If you’re preparing for the United States Medical Licensing Examination® (USMLE®) Step 1 exam, you might want to know which questions are most often missed by test takers. Check out this example from Kaplan Medical, and view an expert video explanation of the answer. Also check out all posts in this series.

This month’s question that stumped most students

An 82-year-old man is admitted after being involved in a motor vehicle collision. He has severe chest and abdominal injuries. His head and extremities are only minimally traumatized. He undergoes surgery for a splenic rupture. After eight hours, he becomes hypotensive and febrile, and is intubated because of respiratory failure. He rapidly develops disseminated intravascular coagulation (DIC). Which of the following is the most likely diagnosis?

A. Anaphylactic shock
B. Cardiogenic shock
C. Hypovolemic shock
D. Neurogenic shock
E. Septic shock

The correct answer is E.
Kaplan Medical explains why

The clinical setting of trauma produces the obvious cause of hemorrhage for shock, but you should be aware that the differential may actually be more complex and include other causes as well. In this case, abdominal trauma and surgery have probably introduced gut organisms into the bloodstream, leading to the development of septic shock several hours later. Another possibility that is not listed among the choices (because it could be an alternate correct answer) is that very severe trauma itself can sometimes initiate DIC via release of large numbers of cytokines and cellular degradation products.

Septic shock is a complex, multisystem organ failure that can be produced either by lipopolysaccharide (LPS), which is present in the cell wall of all gram-negative bacteria, or by certain toxins released by gram-positive bacteria and fungi. LPS binds to a serum protein and stimulates CD14 receptors on endothelial cells and circulating inflammatory cells, eliciting a broad range of end-organ responses similar to those seen in the trauma patient described here. It is important to have a high index of suspicion for septic shock as a cause of the DIC in a trauma setting because, unlike other causes of DIC, high-dose intravenous antibiotics would be indicated as part of the supportive therapy. The combination of septic shock and DIC is very life-threatening, as many cases progress to multiple organ failure.

Why you shouldn’t choose the other answers

Read these explanations to understand the important rationale for each answer.

**Choice A:** Anaphylactic shock is brought about by an exaggerated type I hypersensitivity reaction mediated by IgE antibodies bound to mast cells and basophils. The resulting degranulation produces massive histamine and adenosine release, which produces constriction of the bronchi and pulmonary circulation. It would be unlikely to be seen as a result of this patient's accident.

**Choice B:** Cardiogenic shock should be considered in this patient's differential diagnosis. If he had suffered a myocardial infarction that caused his accident or a cardiac tamponade as a result of the trauma, you would expect him to be in shock when he arrived at the hospital, rather than developing shock several hours later. A secondary myocardial infarction or cardiac failure as a result of the accident might cause shock several hours after admission, but would not be expected to cause his disseminated intravascular coagulation. Cardiogenic shock reflects the inability of the heart to maintain arterial pressure sufficiently to perfuse the systemic vasculature. Cardiogenic shock is intrinsic to the heart and usually a consequence of ischemia, arrhythmia or obstruction.
**Choice C:** Hypovolemic shock due to hemorrhage in the setting of trauma is a real clinical possibility in this case. If the patient had an unidentified site of moderate bleeding, it is conceivable that shock could develop over a period of hours. However, it would be unlikely to cause the disseminated intravascular coagulation. Hypovolemic shock occurs when blood volume decreases to a point at which it is inadequate to maintain arterial pressure in the vital organs. Hypovolemic shock is due to hemorrhage, fluid loss from burns or severe diarrhea and vomiting.

**Choice D:** Neurogenic shock can also be in the differential diagnosis in shock after severe trauma, but it usually occurs rapidly and would be seen at the time of initial examination. Neurogenic shock is an unusual form of shock that occurs in catastrophic nervous-system injuries that cause diffuse vasodilation and hypotension. It is an important cause of disseminated intravascular coagulation, probably secondary to the release of cytokines and cellular degradation products in the setting of massive central nervous system damage, but can be excluded in this case because there was comparatively little damage to the head.

For more prep questions on USMLE Steps 1 and 2, view other posts in this series.