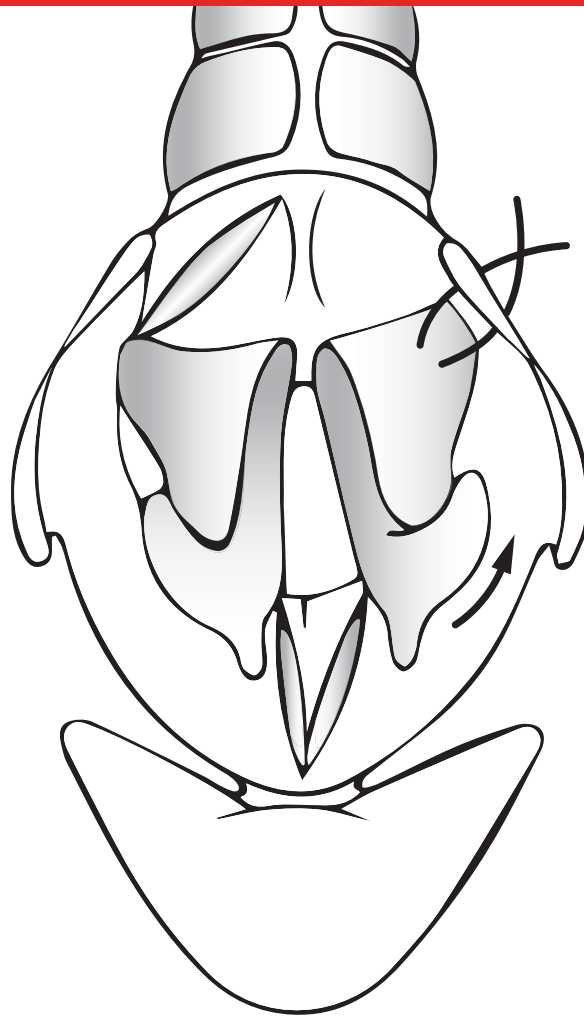


Laryngeal Paralysis Surgery

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When respiratory difficulty is encountered and a laryngeal examination results in the diagnosis of bilateral laryngeal paralysis (LP), surgical management is recommended. Surgery to address LP is technically difficult and may result in serious complications if not performed properly. This procedure is best performed by an experienced surgeon.

Many surgical therapies have been described for the treatment of LP, such as ventriculocordectomy per os, ventriculocordectomy via ventral approach, castellated laryngofissure, permanent tracheostomy, and partial laryngectomy. Although many treatments are available, unilateral arytenoid lateralization provides consistent results.¹⁻³

Surgical Intentions

The goal of this procedure is to permanently open the rima glottidis and allow better air movement. Unilateral arytenoid lateralization is associated with high client satisfaction, and most dogs undergoing the procedure experience alleviation of dyspnea.^{1,2}

One form of a unilateral arytenoid lateralization procedure is a cricoarytenoid lateralization. This involves passing 1 or 2 sutures from the caudodorsal cricoid cartilage to the muscular process of the arytenoid cartilage. These sutures are intended to simulate the cricoarytenoideus dorsalis muscle, which is dysfunctional in dogs affected with laryngeal paralysis. Instead of a functioning muscle that

▲ Cricoarytenoid lateralization allows better air movement in a dog with laryngeal paralysis by permanently opening the rima glottidis.

LP = laryngeal paralysis

allows the rima glottidis to open and close, the suture acts to rotate the arytenoid cartilage laterally, permanently enlarging the rima glottidis.

Complications

The most common complication associated with unilateral cricoarytenoid lateralization is aspiration pneumonia,³ which has been reported to occur at an incidence of 8% to 25%.²⁻⁵ After the cricoarytenoid lateralization has been

performed, aspiration pneumonia may occur at any time during the dog's life.

Other reported complications include recurrence of respiratory distress, suture failure, fragmentation of the arytenoid cartilage, coughing or gagging, and seroma formation.²⁻⁴ Bilateral arytenoid lateralization is associated with a very high complication rate and is not recommended.³

Author Insight

Before the procedure, counsel the owner that the dog will likely have a voice change and is at increased risk for aspiration pneumonia. Also, the dog will likely have progressive neurological disease regardless of whether treatment is pursued.^{6,7}

Author Insight

Spend some time with patient positioning. Placement of a roll under the neck to elevate the larynx (especially in overweight dogs) can greatly facilitate the surgical approach.

STEP-BY-STEP CRICOARYTENOID LATERALIZATION

STEP 1

Position the dog in right lateral recumbency with the thoracic limbs pulled caudally. Place a roll or towel under the neck to elevate the larynx. Prepare the dog for surgery and drape in a standard fashion.



WHAT YOU WILL NEED

- ▶ A surgical pack
- ▶ Retractor (eg, Freer periosteal elevator)
- ▶ Skin hooks or stay suture
- ▶ Appropriately sized (usually 2-0 to 0) nonabsorbable or slowly absorbable suture on a taper needle
- ▶ A knowledgeable assistant to evaluate the rima glottidis intraoperatively
 - A laryngoscope and new endotracheal tube for reintubation following intraoperative evaluation or a clean location to place the existing endotracheal tube for reintubation
 - Additional anesthetic agent if needed for reintubation
- ▶ Iris scissors or #15 scalpel blade
- ▶ Gelpi retractors

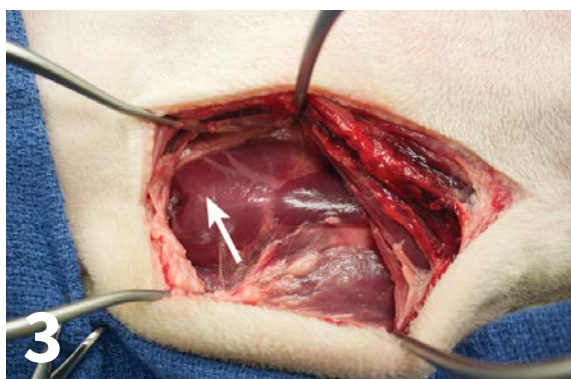
STEP 2

Identify the jugular vein (**dotted lines**) and make a skin incision ventral to the jugular vein, caudal to the ramus of the mandible, and over the left lateral larynx. The incision should be approximately 5 cm in length and can be extended if needed.



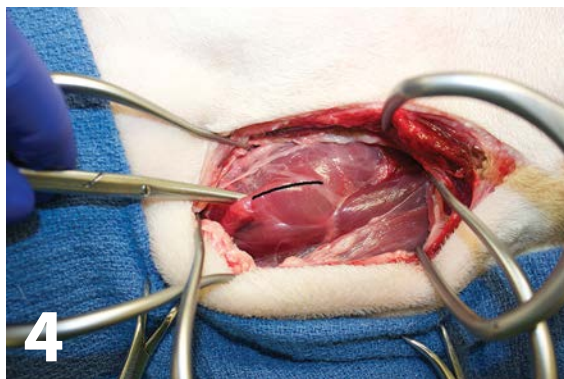
STEP 3

Continue dissection through the platysma muscle, fat, and connective tissue until the thyropharyngeus muscle (**arrow**) is identified.



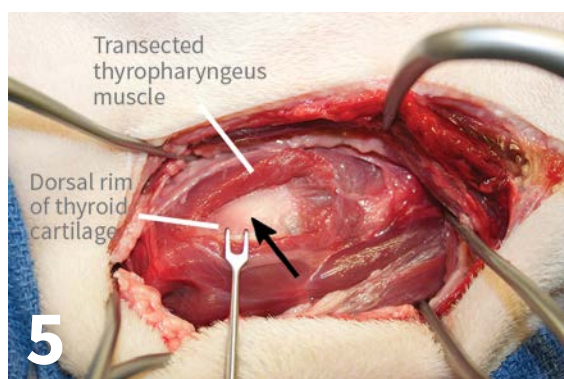
STEP 4

Rotate the larynx laterally. The dorsal aspect of the thyroid cartilage can be palpated deep to the thyropharyngeus muscle. Identify the thyropharyngeus muscle and transect it along the dorsal aspect of the thyroid cartilage. Keep the incision (**solid line**) as small as possible.



STEP 5

Place ventral traction on the thyroid cartilage with a skin hook and assistant or a stay suture placed in the dorsal thyroid cartilage. Use palpation to identify the muscular process (covered by fascial membrane [**black arrow**]) of the arytenoid cartilage.

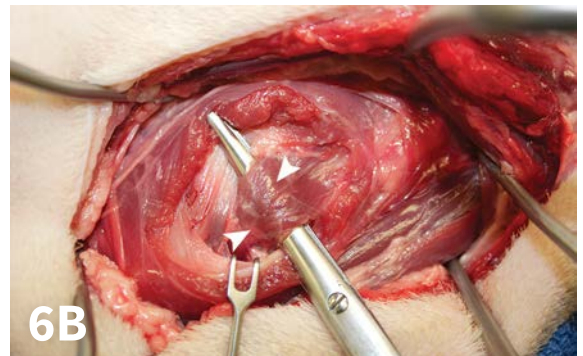
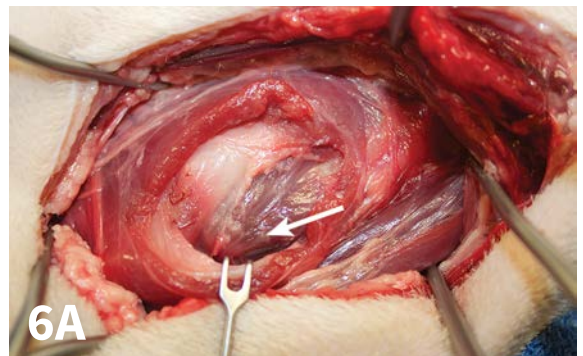


STEP 6

Locate the fascial membrane of the larynx and incise it near the palpable muscular process. Identify the cricoarytenoideus dorsalis muscle (**arrow**). The cricoarytenoideus dorsalis muscle runs from the cricoid cartilage and inserts on the muscular process of the arytenoid cartilage (**arrowheads**).

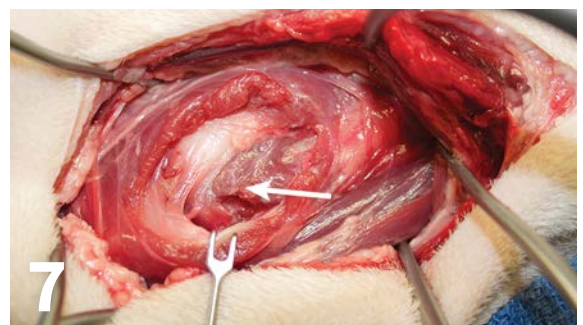
Author Insight

After transecting the thyropharyngeus muscle, be sure to palpate and identify the muscular process and dissect in that location. If the surgeon dissects too cranially, the airway may be inadvertently entered.



STEP 7

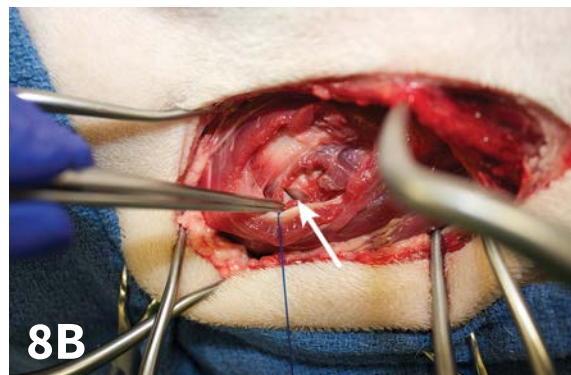
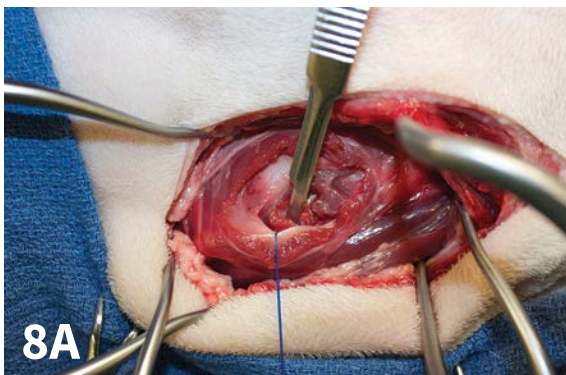
The cricoarytenoideus dorsalis muscle (**arrow**) is often atrophied and may not be easily identified. If identifiable, transect the muscle at its attachment to the muscular process. If desired, obtain a biopsy specimen of this muscle to confirm neuromuscular disease.



STEP 8

Make a small incision with a #15 surgical blade or iris scissors into the caudal portion of the cricoarytenoid articulation (**arrow**) to facilitate suture passage. This incision should be just big enough to visualize the cricoarytenoid articulation and allow suture placement.

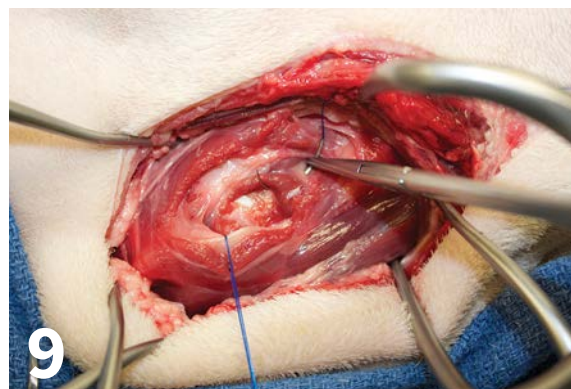
The incision and retraction of the muscular process shown in the photograph are excessive for demonstration purposes. The arytenoid cartilage is located more cranio-laterally, and the cricoid cartilage is located caudomedially. Thumb forceps are shown retracting the muscular process of the arytenoid cartilage (**Figure 8B**).



STEP 9

Place the suture in the cricoid cartilage first. Identify the caudodorsal aspect of the cricoid cartilage. To facilitate identification and suture passage, gently rotate the dorsal aspect of the larynx ventrally using an instrument such as a blunt Freer periosteal elevator or a skin hook.

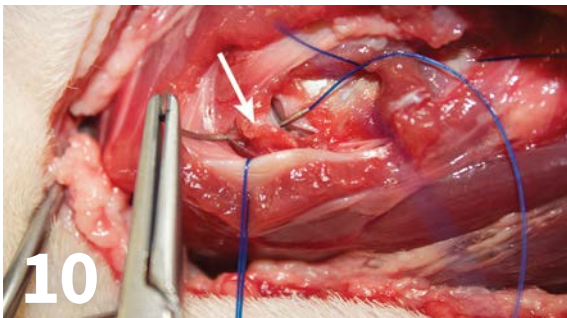
Choose a nonabsorbable or slowly absorbable monofilament suture on a taper needle. Place the first suture close to dorsal midline on the cricoid cartilage. Pass the suture into the cartilage in a cranio-lateral direction. The bite should engage a large amount of cartilage but not penetrate the lumen of the larynx and entrap the endotracheal tube.



STEP 10

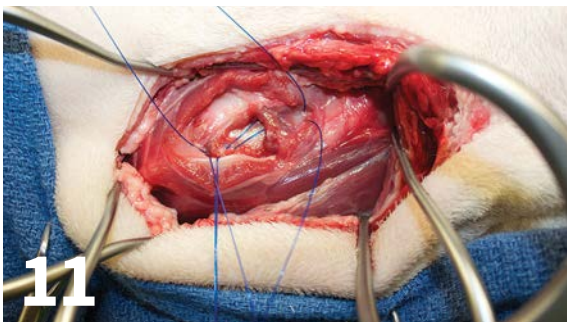
Pass the suture through the joint space into the muscular process of the arytenoid cartilage. This surface of the joint can be visualized where the small incision was made in the cricoarytenoid articulation by gently lifting the muscular process.

The transected cricoarytenoideus dorsalis muscle attached to the muscular process is convenient to lift to expose the articular cartilage. The surface of the arytenoid cartilage is concave and circular. If 2 sutures are to be placed, each should be placed in the concave surface 1 to 2 mm apart. While passing the suture, give care to follow the curve of the needle, but do not force the needle to help prevent fracture of the muscular process (**arrow**).



STEP 11

If desired, repeat the process with a second suture. Pre-place both sutures before they are tied. One suture is preferred in smaller dogs (placed in the center of the concave surface).



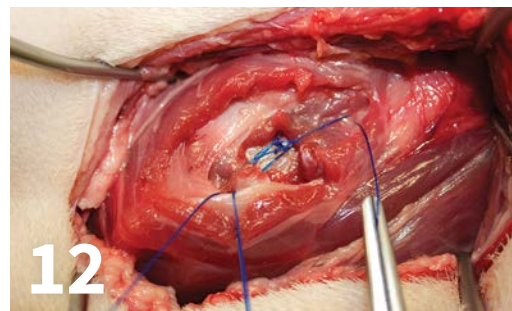
Arthor Insight

If laryngeal cartilages are friable or calcified, small holes can be predrilled with a hypodermic needle to allow suture placement and possibly prevent cartilage fracture. Once the needle is passed through the cartilage, the suture is passed through the end of the needle and the needle is pulled through. In this manner, the surgeon does not push hard with the swaged on needle to pass it through the cartilage.

STEP 12

Tie the sutures. Monitor tension closely to prevent over-tensioning with resulting excessive lateralization of the arytenoid cartilage. At this point, before creating a knot while the suture tension can be adjusted, the patient can be extubated and the rima glottidis can be inspected by a nonsterile assistant. The assistant should note if the suture should be adjusted to provide more or less lateralization. Excessive lateralization is not desired, as the epiglottis must be able to cover the opening to prevent aspiration pneumonia.

The patient should be reintubated after desired lateralization is attained and the first suture has been tied. The perfect amount of suture tension is unknown; the surgeon must achieve a balance between enough abduction to provide easy inspiration and not too much abduction to increase risk for aspiration.



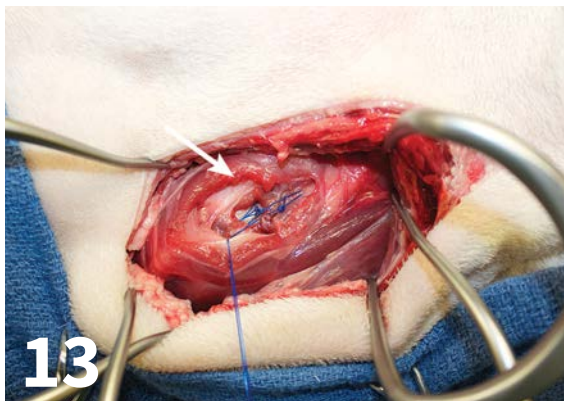
Author Insight

Arytenoid cartilages are already abducted simply by the presence of the endotracheal tube intraoperatively; not much tightening of the cricoarytenoid suture is needed.

STEP 13

Tie the second suture, making sure that no more lateralization is applied to the arytenoid cartilage than what is already present.

Appose the transected thyropharyngeus muscle (**arrow**) with a simple continuous suture pattern. Close the subcutaneous and skin incisions routinely. ■



Author Insight

Postoperatively, the dog should be monitored for aspiration pneumonia.

See page 93 for references.

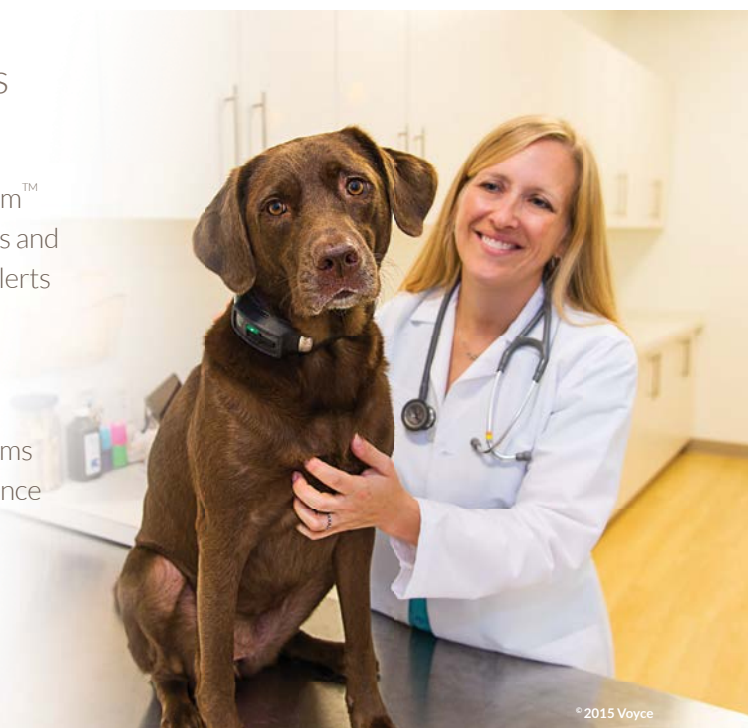
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