



Dopamine vs. Dobutamine

Hypotension occurs in almost 40% of all anesthetized patients. Correction of hypotension will likely require the use of positive inotropic drugs like **dopamine** or **dobutamine**. Prior to anesthesia, if impaired cardiac contractility is presumed, the anesthetist should begin delivery of dopamine or dobutamine as soon as hypotension is determined. Hypotension is defined as a mean arterial pressure less than 60 mmHg and/or a systolic pressure ≤ 80 mmHg. Blood pressure that is ≤ 90 mmHg on a Doppler should also be defined as hypotension.

Dopamine is recommended for patients with kidney disease due to its ability to increase renal blood flow. Dopamine can increase blood pressure through low infusion rates (< 2 $\mu\text{g}/\text{kg}/\text{min}$). This rate causes dopaminergic effects, which results in renal and splanchnic vessel dilation.

As the rate increases, α_1 and β_1 - β_2 -adrenergic effects are seen. This generates an increase in vasoconstriction and contractility. Dopamine can have potent β_1 - and β_2 -adrenergic effects but is safe to use in dogs with early or mild heart valve disease. It is not recommended in dogs with advanced heart valve disease.

Comparatively, **dobutamine** primarily stimulates β_1 -adrenergic receptors. As doses of dobutamine increase, β_2 - and α_1 -adrenergic receptors are similar to dopamine. It does not generate the same degree of vasoconstriction that is created by dopamine. Unlike dopamine, dobutamine does not have any effect on the α_2 -adrenergic receptors. Dobutamine is preferred when there is a need to improve low cardiac output. Dobutamine should be avoided in patients affected by outflow obstructions, pulmonic stenosis, or hypertrophic obstructive cardiomyopathy.

Due to inhalant anesthetics, patients that are cardiovascularly healthy and stable may still require support via dopamine or dobutamine. Primary steps to resolve hypotension begin with decreasing the inhalant anesthetic dose. The maintenance of a surgical plane is still required, and constant rate infusions of an opioid should be utilized to ensure appropriate anesthetic depth. Subsequent steps involve a bolus of a crystalloid and/or colloid. Once adequate hydration status is confirmed, dopamine (1–15 $\mu\text{g}/\text{kg}/\text{min}$) should be added to the anesthetic plan if renal perfusion is needed via dopaminergic receptors. Higher rates of dopamine will provide an increase in heart rate and vasoconstriction. Dobutamine (1–10 $\mu\text{g}/\text{kg}/\text{min}$) is needed when blood pressure is low due to decreases in cardiac output.

Drug	a1	a2	b1	b2
Dobutamine	0	0	+++	+
Dopamine	++ (high dose)	+	++ (low dose)	+

DO NOT

- Give loading doses of dopamine or dobutamine
- Bolus dopamine or dobutamine

DO

- Always dilute
- Ensure proper hydration status