narrowing the differential diagnosis. The chronological sequence of events in the patient's history is often more important than the pain's location.

Table 3 Table 16-3: Differential Diagnoses of Abdominal Pain by Usual Location

Location	Differential Diagnoses
Right Upper Quadrant	Cholecystitis, Cholangitis, Pancreatitis, Pneumonia/empyema, Pleurisy/pleurodynia, Subdiaphragmatic abscess, Hepatitis, Budd-Chiari syndrome
Epigastric	Peptic ulcer disease, Gastritis, GERD, Pancreatitis, Myocardial infarction, Pericarditis, Ruptured aortic aneurysm, Esophagitis
Left Upper Quadrant	Splenic infarct, Splenic rupture, Splenic abscess, Gastritis, Gastric ulcer, Pancreatitis, Subdiaphragmatic abscess
Right Lower Quadrant	Appendicitis, Early appendicitis, Gastroenteritis, Inguinal hernia, Ectopic pregnancy, Nephrolithiasis
Periumbilical	Gastroenteritis, Bowel obstruction, Irritable bowel syndrome, Mesenteric lymphadenitis, Inflammatory bowel disease
Left Lower Quadrant	Diverticulitis, Salpingitis, Inguinal hernia, Ectopic pregnancy, Nephrolithiasis, Inflammatory bowel disease
Diffuse Nonlocalized Pain	Gastroenteritis, Mesenteric ischemia, Bowel obstruction, Irritable bowel syndrome, Peritonitis, Diabetes, Malaria, Familial Mediterranean fever, Metabolic diseases, Psychiatric disease

4.2 Intrathoracic Mimics

- Myocardial infarction: A most important, yet often forgotten, dictum is that the possibility of intrathoracic disease must be considered in every patient with abdominal pain, especially if the pain is in the upper abdomen. Diaphragmatic pleuritis resulting from pneumonia or pulmonary infarction may cause pain in the right upper quadrant and pain in the supraclavicular area, the latter radiation to be distinguished from the referred subscapular pain caused by acute distention of the extrahepatic biliary tree. The ultimate decision as to the origin of abdominal pain may require deliberate and planned observation over a period of several hours, during which repeated questioning and examination will provide the diagnosis or suggest the appropriate studies.

4.3 Referred Pain Differentiation

- Referred pain of thoracic origin: Referred pain of thoracic origin is often accompanied by splinting of the involved hemithorax with respiratory lag and a decrease in excursion more marked than that seen in the presence of intraabdominal disease. In addition, apparent abdominal muscle spasm caused by referred

pain will diminish during inspiration, whereas it persists throughout both respiratory phases if it is of abdominal origin. Palpation over the area of referred pain in the abdomen also does not usually accentuate the pain and, in many instances, actually seems to relieve it. Thoracic disease and abdominal disease frequently coexist and may be difficult or impossible to differentiate. For example, the patient with known biliary tract disease often has epigastric pain during myocardial infarction, or biliary colic may be referred to the precordium or left shoulder in a patient who has suffered previously from angina pectoris.

4.4 Spinal Pain Differentiation

• Spinal pain: Pain arising from spinal nerves or roots comes and goes suddenly and is of a lancinating type. It may be caused by herpes zoster, impingement by arthritis, tumors, a herniated nucleus pulposus, diabetes, or syphilis. It is not associated with food intake, abdominal distention, or changes in respiration. Severe muscle spasms, when present, may be relieved by, but are usually not accentuated by, abdominal palpation. The pain is made worse by movement of the spine and is usually confined to a few dermatomes. Hyperesthesia is very common.

4.5 Functional Disorders

• Functional disorders: Pain due to functional causes conforms to none of the aforementioned patterns. Here mechanisms of disease are not as clearly established. For example, irritable bowel syndrome (IBS) is a functional gastrointestinal disorder characterized by abdominal pain and altered bowel habits. The diagnosis is made on the basis of clinical criteria and after exclusion of demonstrable structural abnormalities. The episodes of abdominal pain may be brought on by stress, and the pain varies considerably in type and location. Nausea and vomiting are rare. Localized tenderness and muscle spasm are inconsistent or absent. The causes of IBS or related functional disorders are not yet understood, although proinflammatory cells and lipotoxic lipids likely play a role.

5. INVESTIGATIONS & DIAGNOSIS

Laboratory examinations may be valuable in assessing the patient with abdominal pain, yet, with few exceptions, they rarely establish a diagnosis. Leukocytosis should never be the single deciding factor as to whether or not operation is indicated. A white blood cell count >20,000/µL may be observed with perforation of a viscus, but pancreatitis, acute cholecystitis, pelvic inflammatory disease, and intestinal infarction may also be associated with marked leukocytosis. A normal white blood cell count is not rare in cases of perforation of a viscus. In the examination, simple critical inspection of the patient, for example, of facies, position in bed, and respiratory activity, provides valuable clues. The amount of information to be gleaned is directly proportional to the gentleness and thoroughness of the examiner. Once a patient with peritoneal inflammation has been examined brusquely, accurate assessment by the next examiner becomes almost impossible. Eliciting rebound tenderness by sudden release of a deeply palpating hand in a patient with suspected peritonitis is cruel and unnecessary. The same information can be obtained by gentle percussion of the abdomen (rebound tenderness on a miniature scale), a maneuver that can be far more precise and localizing. Asking the patient to cough will elicit true rebound tenderness. The forceful demonstration of rebound tenderness will startle and induce protective spasm in a nervous or worried patient in whom a reasonably accurate diagnosis can be made before any further true rebound tenderness is not present. A palpable gallbladder will be missed if palpation is so aggressive that voluntary muscle spasm becomes superimposed on involuntary muscular rigidity. As with history taking, sufficient time should be spent in the examination. Abdominal signs may be minimal but, nevertheless, if accompanied by consistent symptoms, may be exceptionally meaningful. Abdominal signs may be virtually or totally absent in the cases of pelvic peritonitis, so careful pelvic and rectal examinations are mandatory in every patient with abdominal pain. Tenderness on pelvic or rectal examination in the absence of other abdominal signs can be caused by

operative indications such as perforated appendicitis, diverticulitis, twisted ovarian cyst, and many others. Much attention has been paid to the presence or absence of peristaltic sounds, their quality, and their frequency. Auscultation of the abdomen is one of the least revealing aspects of the physical examination of a patient with abdominal pain. Catastrophes such as a strangulating small-intestinal obstruction or perforated appendicitis may occur in the presence of normal peristaltic sounds. Conversely, when the proximal part of the intestine above obstruction becomes markedly distended and edematous, peristaltic sounds may lose the characteristics of borborygmi and become weak or absent, even when peritonitis is not present. It is usually the severe chemical peritonitis of sudden onset that is associated with the truly silent abdomen.

6. MANAGEMENT & TREATMENT

Few abdominal conditions require such urgent operative intervention that an orderly approach needs to be abandoned, no matter how ill the patient is. Only patients with exsanguinating intraabdominal hemorrhage (e.g., ruptured aneurysm) must be rushed to the operating room immediately, but in such instances, only a few minutes are required to assess the critical nature of the problem. Under these circumstances, all obstacles must be swept aside, adequate venous access for fluid replacement obtained, and the operation begun. Unfortunately, many of these patients may die in the radiology department or the emergency room while awaiting unnecessary examinations. There are no absolute contraindications to operation when massive intraabdominal hemorrhage is present. Fortunately, this situation is relatively rare. This statement does not necessarily apply to patients with intraluminal gastrointestinal hemorrhage, who can often be managed by other means. In these patients, obtaining a detailed history when possible can be extremely helpful even though it can be laborious and time-consuming. Decision-making regarding next steps is facilitated and a reasonably accurate diagnosis can be made before any further diagnostic testing is undertaken. In cases of acute abdominal pain, a diagnosis can be readily established in most instances, whereas success is not so frequent in patients with chronic pain. IBS is one of the most common causes of abdominal pain and must always be kept in mind. Narcotics or analgesics should not be withheld until a definitive diagnosis or a definitive plan has been formulated; obfuscation of the diagnosis by adequate analgesia is unlikely. An accurate menstrual history in a female patient is essential. It is important to remember that normal anatomic relationships can be significantly altered by the gravid uterus. Abdominal and pelvic pain may occur during pregnancy due to conditions that do not require operation. Lastly, some otherwise noteworthy laboratory values (e.g., leukocytosis) may represent the normal physiologic changes of pregnancy.

6.1 Analgesia

- Analgesia: Narcotics or analgesics should not be withheld until a definitive diagnosis or a definitive plan has been formulated; obfuscation of the diagnosis by adequate analgesia is unlikely.

6.2 Surgical Indications

- Surgical indications: Only patients with exsanguinating intraabdominal hemorrhage (e.g., ruptured aneurysm) must be rushed to the operating room immediately. There are no absolute contraindications to operation when massive intraabdominal hemorrhage is present. This statement does not necessarily apply to patients with intraluminal gastrointestinal hemorrhage, who can often be managed by other means.

6.3 Immunocompromised Management

- Immunocompromised management: Optimal management of these patients requires meticulous follow-up including serial examinations to assess the need for more surgical intervention, for example, to address perforation.

7. PROGNOSIS & COMPLICATIONS

Although most patients who present with acute abdominal pain will have self-limited disease processes, it is important to remember that pain severity does not necessarily correlate with the severity of the underlying condition. The most obvious of 'acute abdomens' may not require operative intervention, but the mildest of abdominal pain could. Catastrophes such as a strangulating small-intestinal obstruction or perforated appendicitis may occur in the presence of normal peristaltic sounds.

8. SPECIAL CONSIDERATIONS

- Pregnancy: It is important to remember that normal anatomic relationships can be significantly altered by the gravid uterus. Abdominal and pelvic pain may occur during pregnancy due to conditions that do not require operation. Some otherwise noteworthy laboratory values (e.g., leukocytosis) may represent the normal physiologic changes of pregnancy.

9. KEY PEARLS & CLINICAL TRAPS

- Pain severity does not necessarily correlate with disease severity; the mildest abdominal pain could be catastrophic.