香港獸醫專科服務

HONG KONG VETERINARY SPECIALTY SERVICES

Persistent Right Aortic Arch (PRAA) in Dogs and Cats

Quick take

Persistent Right Aortic Arch (PRAA) is a c**ongenital "vascular ring anomaly"**. A blood vessel that should have developed differently in the foetus instead **forms a ring around the oesophagus** (and sometimes the trachea), **pinching it like a tight collar** at the base of the heart. This causes food to get stuck and **come back up (regurgitation), most often starting right after weaning**.

Surgery is the definitive treatment for almost all PRAA cases. The goal is to **cut the constricting band so the oesophagus is no longer squeezed**. Surgery often dramatically improves quality of life, but some pets still need lifelong feeding management if the oesophagus has been stretched too long (megaoesophagus). **Early treatment is the key!**

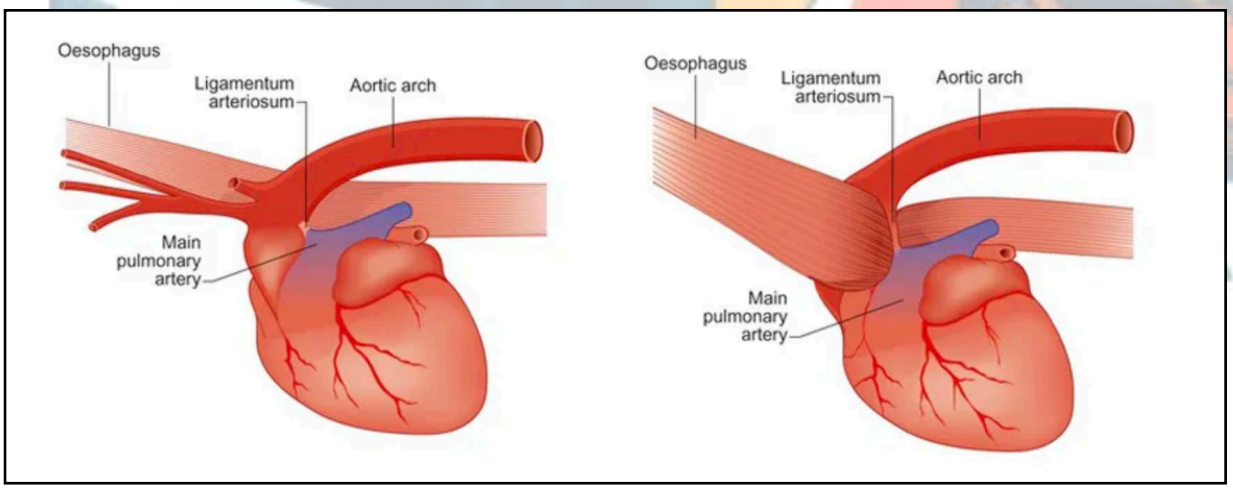
1) What's going on inside? (Plain-English pathophysiology)

Normal
The oesophagus is a flexible tube that moves food from mouth to stomach.

In PRAA
A "ring" of blood vessels forms around the oesophagus (and occasionally the airway). The most common pattern is:
Right-sided aortic arch plus a left ligamentum arteriosum creating a tight band.

This causes:

- Narrowing (stricture-like compression) of the oesophagus near the heart base
- Food and water pooling in front of the pinch point
- Oesophageal dilation (megaoesophagus) in the neck/chest in front of the narrowing
- Regurgitation and risk of aspiration pneumonia (food/liquid entering lungs)



A barium swallow is shown on this radiograph and demonstrates the blockage in the oesophagus. The contrast medium stops abruptly at the base of the heart and a large oesophageal dilation has formed in the cranial mediastinum. The dilation is focal initially and can progress cranially over a few months if the surgery is delayed, thereby giving a more generalised appearance.

Key concept: Surgery removes the pinch, but it can't always "undo" an already overstretched oesophagus—especially if the problem has been present for weeks to months.

2) Who gets it and what owners notice

Dogs
Most commonly recognised in young puppies soon after weaning. PRAA is reported in breeds such as German Shepherd Dogs, Irish Setters, Boston Terriers, and others (any breed can be affected).

Cats
Less common than in dogs, but it happens (often recognised in kittens after weaning).

Signs owners commonly see

- Regurgitation (food comes back up without retching—different from vomiting) shortly after eating
- Poor growth, "runty" appearance
- Increased appetite but inability to keep meals down
- Coughing, fever, lethargy (may indicate aspiration pneumonia)
- Some pets do better with liquids; others do worse with liquids—depends on severity

3) Diagnosis

The basics
Your vet may hear abnormal chest sounds, but many patients have normal heart sounds.
Chest X-rays often show a large oesophagus in front of the heart base and sometimes aspiration pneumonia.

"Best practice" imaging

Contrast oesophagogram (barium swallow) can show the narrowing at the heart base (see previous picture).
CT angiography is increasingly used to map the exact vessel anatomy—important because several different vascular ring patterns exist and surgical planning depends on the exact pattern. This being said, an **experienced surgeon will typically know how to plan the surgery without requiring this fancy imaging.**

4) Conservative options: feeding management (supportive, not curative)

Feeding changes can reduce regurgitation and aspiration risk:
- Small, frequent meals
- Upright feeding (Bailey chair for dogs; elevated upright position for cats)
- "Meatball" consistency or slurry depending on what the pet tolerates

Treat aspiration pneumonia promptly if it occurs

Supportive care is important, but it does not remove the vascular ring. Without surgery, the oesophagus remains compressed and damage tends to progress. Conservative management is not a long-term solution. Death ultimately occurs due to generalisation of the oesophageal dilation and aspiration pneumonia.

5) Surgical treatment — the definitive solution

The goal of surgery

- Release the constriction around the oesophagus (and trachea if involved)
- Allow food to pass normally into the stomach
- Reduce regurgitation and aspiration risk
- Give the oesophagus the best chance to regain function (especially if done early)

The typical operation (most common PRAA pattern)

1. A surgeon enters the chest (commonly a **left intercostal thoracotomy**)
2. Identifies the **tight band** (often the ligamentum arteriosum)
3. Ligates (ties off) and transects (cuts) the band to open the ring
4. Breaks down fibrous adhesions that may be tightening the area
5. In many cases, an oesophageal dilation ("ballooning") is performed gently to open the narrowed segment after release (surgeon-dependent).

This is the "classic" and most common corrective surgery.

Minimally invasive options
Some centres can perform thoracoscopic (camera-assisted) approaches in selected cases, but open surgery is most commonly performed and very effective. Open approach is faster and such patients are typically hard to keep anaesthetised for too long.

6) Why early surgery matters

The **longer food pools in the oesophagus, the more it stretches and loses tone**. Even if surgery is perfect, a severely stretched oesophagus may continue to cause regurgitation.

Clinical literature and reviews emphasise that earlier correction (often soon after diagnosis in young animals) improves the chance of better function and easier long-term feeding.
Even performed in an older patient, the **surgery will greatly improve the medical management. Again we insist… medical management does not work.**

Patients that we treat at Hong Kong Veterinary Specialty Services are typically between three and four months of age. Uncommonly, we would treat younger patients if the initial feeding recommendations do not work.

7) Outcomes and prognosis

Dogs
- Large retrospective studies report:
Survival to discharge around ~90% after surgical correction in dogs (exact numbers vary by case severity and complications).

- In one study, **long-term outcome in dogs was good or excellent in ~87%** of survivors, though some dogs still required ongoing feeding management.

Earlier classic data also found many dogs had major improvement in regurgitation long term.

Cats

Feline data are more limited (fewer cases overall), but case reports/series show that **cats can improve substantially after surgical release, especially when treated early**, while some may still have residual megaoesophagus and need careful feeding strategies.

What "success" usually means
- Many pets improve a lot: less regurgitation, better growth, better energy.
- Some still regurgitate occasionally because megaoesophagus may persist even after the ring is cut. Persistent dilation has been documented on follow-up imaging in some dogs despite clinical improvement.
- All surgically treated patients will respond better to the medical management afterwards. They all carry a chance to survive long-term.

8) Complications and realistic rates

Complication risk depends heavily on:

- How sick the pet is at presentation
- Presence of aspiration pneumonia
- Chronicity (how long it's been going on)
- Exact vascular anatomy
- Surgeon/team experience

Common complications (and typical ranges)

1) Aspiration pneumonia (before or after surgery)

Common clinical issue in PRAA patients because regurgitation can continue during recovery. (Rates vary widely; it's one of the main reasons for prolonged hospitalisation and why strict feeding plans matter.)

2) Persistent regurgitation / persistent megaoesophagus

Not a "surgical failure" necessarily—often reflects pre-existing oesophageal damage. Many pets still improve, but some require lifelong upright feeding.

3) Intraoperative haemorrhage (bleeding)

A serious risk because major vessels are nearby. A recent JAVMA study on PRAA surgery reported survival to discharge of 97% overall and noted that most dogs with intraoperative haemorrhage still survived to discharge (95% in that report).

4) Oesophageal injury (rare but serious)

The oesophagus is delicate and already compromised. Injury can lead to infection or mediastinal inflammation.

5) Laryngeal nerve irritation (rare)
Hoarse bark/voice change can occur if nearby nerves are affected.

Mortality risk

- Most deaths (when they occur) are linked to:
- Severe aspiration pneumonia
- Poor body condition/debilitation
- Complications of anaesthesia or bleeding

Large series highlight that while long-term outlook can be good in survivors, a subset of patients may die or be euthanised early due to complications or persistent severe signs.

Studies show as well that **all untreated patients** die early. Conservative management should only be considered as a way to delay the surgery for a couple of months until the patient can be safely anaesthetised (surgery at three to four months).

9) Postoperative care (this is as important as the surgery)
Even after successful surgery, the oesophagus often needs time to recover.
- Feeding plan (critical)
- Upright feeding for weeks to months (sometimes lifelong)
- Small, frequent meals
- Consistency tailored to what your pet does best with (meatballs vs slurry)
- Keep upright 10–20 minutes after meals (per your surgeon's guidance)

Medications (common)
- Pain control
- Antibiotics if pneumonia is present or suspected
- Acid reducers / oesophageal protectants if irritation is severe (case-dependent)

Monitoring
- Watch for coughing, fever, increased breathing effort, lethargy → possible pneumonia
- Weight checks (growth should improve)
- Recheck imaging if regurgitation persists or worsens

Important: Many pets continue to regurgitate early after surgery; improvement is often gradual. What matters is trend (frequency, severity, weight gain, pneumonia control).

10) When surgery may not be enough (and what else can help)

If regurgitation remains significant due to severe megaoesophagus, some pets benefit from:

- Long-term upright feeding routines
- Feeding tube placement in select cases (to support nutrition while training feeding strategies). A gastrostomy tube can be placed for a period of time to facilitate the initial recovery
- Managing reflux and repeated pneumonia aggressively
- Working with a veterinary internist/nutritionist

11) Selected veterinary references

- Long-term improvement and regurgitation outcomes after PRAA surgery in dogs (JAVMA; PubMed record).

- Survival to discharge and long-term outcomes following PRAA surgery in dogs (JAAHA).

- Review of diagnostics, surgical treatments, and prognosis for vascular ring anomalies (JAVMA review).

- Risk factors for intraoperative haemorrhage and perioperative outcomes in dogs undergoing PRAA surgery (JAVMA 2023).

Bottom line

PRAA causes mechanical choking of the oesophagus leading to regurgitation and aspiration risk.

Surgery is the definitive treatment and is strongly recommended for most patients once stabilised. Many dogs—and some cats—do extremely well after surgery, but ongoing feeding management is often part of success, especially if megaoesophagus developed before repair.

The earlier the diagnosis and correction, the better the chance for near-normal function.