Umbilical Hernia Repair: What Does the Data Suggest?

David M Krpata, MD
Disclosures

• None
How Would You Fix This Umbilical Hernia?

• 45 year old male with symptomatic, 1 cm, reducible primary umbilical hernia, BMI 28

• A) Open Primary Repair
• B) Open Mesh Repair
• C) Laparoscopic Repair
• D) Robotic Repair
How Would You Fix This Umbilical Hernia?

• 45 year old male with symptomatic, 3 cm, reducible primary umbilical hernia, BMI 28

• A) Open Primary Repair
• B) Open Mesh Repair
• C) Laparoscopic Repair
• D) Robotic Repair
What do you quote patients as the recurrence rate for suture repair of a 1-2 cm primary umbilical hernia?

- A) 10%
- B) 20%
- C) 30%
- D) 40%
- E) > 50%
Objectives

• Mesh vs Suture Repair
• Open Mesh Repair
  – Deployable 3D meshes
• Laparoscopic vs Open Umbilical Hernia Repair
• Robotic Umbilicals
• The AHSQC Umbilicals
Umbilical Hernias by the Numbers

• Incidence
  – Estimated 1,676,615 diagnosed annually\(^1\)

• Repaired Annually in the US
  – 11% repaired (189,724)\(^1\)

• Methods of Repair
  – 19,200

• Umbilical Hernia Repair long-term follow-up
  – Priceless

\(^1\)Earle, Surg Clin N Am, 2013
Patient Factors Matter Too!

• Patient Factors
  – BMI/Obesity
  – Smoking
  – COPD
  – Immunosuppression
  – Childbearing status
  – Activity/performance level
  – Special circumstances
    • Rectus diastasis
    • Cirrhosis
    • Pregnancy
So, What Do We Know???
Mesh vs. Suture Repair

Surgical outcome of mesh and suture repair in primary umbilical hernia: postoperative complications and recurrence

A. Winsnes¹ · M. M. Haapamäki¹ · U. Gunnarsson¹ · K. Strigård¹

- 306 patients
  - 122 Suture Group
  - 184 onlay, sublay, IPOM, or “other”
- 20 mm defect in mesh group vs 10 mm defect in suture group
- Mean BMIs 26 vs 29 (P=NS)
- Median f/u 8.6 years
Mesh vs. Suture Repair

Surgical outcome of mesh and suture repair in primary umbilical hernia: postoperative complications and recurrence

A. Winsnes¹ • M. M. Haapamäki¹ • U. Gunnarsson¹ • K. Strigård¹

Hemia (2016) 20:509–516

• Cumulative Recurrence Rate: 8.4%
  – Suture Repair: 9%
  – Mesh Repair: 8%

• Complication rate
  – 4% in suture group
  – 25% in mesh group
• 392 patients
  – 126 mesh repairs
  – 266 suture repairs
• Median F/U: 5 years
• Retrospective review
  – 2000-2010
• Recurrence Rates
  – Suture Repair: 7.5%
  – Mesh Repair: 5.6%
• Higher rates of SSI and Seromas with mesh Repair
  – SSI: 19.8% vs 7.9%
  – 14.3% v 4.1%
• Risk Factors for Recurrence:
  – BMI
  – Smoking
Latest News on Umbilical's!!!
Mesh versus suture repair of umbilical hernia in adults: a randomised, double-blind, controlled, multicentre trial

- 300 patients
  - 150 suture vs 150 mesh repairs
  - Multi-center
- Mean follow up:
  - 25.1 Months
Mesh versus suture repair of umbilical hernia in adults: a randomised, double-blind, controlled, multicentre trial

<table>
<thead>
<tr>
<th></th>
<th>Suture repair (n=138)</th>
<th>Mesh repair (n=146)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>113 (82%)</td>
<td>122 (84%)</td>
</tr>
<tr>
<td>Female</td>
<td>25 (18%)</td>
<td>24 (16%)</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>52 (43-59; 20-74)</td>
<td>55 (44-63; 25-77)</td>
</tr>
<tr>
<td><strong>Height (cm)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>179 (172-185; 152-202)</td>
<td>178 (172-185; 150-198)</td>
</tr>
<tr>
<td><strong>Weight (kg)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>90 (83-99; 57-155)</td>
<td>90 (83-102; 44-170)</td>
</tr>
<tr>
<td><strong>BMI (kg/m²)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28 (25-31; 19-44)</td>
<td>28 (26-31; 19-59)</td>
</tr>
<tr>
<td><strong>ASA classification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>87 (62%)</td>
<td>80 (55%)</td>
</tr>
<tr>
<td>II</td>
<td>47 (34%)</td>
<td>58 (40%)</td>
</tr>
<tr>
<td>III</td>
<td>4 (3%)</td>
<td>8 (5%)</td>
</tr>
<tr>
<td><strong>Hernia diameter (cm)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>101 (73%)</td>
<td>101 (69%)</td>
</tr>
<tr>
<td>&gt;2-4</td>
<td>37 (27%)</td>
<td>45 (31%)</td>
</tr>
<tr>
<td><strong>Risk factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>15 (11%)</td>
<td>10 (7%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>13 (9%)</td>
<td>13 (9%)</td>
</tr>
<tr>
<td>Smoking</td>
<td>23 (18%)</td>
<td>17 (11%)</td>
</tr>
<tr>
<td>Operation time (min)</td>
<td>33 (25-43; 10-95)</td>
<td>44 (32-57; 20-122)</td>
</tr>
</tbody>
</table>

Data are n (%) or median (IQR, range). BMI=body mass index. ASA=American Society of Anesthesiologists. COPD=chronic obstructive pulmonary disease.

Table 1: Baseline characteristics of the intention-to-treat population
Mesh versus suture repair of umbilical hernia in adults: a randomised, double-blind, controlled, multicentre trial

<table>
<thead>
<tr>
<th></th>
<th>Suture repair (n=138)</th>
<th>Mesh repair (n=146)</th>
<th>Number needed to harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>1 (&lt;1%; 17 days)</td>
<td>3 (2%; 21 days, 14-23)</td>
<td>75</td>
</tr>
<tr>
<td>Haematoma</td>
<td>2 (1%; 24 days, 13-34)</td>
<td>3 (2%; 13 days, 11-16)</td>
<td>165</td>
</tr>
<tr>
<td>Seroma</td>
<td>1 (&lt;1%; 20 days)</td>
<td>5 (3%; 14 days, 7-20)</td>
<td>37</td>
</tr>
<tr>
<td>Seroma evacuation</td>
<td>0</td>
<td>1 (&lt;1%; 20 days)</td>
<td>146</td>
</tr>
<tr>
<td>Skin necrosis</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>Pulmonary complications</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>Cardiovascular complications</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
<tr>
<td>Urinary tract complications</td>
<td>0</td>
<td>0</td>
<td>--</td>
</tr>
</tbody>
</table>

Data are n (%) or median time in days (range) to occurrence of complication.

Table 2: Postoperative complications
Mesh versus suture repair of umbilical hernia in adults: a randomised, double-blind, controlled, multicentre trial
Mesh versus suture repair of umbilical hernia in adults: a randomised, double-blind, controlled, multicentre trial

Lancet 2018; 391: 860–69
Mesh versus suture repair of umbilical hernia in adults: a randomised, double-blind, controlled, multicentre trial

Figure 2: Time to recurrence for mesh versus suture (all hernia diameters, 1-4 cm)
Recurrence: Defects 1-2 cm

Figure 3: Time to recurrence in mesh versus suture (hernia diameters 1-2 cm)
Mesh Placement

Laparoscopic vs Open Hernia Surgery
WHICH IS THE BEST?
Open Mesh Repair: Ventral Hernia Patches

- Deployable patch
- Mechanism that is meant to cause them to lay flat
- Most have a permanent or absorbable barrier coating
- Purported benefit: to place a larger mesh through a smaller incision
Open Mesh Repair: Ventral Hernia Patches

• Many retrospective reviews but no good RCTs
Mesh OR Patch for Hernia on Epigastric and Umbilical Sites (MORPHEUS-Trial)

The Complete Two-year Follow-up

Jeroen E. H. Ponten, MD,* Wouter K. G. Leclercq, MD, PhD,† Tanja Lettinga, MD,‡
Jeroen Heemskerk, MD, PhD,§ Joop L. M. Konsten, MD, PhD,¶ Nicole D. Bouvy, MD, PhD,||
and Simon W. Nienhuijs, MD, PhD*


• Netherlands
  – 5 Hospitals
• 348 Patients
  – 177 Patch (6.4 cm)
  – 171 Mesh (6 cm)
• Defect size
  – 2 Finger Width or smaller
• Primary outcome
  – Any complication within 2 years
<table>
<thead>
<tr>
<th>TABLE 1. Baseline Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 348</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Patient characteristics</strong></td>
</tr>
<tr>
<td>Age (yrs, SD)</td>
</tr>
<tr>
<td>Gender (M/F)</td>
</tr>
<tr>
<td>BMI (kg/m², SD)</td>
</tr>
<tr>
<td>Exercise (SD)</td>
</tr>
<tr>
<td>Preoperative pain at rest (VDS, SD)</td>
</tr>
<tr>
<td>Preoperative pain during exercise (VDS pain)</td>
</tr>
<tr>
<td>Appearance of swelling (VDS cosmetic)</td>
</tr>
<tr>
<td><strong>Hernia characteristics</strong></td>
</tr>
<tr>
<td>Hernia type (u/e)</td>
</tr>
<tr>
<td>Incarceration (n)</td>
</tr>
<tr>
<td><strong>Comorbidities</strong></td>
</tr>
<tr>
<td>Diabetes mellitus (n)</td>
</tr>
<tr>
<td>Skin disease (n)</td>
</tr>
<tr>
<td>Pain syndrome (n)</td>
</tr>
</tbody>
</table>
### TABLE 2. Two Years Postoperative Findings

<table>
<thead>
<tr>
<th></th>
<th>PVP = 154</th>
<th>MESH = 145</th>
<th>P = Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All complications* (%)</td>
<td>32.5 (n = 50)</td>
<td>22.1 (n = 32)</td>
<td>0.044</td>
</tr>
<tr>
<td>Infection/seroma (SSD)† (%)</td>
<td>21.4 (n = 33)</td>
<td>15.2 (n = 22)</td>
<td>0.231</td>
</tr>
<tr>
<td>Requiring antibiotic</td>
<td>11.7 (n = 18)</td>
<td>7.6 (n = 11)</td>
<td>0.163</td>
</tr>
<tr>
<td>treatment (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended hospitalization (n)</td>
<td>1 (1)</td>
<td>0 (0)</td>
<td>0.331</td>
</tr>
<tr>
<td>(d)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reoperation‡ (%)</td>
<td>12.3 (n = 19)</td>
<td>4.8 (n = 7)</td>
<td>0.021</td>
</tr>
<tr>
<td>Recurrence (%)</td>
<td>8.4 (n = 13)</td>
<td>4.1 (n = 6)</td>
<td>0.127</td>
</tr>
<tr>
<td>Operated recurrence (%)</td>
<td>5.8 (n = 9)</td>
<td>1.4 (n = 2)</td>
<td>0.040</td>
</tr>
<tr>
<td>Nonoperated recurrence (%)</td>
<td>2.6 (n = 4)</td>
<td>2.8 (n = 4)</td>
<td>0.930</td>
</tr>
<tr>
<td>Use of painkillers (%)</td>
<td>2.6 (n = 4)</td>
<td>1.4 (n = 2)</td>
<td>0.453</td>
</tr>
<tr>
<td>Pain at rest (VDS pain†, SD)</td>
<td>1.1 (0.4)</td>
<td>1.1 (0.2)</td>
<td>0.442</td>
</tr>
<tr>
<td>Pain during exercise (VDS</td>
<td>1.1 (0.5)</td>
<td>1.2 (0.5)</td>
<td>0.505</td>
</tr>
<tr>
<td>pain†, SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appearance (VDS cosmetic†,</td>
<td>1.5 (0.8)</td>
<td>1.4 (0.7)</td>
<td>0.829</td>
</tr>
<tr>
<td>SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
28 patients operated in 1 year with intraoperative laparoscopic exam

- ePTFE/PPE patch
- Median f/u 25 months
- 14.8% recurrence
- >80% failure of adequate patch deployment
Open Retromuscular Mesh Repair

Clinical Science

Open intraperitoneal versus retromuscular mesh repair for umbilical hernias less than 3cm diameter

Frederik Berrevoet, M.D.,* Frederik D’Hont, M.D., Xavier Rogiers, Ph.D., Roberto Troisi, Ph.D., Bernard de Hemptinne, Ph.D.

The American Journal of Surgery (2011) 201, 85–90

• 116 Patients
  – 56 Retromuscular Lightweight PP Mesh
  – 60 Umbilical Patch

• Retromuscular Repair:
  – Longer OR Time
  – Longer LOS
  – Higher Post-op VAS
But,
  – Lower Recurrence Rate (8.3% v 3.6%)
Laparoscopic Umbilical Hernia Repair

Laparoscopic versus open umbilical or paraumbilical hernia repair: a systematic review and meta-analysis

S. Hajibande1,2, S. Hajibande2,3 · A. Sre4 · A. Khan3 · D. Subar3 · L. Jones3

- 3 RCT/ 7 Retrospective studies
- 16,549 patients

Cleveland Clinic
Laparoscopic Umbilical Hernia Repair

Laparoscopic versus open umbilical or paraumbilical hernia repair: a systematic review and meta-analysis

S. Hajibandeh¹²³ · S. Hajibandeh²³ · A. Sreh³ · A. Khan³ · D. Subar³ · L. Jones³

- 3 RCT/ 7 Retrospective studies
- 16,549 patients

Wound Infection

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Open Events</th>
<th>Laparoscopy Events</th>
<th>Total Events</th>
<th>Weight</th>
<th>Odds Ratio</th>
<th>M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wright 2002</td>
<td>8</td>
<td>8</td>
<td>16</td>
<td>0.30</td>
<td>2.97</td>
<td>[0.36, 24.83]</td>
</tr>
<tr>
<td>Gonzalez 2003</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>0.32</td>
<td>5.48</td>
<td>[0.27, 109.95]</td>
</tr>
<tr>
<td>Lau 2003</td>
<td>8</td>
<td>7</td>
<td>15</td>
<td>0.26</td>
<td>6.68</td>
<td>[0.37, 118.00]</td>
</tr>
<tr>
<td>Solomon 2010</td>
<td>14</td>
<td>2</td>
<td>16</td>
<td>0.28</td>
<td>2.54</td>
<td>[0.83, 8.78]</td>
</tr>
<tr>
<td>Othman 2012</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>0.20</td>
<td>8.20</td>
<td>[0.40, 169.90]</td>
</tr>
<tr>
<td>Shaikh 2013</td>
<td>8</td>
<td>2</td>
<td>10</td>
<td>0.26</td>
<td>4.52</td>
<td>[0.17, 14.65]</td>
</tr>
<tr>
<td>Colon 2013</td>
<td>6</td>
<td>3</td>
<td>9</td>
<td>0.25</td>
<td>3.04</td>
<td>[0.35, 26.14]</td>
</tr>
<tr>
<td>Malik 2015</td>
<td>12</td>
<td>1</td>
<td>13</td>
<td>0.19</td>
<td>4.10</td>
<td>[1.14, 14.81]</td>
</tr>
<tr>
<td>Purushotham 2015</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>0.21</td>
<td>5.51</td>
<td>[0.25, 122.08]</td>
</tr>
</tbody>
</table>

Total (95% CI) 1176     721 100.0%    2.35 [1.23, 4.48]
Laparoscopic Umbilical Hernia Repair: Hernia Recurrence

- 3 RCTs did not show a significant difference in hernia recurrence rates
Robotic Umbilical Hernia Repair

- Chen et al. Surg Endo 2017
- Retrospective
- Mean F/U: 47 days
- 72 Patients
  - 39 Robotic vs. 33 Lap
- Defects:
  - Lap: 2 cm
  - Robotic: 3 cm
- Op time:
  - 156 min vs 65 min
Summary

• Open vs Suture repair:
  – Overall lower than expected recurrence rates with suture repair
  – But mesh does significantly reduce recurrences even for 1-2 cm defects

• Open Repair With Mesh
  – Need to make sure the mesh is flat

• Laparoscopic Repair:
  – Laparoscopy reduces wound morbidity and “possibly” recurrence
  – Longer operative time
What’s Happening in the AHSQC?
AHSQC Umbilical Hernias

AHSQC
7,510

Open
5,786

MIS
1,724
AHSQC Umbilical Hernias

AHSQC
7,510

Open
5,786
77%

MIS
1,724
23%
AHSQC Umbilical Hernias: Open Repairs

Open
5,786

Mean Width: 1 cm (SD 1 cm)
AHSQC Umbilical Hernias: Open Repairs

Open
5,786

Suture
2,676

Mesh
3,110
AHSQC Umbilical Hernias: Open Repairs

- Open
  - Suture: 2,676
  - Mean Width: 1 cm (SD 1 cm)
- Mesh: 3,110
  - Mean Width: 2 cm (SD 2 cm)
  - 98% Synthetic Mesh
  - Mesh Location
    - 92% Sublay
    - 4% Onlay
    - 3% Inlay
AHSQC Umbilical Hernias: MIS Repairs

- MIS 1,724
  - Laparoscopic 613
  - Robotic 1,111
AHSQC Umbilical Hernias: MIS Repairs

- MIS: 1,724
  - Laparoscopic: 613
    - IPOM: 518
    - TAPP: 73
    - eTEP: 22
  - Robotic: 1,111
    - IPOM: 502
    - TAPP: 534
    - eTEP: 75