My patient's hypotensive, what should I do?

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Many of the drugs we use in practice have some side effects, this can be even more apparent with some of our anaesthetic agents. Numerous drugs that we use before, during and after anaesthesia have effects on our patient's cardiovascular system, with the main effect being vasodilation. Vasodilation leads to low blood pressure or hypotension. Blood pressure is responsible for maintaining perfusion to the whole body; when blood pressure falls and hypotension occurs this perfusion may be reduced. Poor perfusion can affect oxygen delivery to the organs which can, in severe cases, lead to organ dysfunction, for example, acute renal failure.

Blood pressure can be measured in several different ways, either indirectly or directly. Indirect measurement can be done with an oscillometric device or a Doppler and sphygmomanometer. However the accuracy of these methods can be affected by the way they are used, and in some cases they may fail to give a reading at all. It is very important that true hypotension is detected as this will influence ongoing treatment. Direct arterial blood pressure measurement via an arterial catheter requires some skill in placement but is considered the most reliable method of monitoring blood pressure and, as such, identifying hypotension.

Once hypotension has been identified it is important to try to recognize the cause as this will direct the treatment. Causes of hypotension under anaesthesia include:

- Hypovolaemia
- Vasodilation
- Decreased myocardial contractility
- Arrhythmias
- Reduced venous return due to obstruction
- Bradycardia resulting from vagal stimulation.

Treatment of hypotension will depend on the cause but several options can be tried before resorting to sympathomimetic therapy. These include:

- Treatment of hypovolaemia with crystalloids, colloids or blood as necessary
- Reduction of the volatile agent
- Giving an anaesthetic-sparing drug, for example, fentanyl or ketamine

- Treatment of arrhythmias
- Removal of obstruction reducing venous return
- Stopping ocular or visceral retraction that is causing a vagal response and, if necessary, administer an anticholinergic drug
- Giving a crystalloid fluid bolus.

If these methods are unsuccessful it may be necessary for the veterinary surgeon to administer a sympathomimetic drug. These drugs act by increasing contractility (inotropic), increasing heart rate (chronotropic) or causing vasoconstriction (improves venous return). They include:

- Dobutamine
- Dopamine
- Ephedrine
- Noradrenaline
- Phenylephrine
- Vasopressin
- Adrenaline (epinephrine).

KEY LEARNING OBJECTIVES

- Be able to define hypotension under anaesthesia
- Understand the implications of hypotension
- Be able to react to hypotension to resolve it and understand more advanced interventions that may be prescribed by the veterinary surgeon

MULTIPLE CHOICE QUESTIONS

1. Which of the following is a very potent vasodilator?
 - (A) Volatile agent, e.g. isoflurane
 - (B) Propofol
 - (C) Alfaxan
 - (D) Medetomidine
2. Which of the following mean arterial pressure is mild hypotension?
 - (A) 45–60 mmHg
 - (B) 55–65 mmHg
 - (C) 35–50 mmHg
 - (D) <45 mmHg
3. What is the action of an inotrope?
 - (A) Improves cardiac contractility
 - (B) Increases heart rate
 - (C) Increases systemic vascular resistance
 - (D) Decreases cardiac contractility