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Comprehensive Nursing Assessment and Clinical Management of Patients Presenting with Acute Abdomen-An Updated Review

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Abstract

Background: Acute abdomen is a common emergency presentation requiring rapid diagnosis due to potentially life-threatening causes such as infection, obstruction, ischemia, and perforation.
Aim: This review aims to summarize updated clinical assessment and management approaches.
Methodology: Methods include structured evaluation of patient history, physical examination, and targeted laboratory and imaging studies.
Results: Results highlight the diverse gastrointestinal, vascular, urologic, and gynecologic etiologies contributing to diagnostic complexity. Effective management requires early stabilization, analgesia, antibiotics when indicated, and timely surgical referral.
Conclusion: A systematic, evidence-based approach improves outcomes.
Keywords: acute abdomen, diagnosis, management, emergency care.

Introduction

Acute abdominal pain represents one of the most frequent reasons for patient presentation to emergency departments. Despite the fact that many cases arise from self-limiting or relatively benign conditions, clinicians must maintain a high level of vigilance because acute abdominal pain may also signal serious or life-threatening pathology. The term acute abdomen generally describes a clinical condition characterized by sudden abdominal pain that may necessitate urgent medical evaluation or surgical intervention. The diagnostic process is often challenging because numerous pathological processes can produce similar clinical manifestations. Consequently, healthcare professionals must rapidly distinguish between conditions that require immediate treatment and those that can be managed conservatively. The broad spectrum of etiological factors contributing to acute abdominal pain increases the complexity of the diagnostic approach and requires careful clinical reasoning during patient assessment [1][2][3]. The underlying causes of an acute abdomen are highly heterogeneous and may involve several physiological systems. Infectious processes within abdominal organs, inflammatory disorders, vascular compromise, and gastrointestinal obstruction represent some of the most frequently encountered etiologies. In certain cases, acute abdominal pain may arise from vascular conditions such as mesenteric ischemia or aortic dissection, both of which can rapidly progress to severe complications if not promptly recognized. Mechanical obstruction of the bowel may also lead to significant abdominal pain accompanied by distension and vomiting. Furthermore, clinicians must remain alert to less obvious causes, including previously undetected malignancies or rupture of a hollow viscus, both of which may initially present with non-specific symptoms but can quickly deteriorate into life-threatening emergencies [1][2][3]. Patients commonly report an abrupt onset of abdominal discomfort, which may be associated with additional manifestations such as nausea, vomiting, fever, or visible abdominal distension depending on the underlying pathology [4].

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A systematic clinical evaluation is essential for identifying the potential cause of acute abdominal pain. The initial stage of assessment involves obtaining a comprehensive history that carefully characterizes the patient's pain. Important elements include determining the exact anatomical location of the pain, identifying whether the pain radiates to other areas, and assessing the timing, duration, and intensity of symptoms. Clinicians should also explore factors that worsen or alleviate the discomfort and inquire about associated symptoms that may provide diagnostic clues. Alongside history taking, vital signs must be promptly recorded because abnormalities in blood pressure, heart rate, respiratory rate, or temperature may indicate systemic involvement or clinical deterioration. A detailed abdominal examination is then performed, which typically includes inspection, auscultation, percussion, and palpation. The remainder of the physical examination should be directed by findings obtained during the history and initial clinical assessment [5][6]. Patients presenting with an acute abdomen often appear significantly unwell and may demonstrate clinical signs that indicate severe intra-abdominal pathology. Such manifestations may include circulatory instability, evidence of shock, diffuse abdominal tenderness, guarding, and signs of peritoneal irritation. Additional findings may involve the absence of bowel sounds, rebound tenderness, or other indicators suggestive of peritonitis. Clinicians may also observe signs of dehydration, urinary discomfort, persistent vomiting, or abnormalities in bowel function such as constipation or diarrhea. These findings provide valuable information that assists clinicians in narrowing the differential diagnosis and determining the urgency of further investigations [5][6]. Immediate medical attention is required for patients who exhibit unstable vital signs or physical findings consistent with peritoneal inflammation. Likewise, individuals suspected of having critical conditions such as intestinal obstruction, mesenteric ischemia, gastrointestinal perforation, or ectopic pregnancy must receive urgent evaluation and possible surgical consultation. Certain clinical presentations, including fever associated with abdominal pain, the presence of jaundice, or localized pain in the right upper quadrant, may also indicate potentially serious hepatobiliary or infectious conditions that warrant prompt assessment. Even when abdominal pain initially appears less severe, a thorough and systematic evaluation remains essential in order to exclude significant underlying disease. Decisions regarding further diagnostic procedures, including laboratory testing and imaging studies, should be guided by the patient's clinical presentation and evolving symptoms. During this process, effective pain management remains an important component of patient care, and appropriate analgesia should not be delayed or withheld while diagnostic assessment is underway [7].

Etiology

The term acute abdomen encompasses a wide spectrum of pathological conditions that produce sudden and often severe abdominal pain requiring prompt clinical assessment. These conditions arise from multiple organ systems, including the gastrointestinal tract, genitourinary structures, vascular system, and infectious processes. Because the clinical manifestations of these disorders frequently overlap, identifying the precise underlying cause requires a systematic diagnostic approach. Clinicians must integrate information obtained from a detailed patient history, comprehensive physical examination, appropriate laboratory investigations, and imaging studies in order to establish an accurate diagnosis and determine the most appropriate management strategy. The diversity of potential etiologies contributes to the diagnostic complexity associated with acute abdominal pain and necessitates careful clinical judgment throughout the evaluation process. Gastrointestinal disorders represent the most frequent causes of an acute abdomen. Among these conditions, acute appendicitis remains one of the most commonly encountered surgical emergencies. This condition results from obstruction and subsequent inflammation of the appendix, which can progress to perforation if not promptly treated. Perforated peptic ulcer disease also constitutes an important cause of acute abdominal pain, particularly when gastric or duodenal ulcers rupture and release gastric contents into the peritoneal cavity, leading to severe peritoneal irritation. Acute pancreatitis is another significant gastrointestinal cause and involves inflammation of the pancreas, often associated with gallstones or excessive alcohol consumption. Similarly, acute cholecystitis arises from inflammation of the gallbladder, frequently due to obstruction of the cystic duct by gallstones.

Other gastrointestinal etiologies include diverticulitis and ruptured diverticula, conditions characterized by inflammation or perforation of diverticular pouches within the colon. Mechanical disorders such as volvulus, which involves twisting of a segment of intestine, and small bowel obstruction also contribute to the development of acute abdominal symptoms. Incarcerated hernia represents another mechanical cause in which protruded abdominal contents become trapped, resulting in compromised blood supply and potential tissue necrosis. Traumatic injuries involving abdominal organs, including lacerations of the spleen or liver, may also produce acute abdominal pain accompanied by internal bleeding. In addition, ischemic bowel disease, resulting from compromised intestinal blood flow, can rapidly lead to tissue necrosis and severe systemic complications if not identified early [1][2][3]. Inflammatory involvement of the peritoneal cavity represents another important etiology. Peritonitis frequently develops as a consequence of bacterial infection within the abdominal cavity and may arise

from multiple underlying conditions. Surgical complications, perforation of gastrointestinal organs, pelvic inflammatory disease, and accumulation of infected ascitic fluid can all contribute to the development of peritoneal inflammation. Chronic systemic conditions such as tuberculosis, liver disease, and intra-abdominal malignancies may also predispose individuals to peritonitis. Additional causes include abdominal trauma, complications related to enteral feeding tubes, and infections associated with peritoneal dialysis procedures [8][9][10]. Vascular disorders constitute another critical category of acute abdominal conditions. Mesenteric ischemia occurs when the blood supply to the intestines becomes significantly reduced or obstructed, leading to intestinal injury and severe abdominal pain. This condition is particularly dangerous because early clinical signs may appear relatively mild while intestinal damage progresses rapidly. Rupture of an abdominal aortic aneurysm represents another life-threatening vascular emergency that can present with sudden abdominal or back pain accompanied by hemodynamic instability, requiring immediate medical intervention [11][12].

Gynecologic and obstetric conditions also contribute to the etiology of acute abdomen in women of reproductive age. A ruptured ectopic pregnancy represents a medical emergency in which a fertilized ovum implants outside the uterine cavity and subsequently ruptures, causing intra-abdominal bleeding. Pelvic inflammatory disease, an infection involving the female reproductive organs, may also produce significant lower abdominal pain and systemic symptoms. Ovarian torsion, characterized by twisting of the ovary and compromise of its blood supply, represents another gynecologic cause requiring urgent diagnosis and treatment [13]. Urologic conditions may mimic gastrointestinal causes of acute abdominal pain. Ureteric colic, usually caused by the passage of renal calculi through the urinary tract, produces severe flank or abdominal pain that can radiate toward the groin. Acute pyelonephritis, an infection of the kidney and upper urinary tract, may also present with abdominal discomfort accompanied by fever and urinary symptoms. In pediatric populations, the causes of acute abdomen differ somewhat from those observed in adults. Neonates and infants may present with serious conditions such as necrotizing enterocolitis, midgut volvulus, and intussusception, each of which requires prompt recognition and treatment. Despite these differences, acute appendicitis remains the most common cause of acute abdomen among children and adolescents [14].

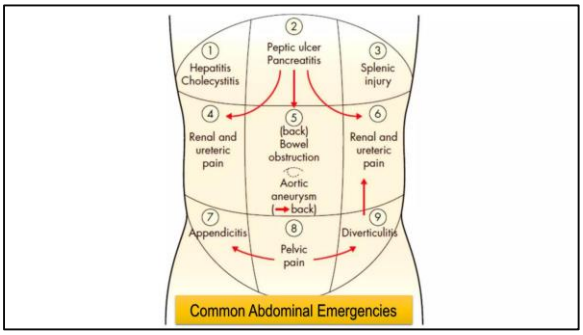

Fig. 1: Acute Abdomen Emergencies.

Epidemiology

Abdominal pain represents one of the most frequent reasons for patients seeking emergency medical care. Epidemiological data indicate that abdominal pain accounts for approximately 7% to 10% of all visits to emergency departments, which translates to nearly five to ten million patient encounters each year in the United States alone [15]. This high prevalence highlights the significant burden that abdominal complaints place on healthcare systems and emphasizes the need for efficient diagnostic approaches in emergency and primary care settings. The broad range of possible underlying conditions associated with abdominal pain contributes to the complexity of clinical evaluation, as symptoms may arise from gastrointestinal, genitourinary, vascular, or systemic disorders. In pediatric healthcare settings, abdominal pain is also a frequent presenting complaint. Evidence suggests that nearly 9% of primary care consultations involving children are related to episodes of acute abdominal pain [4]. Although some cases are linked to identifiable pathological conditions, a considerable proportion remain classified as nonspecific abdominal pain. Recent retrospective analyses have demonstrated that nonspecific abdominal pain and renal colic together account for nearly sixty percent of diagnoses among patients presenting with acute abdominal discomfort [16]. This finding reflects the diagnostic challenge associated with abdominal pain, as symptoms may initially lack clear clinical indicators that point to a specific underlying disease. Age-related differences play an important role in the epidemiological distribution of abdominal disorders. Among individuals older than 65 years, conditions such as diverticulitis and acute cholecystitis appear more frequently as causes of abdominal pain. These disorders are often associated with chronic physiological changes, comorbid medical conditions, and structural alterations within the gastrointestinal tract that develop with advancing age. In contrast, younger patients under the age of 65 more commonly present with renal colic or acute appendicitis, both of which tend to occur in otherwise healthy individuals and may develop suddenly without prior warning signs [15].

Acute abdomen specifically accounts for a substantial proportion of patients who present with

non-traumatic abdominal pain. Current epidemiological estimates indicate that approximately 14% of such patients are ultimately diagnosed with an acute abdomen requiring urgent medical evaluation. Studies have also demonstrated a higher incidence of acute abdomen among male patients compared with female patients, with reported rates of approximately 62.61% in males and 37.39% in females [17]. In adult populations, the peak occurrence is typically observed among individuals in their mid to late twenties. Within this age group, the most frequently identified causes include acute appendicitis, acute cholecystitis, and acute pancreatitis, all of which represent significant clinical conditions that may require immediate medical or surgical intervention [17]. The epidemiological profile differs somewhat in pediatric populations, where the underlying causes of acute abdomen vary according to developmental stage. In infants, incarcerated inguinal hernia and intussusception are commonly identified as primary causes of acute abdominal emergencies. As children grow older, the distribution of etiological factors changes, with acute appendicitis becoming the most prevalent cause of acute abdomen in children older than one year of age [18]. These variations highlight the importance of considering patient age when evaluating abdominal pain, as the likelihood of specific diagnoses changes across different stages of life.

Pathophysiology

The pathophysiology of abdominal pain in patients presenting with an acute abdomen is closely related to the activation of different types of sensory receptors within the abdominal cavity and surrounding structures. Clinicians generally classify abdominal pain into three major categories according to the origin of the sensory stimulus and the neural pathways involved in pain transmission. These categories include visceral pain, somatoparietal pain, and referred pain. Each type of pain reflects the stimulation of specific receptors and distinct neural mechanisms that influence how the pain is perceived, localized, and described by the patient. Understanding these mechanisms is essential for clinicians because the characteristics of pain often provide valuable clues regarding the underlying anatomical source and pathological process responsible for the patient's symptoms. Visceral pain originates from receptors located within the internal organs and their associated connective tissues. These receptors are distributed across the serosal surfaces of abdominal organs, within the mesentery, inside the muscular layers of the gastrointestinal tract, and within the mucosal lining of hollow viscera. The primary stimulus responsible for activating visceral pain receptors is mechanical stretching of the organ wall. However, several additional mechanical and chemical stimuli can also activate these receptors. Such stimuli include tension, distention, contraction of smooth muscle, traction exerted on mesenteric attachments, compression of surrounding structures, torsion of organs, and reduced blood supply resulting in ischemia. These processes frequently occur during pathological conditions such as intestinal obstruction, inflammatory swelling, or vascular compromise. Visceral pain signals are transmitted through unmyelinated C nerve fibers that enter the spinal cord at multiple segmental levels on both sides of the body. Because these nerve fibers conduct impulses slowly and converge at several spinal cord segments, the resulting sensation is typically described by patients as dull, vague, and poorly localized. Patients often find it difficult to identify the exact origin of visceral pain, and the discomfort is frequently perceived along the midline of the abdomen. Clinically, visceral pain tends to correspond with three major anatomical regions associated with the embryological development of the gastrointestinal tract. Pain arising from foregut structures, which include organs such as the lower esophagus, stomach, and proximal duodenum, is usually perceived in the epigastric region. Pain originating from midgut structures, including the small intestine and portions of the proximal colon, is commonly experienced around the periumbilical area. In contrast, pain arising from hindgut structures, such as the distal colon and rectum, is generally localized to the lower abdominal region [19].

Somatoparietal pain represents another important mechanism involved in acute abdominal conditions. This type of pain originates from receptors located in the parietal peritoneum as well as in the muscles and skin of the abdominal wall. These receptors become activated primarily in response to inflammatory processes, mechanical stretching, or direct injury to the peritoneal lining. Compared with visceral pain receptors, somatoparietal receptors are associated with more precise neural pathways that allow clearer localization of the painful stimulus. The transmission of somatic pain occurs through myelinated A-delta nerve fibers, which conduct impulses more rapidly than unmyelinated fibers. These nerve signals travel to specific dorsal root ganglia within the spinal cord, allowing the central nervous system to interpret the location of the pain more accurately. As a result, patients typically describe somatoparietal pain as sharp, intense, and well localized to a particular area of the abdomen. This type of pain frequently develops when an inflammatory process spreads from an internal organ to involve the parietal peritoneum, as commonly observed in advanced appendicitis or perforated abdominal viscera [19]. Referred pain represents a third mechanism that contributes to the complex presentation of abdominal pain. This phenomenon occurs because sensory nerve fibers from different anatomical regions converge at the same spinal cord segments. When visceral and somatic afferent neurons transmit signals to shared spinal cord pathways, the

central nervous system may misinterpret the origin of the pain. The brain is generally more accustomed to processing sensory input from somatic structures such as the skin and muscles rather than from internal organs. Consequently, when visceral pain signals reach these shared neural pathways, the brain may incorrectly attribute the sensation to a somatic region rather than the actual internal organ that generated the stimulus. This misinterpretation produces the phenomenon known as referred pain. Several well recognized clinical examples illustrate this mechanism. Pain resulting from myocardial ischemia is frequently perceived not only in the chest but also in the neck, left shoulder, and left upper limb because these areas share similar spinal cord segments involved in sensory transmission. Similarly, inflammation of the gallbladder, as occurs in acute cholecystitis, may produce pain that radiates toward the scapular region due to shared neural pathways between the gallbladder and shoulder area. These patterns of referred pain provide important diagnostic information and assist clinicians in identifying the potential source of abdominal pathology during clinical evaluation [19].

History and Physical

Evaluation of patients presenting with acute abdominal pain requires a structured and systematic clinical approach. Although a large proportion of cases result from self-limited conditions, the clinician's primary responsibility during the initial assessment is to identify individuals who may be experiencing a potentially life-threatening intra-abdominal process that requires urgent intervention. Distinguishing a patient who already demonstrates clear features of an acute abdomen is generally less difficult than recognizing a developing abdominal emergency in its early stages. In many cases the initial symptoms may be vague or nonspecific, which increases the risk of delayed diagnosis. For this reason, a comprehensive history and careful physical examination remain essential components of the diagnostic process and serve as the foundation for determining appropriate investigations and management strategies. The clinical history provides the first and often the most important diagnostic clues. Accurate characterization of abdominal pain helps clinicians narrow the differential diagnosis and identify possible underlying pathology. One of the most informative aspects of the history involves determining the precise anatomical location of the pain as well as whether the discomfort radiates to other areas of the body. The pattern of radiation can provide important clues regarding the involved organ systems. Clinicians should also explore the temporal characteristics of the pain, including its onset, duration, and frequency. Pain that develops suddenly may indicate conditions such as perforation, vascular occlusion, or torsion, whereas gradually progressive pain may be associated with inflammatory processes or obstructive disorders. Assessment of pain intensity is another important element of the clinical history. Patients may describe their pain in different qualitative terms such as burning, gnawing, stabbing, or cramping, and these descriptors may provide insight into the underlying mechanism. For example, burning epigastric discomfort may suggest peptic ulcer disease or gastroesophageal reflux, whereas severe colicky pain may indicate bowel obstruction or ureteric colic. Identifying factors that precipitate or exacerbate pain is equally important. Symptoms that worsen after food intake may suggest gallbladder disease or peptic ulcer pathology, while pain aggravated by movement may reflect peritoneal irritation. Conversely, information regarding measures that relieve discomfort can also be useful. Some patients report improvement when assuming particular positions or after eating food, which may guide diagnostic considerations.

Associated symptoms frequently provide additional diagnostic information. Patients presenting with abdominal pain should be questioned regarding the presence of nausea, vomiting, fever, diarrhea, constipation, rectal bleeding, urinary symptoms, or systemic manifestations such as weight loss and anorexia. Respiratory or cardiovascular symptoms including cough, chest pain, dyspnea, or orthopnea must also be explored because certain thoracic conditions can mimic abdominal pathology. The clinician must obtain a detailed reproductive and sexual history when evaluating female patients of reproductive age. Important information includes the date of the last menstrual period, history of dyspareunia or dysmenorrhea, and potential exposure to sexually transmitted infections. These details assist clinicians in evaluating gynecological causes of abdominal pain such as pelvic inflammatory disease or ectopic pregnancy. Past medical history also plays a critical role in the evaluation of abdominal pain. Previous abdominal operations increase the risk of adhesions, which may lead to intestinal obstruction. A history of alcohol misuse may suggest pancreatitis or chronic liver disease, whereas hypertension and cardiovascular disease increase the risk of vascular disorders such as abdominal aortic aneurysm or mesenteric ischemia. Clinicians must also review the patient's medication history because several medications may contribute to abdominal symptoms. Drugs that slow gastrointestinal motility may lead to constipation and abdominal discomfort, while recent antibiotic therapy may predispose patients to infection with Clostridioides difficile. Nonsteroidal anti-inflammatory drugs increase the likelihood of peptic ulcer disease and gastrointestinal bleeding, whereas chronic corticosteroid therapy may suppress immune function and mask typical signs of infection. Additional elements of the history include alcohol intake and recent travel history. Excessive alcohol consumption may contribute to liver disease, gastritis, or pancreatitis. Travel history may raise suspicion for infectious gastrointestinal conditions such as bacterial colitis or parasitic gastroenteritis. These historical elements collectively assist clinicians in developing a

focused differential diagnosis and determining the need for further diagnostic testing. The anatomical location of abdominal pain frequently correlates with specific underlying conditions. Pain in the left upper quadrant may be associated with disorders involving the spleen such as splenomegaly, splenic infarction, splenic abscess, or splenic rupture. Epigastric pain may indicate pathology related to the stomach, pancreas, or esophagus and can occur in conditions such as acute pancreatitis, chronic pancreatitis, peptic ulcer disease, gastritis, gastroparesis, or gastroesophageal reflux disease. Importantly, clinicians must also consider extra-abdominal causes such as myocardial infarction when patients present with epigastric discomfort. Pain localized to the right upper quadrant often suggests hepatobiliary disease. Conditions commonly associated with this region include biliary colic, acute cholecystitis, acute cholangitis, sphincter of Oddi dysfunction, acute hepatitis, perihepatitis, liver abscess, Budd-Chiari syndrome, and portal vein thrombosis [20][6].

Following the clinical history, a focused physical examination must be conducted promptly. The initial assessment begins with evaluation of vital signs because abnormalities may signal systemic instability. Fever may indicate infection or inflammation, while hypotension may suggest hypovolemia, sepsis, or internal bleeding. The clinician should also observe the patient's general appearance and level of distress. A patient who lies completely still and avoids movement may be experiencing peritoneal irritation because movement intensifies the pain. In contrast, patients who repeatedly change position or appear restless may be experiencing colicky pain associated with biliary disease or intestinal ischemia. The abdominal examination begins with visual inspection. Clinicians should assess for abdominal distension, surgical scars, visible masses, or skin discoloration. Observing the patient's response to movement of the examination table can provide important clues. Patients with peritonitis often experience severe pain even with minimal movement or vibration. Auscultation of bowel sounds should occur before palpation to avoid altering intestinal activity during examination. Absent or markedly reduced bowel sounds may indicate paralytic ileus or advanced obstruction. High-pitched or tinkling bowel sounds often suggest mechanical intestinal obstruction [21][22]. Percussion is performed after auscultation and provides additional information about the underlying abdominal structures. Gentle percussion may reveal areas of tympany caused by gas-filled bowel loops, while dullness may indicate the presence of fluid, enlarged organs, or masses. Shifting dullness during percussion suggests the presence of ascites. Patients with peritoneal inflammation frequently experience pain even with light percussion because of irritation of the parietal peritoneum [23]. Palpation represents the final stage of the abdominal examination and must be performed carefully to identify areas of tenderness. Guarding, rigidity, and rebound tenderness are classic signs of peritoneal irritation and often indicate serious intra-abdominal pathology. Clinicians must carefully note the exact location of tenderness because localized pain may help identify the affected organ system. For example, tenderness in the right lower quadrant may suggest appendicitis, whereas left lower quadrant tenderness may indicate diverticulitis.

Additional components of the physical examination are sometimes required depending on the clinical presentation. Although rectal examination was traditionally recommended for all patients with abdominal pain, current evidence suggests that it provides limited diagnostic value in certain conditions such as appendicitis. Nevertheless, rectal examination remains important when gastrointestinal bleeding or prostate pathology is suspected. Pelvic examination is essential for female patients with lower abdominal pain to evaluate possible gynecologic conditions. Examination of the testes is necessary in male patients presenting with lower abdominal discomfort to exclude testicular torsion. Assessment for inguinal or abdominal wall hernias should also be performed routinely. A comprehensive clinical evaluation extends beyond the abdomen. Examination of the skin and sclera may reveal jaundice, which suggests hepatobiliary disease. Patients presenting with chest pain or respiratory symptoms should undergo a thorough cardiovascular and pulmonary examination because thoracic pathology may mimic abdominal pain. In some cases, systemic signs such as skin lesions, joint abnormalities, or ocular inflammation may indicate extraintestinal manifestations associated with inflammatory bowel disease [23].

Evaluation

The diagnostic evaluation of acute abdominal pain is guided primarily by findings obtained during the clinical history and physical examination. These initial steps provide essential information that helps clinicians determine the urgency of further investigations and identify patients who may require immediate intervention. Individuals presenting with unstable vital signs, signs of peritoneal irritation, or suspicion of critical conditions must undergo urgent assessment in the emergency department. Life-threatening causes of abdominal pain include ectopic pregnancy, myocardial infarction, intestinal obstruction, abdominal aortic aneurysm, mesenteric ischemia, and gastrointestinal perforation. In such situations, diagnostic evaluation and resuscitative measures must occur simultaneously to stabilize the patient while identifying the underlying cause. The first stage of evaluation involves rapid assessment of the patient's overall clinical condition. Healthcare professionals begin by observing the patient's general appearance and evaluating airway patency, breathing, and circulatory status. Vital signs including blood

pressure, heart rate, respiratory rate, temperature, and oxygen saturation provide critical information regarding hemodynamic stability. Bedside diagnostic tools may assist clinicians in identifying potentially serious conditions during the early stages of assessment. For example, a fingerstick blood glucose test helps detect metabolic disorders such as diabetic ketoacidosis that may present with abdominal pain. An electrocardiogram is performed when cardiac pathology or electrolyte disturbances are suspected, particularly in patients presenting with epigastric discomfort or risk factors for cardiovascular disease. Bedside ultrasonography has become an essential point-of-care tool because it allows rapid evaluation of several important conditions. This technique can identify abdominal aortic aneurysm, hydronephrosis, pericardial effusion, and the presence of intra-abdominal fluid suggesting hemoperitoneum [23].

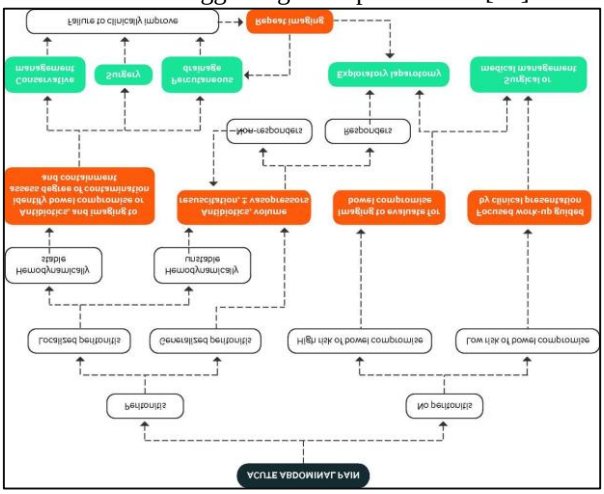

Fig. 2: Acute abdomen Evaluation.

When perforation of a hollow abdominal organ or abdominal sepsis is suspected, an upright chest radiograph is commonly used as an initial imaging study. This examination may reveal free air beneath the diaphragm, indicating perforation of the gastrointestinal tract. If bedside ultrasound and plain radiographs fail to provide adequate diagnostic information, computed tomography of the abdomen and pelvis with intravenous contrast is often the next step. CT imaging provides detailed visualization of abdominal organs, vascular structures, and surrounding tissues, allowing clinicians to identify conditions such as appendicitis, diverticulitis, bowel obstruction, ischemia, or abscess formation. In pregnant patients, radiation exposure must be minimized. For this reason, abdominal and pelvic ultrasonography serves as the preferred initial imaging modality when evaluating suspected intrauterine pregnancy, appendicitis, nephrolithiasis, cholecystitis, cholelithiasis, or uterine rupture. If ultrasound findings remain inconclusive and further imaging is required, magnetic resonance imaging of the abdomen offers an alternative diagnostic approach that avoids radiation exposure. For patients whose condition appears less urgent, diagnostic evaluation may proceed in a more structured and targeted manner based on the location of the pain. Anatomical localization frequently guides the selection of laboratory tests and imaging studies. This approach allows clinicians to narrow the differential diagnosis while avoiding unnecessary investigations. Pain localized to the right upper quadrant typically suggests involvement of the hepatobiliary system. Because the liver itself produces pain primarily when its capsule becomes distended, many conditions affecting this region involve the gallbladder or biliary tree. Laboratory evaluation generally includes a complete blood count to assess for infection or inflammation, as well as measurement of serum electrolytes. Liver function tests including aminotransferases, alkaline phosphatase, and bilirubin help evaluate hepatocellular injury or biliary obstruction. Pancreatic enzymes such as lipase and amylase may also be measured because pancreatic disease can produce epigastric or upper abdominal pain. Ultrasonography of the abdomen remains the preferred imaging modality for right upper quadrant pain because it provides detailed visualization of gallstones, gallbladder wall thickening, biliary duct dilation, and other hepatobiliary abnormalities [30][31][32].

Evaluation of epigastric pain often overlaps with the assessment of right upper quadrant symptoms because many structures in this region share similar clinical presentations. In addition to gastrointestinal causes, clinicians must consider cardiac pathology when patients report epigastric discomfort accompanied by symptoms such as dyspnea, diaphoresis, nausea, or exertional chest pressure. For this reason, patients with cardiovascular risk factors typically undergo electrocardiographic testing and measurement of cardiac biomarkers such as troponin. A chest radiograph may also be performed to evaluate potential thoracic causes of pain. Depending on the findings of these initial tests, additional cardiac investigations may include echocardiography, stress testing, coronary computed tomography angiography, or invasive coronary angiography. In patients suspected of having peptic ulcer disease or other upper gastrointestinal disorders, upper endoscopy may be necessary to visualize the mucosal surface of the esophagus, stomach, and duodenum. Pain in the left upper quadrant may originate from splenic or gastric pathology. Splenic disorders may present with symptoms such as abdominal fullness, early satiety, or referred pain to the left shoulder or chest. Ultrasonography is commonly used to evaluate splenic size and structure. Laboratory tests including complete blood count can detect hematologic abnormalities associated with splenic enlargement or destruction of blood cells. Liver function tests may also be performed because hepatic disease can influence splenic circulation. Additional investigations depend on the suspected diagnosis. For example, blood cultures may be necessary when infection is suspected, whereas specific metabolic tests such as glucocerebrosidase

assays may help exclude rare genetic conditions such as Gaucher disease. Cross-sectional imaging using CT or MRI may be required to evaluate focal lesions including splenic infarction or abscess formation. A chest radiograph may reveal pleural effusion associated with splenic infection [33]. When malignancy is suspected, further diagnostic procedures such as bone marrow examination or lymph node biopsy may be required. Lower abdominal pain frequently arises from structures within the distal colon, urinary tract, reproductive organs, or pelvic cavity. In patients of reproductive age, clinicians must always exclude pregnancy because ectopic pregnancy represents a potentially life-threatening condition. Gynecologic causes of lower abdominal pain include pelvic inflammatory disease, tubo-ovarian abscess, ovarian torsion, and ruptured ovarian cyst. Urologic conditions such as urinary tract infection, nephrolithiasis, or ureteral obstruction may also produce symptoms in this region. Gastrointestinal causes include appendicitis, diverticulitis, and incarcerated hernia. Diagnostic testing in these situations is guided by the clinical presentation. A complete blood count may identify infection or anemia related to bleeding. Type and cross-matching of blood is necessary when significant hemorrhage is suspected. Urinalysis and urine culture help evaluate urinary tract infection, while blood cultures may be required in cases of systemic infection.

Testing for sexually transmitted infections such as gonorrhea, chlamydia, trichomoniasis, and bacterial vaginosis may be indicated when pelvic inflammatory disease is suspected. Transvaginal and transabdominal ultrasonography play important roles in detecting gynecologic pathology and identifying free intraperitoneal fluid associated with ruptured ectopic pregnancy or ovarian cysts. In nonpregnant adults, computed tomography of the abdomen and pelvis is frequently used when appendicitis, diverticulitis, small bowel obstruction, or renal calculi are suspected. Colonoscopy may be performed in patients with anemia and abdominal pain to evaluate potential colorectal malignancy or inflammatory bowel disease. When abnormalities of the scrotum are detected during physical examination, scrotal ultrasonography is necessary to assess testicular blood flow and exclude torsion. Diffuse abdominal pain often presents a more complex diagnostic challenge because it may arise from intra-abdominal, thoracic, or systemic conditions. Initial laboratory evaluation generally includes complete blood count with differential, serum electrolyte analysis, and measurement of pancreatic enzymes such as amylase and lipase. Additional tests include assessment of renal function through blood urea nitrogen and creatinine levels, measurement of serum glucose, and evaluation of liver enzymes including aminotransferases, alkaline phosphatase, and bilirubin. Serum calcium measurement may also be useful because abnormalities can contribute to gastrointestinal symptoms. A pregnancy test must be performed in all patients with childbearing potential. Further evaluation depends on the findings of the initial assessment. Patients presenting with diffuse upper abdominal pain and respiratory symptoms may require chest radiography to evaluate possible pneumonia. Abdominal radiographs may identify free intraperitoneal air suggesting perforation or reveal dilated bowel loops consistent with obstruction. Computed tomography pulmonary angiography may be indicated when pulmonary embolism is suspected. CT imaging of the abdomen and pelvis assists in diagnosing volvulus, bowel obstruction, or abdominal aortic aneurysm in hemodynamically stable patients. For unstable patients with suspected rupture of an abdominal aortic aneurysm, bedside abdominal ultrasonography provides rapid confirmation. When clinicians suspect mesenteric ischemia or aortic dissection, CT angiography of the chest, abdomen, and pelvis with intravenous contrast allows visualization of vascular structures and identification of compromised blood flow.

Evidence-based guidelines also assist clinicians in determining appropriate imaging strategies. The American College of Radiology Appropriateness Criteria provide recommendations regarding the most suitable diagnostic imaging techniques based on specific clinical scenarios. These guidelines help ensure that patients receive appropriate diagnostic evaluation while minimizing unnecessary procedures. Evaluation of abdominal pain in children follows similar principles but requires additional considerations related to age-specific conditions and sensitivity to radiation exposure. In infants and young children presenting with bilious vomiting, clinicians must consider intestinal malrotation with volvulus, which represents a surgical emergency. Children who present with abdominal pain accompanied by pharyngitis may require testing for streptococcal infection because systemic infections can manifest with abdominal symptoms. Computed tomography is used less frequently in pediatric patients due to the long-term risks associated with radiation exposure. For children presenting with severe abdominal pain, abdominal distension, bilious vomiting, or signs of peritonitis, abdominal radiography is often the initial diagnostic imaging technique. This examination can rapidly identify bowel obstruction through visualization of air-fluid levels and detect perforation through the presence of free intraperitoneal air. Ultrasonography is particularly useful in pediatric patients because it effectively identifies conditions such as intussusception. In many cases, contrast enema studies serve both diagnostic and therapeutic purposes by reducing the intussuscepted bowel segment. An upper gastrointestinal contrast series remains the preferred imaging study for diagnosing malrotation associated

with volvulus. Children who exhibit classic symptoms of appendicitis should undergo evaluation by a pediatric surgeon before imaging is performed. When clinical findings are atypical, abdominal ultrasonography provides a useful noninvasive diagnostic tool. Infants suspected of having necrotizing enterocolitis require abdominal radiographs, which often demonstrate pneumatosis intestinalis, a characteristic radiographic sign. Some healthcare centers also use ultrasonography to detect free air, localized fluid collections, thickening of the bowel wall, and changes in bowel echogenicity [34]. Infants with suspected necrotizing enterocolitis must undergo comprehensive laboratory evaluation including complete blood count, serum electrolytes, renal function testing, and blood glucose measurement. Persistent metabolic abnormalities such as hyponatremia, hyperglycemia, and metabolic acidosis may indicate severe intestinal necrosis and systemic infection [35]. Monitoring serum lactate levels can assist clinicians in assessing disease progression and evaluating response to treatment [34].

Treatment and Management of Acute Abdomen

Management of acute abdominal conditions begins at the same time as the diagnostic evaluation. Early stabilization of the patient is essential because many underlying causes of acute abdomen can rapidly progress to life-threatening complications. Healthcare professionals must focus first on maintaining physiological stability while continuing diagnostic assessment. Immediate resuscitation should not be delayed while waiting for imaging results or laboratory confirmation. Initial management involves continuous monitoring and rapid assessment of the patient's hemodynamic status. Patients are connected to a cardiac monitor to observe heart rate and rhythm. Clinicians evaluate blood pressure, oxygen saturation, and respiratory status. Individuals who present with signs of peritonitis, hypotension, or systemic toxicity require urgent stabilization. Establishing large-bore intravenous access is one of the first critical steps because it allows rapid administration of fluids and medications. Intravenous crystalloid solutions such as normal saline or lactated Ringer's solution are administered to correct dehydration and improve circulatory perfusion. Patients who develop septic shock or persistent hypotension despite fluid therapy may require vasopressor medications to maintain adequate blood pressure and organ perfusion. Early recognition and treatment of shock significantly reduce the risk of organ failure. In individuals with known adrenal insufficiency or long-term glucocorticoid therapy, clinicians administer stress-dose corticosteroids to prevent adrenal crisis during acute illness. Patients who demonstrate evidence of severe hypovolemia or active hemorrhage require transfusion of blood products to restore circulating volume and oxygen delivery. When infection, gastrointestinal perforation, or intra-abdominal contamination is suspected, clinicians initiate broad-spectrum antimicrobial therapy without delay. Antibiotic regimens must cover gram-negative bacteria and anaerobic organisms that commonly originate from the gastrointestinal tract. Early antibiotic administration reduces the risk of sepsis and prevents the spread of infection within the abdominal cavity. Effective pain control is another essential component of management. Adequate analgesia improves patient comfort and facilitates clinical examination. Evidence shows that appropriate pain management does not interfere with diagnostic accuracy or mask important physical findings. Commonly used medications include acetaminophen for mild to moderate pain and parenteral nonsteroidal anti-inflammatory drugs such as ketorolac for stronger analgesic effects. However, clinicians must exercise caution when prescribing ketorolac because it may worsen certain conditions including gastritis, peptic ulcer disease, and acute kidney injury. Opioid medications may be required in cases of severe pain, particularly when other analgesics fail to provide adequate relief [35].

Further treatment depends on the underlying diagnosis identified during evaluation. Many causes of acute abdomen require consultation with specialized medical or surgical teams. Multidisciplinary collaboration ensures timely intervention and improves clinical outcomes. General surgeons are often involved when conditions such as appendicitis, intestinal obstruction, or gastrointestinal perforation are suspected. Vascular surgeons may participate in cases involving abdominal aortic aneurysm or mesenteric ischemia. Gynecologists are consulted when pelvic pathology such as ectopic pregnancy, ovarian torsion, or tubo-ovarian abscess is suspected. Additional specialists may include interventional radiologists, urologists, and gastroenterologists depending on the clinical presentation. Certain conditions demand immediate surgical intervention because delays in treatment can result in significant morbidity or mortality. For example, the presence of pneumoperitoneum on imaging strongly suggests perforation of a hollow abdominal organ and requires urgent surgical referral. Similarly, ruptured ectopic pregnancy represents a gynecologic emergency that requires immediate operative management to control internal bleeding. Testicular torsion and ovarian torsion both involve compromised blood flow to reproductive organs and require rapid surgical correction to preserve tissue viability. Obstructing kidney stones complicated by infection require urgent urologic intervention to relieve obstruction and control sepsis. Another critical emergency is rupture of an abdominal aortic aneurysm, which requires immediate vascular surgical management due to the high risk of fatal hemorrhage [35].

Conclusion:

Acute abdomen remains a complex clinical emergency due to its broad etiological spectrum and the potential for rapid deterioration. Early recognition,

comprehensive history taking, thorough abdominal examination, and appropriate imaging are critical for accurate diagnosis. Management must emphasize hemodynamic stabilization, pain control, and prompt initiation of antibiotics when infection or perforation is suspected. Multidisciplinary collaboration and timely surgical or specialty intervention are essential for conditions such as appendicitis, bowel obstruction, vascular emergencies, and gynecologic pathology. Ultimately, rapid, systematic, and evidence-based care significantly reduces morbidity and mortality in patients presenting with acute abdomen.

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