In Afghanistan during Operation Anaconda on March 4, 2002, Air Force combat medic Jason Cunningham was shot several times, and while saving fellow comrades he bled to death an hour before help arrived. The same has happened to countless police officers unable to immediately reach medical attention.

Medical personnel have known for years that approximately 80 percent of combat deaths occur within 30 minutes of wounding, often because of loss of blood. Bleeding, or acute hemorrhage in medical terms, is a leading cause of death in trauma cases among the civilian population. And that includes police officers. If you can stop the bleeding you can save lives.

In both law enforcement and military operations, gunshot wound victims under certain situations may be prevented from being immediately evacuated. Police officers are often first on the scene of a shooting or...
motor vehicle accident, where effective and immediate early hemorrhage control (hemostasis) is essential to saving lives. This becomes even more important when an injured officer must be able to effectively self-apply a bandage without assistance or control the bleeding of a fellow officer or injured victim.

New hemostatic bandages currently being marketed contain agents that make blood clot more quickly than the body can on its own. The faster the blood clots, the less blood is lost and the better chance the victim has to survive. Recently, tactical medics, both law enforcement and military, have had success with this new technology.

Hemostatic Bandages

Currently, there are several new blood-clotting hemostatic bandages on the market or being tested. Each takes a different approach to stopping bleeding, and each has advantages and disadvantages. Anyone who can apply a bandage can use these products. Within reason, this covers just about everyone in medicine, the military, and law enforcement. The benefits are lives saved, at least in theory. Therefore, the topic is a must for unbiased discussion.

Blood clotting is the body's way of closing a wound to prevent blood loss. For small wounds, a clot begins to form a mesh of platelets and blood cells within one to two minutes.

If, however, the wound is large and the blood flow is under pressure, such as in a wound to the femoral artery in the thigh, the normal clotting mechanism fails to stop the bleeding, and the victim can bleed to death within a few minutes.

Hemostatic bandages are made to supplement the body's clotting process to stop bleeding. Readers are strongly urged to carefully conduct their own investigation to determine what is best for their agency, team, and level of training. It should also be noted that the information in this article was obtained from the manufacturers, representatives from the companies, and from physicians, surgeons, and medics who have actually used these products on the battlefield.

HemCon

HemCon Bandage is manufactured by HemCon Inc. of Tigard, Ore. It uses a material called Chitosan, a biodegradable, nontoxic, complex carbohydrate of chitin, which is found in the exoskeletons of shellfish.

It will not cause an allergic reaction, according to product literature. A recent study by the U.S. Army Institute of Surgical Research looked at the effectiveness of a chitosan-based hemostatic dressing to prevent blood loss in swine. Based on the results, the team concluded that a chitosan dressing reduced hemorrhage and improved survival after severe liver injury in swine and that further studies are warranted.

The bandage is designed for immediate hemorrhage control and is deployable by an injured soldier, combat medic, or an untrained first responder. The bandage has been tested in animal models of severe bleeding by the U.S. Army and other laboratories.

Company literature claims HemCon is superior to all known hemorrhage dressings. But John Hagman, M.D., medical director for the FBI Hostage rescue team, reported at the December 2003 Special Operations Medical Association (SOMA) conference in Orlando, Fla., that a recent study completed for the U.S. Air Force showed HemCon had a significant failure rate.

The disadvantage for most agencies is the price. One package of five, 4x4-inch bandages is packaged in a sterile foil pouch and is priced at $495. In addition, the product has only a six-month shelf life.

QuikClot

QuikClot is manufactured by Z-Medica of Newington, Conn. According to product literature, newspaper articles, and press releases from Z-Medica, QuikClot was used extensively during Operation Iraqi Freedom. The active ingredient in the product is called granular zeolite, a substance derived from lava rocks. When this material is placed into a bleeding wound, it absorbs the water molecules in the blood and creates a high platelet concentration to promote clotting. This causes an exothermic reaction. In other words, it gives off heat.

Several U.S. Navy physicians who served in Iraq report that QuikClot produces sufficient heat to cause burns to the skin if measures are not taken to wipe off water, sweat, and excess blood from the wound and skin before use. In fact, Navy Corpsmen that served with Marine combat units in Iraq reported they observed
“second-degree burns” in Iraqi soldiers treated with QuikClot.

QuikClot concentrates clotting factors in the blood by promoting extremely rapid adsorption of fluids in and around the wound, creating a matrix for clot formation. As per product literature instructions, QuikClot is to be poured directly onto an open bleeding wound where it promotes formation of a stable powerful clot. The clot, according to Z-Medica, is then easily removed through suction or irrigation of the wound when the patient arrives at a care facility.

The exact formula of QuikClot is proprietary, but it contains no biological or botanical material, thus decreasing the chance of an allergic reaction.

Although some organizations are not completely sold on QuikClot, the Navy and Marines performed a limited study using a swine model and were impressed. Webb found most worrisome, however, was the potential for burns resulting from use of the product.

“Exothermic reactions can cause second-degree burns on surrounding tissue. It is impossible to dry the wound enough to prevent burning. If you can dry the wound that well, you don’t need QuikClot.”

QuikClot packaging has a net weight of 3.5 ounces, and is vacuum-packed in a sterile foil pouch. Poly-N-acetylglucosamine accelerates the normal clotting process resulting in the rapid control of bleeding.

The dressing is easy to handle and coats the wound surface. A distinct advantage of the RDH bandage is that it is fully biodegradable and can be left in place on a bleeding surface to provide continued hemostasis after wound closure.

Studies looking at the effectiveness of the RDH Bandage have been conducted at the Department of Surgery, Ryder Trauma Center, University of Miami School of Medicine in Miami, Fla., and the Department of Surgery, New England Medical Center in Boston, Mass.

The RDH bandage is packaged as a soft, white 4x4-inch sterile non-woven pad of a cellulose polymer placed on gauze backing in a sterile foil packet. It is heat sealed on all four sides. The top of the packet has an easy tear notch. Labeling on both front and back includes instructions, diagrams, and warnings. The retail price is $21.99 per packet.

RDH Rapid Deployment Hemostat Bandage, or RDH, is manufactured by Marine Polymer Technologies in Danvers, Mass. The material used to promote blood clotting, poly-N-acetylgulcosamine (p-GlcNAc), is derived from single-cell algae found in the ocean. The dressing is in powder form and is based on a case-by-case basis, according to the Marine Corps to evaluate the continued use of QuikClot. Col. David G. Burris, M.D., interim chairman of the Department of Surgery, New England Medical Center in Boston, Mass.

The RDH bandage is intended for the EMS environment, it is intended for the temporary treatment and management of severe bleeding while in transit to a hospital or trauma center.

TraumaDEX is manufactured by Medafor Inc. of Minneapolis, Minn., and the following information was provided by its executive vice president, Bob Cerza.

TraumaDEX is a wound-dressing agent utilizing Microporous Polysaccharide Hemostatic (MPH) technology that has been naturally synthesized from potato starch. When applied directly with pressure to a actively bleeding wound, the particles accelerate natural blood clotting by concentrating blood solids such as platelets and red blood cells, and other blood proteins such as albumin, thrombin, and fibrinogen to form a gel around the particles. TraumaDEX material creates a high concentration of platelets, thrombin, fibrinogen, and other proteins on the particle surface, producing a gelling action. The gelled, compacted cells thrombin and fibrinogen accelerate the normal clotting process. This gelling process has been shown to initiate within seconds. In the emergency department or the EMS environment, it is intended for the temporary treatment and management of severe bleeding while in transit to a hospital or trauma center.

Medafor Inc.’s TraumaDEX is naturally synthesized from potato starch. The powder is available in sizes ranging from 0.5 grams to 5 grams. The shelf life for unopened packages is three to five years.

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applied directly to the bleeding wound. Other studies on the effectiveness of TraumaDEX including the Mayo Clinic and the Minneapolis Medical Research Foundation. However, results are not available. TraumaDEX does not cause an exothermic reaction, so there is no risk of secondary burns to the skin as found with QuikClot. Also unlike QuikClot, TraumaDEX is resorbed naturally by the body within hours and does not need to be washed out of the wound prior to definitive wound repair. It is also very reasonably priced. The 0.5 gram package is $7, the 2 gram package is $15, and the 5 gram package is $25. TraumaDEX is bio-compatible, and there is no risk of transmission of disease or immune response. The shelf life for unopened packages is three to five years.

Urgent QR

Urgent QR is manufactured by BioLife LLC based in Sarasota, Fla. The material is composed of a non-toxic polymer and a potassium salt and thrombin derived from cow’s blood.

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HemCon
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Marine Polymer Technologies
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Medafor
(TraumaDEX)
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Z-MEDICA
(QuikClot)
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