Overview

- Options for abdominal wall reconstruction
  - Autologous
- Development of components separation
- Technique
- Results (short and long-term)
- Variations of components separation

The Problem

- Abdominal Wall

The Solution(s)

- Primary repair
- Autologous reconstruction
  - Components separation
- Mesh
- Biologics
- Combinations
The Problem

- Incisional hernias complicate as many as 11% of all abdominal operations
- 30-50% recurrence among those undergoing VHR
- Acquired abdominal wall defects common in the trauma population
- Longstanding open abdomen results in lateral migration of the rectus and flank muscle contraction

Recurrence Rates after Recurrent Incisional Hernia Repair

<table>
<thead>
<tr>
<th>Author</th>
<th>n</th>
<th>Follow-up</th>
<th>Recurrence Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamont, 1988</td>
<td>36</td>
<td>to 5 yrs</td>
<td>44</td>
</tr>
<tr>
<td>Read, 1989</td>
<td>36</td>
<td>to 10 yrs</td>
<td>42</td>
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<tr>
<td>Hesselink, 1993</td>
<td>298</td>
<td>35 months</td>
<td>41</td>
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<tr>
<td>Pless, 1993</td>
<td>32</td>
<td>45 months</td>
<td>28</td>
</tr>
</tbody>
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DiBello and Moore, 1996

Etiology: Abdominal Wall Defects

- Congenital
- Acquired
  - Tumor resection
  - Infection
  - Trauma
  - Incisional (failed attempt at primary closure)

Considerations

- Abdominal wall defect components
  - Overlying skin and soft tissue
  - Fascia
  - Both
- Presence or absence of infection
- Location
- Size
- ALL effect choice of reconstruction
**Preoperative Considerations**

- Optimize nutrition
- Co-morbidities
- Obesity
- Cigarette smoking
- Wound management
- Manage patient expectations

**Location of the Defect**

- Midline vs. lateral
- Upper vs. lower
- CT scan helpful to delineate abdominal wall anatomy

**Mathes Classification**

Mathes SJ, Ann Surg 2000

**Defect Analysis**
Defect Analysis

Benefits to Avoiding Mesh

- Wounds with unstable soft tissue coverage → prosthetic mesh poses an increased risk for extrusion or infection
- Complication rates of 18% to 50%
  - Extrusion
  - Infection
  - Fistula formation
  - Bowel adhesion with obstruction
  - Recurrence of hernia

Exposed Mesh

Abdominal Wall: Vascular Supply

- **Zone I** = Mid-abdomen
  - Deep epigastric arcade, superior & inferior
- **Zone II** = Lower abdomen
  - Superficial inferior epigastric artery
  - Superficial external pudendal artery from femoral artery
  - Deep circumflex iliac artery
- **Zone III** = Flank & lateral abdomen
  - Intercostal, subcostal, & lumbar arteries (lie on TA)
**Innervation of the Abdominal Wall**

Innervation to RA, EO, IO, and TA through T7-L1

**Abdominal Wall Reconstruction**

- **Goals:**
  - Prevent visceral extrusion
  - Tension-free closure
  - Incorporate with the remaining abdominal wall
  - Provide strong, dynamic, innervated, vascularized musculofascial support
  - Endure over time

**Options for Abdominal Wall Reconstruction**

- **Alloplastic Material**
  - Prolene
  - Vicryl
  - Marlex
- **Biologics**
- **Autologous tissue**
  - Local tissue* (components separation)
  - Distant tissue

**Components Separation**

- Ramirez et al 1990
- **Purpose:** “To determine if separation of the muscle components of the abdominal wall would allow mobilization of each unit over a greater distance than possible by mobilization of the entire abdominal wall as a block”
**Components Separation**

- Cadaver dissections:
  - unilateral 10 cm advancement at the waist: including the rectus abdominis, internal oblique and transversus abdominis compound flap

**Findings**

- External oblique separates easily from internal oblique
- Rectus easily separated from posterior sheath
- Neurovascular bundle travels on the deep surface of the internal oblique muscle
- Result: Vascularized tissue coverage with intact innervation

**Technique**

- Components
  - Rectus abdominis
  - Internal oblique
  - Transversus abdominis

**Component Separation**

Elevate skin and subcutaneous tissues just lateral to rectus sheath.
Separate external oblique from rectus and internal oblique.
Separate rectus abdominis from post. rectus sheath.
**Components Separation**

- Upper 1/3rd: up to 10cm defects
- Middle 1/3rd: up to 20cm defects
- Lower 1/3rd: 6-8 cm defects

**“Components Separation” Advancements**

- RA/IO/TA U/L
- RA/IO/TA B/L

**Literature Review**

- Ramirez study: 11 patients, no recurrence
- Recurrence rates:
  - Girotto et al, 2003, 15%
  - Shestak et al, 2000, 2%
  - DiBello et al, 1996, 8.5%
  - Cohen et al, 2000, 3%
  - Dumanian et al, 2009, 22.8%
Complications

- Many due to the hernia reduction and lysis of adhesions
  - Prolonged ileus 10-30%
  - Wound infection 10-40%
  - Seroma 3-20%
  - Blood transfusions 10-20%
  - Recurrence 2-40%

Considerations

- Innervation of the abdominal wall
  - Avoid separating the internal oblique from the transversus abdominis to preserve neurovascular bundles
- Preserve perforating blood supply to the skin when possible

Considerations

- Right of domain: Those patients with massive hernias have an obligatory decrease in the circumference of the abdominal girdle
  - Can lead to pulmonary compromise
- Tissue quality dictates choice of reconstruction

Case Examples
Preserve musculocutaneous perforating vessels to the abdominal wall

Defect size: 16cm
Abdominal Wall

Abdominal Wall

Abdominal Wall

Abdominal Wall
Significant abdominal wall laxity

Conversion to mesh repair
**Post-operative Routine**

- NPO until bowel function
- Binder at all times for 6 weeks
- 2 drains
- Limited activity x 6 weeks

**Rectus Advancement Techniques**

- Lateral Rectus Release
  - Often used synonymously as “components separation”

**Endoscopic Components Separation**

- Minimize damage to the abdominal wall vasculature
- Endoscopic release of the external oblique muscle
**Endoscopic Components Separation**

- Endoscopic CS may minimize vascular damage and decrease post-op dehiscence
- 7 endo CS pts vs. 30 open CS
- Results = Fewer post-op and long term complications w/ endo group, but recurrence was not different

**Tissue Expansion**

Deficient skin and subcutaneous tissues
Tissue expansion prior to repair
Can be placed alternatively under fascia
Can be used with mesh repair

**Algorithm for Abdominal Wall Defects**

- Midline defects <5cm in width
  - Local closure
- Midline defects >6cm
  - Mesh
  - Local, regional flaps or free flaps
  - Lateral rectus release
  - Components separation

**Conclusion**

- Reconstruction of abdominal wall defects requires complex and creative planning and an approach tailored to the unique defect of each patient
- Outcome: Patient selection and type of repair method used
- Components separation effective method for abdominal wall reconstruction
Thank You