Acute Appendicitis

The appendix is a normal true diverticulum of the cecum that is prone to acute and chronic inflammation. Acute appendicitis is most common in adolescents and young adults, with a lifetime risk of 7%; males are affected slightly more often than females. Despite the prevalence of acute appendicitis, the diagnosis can be difficult to confirm preoperatively and may be confused with mesenteric lymphadenitis (often secondary to unrecognized *Yersinia* infection or viral enterocolitis), acute salpingitis, ectopic pregnancy, mittelschmerz (pain caused by minor pelvic bleeding at the time of ovulation), and Meckel diverticulitis.

Pathogenesis. Acute appendicitis is thought to be initiated by progressive increases in intraluminal pressure that compromise venous outflow. In 50% to 80% of cases, acute appendicitis is associated with overt luminal obstruction, usually caused by a small stone-like mass of stool, or fecalith, or, less commonly, a gallstone, tumor, or mass of worms (oxyuriasis vermicularis). Stasis of luminal contents, which favors bacterial proliferation, triggers ischemia and inflammatory responses, resulting in tissue edema and neutrophilic infiltration of the lumen, muscular wall, and periappendiceal soft tissues.

MORPHOLOGY

In early acute appendicitis subserosal vessels are congested and there is a modest perivascular neutrophilic infiltrate within all layers of the wall. The inflammatory reaction transforms the normal glistening serosa into a dull, granular, erythematous surface. Although mucosal neutrophils and focal superficial ulceration are often present, these are not specific markers of acute appendicitis. Diagnosis of acute appendicitis requires **neutrophilic infiltration of the muscularis propria.** In more severe cases a prominent neutrophilic exudate generates a serosal fibrinopurulent reaction. As the process continues, focal abscesses may form within the wall (acute suppurative appendicitis). Further compromise of appendiceal vessels leads to large areas of hemorrhagic ulceration and gangrenous necrosis that extends to the serosa creating acute gangrenous appendicitis, which can be followed by rupture and suppurative peritonitis.

Clinical Features. Typically, early acute appendicitis produces periumbilical pain that ultimately localizes to the right lower quadrant, followed by nausea, vomiting, low-grade fever, and a mildly elevated peripheral white cell count. A classic physical finding is the *McBurney sign*, deep tenderness located two thirds of the distance from the umbilicus to the right anterior superior iliac spine (McBurney point).

Regrettably, classic signs and symptoms of acute appendicitis are often absent. In some cases, a retrocecal appendix may generate right flank or pelvic pain, while a malrotated colon may give rise to appendicitis in the left upper quadrant. As with other causes of acute inflammation there is neutrophilic leukocytosis. In some cases the peripheral leukocytosis may be minimal or, alternatively, so great that other causes are considered. The diagnosis of acute appendicitis in young children and the very old is particularly problematic, since other causes of abdominal emergencies are prevalent in these populations, and the very young and old are also more likely to have atypical clinical presentations.

Given these diagnostic challenges, it should be no surprise that even highly skilled surgeons remove normal appendices. This is preferred to delayed resection of a diseased appendix, given the significant morbidity and mortality associated with appendiceal perforation. Other complications of appendicitis include pyelophlebitis, portal venous thrombosis, liver abscess, and bacteremia.

Tumors of the Appendix

The most common tumor of the appendix is the well-differentiated neuroendocrine (carcinoid) tumor. It is usually discovered incidentally at the time of surgery or examination of a resected appendix. This neoplasm, which is almost always benign, most frequently forms a solid bulbous swelling at the distal tip of the appendix, where it can reach 2 to 3 cm in diameter. Although intramural and transmural extension may be evident, nodal metastases are very infrequent, and distant spread is exceptionally rare. Conventional adenomas or non–mucin-producing adenocarcinomas also occur in the appendix and may cause obstruction and enlargement that mimics acute appendicitis. Mucocele, a dilated appendix filled with mucin, may simply represent an obstructed appendix containing inspissated mucin or be a consequence of mucinous cystadenoma or mucinous cystadenocarcinoma. In the latter instance, invasion through the appendiceal wall can lead to intraperitoneal seeding and spread. In women the resulting peritoneal implants may be mistaken for mucinous ovarian tumors. In the most advanced cases the abdomen fills with tenacious, semisolid mucin, a condition called *pseudomyxoma peritonei* (Chapter 22). This disseminated intraperitoneal disease may be held in check for years by repeated debulking but, in most instances, follows an inexorably fatal course.

KEY CONCEPTS

- **Hemorrhoids** are collateral vessels that develop secondary to persistently elevated venous pressure within the hemorrhoidal plexus. They also occur in portal hypertension.
- **Acute appendicitis** is most common in children and adolescents. It is thought to be initiated by increased intraluminal pressure and compromised venous outflow
- The most common tumor of the appendix is the **benign carcinoid.**
- Peritoneal dissemination of mucinous tumors can cause **pseudomyxoma peritonei**.