Pain Management after Thoracoscopic Lung Resections

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Background

Numerous reports have documented superior pain response with Video-thoracoscopy compared to thoracotomy. Data on peri-operative pain management are less clear.

This Presentation reviews published literature:
1. Thoracic epidural (TED)
2. Thoracic paravertebral block (TPVB)
3. Pre-anesthetic intra-theecal Injections
4. Use of cyrotherapy to intercostal nerves
5. Other agents (Ketamine)
Thoracic Epidural

“Gold standard” for pain management

• Narcotic + local anesthetic
  – Side effects of
    • Urinary retention (males)
    • Hypotension
    • Respiratory depression / decreased clearance of secretions
    • Nausea and vomiting

• Several small, single institution randomized data
  – Pain management superior with combination

Thoracic Epidural (TEP)

• Single institution randomized data
  – Pain management superior with combination

60 patients
Lung resection
Thoracotomy

Epidural Superior Pain control, ambulation, cough and Quality of Life scores, p<0.01
Thoracic Epidural (TEP)

- Single institution randomized data
  - Pain management superior with combination
    Kim et al, J Kor Med Sci, 2009 (Seoul, Korea)

52 patients
VATS Lobectomy
Thoracic Epidural
Morphine PCA

No difference in any measurement of pain or activity
Thoracic Epidural (TEP)

- Single institution randomized data
  - Epidural Local or combination?
    Tuncel et al, Eu J Cardiothorac Surg, 2005 (Ankara, Turkey)

62 patients
Lung resection
Thoracotomy
TEP

Combination Epidural Superior Pain control, cough and FEV1, p<0.01
Thoracic Epidural (TEP)

- Single institution randomized data
  - Epidural Local or combination?


60 patients
VATS Lobectomy
TEP

Local Only
Fentanyl + Local

Combination Epidural Superior Pain control, cough and FEV1, p<0.05
Thoracic Paravertebral Catheter (TPVC)

- Placed catheter either percutaneous or intraoperative into sub-pleural pocket
  - Catheter placed to infuse 3 intercostal levels at incision + one level above and below
  - Infusion either bolus (Q6Hr) or Continuous
  - Bupivacaine or equivalent

Randomized Trials of TEP and TPVC

TPVC placed in addition to TEP

Allen et al., Ann Thorac Surg 2009 (Mayo)

124 patients
Lung resection
Thoracotomy
TEP + Blinded

No difference in any measurement: No benefit to Infusion catheter

Intercostal Local Infusion
Placebo catheter-Saline
Randomized Trials of TPVC and PCA

TPVC placed in addition to PCA

Helm et al., Eu J Cardiothorac Surg 2010 (Strasbourg, Fr)

48 patients
Lung resection
Thoracotomy
TPVC Blinded

No difference in any measurement: No benefit to
Infusion catheter
Randomized Trials of TPVC /Infusion Plan

TPVC placed alone

Fibla et al., Eu J Cardiothorac Surg 2009 (Barcelona)

80 patients
Lung resection
Thoracotomy
TPVC Blinded

No difference in any measurement: No benefit to Infusion catheter
## Randomized Trials of TEP and TPVC

<table>
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<td>Raveglia, 2014</td>
<td>Yes</td>
<td>26/26</td>
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<td>J Thorac Cardiovasc Surg</td>
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Only difference was higher TEP-related events: Urinary retention, hypotension, N&V
Cryotherapy to Intercostal Nerves

Animal experiments on duration of cryo-injury to peripheral nerve

- Probe creates second degree injury with lack of function for 10 days
- Complete reversal of histological change by two weeks
- Near-normal nerve conduction at 14 days
Randomized Trials of Cryo-injury

Cryoprobe injury intraoperatively

Mustola et al., Ann Thorac Surg 2011 (Finland)

42 patients
Lung resection
Thoracotomy
TEP

Cryo to 3 Intercostal nerves
Nothing

No difference in-hospital pain, However at 8 weeks, Cryo patients had worse neuropathic pain / decreased activity
Difference lost at 6 months
Randomized Trials of Intra-thecal Narcotics and TPVC

Small injection intra-thecal prior to incision
Zeid et al., Saudi J Anesth 2014 (Saudi Arabia)

40 patients
VATS resection

0.3mg MSO4 Intra-thecal
TPVC

No difference in-hospital pain and any other measurement
Randomized Trials of Ketamine

Ketamine given before and 24 hours after operation

Tena et al., Clin J Pain 2014 (Barcelona)

104 patients
Lung resection
VATS + TEP
Blinded

Ketamine Infusion
Saline

No difference in-hospital pain and any other measurement
Summary and Recommendations

First Line: TEP or TPVC

Second Line (Contraindications):
Intercostal nerve block+ Wound infiltration
or
Intra-thecal narcotic injection (pre-incision)

Postoperative:
NSAIDS / Acetaminophen or Cox-2 Inhibitor
+ Opiods (IV-PCA) rescue

Note: Thoracoscopy may require less