ICM and Perioperative Medicine 11 May 2022

- 1400 Professor David Walker; Critical Care after Emergency Surgery; live
- 1430 Dr Mevan Gooneratne; Medical input on optimising surgical patients; live
- 1500 Dr John Whittle; Prehabilitation before Major Surgery; live
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- 1645-1700 Roundup & home!

Perioperative pain issues in critical care

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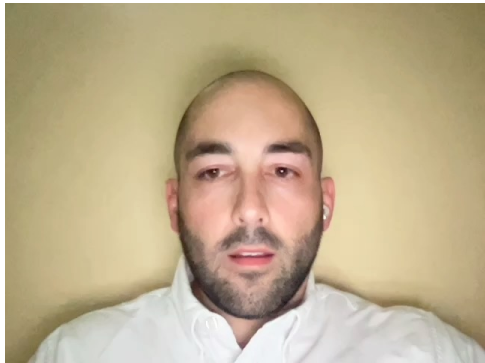


Perioperative pain issues in critical care

- Importance of managing acute postoperative pain
- Challenges & barriers in the ICU environment
- Pharmacological options
- Troubleshooting epidural analgesia

Introduction

- An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage [IASP 2020]
- The prevention and alleviation of postoperative pain are core responsibilities for healthcare professionals
- Assessment & management of perioperative pain in the ICU setting can be complex and challenging

Acute postoperative pain

- Generally short-term & self-limiting adaptive response to surgical tissue injury
- Severe pain after surgery still represents a largely unrecognised clinical problem
- Minor-to-medium level procedures can result in unexpectedly high levels of postoperative pain
- Poorly-controlled postoperative pain is a risk factor for developing chronic or persistent postsurgical pain
- Critical care patients are at particular risk of inadequate analgesia

Adverse effects of pain

Physiological	Cardiovascular: ↑ catecholamine release & sympathetic drive – hypertension, tachycardia, vasoconstriction, myocardial ischaemia); ↑ risk of pressure sores, DVT & PE due to delayed ambulation / reduced mobility	Respiratory: diaphragmatic splinting, ↓ chest expansion, inability to cough – sputum retention, basal atelectasis, hypoxia [slows collagen deposition & delays wound healing], respiratory infections	GIT: ileus, nausea & vomiting	Stress response → protein breakdown, platelet aggregation, immunosuppression
Psychological	Anxiety & distress; Distracting, interferes with sleep; Decreased patient satisfaction - may undermine faith in healthcare staff; post-traumatic stress disorder (PTSD)			
Socioeconomic	Prolonged hospital stay; Delayed return to work; Stress on interpersonal relationships			

- Inadequately treated pain in ICU leads to prolonged ventilation, longer ICU stay & delayed hospital discharge

Assessment of acute postoperative pain

- Challenging in the ICU setting

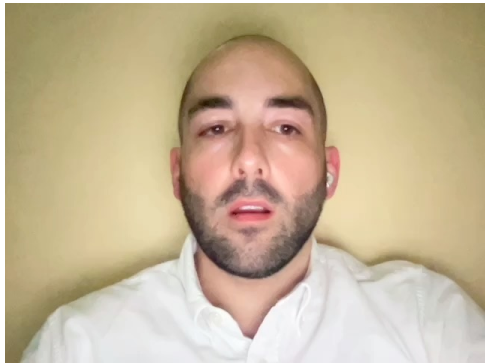
- Currently, pain assessment tends to be linked to the delivery of analgesic drugs with the aim of reducing subjective pain scores

Management of postoperative pain

- Aim for optimal pain relief to achieve functional goals and promote recovery:
  1. Subjective comfort
  2. Reduce the magnitude of the surgical stress response
  3. Enhance restoration of function by allowing the patient to breathe, cough & move easily
- Unrealistic postop goal of achieving pain-free experiences at rest and on movement – expectation setting key.
- Analgosedation

Management of postoperative pain

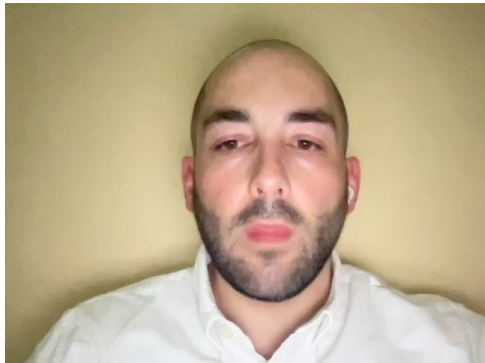
- No perfect analgesic drug exists
- Lack of high-quality procedure- and patient-specific data with sufficient information on efficacy vs safety of simple basic analgesia approaches
- WHO Analgesic Ladder
- Multimodal opioid-sparing approach
- Procedure-specific analgesic strategies: PROSPECT - postoppain.org



Opioids

- Tension between their benefit and threat to optimal postoperative recovery
- Opioids have a similar spectrum of side effects but there is considerable interpatient variability in efficacy & side effects
- Opioid-related adverse events reported in 10% of patients - associated with an increase in duration of hospital stay of 1.6 days
- Patient-controlled analgesia (PCA)

PCA variable	Drug and dose	Comments
Loading dose	0mg	Patients should be comfortable before starting PCA
Bolus dose	Morphine 1mg Fentanyl 20 micrograms Oxycodone 1mg Pethidine 10mg Diamorphine 0.5mg Tramadol 10mg	Patients over the age of 70y may require half this amount
Concentration	Varies, depending on pumps used and hospital protocols	Should be standardised in hospital protocols for each drug
Lockout interval	5min is usual	
Background infusion	0mg/h	If used, the background infusion rate (mg/h) usually should not exceed the bolus dose (mg)
Dose limit	30mg morphine or equivalent in 4h	No clear opinion on how this facility should be used. Often no dose limit is set



Opioids

- Continuation of opioids beyond the postoperative hospital stay represents a risk, as well as potential source for diversion and misuse of opioid supply
- Minimise the number of routes of administration and of the different types of opioids
- Write clear prescriptions and document plan for out-of-hours team dealing with the patient.
- Avoid compound analgesic preparations
- Modified release opioid preparations should be avoided or strictly dose- and time-limited

Paracetamol

- Particularly effective when administered IV
- Opioid-sparing effects
- Often concern relating to development of hepatotoxicity - current data suggest this is unlikely to develop at therapeutic doses

NSAIDs/COX-2-selective inhibitors

- Opioid-sparing effect of between 20% and 40%
- May be used as the sole analgesic for mild to moderate pain
- Some important contraindications – check with surgical team

Other adjuncts

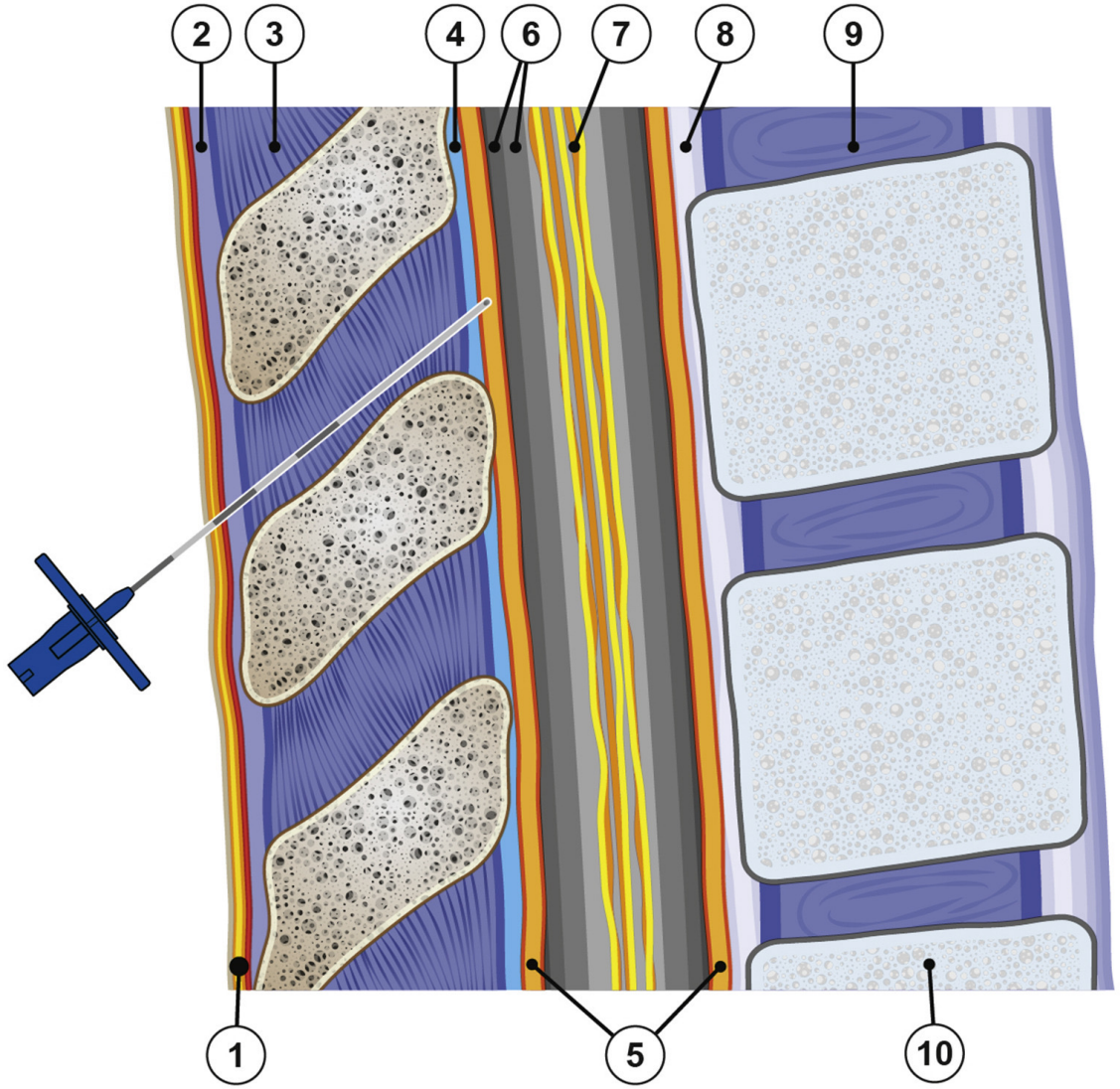
- Non-opioid adjuvant analgesic drugs
  - Insufficient evidence to recommend routine use
  - Ketamine
  - Gabapentinoids – Gabapentin, Pregabalin
  - Lidocaine
  - Alpha-adrenoceptor agonists – Clonidine, Dexmedetomidine

- Non-pharmacological interventions – aromatherapy, music, virtual reality

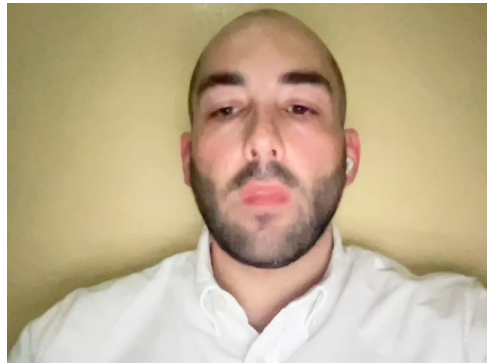
Regional Anaesthesia

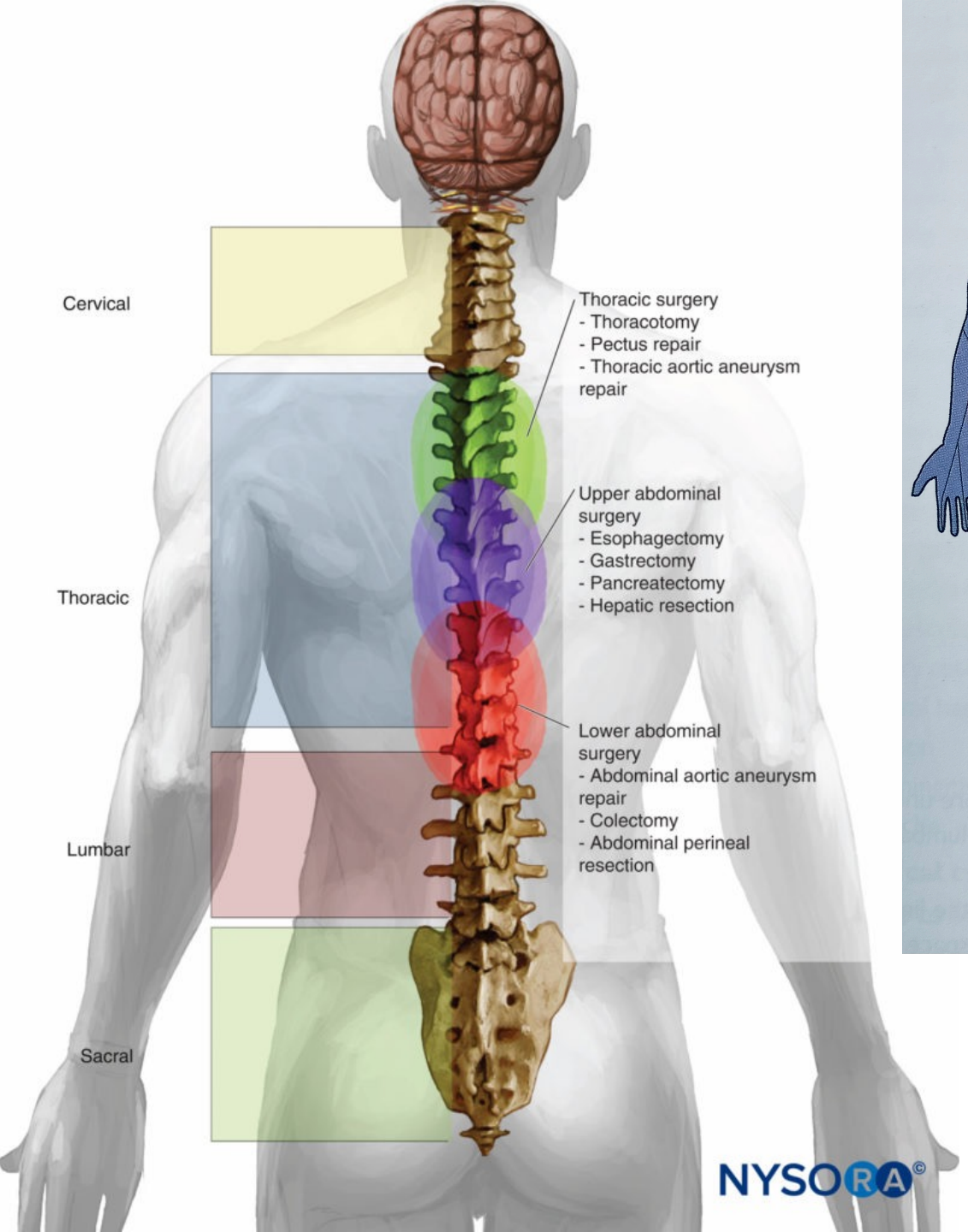
- Single-shot peripheral nerve block
- Spinal
  - LA: Prilocaine 0.5-1.5hr, Bupivicaine 2-4hr
  - Opioids - urinary retention, delayed/late respiratory depression
- Continuous peripheral nerve / wound catheter infiltation
  - Safe doses must be calculated on a per kg basis for every patient
- Epidural
- Implications for the ICU patient– coagulopathy, timing/dosing of anticoagulation, haemodynamic instability

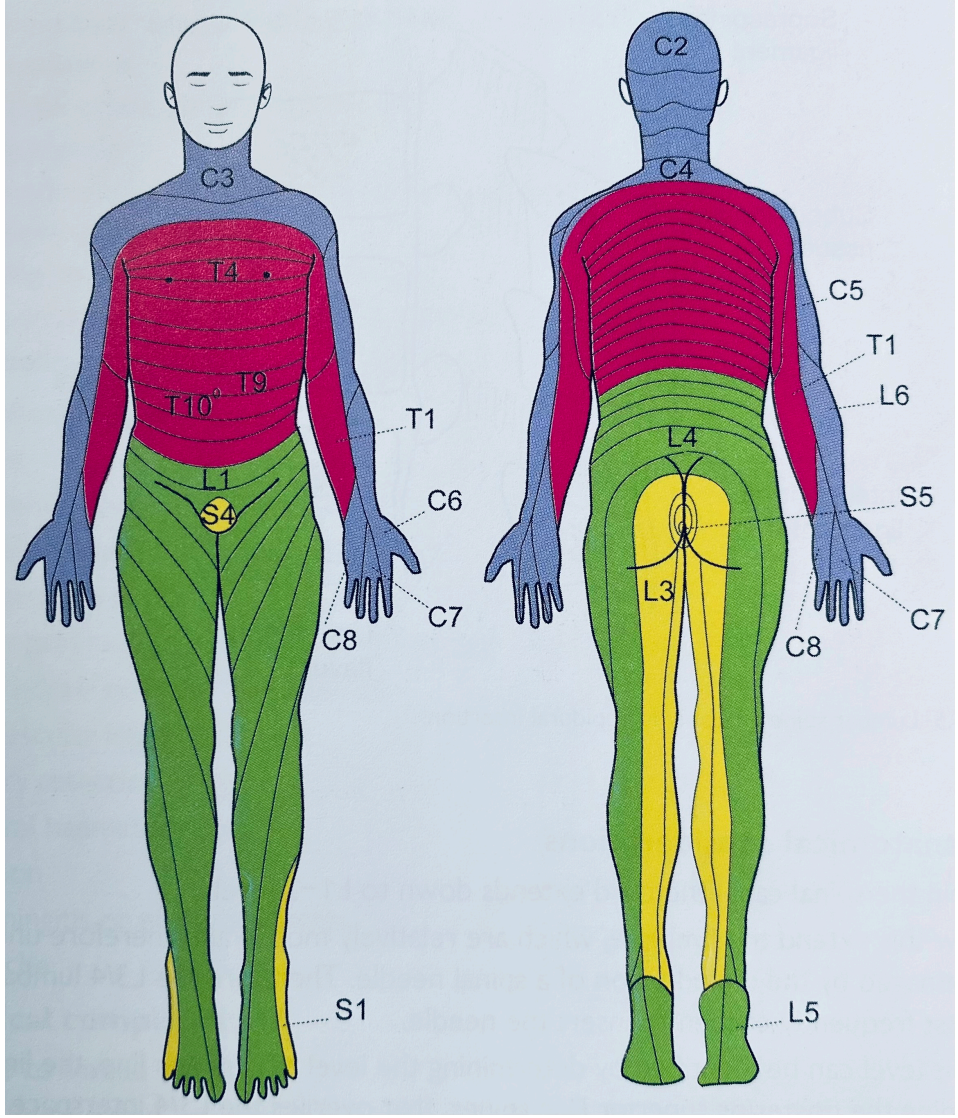
Epidural analgesia



1. Skin/fat/subcutaneous tissue
2. Supraspinous ligament
3. Interspinous ligament
4. Ligamentum flavum
5. Epidural space
6. Dura/arachnoid mater
7. Cauda equina (within intrathecal space containing CSF)
8. Posterior longitudinal ligament
9. Intervertebral discs
10. Vertebral body




Cervical
Thoracic
Lumbar
Sacral
Thoracic surgery
- Thoracotomy
- Pectus repair
- Thoracic aortic aneurysm repair
Upper abdominal surgery
- Esophagectomy
- Gastrectomy
- Pancreatectomy
- Hepatic resection
Lower abdominal surgery
- Abdominal aortic aneurysm repair
- Colectomy
- Abdominal perineal resection
NYSORA©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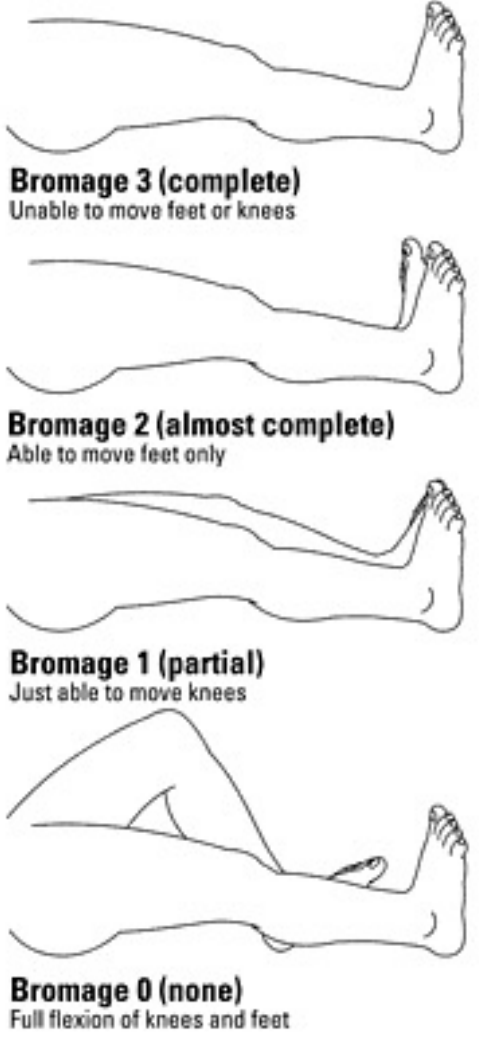
Epidural analgesia

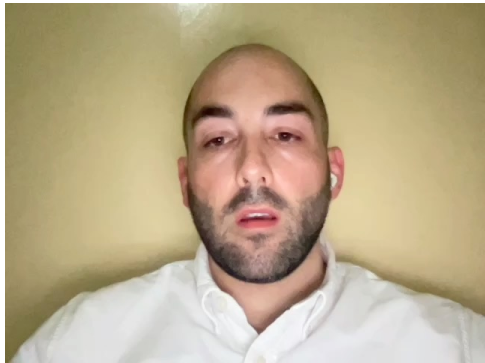
- Benefits
  - Reduced incidence of postoperative pulmonary complications
  - Attenuation of surgical stress response
  - Reduced opioid consumption – reduced ileus
  - Reduced length of ICU/hospital stay
- Contraindications – local or general sepsis, coagulation disorders/anticoagulants, central neurological diseases
- Serial assessments of quality of analgesia required, as well as looking for motor block or other complications of the technique:
  - Catheter migration, PDPH, neurological injury, infection – meningitis or epidural abscess or haematoma, urinary retention
- Duration

Epidural analgesia troubleshooting

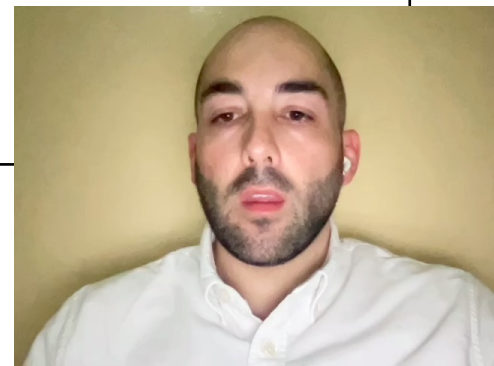
- Review history of patient & documentation of insertion the epidural
- Assess effectiveness of analgesia & density/spread of block
- May be comfortable despite little demonstrable sensory block
- Do not move the epidural catheter within 12hr of LMWH



Problem	Findings	Suggested action
Global failure	No detectable block to cold	Bolus of LA
Low block	Inadequate anaesthesia	Lie flatter Bolus of LA
High block	Hypotension/bradycardia Digital tingling	Turn down/off epidural infusion Support BP with fluid/vasopressor Sit up (when BP allows)
Missed segment	Single dermatomal absence of block (often pain in groin & one-sided)	Roll patient so missed side is downwards – lie lateral position, painful side down, for 20min following top-up Withdrawing catheter 1-2cm if sufficient catheter length in epidural space, leaving at least 3cm in space Further bolus of LA – consider 5-10ml 0.25% bupivicaine Consider fentanyl (50-100mcg) or diamorphine (2.5mg) bolus via epidural (acts via intrathecal action) If no success -> resite or use alternative analgesia
Unilateral block	Unilateral pain, absent block down 1 entire side, often foot warm and dry while foot on painful side cold	



Problem	Findings	Suggested action
Patchy block	Variable spread & density of block throughout; possible subdural catheter (has migrated to lie between the dura mater and the arachnoid space)	Do not use Stop infusion Remove catheter Consider resite at another level
Motor block		Reduce/stop infusion rate – follow local protocol Restart when motor power improving & consider reducing LA concentration
Hypotension/ bradycardia	Nausea/presyncope Vasodilatation	Check fluid status – patient probably relatively hypovolaemic Check block height Reduce/stop infusion Elevate legs Support BP with fluid/vasopressor Consider antiemetic Exclude other causes of hypotension after surgery e.g. bleeding, myocardial insufficiency, sepsis, pulmonary embolism
Severe itching	Opioid-related	Antihistamines may give some relief - Chlorphenamine Naloxone 50-100mcg IV & consider infusion Ondansetron 4-8mg IV Promethazine 25-50mg IM Remove opiate – plain bag



Management of severe postoperative pain

1. IV Ketamine bolus 0.05-0.1mg/kg
   - Dilute Ketamine (10mg) in NS 10ml (1mg/ml)
   - Give up to 0.25mg/kg in small increments
   - May cause hypertension, tachycardia & hallucinations
2. IV Clonidine bolus 0.5-1mcg/kg
   - Dilute Clonidine (150mcg/ml) in NS 10ml (15mcg/ml)
   - Give 1-2ml increments
   - Or 75mcg in 100ml NS infusion over 30min
   - May cause hypotension, nausea, vomiting, sedation & bradycardia
3. Midazolam bolus 1-2mg IV
   - Dilute 10mg in 10ml NS
4. Change of opioid

Take home messages

- Multimodal opioid-sparing approach
- Troubleshoot, be vigilant of complications, discuss with Anaesthetics if concerns
- Involve Acute Pain Team if inadequately controlled postoperative pain or at high risk of inadequately controlled postoperative pain (e.g. long-term opioid therapy, history of substance use disorder, history of complex pain)

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