Guidelines for Epidural Analgesia in Blunt Thoracic Trauma

I. DEFINITIONS

A. Guidelines: Systematically developed recommendations that assist the practitioner and patient in making decisions about health care. These recommendations may be adopted, modified, or rejected according to clinical needs and constraints, are not intended as standards or absolute requirements, cannot guarantee any specific outcome, and are subject to revision as warranted by the evolution of medical knowledge, technology, and practice. **All decisions regarding epidural anesthesia for blunt thoracic trauma will be based on individualized patient care by the attending anesthesiologist**.

B. Epidural Analgesia ("EA"): Insertion of an indwelling catheter into the epidural space to provide infusion of local anesthetic, narcotic, or both

C. Blunt Thoracic Trauma ("BTT"): Soft-tissue trauma and injuries to the bony thorax such as rib fractures and flail chest

II. EFFICACY The use of EA after severe BTT has been shown to significantly improve subjective pain perception and critical pulmonary function tests compared with IV narcotics and is associated with less respiratory depression, somnolence and GI symptoms. EA is safe, permanent disability is extremely rare, and mortality is negligible. EA may improve outcome (ventilator days, ICU LOS, hospital LOS). Paravertebral blockade may improve pain scores and pulmonary function, but there is insufficient data on safety to establish recommendations[3].

III. INDICATIONS FOR EA[3] Care should be individualized and clinical measures considered including pain scale, pulmonary examination/function, ABG, etc.

A. Intravenous narcotics: Initial management for lower risk BTT patients

B. EA: Should be strongly considered for higher risk BTT patients

1. Severity: Four or more rib fractures
2. Age: >65yo
3. Comorbidities: Cardiopulmonary disease, DM, or any other condition which may increase risk of mortality with respiratory complications in BTT

C. Paravertebral Analgesia: Consider for any patient who is not a candidate for EA

IV. CONTRAINDICATIONS TO EA

A. Absolute[2]

1. Patient refusal
2. Localized infection at epidural site
3. Allergy to any of the drugs planned for administration
4. Patient's inability to maintain stillness during needle puncture (can expose the neural structures to traumatic injury)
5. Raised intracranial pressure (may theoretically predispose to brainstem herniation)

B. Relative[2]
    1. Patient's inability to communicate during and after procedure (sedation/intubation, mental handicap, psychiatric disorders, etc.)
    2. Myelopathy or Peripheral Neuropathy
    3. Spinal Stenosis
    4. Spine Surgery
    5. Multiple Sclerosis
    6. Spina Bifida
    7. Aortic Stenosis or Fixed Cardiac Output
    8. Hypovolemia
    9. Inherited Coagulopathy
    10. Infection
        10.1. For information purposes only: Although the profound vasodilation may be sufficient reason to avoid neuraxial techniques in patients with profound bacteremia or septic shock, the theoretic risk of seeding the intrathecal or epidural spaces by performing neuraxial techniques in patients with untreated systemic infection further supports using another technique. Yet patients with evidence of systemic infection may safely undergo neuraxial anesthesia once antibiotic therapy has been initiated and the patient has demonstrated a response to the antibiotics[2]. Final decision to be made by the attending anesthesiologist.
    11. Coagulopathy/Thromboprophylaxis
        11.1. Borne of the catastrophic cases of spinal hematoma causing paralysis associated with the introduction and use of LMWH in the United States, the American Society of Regional Anesthesia and Pain Medicine (ASRA) publishes a practice advisory to guide the provision of neuraxial techniques in patients receiving antithrombotic or thrombolytic therapy. A summary of the ASRA guidelines (2010), along with those of other professional societies is reproduced below[1].
        11.2. Note: on 11/6/2013, the FDA released a Drug Safety Communication regarding the updated recommendations to decrease the risk of neuraxial bleeding and paralysis in patients on LMWH: *A postprocedure dose of enoxaparin should be usually given no sooner than 4 hours after catheter removal* (rather than the two hour time interval recommended by ASRA).

	Antiplatelet Medications	UFH		LMWH
		Subcutaneous	Intravenous	
German Society for Anaesthesiology and Intensive- Care Medicine†	NSAIDs: no contraindication; hold LMWH, fondaparinux 36–42 hrs Thienopyridines and GP IIb/IIIa are contraindicated	Needle placement 4 hrs after heparin; heparin 1 hr after needle placement or catheter removal	Needle placement and/or catheter removal 4 hrs after discontinuing heparin, heparinize 1 hr after neuraxial technique; delay bypass surgery 12 hrs if traumatic	Neuraxial technique 10–12 hrs after LMWH; next dose 4 hrs after needle or catheter placement Delay block for 24 hrs after therapeutic dose
Belgian Association for Regional Anesthesia‡	NSAIDs: no contraindication Discontinue ticlopidine 14 d, clopidogrel 7 d, GP IIb/IIIa inhibitors 87–48 hrs in advance	Not discussed	Heparinize 1 hr after neuraxial technique Remove catheter during normal aPTT; reheparinize 1 hr later	Neuraxial technique 10–12 hrs after LMWH; next dose 4 hrs after needle or catheter placement Delay block for 24 hrs after therapeutic dose
American Society of Regional Anesthesia and Pain Medicine	NSAIDs: no contraindication. Discontinue ticlopidine 14 d, clopidogrel 7 d, GP IIb/IIIa inhibitors 8–48 hrs in advance	No contraindication with twice-daily dosing and total daily dose <10,000 U, consider delay heparin until after block if technical difficulty anticipated. The safety of neuraxial blockade in patients receiving doses greater than 10,000 units of UFH daily, or more than twice daily dosing of UFH has not been established.	Heparinize 1 hr after neuraxial technique, remove catheter 2–4 hrs after last heparin dose; no mandatory delay if traumatic	Twice-daily dosing: LMWH 24 hrs after surgery, regardless of technique; remove neuraxial catheter 2 hrs *before* first LMWH dose Single-daily dosing: according to European statements BUT with no additional hemostasis-altering drugs Therapeutic dose: delay block for 24 hrs
American College of Chest Physicians§	NSAIDs: no contraindication Discontinue clopidogrel 7 d before neuraxial block.	Needle placement 8–12 hrs after dose; subsequent dose 2 hrs after block or catheter withdrawal	Needle placement delayed until anticoagulant effect is minimal	Needle placement 87–12 hrs after dose; subsequent dose 2 hrs after block or catheter withdrawal. Indwelling catheter safe with twice-daily dosing Therapeutic dose: delay block for 18+ hrs

*For patients undergoing deep plexus or peripheral block, follow ASRA recommendations for neuraxial techniques.

†Adapted from the German Society of Anesthesiology and Intensive Care Medicine Consensus guidelines.[103]

‡Adapted from the Belgian Association for Regional Anesthesia. Working party on anticoagulants and central nerve blocks.[68]

§Adapted from the American College of Chest Physicians.[7]

Warfarin	Fondaparinux	Direct Thrombin Inhibitors	Thrombolytics	Herbal Therapy
INR <1.4 for needle/catheter insertion and withdrawal	Needle placement 36–42 hrs after last dose, wait 6–12 hrs after catheter removal for subsequent dose	Needle placement 8–10 hrs after dose; delay subsequent doses 2–4 hrs after needle placement	Absolute contraindication	No contraindication
INR <1.4 for needle/catheter insertion and withdrawal	Needle placement 36 hrs after last dose. Indwelling epidural catheter not recommended	Needle placement 8–10 hrs after dose; delay subsequent doses 2–4 hrs after needle placement	Absolute contraindication	Not discussed
Normal INR (before neuraxial technique); remove catheter when INR ≤ 1.5 (initiation of therapy)	Single injection, atraumatic needle placement or alternate thromboprophylaxis. Avoid indwelling catheters.	Insufficient information Suggest avoidance of neuraxial techniques	Absolute contraindication	No evidence for mandatory discontinuation before neuraxial technique; be aware of potential drug interactions
Avoid or limit epidural analgesia to <48 hrs. Remove catheter when INR <1.5	Single-injection spinal safe Avoid epidural analgesia	Not addressed	Not addressed	Not addressed

V. REFERENCES

1. Horlocker, et al. Regional Anesthesia in the Patient Receiving Antithrombotic or Thrombolytic Therapy: American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines (Third Edition). Reg Anesth Pain Med. 2010 Jan-Feb;35(1):64-101.
2. Miller, et al. *Miller's Anesthesia, 8th Ed*. Philadelphia: Elsevier, 2015. Web.
3. Simon, et al. Pain management guidelines for blunt thoracic trauma. J Trauma. 2005 Nov;59(5):1256-67.