ACUTE ABDOMINAL PAIN

I. INTRODUCTION

Among patients presenting with acute abdominal pain and tenderness (i.e., pain lasting < 7 days), the most common diagnoses are nonspecific abdominal pain (43% of patients), acute appendicitis (4% to 20%), acute cholecystitis (3% to 9%), small bowel obstruction (4%), and ureterolithiasis (4%).1–4 The term “acute abdomen” usually refers to those conditions causing abrupt abdominal pain and tenderness and requiring urgent diagnosis and surgical intervention, such as appendicitis, bowel obstruction, and perforated intra-abdominal organs.

In patients with the acute abdomen, clinicians often order computed tomography of the abdomen because it accurately distinguishes appendicitis from alternative diagnoses and because it detects perforation and abscess formation.5 Nonetheless, bedside diagnosis remains the fundamental diagnostic tool in all patients with the acute abdomen.6 After the clinician analyzes the bedside findings,
Abdominal Pain and Tenderness

some patients can be safely discharged home without further imaging, because the probability of peritonitis is so low. Other patients should proceed directly to the operating room, because the probability of peritonitis is so high. Those patients whose bedside findings are equivocal or suggest abscess formation benefit the most from further imaging with computed tomography.\(^5\)

II. THE FINDINGS

The two most common causes of the acute abdomen are (1) peritonitis, from inflammation (appendicitis, cholecystitis) or perforation of a viscus (appendix, peptic ulcer of stomach or duodenum, diverticulum) and (2) bowel obstruction. Both peritonitis and obstruction cause abdominal tenderness. Additional findings are discussed later.

A. PERITONITIS

The additional findings of peritonitis are guarding and rigidity, rebound tenderness, percussion tenderness, a positive cough test, and a negative abdominal wall tenderness test.

1. Guarding and Rigidity

Guarding refers to *voluntary contraction* of the abdominal wall musculature, usually the result of fear, anxiety, or the laying on of cold hands.\(^7\) Rigidity refers to *involuntary contraction* of the abdominal musculature in response to peritoneal inflammation, a reflex that the patient cannot control.\(^7\) Experienced surgeons distinguish guarding from rigidity in two ways. First, they attempt to distract the patient during examination, often by engaging the patient in conversation or using the stethoscope to gently palpate the abdomen.\(^8,9\) Second, they examine the patient repeatedly over time. Guarding, but not rigidity, diminishes as the patient is distracted and fluctuates in intensity over time, sometimes even disappearing.

The first clinician to clearly describe rigidity was the Roman physician Celsus, writing in 30 AD.\(^10\)

2. Rebound Tenderness

To elicit rebound tenderness, the clinician maintains pressure over an area of tenderness and then withdraws the hand abruptly. If the patient winces with pain on withdrawal of the hand, the test is positive. Many expert surgeons discourage using the rebound tenderness test, regarding it “unnecessary,”\(^7,11\) “cruel,”\(^6\) or a “popular and somewhat unkind way of emphasizing what is already obvious.”\(^12\)

Rebound tenderness was originally described by J. Moritz Blumberg (1873–1955), a German surgeon and gynecologist, who believed that pain in
the lower abdomen after abrupt withdrawal of the hand from the left lower abdominal quadrant was a sign of appendicitis (i.e., Blumberg’s sign).13

3. **Percussion Tenderness**

In patients with peritonitis, sudden movements of the abdominal wall cause pain, such as those produced during abdominal percussion. Percussion tenderness is present if light percussion strokes cause pain.

4. **Cough Test**

The cough test is based on the same principle as percussion tenderness (i.e., jarring movements of the abdominal wall cause pain in patients with peritonitis). The cough test is positive if the patient, in response to a cough, shows signs of pain, such as flinching, grimacing, or moving hands toward the abdomen.14

5. **Abdominal Wall Tenderness Test**

In 1926 Carnett introduced the abdominal wall tenderness test15 as a way to diagnose lesions in the abdominal wall that cause abdominal pain and tenderness and sometimes mimic peritonitis. In this test, the clinician locates the area of maximal tenderness by gentle palpation and then applies enough pressure to elicit moderate tenderness. The patient is then asked to fold the arms on the chest and lift the head and shoulders, as if performing a partial sit-up. If this maneuver causes increased tenderness at the site of palpation, the test is positive,16 which traditionally argues against peritonitis because tense abdominal wall muscles should protect the peritoneum from the clinician’s hands.

One well-recognized cause of acute abdominal wall tenderness is diabetic neuropathy (i.e., “thoraco-abdominal neuropathy” involving nerve roots T7 to T11; lesions of T1 to T6 cause chest pain).17–22 In addition to a positive abdominal wall tenderness test, characteristic signs of this disorder are cutaneous hypersensitivity, often of contiguous dermatomes, and weakness of the abdominal muscles, causing ipsilateral bulging of the abdominal wall that sometimes resembles a hernia.18,19,21

B. **APPENDICITIS**

1. **McBurney’s Point Tenderness**

In a paper read before the New York Surgical Society in 1889 that cited the advantages of early operation in appendicitis, Charles McBurney stated that all patients with appendicitis have maximal pain and tenderness “determined by the pressure of the finger (at a point) very exactly between an inch and a half and two inches from the anterior superior spinous process of the ilium on a straight line drawn from that process to the umbilicus.”23,24
2. **Rovsing’s Sign**

Rovsing’s sign (Neils T. Rovsing, 1862–1927, Danish surgeon) is positive when pressure over the patient’s left lower quadrant causes pain in the right lower quadrant. This sign is sometimes called indirect tenderness.

3. **Rectal Tenderness**

In patients with appendicitis whose inflammation is confined to the pelvis, rectal examination may reveal tenderness, especially on the right side, and some patients with perforation may have a rectal mass (i.e., pelvic abscess).

4. **Psoas Sign**

The inflamed appendix may lie against the right psoas muscle, causing the patient to shorten that muscle by drawing up the right knee. To elicit the psoas sign, the patient lies down on the left side and the clinician hyperextends the right hip. Painful hip extension is the positive response.

5. **Obturator Sign**

The obturator sign is based on the same principle as the psoas sign, that stretching a pelvic muscle irritated by an inflamed appendix causes pain. To stretch the right obturator internus muscle and elicit the sign, the clinician flexes the patient’s right hip and knee and then internally rotates the right hip.

C. **CHOLECYSTITIS AND MURPHY’S SIGN**

Patients with acute cholecystitis present with continuous epigastric or right upper quadrant pain, nausea, and vomiting. The traditional physical signs are fever, right upper quadrant tenderness, and a positive Murphy’s sign. In 1903, the American surgeon Charles Murphy stated that the hypersensitive gallbladder of cholecystitis prevents the patient from taking in a “full, deep inspiration when the clinician’s fingers are hooked up beneath the right costal arch below the hepatic margin. The diaphragm forces the liver down until the sensitive gallbladder reaches the examining fingers, when the inspiration suddenly ceases as though it had been shut off.”

Most clinicians elicit Murphy’s sign by palpating the right upper quadrant of the supine patient. In his original description, Murphy proposed other methods, such as the “deep grip palpation” technique, in which the clinician examines the seated patient from behind and curls the fingertips of his or her right hand under the right costal margin, and the “hammer stroke percussion” technique, in which the clinician strikes a finger pointed into the right upper quadrant with the ulnar aspect of the other hand.

D. **SMALL BOWEL OBSTRUCTION**

Small bowel obstruction presents with abdominal pain and vomiting. The traditional physical signs are abdominal distension and tenderness, visible
peristalsis, and abnormal bowel sounds (initially, high-pitched tinkling sounds followed by diminished or absent bowel sounds).\textsuperscript{7,11} Signs of peritonitis (e.g., rigidity, rebound) may appear if portions of the bowel become ischemic.

### III. CLINICAL SIGNIFICANCE

EBM Box 48-1, EBM Box 48-2, EBM Box 48-3, and EBM Box 48-4 present the physical findings of the acute abdomen. EBM Boxes 48-1 and 48-4 apply to all patients with acute abdominal pain and tenderness and address how well physical signs identify peritonitis (see EBM Box 48-1) and small bowel

#### Box 48-1

**Acute Abdominal Pain, Signs Detecting Peritonitis**

<table>
<thead>
<tr>
<th>Finding (Ref) †</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Likelihood Ratio if Finding Present</th>
<th>Likelihood Ratio if Finding Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal examination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guarding\textsuperscript{2,26–33}</td>
<td>13–76</td>
<td>56–97</td>
<td>2.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Rigidity\textsuperscript{2,30–32,34}</td>
<td>6–40</td>
<td>86–100</td>
<td>3.9</td>
<td>NS</td>
</tr>
<tr>
<td>Rebound tenderness\textsuperscript{2,26–40}</td>
<td>40–95</td>
<td>20–89</td>
<td>2.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Percussion tenderness\textsuperscript{33}</td>
<td>65</td>
<td>73</td>
<td>2.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Abnormal bowel sounds\textsuperscript{2,32}</td>
<td>25–61</td>
<td>44–95</td>
<td>NS</td>
<td>0.8</td>
</tr>
<tr>
<td>Rectal examination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectal tenderness\textsuperscript{2,29,30,32,33,35,36,41}</td>
<td>20–53</td>
<td>41–96</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Other tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive abdominal wall tenderness test\textsuperscript{16,42}</td>
<td>1–5</td>
<td>32–72</td>
<td>0.1</td>
<td>NS</td>
</tr>
<tr>
<td>Positive cough test\textsuperscript{14,26,34,40}</td>
<td>73–84</td>
<td>44–79</td>
<td>1.8</td>
<td>0.4</td>
</tr>
</tbody>
</table>

NS, not significant; likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

*Diagnostic standard: For peritonitis, surgical exploration and follow-up of patients not operated on; causes of peritonitis included appendicitis (most common), cholecystitis, and perforated ulcer. One study also included patients with pancreatitis.\textsuperscript{32}

†Definition of findings: For abnormal bowel sounds, absent, diminished, or hyperactive; for abdominal wall tenderness test, see text; for positive cough test, the patient is asked to cough, and during the cough shows signs of pain or clearly reduces the intensity of the cough to avoid pain.\textsuperscript{26}
### Acute Right Lower Quadrant Tenderness, Signs Detecting Appendicitis*

<table>
<thead>
<tr>
<th>Finding (Ref)†</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Likelihood Ratio if Finding Present</th>
<th>Likelihood Ratio if Finding Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vital signs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever²⁶,³⁶,³⁹,⁴⁴</td>
<td>47–81</td>
<td>40–70</td>
<td>1.5</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Abdominal examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe right lower quadrant tenderness²⁶,²⁷</td>
<td>87–99</td>
<td>8–65</td>
<td>NS</td>
<td>0.2</td>
</tr>
<tr>
<td>McBurney’s point tenderness²⁶,²⁷,⁴⁵</td>
<td>50–94</td>
<td>75–86</td>
<td>3.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Rovsing’s sign²⁷,²⁸,³¹,⁴¹</td>
<td>22–68</td>
<td>58–96</td>
<td>2.5</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Rectal examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rectal tenderness²⁹,³⁰,³³,³⁵,³⁶,⁴¹</td>
<td>38–53</td>
<td>41–62</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Other signs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psoas sign²⁸,²⁹,³³</td>
<td>13–42</td>
<td>79–97</td>
<td>2.0</td>
<td>NS</td>
</tr>
<tr>
<td>Obturator sign²⁹</td>
<td>8</td>
<td>94</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS, not significant; likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

*Diagnostic standard: For appendicitis, surgical findings, histology, and follow-up of patients not operated on.

†Definition of findings: For fever, temperature > 37.3°C²⁶,³⁹,⁴⁴ or not defined²⁰; for positive cough test, see EBM Box 48-1.

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**PERITONITIS**

<table>
<thead>
<tr>
<th>LRs</th>
<th>Probability</th>
<th>LRs</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>decrease</td>
<td>10</td>
</tr>
<tr>
<td>0.2</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>0.5</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Positive abdominal wall tenderness test
*Negative cough test

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**Box 48-2**

Abdominal Pain and Tenderness

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NS, not significant; likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

*Diagnostic standard: For appendicitis, surgical findings, histology, and follow-up of patients not operated on.

†Definition of findings: For fever, temperature > 37.3°C²⁶,³⁹,⁴⁴ or not defined²⁰; for positive cough test, see EBM Box 48-1.
obstruction (see EBM Box 48-4) (these studies included almost 4000 patients). EBM Boxes 48-2 and 48-3 refer to only a subset of patients with abdominal pain: EBM Box 48-2 applies to patients with right lower quadrant tenderness and suspected appendicitis, and EBM Box 48-3 applies to patients with right upper quadrant pain and suspected cholecystitis.

### Acute Right Upper Quadrant Tenderness, Signs Detecting Cholecystitis *

<table>
<thead>
<tr>
<th>Finding (Ref)†</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Likelihood Ratio if Finding Present</th>
<th>Likelihood Ratio if Finding Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever ⁶⁰–⁶³</td>
<td>29–44</td>
<td>37–83</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Murphy’s sign ⁶⁴–⁶⁶</td>
<td>48–97</td>
<td>48–79</td>
<td>1.9</td>
<td>0.6</td>
</tr>
<tr>
<td>Back tenderness ⁶⁷</td>
<td>27</td>
<td>36</td>
<td>0.4</td>
<td>2.0</td>
</tr>
<tr>
<td>Right upper quadrant mass ⁶⁰,⁶²,⁶³,⁶⁷</td>
<td>2–23</td>
<td>70–99</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS, not significant; likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

*Diagnostic standard: For cholecystitis, positive hepatobiliary scintiscan ⁶⁵ or surgical findings and histology ⁶⁰,⁶²–⁶⁶,⁶⁷.

†Definition of findings: For fever, temperature >37.5 °C,³⁹ >37.7 °C,⁶¹ >38 °C,⁶² or undefined.⁶⁰

<table>
<thead>
<tr>
<th>CHOLECYSTITIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR</td>
</tr>
<tr>
<td>decrease</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>Back tenderness</td>
</tr>
</tbody>
</table>

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A. PERITONITIS (SEE EBM BOX 48-1)

The primary cause of peritonitis in the studies of EBM Box 48-1 was appendicitis, although some patients had perforated ulcers, perforated diverticula, or cholecystitis. According to these studies, the most compelling findings arguing for peritonitis are rigidity [likelihood ratio (LR) = 3.9], guarding (LR = 2.6), and percussion tenderness (LR = 2.4). The findings arguing the most
against peritonitis are a positive abdominal wall tenderness test (LR = 0.1) and a negative cough test (LR = 0.4). The presence or absence of rebound tenderness (positive LR = 2.1, negative LR = 0.5) shifts probability relatively little, confirming the long-held opinion of expert surgeons that rebound tenderness adds little to what clinicians already know from gentle palpation.

Unhelpful findings in the diagnosis of peritonitis are the character of the bowel sounds and the presence or absence of rectal tenderness.

B. APPENDICITIS

In patients with acute abdominal pain, the absence of right lower quadrant tenderness is a compelling argument against the diagnosis of appendicitis (sensitivity of right lower quadrant tenderness is 94% to 97%, negative LR = 0.1).40,43

1. Individual Findings (See EBM Box 48-2)

Just as rigidity and guarding argue for peritonitis in patients with acute abdominal pain (see EBM Box 48-1), these findings also argue for appendicitis in patients with right lower quadrant pain (the positive LR for rigidity is 3.2; for guarding, 2.3).26–31,33,34 Other findings that argue for appendicitis are McBurney’s point tenderness (LR = 3.4), a positive Rovsing’s sign (LR = 2.5), and positive psoas sign (LR = 2.0). The absence of severe right lower quadrant tenderness (LR = 0.2), the absence of McBurney’s point tenderness (LR = 0.4), and the negative cough test argue against appendicitis (LR = 0.4).26,34 Again, rebound tenderness is one of the least discriminating of signs (positive LR = 1.9, negative LR = 0.5).*

McBurney’s point tenderness may have even greater accuracy if every patient’s appendix were precisely at McBurney’s point, but radiologic investigation reveals that location of the normal appendix sometimes lies a short distance away.46 In one study of patients with acute abdominal pain, clinicians first located the patient’s appendix using hand-held ultrasound equipment. Maximal pinpoint tenderness over this “sonographic McBurney’s point” had superior diagnostic accuracy for detecting appendicitis (sensitivity 87%, specificity 90%, positive LR 8.4, negative LR 0.1).47

In contrast to a long-held traditional teaching, giving analgesics to patients with acute abdominal pain does not change the accuracy of individual signs nor reduce the clinician’s overall diagnostic accuracy.48,49

Findings having little or no diagnostic value in diagnosing appendicitis are rectal tenderness (whether the tenderness is generalized or confined to the right rectum) and the obturator sign (LRs not significant).50 Nonetheless, a rectal

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*The likelihood ratios for rigidity, guarding, rebound tenderness, and cough test do not appear in EBM Box 48-2, because they are similar to those already shown in EBM Box 48-1.
examination should still be performed to detect the rare patient (2% or less) with a pelvic abscess and rectal mass.\textsuperscript{30,32}

2. Combination of Findings

Many scoring systems have been developed to improve diagnostic accuracy and reduce the negative appendectomy rate in patients with acute right lower quadrant tenderness.\textsuperscript{27,28,36,41,43,51–56} Most of these scoring systems, however, are suboptimal because they are based on either simple conversion of individual LRs to “diagnostic weights,” without first performing tests of independence,\textsuperscript{28,36,41,51,52,54} or on arbitrary diagnostic weights based on traditional teachings.\textsuperscript{53} The few studies available that looked at the independence of findings investigated relatively few physical signs.\textsuperscript{27,40,43,56} When scoring systems are compared to usual clinical care, they fail to reduce the duration of hospital stay, frequency of nontherapeutic operations, or number of delayed surgeries resulting in perforations,\textsuperscript{57} and in some studies, they are actually inferior to the clinical judgment of experienced surgeons.\textsuperscript{4,56,58,59}

C. CHOLECYSTITIS (SEE EBM BOX 48-3)

In patients with right upper quadrant pain and suspected cholecystitis, a positive Murphy’s sign argues modestly for cholecystitis (LR = 1.9). The presence of back tenderness argues somewhat against cholecystitis (LR = 0.4), probably because it is more commonly found in alternative diagnoses such as renal disease or pancreatitis.\textsuperscript{67} The presence or absence of a right upper quadrant mass is unhelpful, probably because a palpable tender gallbladder is uncommon in cholecystitis (sensitivity <25%) and because the sensation of a right upper quadrant mass may occur in other diagnoses, such as liver disease or localized rigidity of the abdominal wall from other disorders.

There is also a “sonographic Murphy’s sign,” elicited during ultrasonography of the right upper quadrant, which is simply the finding of maximal tenderness over the gallbladder. Studies of this sign in patients with right upper quadrant pain reveal much better diagnostic accuracy than conventional palpation: sensitivity 63%, specificity 94%, positive LR = 9.9, and negative LR = 0.4.\textsuperscript{68} The superior accuracy of this sign, which also relies on palpation of the abdominal wall, suggests that the poorer accuracy of conventional palpation is due to the difficulty precisely locating the position of the gallbladder.

Murphy’s sign may be even less accurate in elderly patients, because up to 25% of patients older than 60 years of age with cholecystitis lack any abdominal tenderness whatsoever.\textsuperscript{69} Although most of these patients have abdominal pain, some have altered mental status and lack this symptom as well.
In patients with a pyogenic liver abscess, the presence of Murphy’s sign argues that the patient has associated biliary tract sepsis (sensitivity 32%, specificity 88%, positive LR 2.8, negative LR not significant).  

D. SMALL BOWEL OBSTRUCTION (SEE EBM BOX 48-4)

In patients with acute abdominal pain, the findings of visible peristalsis (LR = 18.8), abdominal distension (LR = 9.6), and hyperactive bowel sounds (LR = 5.0) all argue for bowel obstruction (though visible peristalsis is a rare finding, occurring in only 6% of patients). Diminished or absent bowel sounds also occur in obstruction, being found in 1 of 4 patients.3,32

The findings arguing somewhat against obstruction are normal bowel sounds (i.e., not hyperactive, absent, or diminished) and the absence of a distended abdomen (both LRs = 0.4). Nonetheless, 30% to 40% of patients with obstruction lack abdominal distension, especially early in the course or if the obstruction is high in the intestines. The findings of peritoneal irritation—rigidity and rebound tenderness—argue neither for nor against the diagnosis of obstruction.

E. RENAL COLIC

In one study of 1333 patients presenting with acute abdominal pain, two findings were accurate signs of ureterolithiasis (as diagnosed by imaging or follow-up): loin tenderness (sensitivity 15%, specificity 99%, positive LR = 27.7, negative LR = 0.9) and renal tenderness (sensitivity 86%, specificity 76%, positive LR = 3.6, negative LR = 0.2). As compelling as these findings are, they are less important than the finding of microscopic hematuria, which has a sensitivity of 75%, specificity of 99%, positive LR of 73.1, and negative LR of 0.3.71

CHRONIC ABDOMINAL PAIN

In one study of patients with chronic abdominal pain, the abdominal wall tenderness test (see “Abdominal Wall Tenderness Test”) argued significantly against a visceral cause of the pain (LR = 0.1; EBM Box 48-5). In these patients, a positive abdominal wall tenderness test argued that the pain would respond to an injection of combined anesthetic/corticosteroid into the tender spot and that no serious pathology would be discovered during 3 or more months of follow-up (LR = 7.0).72

Beyond this finding, there is relatively little information on the accuracy of examination in diagnosing chronic abdominal pain. Most studies show that the finding of abdominal tenderness is common in many nonorganic disorders and has little diagnostic value. In patients with suspected biliary colic, right upper quadrant tenderness does not distinguish patients with cholelithiasis from
those without, although lower abdominal tenderness argues modestly against cholelithiasis (LR = 0.5; see EBM Box 48-5). In patients with dyspepsia, epigastric tenderness does not help predict whether upper endoscopy will reveal an ulcer, some other abnormality, or normal findings.

Even if the finding of tenderness has little value, abdominal examination is still important in these patients, to detect masses, organomegaly, and signs of a surgical abdomen (see previous).

### Chronic Abdominal Pain

<table>
<thead>
<tr>
<th>Finding (Ref)</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Likelihood Ratio if Finding Present</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive abdominal wall tenderness test, detecting visceral pain&lt;sup&gt;72&lt;/sup&gt;</td>
<td>11</td>
<td>21</td>
<td>0.1</td>
<td>4.2</td>
</tr>
<tr>
<td>Right upper quadrant tenderness, detecting cholelithiasis&lt;sup&gt;73&lt;/sup&gt;</td>
<td>53</td>
<td>51</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Lower abdominal tenderness, detecting cholelithiasis&lt;sup&gt;73&lt;/sup&gt;</td>
<td>21</td>
<td>57</td>
<td>0.5</td>
<td>1.4</td>
</tr>
<tr>
<td>Epigastric tenderness, detecting positive upper endoscopy&lt;sup&gt;74&lt;/sup&gt;</td>
<td>63</td>
<td>31</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS, not significant; likelihood ratio (LR) if finding present = positive LR; LR if finding absent = negative LR.

*Diagnostic standard: For cholelithiasis, ultrasonography or oral cholecystogram<sup>73</sup>; for positive upper endoscopy, findings on upper gastrointestinal endoscopy, most of which were peptic ulcers; for visceral pain, pain originating from an intraabdominal organ or structure (i.e., not abdominal wall).

*Definition of findings: For abdominal wall tenderness test, see text.
REFERENCES


