**Table 8-2. Signs and Symptoms of Shock**

| Sign | Compensated Shock | Uncompensated Shock |
|---|---|---|
| Heart rate | Mildly increased | Markedly increased |
| Skin | Normal to cool | Cool, pale, clammy |
| Mental status | Normal | Dizzy, syncope, unconscious |
| Respirations | Normal | Tachypnea |
| Blood pressure | Normal | Decreased |

extent of the damage, and thus severity of shock, depends on the size of the affected area and the specific myocardial tissue involved. For example, occlusions of the right heart are generally less devastating than those involving the left heart. The left anterior descending artery supplies the left ventricle and septum and, if occluded, is called the *widow-maker* because it often results in sudden cardiac death.

### Obstructive Shock

Although sometimes classified as cardiogenic shock due to location, obstructive shock is differentiated by the physical obstruction of the heart or great vessels. Similar to cardiogenic shock, obstructive shock results in reduced cardiac output—not from a cardiac dysfunction, but rather from a direct restriction of blood flow.

One example of an obstructive event leading to shock is cardiac tamponade. This occurs when fluid—often blood—collects within the pericardial sac, thereby compressing the heart. As the tamponade accumulates and cardiac output decreases, the pulse pressure narrows and shock ensues. Another example is pulmonary embolism, which is the result of a thrombus or air bubble that lodges in the pulmonary vasculature. This prevents gas exchange in the lung tissue distal to this blockage. The degree of shock is directly proportional to the size of the vessel that is blocked. Another example is a tension pneumothorax. Similar to cardiac tamponade, a tension pneumothorax occurs when air is trapped in the pleural space. The affected lung is compressed as the volume of air increases. This decreases the number of alveoli for gas exchange. When the amount of unoxygenated blood being shunted to the left heart reaches a critical level, hypoxia develops. In addition, the unilateral increased intrathoracic pressure displaces the mediastinum, kinks the aortic arch, and severely decreases the cardiac output.

## Signs and Symptoms of Shock

Rapid assessment and intervention are the keys to successful resuscitation of an individual in shock. Recognition of early signs and symptoms can help the athletic trainer intervene early and avoid the rapid escalation of the cascading events leading to decompensation and death. These early signals are not always obvious, and identifying them is more of an art than a science.

As the patient transitions from normal hemodynamic perfusion to hemodynamic instability due to shock, he or she will, at least briefly, compensate for the shock. For example, if an athlete loses fluid due to dehydration, the body will initially compensate for mild fluid loss by increasing the heart rate, vasoconstriction, and cardiac contractility. These measures can compensate temporarily and arrest the progression of shock if the underlying condition is corrected. Therefore, if rehydration is started and fluid is replaced, progress to shock is halted. However, if, the underlying condition is not corrected or is allowed to worsen, the body's compensatory mechanisms become overwhelmed and shock ensues.

Hypovolemic shock is the most common type of shock encountered by the athletic trainer. Signs and symptoms of compensated hypovolemic shock are dry mucous membranes, thirst, decreased urination, concentrated urine, and mild tachycardia. Blood pressure is ultimately maintained. As shock progresses and compensatory mechanisms are unable to cope with the fluid deficit, signs and symptoms become associated with hypoperfusion syndrome. The body defenses shunt fluid away from the periphery to preserve the brain, heart, and kidneys. Thus, signs and symptoms of uncompensated shock include pale, clammy skin; weak, thready pulse; tachycardia; lightheadedness; syncope; and hypotension. When these developments occur, the vital organs begin to suffer from lack of perfusion. If corrective action is not taken, the risk of permanent injury to these organs increases (Table 8-2).

## Sepsis

When the body is invaded by microorganisms, it responds in a predictable manner. This response involves attacking the microbes by increasing production of and dispatching leukocytes (white blood cells) to the infected areas. Leukocytes engulf and immobilize organisms, clearing them from the body. Some microorganisms and parasites have developed their own defenses, by which they use the leukocytes as hosts or transport vessels, thus evading the leukocyte system of defense.