

Thoracocentesis

Thoracocentesis is indicated for diagnostic and therapeutic reasons. Supplies needed for thoracocentesis depend on the size of the pet. In most cats and small dogs, a butterfly catheter is of sufficient length to reach the thoracic cavity. In obese or big cats, and in larger dogs, a 37–50 (1.5–2 inch) needle may be used instead. The needle is connected to an extension set. A three-way stopcock is placed between the end of the butterfly catheter or extension set and a syringe. Usually a 10 or 20 ml syringe is adequate. In animals with very large volume of effusion (e.g. >1500 ml), it is often worthwhile to place a local block to permit the use of a larger gauge catheter (e.g. 14 or 16 ga) to remove the fluid more rapidly. The preferred site of thoracocentesis is between the seventh and ninth rib spaces (210–213).

Thoracocentesis

210 The midventral aspect of the thorax is clipped and prepared for thoracocentesis. The intercostal vessels run caudal to the ribs.

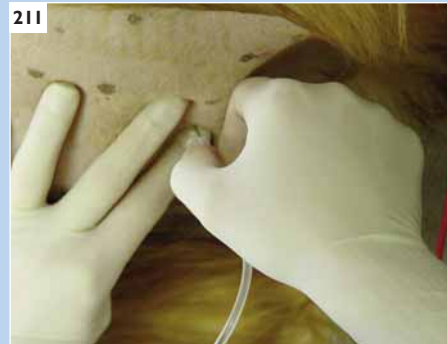
The preferred site of thoracocentesis is between the seventh and ninth rib spaces. Sterile gloves are donned to permit palpation of the desired site.

211 The needle is advanced carefully into the thoracic cavity. Upon entry of the thoracic cavity, a gentle 'pop' is often felt by the experienced operator.

212 A second operator should aspirate the fluid and provide feedback as to if the fluid is still flowing adequately.

213 An aliquot of the fluid should be retained for cytological examination and, if warranted, bacterial culture and sensitivity testing.

Thoracocentesis



Thoracostomy tube placement

A thoracostomy (chest) tube should be placed when a significant amount of pleural effusion or pneumothorax is present. Usually, the tube is placed under general anesthesia, although, in rare cases, local anesthesia may be adequate. The patient may be placed in either sternal or lateral recumbency. The technique is illustrated in 214–217.

Thoracostomy tube placement

214 The entire hemithorax should be clipped and draped for thoracostomy, being careful to include the 13th rib in the field so it may serve as a landmark. In this picture, the red circle represents the site of the skin incision, while the red X marks the site of intended pleural space puncture.

215 The skin is pulled cranially by an assistant. This allows the initial incision to be directly over the site of the pleural penetration. The green line represents the last rib. This line is more visible in this picture than in 213 because the skin has been pulled forward.

216 A combination of blunt and sharp dissection permits placement of the thoracostomy tube into the chest cavity with minimal force. The operator should avoid 'slamming' or 'hitting' the chest tube into place, as underlying cardiopulmonary tissues may be damaged.

217 The chest tube should be secured with a finger trap suture.

Thoracostomy tube placement



Pericardiocentesis



Pericardiocentesis

Pericardiocentesis can be performed in sternal recumbency or left lateral recumbency, but it is recommended that the procedure be performed from the right side of the thorax to reduce the risk of coronary artery laceration. If possible, a complete echocardiogram should be performed *before* pericardiocentesis as the pericardial fluid may help to highlight any mass lesions. The right side of the thorax is clipped and aseptically prepared. A continuous ECG is monitored for arrhythmia as ventricular ectopy is common. Lidocaine (2 mg/kg) may be prepared in the event of hemodynamically significant ventricular ectopy. Echocardiography is useful to identify a good window for the tap, but, alternatively, a successful tap can be performed by selecting the fourth or fifth intercostal site approximately halfway between the sternum and the costochondral junction. Local anesthesia is usually adequate, though sedation may be used if needed. Oxymorphone should be avoided due to the tendency of dogs to pant following administration.

Pericardiocentesis

218 The intended site is marked and local anesthesia is infused.

219 The site is palpated. A small nick in the skin with a #11 blade may be made. In large dogs, a 5.25 inch 14 or 16 gauge catheter is used, while in smaller dogs a 2" 18 gauge catheter is typically adequate.

220 Fluid is carefully withdrawn while simultaneously monitoring the EKG. If arrhythmia is detected, the catheter should be retracted 0.25 to 1 cm. If severe ectopy occurs, the catheter should be withdrawn and lidocaine administered. The effusion frequently has a hemorrhagic ("port wine") appearance. In some cases, a clear or serosanguineous pleural effusion is encountered first. In most dogs, a significant decline in heart rate occurs during the procedure, which is a sign of resolution of the tamponade.

221 Echocardiography may be used to confirm that the pericardial sac has been emptied. Following pericardiocentesis serial monitoring is advisable to watch for ongoing bleeding into the thorax, recurrent pericardial effusion, or the development of cardiac arrhythmias.

Abdominocentesis



Abdominocentesis

Abdominocentesis is commonly performed in the emergency room for diagnostic and therapeutic purposes. In many cases, simple single needle abdominocentesis is successful (222, 223). In other cases, where no fluid is returned despite clinical suspicion of fluid, the following options may be performed:

- Complete volume resuscitation. In animals with hemorrhage or sepsis, the depleted intravascular volume may limit the development of fluid. Repeat abdominocentesis 30–90 min later is often successful.
- Two to four needles may be placed simultaneously in the abdomen. This technique appears to permit smaller volumes of fluid to be detected.
- Abdominal ultrasonography is useful to identify pockets of fluid. Fluid is easily recognized by most operators upon ultrasonography.

- DPL may be performed. First the patient's bladder is emptied, then, following a local anesthetic, a long 13 cm (5.25 inch) 12–14 ga catheter within additional side holes cut is inserted into the abdomen. Warmed saline (22 ml/kg) is then infused into the abdomen and the fluid allowed to drain back out again. An aliquot of the fluid is reserved for biochemical and cytological examination. It is common to retrieve only a small portion of the fluid infused.

Abdominocentesis

222 A 22 ga 25–37 mm (1–1.5 inch) needle is inserted into the abdomen. The left cranial quadrant should be avoided if only a single needle insertion is planned, due to the presence of the highly vascular spleen.

223 Fluid collected by abdominocentesis may be permitted to fall freely into tubes for cytology (EDTA) and culture or may be aspirated by attaching a syringe to the needle. The intended site of pericardiocentesis is marked and local anesthesia is infused.

(221 continued) Hospitalization is advised and vital parameters, PCV, and total solids should be routinely checked 2–6 hr after pericardiocentesis to help monitor for ongoing bleeding. ECG monitoring is indicated for animals noted to have significant arrhythmia before or after pericardiocentesis.

Tracheostomy

Tracheostomy in a controlled circumstance is preferable; however, if needed a “slash” tracheostomy may be performed in < 30 seconds. In life-threatening situations, attention to sterility and anatomy may be abandoned in order to secure an airway. Tracheostomies are indicated most commonly for bypassing the upper airway, due to masses, swelling, or other dysfunction, in order to permit oral surgery or long-term mechanical ventilation. The patient is anesthetized, intubated, and placed in dorsal recumbency. The technique is illustrated in 224–229.

Tracheostomy

224 The tracheostomy site is prepared and a location approximately at the third to fifth tracheal rings is chosen. The site should be distal enough to avoid the larynx but not too close to the thoracic inlet.

225 The site is draped and an incision is made along the midline.

226 The midline cervical muscles (‘strap’ muscles) are bluntly dissected and the trachea is isolated. ‘Stay’ sutures of large suture material (3.5–4 metric [1-0 or 0]) are placed cranial and caudal to the anticipated site of the tracheostomy. These sutures are essential should the tracheostomy tube dislodge from the patient.

227 The cuff of the orally placed endotracheal tube should be deflated and the tube gently removed. Rarely, it is possible to pierce the cuff or the tube itself with the stay sutures. However, the surgeon and the assistant should be alert as to this possible complication.

228 The stay sutures should be used to help lift the trachea toward the incision, and, with gentle traction, the desired stoma can be visualized.

229 The tracheostomy tube is placed via the stoma, and connected to the anesthetic circuit to permit patient recovery. Unless mechanical ventilation is pursued, the cuff should *not* be inflated.

Transtracheal aspirate

A transtracheal aspirate is performed for diagnosis of some respiratory conditions, e.g. pneumonia or allergic pulmonary disease, in dogs weighing >10 kg. Supplies needed include sterile prep and gloves, local anesthetic, a through-the-needle catheter, three to five aliquots of sterile 3–10 ml saline in syringes, EDTA tube for cytology, and culturettes or red top tubes for culture. The technique is illustrated in 230–235.

Transtracheal aspirate

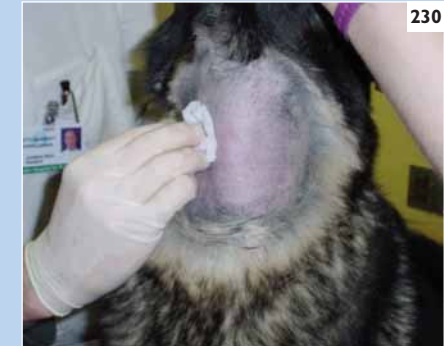
230 The ventral aspect of the neck is clipped and prepped for transtracheal aspiration.

231 The tracheal rings are palpated and local anesthetic is injected. Alternatively, puncture may be made through the cricothyroid membrane.

Tracheostomy



Transtracheal aspirate



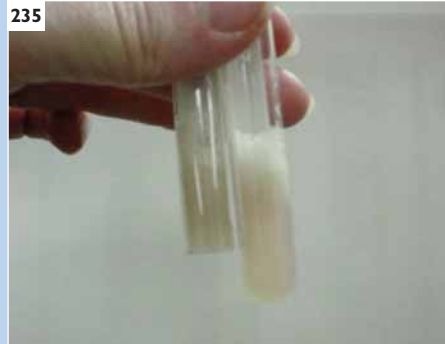
232 The catheter is inserted through the skin and then directed into the tracheal lumen.

233 The catheter is fed its entire length. Most dogs will cough or swallow heavily when the catheter is within the tracheal lumen. The operator should be able to aspirate air freely as the tip of the catheter is located within the trachea.

234 Saline is injected through the catheter and then rapidly re-aspirated through the catheter for collection of the samples for cytology and culture. It is not uncommon to retrieve <20% of the saline injected. Remaining saline will be rapidly reabsorbed and is not problematic.

235 Productive transtracheal wash samples will appear cloudy and may have clumps of mucus or other debris.

Transtracheal aspirate (continued)



Epidural analgesia



Epidural analgesia

Epidural analgesics are very useful to control post-operative pain and to limit the amount of intra-operative anesthetic agents required. Epidural catheters may also be used to provide repeated dosing. The technique is illustrated in 236–240 (photographs courtesy of Dr C. Blaze).

236 The patient to undergo epidural analgesia is placed in sternal recumbency with the legs pulled forward.

237 The site is surgically prepped. Wearing sterile gloves, the operator palpates for the landmarks for proper injection into the lumbosacral space. These landmarks include the cranial aspect of the ilial wings (palpated with the thumb and middle finger) and then the index finger may be used to locate the lumbosacral space.

238 Using a specially designed needle, the lumbosacral space is penetrated. A 'pop' is felt upon successful puncture.

239 Following successful needle placement, the correct placement in the epidural space may be assured by using the 'drop technique' when a drop of saline placed on the hub of the needle will be sucked into the epidural space. If, after removing the stylet, CSF is encountered, this means that the subarchanoid space has been penetrated and the dose should be reduced by 50%. If blood returns, a vessel has been penetrated and the needle should be withdrawn without injection.

240 The desired drug may be slowly injected into the epidural space.