

Abdominal Wall Reconstruction/ Component Separation

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Definitions

Definitions

- **Component Separation Techniques (CST):** Techniques to Separate the Muscular/Fascial Components of the Abdominal Wall to Decrease Tension on the Midline Closure
- **Anterior Component Separation (ACS):** Isolation and Division of the External Oblique Muscle
- **Perforator-Preserving Techniques (PP-ACS):** Modified ACS Techniques that Allow Preservation of the Deep Epigastric Perforating Vessels
- **Posterior Component Separation (PCS):** Separation of the Transversus Abdominis from the Internal Oblique Muscle
 - Required Division of the Neurovascular Bundle with Denervation of Rectus Abdominis
- **Transversus Abdominis Release (TAR):** Isolation and Division of the Transversus Abdominis Muscle – Generally Done as a Modification to a PCS (PCS-TAR)

Goals of Surgery

- Generally Performed as Part of a Retrorectus Ventral Hernia Repair
 - ***See Ventral Hernia Repair**
- The Primary Goal of Component Separation is to Relieve Tension on the Midline Fascia and Promote Closure
- Can Also Facilitate Placement of a Large Retrorectus Mesh

Release

- Releases 7-10 cm Per Side (Total of Up to 20 cm After Both Sides Released) ^{1,2}
 - 5 cm in the Upper Abdomen
 - 8-10 cm in the Middle Abdomen
 - 3-6 cm in the Lower Abdomen
- Exact Length of Release is Debated and Similar Lengths are Generally Reported
- Some Believe Anterior Component Separation to Create More Medialization of the Fascia

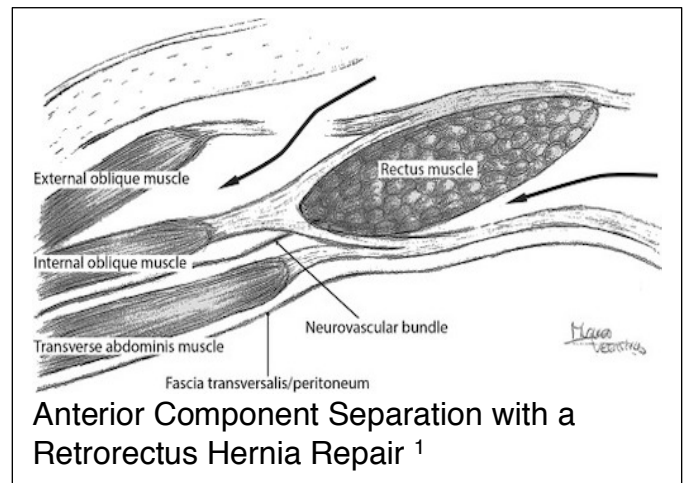
Anterior Component Separation (ACS)

Technique

- Generally Performed as Part of a Ventral Hernia Repair After Hernia Reduction and Lysis of Adhesions
- **Step 1.** Create Subcutaneous Flaps
 - Extend Flaps Laterally to the Anterior Axillary Line (Lateral to the External Oblique Insertion)
 - Avoid Excessively Large Flaps – The Largest Source of Morbidity
- **Step 2.** Incise the External Oblique Aponeurosis
 - Start **2 cm Lateral** to Semilunar Line/Rectus Sheath
 - Extend from the Costal Margin to the Pubis
- **Step 3.** Free the External Oblique from the Internal Oblique
 - Extend as Far Laterally as Possible

Reconstruction

- Generally Reinforced with Placement of Mesh – Most Often in the Retrorectus Position
 - ***See Mesh Placement**
- Reapproximate the Anterior Rectus Sheath to the Midline
- Consider Closed-Suction Drain Placement (Debated)
- Close Skin



Modifications

- *Posterior Rectus Sheath Division*
 - Incision of the Posterior Rectus Sheath Above the Arcuate Line Can Provide Additional Length if Needed
 - Adds an Additional 2-4 cm of Length
- *Perforator-Preserving Techniques*
 - Various Techniques: *See Below

Perforator-Preserving Techniques

Definition

- Anterior Component Separation (ACS) Techniques that Allow Preservation of the Deep Epigastric Perforating Vessels
- Various Techniques:
 - *Open Release with Preservation of Periumbilical Perforators*
 - *Open Release with Additional Inguinal Incisions for Fascial Release*
 - *Open Release with Additional Subcostal Incisions for Fascial Release*
 - *Endoscopic Technique*
 - *Minimally Invasive Component Separation (MICS)*
- Decreases Rates of Wound Complication ³⁻⁵

Open Release with Preservation of Periumbilical Perforators

- A Superior Subcutaneous Flap is Created Above the Umbilicus and then Carried Out Laterally
- A Second Inferior Subcutaneous Flap is Created Below the Umbilicus and Carried Out Laterally
- The Two Flaps are Connected Laterally, Taking Care to Spare the Periumbilical Perforating Vessels
- The External Oblique Aponeurosis is then Incised

Open Release with Additional Inguinal Incisions for Fascial Release

- Separate Inguinal Incisions are Made (Similar to an Inguinal Hernia Repair)
- A Balloon Dissector is Placed Between the Internal and External Obliques
- The Balloon Dissector is then Inflated to Create the Space
- Fascial Separation is Completed Through the Inguinal Incision

Open Release with Additional Subcostal Incisions for Fascial Release

- Transverse Subcostal Incisions are Made
- Fascial Separation is Completed Through these Subcostal Incisions

Endoscopic Technique

- A Small 1-2 cm Incision is Made Below the Costal Margin Lateral to the Rectus Abdominis
- The Incision is Carried Down Through the External Oblique
- The Space Between Internal and External Oblique is Opened Using a Balloon Dissector and then Insufflated
- Using Endoscope/Laparoscope and Two Additional Ports the Plane is Dissected and the Fascia of the External Oblique is Divided
- Procedure is then Repeated on the Other Side
- Hernia Repair is Then Performed in a Traditional Open Fashion

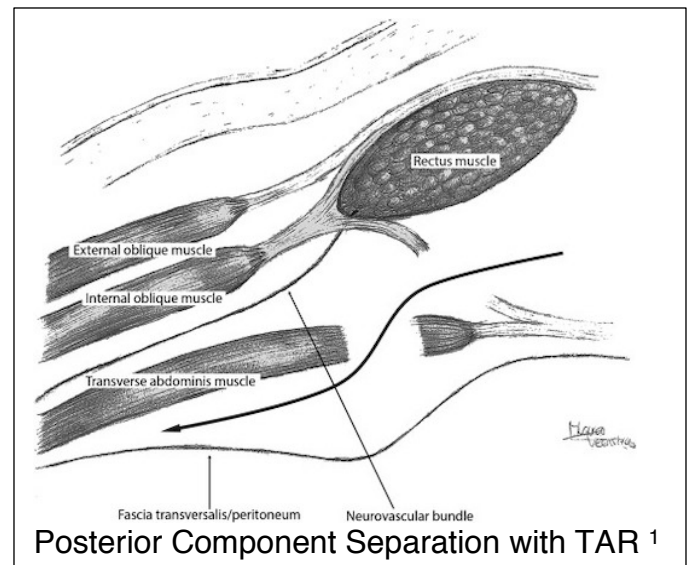
Minimally Invasive Component Separation (MICS)

- Hernia is Reduced in a Minimally Invasive Fashion
- A Small 1-2 cm Incision is Made Below the Costal Margin Lateral to the Rectus Abdominis
- An Incision is Made Through the External Oblique Aponeurosis
- A Yankauer Suction Device is Used to Create a Space Between the Internal and External Oblique
- The Fascia of the External Oblique is Then Divided (Division Extends Superiorly to 12 cm Above the Costal Margin and Inferiorly to the Inguinal Ligament)

Posterior Component Separation (PCS) and Transversus Abdominis Release (TAR)

Posterior Component Separation (PCS) Technique

- Generally Performed as Part of a Retrorectus Ventral Hernia Repair After Hernia Reduction and Lysis of Adhesions
- **Step 1.** Incise the Dorsal Aspect of the Posterior Rectus Sheath 1 cm from the Medial Edge of the Rectus Muscle
 - Enter the Retrorectus Space and Dissect Laterally to the Semilunar Line
 - Take Care to Protect the Neurovascular Bundle Laterally Near the Semilunar Line
- **Step 2.** Incise the Ventral Aspect of the Posterior Rectus Sheath at Lateral-Most Edge
 - Exposes the Underlying Transversus Abdominis Muscle
 - Do Not Penetrate Through the Transversalis Fascia/Peritoneum
- **Step 3.** Dissect the Plane Laterally Between the Internal Oblique and Transversus Abdominis



Transversus Abdominis Release (PCS-TAR) Technique

- **Step 1/Step 2:** Same as Traditional PCS
- **Step 3:** Incise the Transversus Abdominis Muscle Along its Length at the Medial Aspect to Enter the Preperitoneal Space
 - Do Not Penetrate Through the Transversalis Fascia/Peritoneum
- **Step 4:** Dissect the Plane Laterally Between the Transversus Abdominis (Anterior) and Transversalis Fascia/Peritoneum (Posterior)

Reconstruction

- Reapproximate the Posterior Rectus Sheath to Midline
- Typically Place a Large Retrorectus Mesh
- Reapproximate the Anterior Rectus Sheath to Midline
- Consider Closed-Suction Drain Placement (Debated)
- Close Skin

Modifications

- *Laparoscopic PCS*
- *Robotic PCS*

Complications

Hernia Recurrence Rates ⁶⁻¹⁴

- ACS: 12-15%
- PP-ACS: 7-11%
- PCS-TAR: 4-7%
- *ACS May Be Associated with Increased Rates of Recurrence Although the Exact Rates are Debated

Wound Complications ⁷⁻¹⁵

- Total Wound Complication Rates:
 - ACS: 21-48%
 - PP-ACS: 16-21%
 - PCS-TAR: 15-25%
- Complications:
 - Skin Flap Necrosis – Caused by Damage to the Perforating Vessels
 - Surgical Site Infection (SSI)
 - Skin Dehiscence
 - Hematoma/Seroma
 - Fistula Tract Formation
- *Generally Accepted that **ACS Has Significantly Higher Rates of Skin Flap Necrosis and Total Wound Complications**
- *PP-ACS and PCS-TAR are Generally Considered to Have Similar Rates of Wound Complications

Other Complications

- *Abdominal Compartment Syndrome*

- Massive Hernia Repairs with Loss of Domain May Result in Intraabdominal Hypertension
- Can Present as Pulmonary Complications
- *See Abdominal Compartment Syndrome
- *Iatrogenic Spigelian Hernia*
 - Due to Disruption of the Linea Semilunaris

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