ANATOMY OF THE APPENDIX

- Appendix develops as a diverticulum of the cecum (cecal bud) in embryonic week 8, as part of caudal midgut.
- Appendix is variable in length (2-20 cm) and may become inflamed and enlarged owing to fecal impaction and/or infection (appendicitis).
- Small mesentery (mesoappendix) connects with terminal ileum and contains appendiceal blood vessels and lymphatics.
- Tissue layers include mucosa, lamina propria, inner circular and outer longitudinal smooth muscle, and adventitia (peritoneum and mesentery).
- Low mucosa contains numerous goblet cells, intestinal glands, and crypts of Lieberkühn.
- Taeniae coli (triple longitudinal muscle bands of the cecum) merge into a single, outer longitudinal muscle layer on appendix.
- Lamina propria contains masses of lymphoid nodules with germinal centers.

Location and Position of Appendix

- Typical locations: retrocecal-retrocolic, pelvic (descending), subcecal, ileocecal (anterior to ileum), ileocecal (posterior to cecum)
- Variable by time and between individuals
- Can depend on size of mesoappendix
McBurney’s point (on spinoumbilical line)

Barium radiograph of unusually long appendix (A, Appendix; C, Cecum)

Variations in position of appendix

Fixed retrocecal appendix

Vermiform Appendix

Mesoappendix
Serosa (visceral peritoneum)
Longitudinal muscle
Circular muscle
Submucosa
Aggregate lymphoid nodules
Crypts of Lieberkühn

Appendix Diseases
• May be displaced into pelvis in pregnancy, with attendant differences in symptoms

**Mesentery and Folds**

**Mesoappendix**

• Runs from the posterior leaf of the mesentery of the terminal ileum
• Runs posterior to the terminal ileum and is often attached to it
• Attaches to left side of cecum and to the entire length of the appendix
• Triangular
• Contains appendicular artery (branch of ileocolic) and its variants

**Ileocolic or Superior Ileocecal Fold**

• In the terminal ileal mesentery
• Contains anterior cecal artery
• Forms anterior wall of ileocolic or superior ileocecal fossa
• Overlies terminal ileum to posterior wall of fossa

**Ileocecal or Inferior Ileocecal Fold**

• Anterior to mesoappendix
• Extends from right and anterior terminal ileum
• Forms anterior wall of ileocecal or inferior ileocecal fossa
• Mesoappendix: posterior wall of fossa
• Contains no vessels: “bloodless” fold of Treves

**VESSELS AND LYMPHATICS**

**Appendicular (Appendiceal) Artery**

• Branch of the ileocolic artery or of the ileal or colic branch of the ileocolic (branches from the superior mesenteric artery)
• Base of the appendix may be supplied by the anterior or posterior cecal artery.
• Appendiceal artery typically passes behind the terminal ileum, within the mesoappendix.

Appendicular (Appendiceal) Vein
• Joins ileocolic vein, which joins superior mesenteric vein (portal vein drainage)

Veins of Large Intestine
Lymphatics
- Local drainage of nodes within mesoappendix through vessels and nodes along appendiceal and ileocolic arteries
- Draining toward superior mesenteric lymph nodes
CLINICAL CORRELATES

• Appendicitis is considered primarily a disease of adolescents and young adults.
• Rare in infants
• Lifetime risk for Western populations is ~7%; incidence varies with age.

Etiology (Most Common)

• Children: hyperplasia, can follow infection
• Adults: fecalith

Symptoms (Classic Presentation)

• Anorexia, periumbilical pain, vomiting
• Locus of pain shifts to right lower quadrant with onset of peritonitis.

Differential Diagnosis

• Differential diagnosis for appendicitis is extensive.
• Other conditions to be ruled out: other gastrointestinal, gynecologic, urologic, neoplastic diseases.

Appendicitis during Pregnancy

• Most common cause of first-trimester acute abdominal pain
• More likely to occur in second trimester, but not the most common cause of acute pain
• More likely to perforate in third trimester (confused with contraction pain)
• Right upper quadrant pain can occur in third trimester.
• Fetus can die with rupture (35%).
Appendix Diseases

- Acute appendicitis
- Gangrenous appendicitis
- Fecal concretions in inflamed appendix
- Inflamed retrocecal appendix with adhesions
- Appendiceal abscess
- Mucocele of appendix
- Carcinoid of appendix

Diseases of the Appendix
Prophylaxis
• Suspected, but uninflamed appendix may be removed during laparotomy for a ruptured ovarian cyst, thrombosed ovarian vein, or regional enteritis (non-cecal).

Clinical Signs and Landmarks
• McBurney’s point: surface projection on abdomen of appendix attachment to cecum; 1/3 of the way along line from right anterior superior iliac spine to umbilicus; near anterior cutaneous branch of iliohypogastric nerve
• McBurney’s sign: deep tenderness at McBurney’s point
• Aaron’s sign: rebound pain with applied pressure
• Most common site of appendicular perforation: midpoint of antimesenteric border

CT Signs of Appendicitis
• Diameter >7 mm or wall thickness >2 mm
• Bull’s eye appearance

Surgical Appendectomy
• Gold standard remains exploratory laparotomy and appendectomy
• McBurney approach: oblique incision divides external oblique fascia parallel to its fibers
• Rocky-Davis incision: right lower quadrant transverse incision may be preferred in specific instances

Carcinoid of the Appendix
• Most common site for carcinoid tumor (~50%)
• Ileum and rectum next most common sites