Management of post op epidural analgesia

"Provision of pain relief by continuous administration of pharmacological agents into the epidural space via an indwelling catheter"

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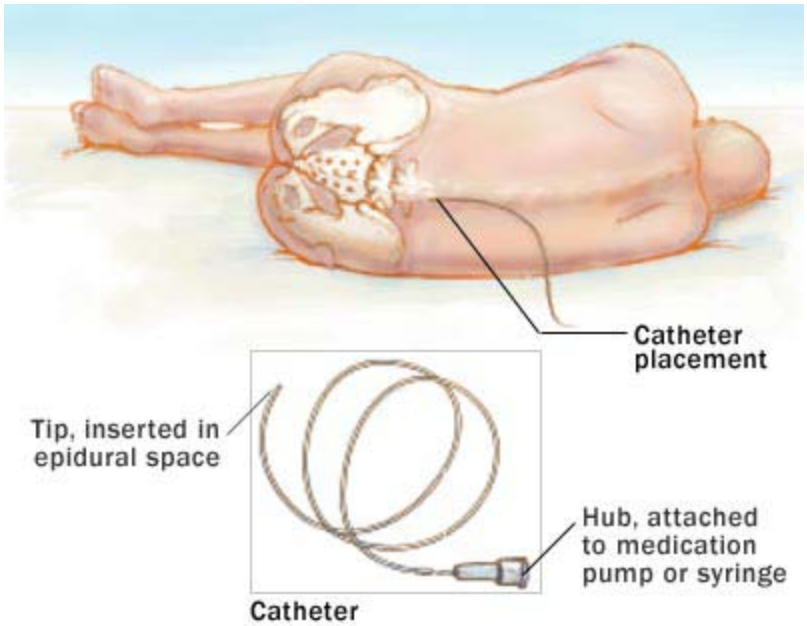
Content

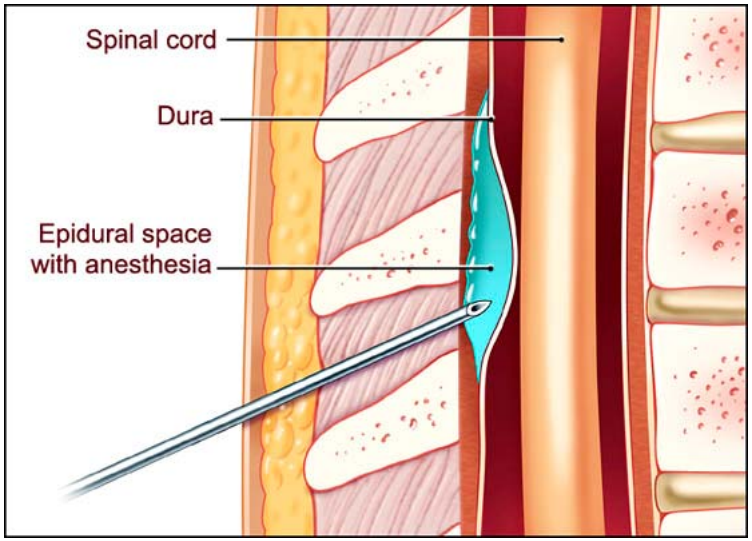
- General introduction
- Efficacy of epidural analgesia
- Contraindications
- Drugs used in epidural
- Drugs toxicity
- Physiological effects of epidural anesthesia
- Epidural analgesia vs anesthesia
- Complications
- Postdural Puncture Headache (PDPH)
- Epidural hematoma
- Prevention of epidural hematoma
- +/- final discussion

Epidural analgesia



Epidural kit

Epidural space



Epidural infusion pump

- Gemstar

Efficacy – pain relief, morbidities

- Regardless of analgesic agent used, location of catheter, type of surgery and type or time of pain assessment, it provided better pain relief than parenteral opioid administration
- Systemic opioids PCA vs Epidural.
- Lower incidence of nausea and vomiting and sedation, higher incidence of pruritis, urinary retention and motor block. (Level I)
- Reduced rate of arrhythmias, earlier extubation, reduced ICU stay, reduced stress hormone, cortisol, and glucose concentrations, reduced renal failure when LA were used. (Level I)
- Improved pain relief led to increase PaO_2 levels and decreased incidence of pulmonary infections and pulmonary complications. (risk of pneumonia is 8% in epidural compare to 12% in opioid group) (Level I)

Efficacy-types of surgery

- Colorectal surgery - Some studies demonstrated reduced hospital stay (level III2)
- Lung resection – Thoracic epidural analgesia (TEA) resulted in better pain relief, and pulmonary function. (Level II)
- CABG – High TEA reduced postoperative pain, risk of dysrhythmias, pulmonary complications and time to extubation when compared with iv opioids. No differences in mortality or the rate of myocardial infarction (Level I). No very good evidence to improve ischemic outcome
- Hip or knee replacement – better pain relief than iv opioids, in particular with movement (Level I). LA/ LA+opioids better than epidural opioids alone
- Vascular surgery – some showed reduced incidence of graft occlusion (Level II)

Efficacy – TEA vs Lumbar

- TEA improved bowel recovery after abdominal surgery, while these benefits were not consistent with lumbar administration (Level I)
- TEA for more than 24 hrs, significant reduction in the incidence of post op myocardial infarction (Level I)
- TEA for gyne surgery, only better if incision extended above umbilicus (Level II)
- Multiple traumatic # ribs, TEA with LA, reduced the duration of ventilation compared with lumbar epidural/iv opioids, mortality and length of ICU stay was not different. Hypotension more different (Level I).
- #ribs, risk of nosocomial pneumonia was reduced by TEA (Level II)

Contraindications

- Absolute
  - Patient refusal
  - Sepsis with hemodynamic instability
  - Uncorrected hypovolemia
  - Coagulopathy

Contraindications

- Relative
  - Elevated intracranial pressure
  - Prior back injury with neurologic deficit
  - Progressive neurological disease eg. Mulitiple sclerosis
  - Chronic back pain
  - Localised infection at injection site

Drugs use for epidural analgesia – Local anaesthetics

- *Bupivacaine* 0.1 % to 0.125 %

  (racemic mixture of S&R isomers)
- *Levobupivacaine* 0.1 % to 0.125 %

  (S enantiomer of bupivacaine)
- *Ropivacaine* 0.2%

  (S enantiomer)
- *S- isomers : claimed adv providing differential blockade. More selective sensory blockade compare to Bupivacaine. Less cardiotoxic compare to Bupivacaine*

LA plus opioids combinations

- Improve quality of pain relief. Potential dose – sparing benefits (hypotension and motor block)

- Opioids alone seem to be of limited benefit, slight reduction in the rate of atelectasis (Level I), no benefit on bowel recovery (Level I).

Clinical manifestation of LA toxicity

- Elevated levels of plasma levels due to overdose, inadvertent subarachnoid or intravascular injection
- Involves cardiac and CNS.
- CNS affected first

Clinical manifestation of LA toxicity

- CNS
  - Lightheadness, tinnitus, perioral numbness, confusion
  - Muscle twitching, auditory and visual hallucinations
  - Tonic clonic seizure, unconsciousness, respiratory arrest
- Cardiac
  - Hypertension, tachycardia
  - Decreased contractility, and cardiac output, hypotension
  - Sinus bradycardia, ventricular dysrhythmias, circulatory arrest

Systemic: CNS

Plasma [LA]	Manifestations	
low	Circumoral & tongue paraesthesia	
medium	Dizziness	Confusion
	Visual disturbances	Drowsiness
	Auditory disturbances	Restlessness
	Confusion	Muscle disturbances
	Nystamus	
high	Convulsion	
	Coma	
	Cardio-respiratory arrest	

Physiological effects with epidural anaesthesia/analgesia

- Decrease in blood pressure
- Changes in HR. Tachycardia if CO increases to compensate for a drop in SVR. Bradycardia if blockade above T4 disrupt the cardiac sympathetic accelerator fibers
- Ventilation is maintained as long as the diaphragm is not affected (phrenic n C3-5)

Physiological effects with epidural anaesthesia/analgesia

- Bladder distention. Increase risk of catherization if the block is dense
- Intestinal contraction
- Change in thermoregulation. Peripheral vasodilation lowers core body temperature.
- Glucose control is better maintained

Analgesia vs anesthesia

- *Epidural* ***Anesthesia*** implies an intense sensory and motor blockade, which is necessary to perform a surgical procedure. It is usually obtained by a high concentration LA, eg 2%lignocaine, or 0.5 %bupivacaine.

- *Epidural* ***Analgesia*** : Sensory block only for pain management. More diluted agents eg 0.1%bupivacaine infusion are used

Segmental blockade

- Epidural analgesia is segmental. There is an upper and lower level. The block is most intense near the site of catheter insertion and diminishes caudad and cephalad.
- Ideally the catheter should be placed as close to surgical site as possible.
- Eg. thoracic for chest surgery, midlumbar for hip

EPIDURAL INFUSION ATTACHMENT

THIS IS A SPECIALISED ANALGESIA TECHNIQUE AND MAY ONLY BE INITIATED BY THE CHILDREN'S PAIN MANAGEMENT SERVICE

AFFIX PATIENT LABEL HERE

Weight: _____kg

Level of epidural insertion:_____ ***Catheter position at skin:***_____***cm Skin to space distance:***_____***cm***

PRESCRIPTION

Local anaesthetic solution: ....**% in** ..... **ml**

Additive: .... **micrograms per ml Infuse at** ..... **ml/hr**

If patient in pain, contact the Children's Pain Management Service (CPMS) to initiate the ticked options below:

☐ Administer ..... **ml** bolus of the prescribed epidural solution. **If no improvement after 15 minutes call CPMS.**

☐ Increase infusion rate to ..... **ml/hr**

☐ Bolus to be administered by CPMS staff **only** Reason: .....

PRESCRIBER TICK APPROPRIATE BOX BOLUS TO BE ADMINISTERED BY ACCREDITED NURSES ONLY

Prescriber's Signature ..... Date ..... Printed Name .....

CHANGES TO INFUSION RATE:

Pharmacy Initials

Date/Time	Revised rate ml/hr	Reason for change	Prescriber signature & name

REPORTABLE PROBLEMS: **Contact the Children's Pain Management Service (PAGER 5773) IMMEDIATELY**

BP (systolic) >..... <..... **HR** >..... <..... **Temperature > 38.5˚C**

- Sedation score = or > 3
- Numbness/tingling in fingers/arms
- Bleeding/pain at epidural site
- Oxygen saturation <90% or difficulty breathing
- Dense motor block
- Urinary retention
- Inadequate pain relief

REVISED PRESCRIPTION

(Reason for change: .....*)*

Local anaesthetic solution: ....**% in** ..... **ml**

Additive: .... micrograms per ml **Infuse at** ..... **ml/hr**

If patient in pain, contact the Children's Pain Management Service (CPMS) to initiate the ticked options below:

☐ Administer ..... **ml** bolus of the prescribed epidural solution. If no **improvement after 15 minutes call CPMS.**

☐ Increase infusion rate to ..... ml/hr

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Prescriber's Signature ..... Date ..... Printed Name .....

CHANGES TO INFUSION RATE:

Pharmacy Initials

Date/Time	Revised rate ml/hr	Reason for change	Prescriber signature & name

DATE/TIME INFUSION TO BE CEASED: Date..... Time..... Restarted: YES / NO

DATE/TIME INFUSION CEASED: Date..... Time.....

See over page for record of bolus doses given, bag changes and details of epidural catheter removal.

For full details of Hospital guidelines concerning Epidural infusions please see "Epidural infusion protocol" in the Children's Pain Management Service Guidelines (in CPMS information folder on wards or on Royal Children's Hospital Intranet)

THIS ATTACHMENT IS A LEGAL PRESCRIPTION. Stock No. 306512

EPIDURAL INFUSION ATTACHMENT

This order is not valid unless securely attached to designated area on MR52.

RECORD OF INFUSION: (PLEASE SIGN FOR EACH NEW BAG/FLASK OF EPIDURAL SOLUTION)

ORIGINAL PRESCRIPTION:

Date	Time	Initials	Initials		Date	Time	Initials	Initials

REVISED PRESCRIPTION:

Date	Time	Initials	Initials		Date	Time	Initials	Initials

EPIDURAL BOLUS ADMINISTRATION:

Date / Time	Current infusion rate (ml/hr)	Epidural solution administered (concentration/ml)	Reason bolus given	Effect of bolus	Prescriber signature & name

EPIDURAL CATHETER WITHDRAWAL:

Date / Time	Reason catheter withdrawn	By how many cm	Revised position at skin (cm)	Signature & name

EPIDURAL CATHETER REMOVAL:

Date/Time for epidural catheter to be removed:.....

Catheter position at skin PRIOR to removal:.....(cm)

CIRCLE: Catheter tip intact: YES / NO

CIRCLE: Site inflamed: YES / NO

CIRCLE: Discharge at site: YES / NO

IF THE CATHETER TIP IS **NOT** INTACT OR THERE IS SITE INFLAMMATION OR DISCHARGE PLEASE KEEP THE CATHETER AND INFORM THE CHILDREN'S PAIN MANAGEMENT SERVICE **IMMEDIATELY.**

Date/Time of removal of epidural catheter:.....

Name & signature of person removing epidural catheter:.....

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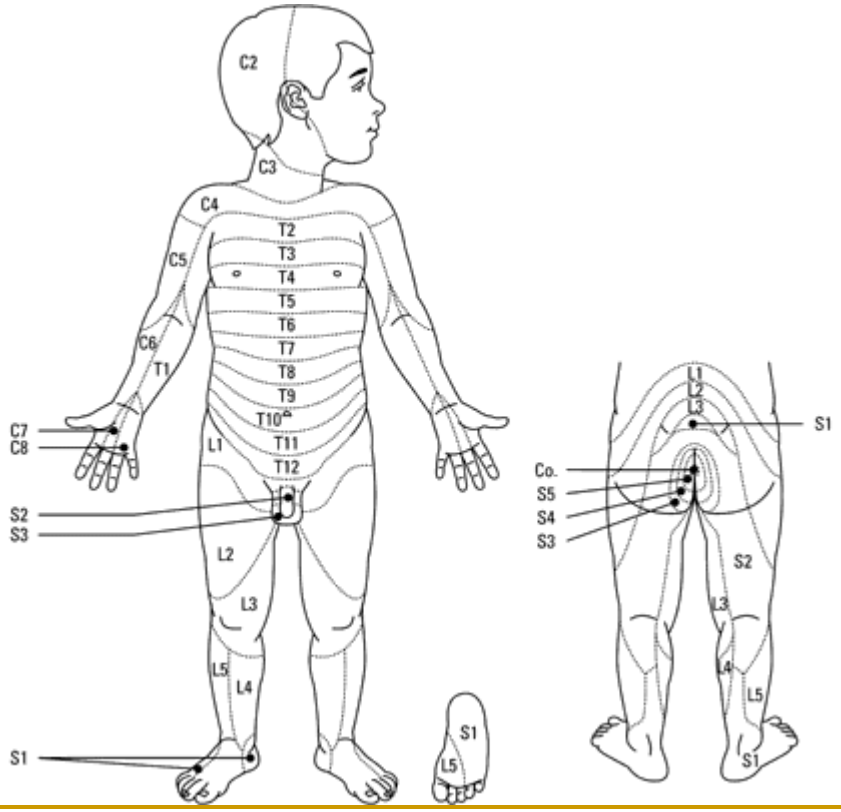
Sensory blockade



Factors that affect the spread of epidural solution

- Extent of block is primarily determined by the *volume of LA solution*
- Increase ml of LA ➔ more dermatomes are blocked
- To achieve a T4 block from a lumbar epidural catheter 20-30 ml solution is required.
- Other factors: Age, pregnancy, and obesity usually require less volume. Taller patients may need larger volume

Potential complications of epidural analgesia

- Hypotension due to sympathetic blockade; ensure adequate fluid replacement. The sympathetic blockade is weak with analgesia concentration of LA

- Catheter migration lead to intrathecal infiltration of drugs. Hence lead to total spinal. Proper testing of catheter with test dose of LA, monitoring of sensory blockade is essential

⊤ Post dural puncture headache

⊤

- PDPH due to accidental dural puncture.
- Diagnostic feature: postural headache, worse when sit up, relief with supine position.
- !!exclude other pathological causes of headache eg AVM
- More than 70% of PDPH cases recover with time without treatment

PDPH treatment options

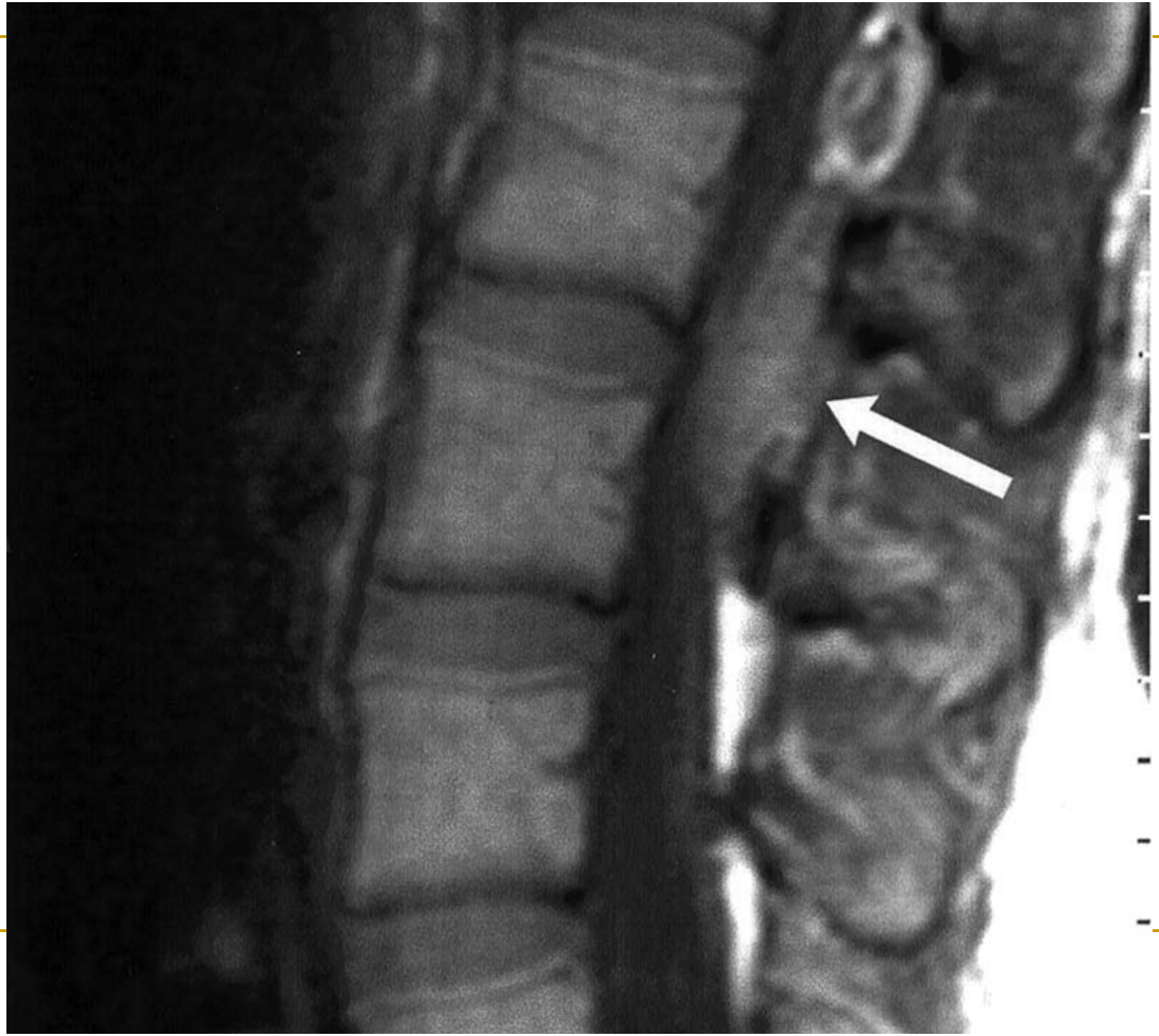
- Simple analgesics: paracetamol
- Caffeine

- Epidural blood patch: severity, patient request. Up to 20 ml of the patient's blood is placed in the epidural space to seal the dural hole and to elevate low CSF pressure

Adverse effects: Neurological injury

- The risk or permanent neurological injury is very low. (0 to 7.6:10000) Higher incidence when there have been delays in diagnosing an epidural haematoma or abscess
- Paraplegia and cauda equina syndrome

  ~0.09 : 10000 and 0.23 :10000
- Epidural hematoma ? 1: 100000
- Epidural abscess 0.015% to 0.05% (Level IV)



Epidural hematoma

- Rare
- Increase risk with preexisting coagulopathy
- Presentation: back pain and leg weakness and early investigation and surgical decompression within 6- 8 hrs is advocated for favorable outcome
- Special precautions in patients on *anticoagulation medications*
- Insertion and removal of epidural catheter carry the same risk of developing epidural hematoma in patients with altered coagulation.

Prevention of epidural hematoma

- **POST-OPERATIVE ANAESTHETIC MANAGEMENT**
- **OF PATIENT WITH SPINAL/EPIDURAL ANAESTHESIA**
- Bed rest for at least six hours.
- Start to mobilize if required when
  - General condition stable.
  - Muscle power of both lower limbs return to normal.
  - Numbness of lower limbs disappear completely.
  - No fainting and dizziness on sitting up.
  - Blood pressure is stable and above 100mmHg systolic.
- Check blood pressure and heart rate hourly till stable (minimum 6 hours).
- Inform anaesthetist if patient complains of headache.
- Watch out for urinary retention.
- **Instructions on post op anticoagulant therapy**
- *Withhold LMWH for 24 hrs until _____*(time/date)*
- *Withhold antiplatelet agent (ticlodipine and clopidogrel) for 24 hrs until _____ *(time/date)*
- *Withhold _____until _____(time/date)
- * please delete if not indicated
- **Signature:**
- **Anaesthetist:**

Guidelines

Table 6. Neuraxial Anesthesia in the Patient Receiving Thromboprophylaxis

	Antiplatelet Medications	Unfractionated Heparin		Low Molecular Weight Heparin	Warfarin	Thrombolytics	Herbal Therapy
		Subcutaneous	Intravenous				
German Society of Anesthesiology and Intensive Care Medicine	No contraindication	Needle placement 4 h after heparin; heparin 1 h after needle placement or catheter removal	Needle placement and/or catheter removal 4 h after discontinuing heparin, heparinize 1 h after neuraxial technique; delay surgery 12 h if traumatic	Neuraxial technique 10-12 h after LMWH; next dose 4 h after needle or catheter placement	Discontinue in advance, remove catheter prior to initiation of warfarin	Not discussed	Not discussed
Spanish Consensus Forum	Discontinue in advance	Not discussed	Neuraxial technique 4 h after heparin dose; heparinize 30 min after needle placement; delay heparinization 6 h if traumatic	Needle placement 12+ h after LMWH; first postoperative dose 4-12 h; catheters removed 10-12 h after LMWH *and* 4 h prior to next dose; postpone LMWH 24 if traumatic	INR < 1.5 for performance of neuraxial techniques; no INR guidelines for catheter removal	Not discussed	Not discussed
American Society of Regional Anesthesia and Pain Medicine	No contraindication with NSAIDs; discontinue ticlopidine 14 d, clopidogrel 7 d, GP IIb/IIIa inhibitors 8-48 h in advance	No contraindication, consider delaying heparin until after block if technical difficulty anticipated	Heparinize 1 h after neuraxial technique, remove catheter 2-4 h after last heparin dose; no mandatory delay if traumatic	Twice daily dosing: LMWH 24 h after surgery, regardless of technique; remove neuraxial catheter 2 h before first LMWH dose. Single daily dosing: according to European statements	Document normal INR after discontinuation (prior to neuraxial technique); remove catheter when INR ≤ 1.5 (initiation of therapy)	No data on safety interval for performance of neuraxial technique or catheter removal; follow fibrinogen level	No evidence for mandatory discontinuation prior to neuraxial technique; be aware of potential drug interactions

Abbreviations: NSAIDs, nonsteroidal anti-inflammatory drugs; GP IIb/IIIa, platelet glycoprotein receptor IIb/IIIa inhibitors; INR, international normalized ratio; LMWH, low molecular weight heparin.

Data from the German Society of Anesthesiology and Intensive Care Medicine Consensus guidelines[77] and the Spanish Consensus Forum.[76]

Guidelines for Management of Central Neural Blockade in Patients Receiving Anticoagulant

(Princess Margaret Hospital)

	Spinal/Epidural catheter placement	Catheter removal
iv heparin	▪Normal APTT prior ▪1 hr before heparinisation	▪Normal APTT ▪4 hrs after discontinue heparin infusion
Subcutaneous unfractionated heparin	At least 4 hrs after last scheduled dose	▪4hrs before next scheduled dose, 6 hrs after last dose ▪If patient has more than 4 days of SC heparin, platelet count is required to exclude heparin induced thrombocytopenia before removal of catheter
Subcutaneous LMWH	At least 10 hours after last dose	At least 10 hrs after last dose or 2 hrs before next dose

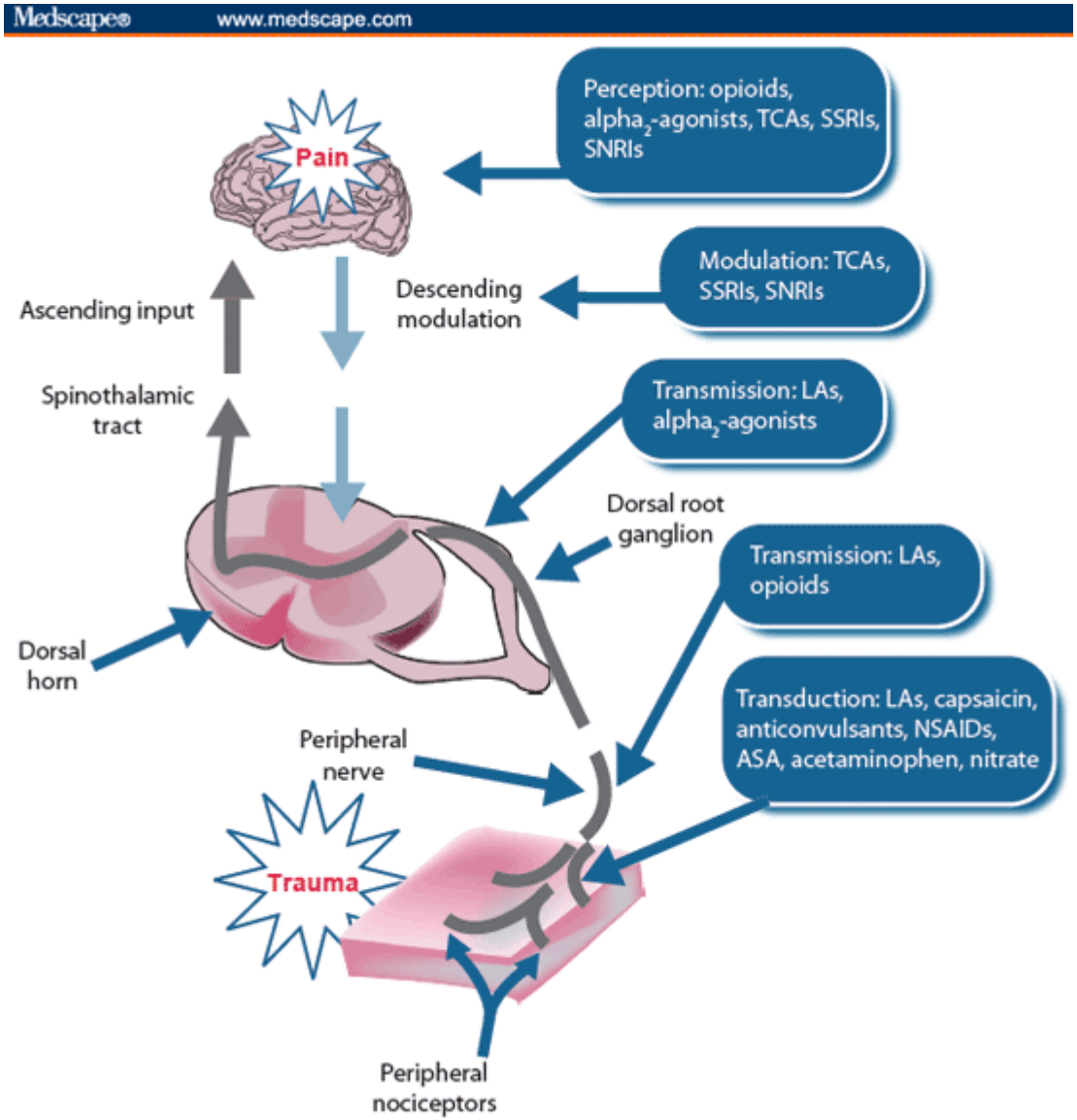
Guidelines for Management of Central Neural Blockade in Patients Receiving Anticoagulant

(Princess Margaret Hospital)

	Spinal/Epidural catheter placement	Catheter removal
Warfarin	Normal INR	Normal INR
NSAID	↑ risk when combined with other anticoagulants	
Thrombolytic agent	Contraindicated	Normal coagulation profile
Antiplatelet agent ▪Ticlopidine ▪Clopidogrel	▪Ticlopidine: stop 14 days prior CNB (central neuraxial blockade) ▪Clopidogrel: stop 7 days prior CNB	

Final discussion

- How to manage a failed epidural?
- Patient underwent thoracotomy Day 2 post op
- Epidural infusion of LA +fentanyl 3 ml/hr
- still complain of VAS 8-9, Sat O2 92% on 2l/ min O2
- He has difficulty to do chest physio because of pain, insufficient cough effort affected by wound pain
- Called anaesthetist on call (Sunday), too busy at OT will not be available to assess immediately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Pain
Perception: opioids, alpha2-agonists, TCAs, SSRIs, SNRIs
Modulation: TCAs, SSRIs, SNRIs
Descending modulation
Ascending input
Spinothalamic tract
Transmission: LAs, alpha2-agonists
Dorsal root ganglion
Transmission: LAs, opioids
Dorsal horn
Transduction: LAs, capsaicin, anticonvulsants, NSAIDs, ASA, acetaminophen, nitrate
Peripheral nerve
Trauma
Peripheral nociceptors