Performing a thoracocentesis
A thoracocentesis is often life saving, and should be performed immediately in any dyspneic patient that is suspected of having pleural space disease (e.g., pleural effusion, pneumothorax). A thoracocentesis should be performed cranial to the rib, as the blood vessels and nerves lie caudal to the rib (e.g., “hiding” behind the rib). A thoracocentesis should be performed at the 7th to 9th intercostal space (ICS) to avoid the heart (3-5th ICS) or liver (caudal to the 9th ICS). The patient should be shaved, scrubbed, and prepared aseptically. The use of a 3-way stopcock, extension tubing, an appropriately sized needle or catheter, and syringe should be used to collect air or fluid. Appropriate sterile collection tubes should be available for sample collection for fluid analysis, cytology and/or culture purposes. For cats, a 22 gauge, 1-1.5” needle can be used. Depending on the size of dog, an 18 to 22 gauge, 1-3” needle or catheter can be used. NOTE: A short cut technique – rather than counting rib spaces in cases of severe emergency – is to draw an imaginary line caudal to the xiphoid along the lateral body wall. This is approximately the 8th ICS, and thoracocentesis can be performed in this area. If pleural effusion is present, the needle should be directed towards the bottom 1/3 of the chest cavity; if abnormal air is present, the dorsal 1/3 of the chest cavity should be used for thoracocentesis.

Performing an abdominocentesis
An abdominocentesis should be performed when the patient is suspected of having ascites secondary to underlying trauma (e.g., uroabdomen, hemoabdomen, bile peritonitis), metabolic disease (e.g., liver failure, hypoproteinemia), cardiac disease (e.g., right-sided heart failure), neoplasia (e.g., hemangiosarcoma, etc.), etc. An abdominocentesis should be performed using sterile technique. The abdomen should be clipped, shaved and prepared aseptically. A four-quadrant tap around the umbilicus should be performed; note, if you obtain fluid from one location, there is no reason to tap the other remaining 3 regions. Gently, but briskly, insert a sterile 22-ga. needle into these locations. One can use either a closed technique (e.g., needle attached to 3 ml syringe) or open technique (e.g., needle alone). If no fluid is obtained, a “2-tap technique” can be used; a second needle can be inserted several millimeters away from the first sterile needle insertion - this will often allow fluid to gently flow out. Once fluid is seen, gentle suction can be used with an attached 1-, 3- or 6-ml syringe to aspirate the ascites. This fluid should be promptly evaluated for packed cell volume, protein content, cellularity, chemical analyses (e.g., glucose, lactate, creatinine, potassium, or bilirubin if trauma or sepsis is suspected), and presence of intracellular bacterial organisms.

Doing FAST (Focused Assessment with Sonography for Trauma) or TFAST ultrasounds
The focused assessment with sonography for trauma (FAST) ultrasound is a 2-minute procedure that detects the presence of fluid in the abdominal cavity to allow for rapid therapeutic
intervention (e.g., fluid resuscitation, abdominocentesis, cytology, clinicopathologic testing). This rapid method of ultrasound is designed to be used by health care professionals with limited ultrasonographic training and is not designed for extensive examination of the abdomen. The added benefit of the FAST examination is the ability to detect very small amounts of fluid. Typically, 5 to 25 ml/kg of fluid needs to be present to be removed by blind abdominocentesis; >10 to 20 ml/kg of fluid has to be present before it can be detected by fluid-wave assessment on physical examination; and approximately 8.8 ml/kg of fluid needs to be present before it can be detected radiographically. On the contrary, as little as 2 ml/kg of fluid can be detected on a FAST examination, allowing for rapid diagnosis and identification of underlying pathology.

Ideally, the FAST ultrasound should be performed in the position that the patient is the most comfortable and least stressed (e.g., lateral). The FAST examination typically involves assessment of 4 sites of the abdomen: caudal to the xiphoid, cranial to the bladder, and the right and left dependent flank. The presence of fluid at any of the sites is considered positive. Evaluation of the xiphoid region allows you to check for fluid between the liver and diaphragm and the liver lobes, as well as for pericardial or pleural effusion. Evaluation of the bladder view evaluates for fluid cranial to the bladder and for the presence of a bladder. The right dependent flank allows for fluid detection between the intestines and the body wall, whereas the left dependent flank view allows for identification of the spleen, abdominal effusion near the spleen and body wall, the kidney and spleen, and the liver and spleen.

![Figure 1](image_url)

Figure 1. Illustration of the probe placements and movements used to obtain ultrasonographic views of the abdomen via FAST in a dog. Figure courtesy of Boysen SR from IVECCS proceedings 2006.

More recently, the FAST ultrasound has been expanded to include the thorax. The Thoracic Focused Assessment with Sonography for Trauma (TFAST) evaluates for the presence of pleural effusion, pericardial effusion, or even the presence of an occult pneumothorax. In the dyspneic patient, a TFAST can be performed as a rapid diagnostic tool and to assist with ultrasound-guided thoracocentesis (which may be necessary for fluid pockets that may be difficult to obtain blindly). The TFAST can be done quickly and efficiently while the patient is in sternal recumbency. Rapid shaving of the patient (in the least stressful manner possible) allows for a better ultrasonographic image and prepares the patient in the event that a thoracocentesis is necessary. In a dyspneic patient (particularly cats), the TFAST is much less invasive than performing chest radiographs, and is advocated as an easy, repeatable test that can be performed. In a normal patient, the “glide sign” can be seen when imaging the thorax; this is due to the air/tissue interfaces that are created when the parietal pleural slides against the visceral pleura during respiration. Absence of the sliding “slide sign” layers or a “comet-tail artifact” is suggestive of a pneumothorax.
How to perform a gastric lavage

Gastric lavage is a labor-intensive procedure, but is life-saving with certain toxicants. While emesis induction can be safely performed in the majority of poisoned patients (e.g., in asymptomatic patients, with recent ingestion within the past 1-2 hours, etc.), some toxicities warrant the use of gastric lavage. Knowing how to perform a gastric lavage is important, as this procedure needs to be performed in life-threatening situations in the poisoned patient. This should be performed when emesis induction is contraindicated. For example, if the patient is already symptomatic (e.g., too sedate, seizuring, tremoring, etc.), but the toxicant is still thought to be within the stomach, gastric lavage should be performed. Ideally, this should be performed within 6 hours of ingestion of the toxicant. Rarely, complications of gastric lavage may occur, and include risks of sedation, secondary aspiration pneumonia (once extubated), mechanical injury (to the mouth, oropharynx, esophagus, stomach), or respiratory effects (e.g., hypoxemia secondary to aspiration, hypercapnea secondary to sedation, etc.). The reader is directed to a toxicology resource for additional information on gastric lavage.

The following materials should be organized prior to the start of the procedure:

- white tape
- mouth gag
- sterile lubricant
- gauze
- orogastric tube
- warm lavage fluid (e.g., tap water) in a bucket
- bilge/drench or stomach pump (or funnel if a bilge is not available)
- sedatives (e.g., pre-drawn and appropriately labeled)
- ETT and anesthesia machine or ambu bag
- empty syringe to inflate the cuff
- material to secure and tie-in the ETT
- IV catheter supplies
- activated charcoal pre-drawn in 60 mls syringes ready for administration (Dose: 1-5 g/kg of charcoal)
- sedation reversal agents if necessary (e.g., naloxone, yohimbine, etc.)
- anti-emetic (e.g., maropitant)

The patient should have IV access established, and then sedated and intubated with an ETT and connected to an ambu bag or anesthesia machine. A potent anti-emetic (e.g., maropitant, ondansetron, etc.) should be given as part of the pre-medication to prevent secondary aspiration. The patient should then be placed in either sternal or right lateral recumbency. An appropriately sized orogastric tube should be pre-measured to the last rib (so you know the maximum distance to insert the tube) and marked with white tape. A mouth gag should be placed in the patient. The tip of the orogastric tube should be lubricated and passed into the stomach using gentle, twisting motions. Appropriate placement of the orogastric tube should be confirmed to ensure that it is not in the airway; once this has been done, warm water should be infused via a bilge/drench pump (or funnel). Copious amounts of lavage fluid can be used for gavage. Attempt to recover the gavage fluid by gravity, emptying it directly into the empty bucket. While gavaging, make sure to frequently palpate the stomach for over-distension. Physical manipulation to
massage/agitate the stomach is necessary to help break up stomach contents or bezoars; hopefully, this will allow small material to be removed via the orogastric tube. Perform several lavage cycles (>5-10) to evacuate stomach contents and maximize decontamination. Most of the gavage liquid should be removed prior to activated charcoal administration. Make sure to evaluate the gastric lavage fluid for presence of toxicants (e.g., pills, plant material, etc.). This can potentially be saved for diagnostic evaluation or toxicology testing if malicious or unknown poisoning is suspected. Before removing the orogastric tube, administer activated charcoal (with a cathartic) via the tube, and flush it with additional water (or by blowing forcefully into the tube) to clear it out. Kink the tube (to prevent lavage fluid from being aspirated) prior to immediate removal of the tube. Once kinked, the tube should be removed quickly in one sweeping movement. Extubate the patient only when the gag reflex has returned. Ideally, maintain the patient in sternal (or slightly elevated) recumbency (with the head elevated) to prevent aspiration.

How to trocharize a GDV
Gastric decompression is a necessary part of stabilization of the gastric dilatation-volvulus patient. This can be done by passing an orogastric tube (see “How to perform a gastric lavage”). This author prefers trocharization as compared to orogastric intubation, as it is easy to perform, effective, has minimal side complications, and is less stressful to the patient. The clinician should locate the most tympanic region (estimating where the stomach is) and clip and prep the region. Aseptic technique should be used. A large gauge needle or catheter (e.g., 14 or 16 ga.) should be directed into this area to alleviate gas from the stomach; the sound of hissing gas indicates appropriate placement into the stomach. Rare complications can be seen secondary to trocharization including splenic laceration, gastric perforation, or septic peritonitis. Alternatively, once the patient has been appropriate stabilized, orogastric intubation can be performed to aid in gastric decompression. Goodrich et al evaluated dogs undergoing orogastric intubation versus trocharization in 116 dogs and found that orogastric tube placement was successful in 77% of dogs, with 38% of the dogs requiring sedation. In comparison, trocharization was successful in 86% of the cases, with no need for sedation. (In the author’s opinion, all dogs should be sedated for orogastric intubation unless comatosed or obtunded to prevent undue stress and anxiety to the patient.)

How to perform a pericardiocentesis
To perform a pericardiocentesis, light sedation is typically necessary. A cardiovascularly sparing protocol should be used (e.g., butorphanol, fentanyl or hydromorphone and midazolam or diazepam, etc.). Sterile technique and ECG monitoring is imperative.

The appropriate supplies should be prepared in advanced:
  • Sterile gloves
  • Sterile drape
• Appropriately-sized pericardiocentesis or "centesis" catheter
• Scalpel (to add extra side holes into the centesis catheter, if needed)
• ECG
• Pre-drawn lidocaine (dosed appropriately) in the event of an emergency
• Oxygen supplementation
• A three-way stopcock or one-way valve
• A 12-, 20- or 60-ml syringe (based on patient size)
• An EDTA tube for fluid analysis
• A red top tube for possible culture (rarely done) and to confirm if the sample clots or not (alternatively an ACT tube can be used)

Depending on clinician preference, pericardiocentesis can be performed on the left or ride side [The author prefers the right side (e.g., left lateral recumbency) to avoid puncture of the lung (via the cardiac notch)]. Ultrasound-guidance can be used during the procedure, if needed. An over-the-needle catheter system (typically 16 gauge, 1.5 to 4 inches, depending on the size of the patient) can be used, with extra small side holes smoothly cut into the catheter (via sterile scalpel) to facilitate flow during pericardiocentesis. After the catheter is advanced and the stylet removed, an extension tubing, 3-way stopcock, and syringe should be attached. A small amount should be removed and placed in a red top to evaluate for the presence of a clot. (This is bad. This means you hit the heart. Slowly back out and keep calm). Non-clotting blood is consistent with blood present in the pericardial sac that has already undergone fibrinolysis (This is good. It means you can continue to aspirate during your pericardiocentesis). Once pericardial effusion can no longer be aspirated out gently, ultrasound should be used to confirm improvement or resolution of the pericardial effusion.

How to unblock a feline urethral obstruction
Alleviation of a feline urinary obstruction can be performed using several different techniques or catheter types (e.g., rigid olive tip, Slippery Sam, MILA, etc.), and is dependent on clinician preference. The author prefers using a Tomcat sterile polypropylene catheter initially, followed by a 3.5 to 5 French red rubber catheter. Aseptic technique should be used as much as possible. In order to alleviate the obstruction, the lubricated urinary catheter should be well seated into the tip of the penis, making sure to pull the prepuce caudally to straighten the penile flexure and aid in passing the urinary catheter. A sterile syringe with saline should be used to copiously flush the urethra, with the goal to dislodge and flush the obstructing materials (e.g., crystals, blood clots, cellular debris, calculi, etc.) out of the urethra (either back into the urinary bladder or antegrade out of the tip of the urethra). The author prefers to flush aggressively as the temporary catheter is removed, followed by immediate placement of a longer indwelling urinary catheter (e.g., red rubber, Slippery Sam). The catheter should be sutured in immediately (e.g., Chinese finger trap, etc.) and the bladder copiously flushed. Once the patient is unblocked, a closed collection system should be used to prevent ascending infection.

How to perform a coccygeal block for perineal analgesia
Coccygeal blocks allow us to provide analgesia without affecting motor function. The use of a coccygeal block is beneficial for certain conditions including pelvic fractures, perineal injuries, surgery of the lower urinary tract, feline urethral obstruction, tail pull injuries, and reproductive emergencies (e.g., dystocia). As a coccygeal block will only provide analgesia to the perineal
region for approximately 1 hour, additional analgesic therapy (e.g., buprenorphine 11-22 mcg/kg, IV q 6 or long-acting Simbadol at 0.12-0.24 mg/kg, SQ q 24) should be continued. Note that there are some contraindications for performing a coccygeal block including: anatomical abnormalities (e.g., Manx cat, pelvic fractures) that cause loss of appropriate landmarks, skin infections over the insertion site, severe obesity, hypotension, septicemia and coagulopathies. Rare complications can occur with coccygeal blocks, including lidocaine toxicity, infection at the injection site, and inadequate analgesia.

Here, a step-by-step approach on how to perform a coccygeal block:

1. Use a sterile bottle of 2% preservative-free lidocaine at a dose of 0.1-0.2 mL/kg.
2. Sedate the patient. Once sedated, the patient is placed in ventral recumbency and the sacrococcygeal region surgically prepped. The injection site can be found by palpating the space between the sacrum and first coccygeal vertebra, which can be easily palpated when the tail is moved. Draping is not required and may interfere with the procedure, but aseptic technique is imperative.
3. After donning sterile gloves, the injection site is located just cranial to the first coccygeal vertebrae. Alternatively, the first or second coccygeal intervertebral space can be used. To facilitate this step, an assistant can manipulate the tail.
4. A 25 gauge, 1 inch needle is inserted at a 30 to 45° angle at the midline of the sacrococcygeal space (which is identified with the index finger of the other hand). While Advancing the needle, a characteristic “pop” can be felt. This occurs as the needle penetrates the ligamentum flavum.
5. After entering the epidural space, a syringe is attached and gentle negative pressure applied. If blood or cerebrospinal fluid is obtained, the procedure needs to be started again. If no blood or any other fluid is aspirated, proceed to infuse the calculated volume into the epidural space. No resistance to injection should be noticed. Inappropriate infiltration into the subcutaneous tissue may create resistance. The needle is removed after injection.
6. You can tell if your epidural is working if you notice relaxation of the tail and rectum; also, pinching of the tail should not produce a response. If a pain response is elicited after 5 minutes of the first injection, a second injection can be attempted. Due to the increase risk of complications, no more than 2 attempts are recommended.
7. Urethral de-obstruction can be performed after the lidocaine block has taken effect (which occurs within just minutes).

Conclusion
The veterinary clinician must be comfortable performing certain types of procedures in the emergency room. When in doubt, these procedures should be practiced on a cadaver to ensure appropriate technique and comfort level.

References:


NOTE: When in doubt, all drug dosages should be confirmed and cross-referenced with a reference guide such as *Plumb’s Veterinary Drug Handbook*. 