REAL-TIME IN-PLANE ULTRASOUND GUIDED INTERPLEURAL CATHETER INSERTION FOR ANALGESIA AFTER TRAUMATIC RIB FRACTURES

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RIB FRACTURES

- Pain can lead to pneumonia
  - splinting, reduced chest expansion
  - inhibits effective coughing

- NSAIDs and opioid drugs form the mainstay of treatment but have associated toxicity

- NPSA Signal, March 2011\(^1\):
  - management of pain and morbidity from fractured ribs is sub-optimal
  - the need to actively manage pain from rib fractures is not always recognised

\(^1\)www.nrls.npsa.nhs.uk/resources/type/signals/?entryid45=130182.
CASE 1

- 85-year-old lady with COPD
- Fractured right neck of femur
- Severe (R) chest pain
- CXR
  - Fractured right 3rd to 6th ribs laterally
- Effective analgesia essential to maintain respiratory function
Apparatus

Displayed with the kind permission of Dr Ravi Dravid.

MODIFIED APPARATUS & TECHNIQUE²

- In-plane, real-time ultrasound
- 3-way tap with extension
- Improved needle control

CASE 1

- 20 ml bolus of plain 0.125% bupivacaine
  - 5-10ml/hr continuous infusion

- Improvement noted within 30 minutes

- Complete analgesia in 60 minutes

- Hip hemi-arthroplasty – spinal anaesthesia

- Uneventful recovery
OUR METHOD

- Consent
- Transfer to theatre
- Analgesia/Sedation: ketamine
- Position: lateral, # ribs uppermost
- US localisation of pleura: out-of-plane, in-plane
As per schematic

<table>
<thead>
<tr>
<th></th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
<th>Case 4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>85</td>
<td>67</td>
<td>43</td>
<td>48</td>
</tr>
<tr>
<td><strong>Mech of injury</strong></td>
<td>Fall from standing height</td>
<td>Fall onto concrete</td>
<td>RTC 50mph, motorcycle</td>
<td>Fall from ladder</td>
</tr>
<tr>
<td><strong>Rib fractures</strong></td>
<td>(R) 3/4/5/6</td>
<td>(R) 8x2, 9x3, 10x2, 11x2, 12</td>
<td>(L) 3/4/6</td>
<td>(R) 4-10</td>
</tr>
<tr>
<td><strong>Other injuries</strong></td>
<td># (R) hip</td>
<td>nil</td>
<td># (L) scapula, # (L) clavicle</td>
<td># (R) T12-L3 transverse processes</td>
</tr>
<tr>
<td><strong>Morphine 24hrs prior to i-p catheter</strong></td>
<td>70mg oral</td>
<td>60mg oral</td>
<td>20mg iv</td>
<td>10mg iv, 60mg oral</td>
</tr>
<tr>
<td><strong>Morphine 0-24hrs after i-p catheter</strong></td>
<td>30mg oral</td>
<td>20mg oral</td>
<td>80mg oral</td>
<td>10mg iv, 90mg oral</td>
</tr>
<tr>
<td><strong>Pain score pre-i-p catheter (deep breathing)</strong></td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Pain score 24hr post-i-p catheter (deep breathing)</strong></td>
<td>0</td>
<td>Walking around!</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
REAL-TIME IN-PLANE ULTRASOUND

- The real-time in-plane approach may reduce the risk of intercostal neurovascular bundle damage

- The British Thoracic Society recommends US for interpleural procedures\(^3\)

- NICE suggested US can improve efficacy & safety in regional nerve blockade\(^4\)

- This technique satisfies all of the above and was developed prior to the NPSA signal\(^1\)

\(^1\)www.nrls.npsa.nhs.uk/resources/type/signals/?entryid45=130182.
CONCLUSION

- Interpleural local anaesthesia provides effective analgesia for rib fractures

- Interpleural analgesia improves mobility

- This ultrasound guided technique sets the standard
  - optimal analgesia
  - patient safety
  - best practice