Removal of Tourniquet Guideline

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PURPOSE: To establish a protocol for the removal of a tourniquet placed on a patient. Based on data from the current overseas conflicts, exsanguination represents the primary cause of death seen in battlefield trauma. Extremity and Junctional Tourniquets have proven to be extremely effective in decreasing mortality by arresting life-threatening hemorrhage from exsanguinating extremity wounds. The nature of civilian trauma differs dramatically from wounds seen in military trauma, and for this reason, the liberal use of tourniquets is not recommended. The majority of extremity hemorrhage can be controlled with direct pressure. Complications from tourniquet can include soft tissue, muscle and nerve injury, increased bleeding from distal soft tissue injuries, and reperfusion injury. As a rule, the indication for application of an extremity tourniquet is life threatening bleeding that cannot be controlled with direct pressure or packing of the wound for any reason. Once the decision has been made to place a tourniquet, there are no specific guidelines for how to proceed. However, it is important to document the time of application and to also not remove/loosen the tourniquet until the patient has been transported to a trauma center.

EQUIPMENT: N/A

PROCEDURE:

A. Triage prehospital or transferring facility: It should be assumed patients requiring tourniquet placement to achieve lifesaving hemostasis likely have an injury requiring emergent surgical intervention.
    a. If transport time is expected to be greater than 1.5 hours or if other Life Saving Interventions (LSI) are required, evaluation at the nearest trauma center is acceptable. If such a stop is required, the treating physician will determine the most appropriate course of action for the tourniquet based on the patient's injuries, condition and available resource.
    b. For junctional tourniquets, follow manufacturer guidelines. Per manufacturer's guidelines, the AAJT-s should not be applied in the abdominal or Zone 3 position for more than 30-60 minutes and the axillary or inguinal locations is approved for continued use up to 4 hours

B. All patients transported to Froedtert Hospital with Tourniquets in place will be paged as a Trauma Alert and trauma surgeon will be present on patient arrival.

C. **Removal:** Ideally, once a tourniquet has been applied it should not be removed until the patient has reached a trauma center with a surgeon present capable of immediately treating the source of hemorrhage. Periodic loosening of the tourniquet is not recommended, as this practice is associated with episodes of hypotension and worsened mortality. If prolonged transport is required (>90 minutes), the tourniquet may be

loosened after 60 minutes, as some injuries may become amenable to traditional hemostatic measures after this time.

a. External hemostatic devices should only be removed when the option of immediate proximal surgical hemorrhage control (external or endovascular) is available.
b. The treating surgeon may elect to loosen the tourniquet in the trauma arena or take the patient immediately to the operating suite for wound exploration.
c. Only those patients in whom all four of the following parameters are met should be considered for removal of the tourniquet outside of the operating room; HR >50 or HR < 100, systolic BP >110, BD more positive than -3 and pH > 7.3
d. Depending on the nature and location of the injury as well as patient status, the field tourniquet may be exchanged for a sterile, pneumatic tourniquet. Other, life-threatening injuries (neurologic, thoracic, and abdominal) must be dealt with prior to tourniquet removal.
e. Patients arriving with a junctional tourniquet in place
    i. May only be removed in the OR by the surgical team
f. Extra Considerations: There is little data evaluating the maximal duration of tourniquet placement. The majority of recommendations come from the orthopaedic literature in the setting of elective orthopaedic procedures on normovolumic patients. In general, these patients have few complications with tourniquet placement less than 2 hours. Critically ill, injured patients may be more sensitive to prolonged tourniquet duration. For this reason, patients with tourniquet times greater than 60 minutes should be monitored closely for hyperkalemia, rhabdomyolysis, and compartment syndrome. Strong consideration for fasciotomy should be made in the setting of prolonged ischemic times with concomitant vascular repair. This is especially true in patients with altered sensorium (either pathologic or iatrogenic) as they will not be able to convey signs and symptoms of compartment syndrome.

REFERENCES

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APPROVAL:

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