

2. Hypotension

Hypotension occurs for several reasons including low venous return, poor diastolic or systolic function, bradycardia, or low systemic vascular resistance (aka vasodilation). Low venous return can happen in cases of hypovolemia, positive pressure ventilation, or distension of the abdominal cavity. Poor diastolic function can occur in HCM and tachycardia. Poor or impaired systolic function can occur in DCM, atrioventricular valve insufficiency, ventricular arrhythmias, or from antiarrhythmics. Vasodilation can occur secondary to anesthetic drugs especially inhalants or sepsis.

How do we monitor blood pressure?

- Non-invasive techniques
 - Doppler
 - Oscillometric
- Invasive or direct techniques
 - Arterial blood pressure

Non-invasive blood pressure (NIBP) techniques are relatively easy to perform, do not require specialized training, and are reliable in healthy patients. In these techniques the use of an appropriately sized blood pressure cuff is imperative. The width of the cuff should be 40% of the circumference. A large or loose cuff will cause a high reading since more pressure is required to occlude the underlying artery. A small or tight cuff will read lower than normal since very little pressure is required to occlude the underlying artery. Overall non-invasive techniques have variable precision and accuracy. They tend to overestimate blood pressure in hypotensive patients.

Invasive or direct blood pressure (IBP) requires an arterial catheter, pressure transducer and monitor for interpretation, and some specialized training. Overall, this is the gold standard of blood pressure monitoring and is highly encouraged for high-risk anesthetic patients. This blood pressure technique allows for second-to-second interpretation of blood pressure.

If a patient has an arterial line placed, all blood pressures recorded should be from this monitoring device unless an equipment malfunction occurs. If the NIBP is reading higher than the IBP, it is important to remember that NIBP is not accurate and is most likely overestimating blood pressure.

Treatment criteria

Systolic BP < 90 mmHg

Mean BP < 65 mmHg

If you have an arterial line, always use that monitor to base your decisions for treatment.

How to treat hypotension?

1. Check your anesthetic depth and decrease inhalant setting if possible.
 - a. Assess your patient to determine what plane of anesthesia he/she is in.

Created by: Dr. Bornkamp 8/7/2021

Reviewed by: Becky Huskins

- b. If the patient is too “deep”, decrease the inhalant setting by 0.25 - 0.5%. Wait 5 minutes and reassess your patient’s depth.
 - c. Do not lighten a plane of anesthesia just prior to the first incision or painful aspects of the surgery (fracture reduction, foreign body manipulation, etc.).
- 2. Check heart rate and treat bradycardia if it is present.
 - a. If the heart rate is low and blood pressure is low, treatment with an anticholinergic is indicated.
- 3. Give crystalloid or colloid boluses.
 - a. In euhydrated patients, one to two fluid boluses of 5 – 10 ml/kg IV may be indicated.
 - b. Be cautious in patients with heart disease or failure.
 - c. I am a huge advocate of fluids peri-operatively in pretty much every patient!
 - d. Colloids can be given if a patient has hypoproteinemia or hypoalbuminemia.
 - i. Be cautious in septic or coagulopathic patients.
 - ii. Dose is 2 – 5 ml/kg. The maximum dose is 20 ml/kg/DAY.
- 4. Vasopressors or inotropes
 - a. Dopamine (40 mg/ml), 5 -10 mcg/kg/min CRI
 - i. Works primarily on beta 1 receptors and will improve cardiac contractility.
 - 1. Also has effect on dopamine and alpha receptors (dose-dependent)
 - ii. Must be used as a CRI.
 - iii. Onset of action is 5 minutes.
 - b. Ephedrine (50 mg/ml), 0.1 – 0.2 mg/kg IV bolus
 - i. Works on alpha and beta receptors.
 - 1. Will increase heart rate and blood pressure.
 - 2. Do not give if patient is normotensive or has normal heart rate.
 - ii. Onset: 1 -3 minutes
 - iii. Duration of action: 20 – 30 minutes
 - 1. Repeat dosing will lose efficacy due to tachyphylaxis.
 - iv. Amazing drug for puppies and kittens.
 - c. Dobutamine (12.5 mg/ml), 5 – 15 mcg/kg/min CRI
 - i. Works primarily on beta 1 receptors and will improve cardiac contractility.
 - ii. Must be used as a CRI
 - iii. Onset: 5 minutes
 - d. Norepinephrine (1 mg/ml), 0.05 - 2 mcg/kg/min CRI
 - i. Works on alpha and beta 1 receptors.
 - 1. Improves contractility and causes vasoconstriction.
 - ii. Big gun for blood pressure. Will decrease blood supply to the GI tract.

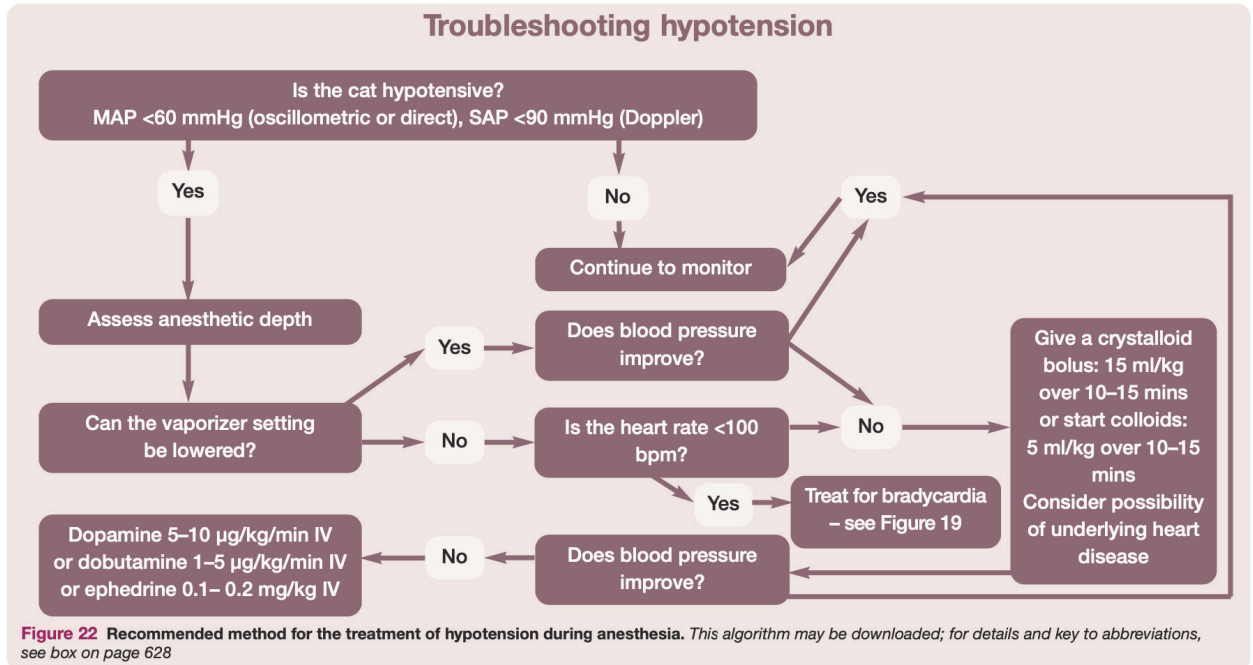


Figure 2.1: This is an algorithm on how to treat hypotension from the AAFP Feline Anesthesia Guidelines. This is still applicable to dogs as well as cats.