

AWR: Endoscopic CST, Ramirez CST, Stoppa, Posterior CST: A Decision Analysis

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Disclosures

- **Research Grants**
 - **W. L. Gore**
 - **LifeCell**
 - **Davol**





Take Home Message

- What are the basic tenets of AWR?
- What are the basic technical aspects of each approach?
- Limitations and benefits of each approach.
- I do most things at least sometimes
- I do one thing almost all the time
- Why I do what I do.

Not every patient has the same definition of a 6 pack!



Ideal Ventral Hernia Repair

- **Minimal wound morbidity**
- **Avoid extensive skin flaps**
- **Large prosthetic mesh**
- **Reconstruct midline**
- **Reproducible**



Component Separation

- What we really mean is:
 - “ try to reconstruct the midline”
- It does not always require a formal component separation.
- Do the least invasive/morbid procedure to accomplish the goal.
- One approach will not fit all defects.

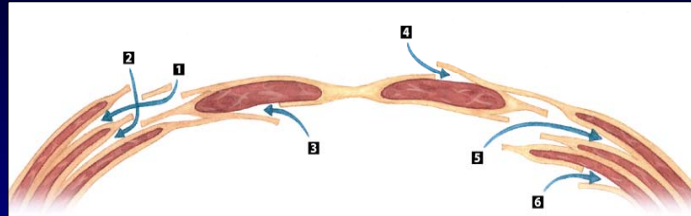


What are the options for reconstructing the midline?

- Retro-rectus Repair- Rives-Stopppa-Wantz
- Open Component Separation
 - Anterior “Ramirez”
- Minimally Invasive Component Separation
 - Periumbilical Perforator Sparing
 - Endoscopic component separation
 - Posterior components separation



Open Component Separation Anterior Approach

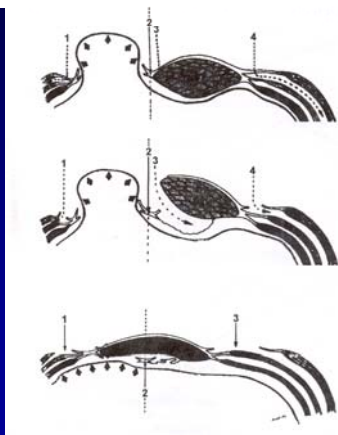


Technique	Author (Year)	Steps Involved
Components Separation Release	Ramirez (1990)	1 3
External Oblique Release	Shetak (2000)	1
External & Internal Oblique Release	Levine (2001)	1 2
"Sliding Door" Release	Kuzbari (1998)	1 3 4
External Oblique/Transversus Abdominis Release	Thomas (1993)	1 4
External Oblique/Anterior Rectus Release	Lucas (1998)	1 4
Anterior Rectus Fascia Release	Yeh (1996)	4
"Lateral" Release	Mathes (2000)	5
Modified Components Separation Release	Fabian (1994)	1 2 3



"Components Separation" Method for Closure of Abdominal-Wall Defects: An Anatomic and Clinical Study

Oscar M. Ramirez, M.D., Ernesto Ruas, M.D., and A. Lee Dellon, M.D.
 Baltimore, Md.



Ramirez OM, et al. PRS. 1990.



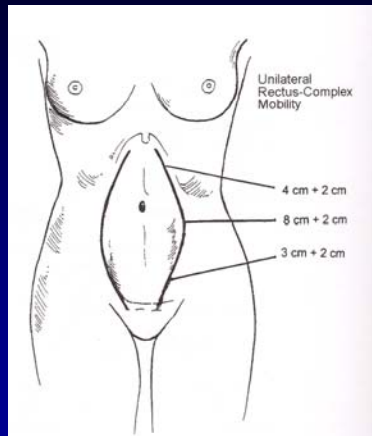
Component Separation

- **Rectus Muscle**

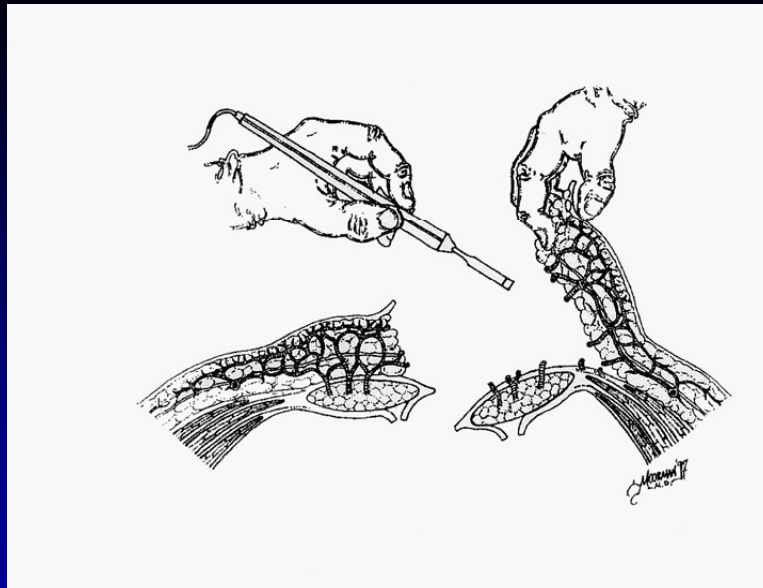
- Upper 3 cm
- Middle 5 cm
- Lower 3 cm

- **External Oblique**

- Upper 2 cm
- Middle 4 cm
- Lower 2 cm



Ramirez OM, et al. PRS. 1990.



Skin Flap Necrosis



Anterior Component Separation

Pros

- Wide fascial advancement
- Innervated / vascularized repair
- Improved functional outcomes
- Closure of wide defects with autologous tissue

Cons

- Significant wound morbidity
 - Necrosis, ischemia, infection, hematoma
- Non compliant abdominal walls, not much advancement
- Durability?



When I use it

- If skin won't come to midline
- Will create a skin flap anyways
- The hernia is so big that the lateral extent of the hernia sac is at the external oblique
- If I don't want to use mesh, violate the retro rectus plane, or think an onlay is acceptable

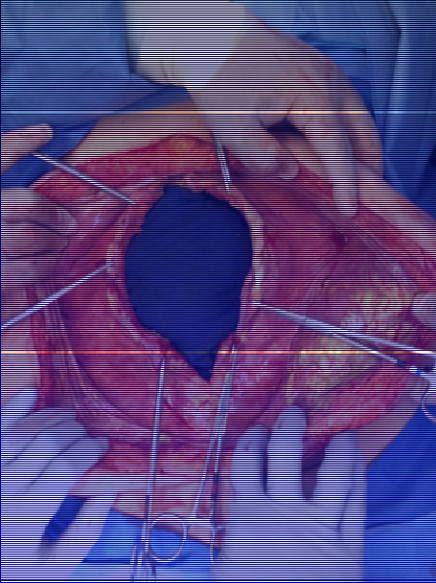


Patient

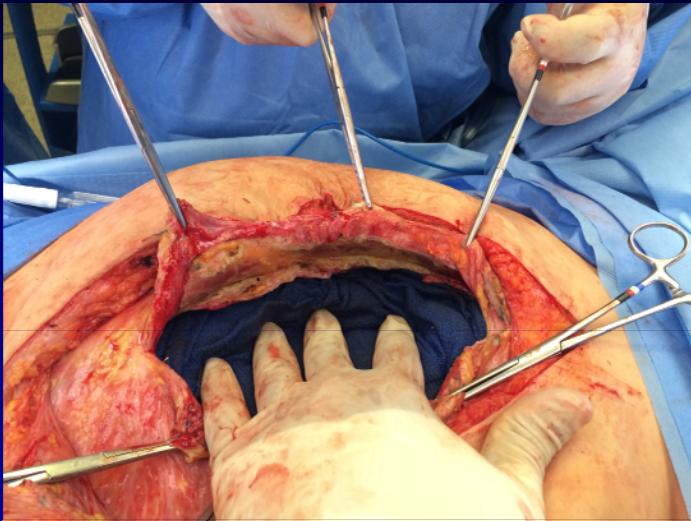
- 62 year old female
- s/p ovarian CA resection
- Planned Liver resection and primary closure of hernia
- On Avastin



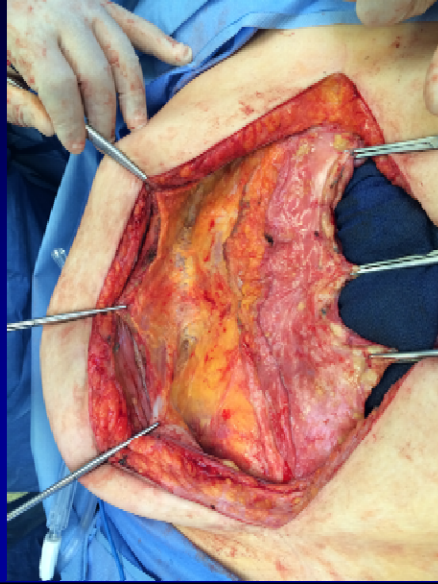
Defect-15x20 cm



Posterior Rectus Sheath Incision



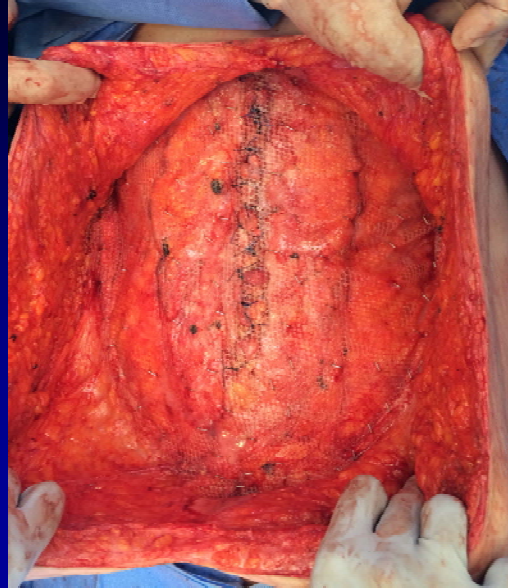
External Oblique Release



Fascia Closed



Onlay PP



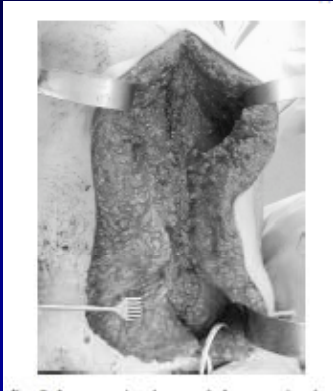
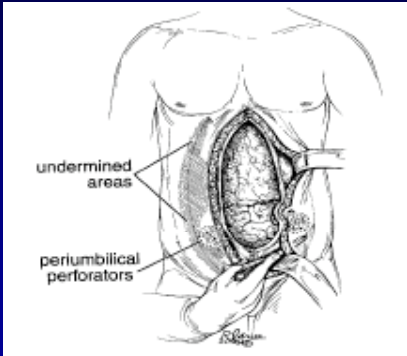
Completed



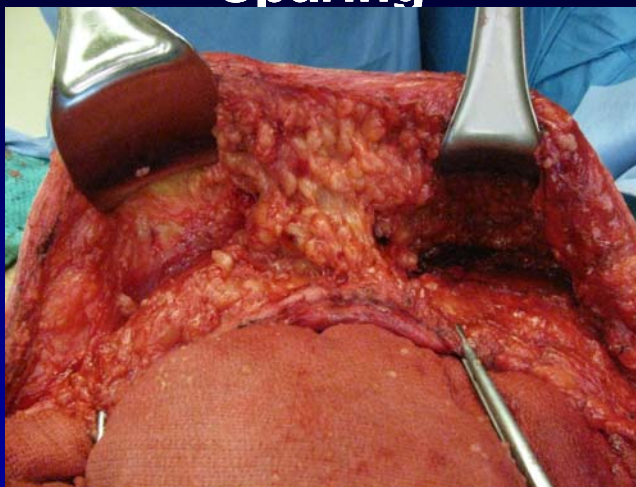
Follow up 3 m



Periumbilical Perforator Sparing



Periumbilical Perforator Sparing



Periumbilical Perforator Sparing

Advantages

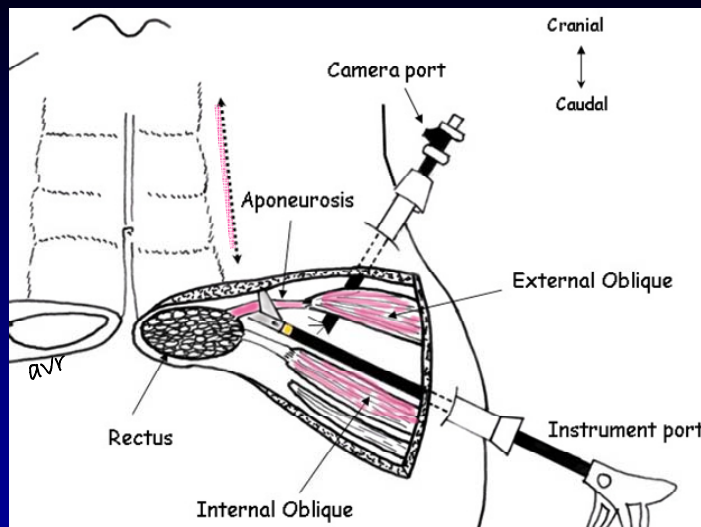
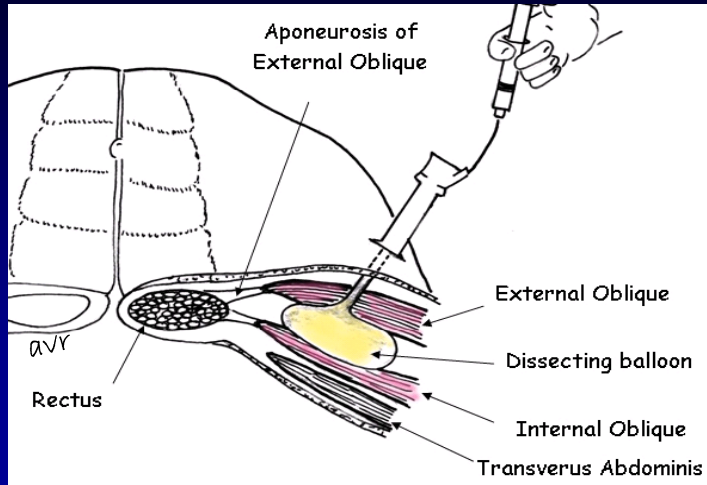
- Preserve main blood supply
- Similar advancement
- Low tech
- Easy to perform

Disadvantages

- Large dead space
- Communicates with midline wound
- Seroma and abscess rates may not change



Minimally Invasive Component Separation Endoscopic Technique



Endoscopic Component Separation

Pros

- Direct access to lateral compartment
- Avoids subcutaneous flap
- Avoids division of abdominal wall perforators
- Decreases complexity of postoperative wound infections

Cons

- Requires laparoscopic skill set
- Achieves 85% of open release
- No flaps, can be difficult to place mesh
- Learning curve



What have I learned from Endoscopic CST? Good

1. Understand blood supply of anterior abdominal wall
2. Try and preserve blood supply to skin and subcutaneous tissues
3. Understand and preserve innervation of rectus muscle
4. If you preserve blood supply you will reduce wound morbidity.



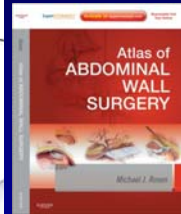
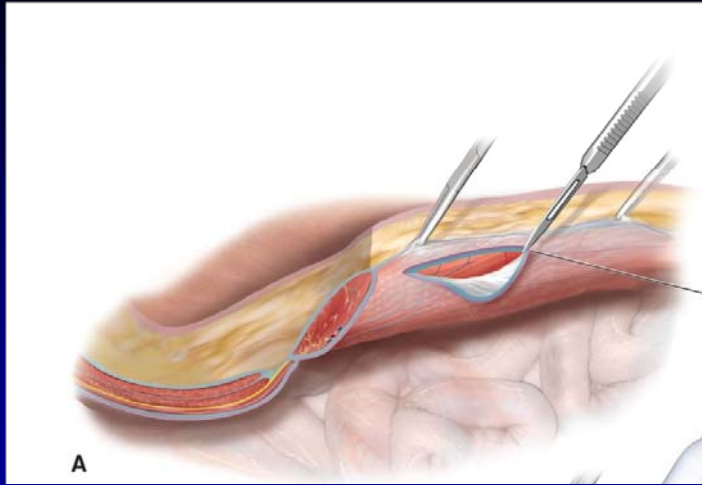
What have I learned from Endoscopic CST? Bad

- Surgeons use it too often in cases that do not require a component separation.
- Those without advanced laparoscopic skill set, will not adopt this approach.
- Placement of mesh without a skin flap is challenging for most surgeons.

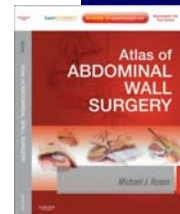
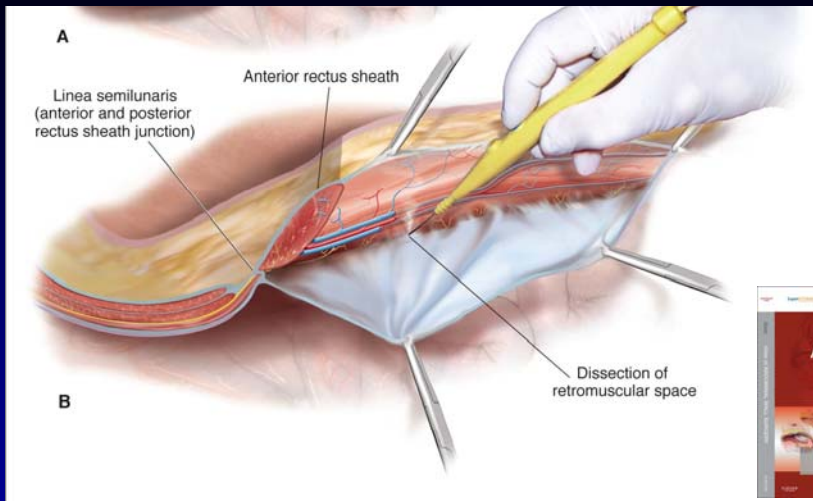


Retro-Rectus Repair Rives-Stoppa How I do it



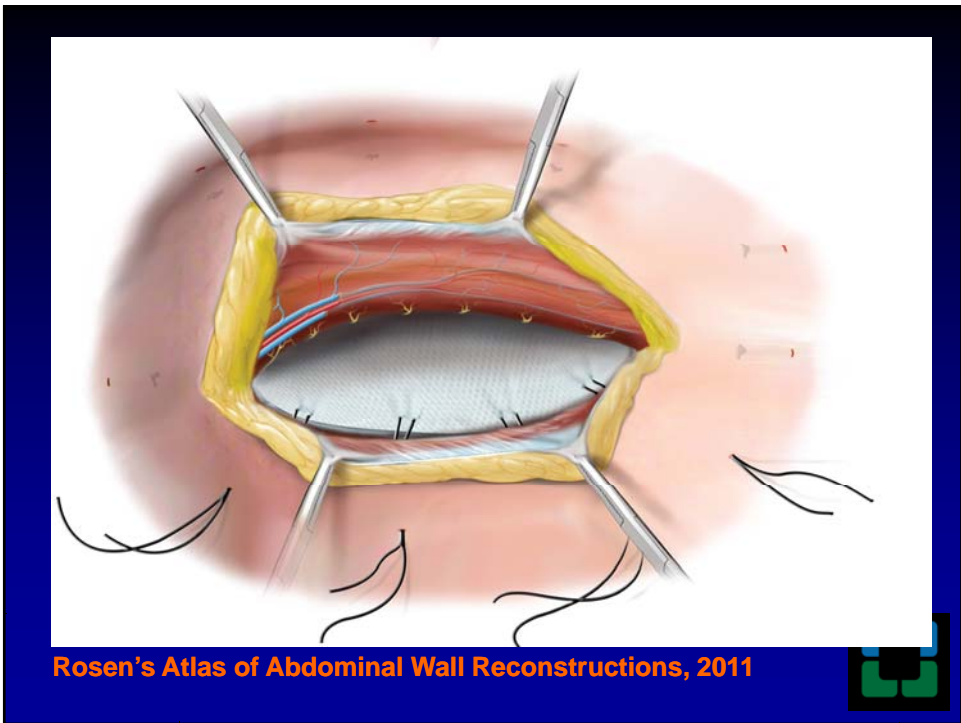
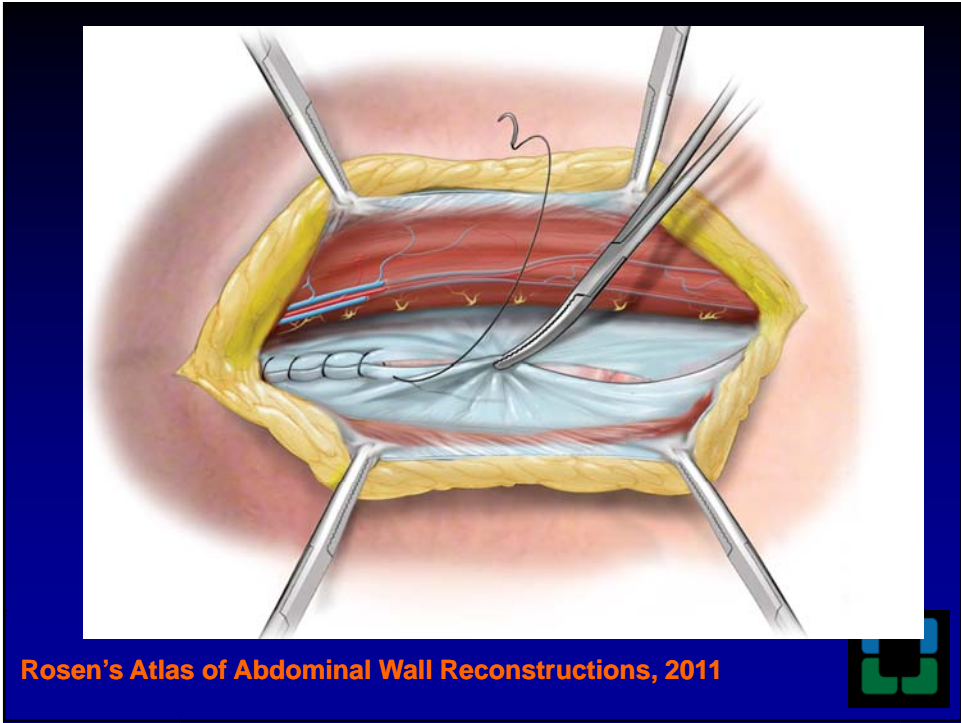


Rosen MJ. Atlas of Abdominal Wall Reconstruction Elsevier



Rosen MJ. Atlas of Abdominal Wall Reconstruction Elsevier





Retro rectus Repair

Pros

- Often good enough to get midline closure in most hernias
- Relatively straightforward
- Large mesh
- Retro-muscular
- No skin flaps

Cons

- Narrow/atrophied rectus muscle limits mesh overlap
- Retrorectus space obliterated
- Large hernias midline might not come together



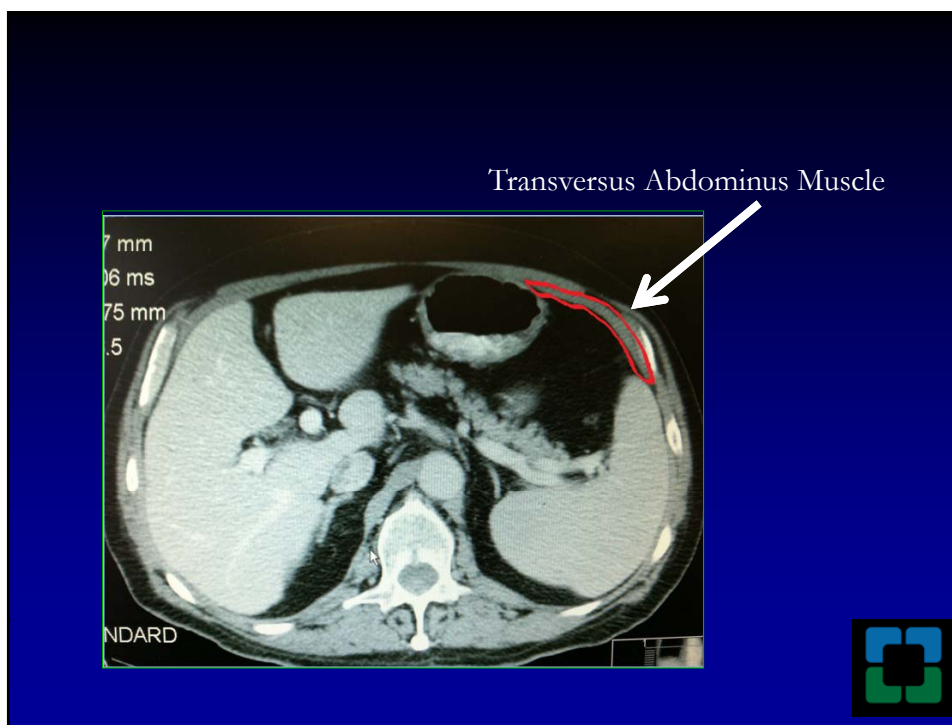
When I use it

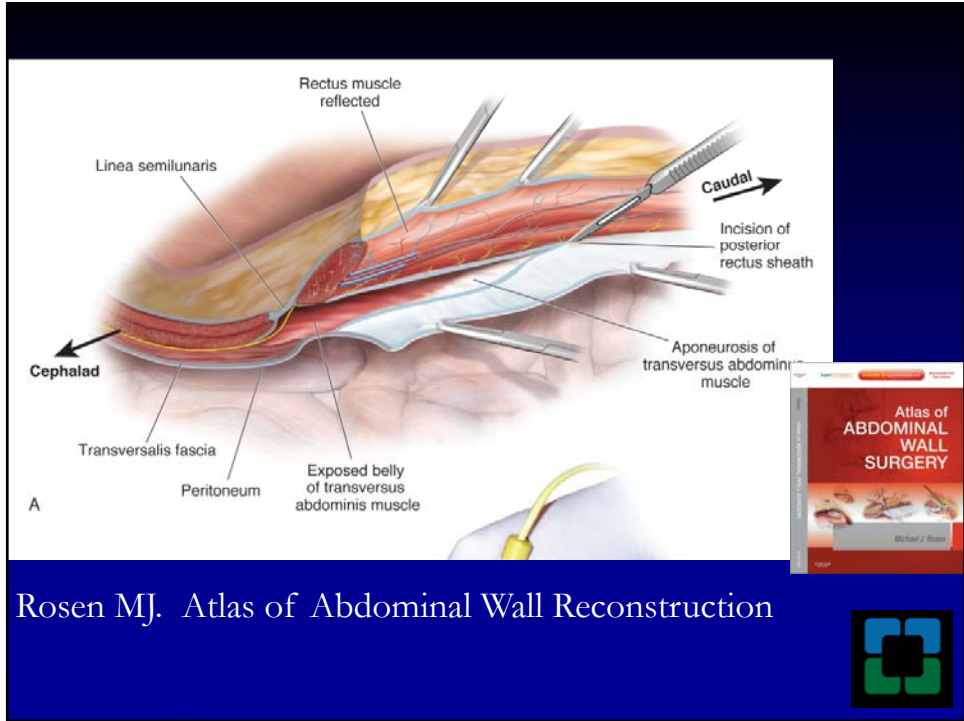
- For any hernia I can
- As long as mesh coverage is wide enough
- Posterior sheath will close



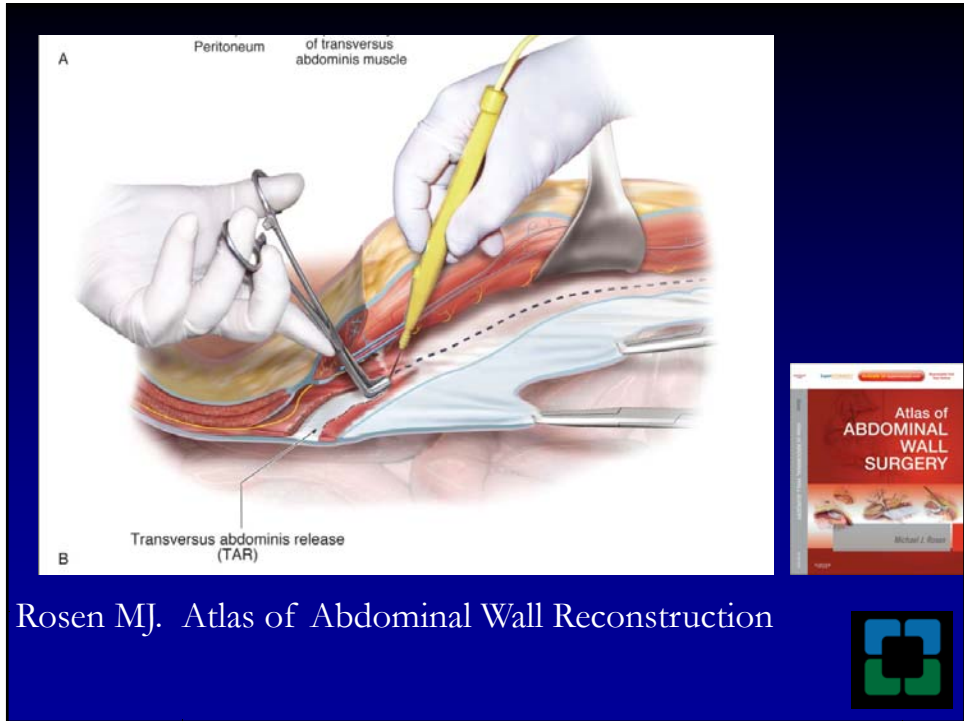
But What if I am doing a Rives-Stoppa and I can't get the Posterior Sheath Closed?

- Make sure you go all the way to the linea semilunaris.
- You can use:
 - Vicryl Mesh
 - Omentum
- Posterior Component Separation
 - Preperitoneal Plane
 - To Psoas
 - Preserve Nerves

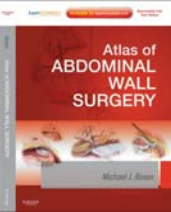
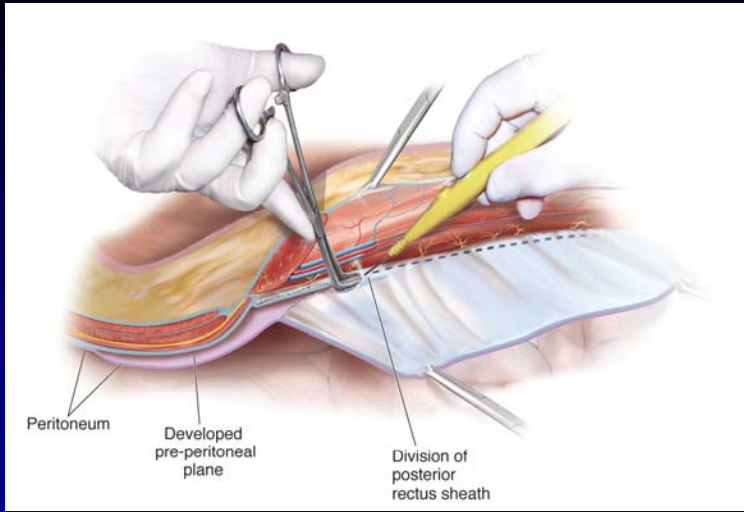




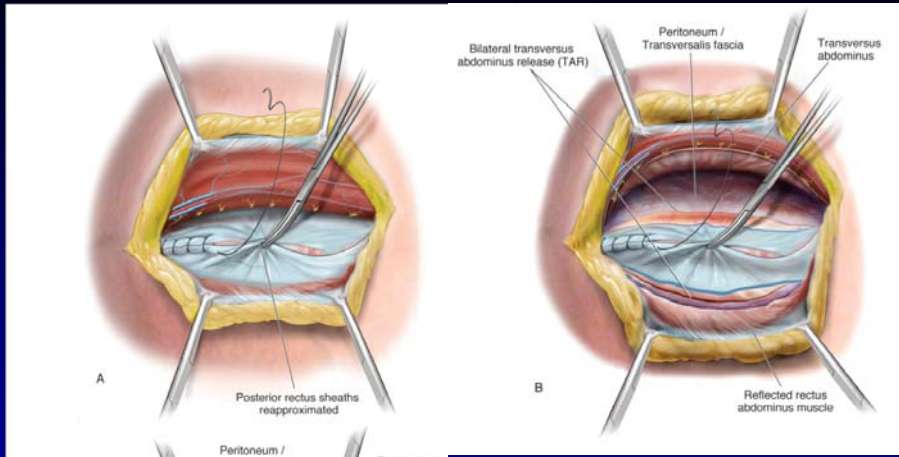
Rosen MJ. Atlas of Abdominal Wall Reconstruction



Rosen MJ. Atlas of Abdominal Wall Reconstruction

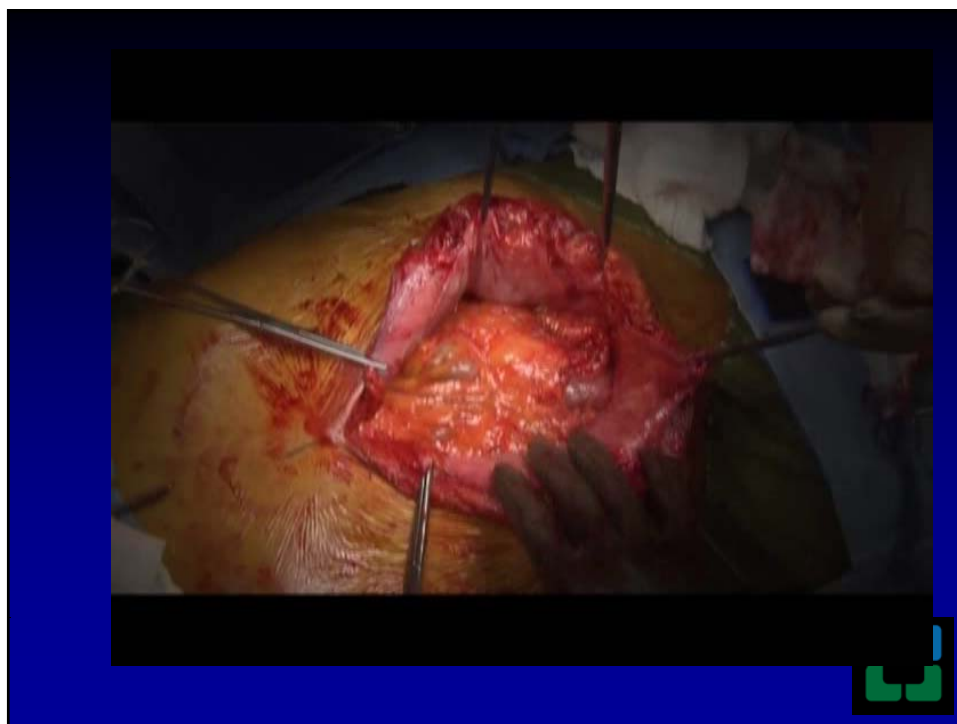


Rosen MJ. Atlas of Abdominal Wall Reconstruction



Rosen MJ. Atlas of Abdominal Wall Reconstruction





**Does Posterior Component
Separation Provide Equivalent
Myofascial Advancement?**



Posterior and open anterior components separations: a comparative analysis

David M. Krpata, M.D.*, Jeffrey A. Blatnik, M.D., Yuri W. Novitsky, M.D.¹,
Michael J. Rosen, M.D.¹

- 56 Open anterior CST versus 55 Posterior CST
- Defect Size equivalent 531 cm² versus 472 cm²
- Myofascial advancement equivalent
- 50% reduction in wound morbidity

American Journal of Surgery March 2012

47



Open Component Separation Posterior Approach

Pros

- Takes advantage of retromuscular dissection plane
- Allows for medialization of both posterior and anterior components
- Closure of defect
- Avoids subcutaneous flap creation

Cons

- Can violate abdominal wall neurovascular supply
- Easy to get in wrong plane
- Large dead space created
- Technically challenging



What happens to the muscles after you perform these releases and reconstruct the abdominal wall?



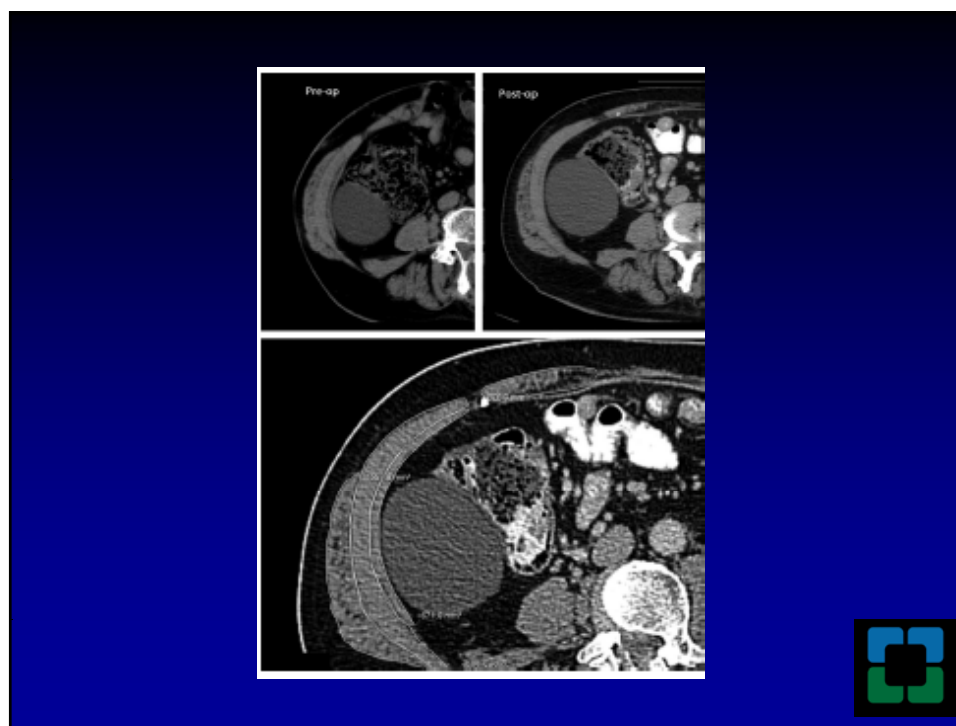
Comparative Radiographic Analysis of Changes in the Abdominal Wall Musculature Morphology after Open Posterior Component Separation or Bridging Laparoscopic Ventral Hernia Repair

Gayan S De Silva, BS, David M Kpata, MD, Caitlin W Hicks, MD, Cory N Criss, MD, Yue Gao, MD, PhD, Michael J Rosen, MD, FACS, Yuri W Novitsky, MD

- **N=50**
- **25 TAR with midline reconstruction**
- **25 Lap ventral NO midline reconstruction**
- **Radiographic evaluation Pre v Post**

JACS 2013





Postop % change in Muscle Area

Muscle	TAR	LVHR
Rectus	+23%	+3%
EAO	+10%	-4%
IAO	+17%	-2%
TA	-18%	1%
P value	<0.001	NS

Functional abdominal wall reconstruction improves core physiology and quality-of-life

Cory N. Criss, MD,^a Clayton C. Petro, MD,^a David M. Krpata, MD,^a Christina M. Seafler, RN,^a Nicola Lai, PhD,^{b,c} Justin Flucem, MS,^c Yuri W. Novitsky, MD,^a and Michael J. Rosen, MD,^a
Cleveland, OH

- **N=13**
- **Preoperative and 6 months Postoperative Biodex**
- **HerQLes Score**
- **TAR / PCST**

Surgery 2014



Isokinetic Dynamometry



Isometric Dynamometry



Test	% Increase	p value
Isokinetic at 60 degrees/sec	23.8	0.008
Isometric at -15 degrees	35.8	0.03
Isometric at 0 degrees	43.3	0.026
Isometric at +15 seconds	38.3	0.006
HerQLes	50	0.016

MY own personal evolution

- Laparoscopic Zealot
- Exposure to reconstructive surgeons and questioned the bridged repair
- Open anterior component separation advocate
- Dissatisfied with wound morbidity
- Endoscopic Component separation
- Limited mesh placement options/ surgeon adoption
- Posterior component separation

57



Conclusion

- There is a wide spectrum of ventral hernias
- Understand all approaches to AWR
- Pick which is best for your skill set, your patient, and your objectives for repair

