PIGTAIL CATHETERS

Bellal Joseph M.D, F.A.C.S
Professor of Surgery
Vice Chairman of Research
The University of Arizona
Nothing to Disclose
**dogma (noun)**

a stubborn belief deemed to be true (because you were told so) with no real proof
SUMMARY

- Introduction
- Thoracic trauma
- Tension Pneumothorax
- Pneumothorax
- Hemothorax
- Management
- Pigtail catheters vs Chest tube
THORACIC TRAUMA
THORACIC TRAUMA

■ Incidence:
  ▪ Blunt 8% of all trauma admissions
  ▪ Penetrating 7% of all trauma admissions

■ Mortality:
  ▪ Blunt 28%
  ▪ Penetrating 7%
Fatal Intrathoracic Injuries

- Tension pneumothorax
- Uncontrolled hemorrhage
- Airway obstruction
- Cardiac tamponade
TENSION PNEUMOTHORAX

EMERGENCY CALL 911
POLICE FIRE MEDICAL
TENSION PNEUMOTHORAX

- 33% of preventable combat deaths
- Injured chest or lung acts as one-way valve
- Air becomes trapped between the lung and chest wall causing the lung to collapse
- The heart is pushed to the other side causing blood vessels to kink
- Death will result if not quickly recognized and treated with needle decompression
- May occur in open and closed chest wounds
TENSION PNEUMOTHORAX

Air collapses lung and pushes heart to other side

Air between lung and chest wall

Blood return to heart restricted by kinked vessels, heart unable to pump
TENSION PNEUMOTHORAX

- Management:
  - GOLD STANDARD: 14G Angiocatheter
TENSION PNEUMOTHORAX

HIGH

FAILURE

RATE
Causes of Failure

- Length
- Bore Diameter
- Blind Sharp Needle Insertion
- Lack of Tactile or Visual Feedback
- Plastic Catheter Kinking/Obstructing
Failure rate of Needle Thoracostomy was 82%

- 17 Needle vs 8 tube thoracostomy
- Outcomes
  - Successful release of t-PTX
Modified Veress Needle Decompression Of Tension Pneumothorax: A Randomized Crossover Animal Study

Lubin, Dafney MD; Tang, Andrew L. MD; Friese, Randall S. MD; Martin, Matthew MD; Green, DJ MD; Jones, Trevor BS; Means, Russell R. BS; Ginwalla, Rashna MD; O'Keeffe, Terence S. MBChB; Joseph, Bellal A. MD; Wynne, Julie L. MD; Kulvatunyou, Narong MD; Vercruysse, Gary MD; Gries, Lynn MD; Rhee, Peter MD

- Swine randomized trial
- 43 tension pneumothorax events
- 14G AC vs modified Veress needle (mVN)
- Outcomes:
  - Successful decompression
TENSION PNEUMOTHORAX

- Tension-PTX
  - 50% reduction in C/O
  - Thoracic CO2 insufflation to 15 mm Hg
TENSION PNEUMOTHORAX

- Tension-PTX
  - Modified Veress needle (mVN)
TENSION PNEUMOTHORAX

**Graph A:**
- X-axis: Start of Decompression, Decompression Time (minutes)
- Y-axis: Systolic Blood Pressure (mmHg)
- Lines:
  - mVN
  - NT
- Key: Arrows indicating changes in pressure.

**Graph B:**
- X-axis: Start of Decompression, Decompression Time (minutes)
- Y-axis: Cardiac Output in Liters/min
- Lines:
  - mVN
  - NT
- Key: Arrows indicating changes in output.
TENSION PNEUMOTHORAX

- Successful Decompression: 100% mVN
- Death During Decompression: 21% mVN, 0% NT
- Crossover: 0% mVN, 58% NT
- Crossover Successful Decompression: 100% mVN
Bigger Is Better: Comparison Of Alternative Devices For Tension Hemopneumothorax And Pulseless Electrical Activity In A Yorkshire Swine Model

Matthew L Leatherman, DO Laura M Fluke, DO Christian S McEvoy, MD Douglas M Pokorny, DO Robert L Ricca, MD Matthew J Martin, MD Christopher S Gamble, DVM Travis Polk, MD

- Swine randomized trial
- 195 tension Hemopneumothorax events
- 14G AC, 10G AC, modified Veress needle (mVN), and 3mm laparoscopic trocar (LT)

Outcomes:
- Return of spontaneous circulation
TENSION PNEUMOTHORAX

Successful Rescue following t-H/PTX

- 14G: 74%
- mVN: 82% (NS)
- 10G: 90% *
- LT: 98% *

* P<0.01 when compared to 14G AC

Time to Successful Rescue t-H/PTX

* P<0.01 when compared to 14G AC

(NS)
are you prepared for a non-emergency?
THORACIC TRAUMA

PTX

HTX

H-PTX
WHAT TO DO?

- **Remove**
  - Fluid and air as promptly as possible

- **Prevent**
  - Drained air & fluid from returning to the pleural space

- **Restore**
  - Negative pressure in the pleural space to re-expand the lung
QUESTIONS

- Should all Pneumothoraces or Hemothoraces be drained?
- Does size matter?
  - Pigtail catheter vs. Chest tube
All hemothoraces, regardless of size, should be considered for drainage

Surgical exploration: $>1500\text{ml}/24\text{hrs}$ via chest tube

Persistent Htx after tube thoracostomy: Treat with VATS
HEMOTHORAX

To Drain Or Not To Drain? Predictors Of Tube Thoracostomy Insertion And Outcomes Associated With Drainage Of Traumatic Hemothoraces

Bryan J. Wells, Derek J. Roberts, Sean Grondin, Pradeep H. Navsaria, Andrew W. Kirkpatrick, Michael B. Dunham, and Chad G. Ball

- Retrospective study
- 635 patients
- Expected management vs tube thoracostomy
- Outcomes:
  - Mortality
  - Hospital length of stay
### Predictors of tube thoracostomy

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>OR [95% CI]</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flail chest</td>
<td>3.3 [1.4-8.8]</td>
<td>0.04</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>6.9 [7.8-22.5]</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Hemothorax size (per 10cc increase)</td>
<td>1.1 [1.04-1.21]</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>
HEMOTHORAX

To Drain Or Not To Drain? Predictors Of Tube Thoracostomy Insertion And Outcomes Associated With Drainage Of Traumatic Hemothoraces

Bryan J. Wells, Derek J. Roberts, Sean Grondin, Pradeep H. Navsaria, Andrew W. Kirkpatrick, Michael B. Dunham, and Chad G. Ball

HTX <300cc corresponds to 1.5-2.0 cm posterior lamellar strip on a CT scan and can be safely managed expectantly
TUBE THORACOSTOMY

Pigtail Catheter VS Chest Tube
PIGTAIL CATHETER
CHEST TUBE

1) PREP

2) INSERT

3) SECURE
TUBE THORACOSTOMY

Which? 1 HURTS MORE ❓

Please make it stop. It hurts.
TUBE THORACOSTOMY

Does Size Matter? A Prospective Analysis Of 2832 Versus 3640 French Chest Tube Size In Trauma

Inaba, Kenji MD; Lustenberger, Thomas MD; Recinos, Gustavo MD; Georgiou, Crysanthos MD; Velmahos, George C. MD; Brown, Carlos VR; Salim, Ali MD; Demetriades, Demetrios MD; Rhee, Peter MD

- Prospective observational

- Small (28-32Fr) vs large (36-40Fr) chest tube

- Outcomes:
  - Efficacy of drainage
  - Complications
  - Residual hemo and pneumothoraces
  - Need for additional tube insertion
**Table 2. Specific Chest Injuries According to Small or Large Chest Tubes in Patients With a Hemothorax**

<table>
<thead>
<tr>
<th>Injury</th>
<th>Total (n = 275)</th>
<th>Small Chest Tube (n = 144)</th>
<th>Large Chest Tube (n = 131)</th>
<th>p</th>
<th>Adjusted OR (95% CI)*</th>
<th>Adjusted p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumothorax</td>
<td>73.8% (203/275)</td>
<td>75.0% (108/144)</td>
<td>72.5% (95/131)</td>
<td>0.640</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary contusion</td>
<td>41.5% (114/275)</td>
<td>40.3% (58/144)</td>
<td>42.7% (56/131)</td>
<td>0.678</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rib fractures</td>
<td>51.3% (141/275)</td>
<td>55.6% (80/144)</td>
<td>46.6% (61/131)</td>
<td>0.136</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sternal fracture</td>
<td>7.3% (20/275)</td>
<td>5.6% (8/144)</td>
<td>9.2% (12/131)</td>
<td>0.250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subcutaneous emphysema</td>
<td>38.9% (107/275)</td>
<td>40.3% (58/144)</td>
<td>37.4% (49/131)</td>
<td>0.625</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumomediastinum</td>
<td>11.3% (31/275)</td>
<td>11.8% (17/144)</td>
<td>10.7% (14/131)</td>
<td>0.770</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flail chest</td>
<td>4.7% (13/275)</td>
<td>5.6% (8/144)</td>
<td>3.8% (5/131)</td>
<td>0.497</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 4. Interventions Required After Initial Chest Tube Placement in Patients With a Hemothorax**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Total (n = 275)</th>
<th>Small Chest Tube (n = 144)</th>
<th>Large Chest Tube (n = 131)</th>
<th>p</th>
<th>Adjusted OR (95% CI)*</th>
<th>Adjusted p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional chest tube insertion</td>
<td>5.1% (14/275)</td>
<td>5.6% (8/144)</td>
<td>4.6% (6/131)</td>
<td>0.713</td>
<td>1.08 (0.35–3.27)</td>
<td>0.896</td>
</tr>
<tr>
<td>Intrapleural thrombolysis</td>
<td>6.2% (17/275)</td>
<td>6.2% (9/144)</td>
<td>6.1% (8/131)</td>
<td>0.961</td>
<td>0.87 (0.32–2.38)</td>
<td>0.784</td>
</tr>
<tr>
<td>Image-guided drainage</td>
<td>4.0% (11/275)</td>
<td>3.5% (5/144)</td>
<td>4.6% (6/131)</td>
<td>0.640</td>
<td>0.67 (0.20–2.32)</td>
<td>0.529</td>
</tr>
<tr>
<td>VATS</td>
<td>2.9% (8/275)</td>
<td>2.8% (4/144)</td>
<td>3.1% (4/131)</td>
<td>1.000</td>
<td>0.81 (0.19–3.41)</td>
<td>0.770</td>
</tr>
<tr>
<td>Thoracotomy</td>
<td>1.1% (3/275)</td>
<td>1.4% (2/144)</td>
<td>0.8% (1/131)</td>
<td>1.000</td>
<td>1.44 (0.13–16.64)</td>
<td>0.769</td>
</tr>
</tbody>
</table>

VATS, video-assisted thoracoscopy; OR, odds ratio; CI, confidence interval; SBP, systolic blood pressure; AIS, Abbreviated Injury Scale; ISS, Injury Severity Score.

* Adjusted for GCS ≤8, SBP <90 mm Hg, Head AIS ≥3, ISS ≥25.
No significant difference in:
- Efficacy of drainage
- Retained hemothorax
- Need for additional tube drainage
- Invasive procedures
PIGTAIL CATHETERS

• Pigtail Catheter (PC) (14-French)
  • Less invasive
  • Less pain
  • Is it effective?
Two-Year Experience of Using Pigtail Catheters to Treat Traumatic Pneumothorax: A Changing Trend

Kulvatunyou, Narong MD; Vijayasekaran, Aparna MD; Hansen, Adam MD; Wynne, Julie L. MD; O'Keeffe, Terrance MD; Friese, Randall S. MD; Joseph, Bellal MD; Tang, Andy MD; Rhee, Peter MD

- Retrospective observational
- 480 patients with pneumothorax
- Pigtail vs chest tube
- Outcomes:
  - Complications
  - Need for mechanical ventilation
PIGTAIL CATHETERS IN PTX

Trend of Chest Tube and Pigtail Catheter Usage by Quarter 08-09

- Chest tube
- Pigtail Catheter
## Pigtail Catheters in PTX

<table>
<thead>
<tr>
<th></th>
<th>Pigtail</th>
<th>Chest Tube</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n = 75 )</td>
<td>( n = 146 )</td>
<td></td>
</tr>
<tr>
<td>Mechanical ventilation, %</td>
<td>36%</td>
<td>47%</td>
<td>0.58</td>
</tr>
<tr>
<td>Tube days, mean ± SD</td>
<td>4 ± 1.6</td>
<td>4.4 ± 2.3</td>
<td>0.17</td>
</tr>
<tr>
<td>Insertion-related complication, n (%)</td>
<td>3 (4%)</td>
<td>4 (2.7%)</td>
<td>0.61</td>
</tr>
<tr>
<td>Ventilator day (d), median</td>
<td>0 (0, 2.5)</td>
<td>0 (0, 3)</td>
<td>0.07</td>
</tr>
<tr>
<td>ICU day (d), median</td>
<td>0 (0, 5)</td>
<td>2 (0, 5)</td>
<td>0.13</td>
</tr>
<tr>
<td>Failure rate, n (%)</td>
<td>8 (11%)</td>
<td>6 (4%)</td>
<td>0.06</td>
</tr>
<tr>
<td>Hospital length of stay (d), median</td>
<td>6 (3, 10)</td>
<td>15 (9, 24)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>
# PIGTAIL CATHETERS IN PTX

## Complications

<table>
<thead>
<tr>
<th>Pigtail catheters (n=3)</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- left subclavian vein insertion catheter</td>
<td>Transfusion, withdrawal</td>
</tr>
<tr>
<td>1 - intercostal artery injury</td>
<td>chest tube placement</td>
</tr>
<tr>
<td>1 - subcutaneous placement</td>
<td>tube replacement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chest tubes (n=4)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - subcutaneous placement</td>
<td>tube replacement</td>
</tr>
<tr>
<td>1 - tube dislodgement</td>
<td>tube replacement</td>
</tr>
</tbody>
</table>
We concluded that pigtails by surgeons:

“Pigtail catheter was safe and equally effective when compared to chest tube in traumatic pneumothorax”
Small Catheter Tube Thoracostomy: Effective in Managing Chest Trauma in Stable Patients

Rivera, Louis MD; O'Reilly, Eamon B. MD; Sise, Michael J. MD; Norton, Valerie C. MD; Sise, C Beth RN, JD; Sack, Daniel I. BA; Swanson, Sophia M. BA; Iman, Rahwa B. BS; Paci, Gabrielle M. BA; Antevil, Jared L. MD

- Retrospective

- 202 Tube thoracostomy

- Small catheter (10-14Fr) vs large catheter (32-40Fr) tube thoracostomy

- Outcomes:
  - Length of stay
  - Complications
**Table 4 Patients in Whom a Single Nonemergent TT Was Performed**

<table>
<thead>
<tr>
<th></th>
<th>SCTT (n = 55)</th>
<th>LCTT (n = 35)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>49.8</td>
<td>40.6</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>69%</td>
<td>77%</td>
<td>NS</td>
</tr>
<tr>
<td><strong>LOS (days)</strong></td>
<td>10.5</td>
<td>16.5</td>
<td>0.05</td>
</tr>
<tr>
<td>ICU days</td>
<td>8.2</td>
<td>11.0</td>
<td>NS</td>
</tr>
<tr>
<td>ISS</td>
<td>18.9</td>
<td>24.3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>27.3%</td>
<td>60.0%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Mechanical ventilation days</td>
<td>12.4</td>
<td>13.2</td>
<td>NS</td>
</tr>
<tr>
<td>Antibiotics</td>
<td>45.5%</td>
<td>71.4%</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

ICU, intensive care unit; NS, not significant.
# Table 3 Complications Associated With Nonemergent LCTT Compared With Image-Guided SCTT

<table>
<thead>
<tr>
<th>Complication</th>
<th>LCTT (n = 71 Tubes)</th>
<th>SCTT (n = 131 Tubes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumothorax</td>
<td>10 (14.1)</td>
<td>11 (8.4)</td>
</tr>
<tr>
<td>Hemothorax</td>
<td>3 (4.2)</td>
<td>8 (6.1)</td>
</tr>
<tr>
<td>Hydrothorax</td>
<td>2 (2.8)</td>
<td>8 (6.1)</td>
</tr>
<tr>
<td>Fibrothorax</td>
<td>3 (4.2)*</td>
<td>0</td>
</tr>
<tr>
<td>Empyema</td>
<td>1 (1.4)</td>
<td>5 (3.8)</td>
</tr>
<tr>
<td>Tube dislodged</td>
<td>2 (2.8)</td>
<td>0</td>
</tr>
<tr>
<td>Tube malposition</td>
<td>0</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Any</td>
<td>21 (29.6)</td>
<td>33 (25.2)</td>
</tr>
</tbody>
</table>

Values within the parentheses indicate percentage.

* $p < 0.05$. 
Randomized Clinical Trial Of Pigtail Catheter Versus Chest Tube In Injured Patients With Uncomplicated Traumatic Pneumothorax

Yu-Chao Lin, MD, Chih-Yen Tu, MD, Shinn-Jye Liang, MD, Hung-Jen Chen, MD, Wei Chen, MD, Te-Chun Hsia, MD, Chuen-Ming Shih, MD, PhD, Wu-Huei Hsu, MD

- Randomized clinical trial
- 70 PTX
- Successful Vs. failed pigtail treatments
### PIGTAIL CATHETERS

<table>
<thead>
<tr>
<th></th>
<th>Success (n = 48)</th>
<th>Failure (n = 22)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>63.3</td>
<td>61.7</td>
<td>.765</td>
</tr>
<tr>
<td>Sex (male/female)</td>
<td>27/21</td>
<td>20/2</td>
<td>.004</td>
</tr>
<tr>
<td>Body mass index</td>
<td>19.6 ± 4.0</td>
<td>19.2 ± 3.6</td>
<td>.726</td>
</tr>
<tr>
<td>APACHE II scores</td>
<td>20.0 ± 9.0</td>
<td>19.0 ± 7.4</td>
<td>.637</td>
</tr>
<tr>
<td>Smoking</td>
<td>15</td>
<td>12</td>
<td>.063</td>
</tr>
<tr>
<td>Pneumothorax side</td>
<td>30/18</td>
<td>13/9</td>
<td>.221</td>
</tr>
<tr>
<td>(right/left)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days from start of</td>
<td>5.5 ± 7.5</td>
<td>10.1 ± 9.6</td>
<td>.034</td>
</tr>
<tr>
<td>mechanical ventilation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>to pneumothorax ARDS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>event</td>
<td>13 (27.1)</td>
<td>11 (50.0)</td>
<td>.061</td>
</tr>
<tr>
<td>Ventilator setting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fio2 &gt;60%</td>
<td>7 (14.6)</td>
<td>10 (45.5)</td>
<td>.005</td>
</tr>
<tr>
<td>PEEP</td>
<td>6.3 ± 2.3</td>
<td>8.7 ± 3.0</td>
<td>.001</td>
</tr>
<tr>
<td>Tidal volume</td>
<td>520.7 ± 105.3</td>
<td>483.8 ± 115.1</td>
<td>.207</td>
</tr>
<tr>
<td>PIP</td>
<td>30.7 ± 5.9</td>
<td>32.3 ± 5.7</td>
<td>.329</td>
</tr>
<tr>
<td>Plateau pressure</td>
<td>25.4 ± 3.9</td>
<td>24.7 ± 3.7</td>
<td>.548</td>
</tr>
<tr>
<td>ICU stay (d)</td>
<td>12.4 ± 8.2</td>
<td>18.8 ± 10.3</td>
<td>.007</td>
</tr>
<tr>
<td>Total hospitalization (d)</td>
<td>34.1 ± 30.4</td>
<td>42.3 ± 39.5</td>
<td>.346</td>
</tr>
<tr>
<td>Pigtail intubation time (d)</td>
<td>6.0 ± 5.3</td>
<td>5.8 ± 6.3</td>
<td>.901</td>
</tr>
<tr>
<td>Complications</td>
<td>3 (6.3)</td>
<td>1 (4.5)</td>
<td>.775</td>
</tr>
<tr>
<td>Mortality</td>
<td>28 (57)</td>
<td>13 (61)</td>
<td>.952</td>
</tr>
</tbody>
</table>
# PIGTAIL CATHETERS IN PTX

<table>
<thead>
<tr>
<th></th>
<th>Barotrauma (n = 30)</th>
<th>Iatrogenic (n = 40)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>56.6</td>
<td>67.5</td>
<td>.027</td>
</tr>
<tr>
<td>Sex</td>
<td>23/7</td>
<td>24/16</td>
<td>.142</td>
</tr>
<tr>
<td>BMI</td>
<td>20.2 ± 3.2</td>
<td>18.9 ± 4.2</td>
<td>.199</td>
</tr>
<tr>
<td>Smoking</td>
<td>15 (50)</td>
<td>12 (30)</td>
<td>.089</td>
</tr>
<tr>
<td>Pneumothorax side (right/left)</td>
<td>15/15</td>
<td>28/12</td>
<td>.089</td>
</tr>
<tr>
<td>Pneumothorax size (large)</td>
<td>25 (83)</td>
<td>34 (85)</td>
<td>.683</td>
</tr>
<tr>
<td>APACHE II score</td>
<td>17.5 ± 6.8</td>
<td>21.4 ± 9.3</td>
<td>.054</td>
</tr>
<tr>
<td><strong>Successful pigtail treatment</strong></td>
<td>13 (43.3)</td>
<td>35 (87.5)</td>
<td>.001</td>
</tr>
<tr>
<td>Days from start of mechanical ventilation to pneumothorax</td>
<td>10.4 ± 8.4</td>
<td>4.3 ± 7.5</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Fio2 &gt;60%</td>
<td>9 (30)</td>
<td>8 (20)</td>
<td>.334</td>
</tr>
<tr>
<td>ICU stay (d)</td>
<td>19.5 ± 9.3</td>
<td>10.6 ± 7.3</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Total hospitalization (d)</td>
<td>41.1 ± 34.7</td>
<td>33.3 ± 32.5</td>
<td>.337</td>
</tr>
<tr>
<td>Duration of pigtail intubation (d)</td>
<td>6.2 ± 5.2</td>
<td>5.8 ± 5.9</td>
<td>.742</td>
</tr>
<tr>
<td>Mortality</td>
<td>20 (67)</td>
<td>21 (52.5)</td>
<td>.234</td>
</tr>
</tbody>
</table>
PIGTAIL CATHETERS IN PTX

Pigtail Catheter For The Management Of Pneumothorax In Mechanically Ventilated Patients


- Prospective randomized trial
- 14-Fr Pigtail vs 28-Fr chest tube
- 40 patients
- Outcomes:
  - Tube site pain and use of pain meds
  - Pneumothorax resolution
  - Complications
PIGTAIL CATHETERS IN PTX

Tube-site pain score

<table>
<thead>
<tr>
<th></th>
<th>28F Chest tube</th>
<th>14F Pigtail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 0</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Day 1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Day 2</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

Numerical Pain Rating Score

- 28F Chest tube: Day 0 > Day 1 > Day 2
- 14F Pigtail: Day 0 > Day 1 > Day 2
Data Concludes:

- NO DIFFERENCE IN FAILURE
- SAME SUCCESS RATE
- SAME Complication Rate
- Reduced PAIN
PIGTAIL CATHETERS IN HTX
A Pilot Study Of Chest Tube Versus Pigtail Catheter Drainage Of Acute Hemothorax In Swine

Russo, Rachel M. MD; Zakaluzny, Scott A. MD; Neff, Lucas P. MD; Grayson, J. Kevin DVM, PhD; Hight, Rachel A. MD; Galante, Joseph M. MD; Shatz, David V. MD

- Swine model
- 6 Yorkshire swine
- 32Fr chest tube vs 14 Fr Pigtail
- Outcome:
  - Drain output
PIGTAIL CATHETERS IN HTX

![Graph showing the rate (mL/min) over time (min) for Chest Tube and Pigtail Catheter.](image)
14 French Pigtail Catheters Placed By Surgeons To Drain Blood On Trauma Patients: Is 14-fr Too Small?

Kulvatunyou, Narong MD; Joseph, Bellal MD; Friese, Randall S. MD; Green, Donald MD; Gries, Lynn MD; O’Keeffe, Terence MD; Tang, Andy L. MD; Wynne, Julie L. MD; Rhee, Peter MD

- Prospective study
- 36 pigtail vs 191 chest tubes
- Outcomes:
  - Initial drainage output
  - Tube duration
  - Failure rate
# Pigtail Catheters in HTX

<table>
<thead>
<tr>
<th></th>
<th>Kulvatunyou et al.</th>
<th>Inaba et al.³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14F PC (n = 36)</td>
<td>32F–40F CT (n = 191)</td>
</tr>
<tr>
<td>IO, mean ± SD, mL</td>
<td>560 ± 81</td>
<td>426 ± 37</td>
</tr>
<tr>
<td>Tube days, mean ± SD</td>
<td>5 ± 0.8</td>
<td>6 ± 0.3</td>
</tr>
<tr>
<td>Failure (retained HTX), %</td>
<td>8</td>
<td>24</td>
</tr>
</tbody>
</table>

CT, chest tube.
TUBE THORACOSTOMY

PIGTAIL

CHEST TUBE
CLOTTED HEMOTHORAX

Wise man once said
“Clot doesn’t come out of any size hole…”
SUMMARY

- Pigtail catheters are now considered standard of care for Trauma Pneumothorax

**Size does not matter**

- Uncollapsed blood **will** drain......14F PCs

- Clotted blood **will not** .......... 32-40F CTs
THANK YOU