Focus on:
acute pain management

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Why?

- Has both humanitarian and medical benefits
- Part of cost-effective and patient-centered medicine
- Affects outcome and recovery
consequences

- delayed ambulation
- impaired rehabilitation,
- delayed discharge from hospital,
- increased risk of developing chronic pain,
- increased cost of care
- decreased quality of life,
- many hospital readmissions

your name
## Incidence of chronic pain

<table>
<thead>
<tr>
<th>procedure</th>
<th>Incidence of chronic pain %</th>
<th>Number of studies</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amputation</td>
<td>30-83</td>
<td>9</td>
<td>6mo-50ys</td>
</tr>
<tr>
<td>thoracotomy</td>
<td>22-67</td>
<td>6</td>
<td>3-33mo</td>
</tr>
<tr>
<td>Breast surgery</td>
<td>11-57</td>
<td>16</td>
<td>3mo-6ys</td>
</tr>
<tr>
<td>gallbladder</td>
<td>3-56</td>
<td>16</td>
<td>3mo-10ys</td>
</tr>
<tr>
<td>Hernia surgery</td>
<td>3-37</td>
<td>10</td>
<td>3-38mo</td>
</tr>
</tbody>
</table>
Why we are not successful?

- Lack of training
- Lack of commitment
- Unsure reimbursement
- Costs
• New specialty area
• Anesthesiologist centered
• Procedure-specific guidelines

• Less than 30% of US surgical population has access to APS
• Patients are not aware of service
• Surgeons are not aware of benefits APS
Available 24/7

- For inpatient and outpatient procedures
- Preoperative assessment and consenting for PNB
- Patients follow up
- Transfer care to chronic pain when appropriate
Acute interventional perioperative pain service

Preoperative Assessment
nerve block preemtive analgesia

Intreoperative Multimodal analgesia

Postoperative nerve block infusion multimodal analgesia

your name
Nerve Blocks

Upper extremity blocks
- interscalene
- Supraclavicular
- Infraclavicular
  - Axillary

Lower extremity blocks
- Lumbar plexus
  - Femoral
  - Sciatic

Trunkal blocks
- Paravertebral
  - Intercostal
  - TAP
Interscalene Block

• Shoulder and upper arm surgery
• Spear inferior trunk/ ulnar nerve
  ➢ >99% Phrenic Nerve Block
  ➢ Horner’s syndrome
  ptosis, miosis, and anhidrosis
  ▪ Common with ISB: 40%-70% *
  ▪ In 1.3% may be associated with hoarseness (RLB)
• the rate of block success is increased from approximately 85% using the landmark technique to 95% using ultrasound guidance*

• a 25% increase in the number of ISBs administered has been reported over 5 years**

**Brull R et al., Acute Pain 2004
• The overall incidence of other short-term and long-term complications is reported to be 0.3% to 0.4%.*

• Neuroaxial spread

• Intravascular injection

• LAT

* Phillips P, Internet J Anesthesiol [online], 1997
Supraclavicular block

- Dense block of upper extremity
- PTX most common complication: 0.5 to 6 percent and diminishes with experience
- Intravascular injection (suprascapular and transverse cervical AA look hypoechoic)
- Phrenic nerve palsy less than 50%
Axillary block

• for surgeries involving the hand or forearm

Any patient who is unable to abduct their arm more than 45° at the shoulder is not an appropriate candidate for the axillary block.
Lumbar Plexus Block

Surface anatomical landmarks for psoas compartment block:
+ Capdevila approach; * Winnie approach.
Techniques

• Identifying the TP of L4 at a depth about 5-6 cm provides a safeguard, the lumbar plexus should be no more than 2 cm from this bony landmark.
Axial view of the fifth lumbar vertebra (L5). Contrast (white) can be seen around femoral nerve (FN) and obturator nerve (ON), which are dark (hypodense). P = psoas muscle.
Femoral nerve block

- Anterior approach with PNS or USG
- Fascia iliaca block
Sacral plexus block (parasacral approach)

4 Parasacral sciatic nerve block (Mansour).  
a Posterior superior iliac spine, b ischial tuberosity.
Sciatic nerve block
Popliteal fossa approach
Paravertebral block
INDICATIONS

Thoracic Surgery
- Esophagectomy
- Thoracotomy
- Thoracoscopy
- Min Inv CABG
- Sternal surgery

Plastic Surgery
- Breast Reconstruction
- Breast Reduction
- Tissue Flaps

Urologic Surgery
- Nephrectomy
- Radical Prostatectomy
- Adrenalectomy
- Ureteral surgery
- Cystectomy

General Surgery
- Hernia - ventral, inguinal
- Cholecystectomy
- Mastectomy
- Axillary Dissection
- Hepatectomy
- Pancreatectomy
- Colectomy/Hemicolecetomy

Gynecologic Surgery
- Hysterectomy
- Myomectomy
- Oophorectomy

Pain Conditions
- Post Herpetic Neuralgia
- Rib Fractures
- Liver Capsule Pain after Trauma

your name
<table>
<thead>
<tr>
<th>Stage</th>
<th>Location</th>
<th>Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>T3,T4,T5</td>
<td>Upper chest</td>
<td>Mastectomy, thoracotomy</td>
</tr>
<tr>
<td>T7,T8,T9</td>
<td>Subcostal, upper abdomen</td>
<td>Mastectomy, thoracotomy</td>
</tr>
<tr>
<td>T8,T9,T10</td>
<td>Abdomen</td>
<td>Ex.Lap, flank incision</td>
</tr>
<tr>
<td>T10,T11,T12</td>
<td>Lower Abdomen</td>
<td>Prostatectomy, hysterectomy herniorrhaphy</td>
</tr>
</tbody>
</table>
The needle tip is directed 45 degrees cephalad and 60 degrees medial to the sagittal plane with the bevel directed medially to allow directed egress of the catheter toward the paravertebral gutter.
Feared complications

- Pneumothorax
  - Interpleural injection (when visceral pleura is not penetrated) does not equate pneumothorax
  - Using a large bore blunt needle (Tuohy) is preferred
  - Using a nerve stimulator may be helpful

- Dural puncture with subarachnoid injection
  - Keep needle in parasagittal plane, do not deviate medially (which may become paramedian epidural block)
  - Use small fractional injections with aspiration in between (as with epidural block)

There are no reports in literature or closed claims and other medico-legal cases
Preemptive analgesia

- Administration of analgesics prior to painful stimuli to prevent the establishment of central sensitization and thus the amplification of postoperative pain.

- The concept is based on animal studies that revealed that local anesthetics or opioids can prevent the development of prolonged behavioral and physiological sequelae following brief noxious stimuli.

- Results from human studies remain inconsistent.

Kissin I, 2000
Wall PD, 1988
Preemptive analgesia

- Can not be effective if the analgesic intervention is not adequate
- Need to produce a sufficiently dense and long duration of blockade (systemic opioids (-), Epidural (+))
- Inflammatory mediators and nociceptive input should be kept inhibited well into postop period
- Central sensitization may not be prevented if the treatment is terminated too early

Ong et al, 2005
Preventive analgesia*

- Was introduced to emphasize the fact, that central neuroplasticity is induced by preoperative, intraoperative and postoperative nociceptive inputs.
- Effective preemptive analgesia may be also helpful in reducing chronic postoperative pain and disability.

*Kissin, Anesth Analg 1994*
Multimodal analgesia

• Was introduced as a technique to improve analgesia and reduce the prevalence of opioid-related adverse events due to the additive or synergistic effects of different analgesics
Multimodal pain therapy

- Variety of agents
- In small doses

Block perception of pain in multiple sites with minimal side effects
OPIOIDS

• **First line rescue medication for moderate/severe pain**

• **Common side effects:**

  • nausea/ vomiting,
  • itching,
  • respiratory depression
  • prolongation of postoperative ileus
  • inhibition of both cellular and humoral immune function
Analgesic adjuvants

- Acetaminophen
- NSAIDs / COX 2 inhibitors
- NMDA blockers
- Alpha 2 agonists
- Anticonvulsants
- Steroids
Acetaminophen

- analgesic and potent antipyretic
- it is a weak inhibitor of cyclooxygenase, (COX-3 in the brain)* which accounts for the lack of any significant antiinflammatory effect
- There is evidence that serotonergic mechanisms are involved (NB! Ondansetron)

* Issioui T et al, Anesth Analg 2002
NSAID / COXI

- “unless contraindicated, all patients should receive an around the clock regimen of NSAIDs, COXIBs, or acetaminophen” *

Practice guidelines for acute pain management in the perioperative setting. ASA. Anesthesiology 2004
NSAIDs well known for alleviating postop pain and reducing requirements for opioids, BUT can cause

- Gastropathy
- Renal dysfunction
- Hemostatic defects (platelet aggregation and bleeding time)

*Especially in fasting and hypovolemic patients (NB: bowel prep!)*

**Absolute contraindications:**

- Renal failure
- Allergy
- Late pregnancy
ACUTE PAIN PATIENT POPULATION

COX-2 suitable in

- presence of PMH of PUD
- Elderly patients may develop fluid retention and mild HTN (lowest effective doses for the shortest duration)
- Suitable for orthopaedic surgery due to lack of anti-platelet effect

S. Bingham et al., 2006
NMDA receptor antagonists

- Reduction of acute postoperative pain
- Reduction of opioid analgesic consumption
- Both
  - Have potential for attenuating central sensitization and wind-up-like states
  - Reduce opioid tolerance

Beyond the clinical activity of the target drug

your name
NMDA receptor antagonists

- effect immediately and beyond the clinical duration of action
- ketamine 0.15 - 1.0 mg/kg
- dextromethorphan 1 mg/kg

Have potential for attenuating central sensitization

✓ Ketamine 58%
✓ Dextromethorphan 67%
✓ Magnesium 0/4
Outcomes

• Improved patient satisfaction
• Earlier OOB / ambulation
• Earlier PO intake
• Decreased length of stay
Therapeutic outcomes

• Decreased stress response to injury/decreased level of circulating CA
• Improved immune response
• Decreased recurrence and metastasis in cancer patients
• Increased longevity in cancer survivors
• Reduction in incidence of surgical site infections
Acute compartment syndrome and effect of analgesia

• All analgesic modalities has been linked to a delayed Dx of ACS (level3)
• By its very nature, ACS Dx and Tx would be ethically impossible to study prospectively because it cannot be reliably and safely reproduced in human subjects
Pain is unreliable because its subjective and variable.
Ischemic pain activation via hydrogen ion excitation may make diluted LA infusion ineffective to provide analgesia.*

* MA Cometa et al., Pain Med 2011
• High index of suspicion
• Written protocols
• Ongoing assessment of patients
• Use of diluted infusion of LA to avoid motor and dense sensory block