

HACKED: THE RED RUBBER CATHETER

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The humble red rubber catheter is an unsung workhorse of veterinary medicine. Inexpensive and versatile, it can be used as a nasal oxygen cannula, feeding tube, chest tube, soaker/wound infiltration catheter, and urinary catheter. In a practice that does not have access to specialty catheters the red rubber catheter can be used to the benefit of many patients.

When referring to the diameter of a catheter or tube, the terms “gauge” or “French” are be used. Needles and catheters with a single lumen are conventionally assigned a gauge (for example, an 18 gauge peripheral catheter). Gauge and size have an inverse relationship, so the larger the diameter of the catheter, the smaller the gauge. As an example, a 12 gauge catheter is much larger in diameter than a 24 gauge catheter. In contrast, most multi-lumen catheters are sized by French. In French measurements, size and diameter are directly related and the size listed refers to the outer diameter (OD) of the catheter versus the inner diameter (ID), although both measurements may be included on the packaging. Red rubber catheters are sized using the French system, so a 5 French catheter is smaller than a 10 French. Most are radiopaque and feature a flanged end (wider than the tip) and at least one Murphy eye or fenestration.

If oxygen supplementation is required in a patient that is too large for an oxygen cage or an O₂ cage is not available, a unilateral or bilateral nasal oxygen cannula can be placed to deliver supplemental oxygen from a central source, portable tank, or oxygen concentrator. Nasal oxygen supplementation will permit the patient freedom of movement and prevents overheating that may occur in an enclosed oxygen cage. It is not a good choice for patients with extensive facial trauma, nasal neoplasia, coagulopathy, intracranial disease, or nasal bone fractures. A red rubber catheter should be selected that will fit comfortably in the patient’s nostril(s) yet still administer efficient oxygen flow. For this reason, the 3.5 French size is rarely utilized. Other supplies include nylon suture on a straight needle (or a stapler), lidocaine or ophthalmic proparacaine drops, water-based lubricant, white tape, a waterproof marker, Elizabethan collar, oxygen source, humidifier/bubbler, and oxygen tubing. If two cannulas are to be placed, a bifurcated adaptor will also be needed.

Begin by introducing 1-2 drops of topical anesthetic into each nostril with the nose pointed up to the ceiling. The author prefers to anesthetize both nostrils as a time saving measure; if placement is unsuccessful in the first nostril, an attempt can be made in the other nostril without waiting for local anesthetic to take effect. Measure the red rubber catheter from the medial canthus of the eye to the naris and mark with ink or a small piece of tape. For brachycephalic breeds, the lateral canthus of the eye can be used. If nasopharyngeal oxygen is desired, measure the catheter from the naris to the ramus of the mandible and mark accordingly. Prepare several butterflyed pieces of white tape and set them aside. Lubricate the tip of the catheter with gel and hold it in your dominant hand using a pencil or dart grip, close to the fenestrated end. With the other hand, tilt the patient’s head up and “pig” the nose with your non-dominant thumb. Insert the catheter in a ventromedial direction to the level of the mark you made earlier. Expect sneezing from the patient! If you cannot feed the catheter or encounter a gritty feel, redirect in a ventromedial direction. When you have the catheter seated to the mark, secure it with suture or staples using the tape butterflies you made earlier. If suturing the catheter, first place a stay suture and then a Chinese finger trap pattern around the tubing. Additional sutures or staples will be needed to fully secure the catheter; you will need to decide if you want to arrange the excess tubing between the patient’s eyes and over their forehead or along the side of the face. Each has advantages and disadvantages but the goal should be to avoid impacting the whiskers, ensure that the eyelids close normally, and to keep the tubing out of the patient’s peripheral vision. Once the catheter is secured, place an E-collar on the patient and attach oxygen tubing to the catheter—a Christmas tree adapter may be needed. Administer humidified oxygen at a flow rate of 50-100 ml/kg/minute. It is essential that oxygen be humidified to prevent epistaxis and drying of the nasal mucosa! The most common complication when placing a nasal oxygen cannula is epistaxis from turbinate damage during placement.

Nutritional support is essential for recovery, and supplemental feeding should be initiated promptly (when a patient has a 1-3 day history of anorexia or hyporexia). The red rubber catheter can be used as a naso-esophageal or esophageal feeding tube in most patients and potentially as a nasogastric feeding tube in small patients. Sizing will depend on the intended use of the tube; nasal feeding tubes are limited to the size of the patient’s nostril and typically accommodate liquid diets while esophagostomy tubes are larger in diameter and can accommodate a thicker slurry diet. Nasal feeding tubes are ideal for short term nutritional support in the hospital but should not be used at home; esophagostomy tubes are ideal for long-term nutritional support and can be used by clients at home with coaching from clinic staff. Any tube that reaches through the cardiac sphincter and into the stomach can also be used to decompress the stomach and quantify gastric residual volume. These techniques are helpful in cases of gastrointestinal ileus. Nasal feeding tubes are contraindicated in patients with facial or nasal trauma, coagulopathy, or intracranial disease. Persistent vomiting or regurgitation may cause malposition of the tube and patients have been known to bite off pieces of a feeding tube if it reflexes into their oral cavity during vomiting. The supplies for a nasal feeding tube are similar to those required for a nasal oxygen cannula.

For naso-esophageal placement, select a tube that will comfortably fit in the patient’s nostril and measure it from the nostril to the level of the carina (7th rib space); mark with tape or a marker. Introduce 1-2 drops of topical anesthetic into

the patient's nostrils several minutes before introducing the catheter. Unlike a nasal oxygen cannula, when placing a nasal feeding tube, the patient must swallow the tube for accurate placement, so patients should be alert for their procedure. If sedation is necessary it should be very mild. Maintain the patient's head in a normal physiologic position rather than extending the neck to facilitate swallowing, and watch to confirm that the patient swallows during the placement. If the patient is coughing, the tube may be in the trachea. Feed the catheter to the level of the mark and staple or suture in place. Quick ways to confirm tube placement include aspiration (large volumes of air may indicate that the tube is in the airway, while negative pressure can indicate that the tube is in the esophagus) and assessment of end tidal carbon dioxide via capnometer (if a waveform and measurement are present, the tube is in the airway; there should be no ETCO₂ reading from the esophagus or stomach). You must confirm placement with a right lateral radiograph before using the tube for feeding. Most patients will require an E-collar while the tube is in place.

If your patient is small, a long red rubber catheter can be used as a nasogastric feeding tube but only if the catheter will extend from the nostril to the level of the 13th rib. The placement technique is the same as for a nasoesophageal tube. Placement must be confirmed radiographically prior to use. Any nasal feeding tube should be flushed before and after use to prevent occlusion.

A red rubber catheter can also be utilized to tube feed neonates. Any neonate that is not gaining at least 10% bodyweight every 24 hours should receive supplemental feeding of a balanced, species-appropriate milk replacer. The catheter should be measured from the tip of the nose to the thirteenth rib, marked with tape or ink, and primed with warm milk replacer before being fed down the left side of the patient's mouth and into the stomach. The gag reflex is not present at birth so tube placement must be confirmed lest the feeding be administered into the lungs. The easiest way to do this is to stimulate the patient to vocalize once the tube is in place; if the patient can vocalize, it can be assumed that the tube is not in the lungs. Other methods include auscultation and aspiration. Once tube placement is confirmed, the milk replacer can be administered via steady push. When removing the tube, it is essential that it be kinked to prevent milk replacer from being introduced into the airways. If the patient shows any signs of distress during tube feeding or evidence of aspiration (milk from the nares, bubbles from the nares, milk replacer from the mouth, etc.), the feeding should be discontinued and the DVM notified immediately.

Esophagostomy tube placement requires general anesthesia and a protected airway. An E-tube is a good choice for patients with facial or oral trauma, laryngeal disease, triaditis, or hepatic lipidosis but is contraindicated in patients with esophageal disease, persistent vomiting or regurgitation, or that cannot protect their airway for any reason. One advantage of esophagostomy tube placement is the increased caloric density of diet that can be used, since almost any canned diet can be blended to a consistency that will pass through a large-French catheter. These tubes can be used for weeks as long as they are maintained properly. Reusable, washable tube wraps can be purchased over the e-commerce to protect the tube site. Technicians can take a lead in client education when an e-tube is placed, since they are the most natural choice to teach the client how to use the tube and maintain it at home. An additional advantage in feline patients is that it permits the patient to be discharged sooner, thereby reducing stress. Complications include tube site infections and tube migration.

Supplies include a large diameter red rubber catheter, a #10 blade, curved Rochester Carmalt forceps, Mayo scissors, nylon suture, scrub, clippers, and bandage material. The patient is placed under general anesthesia, intubated, and placed in right lateral recumbency before the neck is clipped from the jaw to the thoracic inlet and scrubbed. If desired, the catheter can be trimmed above the Murphy eye(s) at a diagonal angle to increase the functional diameter of the tube as long as the cut is clean and no sharp edges are produced. The catheter is measured from the mid thorax to the insertion site and marked before the forceps are inserted through the mouth and into the esophagus; the tip of the forceps should be palpable through the skin. A stab incision is made through the skin at the level of the forcep tips. The catheter is then inserted through the hole and grasped by the tips of the forceps; the distal end of the catheter is then pulled through the skin, into the esophagus, and out of the patient's mouth, causing the flanged end of the catheter to point caudally. The forceps or fingers are then used to feed the distal end of the catheter back into the patient's mouth and down the esophagus. The flanged end will then rotate cranially. A purse string suture is placed around the insertion site followed by a stay suture and Chinese finger trap suture along the length of the tubing. Tube placement should be confirmed radiographically prior to use. The tube should be bandaged and the insertion site checked daily for signs of inflammation or infection. Like a nasal feeding tube, an esophagostomy feeding tube should be flushed before and after use. If the patient vomits, tube position should be verified prior to use.

A red rubber catheter can also be used as an indwelling chest tube (thoracostomy tube) in cases of pneumothorax, pleural effusion, or when pleural lavage is needed. This is a sterile procedure! Supplies include the red rubber catheter, sterile gloves, scrub, local anesthetic, a sterile ER pack with drapes, nylon suture, a tube adapter, three-way stopcock, and adhesive dressing. The patient is positioned in lateral recumbency and the chest wall clipped and prepped in a wide margin (air tends to accumulate dorsally, fluid ventrally). The skin of the thorax is pulled cranially and local anesthetic is infiltrated subcutaneously and into the intercostal muscles over the projected insertion site. The thorax is draped and a small stab incision is made in the skin at the insertion site; the red rubber catheter is grasped by the tip in a pair of forceps and tunneled cranially through the stab incision before being driven between the ribs, through the chest wall, and into the pleural

space. The catheter is fed into the pleural space to the desired level and the skin released; this creates a natural seal between the chest wall and the outside environment. The tube is secured with a purse string, stay suture, and Chinese finger trap before being covered with an adhesive dressing. A tube adaptor is affixed to the end of the tube and topped with a three-way stopcock. The stopcock will permit fluid or air to be evacuated from the pleural space via syringe or continuous suction. The insertion site should be checked frequently for signs of inflammation, infection, or suture failure. Since the tube extends into the patient's thoracic cavity, it is essential that gloves be worn whenever using or handling the tube and that they tube always be capped and clamped so that iatrogenic pneumothorax does not occur.

The red rubber catheter makes an effective soaker catheter to administer local analgesia when inserted into a surgical site. Typically, a sterile red rubber catheter is adapted by the surgeon with additional fenestrations before it is tunneled into the site near an area of muscle or nerve damage. Post-operatively, local anesthetics such as bupivacaine or lidocaine can be administered through the catheter and thus into the surgery site for uptake by the nearby nerves. Bupivacaine is more potent than lidocaine and requires 20-30 minutes to take full effect before providing 3-6 hours of analgesia. Some drugs may need to be diluted before being administered in feline patients to avoid toxicity. The author has seen this technique used with good success in cases of limb amputation and when a total ear canal ablation (TECA) is performed. The soaker catheter is employed for the first few days post-operatively and is removed prior to the patient's discharge. When using the catheter, a catheter cap is placed on the end and a calculated dose of local anesthetic is injected into the catheter followed by a specified amount of sterile saline or air to drive all the anesthetic through the tube. Like any medical device, the insertion site should be inspected several times a day for signs of inflammation, infection, migration, or failure.

A large diameter red rubber catheter can be used as an enema tube for patients suffering from obstipation or those who require an empty colon for diagnostic imaging or surgery. Supplies include syringes, enema solution, and lubricating jelly. To administer an enema, the patient can be conscious, or a mild sedative (such as butorphanol) can be used. The most common enema solution is simply warm water with lubricant or a few drops of liquid soap added, taking care not to make the water too warm. The red rubber catheter is lubricated generously with jelly and inserted gently into the rectum before a syringe of solution is attached and then slowly administered. Ideally, the red rubber catheter should be inserted above (past) the obstruction to break it up. Gentle external massage can be performed or digital pressure per rectum used in addition to the enema to break up the obstruction. Multiple enemas may be required. Once an enema has been administered, the patient should be taken for a walk or given access to a litter pan so they can defecate. If an enema is administered too rapidly, too much solution is used, or the catheter is fed too high in the intestine, vomiting may result, so endeavor to take it slowly. These patients are frequently malodorous and somewhat pitiful, so every effort should be made to keep them clean and comfortable.

The red rubber catheter is also commonly used as a urinary catheter in both male and female cats and dogs. Unlike a Foley unit, a red rubber catheter has no balloon to provide added security, so special attention must be paid to how the catheter is secured. Supplies needed to place a red rubber urinary catheter include sterile gloves, the catheter, nylon suture on a straight needle, lubricant, white porous tape, and a closed collection set (sterile IV line, sterile IV extension sets, sterile IV bag, or specialty urine collection bag). *It is never appropriate for a urinary catheter to be left open to the environment or to be capped without a collection bag.* Dilute chlorhexidine solution, cotton or gauze, and a syringe of sterile saline are also necessary. For male urinary catheterization, the patient is positioned in lateral recumbency and the hair on the prepuce and around the genitals clipped with a #40 blade (clip the hair anywhere the catheter might touch). Once the hair is clipped, the area is cleaned with dilute chlorhexidine. Using the syringe, the prepuce is irrigated with 10-30 ml of dilute chlorhexidine (dependent on patient size). The restrainer extrudes the penis so that it can be swabbed with chlorhexidine solution a minimum of three times. The catheter should be measured while still in its packaging from the tip of the penis, over the pelvic flexure, and to the level of the bladder to give an approximate depth of insertion. In large dogs, a longer catheter will be required. Utilizing aseptic technique, the catheter is opened and the tip lubricated with sterile lubricant. The catheter must be controlled at all times by being wrapped around the operator's non-dominant hand. The lubricated tip is inserted into the urethral orifice and advanced through the urethra and into the bladder; additional lubricant can be applied to the length of the catheter for patient comfort if needed. If resistance is encountered, stop the procedure and consult the veterinarian. Once the catheter is fed to the level of the bladder and urine is flowing from it, the closed collection set is attached. Wipe any remaining lubricant from the length of the catheter and attach the tape butterfly at the level of the prepuce with two separate sutures. For additional security, a finger trap suture can be added to the catheter and attached to one of the preputial sutures. A common complication of red rubber urinary catheters occurs when urine leakage makes the tape wet; the tape then slides and the catheter may become contaminated or migrate out. The sutures and tape on a red rubber urinary catheter should be checked several times a day to ensure they are intact and in good working order.

When placing a red rubber catheter in a female animal, much less of the catheter will be indwelling in the patient and there is a greater risk of catheter loss. The method for securing the catheter is similar but the tape butterfly is sutured to the vulva. In feline patients, it may be helpful to tape the excess catheter and collection tubing to the tail to reduce drag and tension on the unit. At our facility, urinary collection bags are changed every 72 hours and urinary catheter care is performed every 6 hours.

The red rubber catheter is one of the most versatile pieces of equipment found in the veterinary clinic. They are inexpensive and come in a variety of diameters and lengths, making them useful for a variety of purposes.

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