

The Newcastle upon Tyne Hospitals NHS Foundation Trust

RVI Paravertebral Continuous Infusion Guideline

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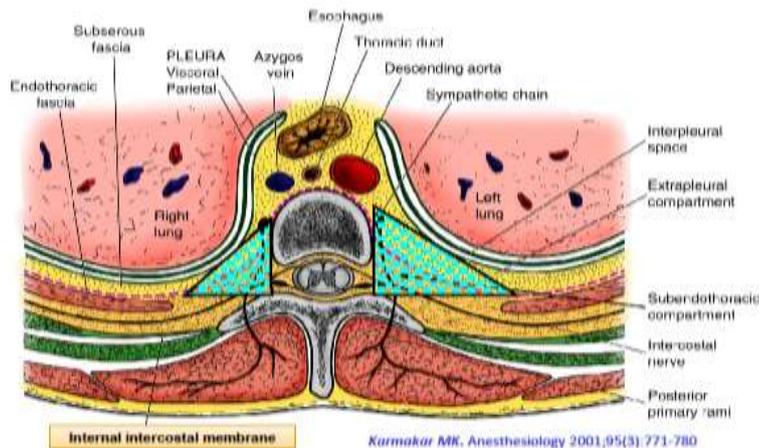
1 Introduction and Aim

The continuous infusion of local anaesthetics into the paravertebral and extrapleural spaces to provide analgesia is a well described technique (Karmakar 2003). The aim of this advanced pain relief technique is to improve patients' respiratory function by enabling coughing and deep breathing (Kaiser, A. 1998, Ilfeld B.2014)

1.1 Definition

Thoracic paravertebral block (TPVB), produces multi-dermatomal, ipsilateral, somatic, and sympathetic nerve blockade

1.2 Anatomy



The thoracic paravertebral space begins at T1 and extends caudally to T12.

- PVBs can be performed in the cervical and lumbar regions but there is no direct communication between adjacent levels in these areas. Most PVBs are therefore performed at the thoracic level.
- The thoracic paravertebral space is wedge shaped in all three dimensions.
- Medially: The bodies of the vertebrae, intervertebral discs, and intervertebral foraminae.
- Anterolaterally: the parietal pleura and the innermost intercostal membrane.
- Posteriorly: the transverse processes (TPs) of the thoracic vertebrae, heads of the ribs, and the superior costotransverse ligament.

- The paravertebral space contains spinal nerves, white and grey rami communicantes, the sympathetic chain, intercostal vessels, and fat. (Tighe et al, 2010)

1.3 Indications

Common surgical procedures in the thoracoabdominal region

- Breast surgery
- Thoracic surgery
- Fractured ribs
- Cholecystectomy
- Renal surgery
- Liver capsule pain (trauma or ruptured cysts)

Relief of chronic pain

- Neuropathic chest or abdominal pain (Post-surgical or post-herpetic)
- Complex regional pain syndrome
- Refractory angina pectoris
- Relief of cancer pain

Miscellaneous

- Therapeutic control of hyperhidrosis. (Tighe et al, 2010)

1.4 Exclusion criteria:

Absolute

- Patient refusal
- Allergy or sensitivity to local anaesthetic
- Total pleurectomy
- Local sepsis (cutaneous or intrathoracic)
- Tumour in paravertebral space at the level of injection

Relative:

- Severe coagulopathy
- Severe respiratory disease (where the patient depends on intercostal muscle function for ventilation)
- Ipsilateral diaphragmatic paresis
- Severe spinal deformities (kyphosis or scoliosis). If the anatomy is abnormal, the difficulty and risks increase. (Tighe et al, 2010)

2 Method

- Effective analgesia is established by the anaesthetist trained in PVB and commencement of continuous infusion.
- Opioid (Morphine) patient controlled analgesia (PCA) may be also be commenced.
- PVB analgesia is maintained with a continuous infusion of 0.25% levobupivacaine at 8 to 12 ml/hour (Fagenholz. P2012).
 - Total 500 mg per 24 hours.
 - No more than 2 mg /kg in any 4 hour period.

- If the pain score is >4 following, staff should inform the acute pain nurse, regional anaesthetist or PINC on-call anaesthetist (out of hours).
 - Acute Pain Team: 29912/29996.
 - Regional Anaesthetist: 21806
- Continuous PVB infusion can be continued in the post-operative period for maximum of five days.
- Drawing up, administering of PVB infusions and removal of the PVB catheter may be performed by acute pain team or anaesthetic assistant.

3 Process

- The paravertebral catheter will be inserted by the anaesthetist in theatre, block area or HDU. STOP before you block should be performed as per Trust policy.
- The anaesthetist will record the insertion details in the acute pain database and nerve catheter chart.
- The anaesthetist will prescribe the hourly infusion rate on nerve catheter chart. The paravertebral catheter is clearly labelled with local anaesthesia grey sticker, correctly positioned and secured. infusion is delivered via either an elastomeric pump or a nerve catheter pump
- The elastomeric pump or nerve catheter pump should be clearly labelled stating drug concentration, date and time drawn up. The drug must be checked with two Anaesthesia Assistants as per Trust policy. This must be cross-checked by the Anaesthetist.
- The elastomeric pump must be filled to the recommended volume as underfilling and overfilling can result in variable infusion rates.
- An anti-bacterial filter must be included on the end of the paravertebral catheter.

4 Patient Observations

4.1 Initial observation

- Venous access should be established before the block.
- Monitor and record respiratory rate, oxygen saturation, BP, pulse, pain score at rest and on movement, sedation score, any signs of toxicity and infusion rate every 5 minutes for 20 minutes, then every 15 minutes for 45 minutes.
- Observations should be made and recorded on the appropriate nerve catheter chart.

4.2 Observations on HDU / ITU/Ward

- Observation should be made and recorded on the appropriate nerve catheter chart.
- Frequency: Hourly for 4 hours, then 4 hourly until nerve catheter infusion is discontinued
- Blocking of sympathetic nerves produces vasodilatation, which can result in hypotension. If the patient is hypovolaemic the hypotension would be

more pronounced. When checking respiratory rate please note the rhythm and depth, chest movements should remain equal on both sides.

- Checking the insertion site: Paravertebral catheter insertion site to be checked 12 hourly by ward nurse or acute pain nurse.
- Check that the catheter dressing (occlusive, sterile and transparent) is intact and dry. The catheter is not stitched in place and can easily fall out, therefore if the dressing requires changing inform the pain team or anaesthetist.
- Check that the anti-bacterial filter is safely secured to prevent disconnection.

5 Discontinuation of the paravertebral catheter

- The infusion will be discontinued on the advice of the acute pain team or anaesthetist.
- Ensure appropriate analgesia is prescribed.

6 Removal of the paravertebral catheter:

The catheter may be removed by the anaesthetist or a member of the appropriate surgical team, or a registered nurse who has attended training.

- Explain the procedure to patient.
- Position the patient comfortably i.e. sitting up.
- Remove catheter without force; catheter should slide out easily.
- Check catheter to ensure tip is complete, if it is not complete inform the pain team and save the catheter.
- If there are any signs of infection such as pus or reddening at the entry site inform pain team who will decide whether to send the tip off for culture and sensitivities.
- Apply sterile dressing over the wound for 24 hours.

7 Management guidelines

Due care by medical & nursing staff must be exercised to ensure that:

- The paravertebral catheter remains in place secured with a semi-permeable dressing, e.g. Tegaderm or Opsite 3400.
- The infusate remains sterile.
- The elastomeric pump is clearly labelled with the infusion label.
- When using nerve catheter pump if the infusion gets blocked, pump will alarm occlusion. It may only need to be flushed by acute pain team or anaesthetist using 0.9% Sodium chloride. **Beware** There is no alarm system to warn occlusion for elastomeric pumps.
- The paravertebral catheter and giving set is clearly labelled at all times using grey stickers.
- All patients receiving PVB infusions are encouraged to undertake physiotherapy, including deep breathing and coughing.

8 Side effects and complications

8.1 Pneumothorax (1%): Symptoms: Severe, sharp pain, dyspnea, absence of breath sounds.

Action: Chest X-ray to determine presence and size of pneumothorax. Record observations and take appropriate actions to minimise patient's discomfort and anxiety. Prepare for insertion of chest drain if required.

8.2 Haemorrhage: Symptoms: Bleeding around PVB catheter site.

Action: Apply pressure to the paravertebral catheter site. Inform surgical team.

8.3 Bilateral block (10%): Due to epidural or pre-vertebral spread.

Action: continue with paravertebral catheter if haemodynamically stable. Consider repositioning the catheter.

8.4 Local anaesthetic toxicity

Symptoms: Peri-oral tingling, light-headedness, twitching, bradycardia, arrhythmias, and convulsions.

Action: Stop infusion, give 100% oxygen, and call acute pain team or anaesthetist!

8.5 Ipsilateral Horner's syndrome

Common side effect if block extends to T1 and T2. Signs and symptoms- ptosis, miosis, anhidrosis, enophthalmos

8.6 Leakage around the insertion site:

Symptoms: Clear fluid leakage around PVB catheter site.

Action: Check for subcutaneous collection

- If yes- remove the catheter and institute alternative analgesia
- If no- apply dermabond at the insertion site and renew dressing to prevent further leakage.
- Inform acute pain team or anaesthetist.

9 References

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