
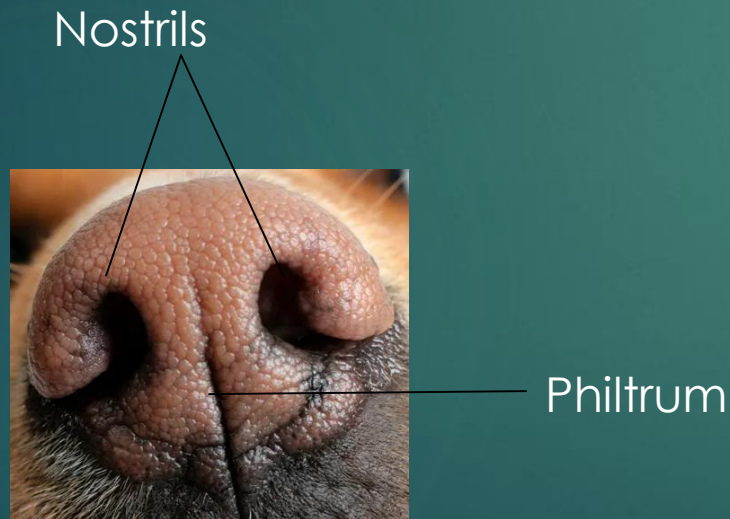


Respiratory System

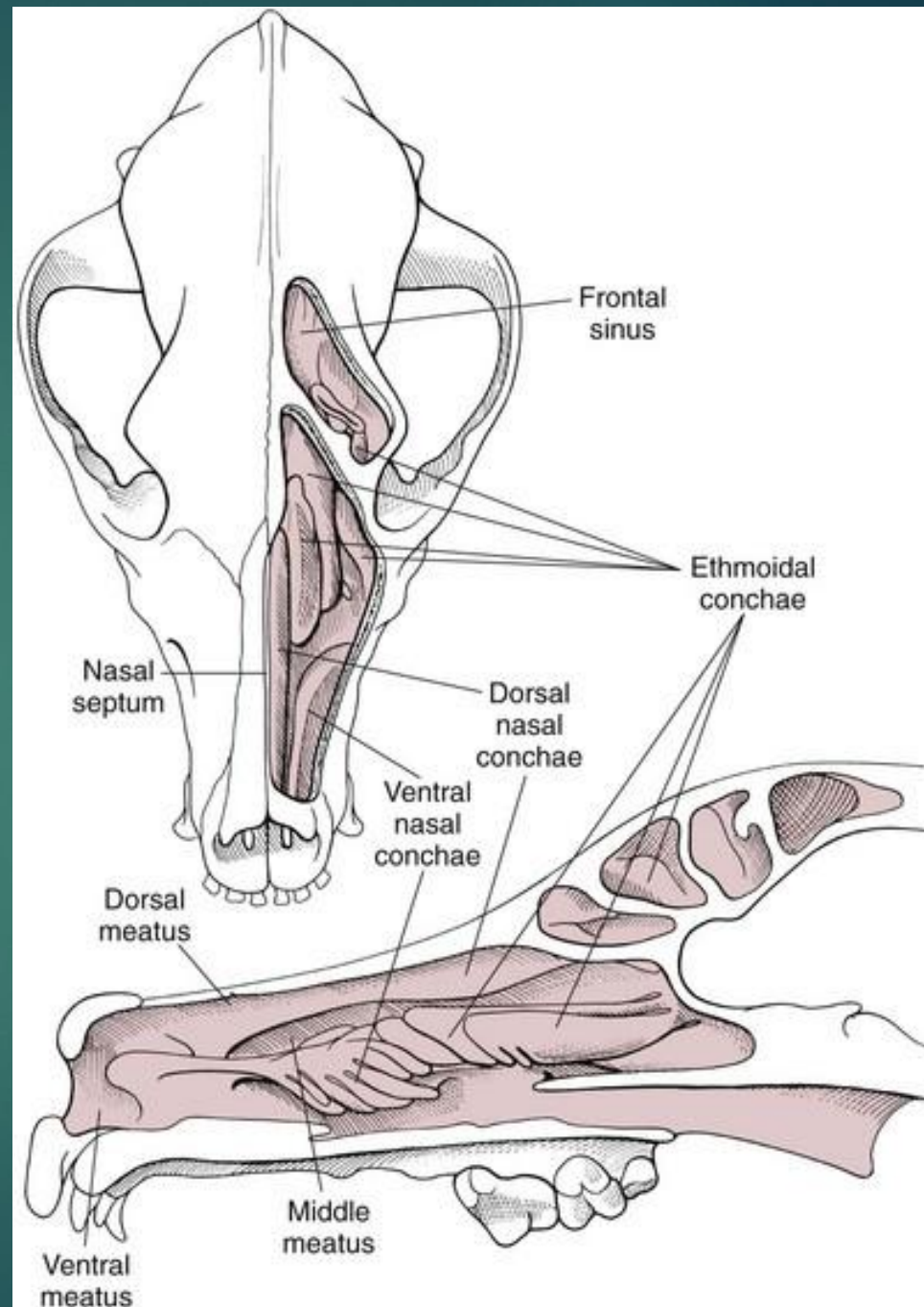
- ▶ Nostrils
 - ▶ Nasal Passage
 - ▶ Para-nasal sinuses
 - ▶ Pharynx
 - ▶ Larynx
 - ▶ Trachea
 - ▶ Lungs
- Upper
- Lower
- 

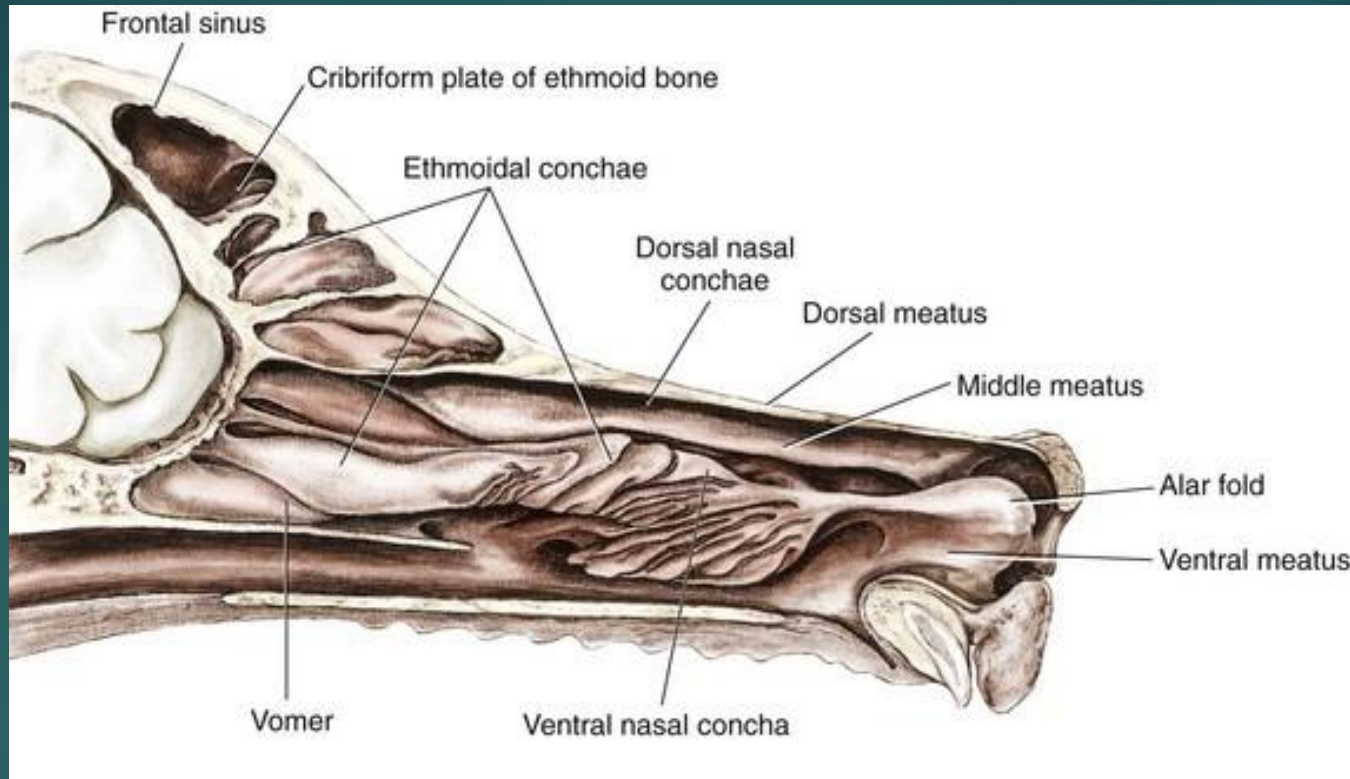
Surgical Anatomy

- ▶ The nasal cavity extends from the nostrils to the nasopharyngeal meatus and is separated into two halves by the nasal septum

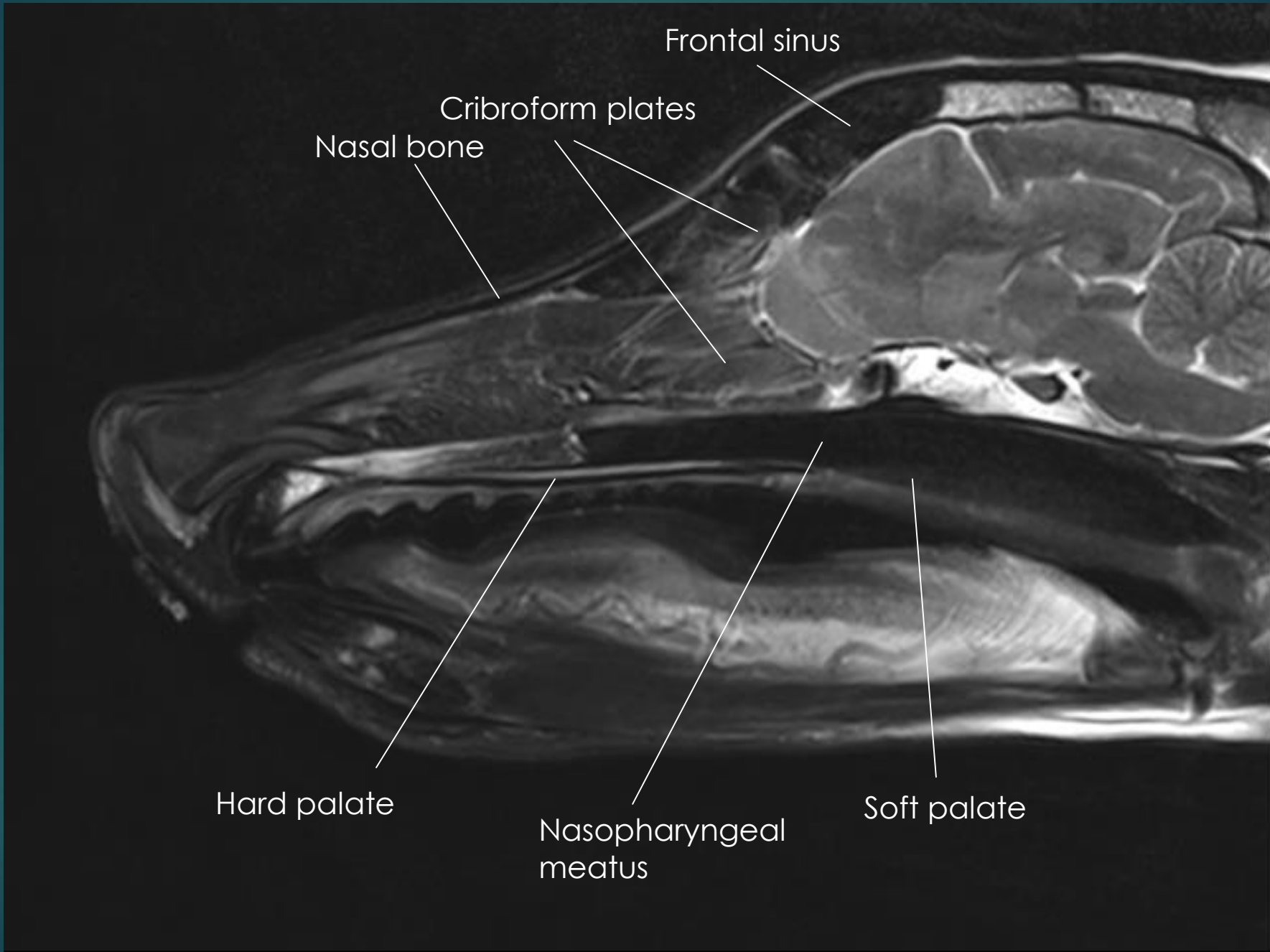


- ▶ The septum is mostly cartilaginous but also has bony and membranous portions.
- ▶ The nasal conchae develop from the lateral and dorsal walls of the nasal cavity.

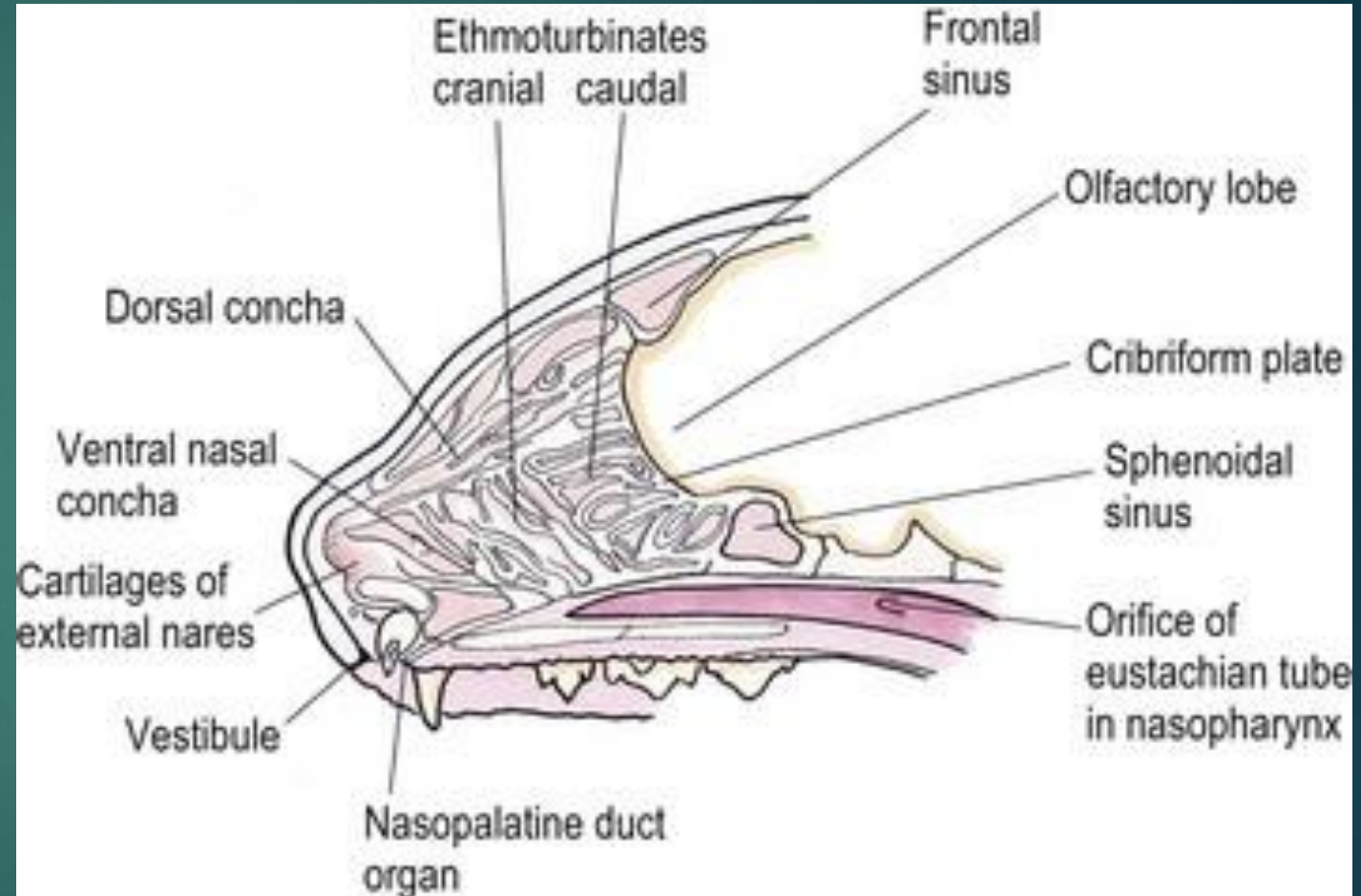




- The air passages between the conchae are known as the meatus.
- The paranasal sinuses include a maxillary recess, a frontal sinus, and a sphenoidal sinus.
- The frontal sinus occupies the supraorbital process of the frontal bone. The two sides are separated by a median septum, and in dogs each side is divided into rostral, medial, and lateral compartments.



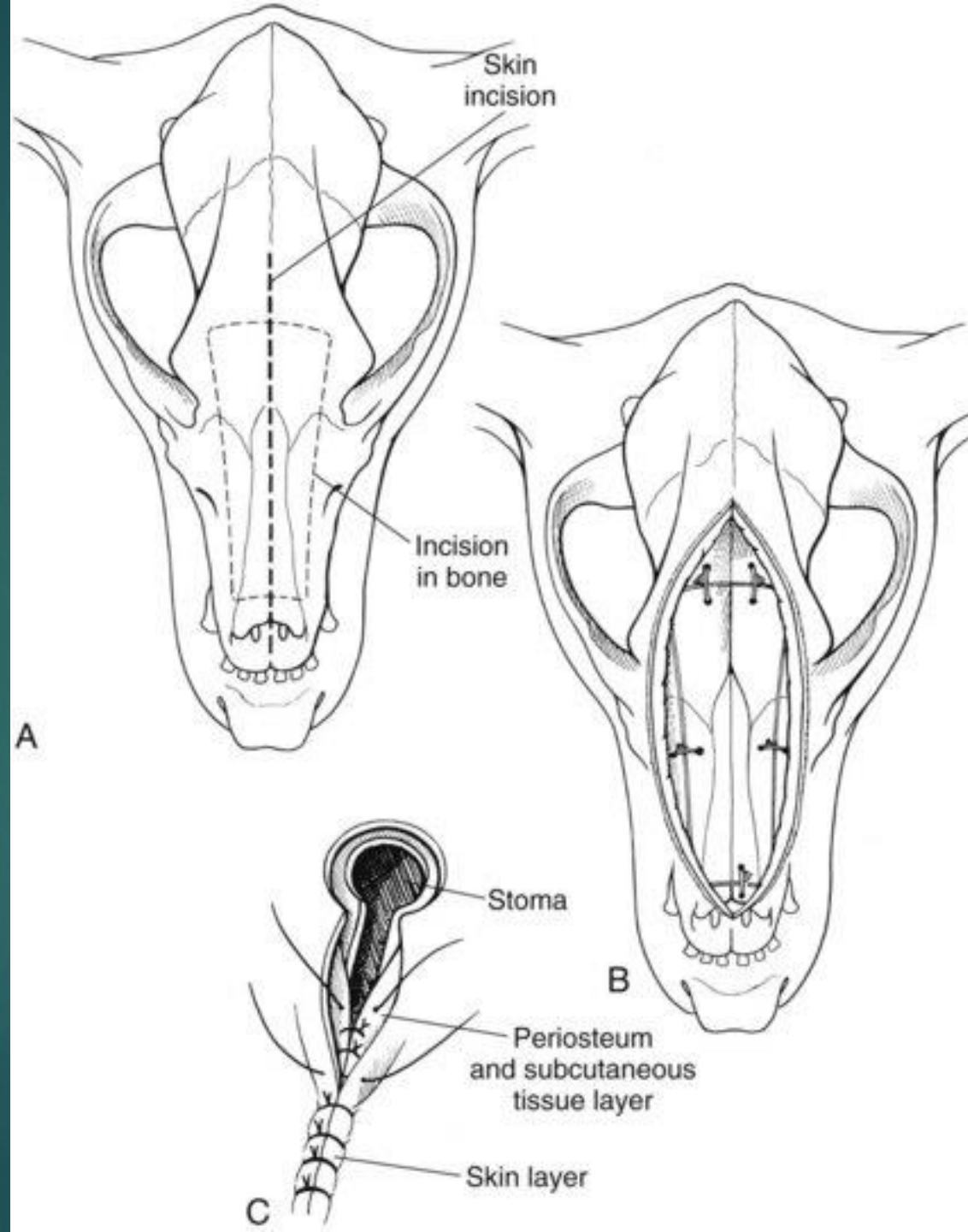
- ▶ The nasopharynx is the portion of the pharynx dorsal to the hard and soft palates.
- ▶ Each auditory tube opens into the lateral nasopharynx through a slit like opening directly caudal to the caudal border of the pterygoid bone.

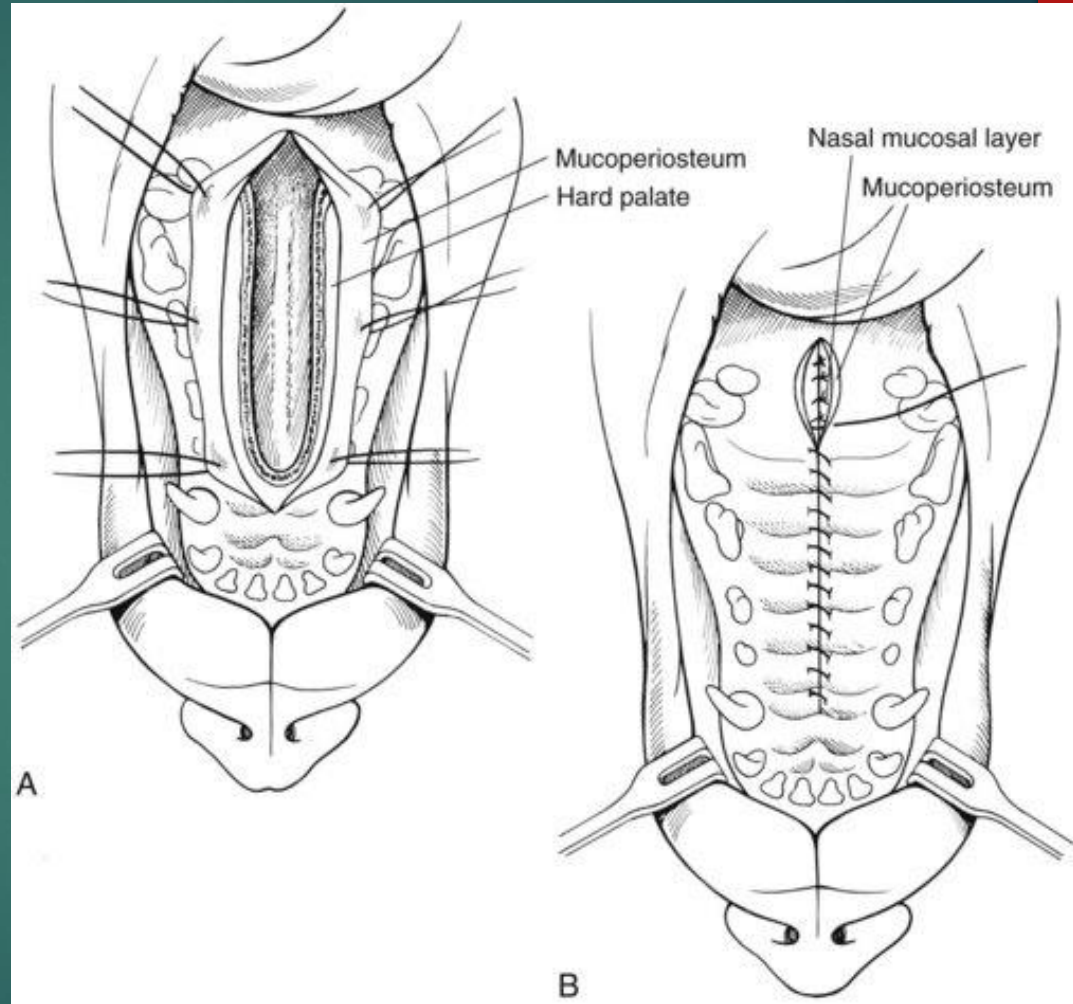
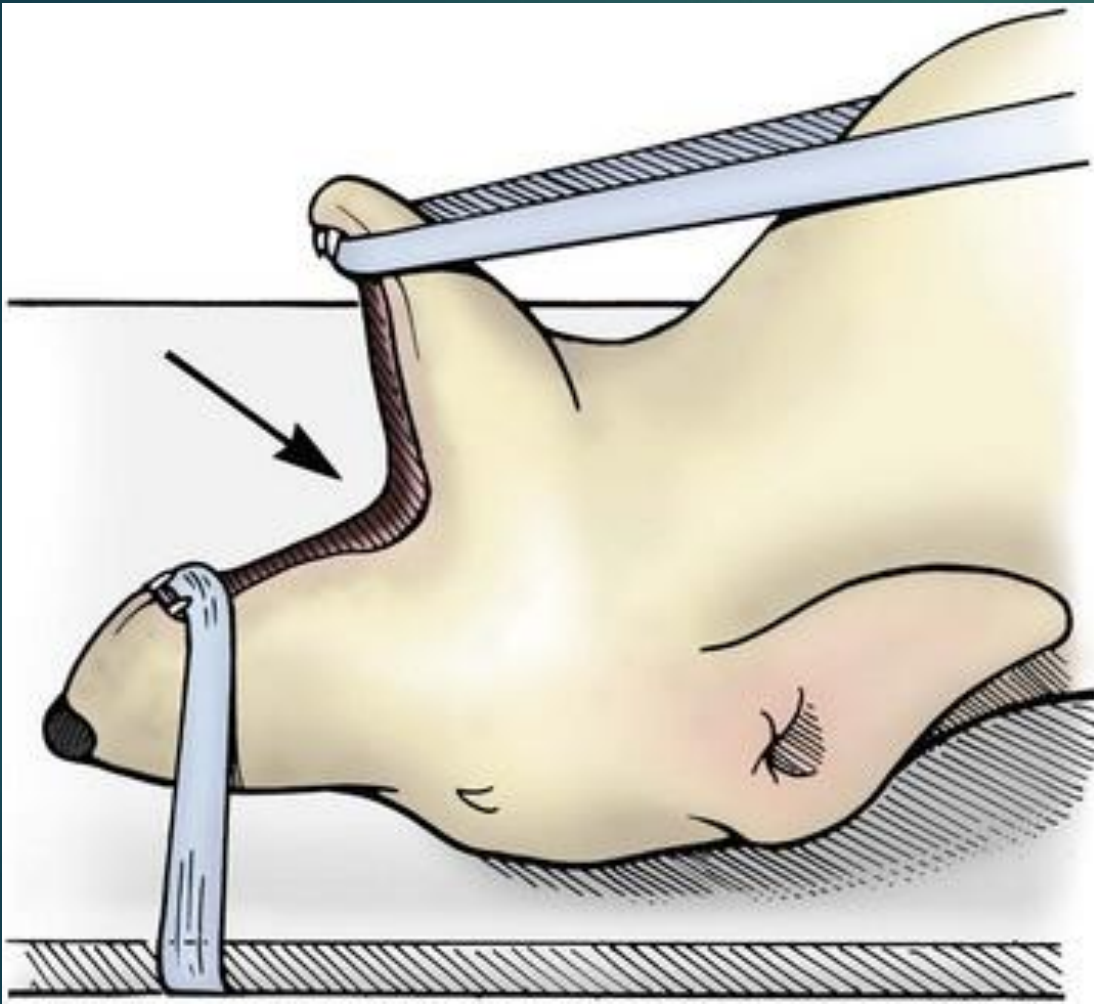


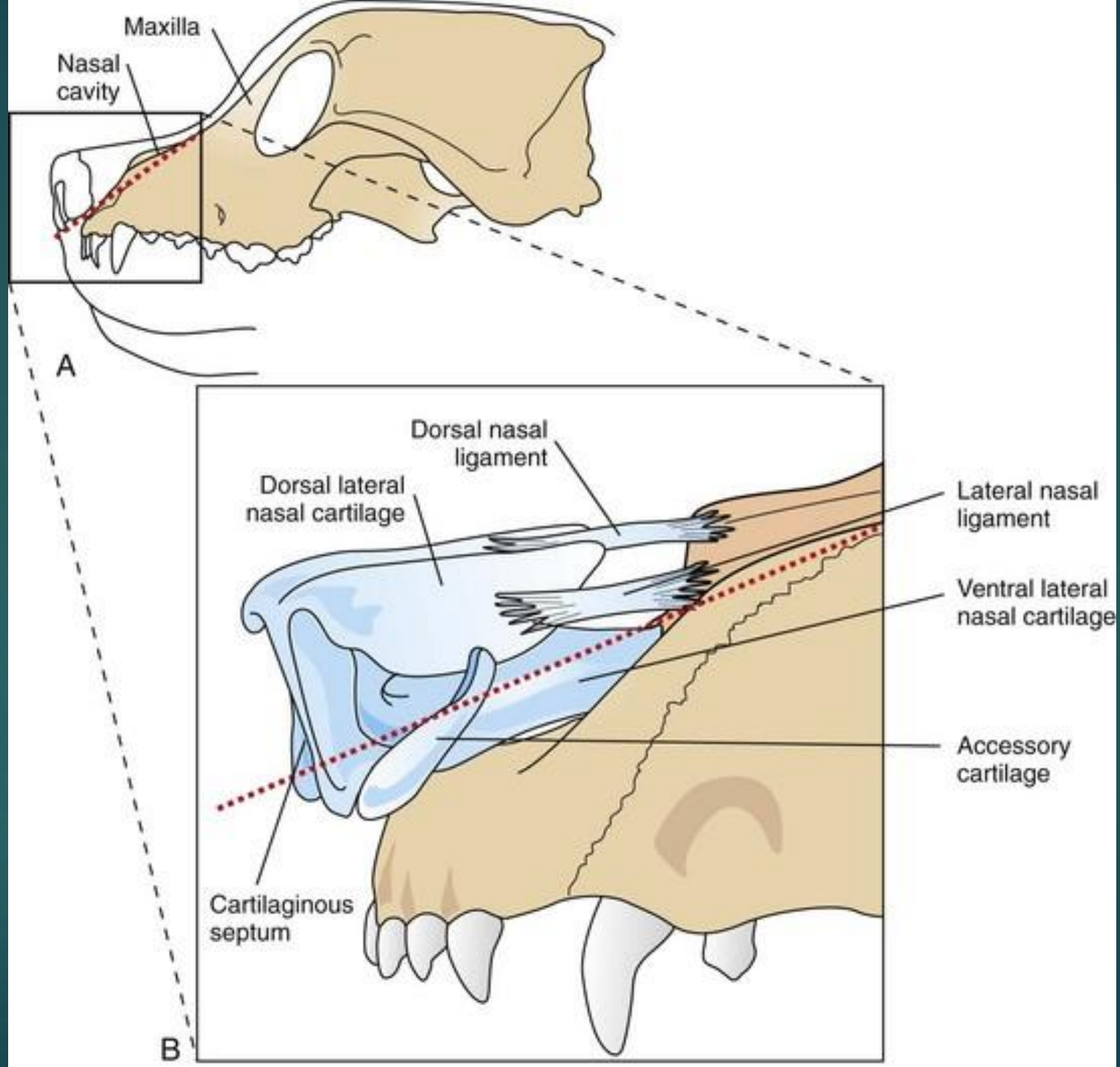
- ▶ Rhinotomy is an incision into the nasal cavity.
- ▶ Tracheotomy is an incision through the tracheal wall.
- ▶ Tracheostomy is the creation of a temporary or permanent opening into the trachea to facilitate airflow.
- ▶ The permanent tracheostomy opening is called a tracheostoma.
- ▶ Tracheal resection and anastomosis consists of removal of a segment of trachea and reapposition of the divided tracheal ends.

Rhinotomy

- ▶ The nasal cavity may be approached through dorsal, ventral, or lateral approaches.
- ▶ The dorsal approach is most commonly used for exploration and biopsy; however, the ventral approach can be used to explore the region caudal to the ethmoid turbinates and the ventral aspect of the turbinates.
- ▶ Lateral approaches are limited to lesions in the rostral aspect of the nasal cavity.





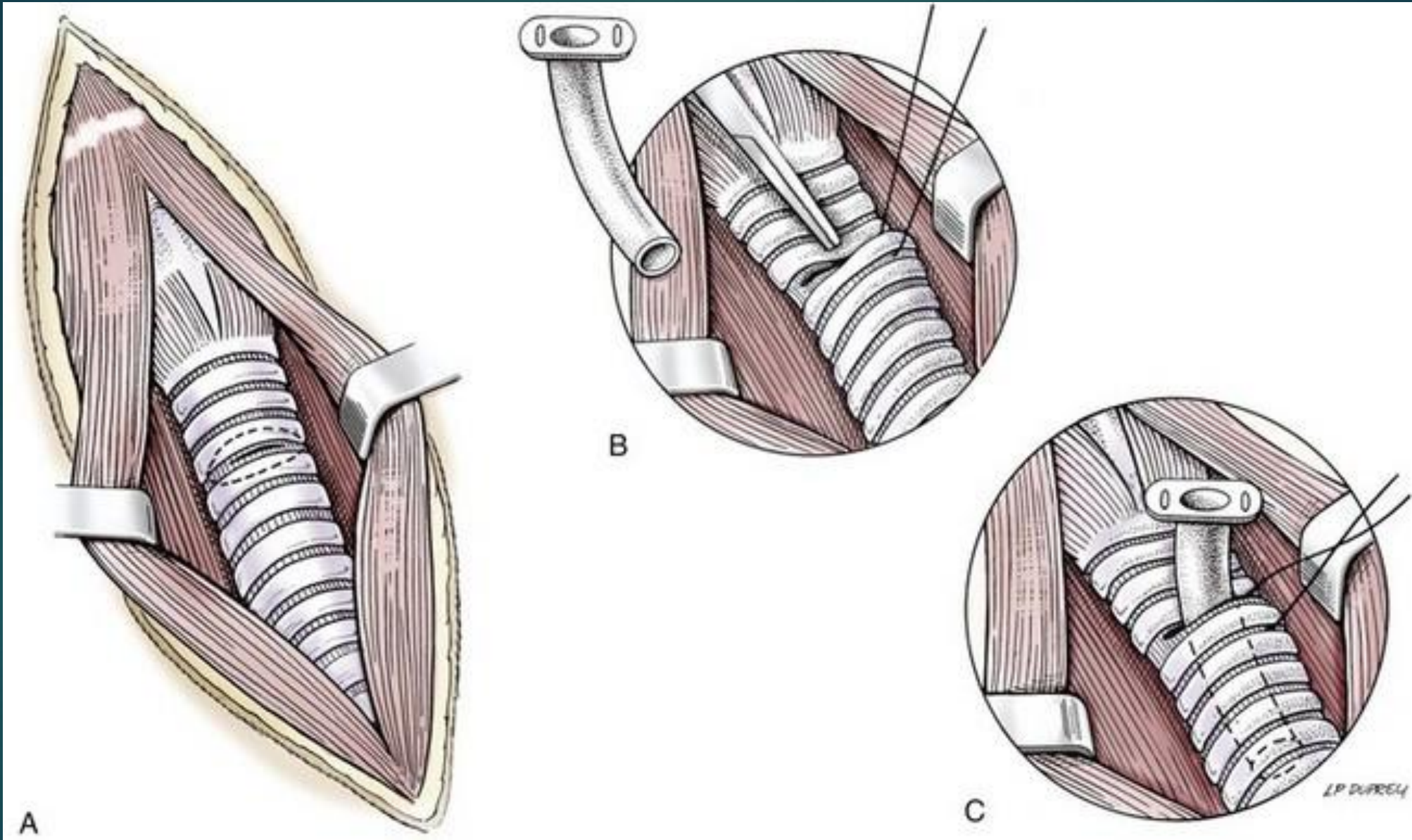


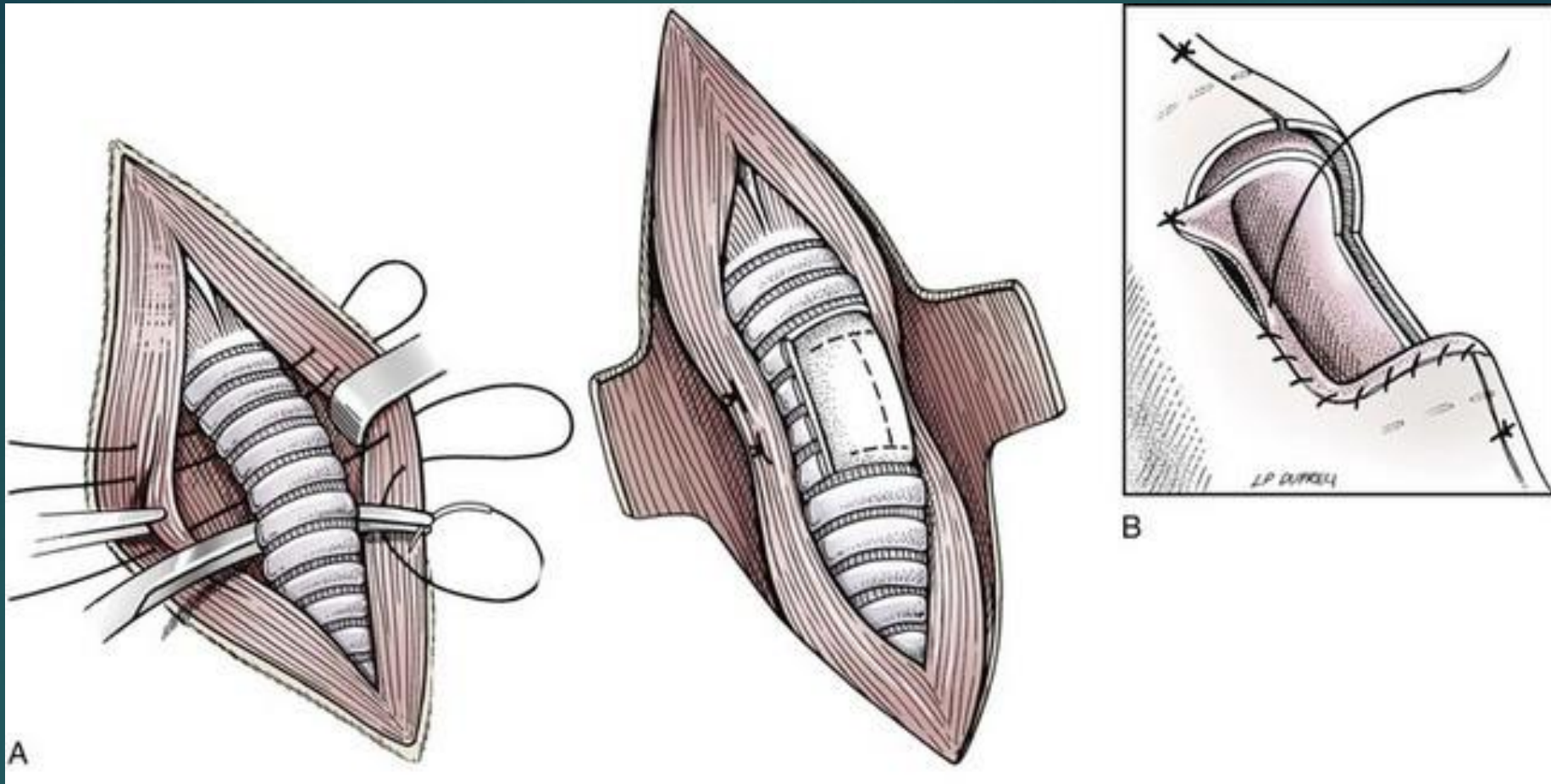
Tracheotomy

- ▶ Tracheotomy is performed to gain access to the tracheal lumen to remove obstructions, collect specimens, or facilitate airflow.
- ▶ The tracheal incision may be closed or allowed to heal by secondary intention.

Tracheostomy

- ▶ Tracheostomy allows air to enter the trachea distal to the nose, mouth, nasopharynx, and larynx.
- ▶ A tracheotomy is performed to insert a tube (temporary tracheostomy) or create a stoma (permanent tracheostomy) to facilitate airflow.
- ▶ A nonreactive tube that is no larger than half the size of the trachea should be selected. Cuffed or cannulated autoclavable silicone, silver, or nylon tubes are recommended.



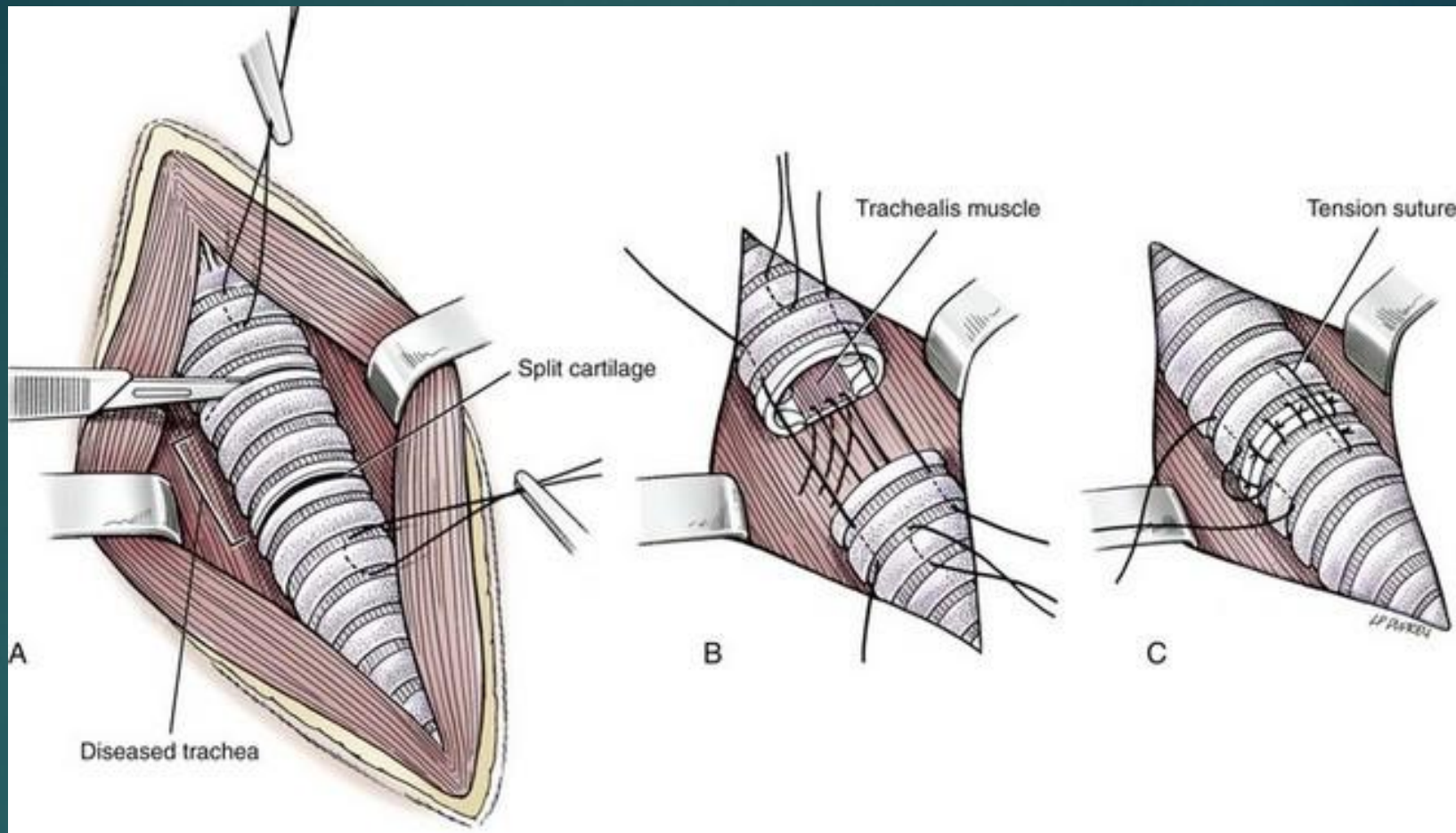


A, Deviate the trachea ventrally by apposing the sternohyoid muscles with mattress sutures dorsal to the trachea. Excise a rectangular segment of ventral tracheal wall without penetrating the mucosa. Note the dotted line where the I-shaped incision is made after the cartilage segment is removed. Excise loose skin adjacent to the stoma. **B**, Use intradermal sutures to appose the skin to the annular ligaments and peritracheal tissues (*dashed lines*). Appose the tracheal mucosa to the skin with three or four interrupted sutures; complete the closure in a simple continuous pattern.

Tracheal Resection and Anastomosis

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- ▶ Removal of a tracheal segment may be necessary to treat tracheal tumor, stenosis, avulsion, or trauma.
- ▶ Depending on the extent of injury, tears in the tracheal wall that occur as a consequence of bite wounds or endotracheal intubation may be allowed to close spontaneously, may be closed primarily, or may be resected and the tracheal ends anastomosed.
- ▶ Accurate and meticulous surgical technique is crucial for reconstruction of the trachea.
- ▶ Diseased trachea that exceeds the limits of resection and anastomosis may be managed with permanent tracheostomy, intraluminal silicone tubes, grafts, or prostheses with variable success.



- A, Place stay sutures cranial and caudal to the resection sites. Split the cartilages with a No. 11 blade, and transect the trachealis muscle with Metzenbaum scissors.
- B, Appose the trachealis muscle with three or four interrupted sutures, then approximate the split cartilages.
- C, Place three or four tension-relieving sutures around cartilages adjacent to the anastomosis.

Brachycephalic Syndrome

- ▶ Brachycephalic airway syndrome refers to a particular set of upper airway abnormalities that affect brachycephalic dogs.
- ▶ An individual dog with brachycephalic syndrome may be affected with a combination of one or more of these abnormalities.
- ▶ Commonly affected dog breeds; English Bulldog, Boxer, Boston Terrier, Lhasa Apso, Pug, Shih Tzu, Pekingese, Shar Pei, French Bulldog, Cavalier King Charles Spaniel



- ▶ The upper airway abnormalities that occur in this syndrome include stenotic nares, extended nasopharyngeal turbinates, an elongated soft palate, laryngeal collapse, a hypoplastic trachea, and everted laryngeal saccules.

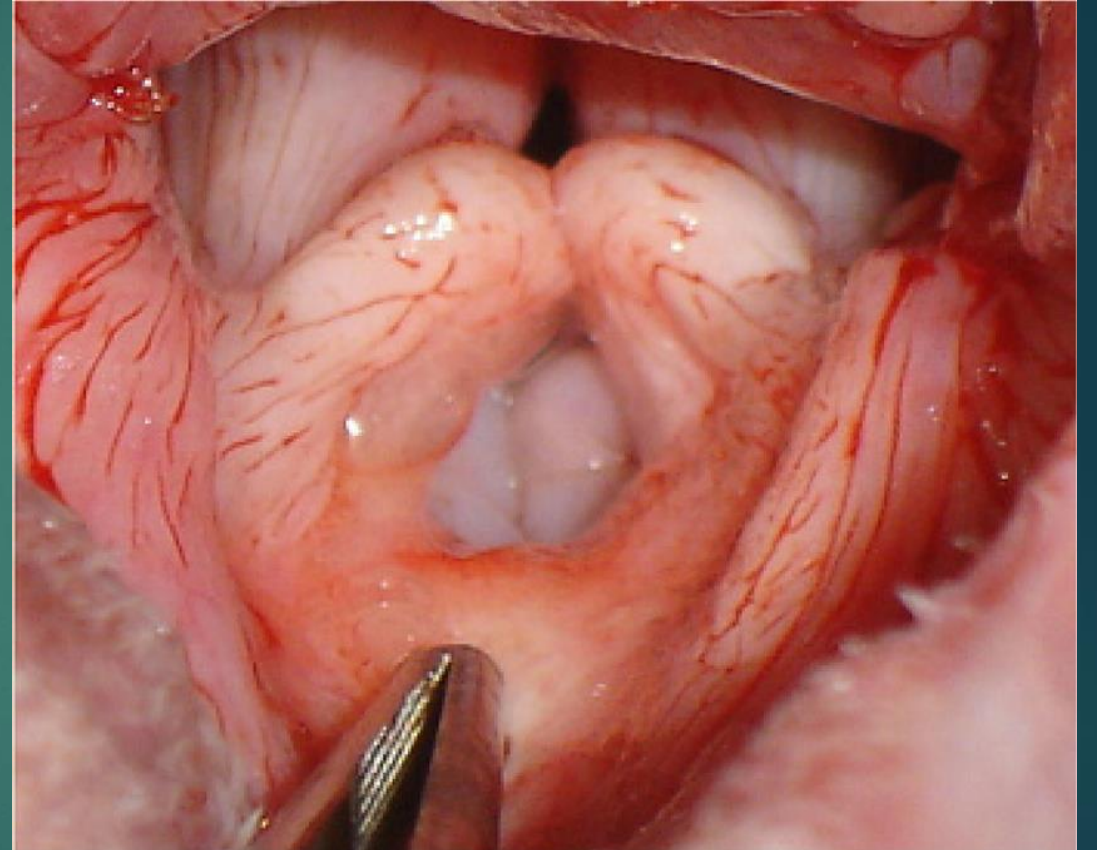
- ▶ Dogs with stenotic nares have abnormally narrowed or small nostrils; the narrowing restricts the amount of air that can flow into the nostrils.
- ▶ Nasopharyngeal turbinates are ridges of bone covered by tissue that help humidify and warm air that is inhaled. When these extend past the nose into the pharynx (the area behind the nose and mouth), they cause variable amounts of airflow obstruction.



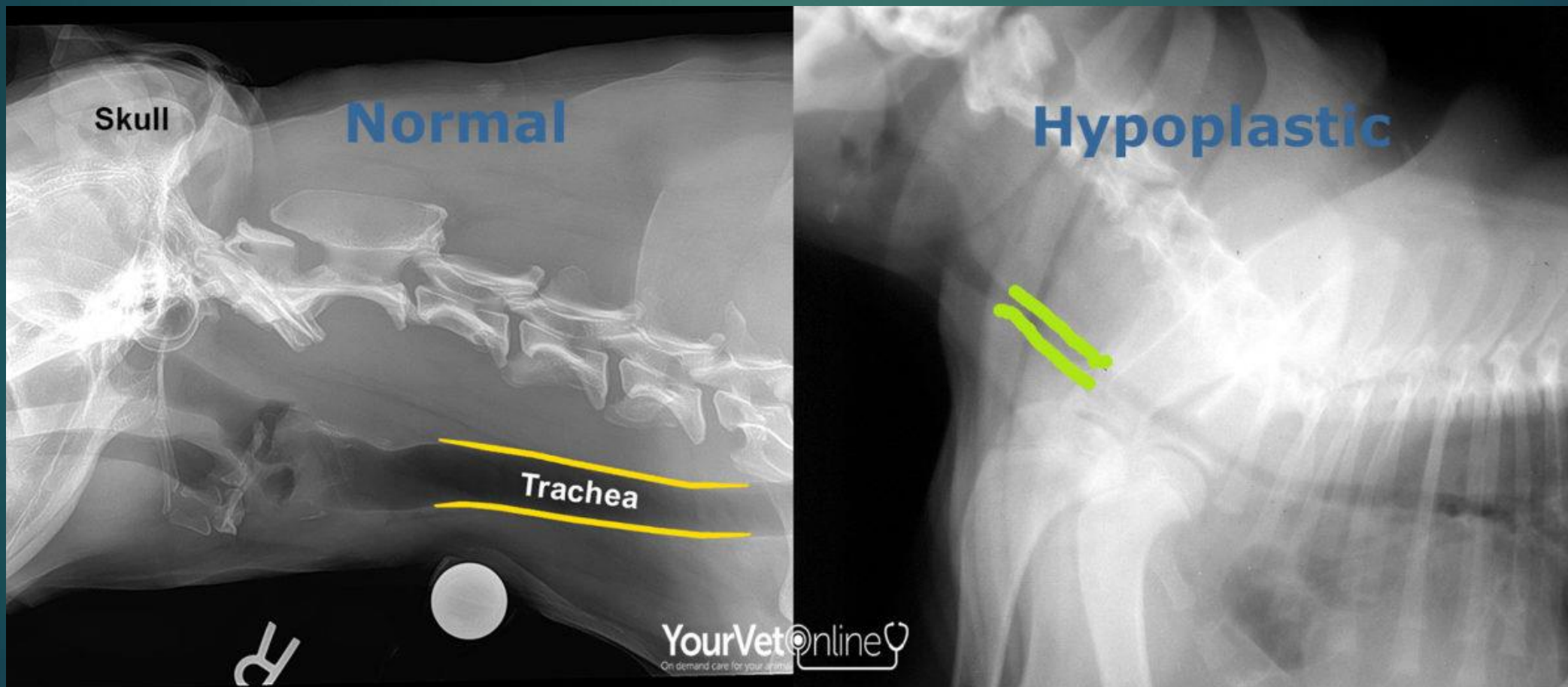


A dog with an elongated soft palate (the soft part of the roof of the mouth) has a soft palate that is too long for the length of the mouth; the excess length partially blocks the entrance to the trachea (windpipe) at the back of the throat.

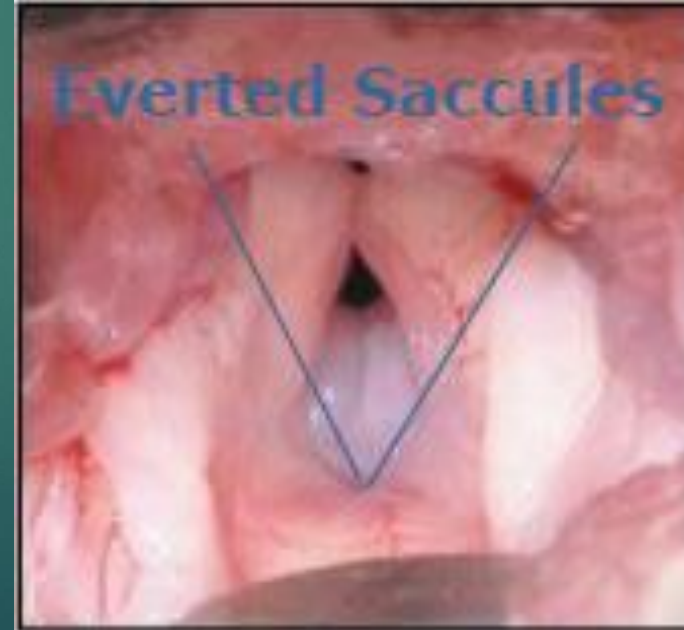
- ▶ Laryngeal collapse is caused by the chronic stress placed on the cartilage of the larynx by other features of brachycephalic syndrome. Eventually, the larynx (voicebox) is not able to open as wide as normal causing further restriction in airflow.



A hypoplastic trachea means that the trachea has a smaller diameter than normal.



- ▶ The laryngeal sacculles are small sacs or pouches that are located just inside the larynx; these sacculles evert (turn outwards) or are sucked into the airway by pressure associated with the increased respiratory effort caused by the stenotic nares and/or the elongated soft palate. Everted laryngeal sacculles will further obstruct airway flow.



Signs

- ▶ noisy breathing, especially with exercise, and most will snort when excited and snore when relaxed or asleep.
- ▶ Severely affected dogs have more pronounced airway noise, appear to tire easily with exercise, and may collapse or faint after exercise.
- ▶ coughing, gagging, retching, and vomiting. Signs are often worse in hot or humid weather.

- ▶ Dogs with impacts to their gastrointestinal tract may show signs including retching, vomiting, or lack of appetite.
- ▶ Over time, dogs with this syndrome may develop other secondary problems, including inflammation of other structures in the airways. In the long term, the increased effort associated with breathing can put an increased strain on the heart.

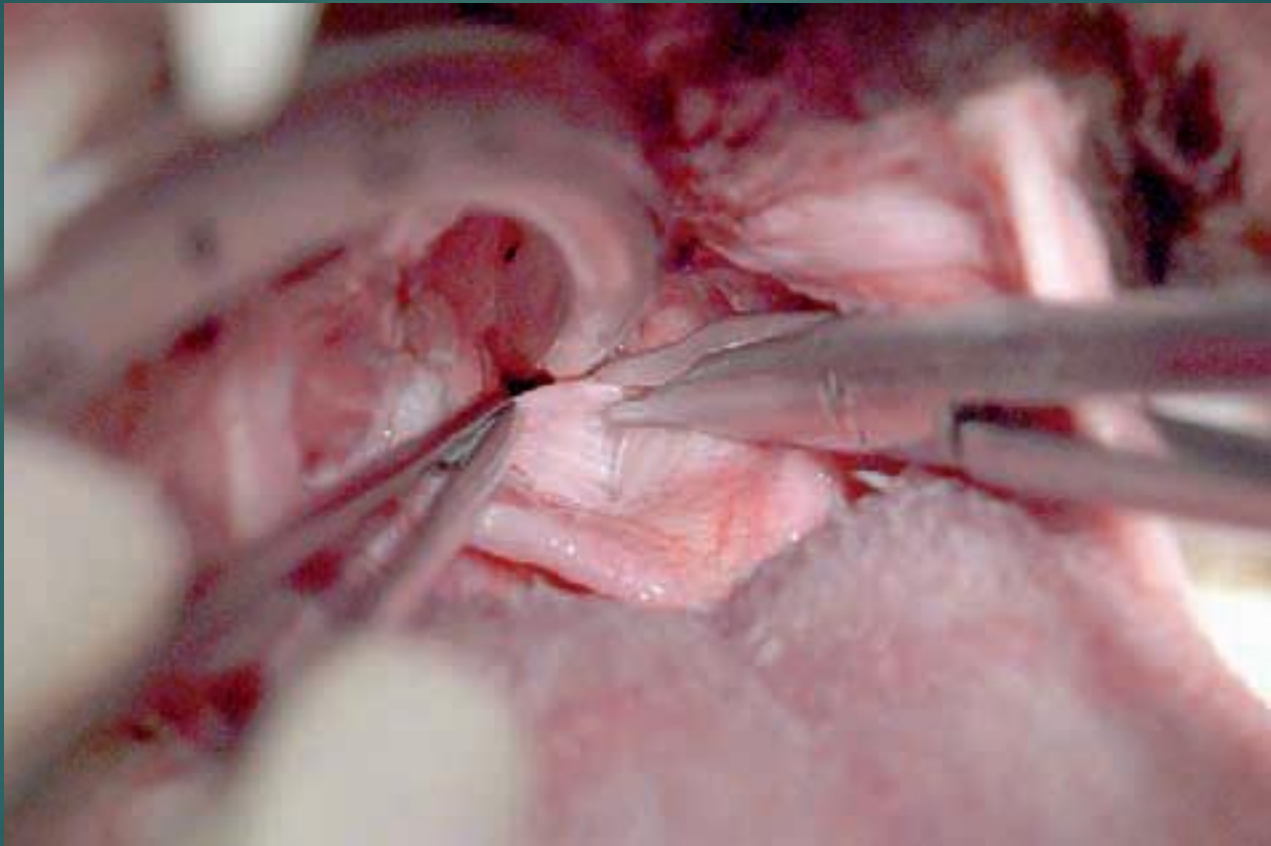
Widening of nostrils



Fossum, 2013

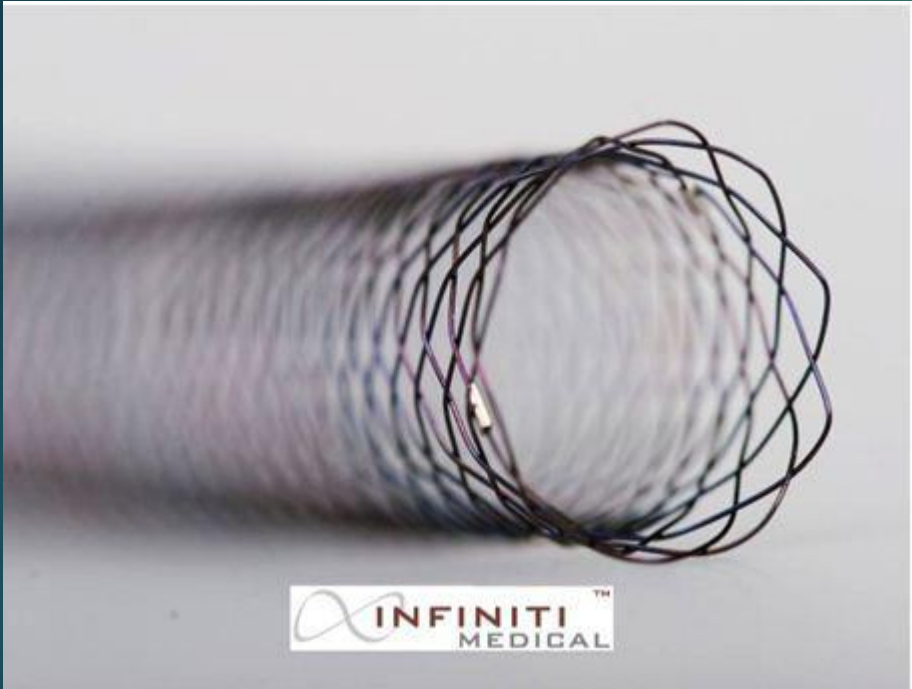
Palatoplasty

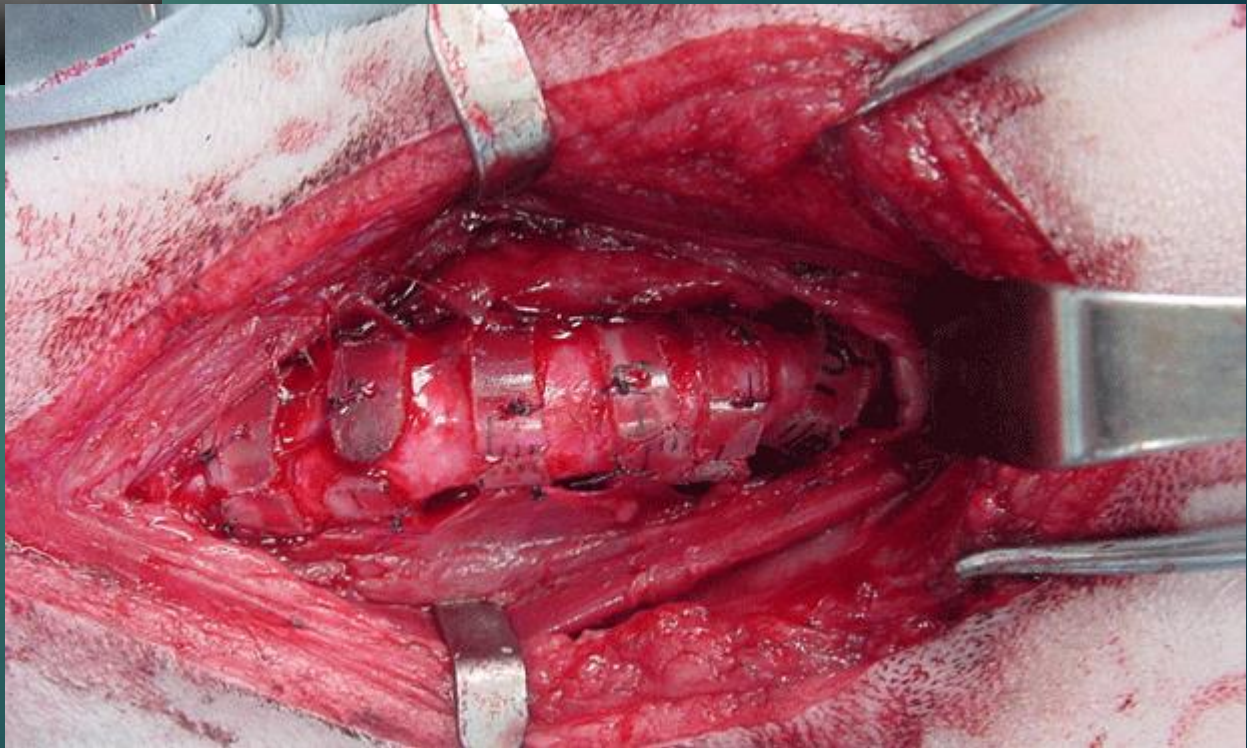




Tracheal Collapse

- ▶ Tracheal collapse is a form of tracheal obstruction caused by cartilage flaccidity and flattening. Tracheal collapse sometimes is erroneously referred to in older reports as congenital tracheal stenosis.
- ▶ Tracheal collapse often affects toy and small-breed dogs especially Yorkshire Terriers, Miniature Poodles, Pomeranians, Chihuahuas and Pugs.
- ▶ Extraluminal Stents
- ▶ Endoluminal Stent





Thoracotomy

- ▶ Thoracotomy may be performed by incising between the ribs or by splitting the sternum.
- ▶ The approach used depends on the exposure needed and underlying disease process.
- ▶ Regardless of the type of thoracotomy performed, a large area should be prepared for aseptic surgery to allow extension of the incision if needed.
- ▶ Depending on which left lobe is affected, a left lateral thoracotomy at the fourth, fifth, or sixth intercostal space provides adequate exposure for lobectomy.