AMPUTATION: EVALUATION AND TREATMENT

CLINICAL PRACTICE GUIDELINE (CPG) TRAINING

Joint Trauma System Trauma Care Educational Program

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- Amputation
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Purpose

- These slides are based on the JTS Airway Management in Prolonged Field Care CPG. The Role 1 prolonged field care CPG is intended to be used after Tactical Combat Casualty Care Guidelines, when evacuation to higher level of care is not immediately possible.
- Date of CPG publication: 01 May 2020
- JTS CPGs are evidence-based guidelines developed by subject matter experts in the military and civilian communities. CPGs are compiled from DoD Trauma Registry data, health data abstracted from patient records and after action reports.
- Information contained in this presentation is only a guideline and not a substitute for clinical judgment.

Summary

- Amputation may be required as a damage-control procedure in a massively injured patient.
- Intact or ability to restore perfusion can delay decision to amputate.

Amputation Terminology

- Traumatic amputation: Immediate extremity amputation caused by the wounding mechanism.
- Primary amputation: Performed by a surgical team after evaluation of the mangled extremity and deciding not to pursue limb salvage
- Secondary amputation: Amputation occurs after an initial attempt at limb salvage.
  - Early: Within 90 days
  - Late: After 90 days

Primary amputation performed at Role 2

Evaluation

- Evaluation of extremity begins with thorough inspection of the wound and perfusion and control of active hemorrhage.
  - May require surgical wound extension to inspect all levels of tissue.
  - Doppler and diagnostic arteriography are adjuncts to evaluation of perfusion.
- Gross decontamination and meticulous sharp debridement of non-viable tissue for all war wounds (see *War Wounds CPG*)

Traumatically amputated right lower extremity undergoing debridement

Decision Criteria

When deciding to amputate, timing hinges on vascularity of the injured extremity. Consider the following:

- Determine if intact or potential to restore perfusion by vascular repair or shunt.
- If perfusion can be restored, decision to amputate for nerve or bone loss can be deferred until later.
- Amputation may be necessary as a damage control procedure in a massively injured patient due to the amount of time required to restore perfusion.

Decision Criteria

- Ipsilateral fractures should be stabilized and should not impact your decision to amputate.
- Scoring systems to predict amputation need are not widely accepted or validated in the combat trauma population.

Complicated lower extremity with potential requirement for primary amputation

Decision Criteria

- Primary and early secondary amputations are most commonly performed for:
  - Vascular injury
  - Nerve injury not amenable to repair or functional extremity
  - Extensive loss or contamination of soft tissue
- Late secondary amputations are generally performed due to patient preference or major complications.

Prolonged damage control procedures for other injuries and patient instability resulted in prolonged ischemia of lower extremity necessitating early secondary amputation.

Amputation Prep

- Thoroughly inspection of all levels of wound tissue.
  - Extent of the injury zone is dependent on mechanism, treatments, and contamination load.
  - Tissue damage is often beyond that which is apparent on initial visual inspection.
- Control active hemorrhage, debride non-viable tissue, and thoroughly irrigate wounds.

Heavily contaminated lower extremity after initial traumatic amputation

Precautions

- Accept atypical skin and tissue flaps as long as the tissue is viable.
- Do not perform primary closure of traumatic amputations.
  - All war wounds should be left open and re-evaluated with serial irrigation and debridement.
- Avoid open circular or guillotine amputations.
  - They sacrifice viable soft tissue and relegate the casualty to more proximal revisions.
  - Have not been shown to be significantly faster than length-preserving procedures.

Amputation Expectations

Current consensus regarding extremity amputation following battle injury is to:

- Preserve limb length and vascularity.
- Facilitate adequate wound drainage.
- Achieve eventual coverage and closure of the amputation wound.

Atypical length and tissue flaps after amputation of battle-injury to lower extremity. Wound is left open to facilitate wound drainage.

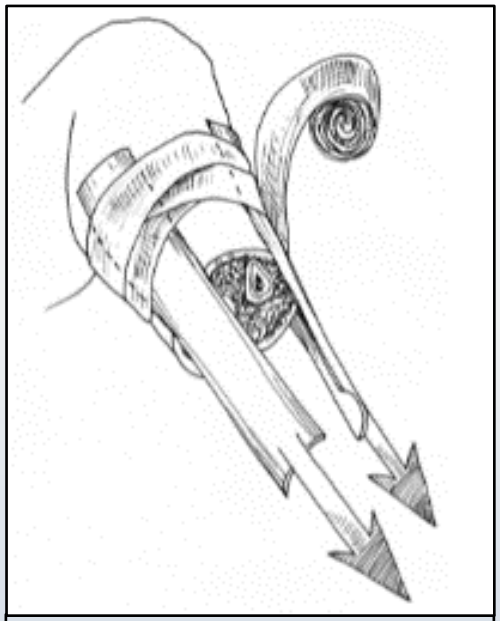
Amputation

- If amputation is required, appropriate vascular structures should be ligated proximal to the bone resection, but distal enough to allow healing.
  - Separate vascular structures from nerves prior to ligation.
- Amputations should be performed at the most distal level which provides viable bone and soft tissue for later closure.
  - If near proximal joint (e.g., knee) preservation of bone length without soft tissue coverage advised to provide later options for reconstruction.
  - Re-evaluate amputation site within the first 24 hours.

Slightly atypical soft tissue flaps with NPWT to facilitate drainage after irrigation and debridement.

Post-Operative Management

- Place soft dry dressings around the amputation site and extremity.
  - Circumferential wraps with gauze rolls and ace wraps in figure of eight fashion.
  - Avoid excessive compression.
- Place in splint or bivalve cast to prevent joint contracture and provide soft tissue support.
  - Allow simple access for wound inspections.
- If short skin flaps, skin traction to prevent soft tissue traction is an option.
- Avoid placement of pillows under knees to prevent contractures.



Skin Traction
Emergency War Surgery Handbook, 4th Edition

Post-Operative Management

Negative pressure wound therapy using reticulated open cell foam can be useful after complete wound debridement and hemostasis achieved.

- Can leave in place for 24 to 48 hours.
- Care to avoid occlusion and leak of seal is essential.
- May macerate healthy tissue, obliterate soft tissue planes, and has a potential role in heterotopic ossification.
- Problems include bulky for transport; occlusion of tubing or leak; maceration of healthy tissue; and obliteration of soft tissue planes.

Gradual closure of extremity amputation wound after NPWT.

Post-Operative Management

- Coordinate all dressing changes and repeat debridement with evacuation schedule and plan to perform them in operating room.
  - OR provides access to equipment for unexpected issues.
  - OR provides anesthetic for patient comfort.

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PI Monitoring

- Population of Interest
  - All patients with diagnosis of limb amputation or limb amputation procedure code.
- Intent (Expected Outcomes)
  - Amputation wounds are not closed at the initial operation
  - Circular/guillotine amputation is avoided (viable soft tissue is preserved).
  - Repeat debridement/dressing change within 48 of first debridement/amputation procedure.

PI Monitoring

- Performance/Adherence Measures
  - Number and percentage of patients in the population of interest who have amputation wounds left open at initial operation (closed flap amputation at first procedure = non-adherence).
  - Number and percentage of patients in the population of interest who have documentation that all viable soft tissue is preserved at the initial operation.
  - Number and percentage of patients in the population of interest who have their dressing change/repeat debridement in <48 hours of initial amputation/procedure
- Data Source
  - Patient Record
  - Department of Defense Trauma Registry

CPG Appendix

- **Appendix A**: Additional Information Regarding Off-label Uses in CPGs

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