



# Dexmedetomidine infusion as part of anaesthetic management in a dog with atrial fibrillation and heart failure undergoing patent ductus arteriosus closure

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## Introduction

Patent ductus arteriosus (PDA) may result in progressive left-sided volume overload and congestive heart failure (1). Chronic atrial enlargement can predispose to atrial fibrillation (AF), further reducing cardiac output and increasing anaesthetic risk (2). The aim of this report is to describe the use of dexmedetomidine constant rate infusion (CRI) as part of the anaesthetic management of a dog with AF and previous congestive heart failure undergoing minimally invasive PDA occlusion.

## Case description

A 7-year-old, spayed female German Shepherd with left-to-right PDA, rapid AF and previously decompensated left-sided congestive heart failure was scheduled for transarterial occlusion using an Amplatz Canine Duct Occluder. The patient was classified as American Society of Anaesthesiologists (ASA) physical status IV. Following medical stabilisation (furosemide, diltiazem, pimobendan, digoxin), premedication consisted of methadone IM (0.3 mg kg<sup>-1</sup>).

## Anaesthetic management

A dexmedetomidine CRI was initiated at 3 µg kg<sup>-1</sup> hour<sup>-1</sup> IV without loading dose, then decreased to 2 µg kg<sup>-1</sup> hour<sup>-1</sup> until sedation and reduction in HR (140 to 100 bpm) were observed [Figure 1].

Anaesthesia was induced with lidocaine (1 mg kg<sup>-1</sup> IV), midazolam (0.2 mg kg<sup>-1</sup> IV) and propofol (2 mg kg<sup>-1</sup> IV), and maintained with isoflurane (end-tidal 0.6–1.1%) in oxygen.

Dexmedetomidine CRI was continued during anaesthesia and titrated between 0.5 and 2 µg kg<sup>-1</sup> hour<sup>-1</sup> according to HR, MAP and anaesthetic depth.

## Intraoperative Events

Hypotension (MAP < 60 mmHg) after induction was corrected with a crystalloid bolus and dobutamine infusion (1–3 µg kg<sup>-1</sup> minute<sup>-1</sup>) [Figure 2 a,b]. During PDA occlusion, increased arterial pressure and reflex bradycardia were observed (Branham reflex). Dexmedetomidine and dobutamine were discontinued, and HR normalised without further intervention [Table 1]. Recovery was calm and uneventful, with no recurrence of pulmonary oedema.

## Conclusion

This case illustrates that a titrated dexmedetomidine infusion without loading dose can provide sedation and reduction in ventricular response in a dog with AF undergoing PDA occlusion. Close haemodynamic monitoring and dose adjustments appear essential when incorporating α<sub>2</sub>-agonists into balanced anaesthesia in high-risk cardiac patients (3). Further research is warranted to confirm these results.

## References

1. Saunders AB, Gordon SG, Boggess MM, Miller MW. Long-term outcome in dogs with patent ductus arteriosus: 520 cases (1994–2009). *J Vet Intern Med.* 2010;24(1):73–80.
2. Pedro B, Fontes-Sousa AP, Gelzer AR. Canine atrial fibrillation: pathophysiology, epidemiology and classification. *Vet J.* 2020;265:105548.
3. Bui Q, Ma G, Pandey A, Chu F, Daniels LB. Sedating the heart: use of dexmedetomidine in refractory atrial fibrillation with rapid ventricular response. *J Am Coll Cardiol.* 2018;71(11 Suppl):1282–150.

## Intraoperative evolution of HR, MAP, dexmedetomidine CRI and dobutamine rate during PDA occlusion in a dog with atrial fibrillation

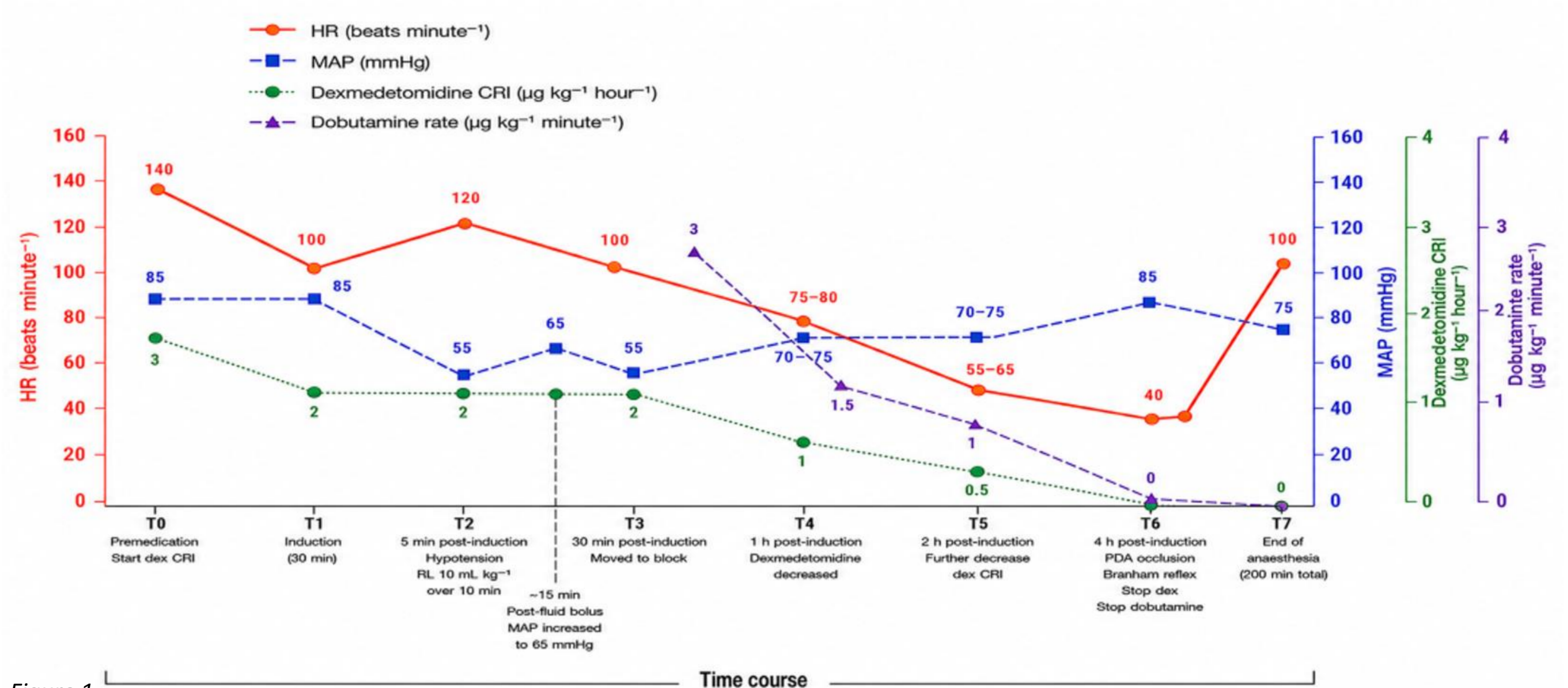


Figure 1

Timepoint	Time (approx.)	HR (beats minute <sup>-1</sup> )	MAP (mmHg)	Dexmedetomidine CRI (µg kg <sup>-1</sup> hour <sup>-1</sup> )	Dobutamine rate (µg kg <sup>-1</sup> minute <sup>-1</sup> )	Relevant Events
T0	Premedication	140	85	3	0	Premedication and dexmedetomidine CRI initiated
T1	30 min	100	85	2	0	Induction
T2	35 min	120	55	2	0	Hypotension; RL bolus 10 mL kg <sup>-1</sup> over 10 min
	-15 min (between T2-T3)	-	65	2	0	Post-fluid bolus; MAP increased to 65 mmHg
T3	60 min	100	55	2	3	Moved to block
T4	90 min (1 h)	75–80	70–75	1	2	1 h post-induction
T5	150 min (2 h)	55–65	70–75	0.5	1.5	2 h post-induction
T6	180 min (4 h)	40	85	0	0	PDA occlusion; Branham reflex observed; dexmedetomidine and dobutamine discontinued
T7	200 min total	100	75	0	0	End of anaesthesia

Abbreviations: CRI, constant rate infusion; HR, heart rate; MAP, mean arterial pressure; PDA, patent ductus arteriosus; RL, Ringer's lactate.

Table 1

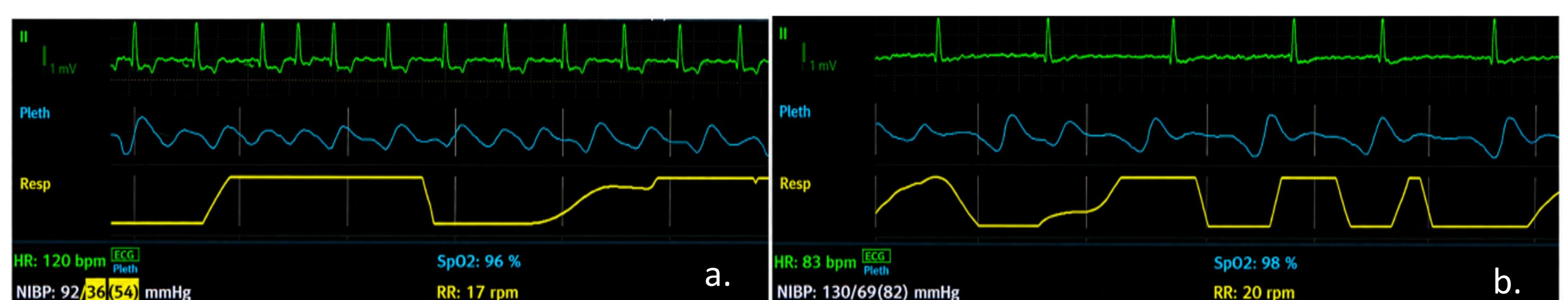


Figure 2.a. Electrocardiographic and haemodynamic monitoring obtained shortly after induction of anaesthesia, demonstrating atrial fibrillation with rapid ventricular response associated with hypotension (MAP 54 mmHg).  
b. Electrocardiographic and haemodynamic monitoring obtained following initiation of dobutamine infusion and progressive dexmedetomidine CRI reduction.