

USE OF A TACTICAL TOURNIQUET

By Chuck Soltys, EMT-B

In November of 2007, NFL player Sean Taylor was shot during a home invasion while in his residence in an upscale Miami neighborhood. Taylor sustained a gunshot wound in the leg injuring his femoral artery and he bled to death. In May of 2008, a Portland Maine police officer unintentionally discharged his firearm while preparing for duty. The bullet struck the officer in the upper leg and he died shortly thereafter. To many, it may seem unlikely if not impossible to die from a gunshot wound to the leg. The fact of the matter is that many lives have been lost on the battlefields of every war due to rapid blood loss from extremity wounds. It is entirely possible that the proper and immediate application of a tourniquet may have saved both of these men's lives. And, with the advancements in medical technology and depending on the extent of the injury, Taylor may have been able to resume his NFL career. In July 2008, a Wichita Kansas police officer survived after being shot in both legs. One of the responding officers had military medical training and applied a tourniquet. He is credited with saving the officer's life. While there may be relatively few civilians that know how to use a tourniquet and even fewer that would have one available if faced with a situation such as Taylor's, everyone in law enforcement and the military should be skilled in the use of a tourniquet and have one available or at least know how to improvise one.

In civilian Emergency Medical Service (EMS), they have an aversion to the use of a tourniquet. In the Tactical Combat Casualty Care (TCCC) or Tactical Emergency Medical Support (TEMS) environment, it is the preferred method of controlling life-threatening extremity hemorrhage. In the Viet Nam War alone, over 2500 deaths have been attributed to hemorrhage caused by extremity wounds. These casualties had no other injuries.

Remember that you and the casualty (assuming you are not the casualty) are in grave danger while applying a tourniquet or treating life-threatening injuries in a hostile environment. Non life-threatening injuries should be ignored until the scene is safe. The decision regarding the relative risk of further injury versus that of bleeding to death must be made by the person rendering care.

The first step in TCCC or TEMS is to **ELIMINATE THE THREAT!**

Battlefield Case Studies

Civil War (fatality)

- Leading Confederate General (Albert Sydney Johnston)
- KIA at Shiloh April 7, 1862
- Gen. Johnston's surgeon, Dr. David Yandell, directed that tourniquets be issued. During the battle, Gen. Johnston sustained an injury to the popliteal artery (located just above and behind the knee) and bled to death
- Tourniquet was in his pocket

Operation Iraqi Freedom (fatality)

- Marine shot in the leg
- Pulsatile femoral artery bleeding
- Corpsman arrived 10 minutes later
- Attempted to use hemostatic material, which failed
- IV attempted-failed
- Tourniquet finally applied-too late
- Casualty died

Self Care/Buddy Care

Training in the area of Self Care and Buddy Care has long been overlooked in basic law enforcement academy curriculums as well as in-service programs. If you or fellow officers are seriously injured during a hostile attack on the street, for an unspecified amount of time, you are on your own! Even the best intentioned EMTs and paramedics will likely not be permitted to come to your aid until the threat has been eliminated. That time lapse could be the difference between life and death. The steps that need to be taken to ensure your survival are simple. But, you must have the training and equipment necessary to accomplish this available when something bad happens.

Gear Placement

“The need for immediate access to a tourniquet in such situations makes it clear that all soldiers on combat missions should have a suitable tourniquet readily available in a standard location in their battle gear and be trained to use it” (Butler, Hagmann, and Butler, *Military Medicine* 1996).

Some experts feel that rather than to hide the tourniquet in a cargo pocket/pouch somewhere different on each operator, the "perfect" location for a tactical tourniquet on an operator is to mount it on the front center upper chest area of the tactical vest, attached via two large rubber bands. Sections cut from bicycle inner tubes are ideal for mounting tourniquets on the vest. The tourniquet should be “pre-loaded” meaning to have the strap set in a condition to immediately apply it. When an operator is injured, he can simply grab the tourniquet and rip it away and immediately put the tourniquet into use. With proper training, he should be able to accomplish this with either hand, day or night. Ideally, getting your team to carry emergency equipment such as a tactical tourniquet on the front 180 degrees of their vest, in a standardized location would be beneficial.

For patrol officers, a tourniquet should be on your person. If that is not possible, it should be included in a basic individual emergency medical kit and stored in the compartment on the driver’s side door or in the center console. Keep in mind that there is a serious compromise when the decision is made to store the tourniquet in the vehicle as opposed to on your person. In all likelihood you may be separated from your patrol car making it potentially difficult, if not impossible to get to when needed.

You are not afforded the luxury of choosing when, where, and how you will be attacked. That will be decided for you. Therefore, these are come as you are events. By virtue of the oath you took, you have an obligation to be prepared. All of the highest speed equipment and training is useless if it is not with you when you need it.

Vital Arteries and Nerves in the Leg

The femoral artery located deep in the thigh, is the major vessel that supplies blood to the thigh, while the anterior (front) and posterior (back) tibial arteries are the primary blood vessels in the lower leg. The major nerve in the leg is the sciatic nerve—the largest nerve in the body, which carries motor information to, and sensory information from most of the leg and foot. Another primary nerve is the tibial nerve, which branches off the sciatic nerve in the lower leg.

According to Dr. Andrew Dennis, trauma surgeon and tactical physician, “the anatomy is very predictable and even in the fattest of people the vessels are palpable (able to be felt by the hands) in the groin.” The femoral artery would be no more or less prone to penetrating injury in a highly conditioned athlete with very low body fat or a high percentage of lean muscle tissue (such as Sean Taylor). It would be anatomically indifferent.

Basic Hemorrhage Control

The vast majority of extremity hemorrhage caused by penetrating trauma can be controlled by direct pressure and elevation. Hemorrhage control by direct pressure is best accomplished by applying firm circumferential pressure around the limb trapping the injured artery against the bone and elevating the limb until bleeding is completely occluded. There are currently a variety of emergency compression dressings on the market that work very well to control hemorrhaging. The OLAES Modular Bandage (www.tacmedsolutions.com) and the Israeli Battle Dressing (www.ps-med.com) are two of the most popular bandages available. If the mechanism of injury has caused a large open wound or considerable tissue damage (i.e. shotgun wound or blast injury), packing sterile gauze into the wound is essential prior to applying a compressive dressing. Once direct pressure and/or a compressive dressing have been applied, the injured extremity should be elevated. The casualty’s body temperature should be monitored and arrangements made for immediate transport to a trauma hospital.

Hemorrhage Control in the TACTICAL ENVIRONMENT

The tactical situation or the presence of an existing hostile threat may not allow the time and may prevent conventional methods of hemorrhage control such as direct pressure, elevation, and/or the use of a hemostatic agent. The recommended means to control extremity bleeding in a tactical environment while under fire is a rapidly and properly applied tourniquet.

If the casualty is shot in the head, neck, or torso, it is a load-and-go situation and medical care should be administered while enroute to a trauma hospital. If bullets or knives penetrate an arm or leg, these wounds are almost always survivable if a tourniquet is used immediately (delayed only by the officer first neutralizing the immediate threats). Once

the bleeding is controlled, it is generally not an immediate life-threatening emergency. The officer can remain behind cover until the extraction route has been tactically cleared. Simply leave the tourniquet in place until arrival at the hospital. In a typical domestic law enforcement situation, if arrival at a hospital cannot be accomplished within 2 hours, there was something drastically wrong with the plan. Wilderness operations and military operations may be an exception to this. Dr. John Wipfler, tactical and emergency physician, puts it this way "When shot or stabbed in the arm or leg, it's simple...neutralize all known threats or until you are in a safe place, and then apply a tourniquet immediately. If you have a medic or fellow officer who wants to first try (for 20 - 30 seconds) to apply direct pressure or a compressive dressing, that's fine. If you are by yourself, apply a tourniquet pronto."

The use of tourniquets has long been discouraged by traditional EMS protocols. However, direct pressure is difficult to maintain during casualty extraction or transport under fire. As combat changes, so do our methods of treatment. In tactical medicine (TEMS), the training and use of tourniquets is not only accepted, it has become the standard intervention for life threatening bleeding injuries to extremities where time or situation are not conducive to the use of direct pressure methods. Tourniquet use is the most reasonable initial choice to stop extremity bleeding as you initiate care to yourself or someone else while under fire. Tourniquets should be immediately available to every officer on the street and should be part of the standard gear load-out for all SWAT operators. As with other life-saving equipment in the tactical environment, where there is a need for one tourniquet, there may very well be a need for more.

Training in the proper use of a tourniquet is crucial. Generally speaking, a tourniquet will more likely be required for arterial bleeding rather than for venous bleeding. Arterial blood is oxygenated blood being pumped from the heart and is characterized by bright red blood spurting from the wound. Venous blood is deoxygenated blood that is returning to the heart and is characterized by a steady flow of dark red blood from the wound. The military cites several issues from the front lines regarding the use of tourniquets.

- Tourniquets are not being placed correctly
- Too liberal use of tourniquets on small oozing distal wounds
- Tourniquets are not being tightened enough

Types of Tourniquets

1. Manufactured: There are a variety of well designed and manufactured tactical tourniquets currently on the market. In order to be a viable tourniquet for use in the tactical environment, the tourniquet must possess the following qualities (in no particular order):

- Easy to use. Can be applied one-handed
- Durable enough so that sufficient tension to occlude bleeding can be applied
- At least 1" wide
- Large enough to fit most upper legs

- Lightweight and compact
- Cost effective (since it is considered a disposable item)

The only tactical tourniquets currently approved for military issue are the Special Operations Forces Tactical Tourniquet (SOFTT)™ (www.tacmedsolutions.com) and the Combat Application Tourniquet (CAT)™ (www.combattourniquet.com).

2. Improvised: The windlass/cravat is an improvised tourniquet made by using a length of 1" or wider strap, webbing, or folded cravat and stick, tool, etc. to use as a windlass to apply sufficient tension. Using anything less than 1" wide for a tourniquet could substantially increase the risk of nerve damage to the victim and possibly result in permanent injury. However, life is more important than limb. If all that is available to use is something less than 1" wide and the blood flow is life-threatening; you must use what you have at your disposal. When improvising a tourniquet, you are only limited by your imagination. Items such as belts, rifle slings, or T-Shirts are just a couple of examples of items that most people would have with them and could be configured into an effective tourniquet. A tree branch, tool, or handcuffs are examples of items that could be used as a windlass. According to former operator and renowned trainer, Henk Iverson, who is currently training U.S. military troops, using the Israeli Battle Dressing as a "tourniquet" works well if applied properly. You may need to substitute a more durable object for the windlass in place of the plastic clip supplied with the bandage. It does take practice, especially if your hands are covered in blood. Training on making and applying an improvised tourniquet will be beneficial should you ever have to do it for real.

Facts about Tourniquets

- Damage to an arm or leg is rare if/when a tourniquet that is 1-2 inches in width is properly applied. Tourniquets may be left in place for 2-4 hours without difficulty, even up to 6 hours in some cases
- Tourniquets are often left in place for several hours during surgical procedures
- In the face of massive extremity hemorrhage, it is better to accept the small risk of damage to the limb than to have a casualty bleed to death
- A properly applied tourniquet is extremely painful. In fact, it will often be more painful than the actual gunshot or knife wound itself, and it will be significantly painful and function of the limb will be reduced until the tourniquet is removed. When a tourniquet is tightened sufficiently to occlude arterial flow, the muscles under the tourniquet can no longer contract, (or if they do, muscle damage or tearing can result)

Common Errors with Tourniquet Use

- Not using a tourniquet when you should (arterial bleeding)
- Using a tourniquet when you shouldn't (minor bleeding)
- Applying the tourniquet too high above the wound
- Not removing the tourniquet when you could (this should be left to experienced medical personnel in a medical facility)
- Not applying the tourniquet tight enough to stop hemorrhage

Tourniquet Application

Proper and immediate application of a tourniquet is critical since it takes about 2-4 minutes to bleed to death from a complete femoral artery and vein disruption.

- Apply without delay for life-threatening bleeding
- All gear and clothing should be removed from the wound site prior to applying the tourniquet
- Apply 2-3 inches above bleeding site
- Windlass should be placed directly over anatomical location of injured artery
- Tighten it until bleeding stops. A quick check of the radial pulse (in wrist area) or foot (top of foot or behind the inside ankle bone) to make sure the pulse is gone may be worthwhile when time allows
- Note time of application (with marker on forehead)
- Periodically check to ensure bleeding has not resumed

It is very important for all tactical operators and medics to practice repeatedly until the application of a tourniquet can be done confidently and rapidly within 30 seconds under simulated “real world” conditions, with either hand (using only one hand) when applying a tourniquet on their own leg or arm.

Tourniquet Removal

- If at all possible, tourniquet removal should be left to experienced medical personnel in a medical facility
- For extended transport times (i.e. delay of more than 2-4 hours in getting casualty to a hospital), if the decision is made to loosen or remove the tourniquet, a properly placed compressive dressing, with or without hemostatic agents, should be put in place before the tourniquet is loosened. After releasing tourniquet, if significant bleeding through the dressing occurs, promptly re-tighten the tourniquet
- When removing the tourniquet, loosen slowly and leave it in place
- Do not remove if there is no distal extremity
- If CASEVAC (casualty evacuation) is 2 hours or less, tourniquet should not be removed

REMEMBER: If unable to control bleeding except with a tourniquet, it is better to sacrifice a limb than to lose a life to excessive bleeding.

Conclusion

Considering the threats faced by the police and military, it is no longer acceptable to report for duty only having attended a basic first aid class. This type of training is fine for a Boy Scout seeking a merit badge, but the police and military must not only be prepared and equipped to deal with a life threatening injury to themselves and/or their buddies, they must also be prepared to accept the responsibility of sustaining that emergency medical treatment until the casualty can be relinquished to a more definitive medical provider.

If your employing agency does not or will not provide you with the necessary emergency medical training and equipment, you must obtain it on your own. Everyone owes a certain amount of their own time and money to their chosen profession. While you may be right that this is the responsibility of your employer, don't be dead right!

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About the Author

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