

Experts Reach Consensus on Amputation Techniques for War Injuries

The military medical system seeks to provide the best care possible for those individuals injured while serving our nation. Because war injuries commonly affect the extremities and sometimes result in the loss of a limb, amputation has long been a core competency in military medicine. Our goal at Walter Reed Medical Center and the Amputee Health Care Center of Excellence is to continue this tradition and ensure that the latest treatment options are investigated and applied in an appropriate, considered fashion, recognizing the time-honored lessons of care for battlefield injuries.

To synthesize past lessons and current state-of-the-art amputation techniques, a conference was convened at Walter Reed Medical Center on March 11, 2003, and surgeons with experience in past wars, current military and civilian orthopaedic traumatologists, and orthopaedic surgeons were invited to discuss current options for treatment. While differences of opinion were present and may persist, a remarkable consensus of approach to these injuries emerged.

Amputation injuries, particularly those sustained in war, are severe injuries that require expert care from many specialists. These complex injuries often require individualized solutions. Although there are many sources of information regarding amputation and rehabilitation, one

specific approach may or may not apply to a particular situation. The following document represents a consensus of civilian and military surgeons, prosthetists, physiatrists, and therapists on some issues surrounding amputation techniques.

Goal of Amputation Surgery

The goal of all amputation surgery is to maximize function. This involves appropriate management of the blood vessels, nerves, muscle, skin, and bone. Injuries with severe wounds require staged management. Delayed reconstructive or revision surgery of the amputated limb may be needed to further optimize function.

War Injuries Are Different!

These injuries are very different from civilian injuries and are often accompanied by more soft tissue damage. The initial trauma is often associated with very high energy, is subject to more complications, and may take longer to heal. This severe damage to the soft tissue envelope, the skin and muscle, may require higher amputation levels to prevent infection and allow for bone coverage.

Rapid and effective evacuation from the war zone can save lives, but it can induce additional stress and lead to open and contaminated wounds. As a consequence, wartime amputees may require longer hospitalization and have more surgical procedures to safely manage these wounds. It may take as long as one year from the time of injury to obtain a stable limb and successful prosthetic fitting.



War Injuries Require a Staged Management Plan of Care

- 1) Initial battlefield amputation and stabilization of the soldier's associated injuries
- 2) Early, aggressive, thorough open wound care (for prevention of infections and to allow tissue recovery)
- 3) Evacuation from battle theater
- 4) Continued aggressive wound care
- 5) Procedures to initially close wounds versus secondary healing
- 6) Definitive amputation (#5 and #6 may or may not occur at the same time)
- 7) Reconstruction of residual limb (#7 may or may not be needed).

Comments on Specific Techniques

Several excellent reconstructive amputation procedures exist and have been successful for many individual amputees. The Burgess procedure and the Ertl procedure are two examples of surgical techniques that promote good reconstructive attention to vessels, nerves, muscle stabilization, and bone. It is important to note that one technique does not work for all amputees.

Wounds related to war surgery are initially left open because of the high risk of infection. A staged approach to amputation surgery is necessary to obtain wound closure and a residual limb that can provide the best function. Because of the severe nature of war wounds, reconstructive procedures are often done later, even months after injury. If extensive soft tissue or bone procedures are done before the soft tissue envelope has recovered and stabilized, there is a higher risk of infection, failure and a higher level of amputation.

The Ertl procedure is one of several reconstructive procedures for a residual limb. The unique aspect most commonly associated with this procedure is the bone bridge with a complete muscle balancing myoplasty. Like other accepted and effective techniques, this procedure addresses appropriate nerve and vessel treatment, muscle stabilization, bone beveling and skin management. Most data supporting the benefits, stabilization of the tibia and fibula, and increased distal end bearing come from series performed as a reconstructive, not as a primary amputation procedure. You and your physicians should discuss the advantages and possible

complications of different procedures for your specific situation.

It is important to note that amputation-related pain is often from multiple sources and not necessarily related to a particular surgical technique. There is limited information supporting any one surgical procedure over any other reconstructive surgical procedure.

A comprehensive team approach is important for evaluation and treatment of physical, emotional and social issues that are all vitally important for everyone with limb loss. Aggressive rehabilitation for injured soldiers in special centers, with

peers, and in a group setting has been shown to foster excellent esprit de corps and improved mental well-being. We support programs to meet these needs. ■

Conference Chairs: Douglas G. Smith, MD, and Lynnford S. Wilson, MD

Conference Participants: P. Dougherty, A. LaNoue, J. Ertl, J. Ertl Sr., D. Polly, D. Unger, W. Doukas, T. Kuklo, K. Murphy, J. Miller, J. Xenos, R. Islinger, J. Gambel, J. Ficke, R. Hayda, B. Birmesser, R. Urgolites

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