Trauma Center Practice Management Guideline

Iowa Methodist Medical Center — Des Moines

Damage Control Orthopedic Surgery	
ADULT – Orthopedic Practice Management Guideline	**Effective: 5/2017**
Contact: Trauma Center Medical Director	**Last Reviewed: 7/2025**

PURPOSE

To define the criteria and principles guiding the use of **Damage Control Orthopedic Surgery (DCO)** in critically injured patients, ensuring timely, staged fracture management in accordance with resuscitation status and soft tissue considerations.

STATEMENT OF THE PROBLEM

Damage Control Orthopedic Surgery (DCO) is a staged approach to fracture management in critically ill or injured trauma patients. Rather than performing early definitive fixation, the DCO strategy prioritizes temporary stabilization of fractures to reduce physiologic burden and allow for resuscitation and stabilization of other life-threatening conditions. This approach recognizes that patients with systemic instability, severe soft tissue injury, or multisystem trauma may not tolerate prolonged operative procedures without an increased risk of complications such as acute respiratory distress syndrome (ARDS), coagulopathy, or worsening traumatic brain injury (TBI).

The DCO model is a cornerstone of modern polytrauma care and represents a shift away from the historical model of "early total care" in unstable patients. By using temporizing measures such as external fixation, skeletal traction, and splinting, orthopedic teams can protect limb alignment and prevent further soft tissue damage while the patient undergoes physiologic optimization.

Damage Control Orthopedic Surgery should be employed in patients who are physiologically unstable or have severe soft tissue injuries, where early definitive fracture fixation would increase the risk of morbidity or mortality. The DCO approach emphasizes temporary stabilization until resuscitation is achieved and soft tissue conditions are appropriate for definitive surgery.

INDICATIONS FOR DAMAGE CONTROL ORTHOPEDICS

The following clinical criteria may warrant the use of DOC Surgery:

- Hemodynamic instability (requiring vasopressors or active transfusion)
- Base deficit >6, serum lactate >4 mmol/L, or arterial pH <7.25 **without trend improvement**
- Severe traumatic brain injury (GCS ≤8 with unstable ICP or CPP); consider delaying definitive fixation until **CPP >60 mmHg** and ICP is controlled
- Acute pulmonary dysfunction requiring high ventilatory support (PaO2/FiO2 <200, FiO2 >60%, or PEEP >10 cm H2O)
- Severe soft tissue injury (e.g., Gustilo IIIB/IIIC open fractures, closed degloving, or crush injuries; includes tibial plateau, plafond, or distal femur fractures with compromised soft tissues)
- Multisystem trauma with concurrent life-threatening injuries being actively managed

Note: Laboratory and ventilatory values should be interpreted in **clinical context and with attention to trends over time**.

TEMPORIZING STABILIZATION TECHNIQUES

The following techniques are acceptable as initial stabilization in the DCO phase:

- External fixation for fractures and dislocations of extremities
- Skeletal traction or Buck's traction
- Binder, external fixation, or resuscitation screws for pelvic fractures
- Splinting extremities to maintain gross alignment

CONVERSION TO DEFINITIVE FIXATION

Conversion from temporary stabilization to definitive fixation should be considered when:

- Hemodynamic stability is achieved (no vasopressors, SBP >100 mmHg)
- Lactate <2.5 mmol/L and base deficit <4
- No escalating oxygen or ventilatory requirements
- ICP and CPP stabilized if TBI is present (target CPP >60 mmHg)
- Soft tissue envelope is suitable for internal fixation

Timing of conversion is typically within **3 to 10 days**, individualized based on clinical progress and determined through a multidisciplinary discussion involving orthopedic surgery, trauma

surgery, anesthesia, and critical care teams. **Definitive fixation should be avoided during the 24–72 hour inflammatory window unless the patient is physiologically optimized.**

PRIORITIZATION OF DEFINITIVE FIXATION

When progressing from damage control to definitive fixation in polytrauma patients, the order of surgical priority should generally follow the principle of addressing the most critical and biomechanically influential injuries first:

- **Pelvic fractures and femoral shaft fractures** should be prioritized early due to their impact on mobilization, bleeding control, and systemic inflammation.
- **Tibial shaft and periarticular lower extremity fractures** may follow, depending on soft tissue condition and resuscitation status.
- **Ankle fractures**, especially those that are adequately reduced in a splint or temporarily stabilized with external fixation, may be safely delayed until later in the reconstructive sequence.
- **Upper extremity fractures** are generally of lower systemic priority and can be staged accordingly.

The sequence may vary depending on patient physiology, associated injuries, and soft tissue status, and should be determined collaboratively by the multidisciplinary team.

DOCUMENTATION AND PERFORMANCE IMPROVEMENT

- All DCO cases will be reviewed in the Trauma Performance Improvement and Patient Safety (PIPS) program to assess timing, complications, and outcomes.
- Unexpected complications related to delayed fixation or early definitive surgery despite DCO criteria will be flagged for PI review.
- The criteria in this policy constitute an institutional guideline and will be monitored for adherence as part of the trauma PI process.

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