

# Hypotension:

## A “Shocking” Scenario

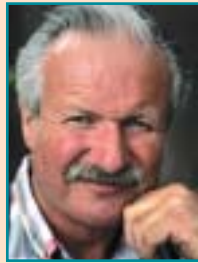


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### Cecil's Case

- Cecil, 60, is a male exotic dancer who collapsed on stage.
- On arrival to the emergency department, he is mumbling incoherently.
- Pulse: 111 bpm
- Blood pressure: 78/50 mmHg
- Respiratory rate: 20/minute
- Temperature: 20 C
- His manager states that Cecil likes beer and takes some heart pills. No further history is forthcoming.



How should you approach Cecil's hypotension?

For the answer, go to page 77.

Despite advances in medicine, shock can still have a high mortality rate. In 2001, Rivers *et al.* published a randomized, controlled trial of 263 septic patients using early goal-directed therapy. Although this study has been criticized as irrelevant to our current practice settings, as both groups received arterial and central venous lines, it clearly demonstrated that early aggressive resuscitation improves outcomes in patients with septic shock.

### How important is resuscitation?

The ABCs of resuscitation are germane to everything we do in shock management, but it is the D—definitive therapy (such as surgery for bleeding or reversal of coronary artery occlusion)—that underlies the resuscitation and all attempts are focused on providing this as soon as possible.

Although shock is a state of cellular hypoperfusion, the first priority remains resuscitation of the patient's airway and breathing. A tension pneumothorax is an easily correctable cause of hypotension and needs to be considered. Did Cecil simply slip and fall, causing a pneumothorax that subsequently tensioned?

Timely intubation results in optimal oxygenation, airway protection and a significant reduction in the work of breathing, which can consume up to 25% of metabolic resources in the unstable patient. The decision to intubate remains a clinical one, but consider it early in the process.

After any airway and breathing issues are dealt with, the next priority is to ensure the patient's volume status is adequate before proceeding to administer vasoactive agents.

# Hypotension

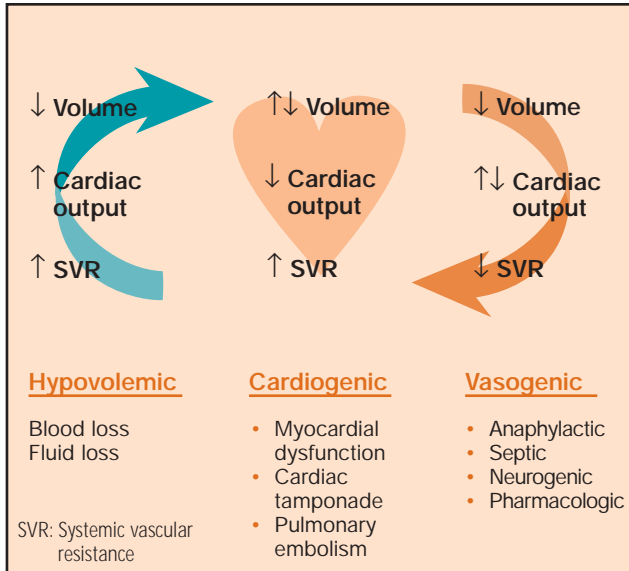


Figure 1. Classification of shock.

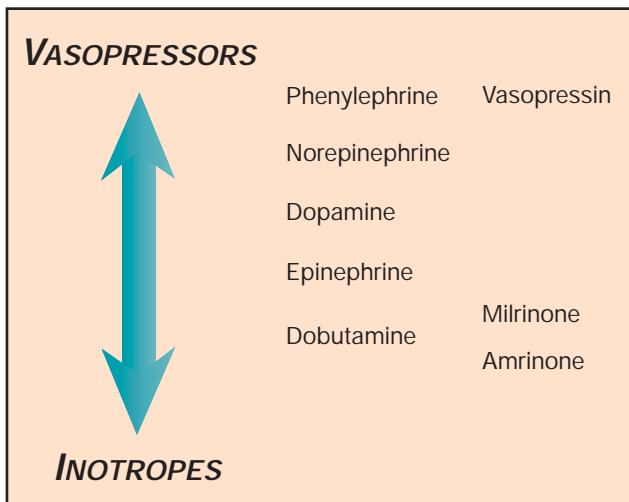


Figure 2. Relative effects of vasoactive agents used in hypotension.

## What comes next?

Having initiated resuscitation, you have time to obtain any further history surrounding the circumstances of the collapse. A “head-to-toe” secondary survey, interventions and investigations should be made. The classification of shock can be divided into hypovolemic, cardiogenic and vasogenic, with their primary defects being volume loss, depressed cardiac output and decreased systemic vascular resistance, respectively (Figure 1):

- 1. Hypovolemic cause:** Evidence of trauma and abdominal aneurysm (mass or femoral pulse deficits); perform a rectal exam and consider placing a nasogastric tube for gastrointestinal blood.
- 2. Cardiogenic cause:** A murmur may signify acute mitral or aortic valve regurgitation or a ventricular septal defect. An electrocardiogram will identify important arrhythmias and may identify ischemic events. Cardiac enzymes should be ordered. Perform a helical chest computed tomography scan for pulmonary embolus in the right clinical setting and a D-dimer can help rule this out.
- 3. Vasogenic cause:** Examine skin and oropharynx for hives or angioedema and also examine for a source of sepsis. A neurologic exam and rectal tone will identify spinal shock from trauma or an epidural bleed or abscess.



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## More on Cecil

- It is determined that his airway is patent and protected and oxygen is applied to obtain an oxygen saturation of 100%.
- An intravenous has been started; a bolus, 500 mls, of crystalloid is ordered while the situation is further assessed.
- A “finger stab” glucose is normal.
- A cursory exam determines that he is moving all four limbs and his pupils are equal and reactive.

For Cecil's treatment, go to [page 78](#).

### *How is each shock category treated?*

Hypovolemic shock is initially treated with crystalloid. The effect on mortality is about the same for crystalloids and colloids, but the added cost makes colloid less desirable. The timing of blood transfusion, if required, is still a clinical decision, but bleeding patients are best resuscitated with blood early. It is extremely rare to use vasoactive agents, as fluid administration and surgery are usually sufficient.

Renal dose dopamine (1 µg/kg/min to 5 µg/kg/min) is no longer considered to protect the kidneys from the hypoperfusion. The trend currently is to run the systolic blood pressure in the range of 80 mmHg to 90 mmHg to provide adequate perfusion without aggravating the bleeding in hemorrhagic shock.

Patients with cardiogenic shock uniformly have low cardiac output and intense peripheral vasoconstriction. Surgery is indicated for a valvular cause. Percutaneous coronary intervention (PCI) improves mortality in those < 75 years of age with a myocardial infarction. If PCI is not available or age is > 75 years, thrombolysis is indicated, but the outcome is poor. If their lungs are clear, judicious boluses of 250 mls crystalloid may help. Dobutamine is the first choice of inotrope as it increases contractility and causes peripheral vasodilation (Figure 2). A blood pressure of 90 mmHg is acceptable to minimize myocardial oxygen demand as long as the patient is mentating and putting out urine.

Table 1

## Commonly used vasoactive agents

Drug	Dose	Heart rate	Contractility	Vasopressor	Vasodilate
Dopamine	5 µg/kg/min to 25 µg/kg/min	++	+++	++	-
Dobutamine	1 µg/min to 30 µg/min	++++	++++	++++	+++
Epinephrine	2 µg/kg/min to 30 µg/kg/min	+	++	++++	-
Norepinephrine	1 µg/min to 10 µg/min	-	-	+++	-

-: Minimal effect  
+ to ++++: Increasing effects

## Cecil's Closing Act

- Cecil had electrocardiogram changes consistent with a large anterior myocardial infarction and he underwent successful percutaneous coronary intervention.
- He was resuscitated with crystalloid and it was felt that he did not initially need intubation, but he later required intubation for a short period.
- He was discharged after 10 days.
- Cecil dances on.

Vasogenic shock, such as in sepsis, requires aggressive fluid resuscitation, usually in combination with a vasopressor agent. The agent of choice for sepsis is norepinephrine, although dopamine is still acceptable. The important message is to use a drug that you are familiar with. Commonly used vasoactive agents are outlined in Table 1. Aim for a blood pressure of 90 mmHg with adequate urine output.

*cme*