The Role of Regional Analgesia in the Management of Pain Related to Trauma

Ellyn Radson, BSN,RN-BC
UF&Shands
Gainesville, Florida

Objectives

- Gain an appreciation of the impact of undertreated pain related to trauma.
- Identify situations in which traumatic injuries can be be treated using regional analgesia.
- Discuss regional analgesia as part of a multimodal treatment plan designed to promote rehabilitation and prevent the development of chronic pain syndromes.
- Develop policies and procedures for the appropriate care of patients receiving regional analgesia.

Trauma Facts and Figures

- Nearly 100K people die from trauma each year, roughly half in motor vehicle crashes – 62% ages 15-24
- Permanent disability dwarfs mortality 3:1
  - For every 2 people killed, 350 are injured severely enough to have a disabling injury -> 7.8 million in costs

Trauma Facts and Figures

- Nine in 10 Iraq/Afghanistan veterans return with some form of pain and 60% of those have significant pain.
- "Earlier and more aggressive acute pain interventions may help to prevent or lessen longer term disabilities and secondary consequences of chronic pain." RM Gallagher, MD, MPH,
- Deputy national program director for pain management for the VA.

Traumatic Injury – The Pain Connection

- Soft tissue injury
- Bone fractures
- Nerve damage
- Pathophysiology of uncontrolled acute pain
- From acute to chronic pain

TRAUMA

Acute to Chronic Pain after Injury

- University of Washington – FP Rivara, MD, MPH
  - The study aimed to determine prevalence of pain in a group of >3000 trauma patients one year after injury.
    - 69 hospitals in 14 US states
    - 12 months after injury 62.7% reported injury related pain with mean severity at 5.5 +- 4.8
    - " Most trauma patients have moderately severe pain from their injuries 1 year later..."

Physiologic Impact of Pain in Trauma

- Accentuates stress response
- Accentuates catabolic processes
- Slows restoration of function
- Increases sympathetic outflow
- Hemostatic response with altered levels of platelets/fibrin and coagulation

Hedderich, Ness Analgesia for Trauma Burns, Critical Care Clinics, VOl 15, Issue 1 Jan 99

Focal responses to Trauma

- Chest – upper abdomen- pulmonary dysfunction
- Abdominal trauma – gastrointestinal dysfunction
- Musculoskeletal trauma – spasm and immobility

Implications for Pain Management

- **Analgesic interventions must have a positive effect on the stress response in order to improve patient outcomes.** ***Kehlet***
- The use of systemic opioids can negatively impact hemodynamics during early phases.
- Sedation caused by large doses of opioids can cloud CNS evaluation.
- Opioids have a depressant effect on ventilation.

Multimodal Treatment

- Regional – Local anesthetic blocks/infusions
- Neuraxial – Intrathecal vs epidural
- NSAIDS
- Opioids – Peripheral and/or central
- NMDA receptor agonists – Ketamine/Methadone/dextromethorphan
- Anticonvulsants – Gabapentin/Lyrica

Blocking the Pathway

- Diagram of pain pathway and each intervention site

Local Anesthetics

- Mechanism of action
- Dosing – typical doses for common blocks
- Side effects/ toxicity
- Mobility

Criteria for Use of Regional Analgesia in Trauma Patients

- Risk/benefit is appropriate
- Meet normal regional technique criteria
- Hemodynamics are stable enough to be sedated
- Injuries do not prevent positioning – eg pelvic fracture patients may not be able to be moved.
- Neck, spine and head injuries are cleared by Neurosurgery for epidural and plexus procedures.
- No concern for compartment syndrome in extremity injury.

Neuraxial Blocks

- **Spinals** – Continuous for anesthetic for hip fractures in frail elderly and at risk patients
- Hip fractures in which the posterior capsule is not involved and femoral neck fractures can be treated using a femoral nerve block prior to a surgical repair done under spinal anesthesia and sedation.
- A femoral catheter can remain as part of the post op analgesia plan.
- LeWendling, Sadasavin 2009

Epidurals

Lumbar Epidurals

- Usual epidural side effects such as hypotension and decreased sensation may be detrimental to the unstable trauma patient.
- Bleeding and coagulation issues may preclude the use of epidurals.
- Consideration should be given to other perineural lower extremity blocks .

Epidurals

- **Segmental Thoracic Epidurals** are ideal for:
- abdominal injuries which result in exploratory or definitive abdominal surgery.
- situations where there is an abdominal incision and fractured ribs bilaterally with or without fractured sternum.
  - This situation might require two epidurals or a low thoracic epidural and high thoracic paravertebral.

Paravertebral/Pexus Blocks

- **Description –** Local anesthetic is deposited in an area beneath the spinous processes and distributed above and below the site of injection via a groove in the muscles. The **roots/trunks/branches** of the spinal nerves are anesthetized.

  Provide wider coverage for analgesia.
- Paravertebral blocks may act like epidurals.
- Closer monitoring for sympathectomy and or hematoma is needed.

Paravertebrals

- **Thorax:**
- **Rib fractures**
- **Chest tubes**
- **Thoracatomy incisions**
- **Associated risks**

Lumbar Paravertebrals

Lumbar paravertebral blocks cover
the entirelumbar plexus and therefore the entire
leg.
Diagram of nerve distribution covered
Risks associated with the lumbar paravertebral block

Contraindications

- Contraindications to the use of epidurals / paravertebrals:
  - Patient refusal
  - Head injuries – subdural
  - Sepsis
  - Coagulapathy
  - Vertebral or meningeal infectious syndromes
  - Neurologic injury at or near the site for epidural placement with or without neurologic symptoms.
  - Risk/benefit is not appropriate for patient

Perineural Blocks and Infusions

- Upper Exremity:
  - Infraclavicular
  - Supraclavicular
  - Axillary
  - Intercostalbrachial
- Lower Extremity:
  - Femoral
  - Sciatic
  - Popliteal
  - Ankle
  - Saphenous

Nursing Assessment/Management

- Basic assessment includes:
  - Pain levels - intensity/quality
  - Pain location – Requires a basic understanding of the nerve distribution covered by the block.
  - Vital signs – recognize when changes may be related to the analgesic technique /medications and when they are NOT.

Nursing

- Sedation levels- Understand the affects of local anesthetics and other analgesics and how they impact sedation.
- Recognition of adverse effects, motor sensory deficits and complications related to the block.

Nursing

- Understand the infusion system and how to maintain the infusion and troubleshoot pump issues.
- Document the effects of therapy, side effects/complications/interventions.
- Policies and Procedures

Compartment Syndrome

- Occurs when excessive pressure develops within the closed fascial compartment, causing ischemia to the tissue in the compartment.
- Etiology:
  - High energy closed fractures
  - Low energy open fractures
  - Arterial bleeding within a closed compartment

Compartment Syndrome

- Signs and Symptoms:
  - Firm, shiny skin over compartment
  - **Sudden onset severe tenderness over the compartment with manual compression or passive stretch of the muscles within the compartment.**
  - Elevated compartment pressures > 30mmHg
- Treatment: Fasciotomies

Compartment Syndrome

- **The main physiologic mechanism is excessive intra-compartmental pressure.**
- **Tissue damage depends on duration.**

Compartment Syndrome

- Implications for nerve blocks:
  - **Contraindicated in any injury where compartment syndrome is a concern.**
  - **Complaints of increasing pain despite a local anesthetic block/infusion**
  - Complaints of "tight casts or dressings" must be reported to the physician and assessed by them.
  - **Documentation of patient complaint, RN assessment and intervention are imperative.**

Additional Options

- Home Catheters for Continued therapy
- Criteria for use
  - Pumps
- Instructions
- Daily follow up
- Discontinuing the catheter