Abdominal Wall Reconstruction

Anterior and Posterior Component Separation

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The discussion will focus on hernias that are big enough and/or warrant an AWR approach.
AWR techniques

- **External component separation (ECS)**
  - “Ramierz CS”
  - can also be performed endoscopically

- **Posterior component separation (PCS)**
  - “Transversus abdominis muscle release” (TAR)
  - can also be performed laparoscopically or robotically

- **Chemical component separation (CCS)**
Component Separations are not all equal!

<table>
<thead>
<tr>
<th>Technique</th>
<th>Author (Year)</th>
<th>Steps Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components Separation Release</td>
<td>Ramirez (1990)</td>
<td>1 3</td>
</tr>
<tr>
<td>External Oblique Release</td>
<td>Shestak (2000)</td>
<td>1</td>
</tr>
<tr>
<td>External &amp; Internal Oblique Release</td>
<td>Levine (2001)</td>
<td>1 2</td>
</tr>
<tr>
<td>&quot;Sliding Door&quot; Release</td>
<td>Kuzbari (1998)</td>
<td>1 3 4</td>
</tr>
<tr>
<td>External Oblique/Transversus Abdominis Release</td>
<td>Thomas (1993)</td>
<td>1 6</td>
</tr>
<tr>
<td>External Oblique/Anterior Rectus Release</td>
<td>Lucas (1998)</td>
<td>1 4</td>
</tr>
<tr>
<td>Anterior Rectus Fascia Release</td>
<td>Yeh (1996)</td>
<td>4</td>
</tr>
<tr>
<td>&quot;Lateral&quot; Release</td>
<td>Mathes (2000)</td>
<td>5</td>
</tr>
<tr>
<td>Modified Components Separation Release</td>
<td>Fabian (1994)</td>
<td>1 2 3</td>
</tr>
</tbody>
</table>
AWR Techniques

External CS
Open Anterior Component Separation

Skin fat
R.a.
E.o.
I.o.
T.a.

Separation of the external oblique muscle
Release of rectal muscle
Myofascial approximation
Traditional Components Separation

Extend 1-2 cm over costal margin

Superiorly: 1-2 cm from rectus edge

Arcuate line

** Inferiorly: ~2 cm from rectus edge

SLIDE courtesy of Robert Martindale
External oblique division and elevation
External oblique release

Amount of Release
Epigastric: 4-5 cm/side
Umbilical: 10 cm/side
Pubic: 3-4 cm/side

Midline fascial approximation now possible
Anterior Components Separation is not without risk of complications

Caution below the arcuate line

SLIDE courtesy of Robert Martindale
AWR Techniques

Posterior CS

TARS
Posterior Component Separation

- Minimizes subcutaneous dissection
- Allows for wide overlap of mesh in the extraperitoneal position
- **Difficult to perform**
- **Less pull (6-8 cm) than Ramirez’s CST**
Starts off as a Rives-Stoppa rectorectus repair…
Gain access to retro-rectus space at midline
Dissect to linea semilunaris
Coverage of the defect at the midline which provides space for wide mesh overlap
Ideal position for mesh with well vascularized tissue on both sides
But if you need more (1) mesh overlap or (2) tension off the anterior rectus fascia closure, then continue on with transversus abdominis muscle release...
Exposure of posterior sheath
Incision of the posterior rectus sheath
Anatomy of the posterior sheath and landmarks

- Posterior lamella of the internal oblique
- Rib
- Rectus muscle
- Neurovascular bundle
Transversus abdominis release
Exposure of transversus abdominis
Release of transversus abdominis muscle
Release of transversus abdominis muscle
Development of preperitoneal space
Completion of release and midline advancement
Subxyphoid exposure
Reapproximation of the posterior sheath
Mesh placement
Mesh fixation with transfacial sutures
Posterior CS VIDEO

COURTESY OF Dr. Daniel Guerron
AWR Techniques

Chemical CS
“Chemical” component separation

Botulinum toxin A

- Administered pre-op (1-4 weeks)
- Total dose 100 - 500 U
- 3-5 sites on each side
- Each muscular layer gets injected
“Chemical” component separation

Botulinum toxin A

<table>
<thead>
<tr>
<th>Study</th>
<th>Mean Transverse Defect Size, cm (SD or Range)</th>
<th>Timing of BTA Administration Before Repair</th>
<th>Primary Fascial Closure (%)</th>
<th>Primary Fascial Closure Rate without CST (%)</th>
<th>Primary Fascial Closure Rate with CST (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elstner et al.</td>
<td>12.3 (5–24)</td>
<td>1–4 wk</td>
<td>32 (100)</td>
<td>26 (81.3)</td>
<td>6 (18.7)</td>
</tr>
<tr>
<td>Zendejas et al.</td>
<td></td>
<td>Median 6 d</td>
<td>9 (40.9)</td>
<td>5 (22.7)</td>
<td>4 (18.2)</td>
</tr>
<tr>
<td>López et al.</td>
<td>(10–15)</td>
<td>4 wk</td>
<td>31 (86.1)</td>
<td>27 (75.0)</td>
<td>4 (11.1)</td>
</tr>
<tr>
<td>Ibarra-Hurtado et al.</td>
<td>14.7 (2.18)</td>
<td>4 wk</td>
<td>17 (100)</td>
<td>8 (47.1)</td>
<td>9 (52.9)</td>
</tr>
<tr>
<td>Ibarra-Hurtado et al.</td>
<td>13.9 (1.49)</td>
<td>4 wk</td>
<td>12 (100)</td>
<td>6 (50.0)</td>
<td>6 (50.0)</td>
</tr>
<tr>
<td>Cháves-Tostado et al.</td>
<td>17.6 (7.35)</td>
<td>Mean 40 d</td>
<td>10 (71.4)</td>
<td>7 (50.0)</td>
<td>3 (21.4)</td>
</tr>
<tr>
<td>Calculated total</td>
<td>111 (83.5)</td>
<td></td>
<td>79 (59.4)</td>
<td></td>
<td>32 (24.1)</td>
</tr>
</tbody>
</table>

*Transverse defect size not reported, mean defect size was 59.7 cm².
“Chemical” component separation
Botulinum toxin A

- Role as an adjunct for the larger hernias
  Small $\rightarrow$ medium $\rightarrow$ large $\rightarrow$ very large

- Role for patients who recurred after previous CS

- Limiting factor – how are you going to do it?
  - cost of Botox ($9-20$ per unit)
  - ultrasound
  - skill set – radiologist? surgeon?
AWR Techniques

Laparoscopic / Robotic CS
You can do it, but…

• There is a learning curve…
  - start small… (don’t do the “ultimate robotic hernia repair you eventually want to do” right off the bat)

• Only proven benefit right now is less wound Cx (due to avoiding larger incision)

• Trouble with reimbursement
  - lesson learned from laparoscopic external CST experience

• Will it catch on?
## Summary of all 4 AWR approaches

<table>
<thead>
<tr>
<th></th>
<th>ECS</th>
<th>PCS</th>
<th>CCS</th>
<th>LAP/ROBOTIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Difficulty (technical)</strong></td>
<td>4</td>
<td>2</td>
<td>---</td>
<td>1 (most difficult)</td>
</tr>
<tr>
<td><strong>Difficulty (physical)</strong></td>
<td>2</td>
<td>1 (most difficult)</td>
<td>---</td>
<td>3</td>
</tr>
<tr>
<td><strong>Mesh overlap</strong></td>
<td>2</td>
<td>1 (most overlap)</td>
<td>2</td>
<td>---</td>
</tr>
<tr>
<td><strong>Mesh location</strong></td>
<td>Onlay, Rectrorectus, Sublay</td>
<td>Preperitoneal</td>
<td>Onlay, Sublay</td>
<td>Rectrorectus, Preperitoneal, Sublay</td>
</tr>
<tr>
<td><strong>Amount of release</strong></td>
<td>1 (most release)</td>
<td>2</td>
<td>2/3</td>
<td>1/2</td>
</tr>
<tr>
<td><strong>Repeatable</strong></td>
<td>?</td>
<td>?</td>
<td>YES</td>
<td>?</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>3</td>
<td>3</td>
<td>1 (most expensive)</td>
<td>2</td>
</tr>
<tr>
<td><strong>Reimbursement</strong></td>
<td>1</td>
<td>1</td>
<td>3 (least likely to be reimbursed)</td>
<td>2</td>
</tr>
</tbody>
</table>