

Abdominal tourniquet gives lifesaving time

Ex-soldiers design inflatable device for field wounds

By Michelle Tan
mtan@militarytimes.com

A tourniquet designed by three former soldiers is saving lives in Afghanistan and at home.

The Abdominal Aortic Tourniquet stops bleeding in casualties with pelvic, groin or upper thigh injuries — areas regular tourniquets can't reach. It uses an inflatable wedge-shaped bladder to push in on the lower abdomen, clamping down the aorta and preventing the patient from bleeding out.

"When you're bleeding, you don't have a lot of time," said retired Master Sgt. Ted Westmoreland, a former special operations soldier and medic who helped design the AAT.

Westmoreland also was one of the designers of the Combat Application Tourniquet, which is carried by virtually every soldier on the battlefield and has saved countless lives in Iraq and Afghanistan.

The CAT stopped blood loss from a casualty's limbs, but one "glaring problem" that remained was how to stop "junctional hemorrhage, where an extremity tourniquet can't be applied," said Westmoreland, general manager of Speer Operational Technologies.

This problem is exacerbated by

the use of improvised explosive devices and land mines on the battlefield, which cause amputations high on the legs and wounds in the pelvic region, he said.

"Our body armor comes down to the waistline," he said. "There's a massive amount of blood loss when you hit the femoral artery in the leg or higher."

Blood loss is the most common preventable cause of death among combat troops, and Army researchers estimate about 20 percent of combat deaths are caused by blood loss from the wounded service member's lower body.

The AAT works by putting the right amount of pressure on the abdomen, said Westmoreland, who worked on the device with Dr. John Croushorn, a former officer who is the emergency room chief at Trinity Medical Center in Birmingham, Ala., and Dr. Richard Schwartz, who served with 5th Special Forces Group and is chairman of the emergency medicine department at Georgia Regents University.

The design is simple enough for anyone to use, Westmoreland said. "If you can find the navel, you can tighten and squeeze a hand pump, you can use this device," he said.

The AAT was sent to Afghanistan with special operations units in 2012, Westmoreland said.

The first ones saved

This April, the AAT was used on its first casualty downrange, Westmoreland said.

ABOUT THE DEVICE

The Abdominal Aortic Tourniquet uses a wedge-shaped bladder that can be inflated to put pressure on the lower abdomen and compress the descending aorta. More details:

Size: Fanny pack, approximately

Dimensions: 9 inches wide, 8 inches deep, 2 inches high

Weight: 17 ounces

Duration: FDA approved for 60 minutes of application.

Pressurization: Manual, using inflator bulb

Environment: -40 degrees Celsius to 85 degrees Celsius

FDA approval: 2011

Maker: Compression Works LLC

The service member had tourniquets on both legs, but he continued to bleed on the medevac helicopter. The medic applied the AAT and the patient's vital signs returned to normal within 10 seconds, Westmoreland said.

The device "concentrates oxygenated blood in the core where it belongs, to preserve the heart, brain and vital organs," he said.

The service member lost both of his legs, but he survived the mine blast, Westmoreland said.

The AAT also can be used to stop junctional bleeding in the shoulder region, although the device is still pending Food and Drug Administration approval for use in that way.

In June, a gunshot victim was brought to Croushorn's emergency room in Birmingham, Westmoreland said. The victim, who was un-



SPEER OPERATIONAL TECHNOLOGIES

The Abdominal Aortic Tourniquet provides a rapid application of pneumatic compression to the aorta at the abdominal-pelvic junction, acting as a valve to stem blood flow.

responsive, had been shot in the shoulder and was bleeding profusely from his brachial artery.

Croushorn happened to be on duty that day and he had an AAT in his office. When he and his staff couldn't control the patient's bleeding, he had someone grab the AAT, and he used it on the patient, Westmoreland said.

The AAT stopped the patient's bleeding long enough for him to be taken to surgery. He survived his wounds, even though he had lost about 75 percent of his blood volume, Westmoreland said.

"It's a great device, and we think it's going to do a lot of good," he said. "All the people involved in it served in the Army, and the reason they're contributing to it is they're still devoted to increasing the survivability of our soldiers on the battlefield."

'How much time? ... None'

The AAT is used primarily by special operations forces, but it is available for conventional units to buy, said Criss Crossley, the military program manager for Speer and a retired sergeant first class.

The AAT works for wounds that previously were unsurvivable, Westmoreland said.

"I was an infantry soldier, and I got to go into Special Forces as a medic, and I got to serve as an assault medic for a long time," he said. "I've treated a lot of wounded people. This is a great solution to providing units with capabilities to keep people alive that previously would not survive."

He cited a friend who was shot in the pelvis during a mission in 2005.

"An assault medic was right there. He treated him and loaded him onto the helicopter very quickly," Westmoreland said. "[The patient] squeezed their hands before takeoff. He was 12 minutes from a surgeon, and he died before the helicopter landed. How much time do you have when you're bleeding? None."

Eventually, Westmoreland and Crossley said they would like for every medic to have an AAT in their kit bags.

"Medics can now do things we didn't even envision before this conflict started," Westmoreland said. □