GENERAL THORACIC SURGERY SKILLS AND DECISION MAKING COURSE

OPTIMAL PERIOPERATIVE ANALGESIA FOR THE THORACIC SURGEON

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PAIN IN THORACIC SURGERY

• Pain after thoracic surgery, especially after thoracotomy, is considered one of the most intense postoperative pains.
• It is a nociceptive pain that is localized in the thoracotomy/port area, however it may radiate to front or back following the corresponding dermatomal trajectory.
PAIN IN THORACIC SURGERY

• Long-term post-thoracotomy pain is reported to be higher than 50%*

• A relationship between the severity of acute postoperative pain and the development of chronic pain has been demonstrated**


PAIN IN THORACIC SURGERY

• Pain after thoracic surgery must be managed very carefully

• A bad control decreases pulmonary function and increases the risk of atelectasis, respiratory infections and cardiovascular alterations
There are mainly two types of analgesia in thoracic surgery:

a) Systemic analgesia

b) Loco-regional analgesia
**Systemic analgesia**

- **a) Opioids**
  - The most popular.
  - Different ways of administration: endovenous, intramuscular, transdermal, PCA pump.
  - Opioids are very effective however their secondary effects limit their use: nausea, vomiting, constipation and respiratory depression.
Systemic analgesia

b) NSAIDs (NonSteroidal Anti-Inflammatory Drugs)
   Their main use is as adjuvant analgesics
   Reduce the need of opioids
   Secondary effects are gastrointestinal bleeding, altered platelet function and kidney failure

c) Paracetamol
   It is analgesic, not anti inflammatory
   Main secondary effect is the dose-dependent hepatotoxicity
Loco-regional Analgesia

a) Epidural thoracic analgesia
   It is still the Gold Standard

b) Paravertebral analgesia
   Increasing popularity
Epidural thoracic analgesia

Epidural analgesia blocks the transmission of signals through nerves in or near the spinal cord.

Insertion of a thoracic epidural is done in the *awake patient* for two reasons: lancinating pain warns the anaesthetist of any potential neurological damage; and the extent of sensory analgesia can be measured before inducing general anaesthesia.
Epidural thoracic analgesia

Thoracic epidural analgesia carries the risk of dural puncture, epidural hematoma, epidural abscess, and side effects such as hypotension, bradycardia, and urinary retention.
The use of paravertebral analgesia for thoracic procedures is well accepted. Results are comparable to epidural block.


Paravertebral analgesia
Personal experience

• Comparative analysis of analgesic quality in the postoperative of thoracotomy: paravertebral block with bupivacaine 0.5% versus ropivacaine 0.2%. JJ. Fibla, L. Molins, J.M. Mier, A. Sierra, G. Vidal. Eur J Cardiothorac Surg 2008; 33(3):430-434.


Percutaneous PVB (anesthesiologist)

Direct vision PVB (surgeon)

“Blind” PVB:
- Arterial injections
- Epidural space
- Pneumothorax

Failure rate: 12%*

Visual control:
- Correct placement

AT THE END OF SURGERY AND WITH THE THORACOTOMY OPENED, PARAVERTEBRAL SPACE CAN BE EASILY IDENTIFIED.

PLACEMENT OF PARAVERTEBRAL CATHETER. POSTEROLATERAL THORACOTOMY
THE PUNCTURE SITE SHOULD BE SITUATED 3 CM LATERAL TO THE SPINOUS PROCESS.
AN 18-GAUGE TUOHY NEEDLE IS INSERTED PERPENDICULARLY TO THE SKIN.
A catheter is then inserted 3 cm.

Placement of paravertebral catheter. Posterolateral thoracotomy.
THE TIP OF THE CATHETER ENTERING INTO THE PARAVERTEBRAL SPACE CAN BE LOCATED VISUALLY.
PLACEMENT OF PARAVERTEBRAL CATHETER.
POSTEROLATERAL THORACOTOMY
BOLUS OF LOCAL ANAESTHETIC
CONTINUOUS INFUSION OF LOCAL ANAESTHETIC THROUGH AN ELASTOMERIC PORTABLE PUMP
3 ports were employed in all the cases: 12 mm / 10 mm / 5 mm

Ports were placed in a maximum range of 3 intercostal spaces between the lower and the upper.
PVC placement (landmark):

The upper edge of the spinous process of the thoracic vertebral body (equidistant to the upper and lower intercostal space where ports had been placed) is identified.
The advance of the needle and the entering of the catheter into the paravertebral space are verified all the time by the surgeon thanks to the camera.
The needle is removed **checking** with the **camera** that the tip of the PVC remains in optimal place.
The PVC is fixed to the skin and attached to the filter.
An initial bolus of local anesthetic is infused at the end of the procedure.

This can be repeated every 6 hours.
Paravertebral analgesia
Personal experience

Direct or thoracoscopic-assisted positioning of PVC is technically simple and allows direct visualization of correct delivery of local anesthetic.

In our experience pain scores have been comparable to those published with epidural block with no side effects.
## Average VAS Scores (Bolus vs Continuous Infusion)

<table>
<thead>
<tr>
<th></th>
<th>Bolus group (n=40)</th>
<th>Cont. Inf group (n=40)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VAS 1 hour</strong></td>
<td>3.1 *</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>VAS 6 hour</strong></td>
<td>6.9</td>
<td>7.1</td>
</tr>
<tr>
<td><strong>VAS 24 hour</strong></td>
<td>6.2 *</td>
<td>6.6</td>
</tr>
<tr>
<td><strong>VAS 48 hour</strong></td>
<td>4.8</td>
<td>5.2</td>
</tr>
<tr>
<td><strong>VAS 72 hour</strong></td>
<td>3.4 *</td>
<td>4.0</td>
</tr>
</tbody>
</table>

Values are mean

Other measures to reduce postoperative pain

a) Reducing the size of the thoracotomy
b) Slower rib spreading procedure
c) Muscle sparing techniques
d) Antero-lateral thoracotomies and VATS
e) “Intracostal” suture
f) Thoracotomy and periphrenic infiltration
g) Use of complementary techniques (TENS, cryoanalgesia)
ANALGESIA IN THORACIC SURGERY

1) **Systemic analgesia**
   - Opioids
   - NSAIDs (NonSteroidal Anti-Inflammatory Drugs)
   - Paracetamol

2) **Loco-regional analgesia**
   - Epidural thoracic analgesia
   - Paravertebral analgesia

3) **Other complementary measures**
Multimodal analgesia

A majority of double or single-blind studies have showed that patients treated with multimodal analgesia experience lower pain scores, need fewer rescue analgesics, and have a prolonged time to requiring analgesics after surgery.

Conclusions

- There are multiple analgesic options to treat postoperative thoracic surgery pain

- **Multimodal analgesia** gets the best results

- It is very important to perform the surgical procedure carefully and meticulously avoiding any unnecessary tissue and neural damage

- With this policy it is possible to minimize morbidity, hospital stay and also decrease chronic pain
THANKS FOR YOUR ATTENTION