



## Treatment of Shock in WWI Military Medicine II

The topic of prevention and treatment of shock due to hypothermia and blood loss is discussed in the Shock I article on this website. This will deal with postural and medication options available in WWI. Fluid resuscitation will be discussed in Part III.

Shock I described the definition and pathophysiology of traumatic shock as it related to WWI battlefield medicine. The symptoms of shock include:

1. Low blood pressure. This leads to poor blood flow to the organs and tissues of the body.
2. Rapid pulse as the heart tries to compensate for the low blood pressure.
3. Cool extremities as the body tries to preserve blood flow to critical organs.
4. Weak pulse, due to the low blood pressure.
5. Confusion or altered mental state due to the above and low blood flow to the brain. More severe cases will be unconscious.

In addition to the treatments I discussed in Shock I, battalion aid stations and field hospitals tried several other treatments. These were desperate times that led to treatments that seemed to make sense at the time, but we now know were ineffective.

### POSTURAL THERAPY

This is an example of a fact we have beat our heads against throughout the history of medicine. Something may be logical, but that doesn't make it so. Postural therapy for shock is a perfect example. At desperate moments, doctors still use it today even though it rarely works.

Friedrich Trendelenburg (1844-1924) described a position in which a patient lies flat (usually on the back) on a surface that is tilted to get his/her feet higher than the head. This became known as the *Trendelenburg Position*. The use of this in shock made perfect sense. There is a reservoir of blood in the large veins of the upper legs, pelvis, and abdomen. In theory, the Trendelenburg position uses gravity to move blood from that reservoir to the heart.

That all made perfect sense, but it turns out it doesn't work very well, if at all. There are cases where Trendelenburg position seems to help, but most of the time, it does not. The use of this position became popular during and after WWI, but it turns out that there were no studies that showed it actually worked with any consistency. In *The Medical Department of the US Army in the World War, Volume XI; Surgery*, page 191, the last sentence says, "...the attempt to improve the circulation by postural change is naturally futile."

Other drawbacks of the Trendelenburg position include patient discomfort (not a trivial issue in a patient who may be in great pain from his wound), vomiting, and the fact that increased venous blood pooling in the brain could worsen brain injuries. This position was not used for anyone with a face or brain injury.

#### VASOCONSTRICTOR MEDICATIONS

A mainstay in the modern treatment of septic shock, safe vasopressors were not available during WWI. These are drugs that narrow (constrict) arteries, which can bring blood pressure up in shock cases. Some of the drugs stimulate the heart to pump more vigorously. However, even in modern treatment, vasopressor medications are avoided to the greatest degree possible in hemorrhagic or traumatic shock, since they don't address the fundamental problem of inadequate blood volume. Modern traumatic shock treatment focuses on stopping bleeding and using transfusions and IV fluids to restore blood volume. Bleeding control was the only one of these options available before a casualty arrived at an evacuation hospital.

Adrenalin and pituitrin were occasionally used in the treatment of shock during the early 20th Century. Pituitrin was an extract from cow pituitary glands. This contained two hormones: oxytocin and vasopressin. Oxytocin is of no benefit in shock treatment. Vasopressin is useful in shock treatment, and is still in use today. Adrenalin was derived from adrenal extracts at first but was synthesized in the laboratory in 1904 and became commercially available in 1906.

Surgeons noted that while pituitrin and adrenalin raised blood pressure in trauma patients, the effect was temporary and didn't seem to be of much benefit. The down-side effects of vasoconstriction of small vessels in trauma patients was recognized at the time, and these drugs were rarely used as a result. They were

not available below the base hospital level in the American military medical system.

Strychnine was used for a time in the 1800s, and persisted into the early 20th Century. It had fallen out of favor by the end of WWI. While the drug did stimulate a rise in blood pressure, toxicity and deaths discredited its use. Like other vasoconstrictors, it also failed to address the fundamental causes of traumatic shock.

References:

Ireland, M.W, ed. *The Medical Department of the United States Army in the World War, Volume XI, Surgery, Part One*. 1927, Washington D.C. Government Printing Office.

In addition to the above source, I drew on years of research, training, and experience as a critical care medicine physician in the preparation of the series of articles I wrote for this website.

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