

Abdominal Ultrasonography: Small Parts

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Advanced ultrasonography is usually directed towards evaluation of smaller structures and/or vascular, musculoskeletal and cardiac imaging. As with all types of ultrasonography, appropriate training and practice is key to developing proficiency and accuracy. Additionally it is important to realize the limitations of your equipment when trying to find small structures. Not all US machines are created equal. High frequency microconvex probes are best suited for imaging small structures in dogs and cats. A high frequency linear probe with a small footprint is also useful for small dogs, cats and exotic pets.

Advanced or small parts abdominal ultrasonography assumes that the practitioner has mastered the fundamentals, and can perform a complete scan, confidently identifying normal and abnormal anatomy as it pertains to the liver, gallbladder, spleen, gastrointestinal tract, kidneys, urinary bladder, ovaries, prostate gland and uterus/uterine stump.

Essential for advanced ultrasonography and finding the small structures is a thorough knowledge of anatomy and the ability to trace/find various organs and vascular structures. Additionally the sonographer must be a “good driver” because the most challenging aspect of advanced ultrasonography is “finding” the structures.

Below is a list of abdominal structures and associated anatomic “landmarks” this author considers to be “small parts”:

1. Adrenal glands: Best using a dorsal approach, often with the dog in lateral or dorsal oblique recumbency
 - a. Left adrenal gland: craniomedial to left kidney. Vascular references are the aorta, celiac and cranial mesenteric artery and left renal artery.
 - b. Right adrenal gland: craniomedial to the right kidney. Vascular references: between the aorta and CVC, when viewing them in a sagittal plane. In deep chested dogs, the right adrenal gland can be imaged in a transverse plane using an intercostal approach.
2. Medial iliac lymph nodes: Dorsal to the urethra and colon. Lateral to the external iliac arteries. Identifying the caudal abdominal aorta and its trifurcation is key. This region should be imaged in transverse and sagittal planes.
3. Hypogastric and sacral lymph nodes: Lateral to internal iliac arteries. Again identifying the aortic trifurcation is important.
4. Pancreas:
 - a. In dogs the right limb is seen more commonly, in cats the left limb and pancreatic duct is often seen best.
 - b. Left limb of pancreas: ventral to splenic vein, caudal to stomach, cranial to transverse colon, medial to spleen
 - c. Right limb of pancreas: Must identify the duodenum. Adjacent to the duodenum, identify the pancreaticoduodenal vein.
 - d. Body of pancreas: caudal to pylorus
 - e. Pancreatic duct in cats (left limb)
 - f. Duodenal papilla, caudal to the cranial duodenal flexure.
5. Portal vein at porta hepatis and the intra-hepatic right, central and left divisional branches
6. Hepatic lymph nodes: adjacent to portal vein
7. Gastrointestinal tract: Identify all 4 layers (mucosa, submucosa, muscularis, serosa) and relative thickness and appearance
 - a. Stomach, pylorus and rugal folds
 - b. Duodenum
 - c. Jejunum (jejunal veins, jejunal lymph nodes)
 - d. Ileum
 - e. Ileocolic junction (colic lymph nodes)
 - f. Colon
 - i. Ascending
 - ii. Transverse
 - iii. Descending
 - iv. Cecum
8. Renal pelvis
9. Ureters when abnormal
10. Major vasculature – aorta, CVC, portal vein, splenic vein, renal veins and arteries

Given unlimited time, any small structure or vasculature can be seen or traced. However optimum patient care within the context of practical limitations guides our expectations and outcomes. For this reason knowing the structural anatomic and vascular relationships

permits one to thoroughly and confidently evaluate the region of small structures. If no abnormality is detected, we can infer that the small part is normal or at least not grossly abnormal. An example is medial iliac lymph nodes in cats. They are very small and difficult to see. If you can confidently identify the caudal abdominal aortic trifurcation in transverse and sagittal planes, and do not see large hypoechoic structures, you can conclude the examination is negative for medial iliac lymphadenopathy.

References

Atlas of Small Animal Ultrasonography (2008) D. Penninck, MA d'Anjou
Small Animal Diagnostic Ultrasound (2002) TG Nyland, JS Matton