The Role of Regional Analgesia in the Management of Pain Related to Trauma
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Objectives
- Gain an appreciation of the impact of undertreated pain related to trauma.
- Identify situations in which traumatic injuries can 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, Sadassavin 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
  - Thoracotomy incisions
  - Associated risks

Lumbar Paravertebrals

Lumbar paravertebral blocks cover the entire lumbar 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
  - Coagulopathy
  - 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

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<tr>
<th>Upper Extremity:</th>
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<td>Infracavicular</td>
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### 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