Car.

The Abdomen

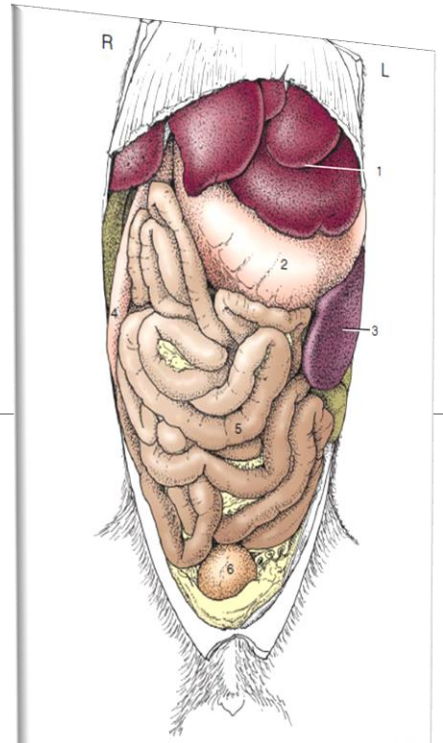
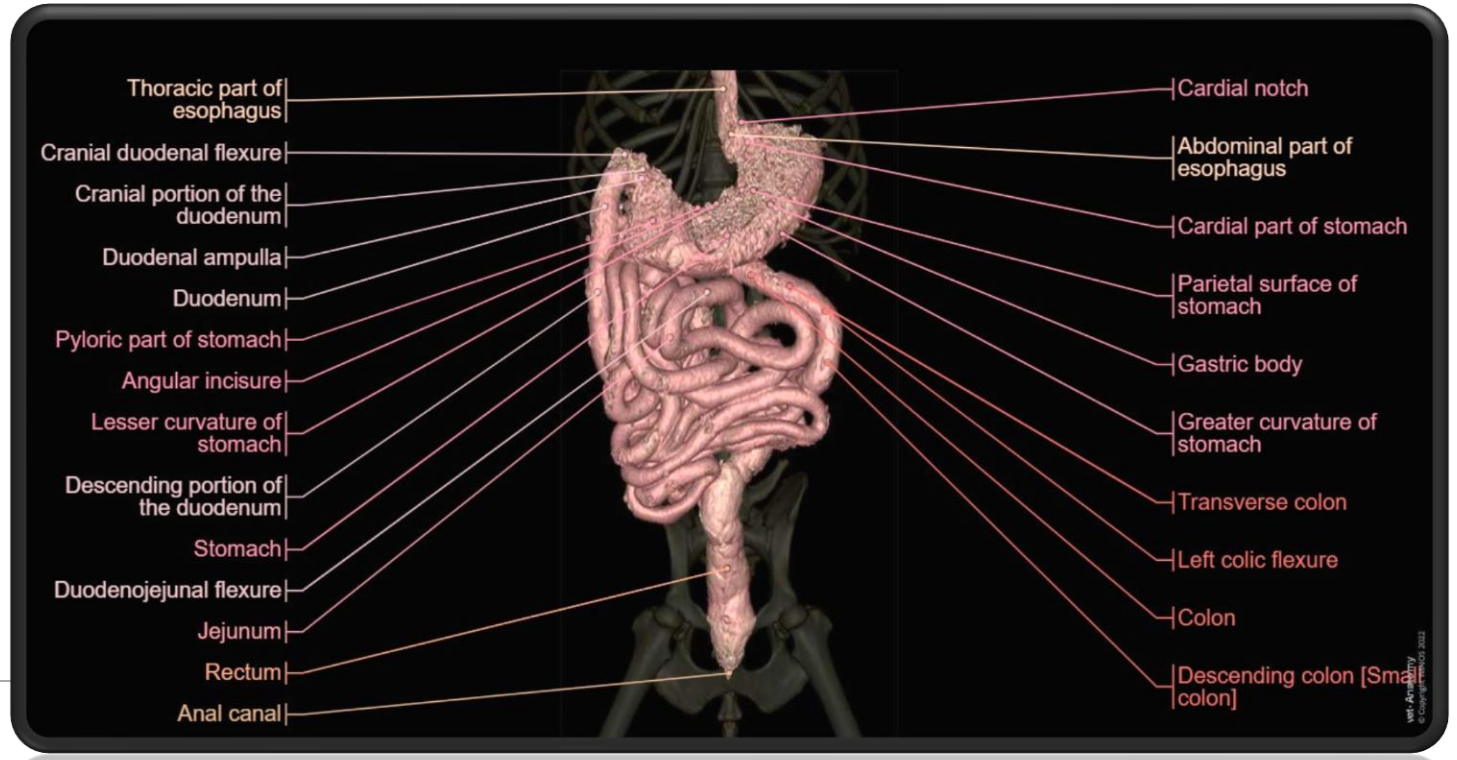


Figure 3–41 Ventral view of the abdominal organs of the dog after removal of the greater omentum. *1*, Liver; *2*, stomach; *3*, spleen; *4*, descending duodenum; *5*, jejunum; *6*, bladder; *7*, diaphragm.



https://download.noanimaltesting.ir/Virtual-Canine-Anatomy.iso

The most common abdominal surgeries performed on dogs are:

1. Exploratory laparotomy: This is a surgical procedure that involves opening the abdomen to examine the abdominal organs. It is usually used as a last resort when other diagnostic tests fail to indicate the underlying issue for abdominal disease.

2. Gastrotomy: A surgical incision into the stomach, often performed to remove a foreign body or biopsy the stomach wall.

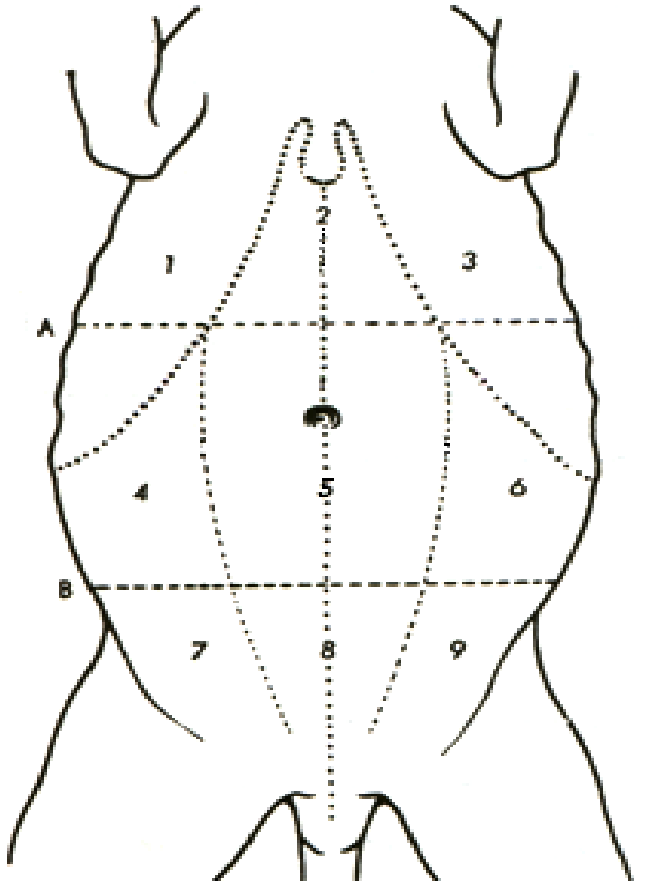
3. Cystotomy: A surgical incision into the urinary bladder, commonly done to remove uroliths (bladder stones).

4. Splenectomy: Surgical removal of the spleen, which may be necessary for conditions such as splenic torsion or hematoma.

5. Intestinal resection and anastomosis: Removal of a damaged or diseased portion of the intestine and reconnecting the healthy ends.

During an exploratory laparotomy, the surgeon follows a systematic approach to examine all the abdominal organs[5]. The incision is made on the ventral midline, extending from the xiphoid process to the pubis. The falciform ligament is often removed to improve visualization of the cranial abdomen.

After the surgery, it is crucial to keep the dog quiet and restrict activity for at least 2-3 weeks to allow proper healing of the incision[4]. The incision should be monitored for signs of infection, such as redness, swelling, or discharge. Licking or chewing at the incision site must be prevented by using an E-collar.



2 : Xyphoid Region
1& 3 : Hypochondrial R
5 : Umbilical R
4 & 6 : Left & right flank
8 : Pubic R
7 & 9 : Inguinal R

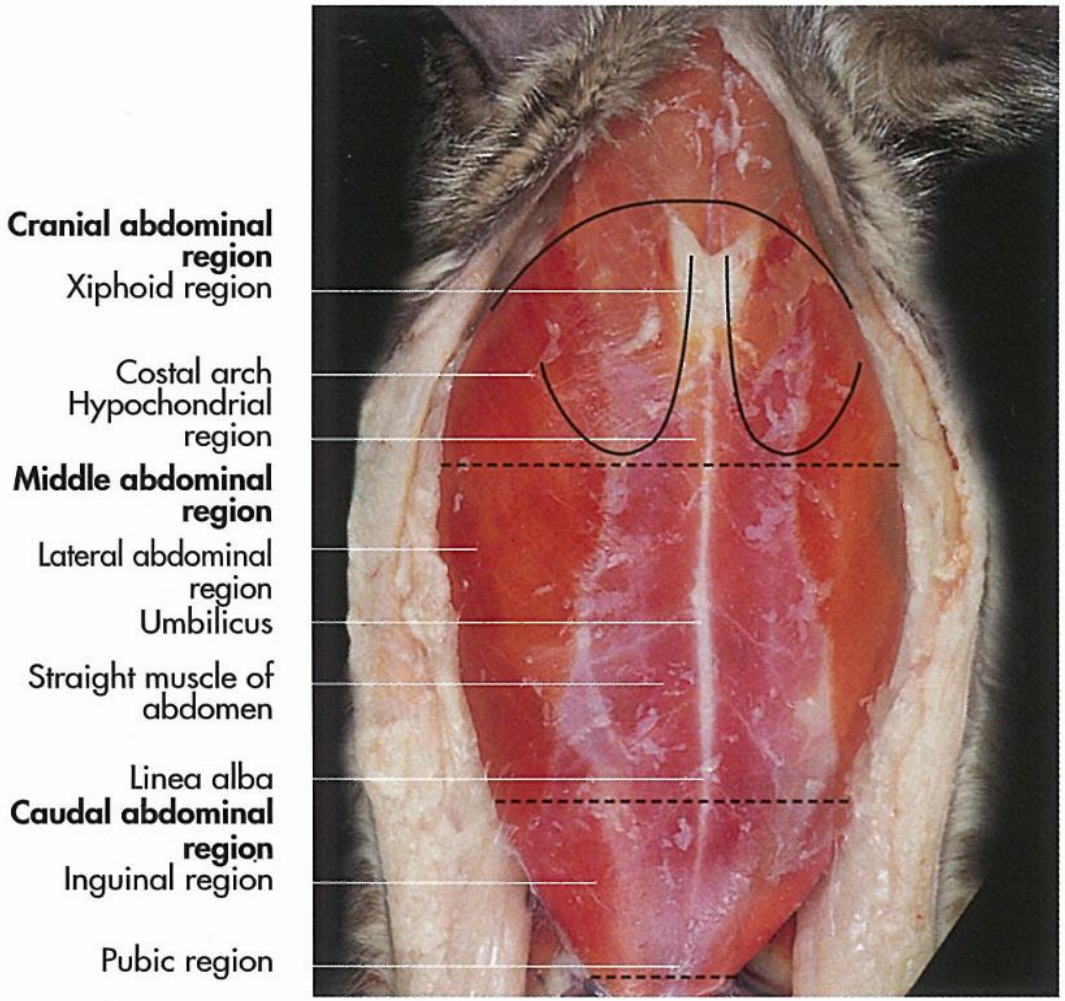


Fig. 6-17. Regions of the ventral abdomen shown on a cat (König, 1992).

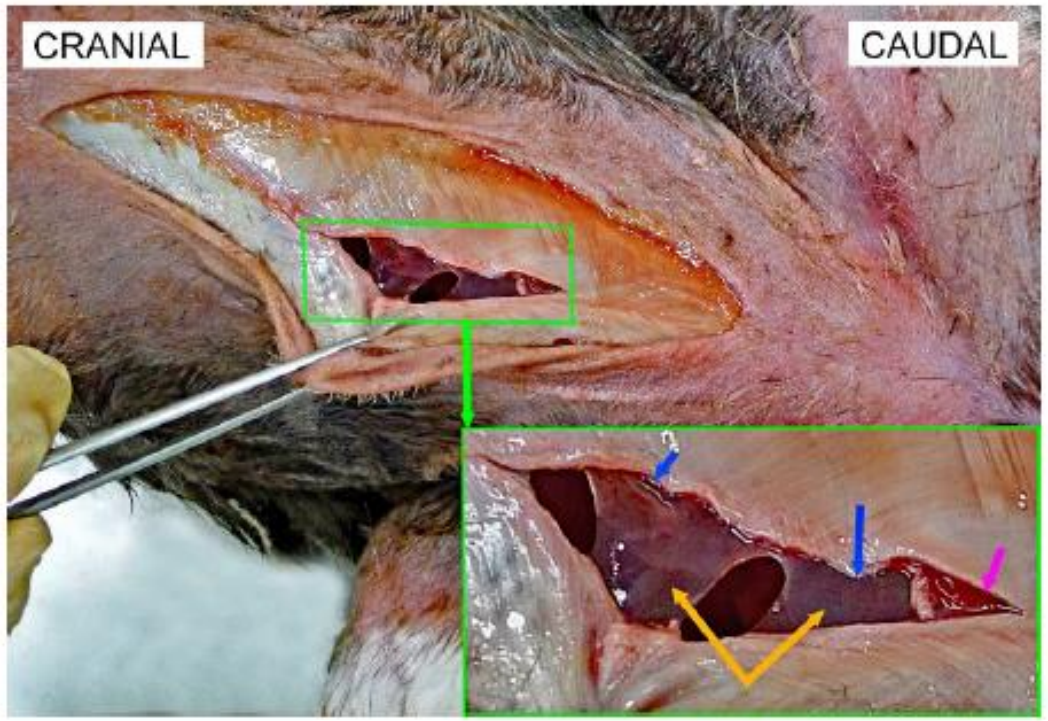


FIGURE 5.8-4 Ventral abdominal wall of a cat. The skin, subcutaneous tissue, and linea alba have been incised to reveal the thin, translucent parietal peritoneum, which lines the abdominal wall *(yellow arrows)*. The peritoneum was inadvertently punctured in two places in this prosection, which illustrates how readily the peritoneal cavity is entered on incising the linea alba *(blue arrows)*. Note, too, that the belly of the rectus abdominis muscle is exposed *(pink arrow)* in the caudal portion of the incision, which deviated slightly from midline.

Exploratory laparotomy, also known as an ex-lap surgery, is a common surgical procedure performed on dogs to investigate and diagnose internal health issues that cannot be detected through external examination or diagnostic tests alone. During this procedure, the veterinarian makes an incision in the abdominal area to gain access to the organs and structures within the abdomen.

The standard approach is a ventral midline laparotomy incision extending from the xiphoid to the pubis. This allows for a thorough exploration of the entire abdominal cavity in a systematic manner. The surgeon examines the abdominal organs, including the liver, spleen, intestines, and kidneys, for any abnormalities, tumors, or signs of disease. If concerning findings are observed, biopsies may be taken for further analysis to determine the precise diagnosis.

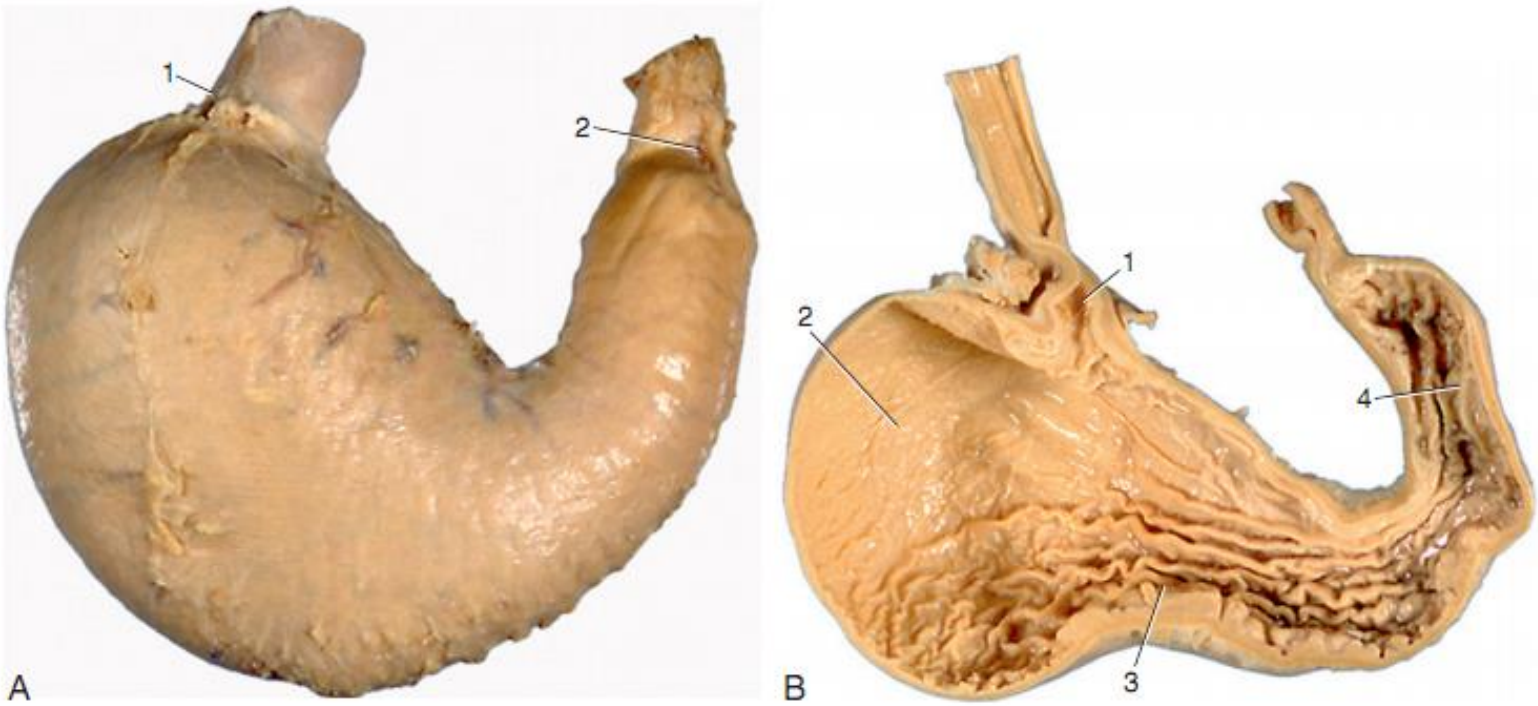
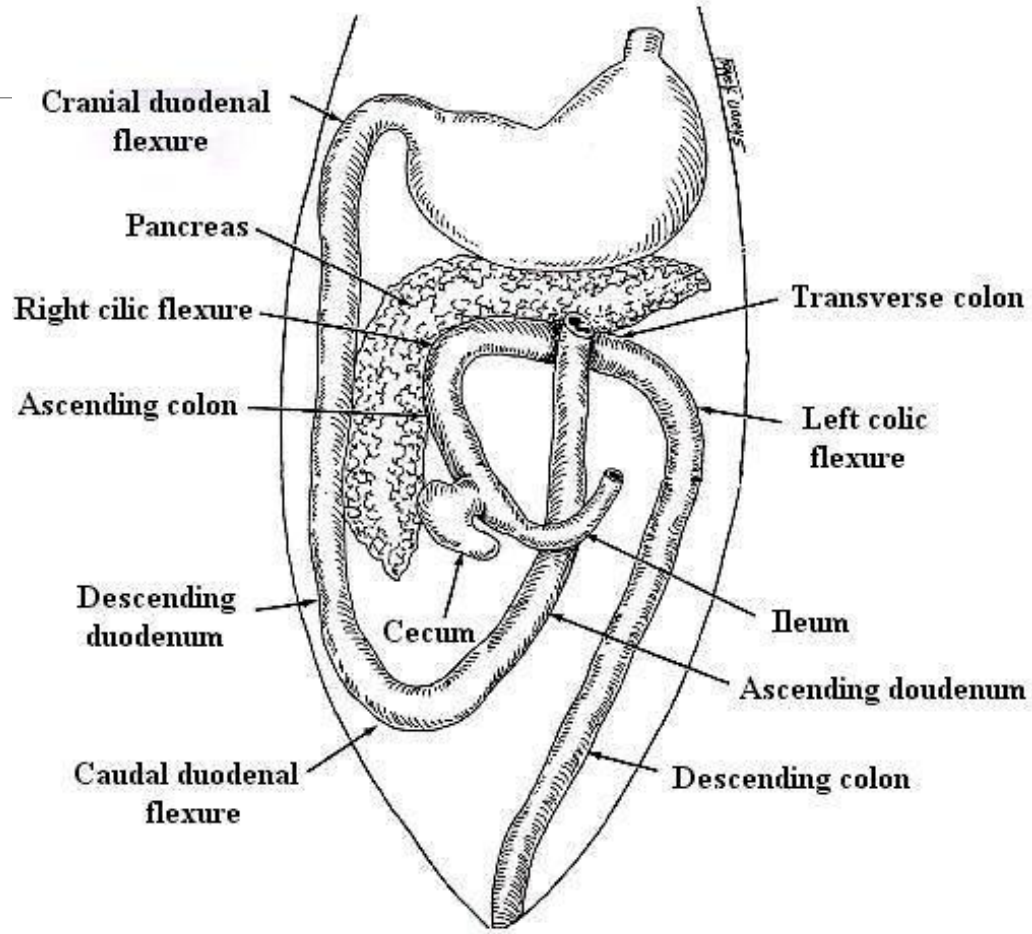
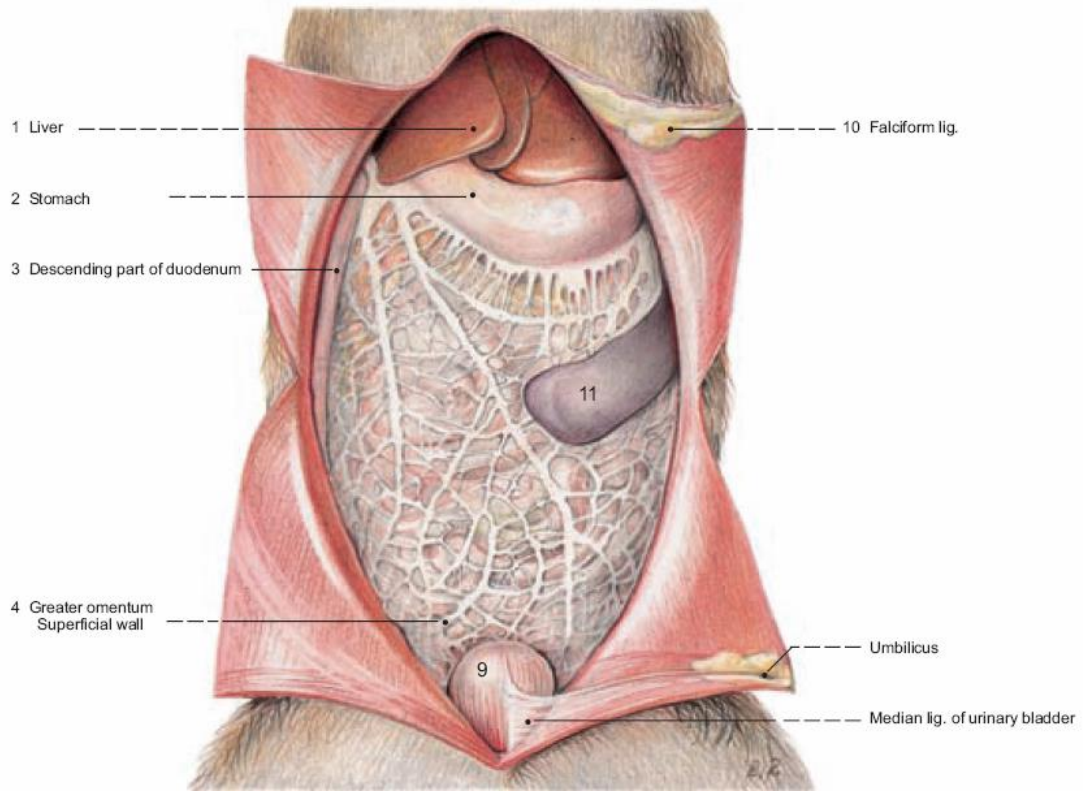
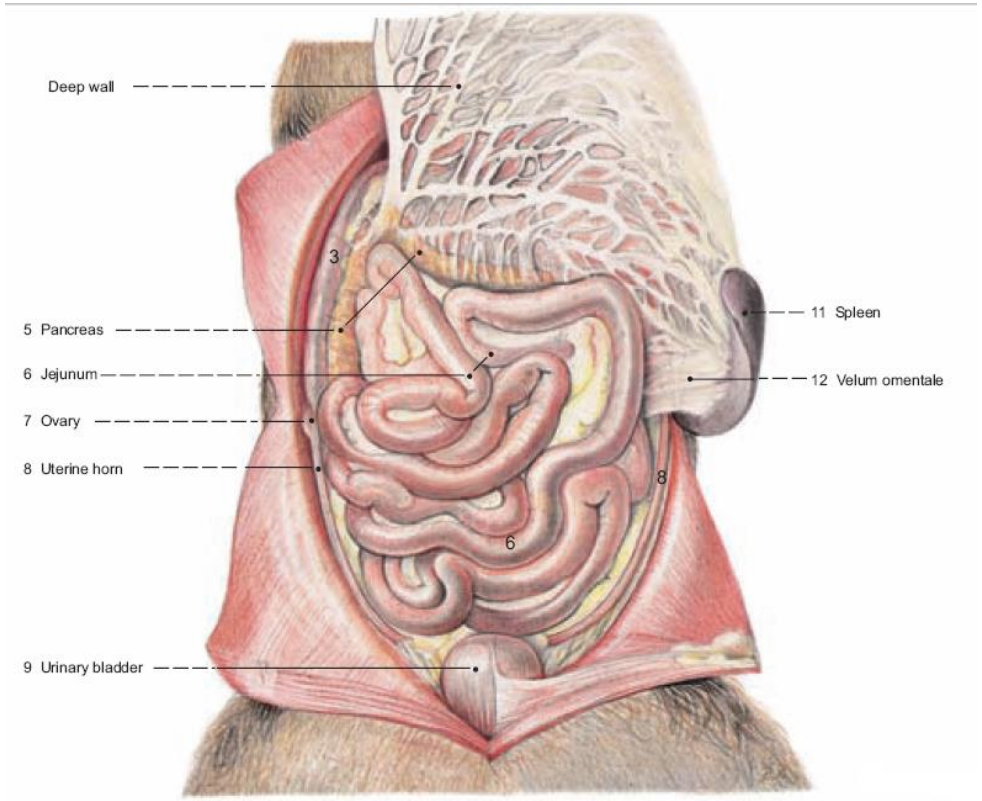
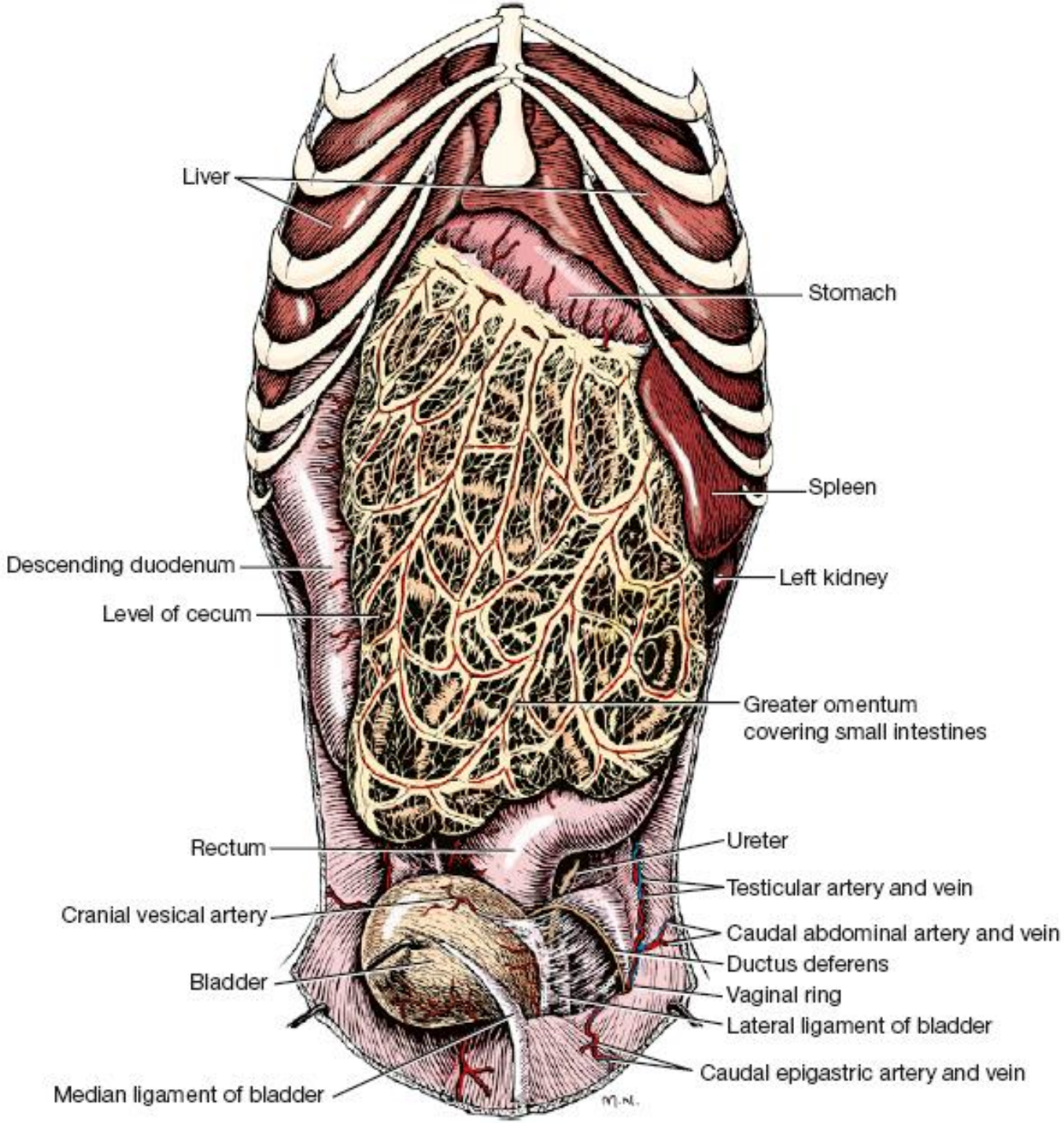


Figure 3–35 **A,** Visceral surface of stomach (dog). *1,* cardia; *2,* pylorus. **B,** Interior of stomach (dog). *1,* cardiac opening; *2,* fundus; *3,* body; *4,* pyloric antrum.


Cranial duodenal flexure
Pancreas
Right cilic flexure
Ascending colon
Descending duodenum
Caudal duodenal flexure
Cecum
Transverse colon
Left colic flexure
Ileum
Ascending doudenum
Descending colon


1 Liver
2 Stomach
3 Descending part of duodenum
4 Greater omentum
Superficial wall
10 Falciform lig.
Umbilicus
Median lig. of urinary bladder
11
9


Deep wall
5 Pancreas
6 Jejunum
7 Ovary
8 Uterine horn
9 Urinary bladder
11 Spleen
12 Velum omentale
3
8
6


Liver
Stomach
Spleen
Descending duodenum
Left kidney
Level of cecum
Greater omentum
covering small intestines
Rectum
Ureter
Testicular artery and vein
Cranial vesical artery
Caudal abdominal artery and vein
Ductus deferens
Bladder
Vaginal ring
Lateral ligament of bladder
Caudal epigastric artery and vein
Median ligament of bladder

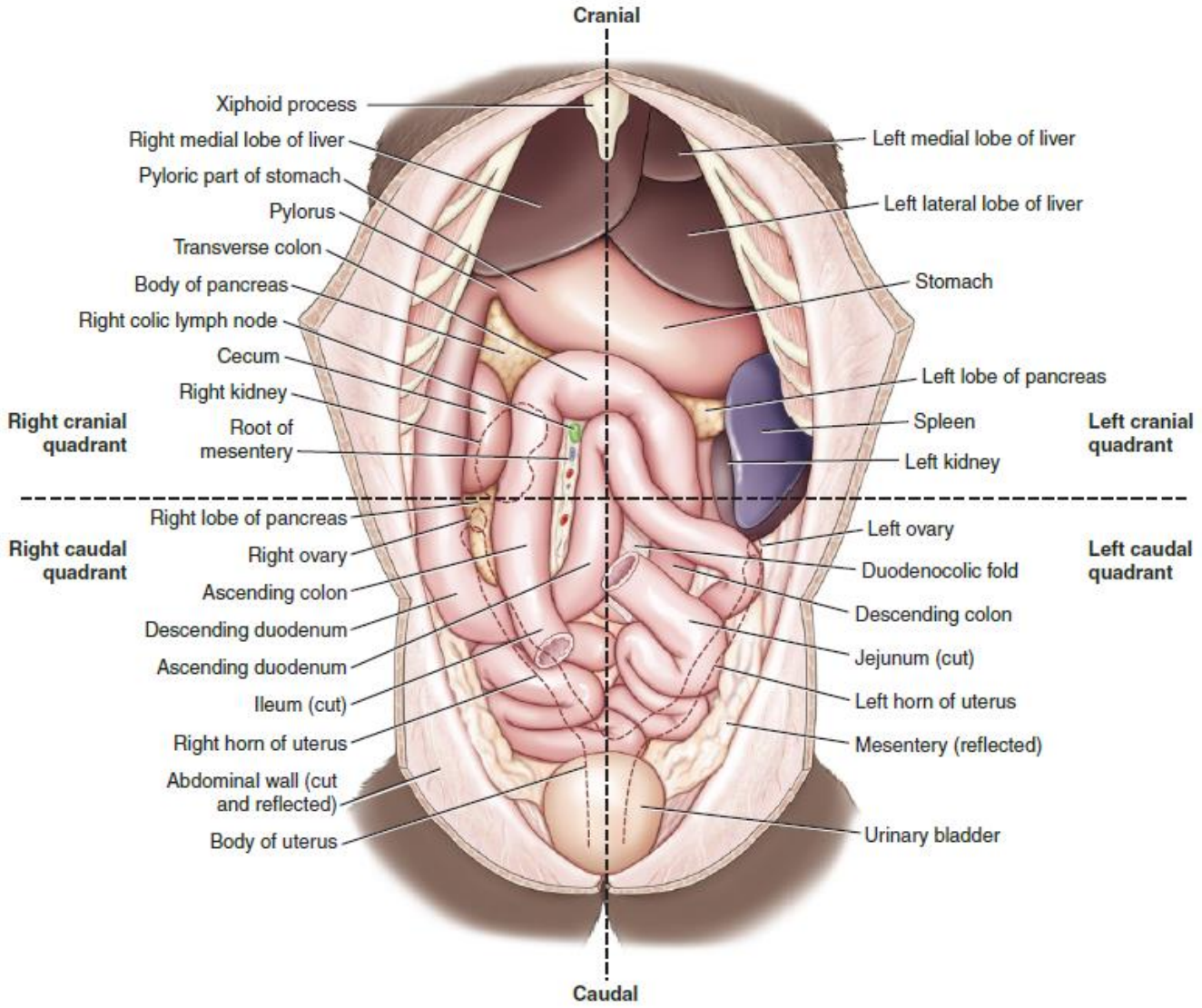
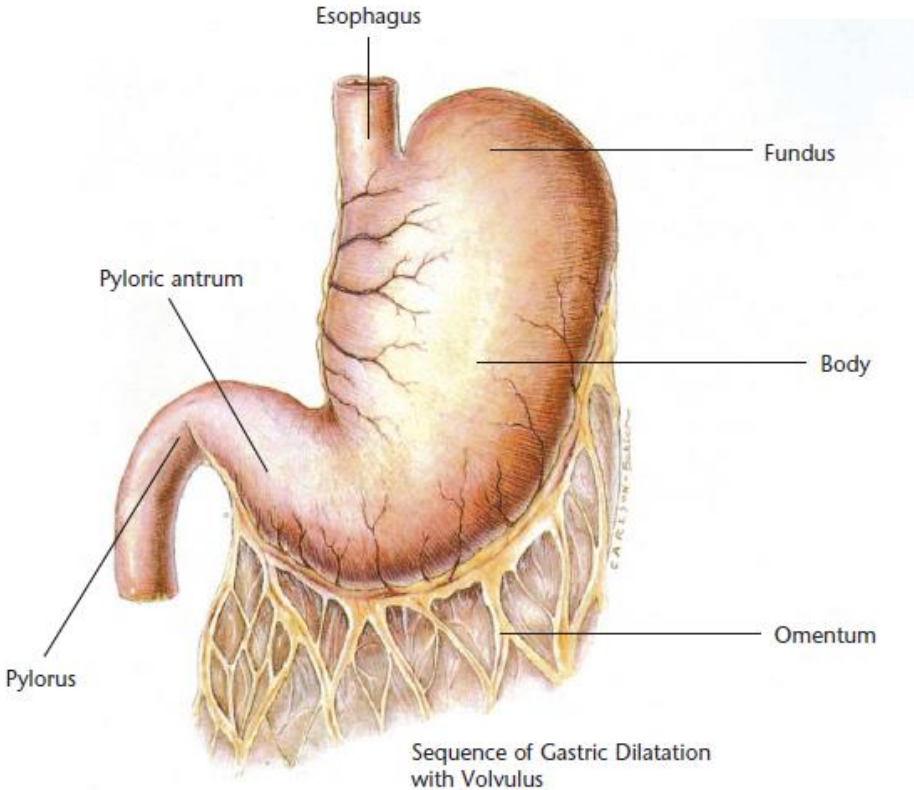
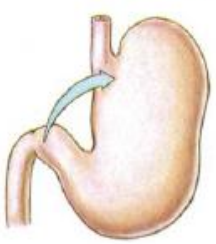


FIGURE 3A-8 Ventral view of the canine abdominal cavity.

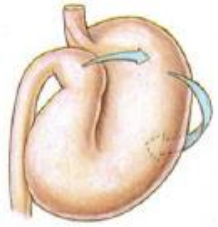


Sequence of Gastric Dilatation with Volvulus

Clockwise rotation as viewed from a ventral position



The pyloric antrum is displaced downward.



The pylorus crosses the midline, passes underneath the distended proximal part of stomach, and moves upward along the left abdominal wall.

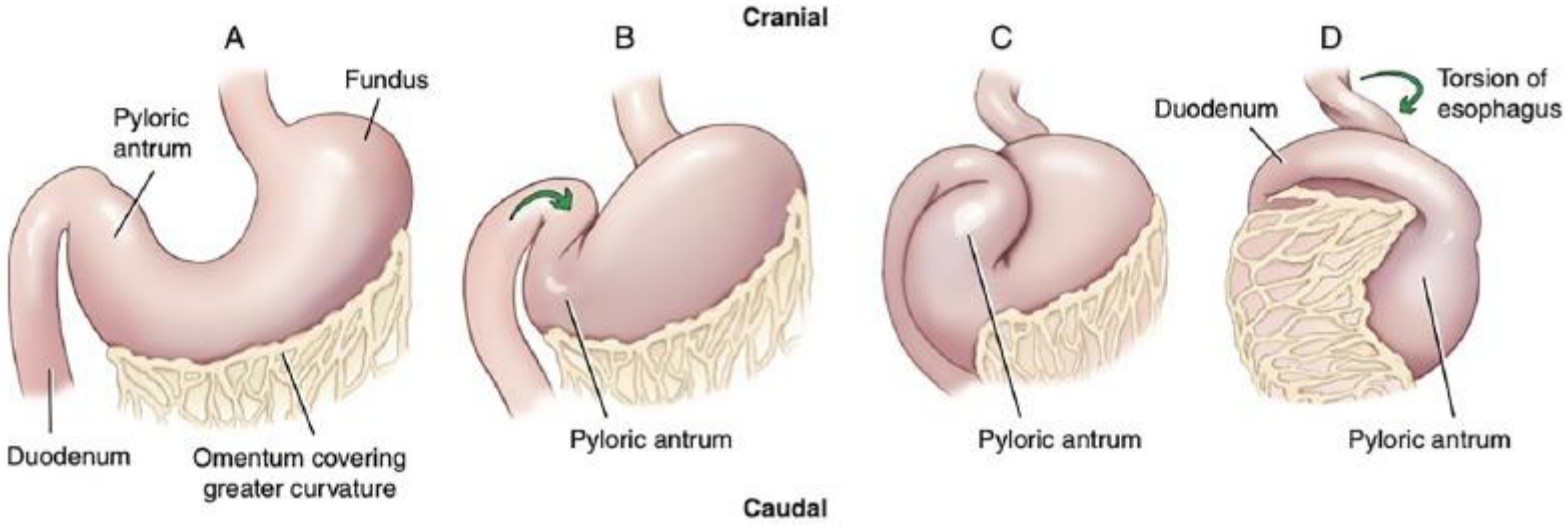


FIGURE 5.5-2 Direction of a "clockwise" stomach rotation in most dogs with gastric dilatation-volvulus as viewed ventrally. (A) The normal position of the esophagus, stomach, pylorus, and duodenum. (B) The pylorus rotates ventrally and laterally to the body of the stomach. (C) The pylorus moves upward, crossing the distended stomach toward the left abdominal wall and stretching the duodenum across the cardia as it crosses the midline. (D) The fundic part of the stomach moves dorsally, the greater curvature is displaced ventrally, and the ventral leaf of the greater omentum covers the ventral aspect of the stomach. This results in a clockwise torsion of the esophagus with the duodenum displaced to the left.

GASTRIC DILATATION AND VOLVULUS (GDV)

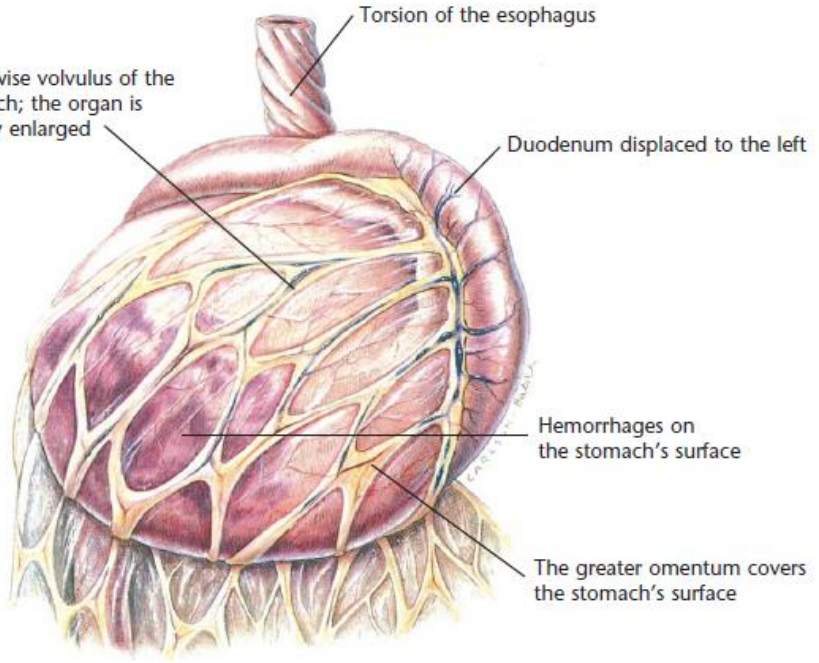
Gastric dilitation and volvulus is an acute, life-threatening condition. It most commonly occurs in large, deep-chested dogs including the German Shepherd, Standard Poodle, Great Dane, Boxer, Doberman Pinscher, Saint Bernard, and Irish Setter. It is most common in middle-age to older dogs.

Etiologic factors associated with GDV include anatomic predisposition, hereditary factors, food-filled stomach with postprandial exercise, large amounts of water consumption, and weakened gastric supportive ligaments.

Risk factors associated with gastric dilatation are general anesthesia, aerophagia, high anxiety level, overeating, and gastric and duodenal obstruction.

With GDV, the stomach moves in a clockwise direction as viewed ventrodorsally and caudally. The degree of rotation usually ranges from 90 to 360 degrees, and occasionally rotates up to 540 degrees.

Canine Gastric Dilatation with Volvulus



The gastric fundus moves ventrally and becomes located in the ventral abdomen.

The continuing gastric dilatation displaces the greater curvature ventrally.

Gastric Dilatation with Volvulus

Diagnostic Plan
History
Physical examination
X-ray of the stomach
Blood work

Therapeutic Plan
Stomach distention relief
Shock therapy
Surgery

Dietary Plan
A low-residue diet, fed in small portions
Avoid excessive postprandial exercise

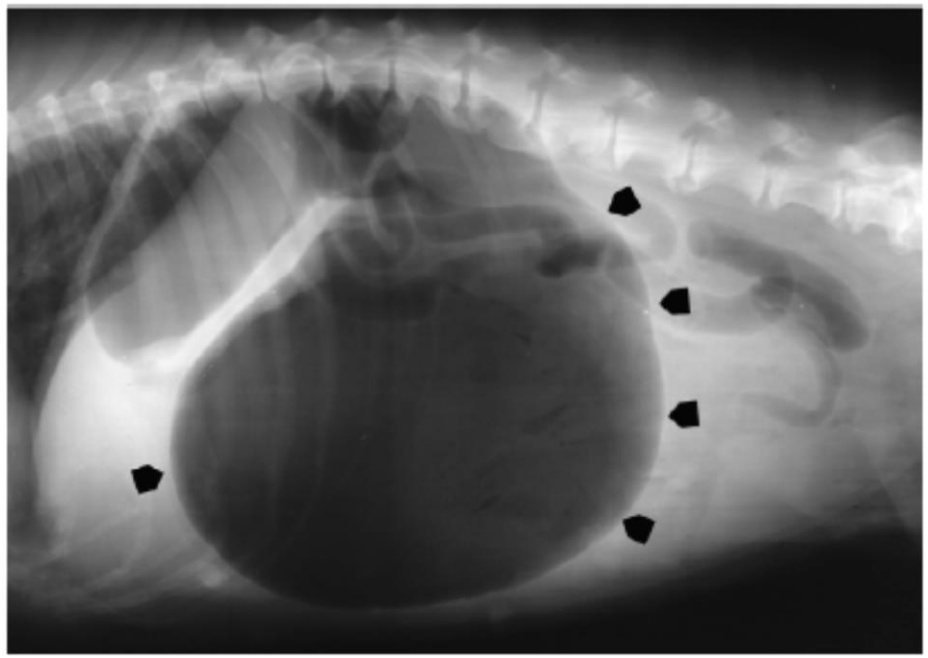


FIGURE 5.5-1 Right lateral radiograph of a 9-year-old male intact Doberman Pinscher with a gastric dilatation and volvulus. Multiple *black arrow heads* outline the gastric dilatation.

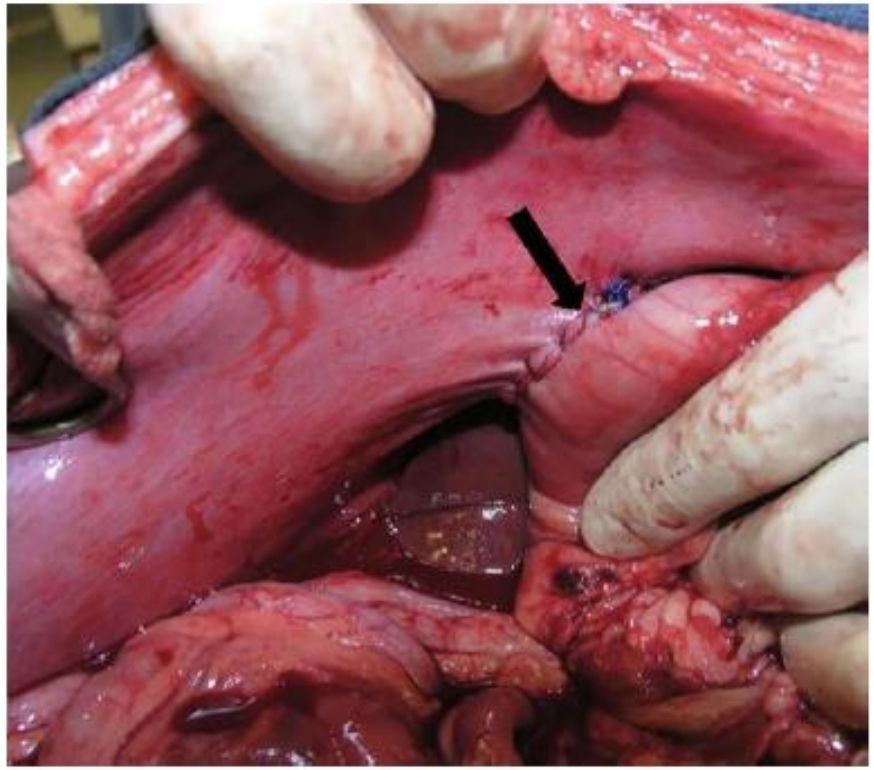


FIGURE 5.5-4 The seromuscular layer of the pyloric antrum is sutured to an incision in the peritoneum and the transversus abdominis muscle of the cranial right ventral abdomen *(arrow)*.

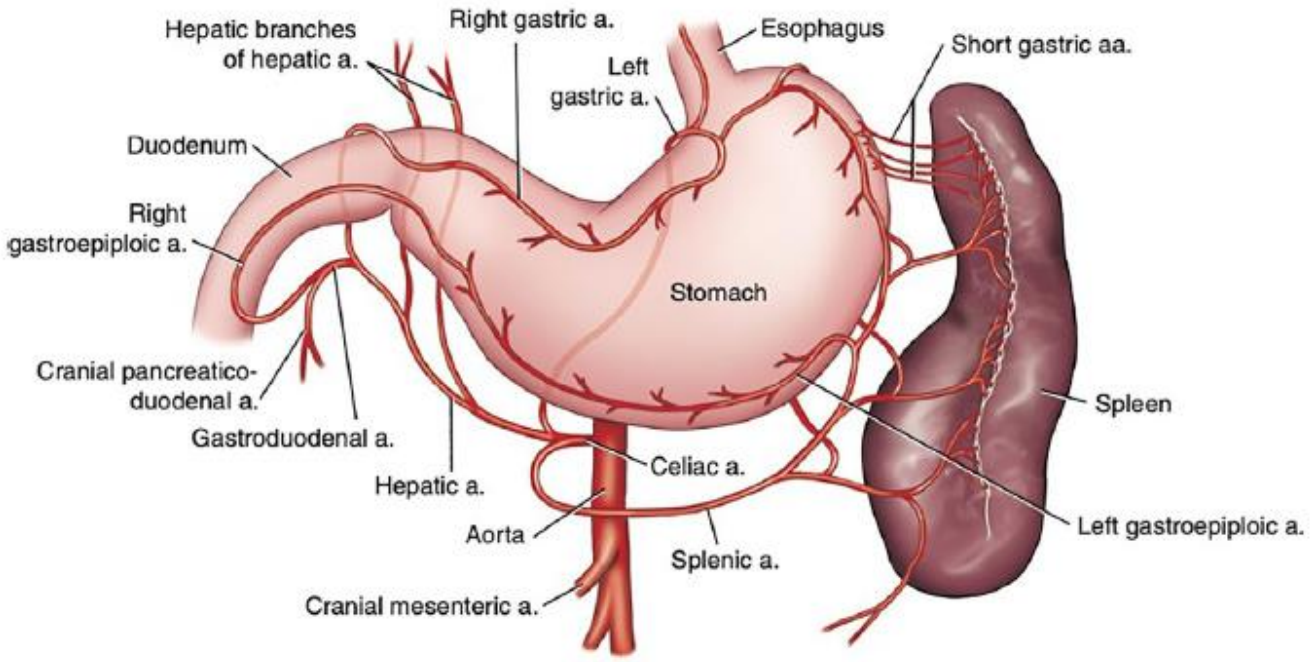
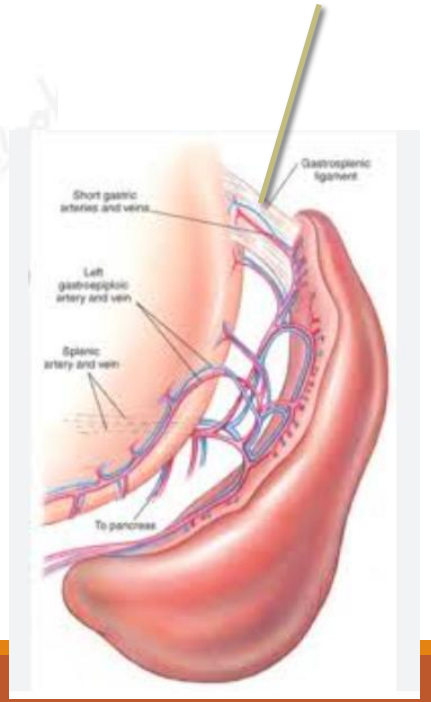


FIGURE 5.5-6 Blood supply of the stomach and the spleen. The celiac artery and its branches constitute the major blood supply.

gastrosplenic ligament



The gastrosplenic ligament often tears with rupture of the short gastric arteries, as the spleen and stomach rotate in patients with GDV. It is not unusual to find blood in the abdominal cavity and bleeding along the greater curvature of the stomach due to rupture of the short gastric vessels. This may contribute to gastric wall necrosis, most often occurring along the fundus and greater curvature.

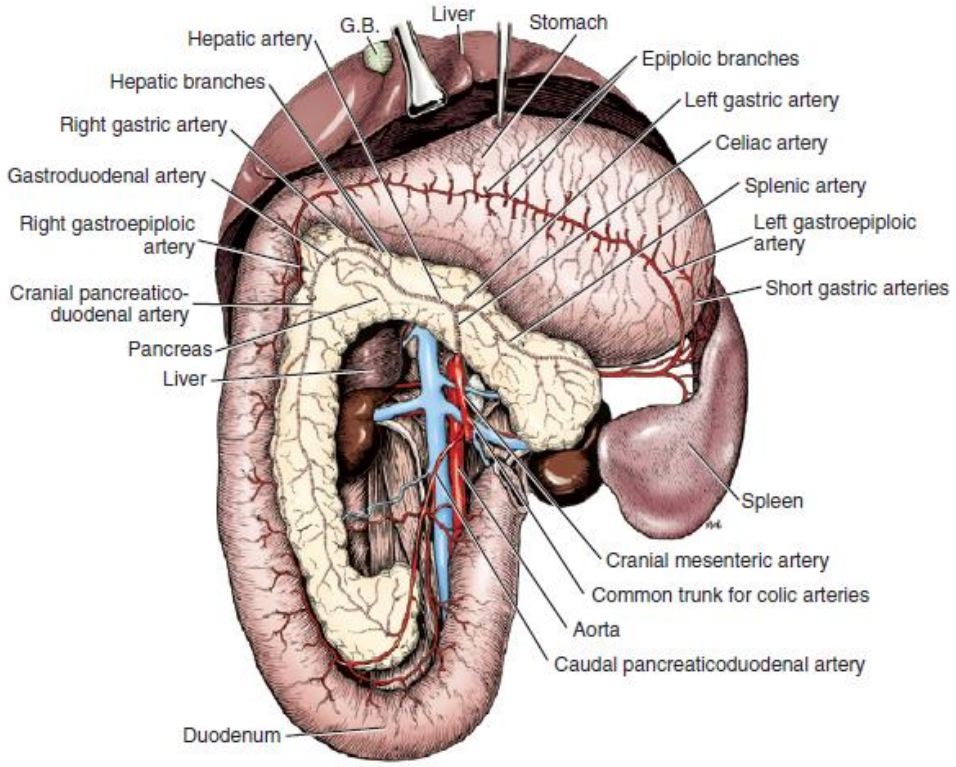


FIGURE 11-54 Celiac and cranial mesenteric arteries, ventral aspect. (Stomach reflected cranially.)

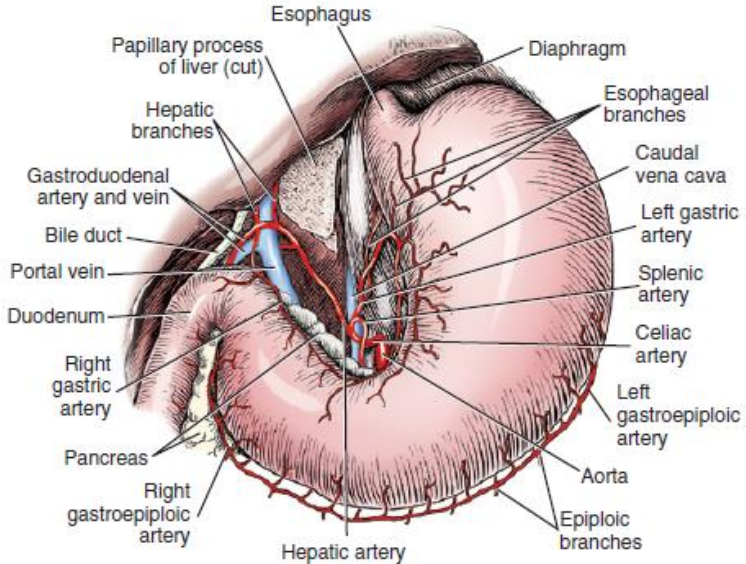


FIGURE 11-55 Celiac artery, ventral aspect. (Stomach displaced to left.)

The venous return is often compromised with GDV. As the stomach dilates in GDV, it can obstruct blood flow from the caudal vena cava and portal vein. This leads to sequestration of blood in the portal system, splanchnic circulation, and caudal vena cava—and a cascade of events resulting in a decrease in venous return, cardiac output, and arterial blood pressure and hypovolemia.

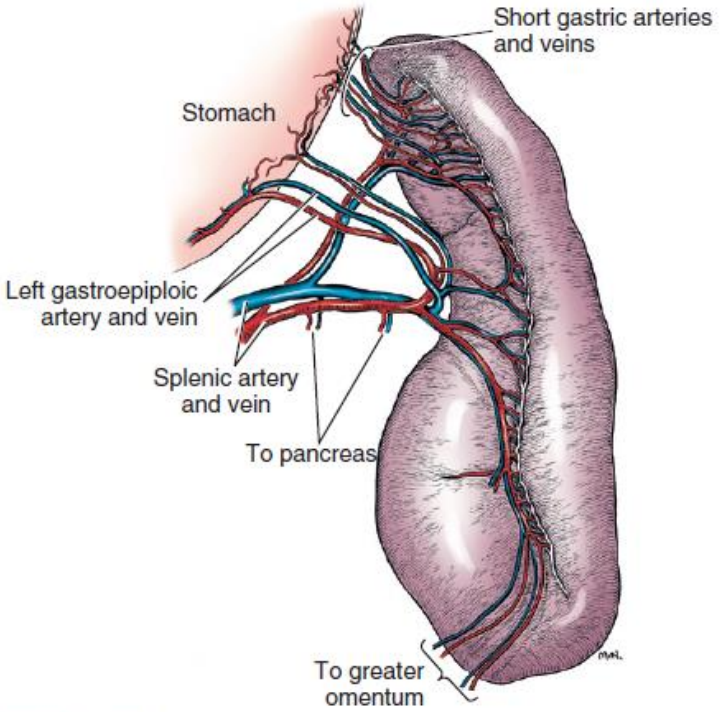


FIGURE 11-57 Blood supply of the spleen. (The cranial border is reflected laterally.)

Interestingly, even though the spleen provides many critical functions, its removal is well tolerated. The liver, lymph nodes, and bone marrow seem able to take over most of its physiological work.

A splenectomy is the surgical removal of the spleen in dogs. It is most commonly performed to treat:

1.Splenic tumors or masses, which can be either benign or malignant. Removing the spleen is curative if the tumor is benign and has not ruptured.

2.Splenic rupture or bleeding, often due to trauma, cancer, or torsion (twisting). This can lead to life-threatening internal bleeding and requires emergency surgery. Splenic trauma (with subsequent rupture of the capsule/tearing of the parenchyma) can lead to substantial intraabdominal hemorrhage (and even death) due to the spleen's highly vascular nature.

3.Splenic torsion, where the spleen twists on itself, cutting off blood supply.

4.Gastric dilatation volvulus (bloat), where the stomach twists. The spleen often twists with it, requiring removal.

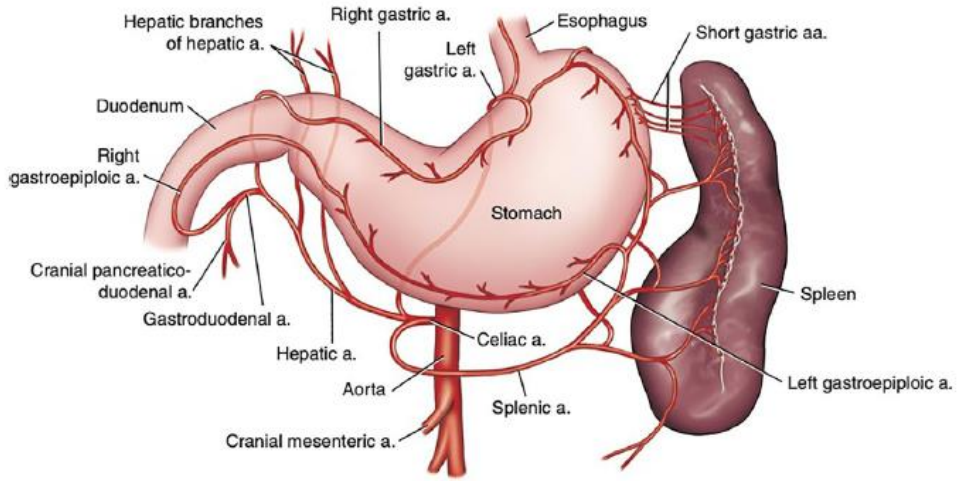
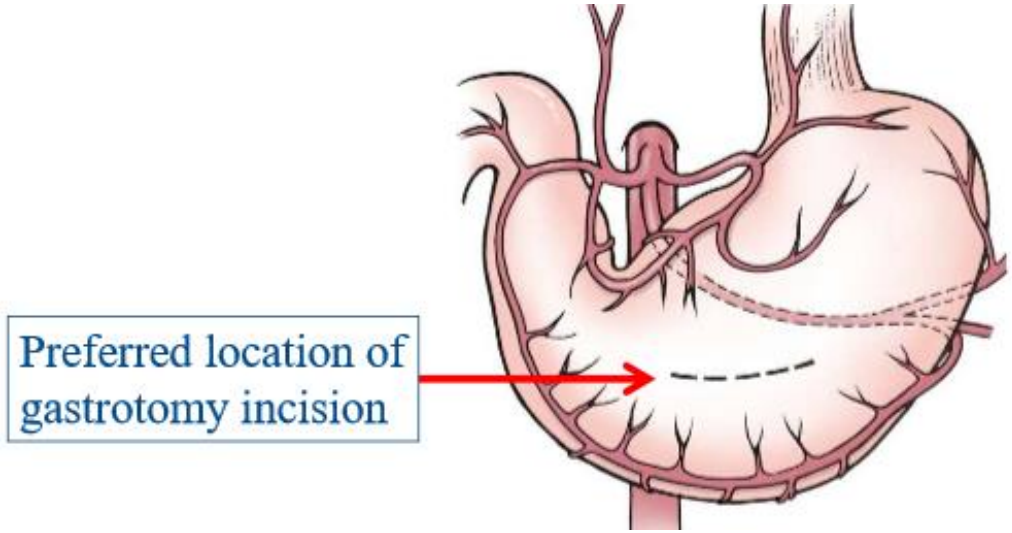


FIGURE 5.5-6 Blood supply of the stomach and the spleen. The celiac artery and its branches constitute the major blood supply.



The location of a gastrotomy in a dog is typically performed midway between the lesser and greater curvatures of the stomach. This surgical procedure involves opening up the stomach to remove foreign bodies, tumors, or for diagnostic purposes like biopsies. The incision for a gastrotomy is made in a relatively avascular area to ensure safety and effectiveness during the surgery.

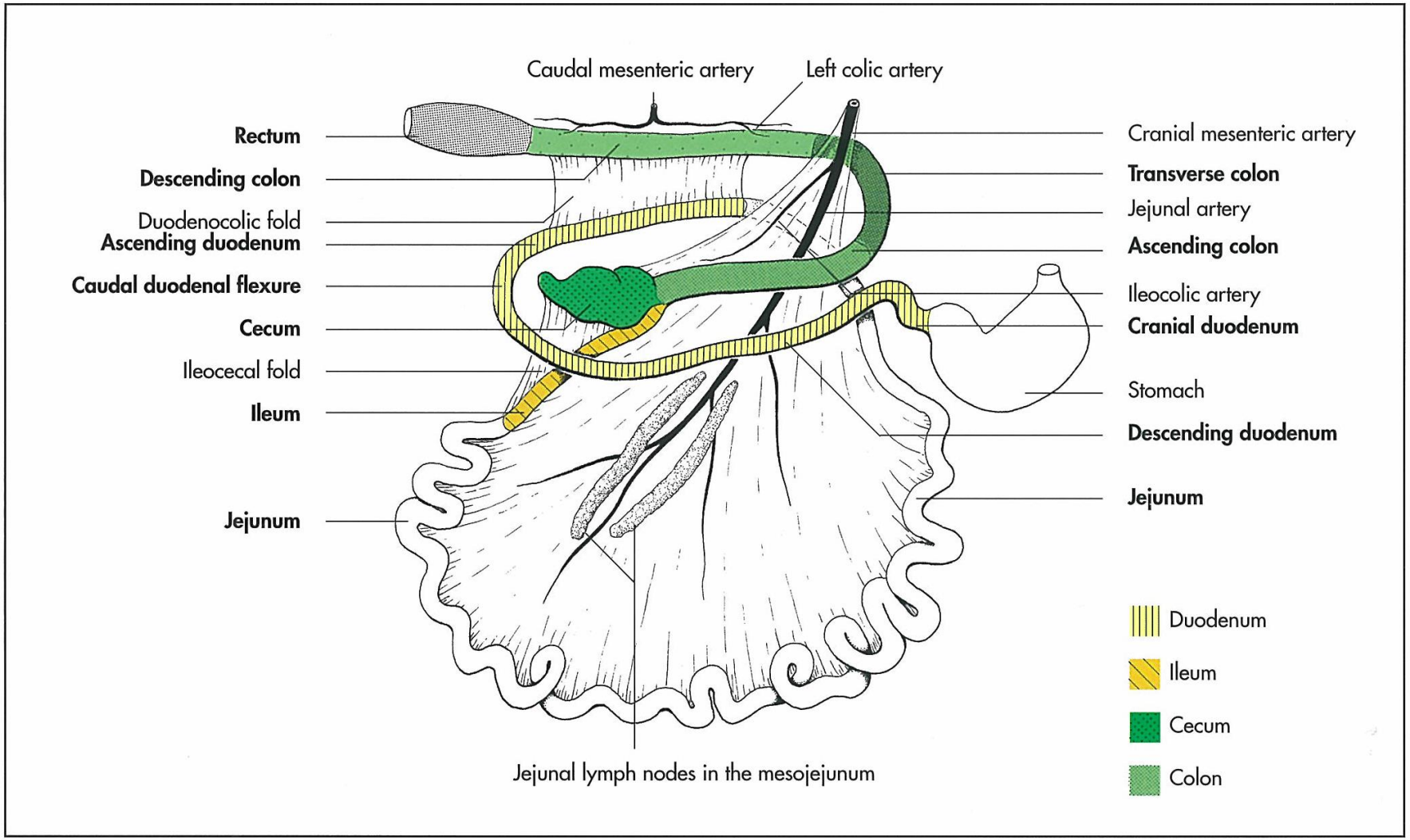
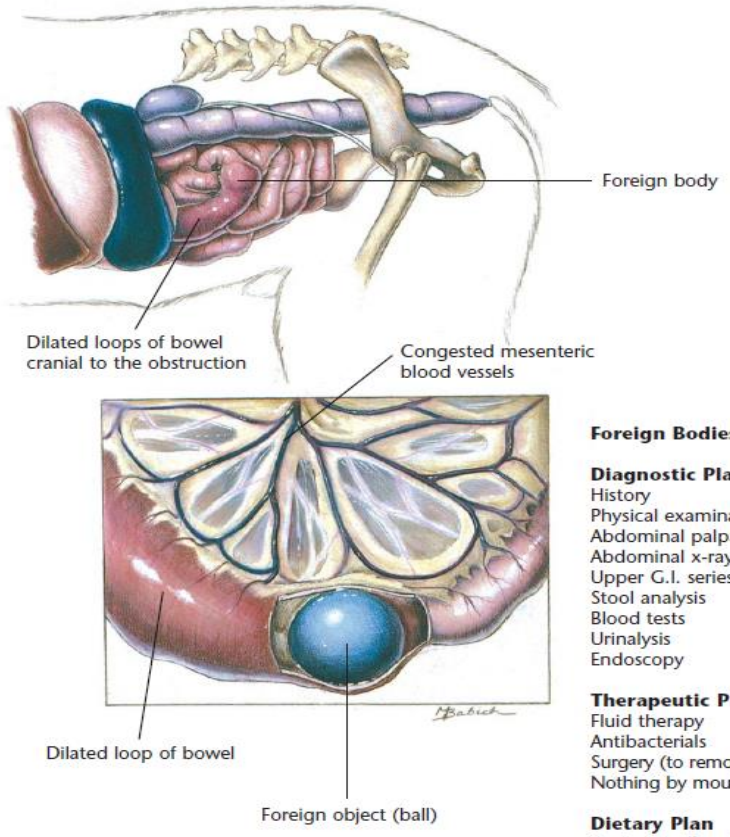


Fig 7-85. Intestinal tract of the dog, schematic (Ghetie, 1958).



Foreign Bodies

Diagnostic Plan
History
Physical examination
Abdominal palpation
Abdominal x-rays
Upper G.I. series
Stool analysis
Blood tests
Urinalysis
Endoscopy

Therapeutic Plan
Fluid therapy
Antibacterials
Surgery (to remove foreign bodies)
Nothing by mouth for 24-48 hours

Dietary Plan
Postsurgically, a low-residue diet fed in small portions
Consider overall patient condition when determining the protein level and caloric density of the diet

Enterotomies are most commonly performed in the dog and cat for the removal of foreign bodies, while intestinal resection and anastomosis (Gr. *anastomōsis* opening, outlet) are used in surgery when the intestine is devitalized due to intussusception (L. *intus* within + *suscipere* to receive), bowel necrosis (Gr. *nekrōsis* deadness), or torsion (Gr. *torsio* to twist) and volvulus.

In properly exposed radiographs without contrast (barium), the small intestine often contains gas and an obstruction is likely present if the small intestinal diameter is > 2 times the height of the body of lumbar vertebrae 5 (L5).

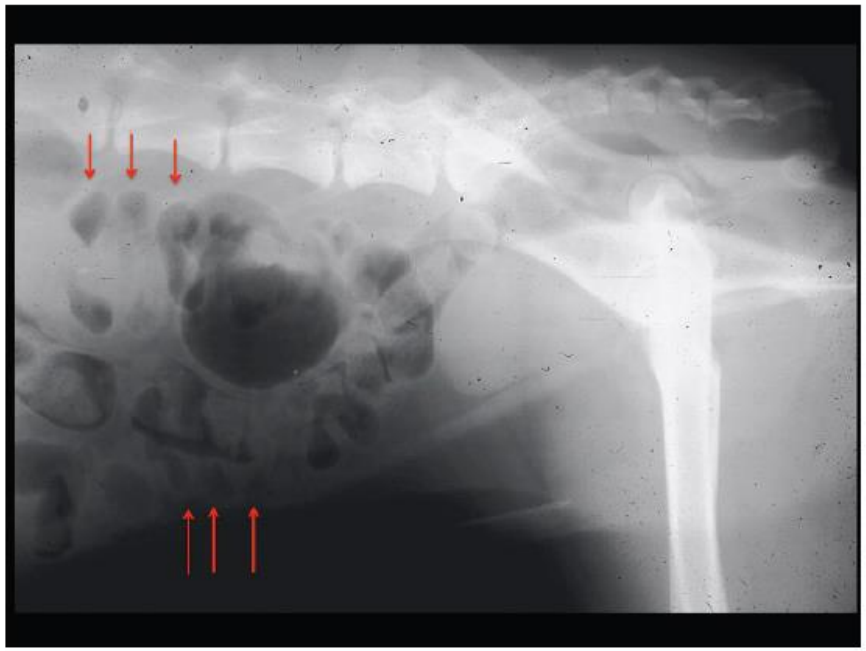
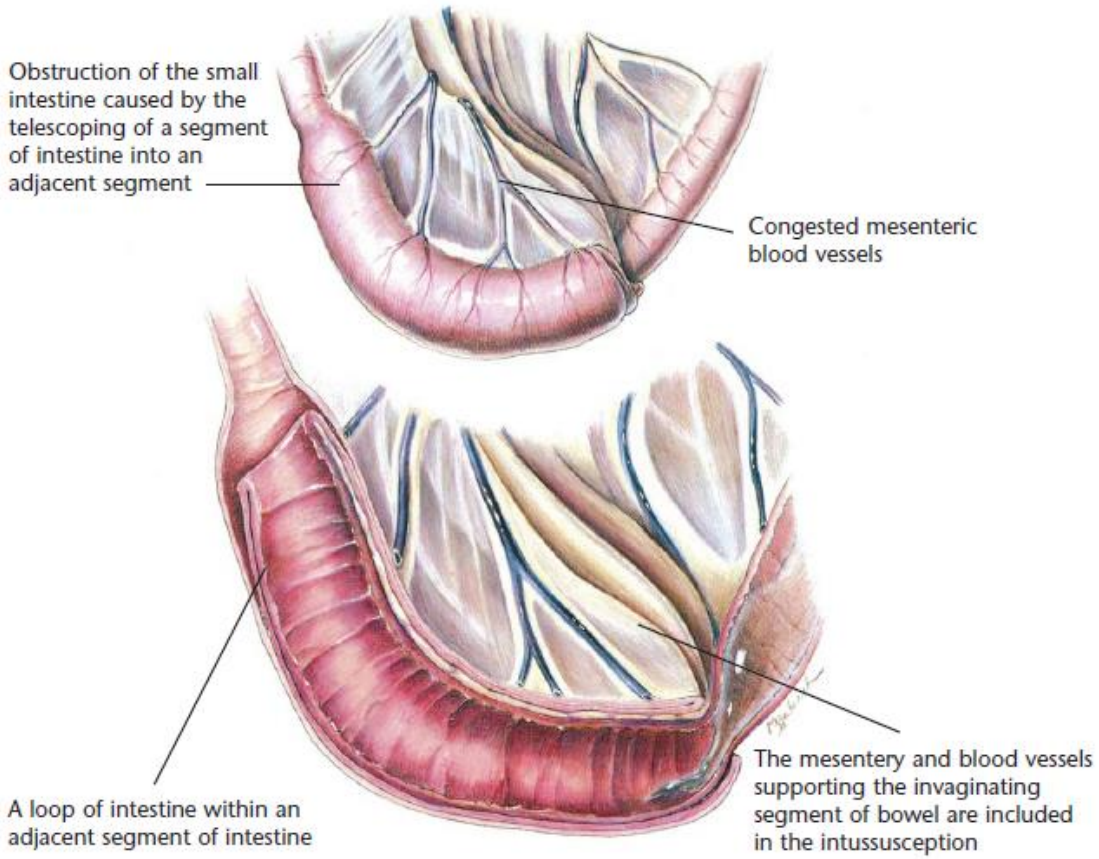


FIGURE 5.6-1 Lateral abdominal radiograph showing plicated (folded) loops of small intestine *(arrows)*.

Radiographs of the abdomen revealed gas-dilated loops of intestine that appeared to be clustering or lining up, suggesting a linear foreign body.



Intussusception

Diagnostic Plan
History
Physical examination
Abdominal palpation
Abdominal x-rays

Therapeutic Plan
Fluid therapy
Surgery
Removal of the cause
Nothing by mouth

Dietary Plan
Postsurgically, a low-residue diet fed in small portions
Consider overall patient condition when determining the protein level and caloric density of the diet

The most common locations for intestinal intussusceptions in dogs are:

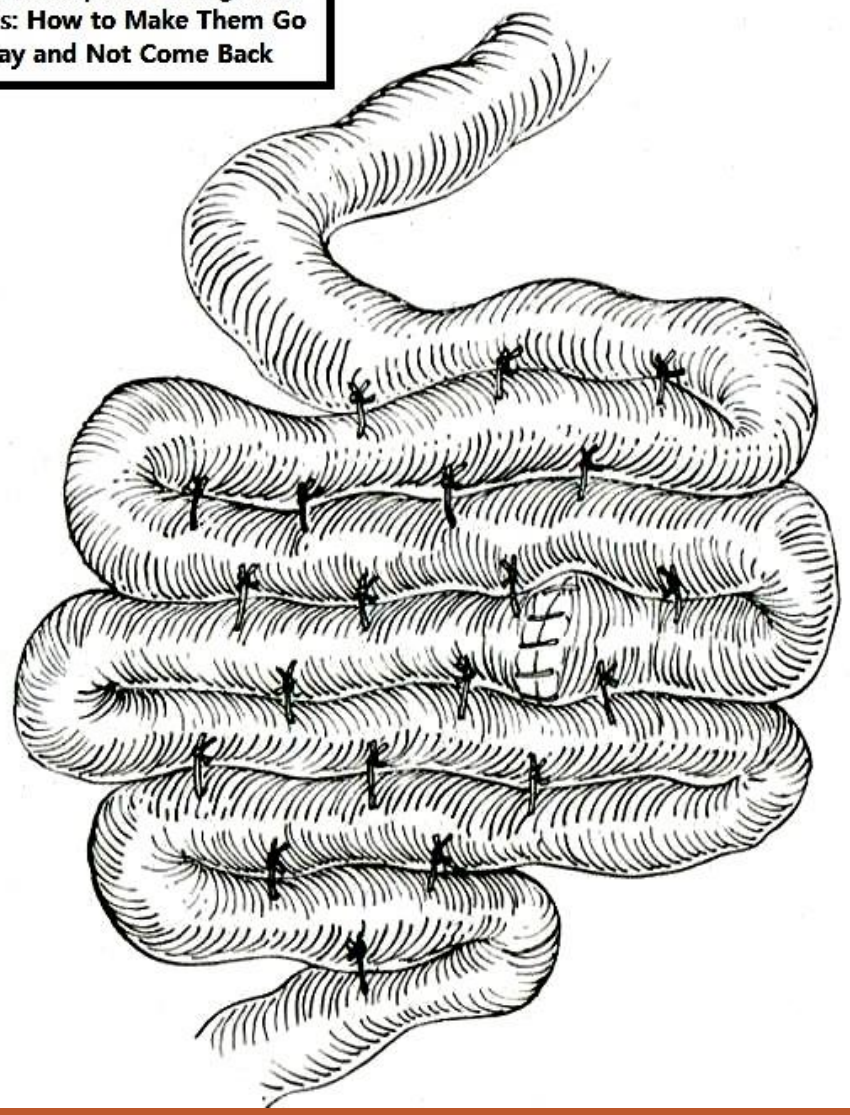
Ileocolic junction (42.5%) - The junction between the ileum and the cecum (first part of the large intestine).

Jejunojejunal (30%) - Between two segments of the jejunum

Jejunocolic (10%) - Between the jejunum and colon.

Duodenojejunal (7.5%) -

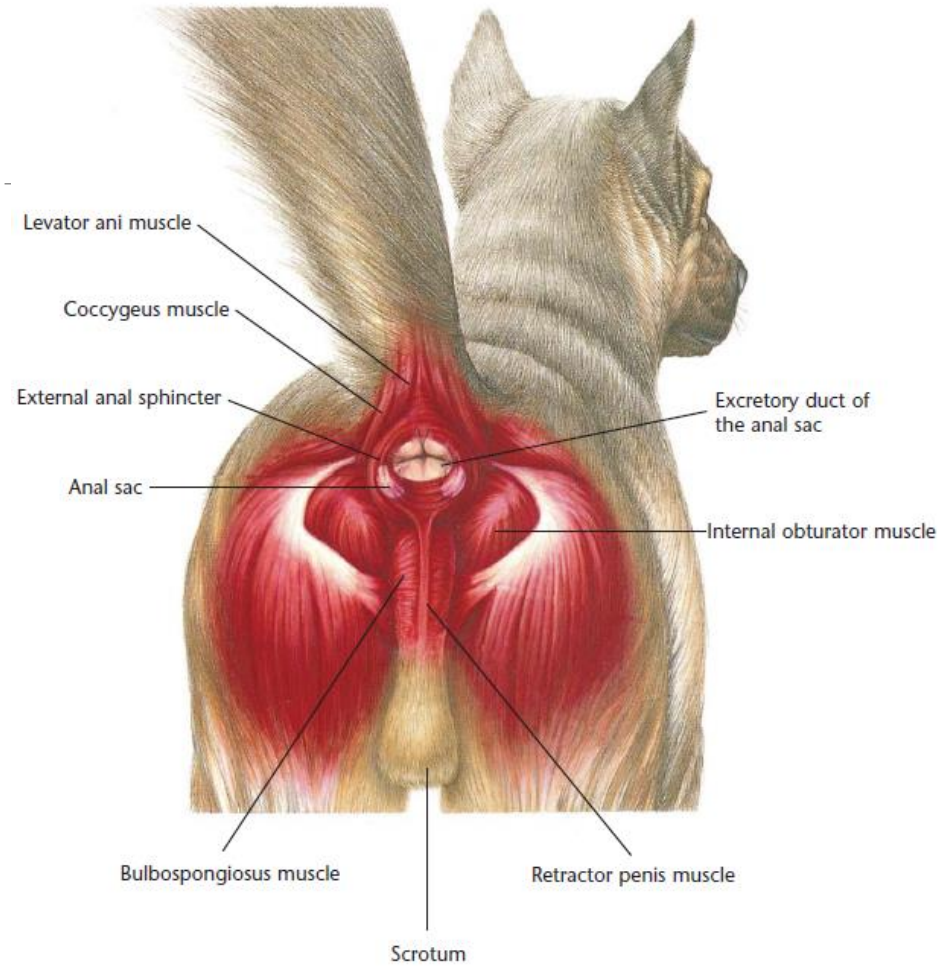
Intussusception in Dogs and Cats: How to Make Them Go Away and Not Come Back

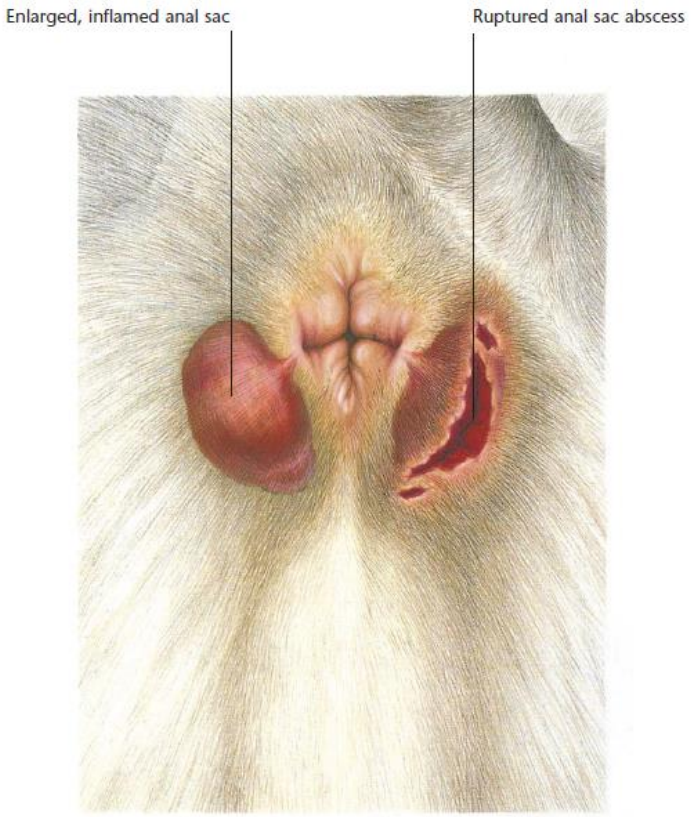


ABDOMINAL PALPATION

If the abdominal muscles are relaxed in a dog, it is possible to palpate the right descending duodenum and ileo-colic junction. This is accomplished using gentle and firm digital pressure, compressing the duodenum and ileum dorsally against the sub-lumbar muscles and rolling them in a medial to lateral direction. The descending colon can likewise be palpated on the left, especially if constipation is present.

In the cat, the ileocolic junction can be mistaken for a foreign body.





Anal Sac Abscess

Diagnostic Plan
History
Physical examination
Abscess culture

Therapeutic Plan
Lancing of the abscess
Anal sac expression
Hot soaks
Antiseptic solutions
Antibacterials
Anal sac removal

Dietary Plan
Postsurgically, a diet adequate for tissue repair

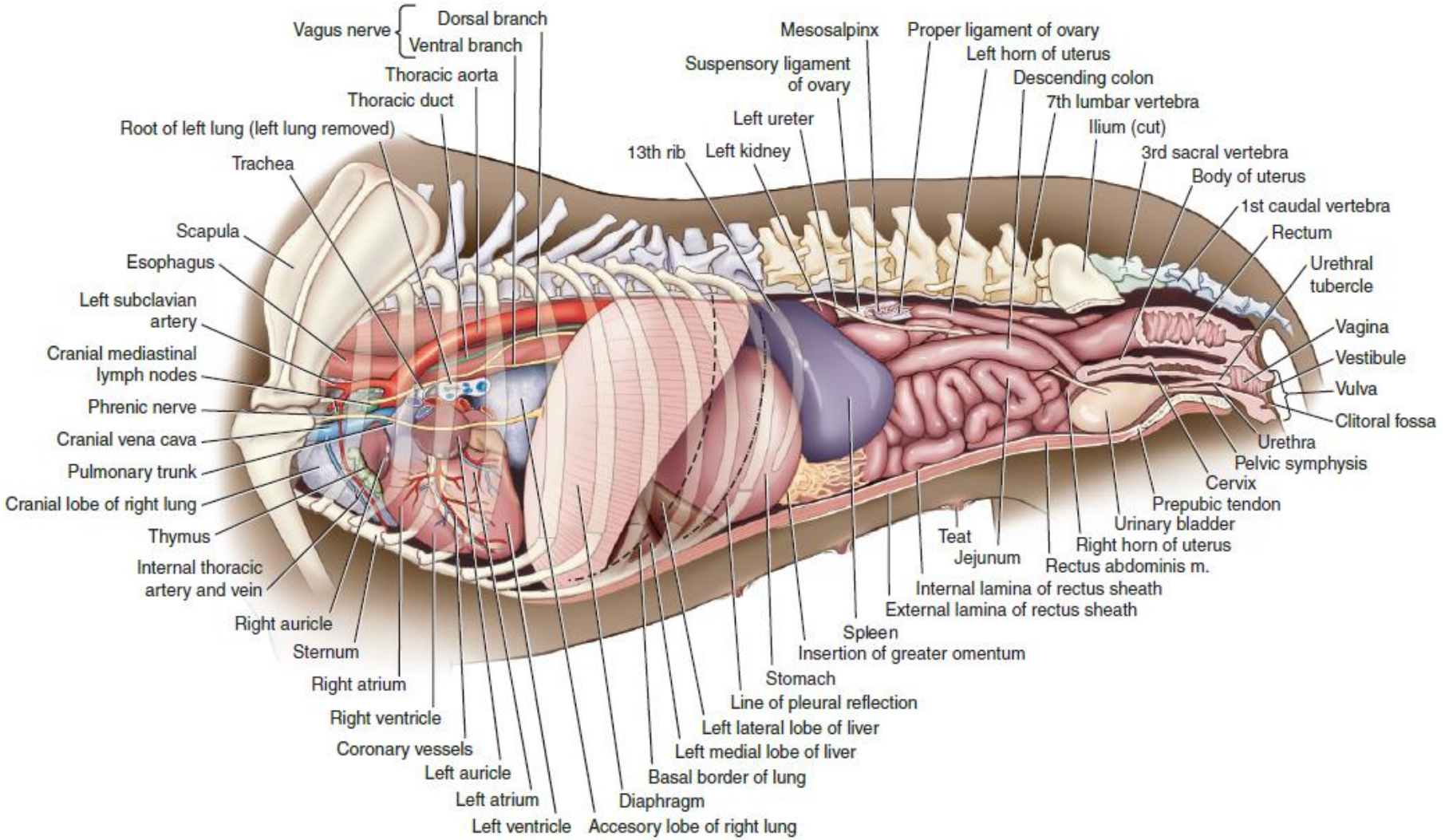


FIGURE 3A-6 Left view of the canine thoracic and abdominal cavities and pelvis (female).

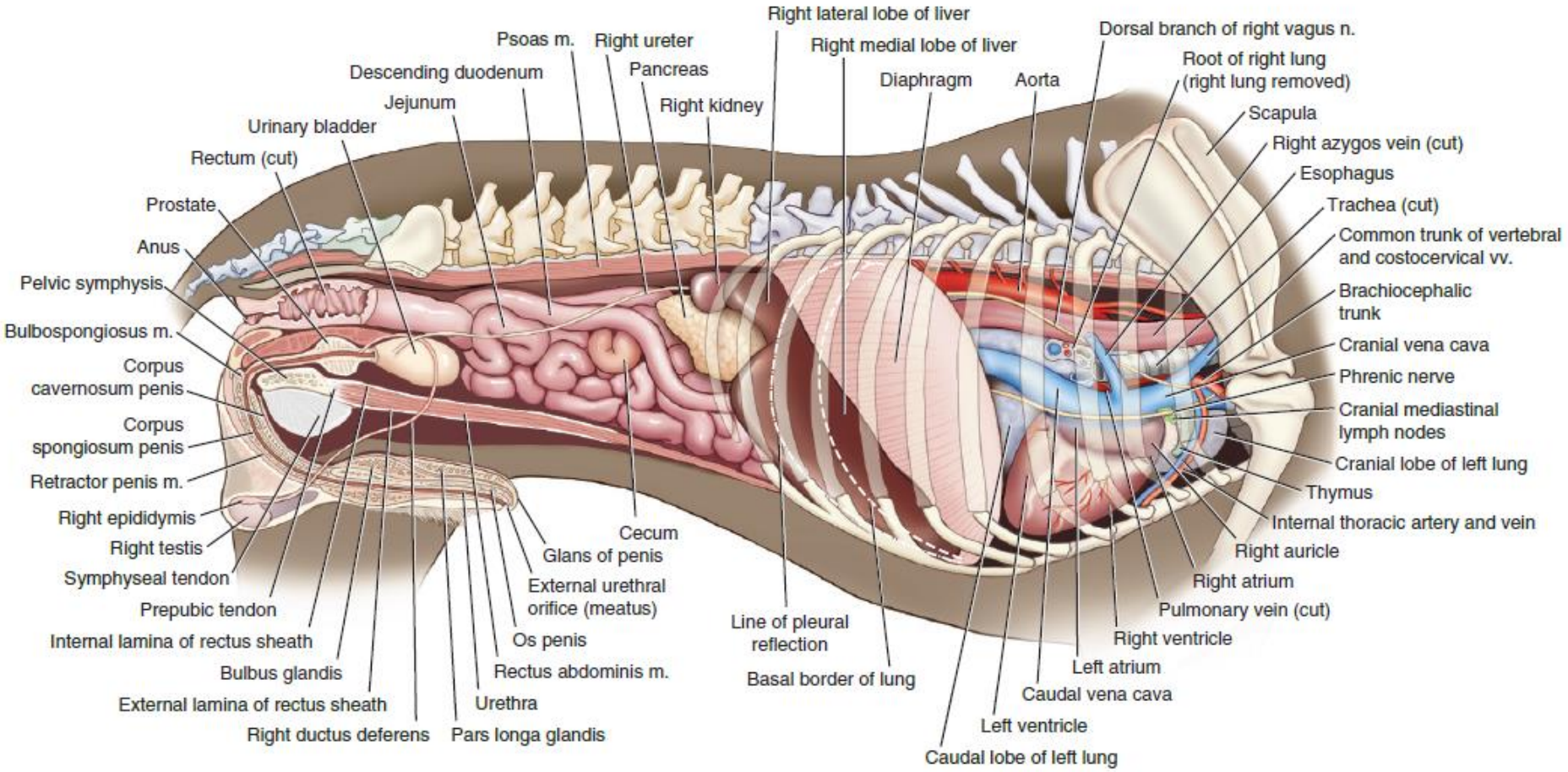


FIGURE 3A-7 Right view of the canine thoracic and abdominal cavities and pelvis (male).

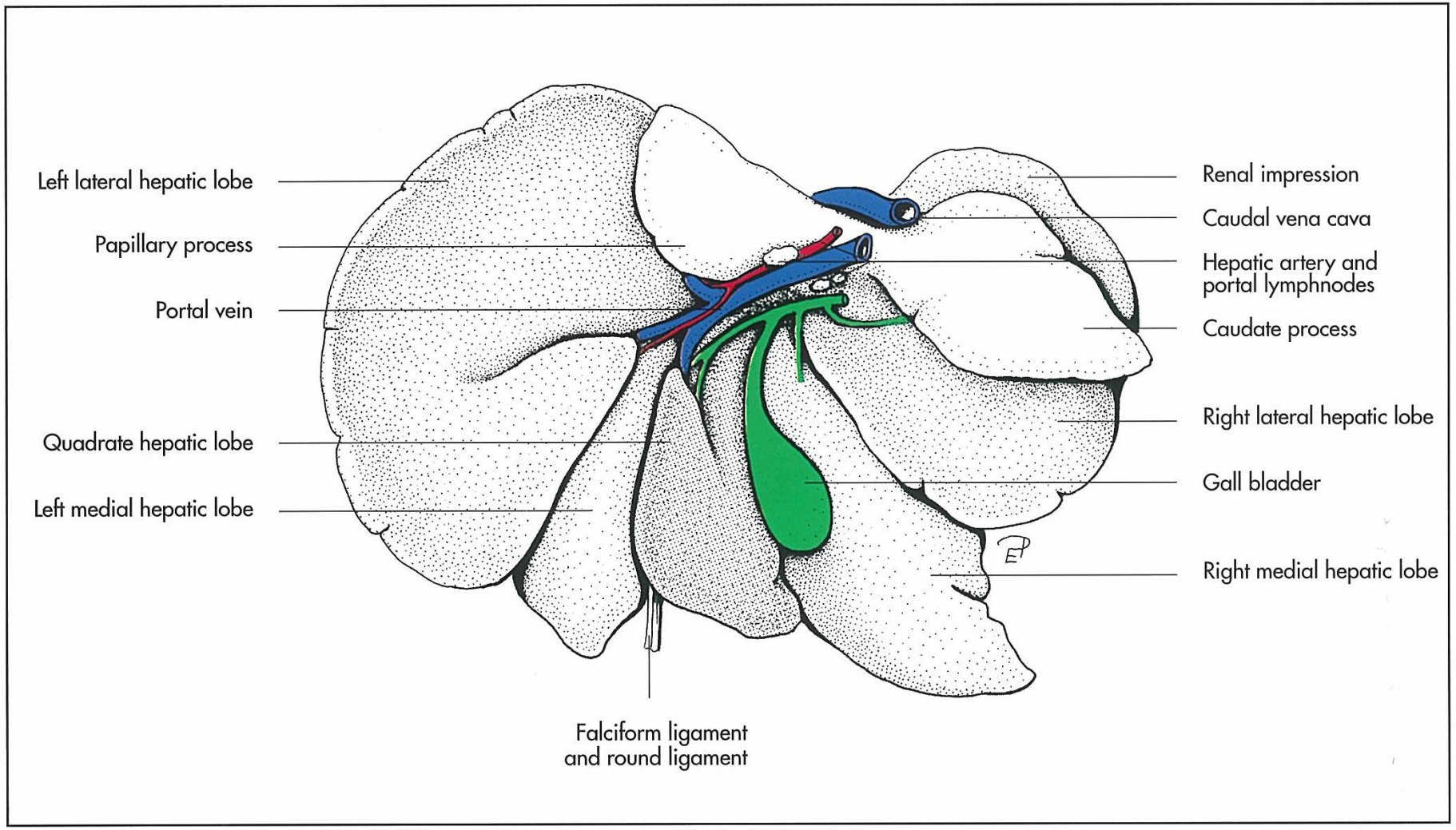


Fig 7-97. Liver of the dog, schematic, visceral surface.

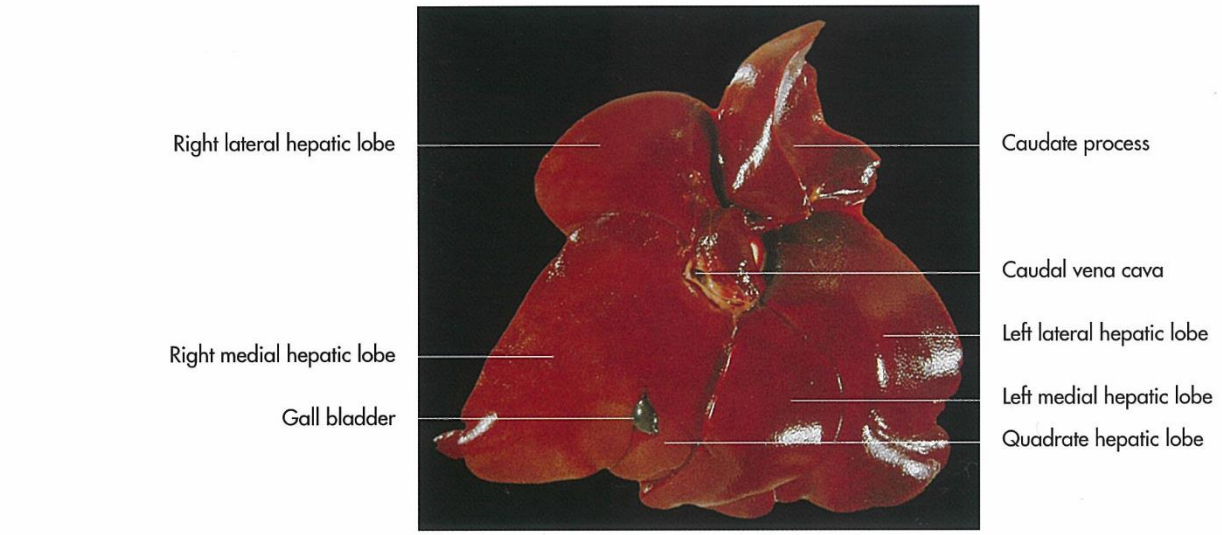


Fig 7-101. Liver of a cat, diaphragmatic surface (König, 1992).

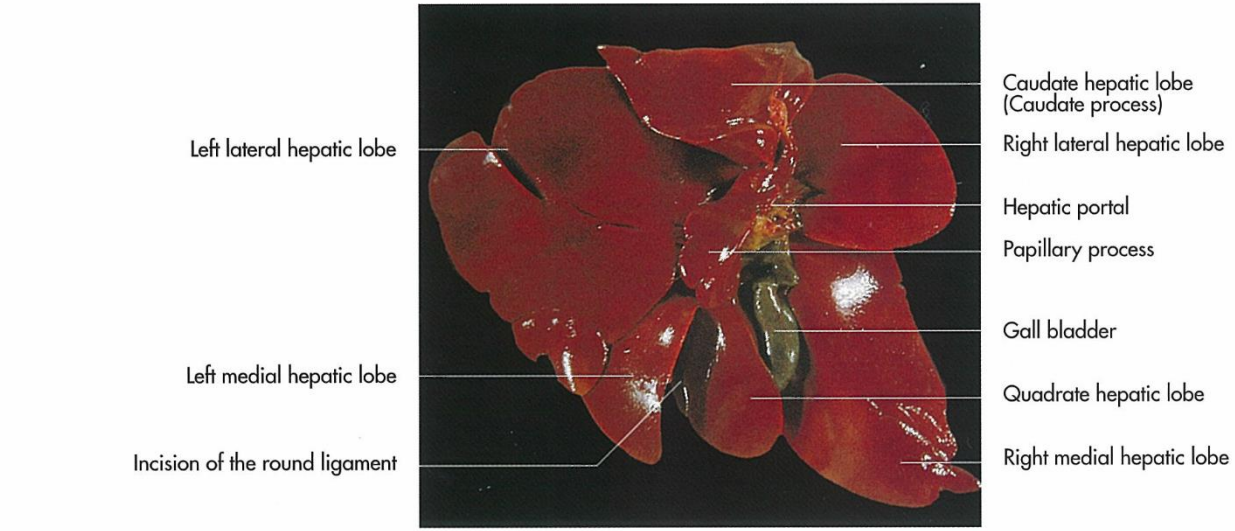


Fig 7-102. Liver of a cat, visceral surface (König, 1992).

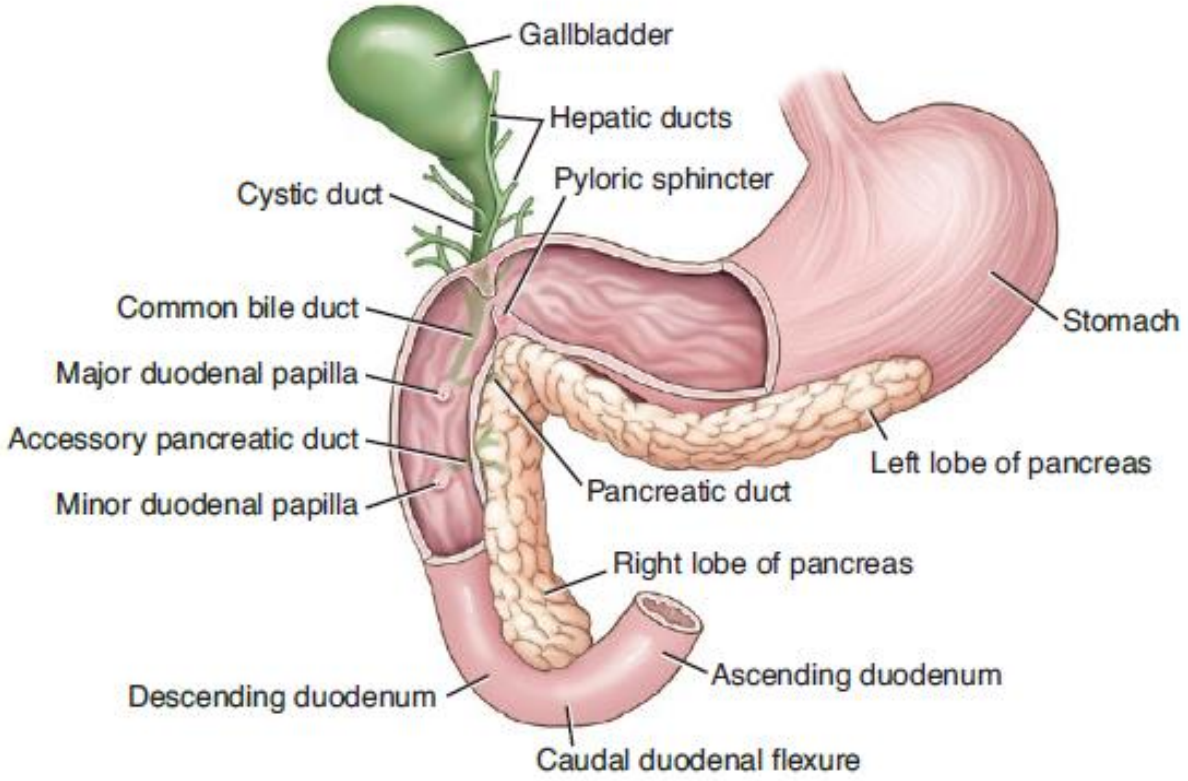


FIGURE 5.2-2 Normal canine anatomy of the extrahepatic biliary system and pancreas.

This anatomic difference in the pancreatic ducts between dogs and cats is thought to play a role in the pathophysiology of “triaditis” in cats. It has been postulated that cholangitis/cholangiohepatitis may occur in cats with inflammatory bowel disease secondary to reflux of enteric bacteria into the common bile duct. Pancreatitis may result from bacterial reflux into the pancreatic duct or from pancreatic duct obstruction secondary to cholangitis.

"Triaditis" is the term used to describe concurrent inflammation of the pancreas, liver and small intestines. Triaditis has been reported in 50 to 56% of cats diagnosed with pancreatitis and 32 to 50% of those with cholangitis/inflammatory liver disease.

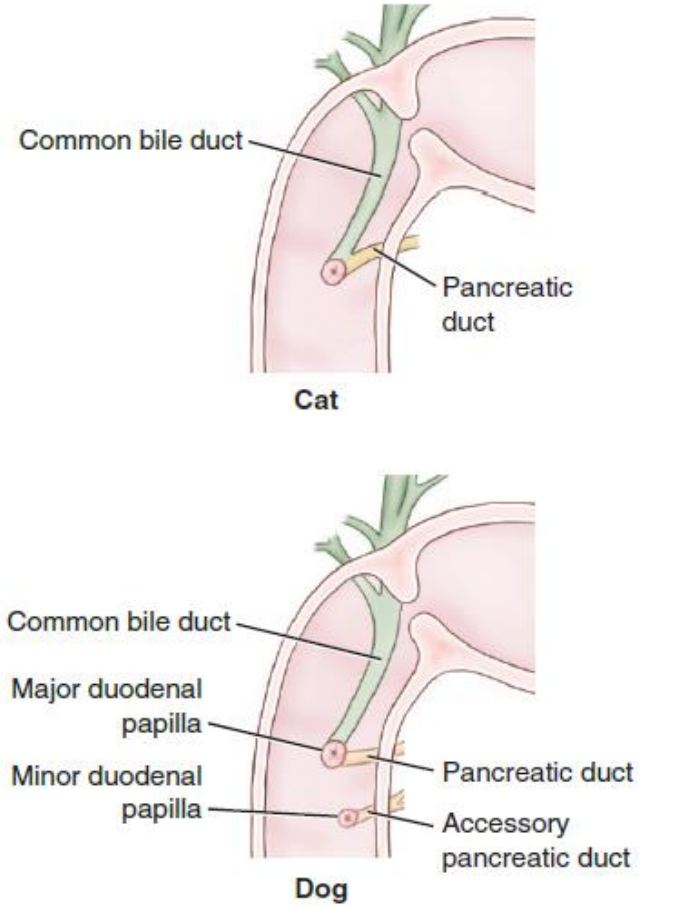
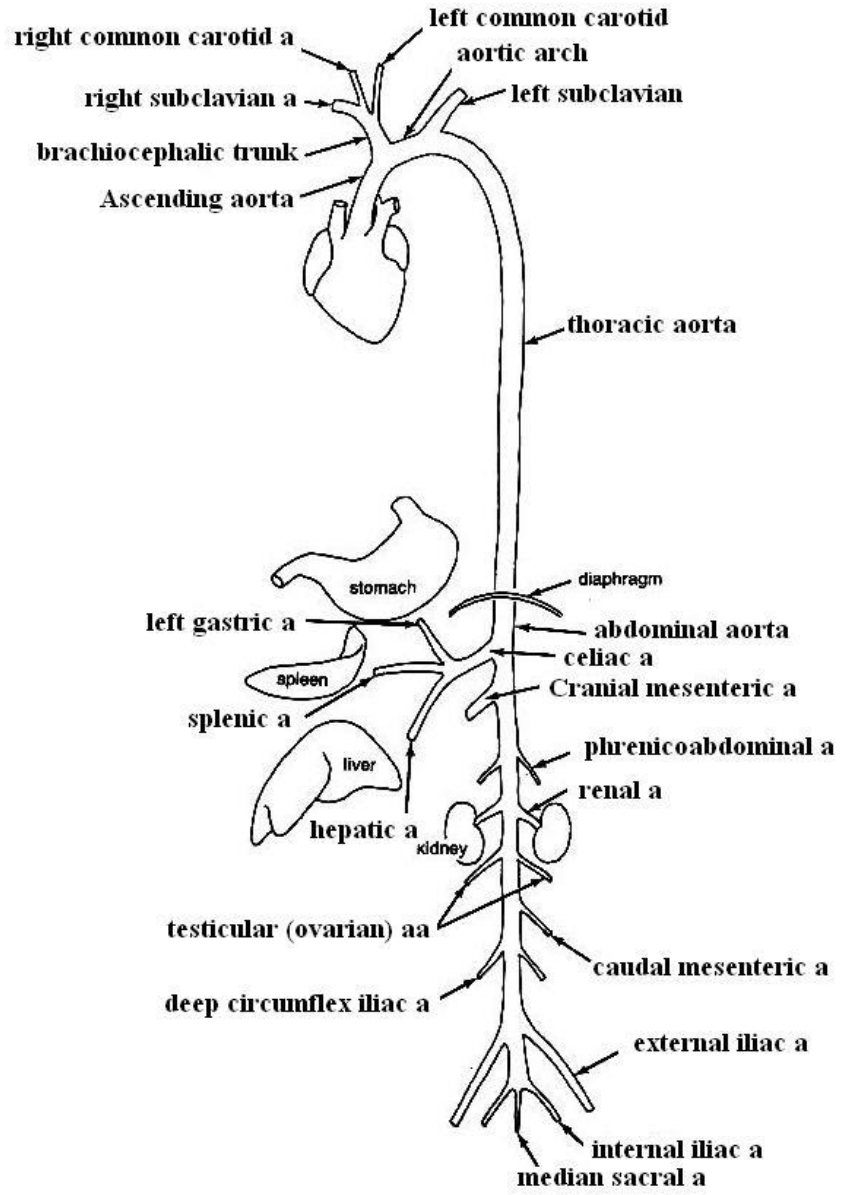
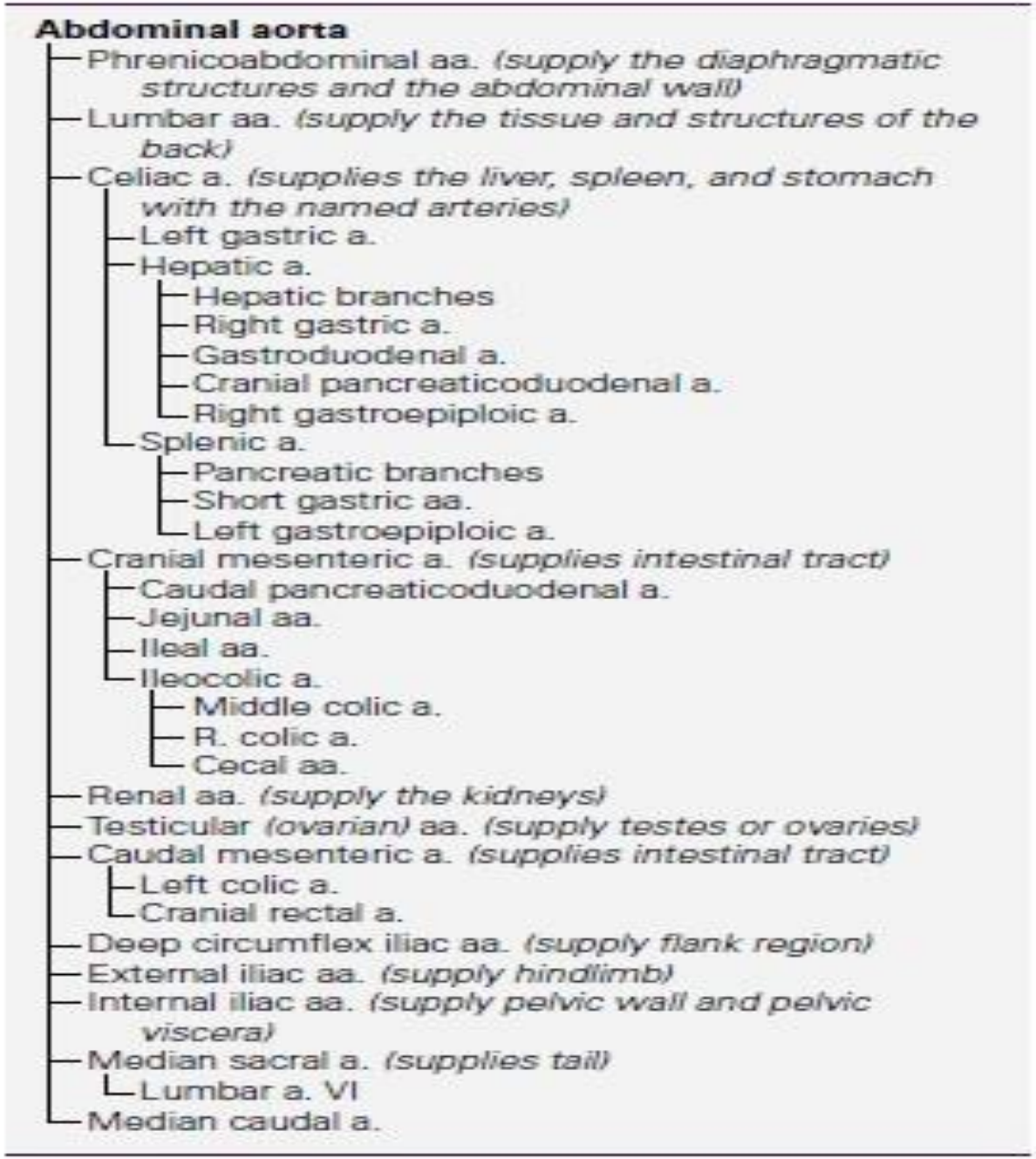


FIGURE 5.2-3 Pancreatic and bile ducts of the dog and cat.

Vessels Of Abdominal Cavity




Abdominal aorta
Phrenicoabdominal aa. (supply the diaphragmatic structures and the abdominal wall)
Lumbar aa. (supply the tissue and structures of the back)
Celiac a. (supplies the liver, spleen, and stomach with the named arteries)
Left gastric a.
Hepatic a.
Hepatic branches
Right gastric a.
Gastroduodenal a.
Cranial pancreaticoduodenal a.
Right gastroepiploic a.
Splenic a.
Pancreatic branches
Short gastric aa.
Left gastroepiploic a.
Cranial mesenteric a. (supplies intestinal tract)
Caudal pancreaticoduodenal a.
Jejunal aa.
Ileal aa.
Ileocolic a.
Middle colic a.
R. colic a.
Cecal aa.
Renal aa. (supply the kidneys)
Testicular (ovarian) aa. (supply testes or ovaries)
Caudal mesenteric a. (supplies intestinal tract)
Left colic a.
Cranial rectal a.
Deep circumflex iliac aa. (supply flank region)
External iliac aa. (supply hindlimb)
Internal iliac aa. (supply pelvic wall and pelvic viscera)
Median sacral a. (supplies tail)
Lumbar a. VI
Median caudal a.

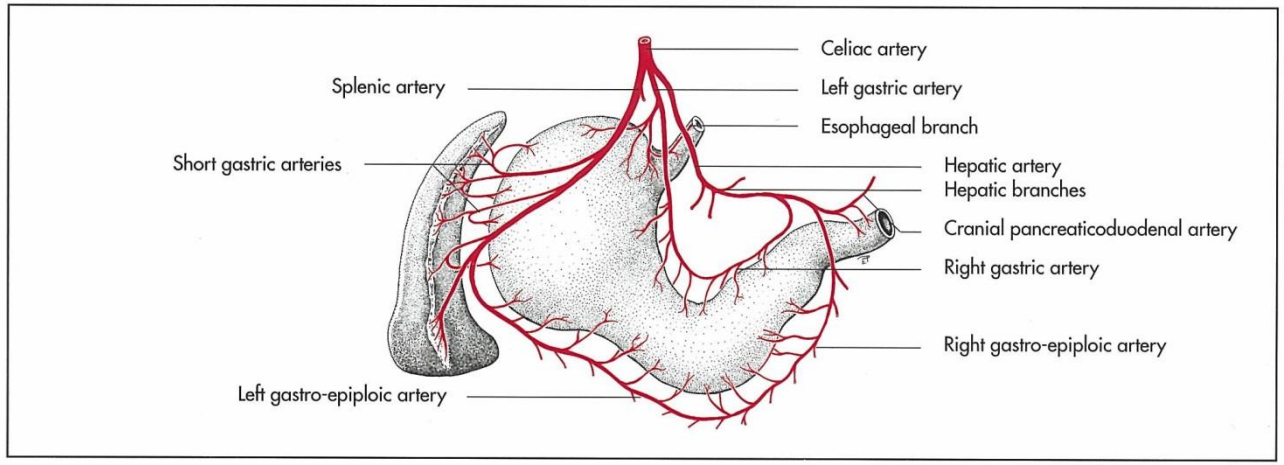


Fig. 12-33. Celiac artery of the dog, schematic.

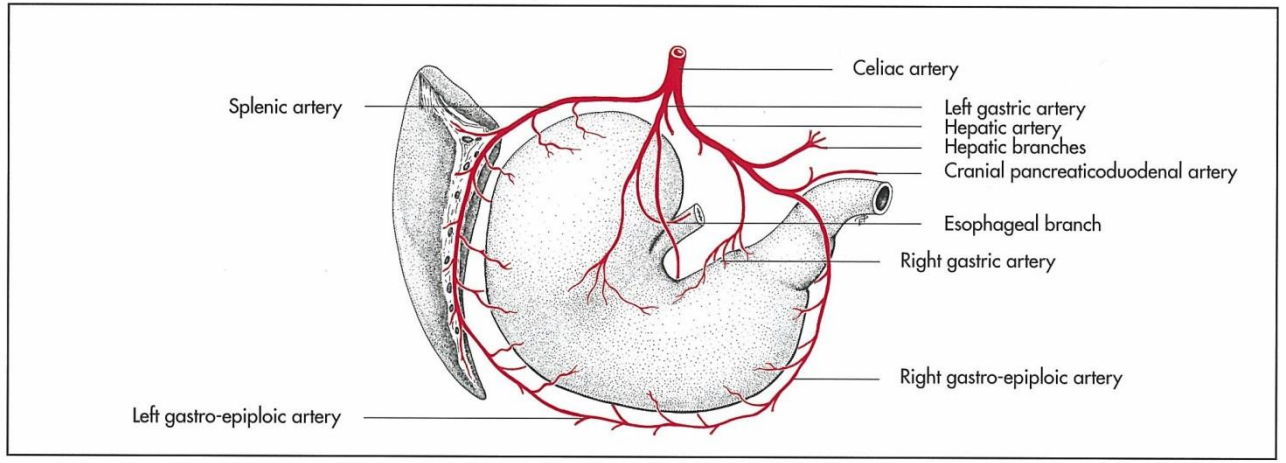
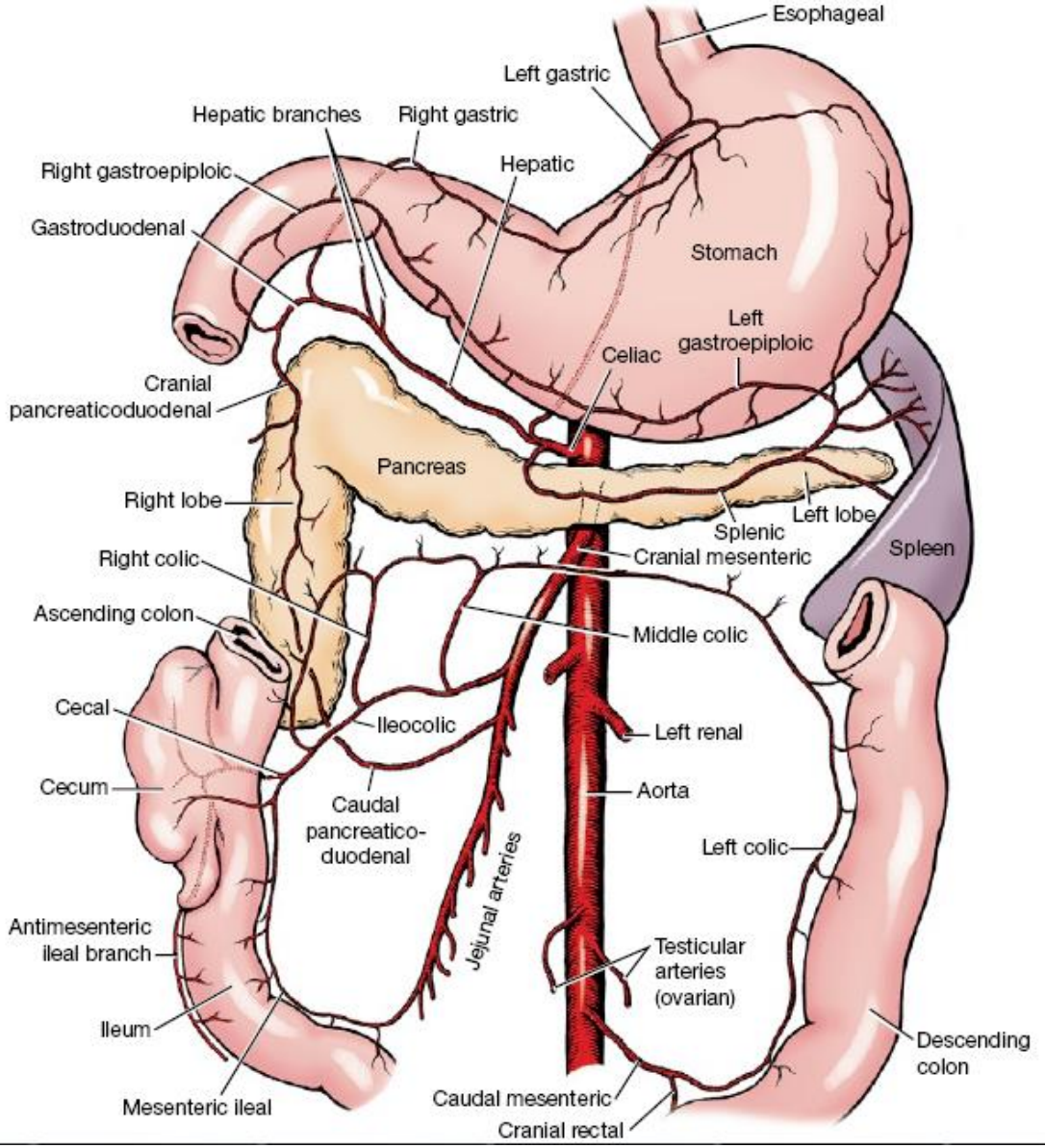
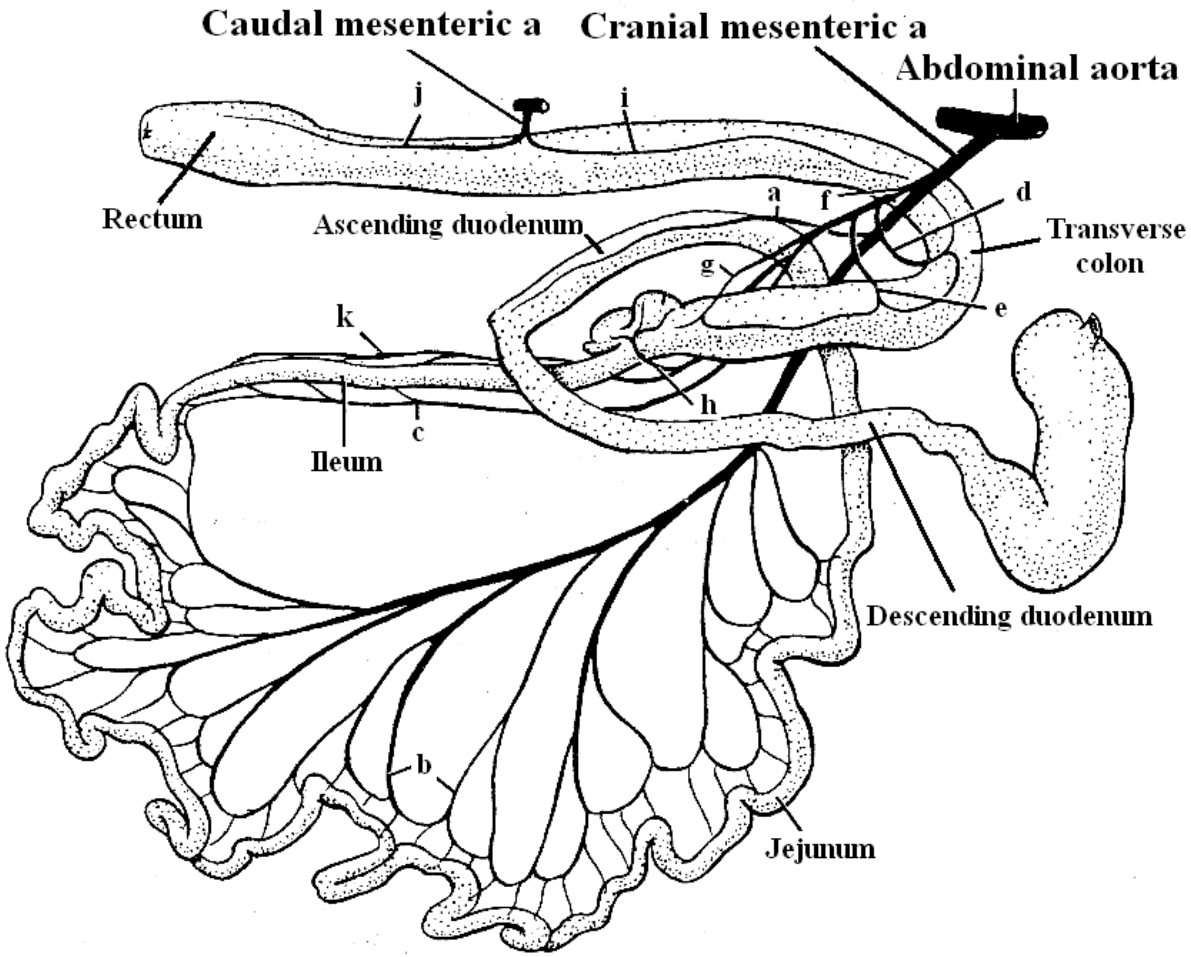


Fig. 12-34. Celiac artery of the horse, schematic.


Esophageal
Left gastric
Hepatic branches
Right gastric
Hepatic
Right gastroepiploic
Gastroduodenal
Stomach
Left gastroepiploic
Celiac
Cranial pancreaticoduodenal
Pancreas
Right lobe
Left lobe
Splenic
Spleen
Right colic
Cranial mesenteric
Ascending colon
Middle colic
Cecal
Ileocolic
Left renal
Cecum
Caudal pancreatico-duodenal
Aorta
Jejunal arteries
Left colic
Antimesenteric ileal branch
Testicular arteries (ovarian)
Ileum
Descending colon
Mesenteric ileal
Caudal mesenteric
Cranial rectal



a)Caud. panctatico duodenal a. b)Jejunal a. c)Ileal a. d)Middle colic e)Rt.colic a f)Ileocolic a g)colic branch h)cecal branch i)Lt. colic a. j)Cran. rectal a k)Antimesenteric a

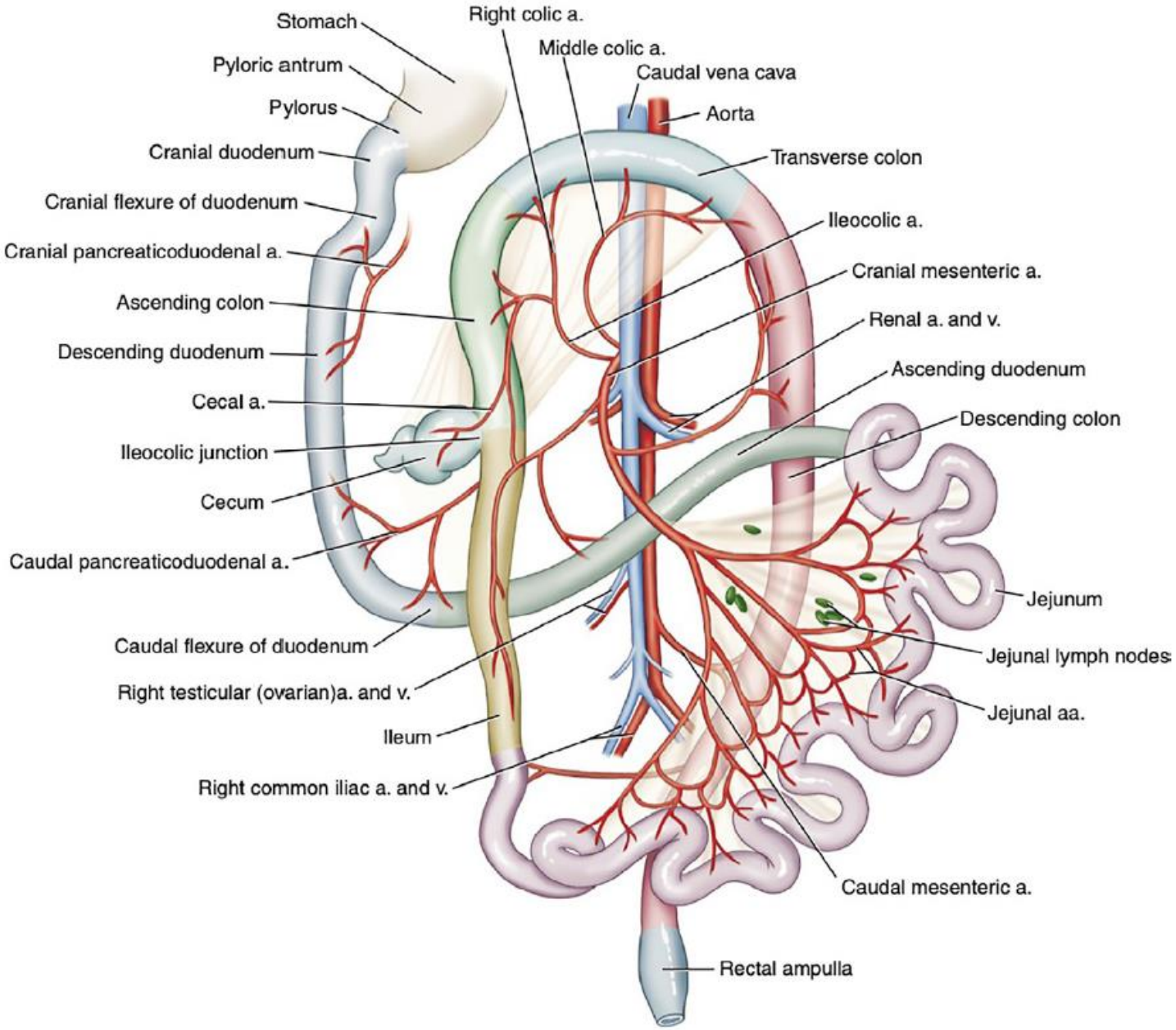


FIGURE 5.6-2 Dog intestinal tract demonstrating arterial supply, formation of the caudal vena cava, and the various segments comprising the gastrointestinal tract (each a different color to highlight the various sections).

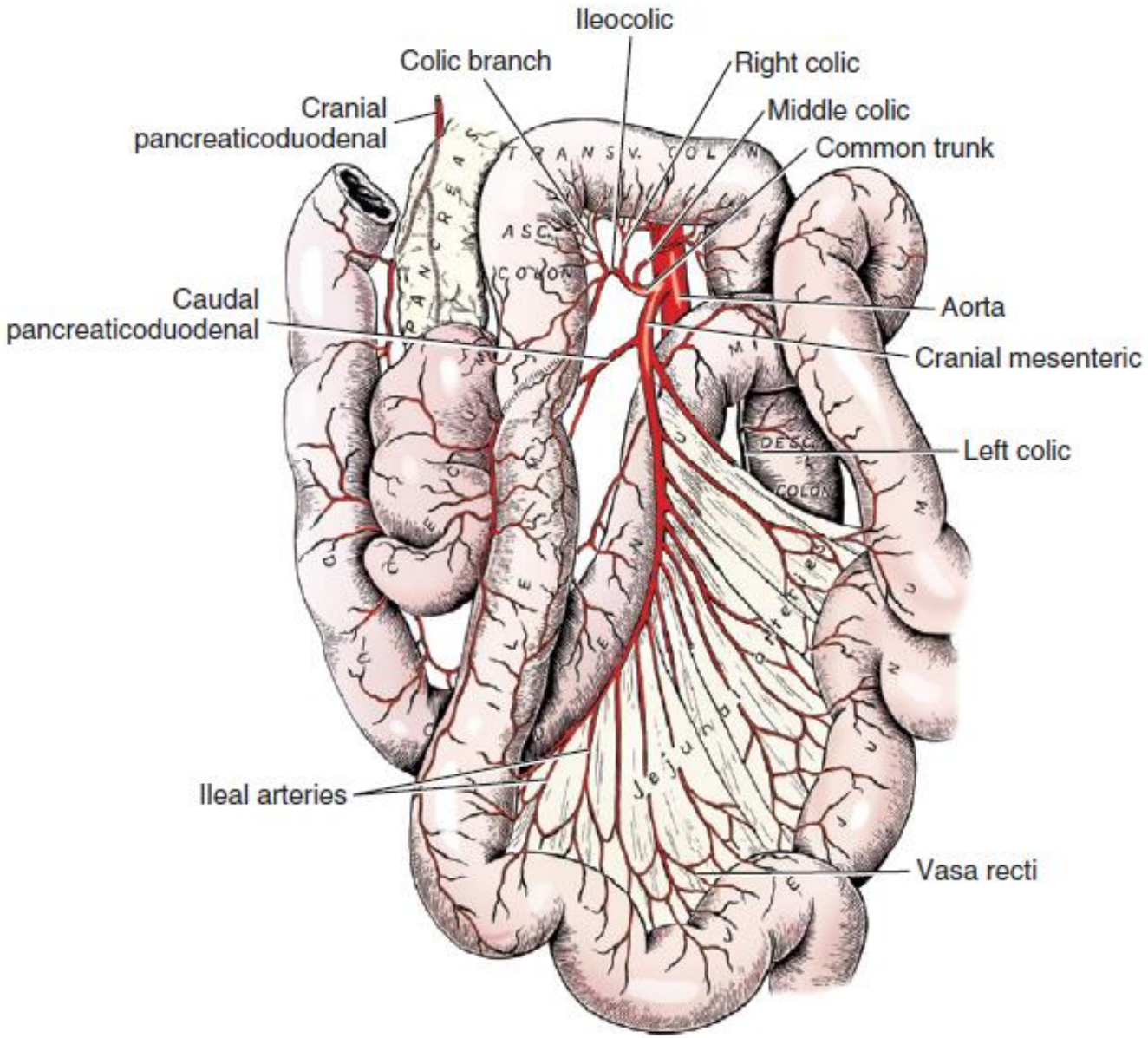
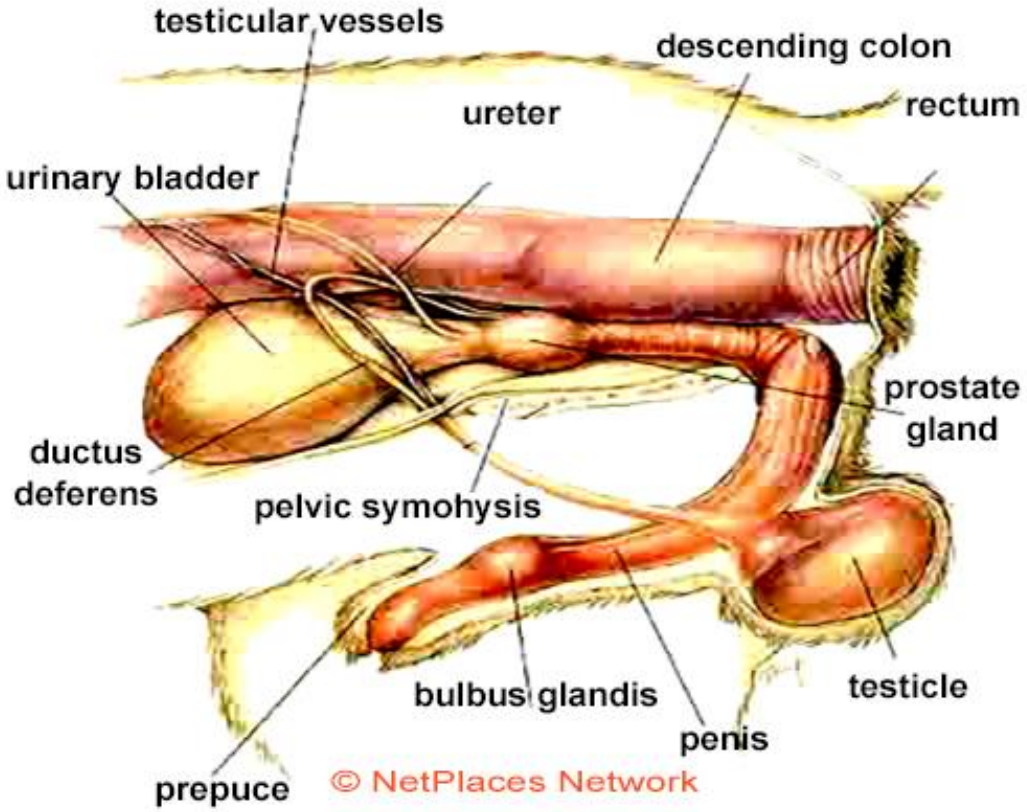
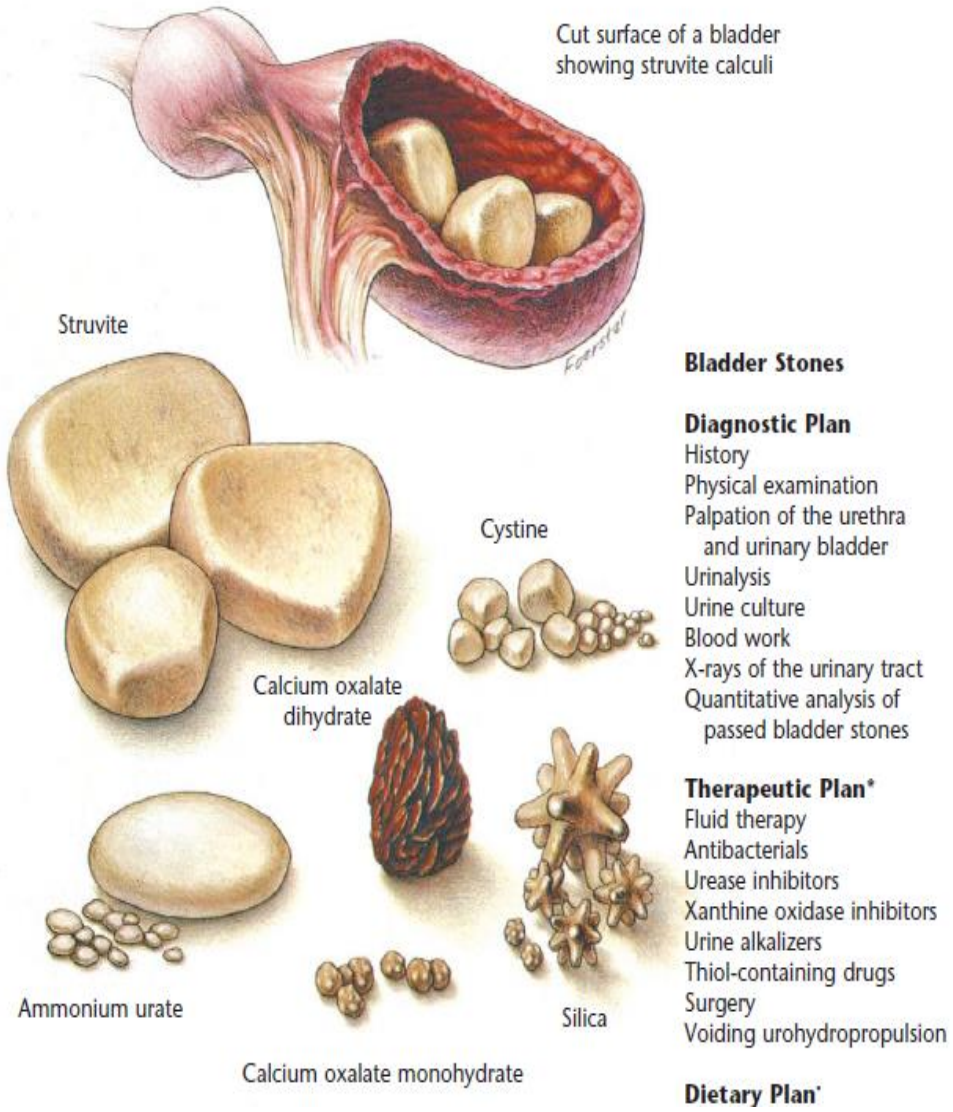
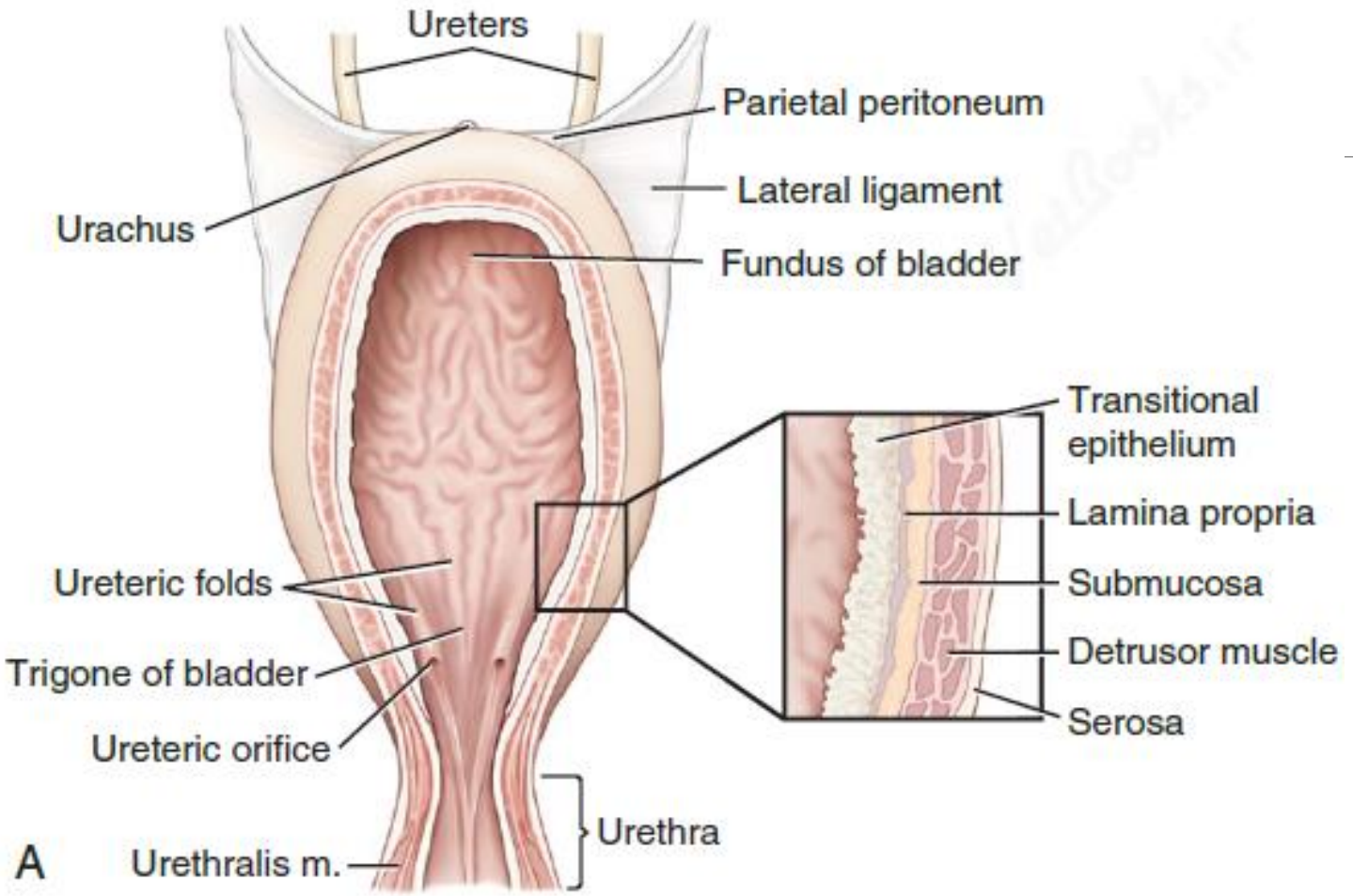


FIGURE 11-58 Branches of the cranial mesenteric artery, ventral aspect.

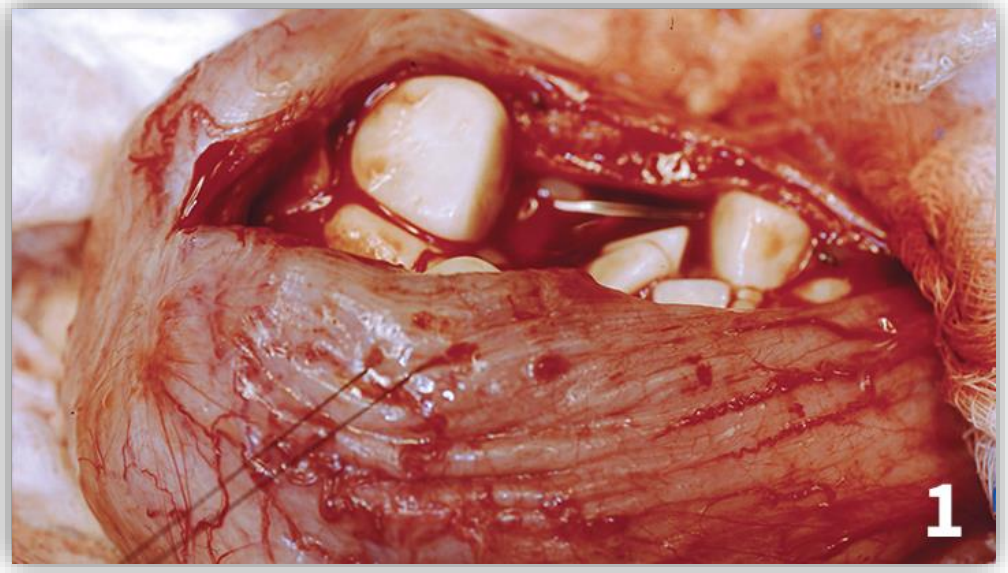




Urinary stones are most commonly found in the lower urinary tract (bladder and urethra) in both male and female dogs. Only a small percentage of stones are located in the kidneys or ureters



Ventral view of equine urinary bladder



It is recommended to perform a 3-4 cm ventral, midline cystotomy incision that extends towards the trigone but not closer than 1-2 cm from the urethra

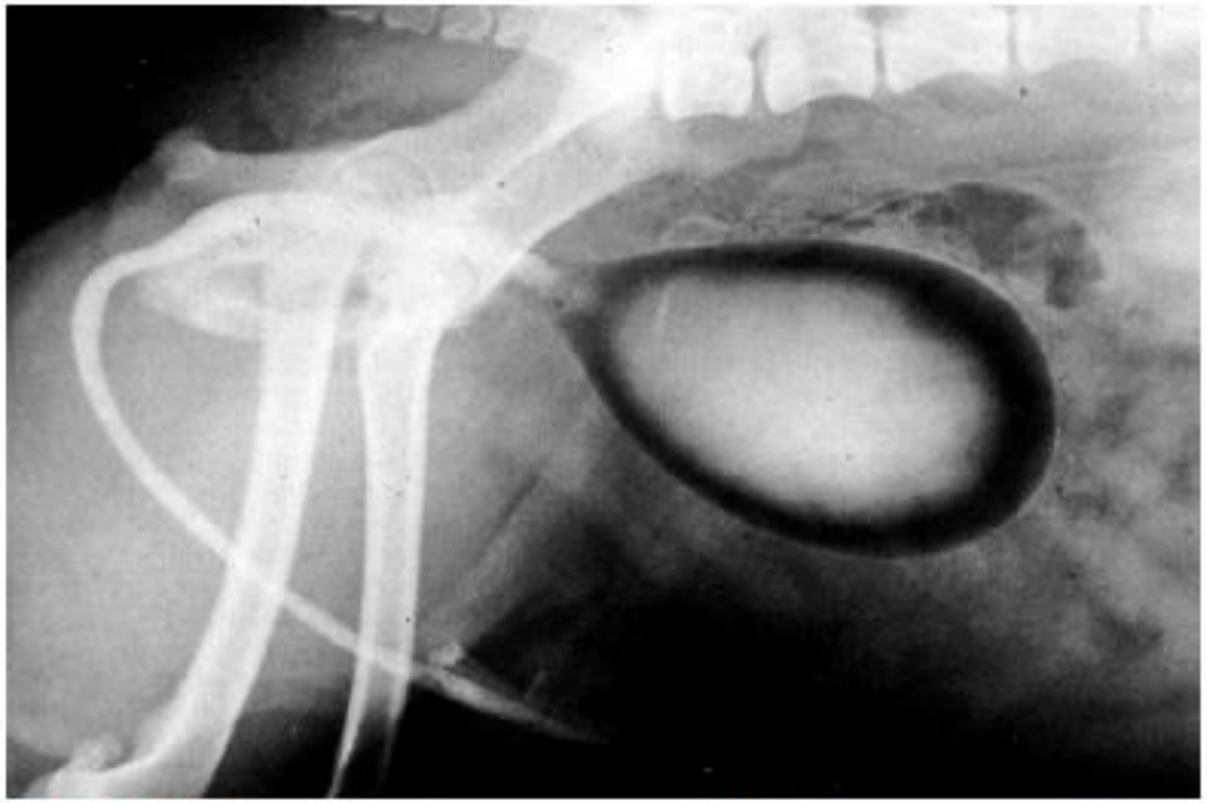
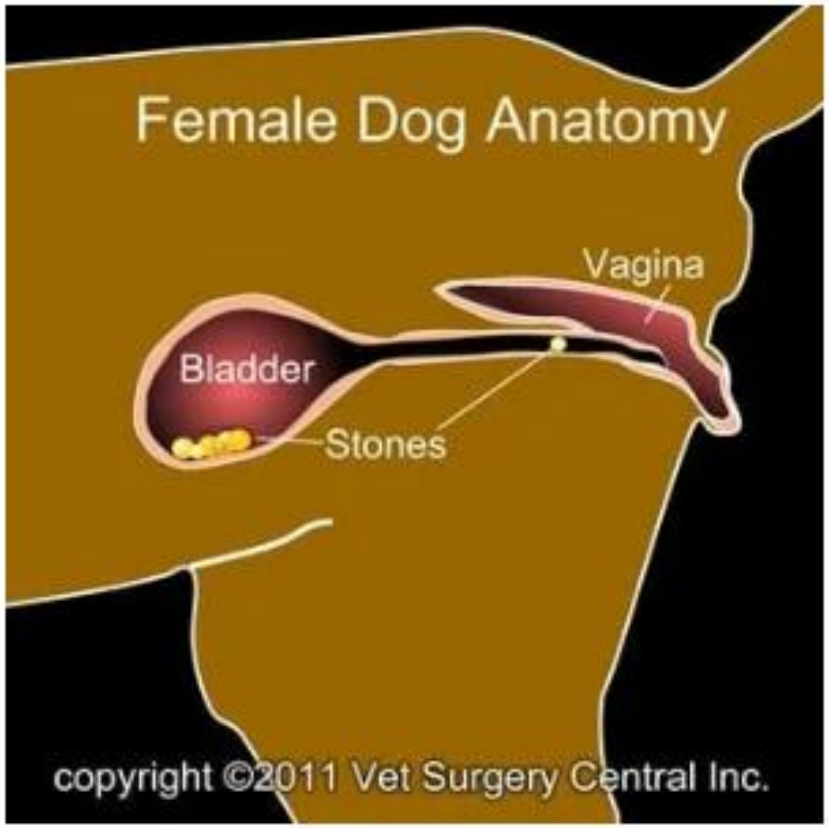
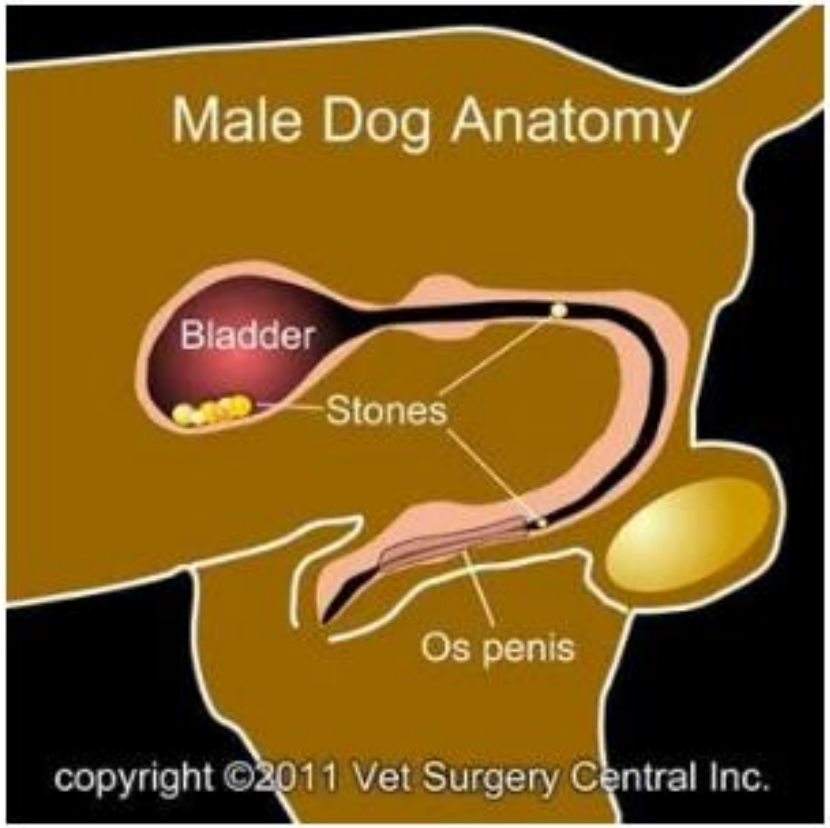
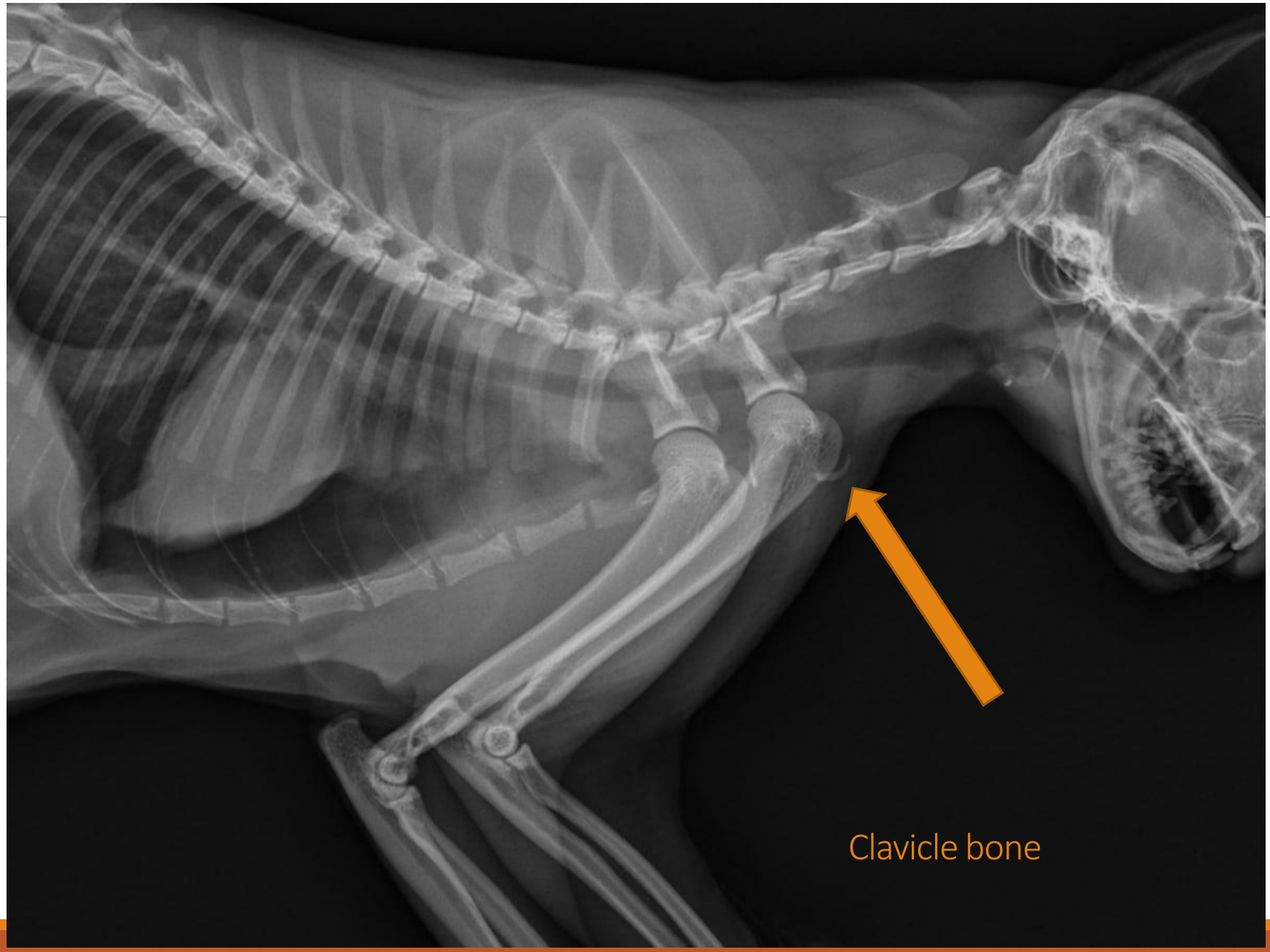


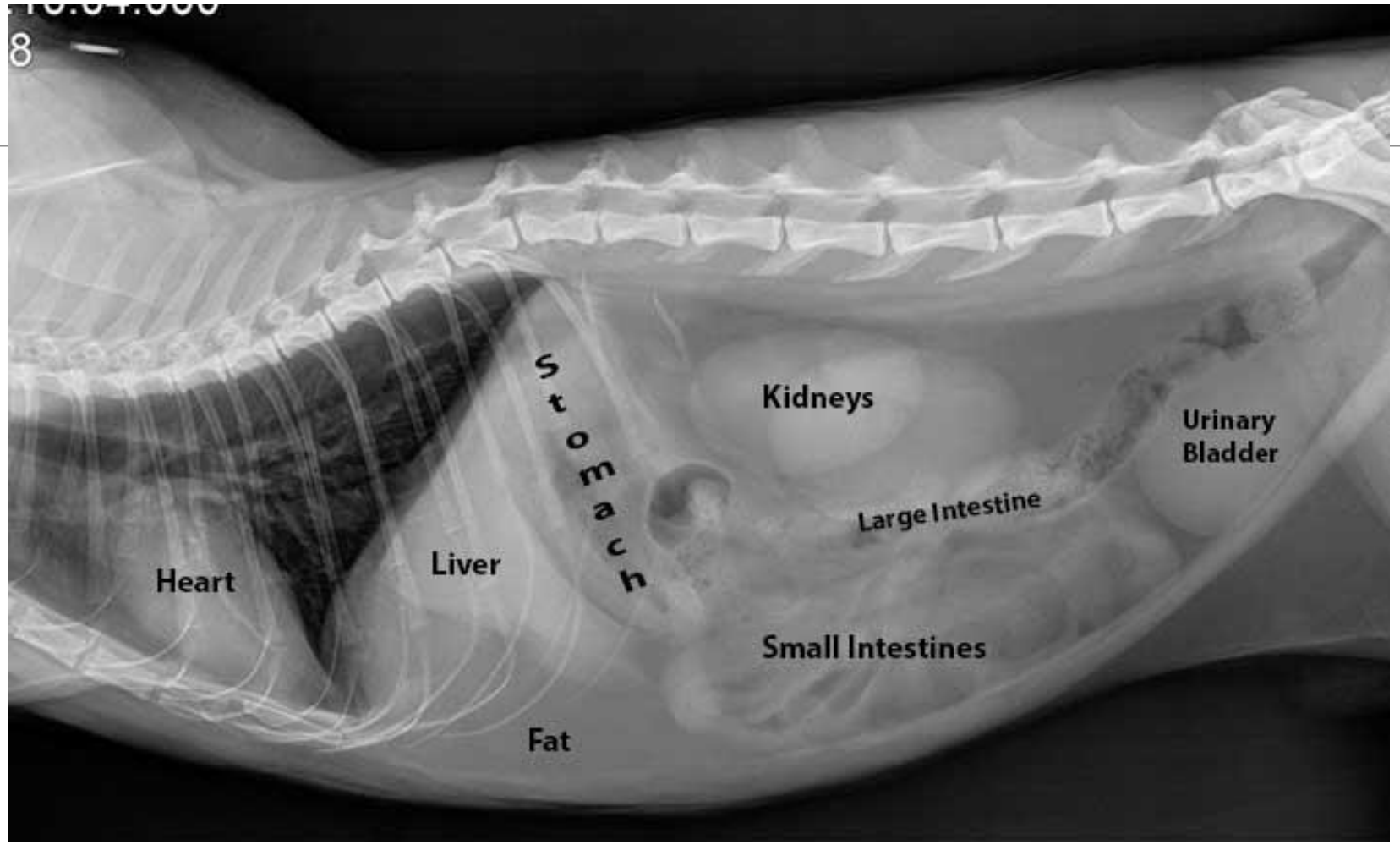
FIGURE 9-17 Lateral contrast radiograph of the bladder and urethra in the male.



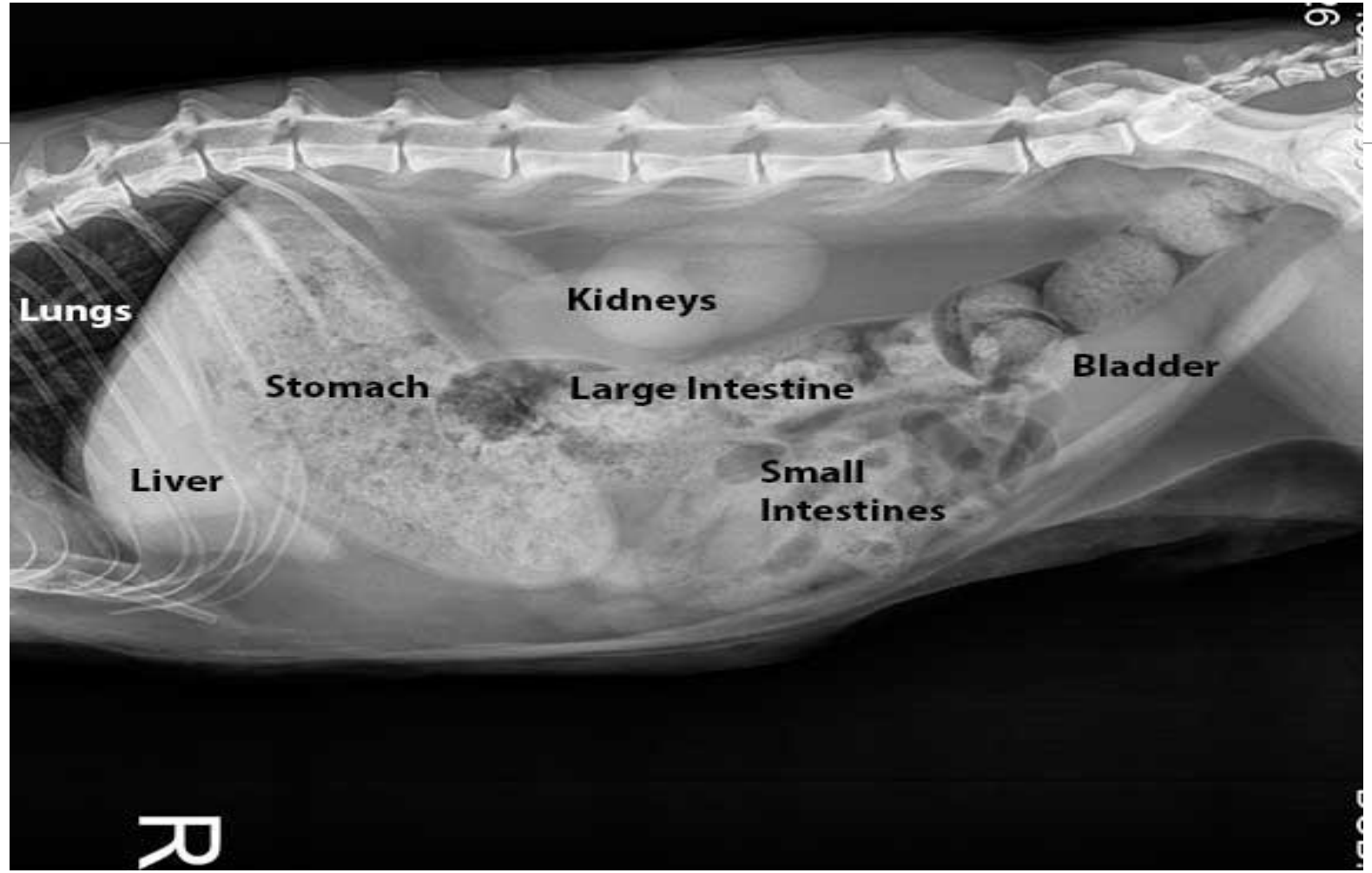


The common location of obstruction in the urethra in dogs is at the level of the ischial arch and just caudal to the os penis. The ischial arch is a region of reduced diameter and curvature in the urethra, making it a frequent site for urinary calculi to become lodged. The os penis, a bone located in the penis of male dogs, further narrows the diameter of the urethra, increasing the likelihood of small stones becoming stuck at this location


Clavicle bone



Here is another normal cat abdominal and chest radiograph, this time with an empty stomach



The stomach has food in it, and the large intestine contains feces.

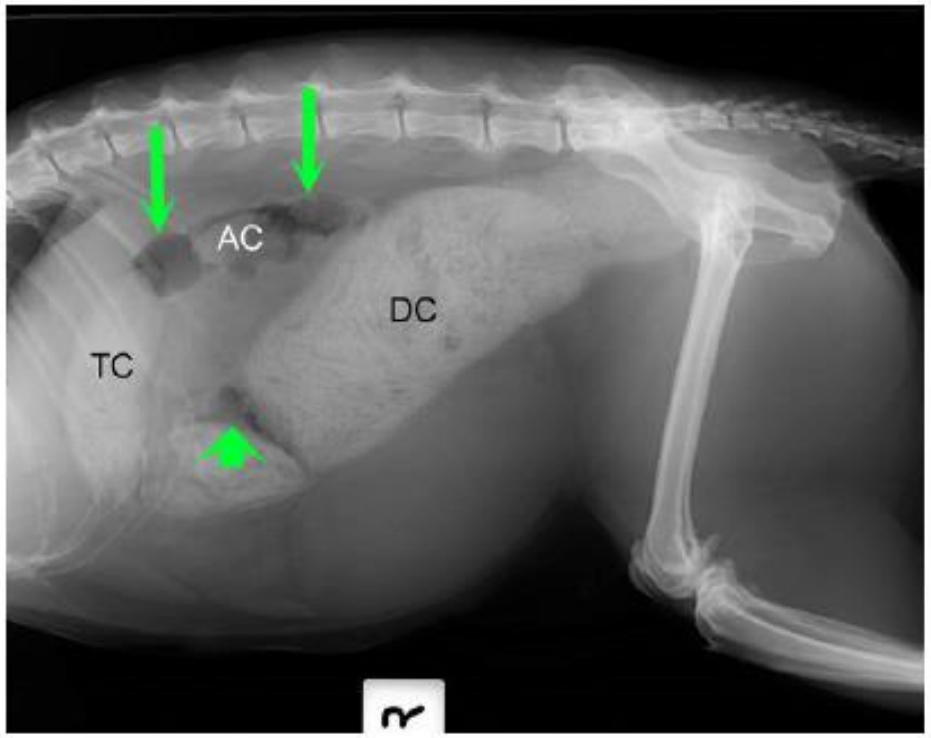


FIGURE 5.7-1 Right lateral radiograph of the cat in this case. The colon is markedly distended with digesta/feces from transverse colon (TC) to rectum (superimposed by the pelvis). Note the accumulation of gas *(arrows)* in the ascending colon (AC) oral, yet caudal, to the fecal impaction. There is also a gas pocket *(arrowhead)* in the proximal third of the descending colon (DC).

FIGURE 5.8-1 Lateral radiograph of the cat described in this case, depicting herniation of small intestine through the abdominal wall. Both the small intestine and the colon contain digesta/feces and gas, making it easy to see the herniated loops of small intestine under the skin ventral to the body wall on this lateral projection. (The hernia was located on the right lateral abdominal wall, but the herniated bowel assumed a more ventral position in this view because the cat was lying in right lateral recumbency.)