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Analgesia in thoracotomy patients: epidural vs paravertebral technique.
A randomized, double-blind, prospective study

Presenter Disclosure Information
“Nothing to disclose with regard to commercial support”

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“the Lord caused a deep sleep to fall upon Adam so that his rib could be removed to create the female of the species”

“It was prophesied that thoracic surgery would be very painful and it would require an appropriate and effective analgesic treatment”
Introduction

Step 1
- You are going to perform a thoracotomy
- The anaesthetist wants to insert an epidural catheter for analgesia preoperatively

Step 2
- You are worried about possible complications
- You would prefer a paravertebral block

Step 3
- The anaesthetist contends that epidural is the gold standard in pain relief
- You resolve to check the literature yourself

“Paravertebral and epidural analgesia provide comparable pain relief but paravertebral has a better side-effect profile and is associated with a reduction in pulmonary complications.”

No Blinded Studies
No Prospective Trials
Different Methods of Placement
Variability Of Drugs Administered
Objective

COMPARE EPIDURAL CATHETER (EC) VERSUS PARAVERTEBRAL CATHETER (PC) TECHNIQUE IN THORACOTOMY PATIENTS

...choosing...

- Blind posterior approach
- Ultrasound-guided posterior approach
- Intraoperative under direct vision approach
Materials and Methods

Pain relief
- Visual Analogue Scale (VAS) at rest
- Visual Analogue Scale at cough

Systemic surgical stress
- Intra/post operative Seric Cortisol measurements

Pulmonary function
- Pre/post operative serial pulmonary functions test (FEV1)
- Pre/post operative saturation

Side effects
- Pruritus (itching), hypotension, vomiting, urinary retention

Procedure length
- Time from patient access into O.R. up to thoracotomy closure end
### Materials and Methods - Inclusion/Exclusion Criteria

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt; 18 or &lt; 80</td>
<td>Age &lt; 18 or &gt; 80</td>
</tr>
<tr>
<td>Karnofsky p.s. &gt;/= 70%</td>
<td>Coagulopathies</td>
</tr>
<tr>
<td>ASA &lt; IV</td>
<td>Anticoagulant/platelets therapies</td>
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<tr>
<td>FEV1 &gt;/= 50% predicted</td>
<td>Allergies</td>
</tr>
<tr>
<td>WG &gt; 4000/mm3</td>
<td>Spinal Deformities</td>
</tr>
<tr>
<td>PST &gt; 100000/mm3</td>
<td>Neurologic diseases</td>
</tr>
<tr>
<td>Hb &gt; 8,5 g/dl</td>
<td>Psychiatric Diseases</td>
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<tr>
<td>Bilirubin &lt; 3,0 mg/dl</td>
<td>Past Thoracic Surgery</td>
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<td>SGOT &lt; 2 times limits</td>
<td>Pre-op Thoracic Drainage</td>
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<td>Creatinin &lt; 3,0 mg/dl</td>
<td>Past IMA</td>
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<td>pCO2 &lt; 50 mmHg</td>
<td>Abused of alcohol or drugs</td>
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<td></td>
<td>BMI &gt; 30</td>
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<td></td>
<td>Pregnancy</td>
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</table>

Records have been analyzed with Mann-Withney and Student's tests for independent variables.
Materials and Methods - Randomization

Blind randomization (52 patients)

Preoperative epidural group (Group A = 27 patients)
- 3 patients excluded due to wrong placement

Analgesia dosing pattern:
- Fentanyl 0.001% (10 mcg/ml) + Bupivacaina 0.1%
- Paracetamol 500 mg x 3/die i.v.
- Tramadol 50 mg i.v. if VAS> 6

Intraoperative paravertebral group (Group B = 25 patients)
- 1 patient excluded due to accidental removal

Analgesia dosing pattern:
- Naropine 0.3% (5, 10 ml vials (10 mg/ml) in 100 cc saline solution 0.9%); 7 ml/h; 72 h
- Paracetamol 500 mg x 3/die i.v.
- Tramadol 50 mg i.v. if VAS> 6
Materials and Methods - Intraoperative Paravertebral Catheter Placement Technique

I. Extrapleural pocket tunnelization
II. Catheter positioning under parietal pleura
III. Needle insertion through the chest wall
IV. Catheter passage into the pleural cavity
V. Catheter taping on the skin
## Results - Overall

<table>
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<tr>
<th>Parameter</th>
<th>-24h</th>
<th>6h</th>
<th>12h</th>
<th>24h</th>
<th>48h</th>
<th>72h</th>
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<td>1-7</td>
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<td>1-8</td>
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<td>1-7</td>
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<td>Mean</td>
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<td>Mean</td>
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<td>45.00</td>
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</table>

* = significative p value (< 0.05)
Results – VAS

**VAS tendency at rest : comparison between groups**

- Paravertebral
- Epidural

<table>
<thead>
<tr>
<th></th>
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<th>B</th>
<th>P+</th>
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<tbody>
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<td>Mean</td>
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<td>12 Hours</td>
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<td>48 Hours</td>
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<tr>
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<tr>
<td>72 Hours</td>
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<td>1.777</td>
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<tr>
<td></td>
<td>2.21</td>
<td>1.215</td>
<td>2.00</td>
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</table>

*p = 0.002

**VAS tendency at cough : comparison between groups**

<table>
<thead>
<tr>
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<th>P+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Median</td>
<td>m-m</td>
</tr>
<tr>
<td>6 Hours</td>
<td>6.46</td>
<td>1.351</td>
<td>7.00</td>
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<tr>
<td></td>
<td>4.17</td>
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<tr>
<td>24 Hours</td>
<td>4.33</td>
<td>1.494</td>
<td>4.00</td>
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<tr>
<td></td>
<td>3.00</td>
<td>1.351</td>
<td>3.00</td>
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<td>48 Hours</td>
<td>3.76</td>
<td>1.700</td>
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<tr>
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<td>72 Hours</td>
<td>3.52</td>
<td>1.806</td>
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<tr>
<td></td>
<td>2.29</td>
<td>1.367</td>
<td>2.00</td>
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</tbody>
</table>

*p = 0.002

* = significative p value (< 0.05)
### Results – FEV1 and Saturation

**FEV1 tendency: comparison between groups**

- **Pre-op**
  - Epidural: 80.08 ± 8.802
  - Median: 85.00
  - m-m: 64-89
  - Paravertebral: 79.17 ± 12.534
  - Median: 80.00
  - m-m: 51-95

- **12 Hours**
  - Epidural: 42.17 ± 4.030
  - Median: 41.00
  - m-m: 35-51
  - Paravertebral: 52.83 ± 11.657
  - Median: 51.00
  - m-m: 33-76

- **24 Hours**
  - Epidural: 45.05 ± 6.953
  - Median: 42.00
  - m-m: 39-60
  - Paravertebral: 59.08 ± 11.564
  - Median: 59.50
  - m-m: 40-79

- **48 Hours**
  - Epidural: 52.90 ± 8.197
  - Median: 52.00
  - m-m: 39-65
  - Paravertebral: 59.21 ± 11.836
  - Median: 59.00
  - m-m: 40-81

- **72 Hours**
  - Epidural: 58.43 ± 6.361
  - Median: 60.00
  - m-m: 49-67
  - Paravertebral: 62.63 ± 11.970
  - Median: 61.00
  - m-m: 40-82

**Ambient saturation tendency: comparison between groups**

- **Pre-op**
  - Epidural: 96.75 ± 1.152
  - Median: 96.00
  - m-m: 95-99
  - Paravertebral: 96.79 ± 1.615
  - Median: 97.00
  - m-m: 93-99

- **6 Hours**
  - Epidural: 90.83 ± 3.841
  - Median: 91.00
  - m-m: 81-96
  - Paravertebral: 91.88 ± 1.918
  - Median: 92.00
  - m-m: 87-94

- **12 Hours**
  - Epidural: 93.22 ± 2.373
  - Median: 93.00
  - m-m: 89-98
  - Paravertebral: 95.25 ± 0.989
  - Median: 95.00
  - m-m: 93-97

- **24 Hours**
  - Epidural: 94.29 ± 2.572
  - Median: 95.00
  - m-m: 90-98
  - Paravertebral: 95.50 ± 0.933
  - Median: 95.00
  - m-m: 94-97

- **48 Hours**
  - Epidural: 95.33 ± 1.683
  - Median: 95.00
  - m-m: 93-99
  - Paravertebral: 96.83 ± 1.007
  - Median: 97.00
  - m-m: 95-99

- **72 Hours**
  - Epidural: 96.43 ± 1.165
  - Median: 96.00
  - m-m: 64-89
  - Paravertebral: 96.83 ± 1.341
  - Median: 97.00
  - m-m: 95-99

* = significative p value (< 0.05)

\( p = 0.023 \)

\( p = 0.001 \)
Results – Side Effects and Procedure Length

**Side effects – comparison between groups**

- **Paravertebral**
  - Urinary retention: 0
  - Hypotension: 0
  - Nausea/vomit: 0
  - Itch: 0

- **Epidural**
  - Urinary retention: 6
  - Hypotension: 9
  - Nausea/vomit: 8
  - Itch: 6

**Time from patient access into O.R. area up to thoracotomy closure end**

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minutes</td>
<td>141.3</td>
<td>108.6</td>
<td>P &lt; 0.0001</td>
</tr>
</tbody>
</table>
Discussion

Paravertebral catheter...

- More effective than EC in pain control \( (p = 0.002) \)
- More effective than EC concerning respiratory outcomes \( (p = 0.023) \)
- Better than EC concerning side effects
- Allowed to save time \( (108.6 \text{ min vs } 141.3 \text{ min } p < 0.0001) \)
- Its placement has not contraindications (spinal anomalies, coagulation disorders, etc)
- Not affected by serious complications (epidural hematoma, infection, respiratory depression)
- Available also in case of conversion to thoracotomy from VATS
Conclusion

Paravertebral catheter should always be considered as alternative to epidural catheter to provide:
- Pain relief
- Better respiratory outcomes
- Absence of side effects
- Absence of complication

...thoracotomy patients...