SUBJECT: Venous Thromboembolism Prophylaxis Guidelines for Trauma & Emergency General Surgery

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RECOMMENDATION(S): Dr. Kyle Kalkwarf  APPROVAL: 5/30/2019

CONCURRENCE(S): Drs. Allie Oswalt & Rebecca Smith  EFFECTIVE: 7/1/2020

PURPOSE:
Standardize practices for the treatment of trauma and emergency general surgery patients and establish guidelines for the administration of venous thromboembolism (VTE) prophylaxis in high-risk patients

Establish a consensus for administration of chemical VTE prophylaxis in patients who are to undergo invasive procedures or have high-risk injuries

DEFINITIONS:

High-risk patients: those anticipated to be hospitalized for >24h and have one or more of the following risk factors:
- Multiple system trauma
- Traumatic brain injury with GCS <12
- Major vascular injury to neck, thorax, abdomen, or extremities
- Multiple rib fractures
- Pelvic fracture
- Long-bone fracture
- Spinal fracture
- Anticipated immobilization >24 hours
- History of VTE (DVT/PE)
- History of hypercoagulable disease
- History of or current diagnosis of cancer
- Obesity (BMI > 30)
- Tobacco use within one month
- Critical illness

PROCEDURES:

1) Sequential compression devices (SCDs) should ONLY be used for patients not receiving chemical VTE prophylaxis
   a. SCDs are contraindicated in legs with fractures prior to fixation
   b. SCDs are contraindicated in legs with external fixators or large open wounds
   c. SCDs may be used on fractured lower extremities following open reduction and internal fixation

2) Relative contraindications to INITIAL chemical VTE prophylaxis include:
   a. Uncontrolled blood loss
   b. Coagulopathy
   c. Non-operative management of liver, spleen, or renal injuries
   d. Intracranial hemorrhage
   e. Spinal cord hematoma
3) All high-risk patients who do not have a contraindication should be started on enoxaparin (heparin is reserved for GFR <30 mL/min and/or patients with epidurals):
   a. GFR > 30 mL/min: enoxaparin (Lovenox) 0.5 mg/kg SQ q12h (maximum starting dose is enoxaparin 60 mg SQ q12h)
   b. GFR < 30 mL/min:
      i. Weight < 90 kg: heparin 5000 units SQ q8h
      ii. Weight > 90 kg: heparin 7500 units SQ q8h

4) Management of enoxaparin (Lovenox) dosing for trauma and emergency general surgery patients:
   a. An Anti-Xa Assay should be ordered 4h AFTER the 3rd dose of enoxaparin (either 0100 or 1300 depending on when enoxaparin was started)
      i. If < 0.2, increase the enoxaparin dose by 10 mg and recheck an anti-Xa after three doses of the new regimen
      ii. If 0.2 – 0.4, no adjustment necessary and no further anti-Xa levels needed unless there is a change in renal function or patient clinical status
      iii. If > 0.4, reduce the enoxaparin dose by 10 mg and recheck an anti-Xa after three doses of the new regimen

5) Patients with a history of HIT/HITT – Fondaparinux is preferred
   a. If weight > 50 kg and GFR > 50 mL/min: 2.5 mg SQ daily
   b. If GFR 30-50 mL/min: use with caution (consider dose reduction)
   c. If GFR <30 mL/min: use is contraindicated

6) IVC Filters
   a. IVC INSERTION: Filters will be placed within 48h of time of consult in patients who meet the following criteria:
      i. The patient has a documented DVT and cannot be fully anticoagulated
      ii. The patient cannot receive VTE prophylaxis for at least five days (rare)
   b. IVC REMOVAL: When it is medically appropriate to start VTE prophylaxis:
      i. If there is no contraindication, perform a bilateral lower extremity venous duplex. If negative for DVT, schedule retrieval of the IVC filter during the current admission.
      ii. If the patient is cleared for VTE prophylaxis, but doses are being held for frequent trips to the OR, the IVC filter may be left in place. When the series of operations are complete, a bilateral lower extremity venous duplex should be performed. If negative for DVT, schedule retrieval of the IVC filter during the current admission.

7) Initiation of anticoagulation for at-risk patient populations:
   a. Solid Organ Injury
      i. In the non-operative management of liver, spleen, and renal injuries, VTE prophylaxis may be initiated:
         1. Day of injury for grade I injuries
2. 24h without significant blood loss for grade II/III injuries
3. 48h without significant blood loss for grade IV injuries

b. Traumatic Brain Injury
   i. Chemical VTE prophylaxis should be initiated 24h following stable head CT
   ii. Chemical VTE prophylaxis should be initiated 48h following craniotomy
   iii. VTE prophylaxis should NOT be held for EVD/ICP monitor placement or removal

c. Spinal fractures and spinal cord injuries (SCI)
   i. Patients with spinal fractures or SCI may be started on VTE prophylaxis once the spine surgeon has deemed that there is no emergent need for surgical decompression or stabilization (usually within 24h – an attending discussion is required for a 48h delay)
   ii. Patients with spinal cord hematoma may be started on VTE prophylaxis once cleared by the spine surgery team (usually within 24h – an attending discussion is required for a 48h delay)
   iii. If surgery is planned, VTE prophylaxis will be held the night before the operation and resumed 24h post-operatively

d. Chemical VTE Prophylaxis should not be held for non-spinal musculoskeletal injuries or procedures

e. Regional anesthetic catheter placement for pain control (e.g., epidural) or lumbar drain
   i. Before Puncture:
      1. Prophylactic enoxaparin (Lovenox) should be held for 12h
      2. Therapeutic enoxaparin (Lovenox) should be held for 24h
      3. IV heparin should be held for 4-6h
      4. SC heparin should be held for 8-12h
      5. Fondaparinux should be held for 36-48h
      6. INR should be < 1.6
   ii. While epidural or lumbar drain is in place:
      1. Appropriate weight-based dosing of heparin should be used (section 3b)
      2. Enoxaparin (Lovenox) should NOT be used if epidural or lumbar drain is in place
   iii. After removal of epidural or lumbar drain:
      1. Enoxaparin (prophylactic or therapeutic) should be held for 4h
      2. Heparin (IV or SQ) should be held for 1h
      3. Fondaparinux should be held for 6-12h
      4. Warfarin (Coumadin) or novel anticoagulants should not be started until after epidural/lumbar drain removal

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