Blood pressure monitoring in anaesthetized animals: should I be worried?

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Anaesthesia can interfere with normal physiological processes in our patients, causing changes including depressed ventilation and alterations in neurological, renal and cardiovascular function. Maintaining cardiovascular stability and optimizing function in anaesthetized patients is an essential part of ensuring adequate perfusion and oxygen delivery to organs. A minimum blood pressure is required to maintain tissue perfusion. Certain critical organs, including the brain and kidneys, are able to autoregulate their blood flow when the mean arterial blood pressure (MAP) is between 60 mmHg and 160 mmHg; when MAP falls below this range the organs are at greater risk of hypoperfusion and ischaemic injury. Therefore, maintaining normotension is an important part of anaesthetic management in human and veterinary patients alike.

In order to manage blood pressure in our patients, it must be monitored accurately and repeatedly throughout anaesthesia. Blood pressure can be measured both directly and indirectly. Direct measurement of blood pressure requires cannulation of a peripheral artery; it is still considered to be the 'gold standard' for measuring blood pressure but is technically more challenging and carries a slight risk of complication when compared with the indirect methods. Commonly used indirect methods of measuring blood pressure include using oscillometry and a Doppler device.

If a derangement in arterial blood pressure is detected in a patient, prompt intervention can reduce any potential negative impact it may have. Hypotension (MAP <60 mmHg) may result from a decrease in cardiac output, peripheral vasodilation and hypovolaemia. Management of hypotension may include ensuring anaesthetic depth is optimal, administering appropriate intravenous fluids and pharmacological interventions, including inotropic agents and vasopressors. Hypertension (MAP >110 mmHg) may result from sympathetic stimulation due to nociception or inadequate anaesthetic depth; it may also occur secondary to certain pre-existing conditions, for example, hyperthyroidism and renal disease.

When used correctly and appropriately, blood pressure monitoring is an invaluable tool, helping to improve

patient safety during anaesthesia and reducing associated morbidity and mortality.

KEY LEARNING OBJECTIVES

- Understand the limitations of commonly used blood pressure monitors in small animal practice
- Understand the benefits of monitoring blood pressure in patients under anaesthesia
- Develop confidence in managing perioperative derangements in blood pressure

MULTIPLE CHOICE QUESTIONS

1. What is the acceptable lower limit for blood pressure in a dog under anaesthesia when measured using a Doppler device?
(A) 30 mmHg
(B) 60 mmHg
(C) 90 mmHg
(D) 120 mmHg
2. Which of the following DOES NOT contribute to the development of hypotension in anaesthetized patients?
(A) Vasoconstriction of peripheral vessels, e.g. secondary to drug administration and sympathetic stimulation
(B) Hypovolaemia secondary to haemorrhage, dehydration and evaporative losses at surgery
(C) Decreased myocardial contractility and arrhythmias that result in a reduction in cardiac output
(D) Reduced venous return to the heart secondary to positive-pressure ventilation and increased intrathoracic pressure
3. Which of the following statements is INCORRECT regarding the impact of common anaesthetic drugs on arterial blood pressure?
(A) Propofol and alfaxalone can decrease vascular resistance and blood pressure
(B) Volatile anaesthetic agents (e.g. isoflurane and sevoflurane) cause dose-dependent vasodilation and hypotension
(C) Alpha-2 adrenoreceptor agonists (e.g. medetomidine) initially cause peripheral vasoconstriction, hypertension and bradycardia
(D) Phenothiazines (e.g. acepromazine) cause an increase in vascular resistance and blood pressure