WEBAIRS

ANZTADC Case Report Writing Group

Intraoperative Hypotension

The web based anaesthetic incident reporting system (WebAIRS) reached over 10,000 incident reports by the end of November 2022. 1,796 reports were coded by the reporters as involving the cardiovascular system and nearly 400 of these reports were reported as involving hypotension. As there is no available widely accepted definition of intraoperative hypotension or safe limits for the duration of the event, the Australian and New Zealand Tripartite Anaesthetic Data Committee (ANZTADC) did not include a definition of hypotension in the WebAIRS reporting system. If a reporter is sufficiently concerned regarding a low blood pressure, they are encouraged to report the incident for review. .

CARDIOVASCULAR INCIDENTS	NO.	%	> 15%
Blood loss	160	7.97%	
Bradycardia	207	10.31%	*
Cardiac Arrest	388	19.32%	*
Cardiac Failure	50	2.49%	
CVS trauma (unintentional surgical)	18	0.90%	
Disseminated Intravascular Coagulation	4	0.20%	
Dysrhythmia (other)	32	1.59%	
Electrolyte/Metabolic disturbance	5	0.25%	
Embolism	65	3.24%	
Hypertension	57	2.84%	
Hypotension	399	19.87%	*
Myocardial Infarction	64	3.19%	
Myocardial Ischaemia	86	4.28%	
Tachycardia	191	9.51%	
Other	282	14.04%	
Total events from 1796 reports	**2008**		

Table 1. Cardiovascular incidents reported to WebAIRS – Nov 2022

Table 1 shows that 1,796 cardiovascular incidents had been reported to WebAIRS by the end of November 2022. As it is possible to code more than one incident per report, there were slightly more incidents (2,008) than reports (1,796). Also, when the subgroups are analysed, it is expected that slightly more events will be found during a narrative search. For instance, some of these hypotensive events might be due to anaphylaxis and then progress to a cardiac arrest but it is possible that only hypotension is coded by the original reporter. Anaphylaxis events are currently being analysed separately from the other cardiovascular incidents as anaphylaxis might have been reported as involving the respiratory system, angioneurotic oedema or rash instead of the cardiovascular system. Also, many of the anaphylaxis reports have simply been reported as a medication incident and the narrative sections describe the details of the event.

PRELOAD	MYOCARDIAL FUNCTION	AFTERLOAD
(Venous return)	(Heart rate, rhythm & contractility)	(Systemic vascular resistance)
Hypovolaemia: Blood loss, fluid loss, capillary leak, or dehydration.	Ischaemic heart disease, myocardial ischaemia, or acute myocardial infarction	Anaesthetic drugs including induction drugs, volatile agents muscle
Obstructed venous return	Drugs (including anaesthetic drugs)	Vasodilators
Pneumoperitoneum	Cardiomyopathy	Regional blockade
Elevated intrathoracic pressure	Myocarditis	Anaphylaxis
Tamponade	Arrythmia	Sepsis
Embolism: Air, venous, amniotic fluid, fat, bone cement, tumour and other.		
Patient position or position changes	Reduced sympathetic drive: (General or regional techniques)	Addison's disease
Pregnancy (IVC compression)		Thyroid disease
	Hypothermia Electrolyte abnormalities	Bone cement
Common causes		
Anaesthetic agents, narcotics, regional blockade, hypovolaemia, vasovagal, IVC compression, and elevated intrathoracic pressure.		
Measurement error Equipment error including transducer height, arterial trace damping, incorrect blood pressure cuff size, incorrect detection secondary to patient arrhythmias		

Table 2. Adapted from: The anaesthetic Crisis Manual - David C. Borshoff- First published 2011.

The differential diagnosis of hypotension includes factors affecting preload, myocardial function and afterload,1,2 as shown in Table 2, and commonly occurs as a side effect of the drugs used in general anaesthesia. At different stages of the perioperative journey, some causes are more common than others. During induction, hypotension secondary to anaesthetic drugs is common and might be exacerbated by combinations of age, co-morbidities or hypovolemia, secondary to blood loss, fluid loss or dehydration. The effects of narcotics, volatile agents or regional blockade on peripheral vascular resistance might contribute to the fall in blood pressure. Medications that have been used should be checked for errors of wrong drug or wrong dose. Also, during this phase anaphylaxis might occur, as antibiotics, muscle relaxants and on rare occasions even propofol might be responsible. During maintenance and emergence, surgical causes should be considered. These predominantly affect preload but on occasions might involve myocardial function or afterload as shown in Table 1. Other causes of hypotension from the list above might not be related to any particular stage of the perioperative care.

As pressure is a reflection of the balance between myocardial contractility and vascular resistance, intraoperative hypotension is not necessarily an indication of reduced flow. However, tissue ischaemic injuries due to inadequate organ perfusion may occur if perfusion is compromised. A detailed analysis of the hypotensive events reported to WebAIRS is about to be commenced and ANZTADC welcomes any feedback or suggestions related to this topic.

References

1. Morris, R., et al., Crisis management during anaesthesia: hypotension. Qual Saf Health Care, 2005. 14(3): p. e11.
2. Borshoff D. The Anaesthetic Crisis Manual. Leeuwin Press. First published 2011. ISBN 978-0-646-90652-2.

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