IX Congresso
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# THE IMPORTANCE OF OPTIMIZATION OF BLOOD PRESSURE AND CARDIAC FUNCTION IN PREVENTING SCI WITH TAA REPAIRS

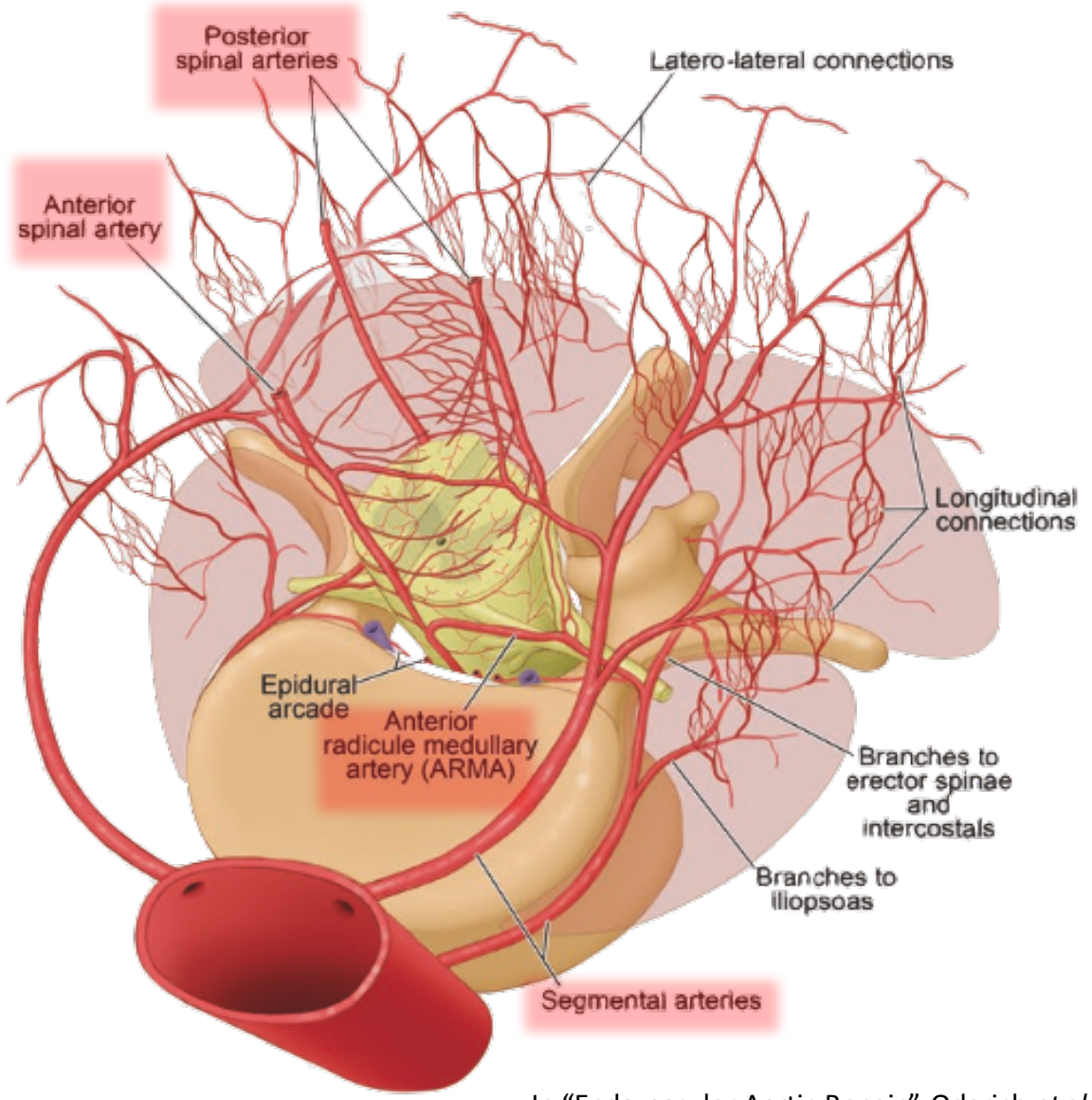
Armando Mansilha MD, PhD, FEBVS
Joel Sousa MD

# SCI IN TAA REPAIR

- **COMMON complication**
  - 22% of type II open repairs
  - 30% of all endovascular repairs
- **Most dreaded complication for SURGEONS**
- **Devastating for PATIENTS**
  - Dramatic life changes
  - Often leads to early mortality

# SCI IN TAA REPAIR - ANATOMY

- **SPINAL CORD is nourished by 3 main arteries:**
  - Anterior spinal artery (ASA) - 1
  - Posterior spinal arteries (PSA) - 2
- **Their flow depends on branches of the intercostal and lumbar arteries (Segmental arteries - SA's):**
  - Anterior radicular-medullary arteries
  - Posterior radicular-medullary arteries

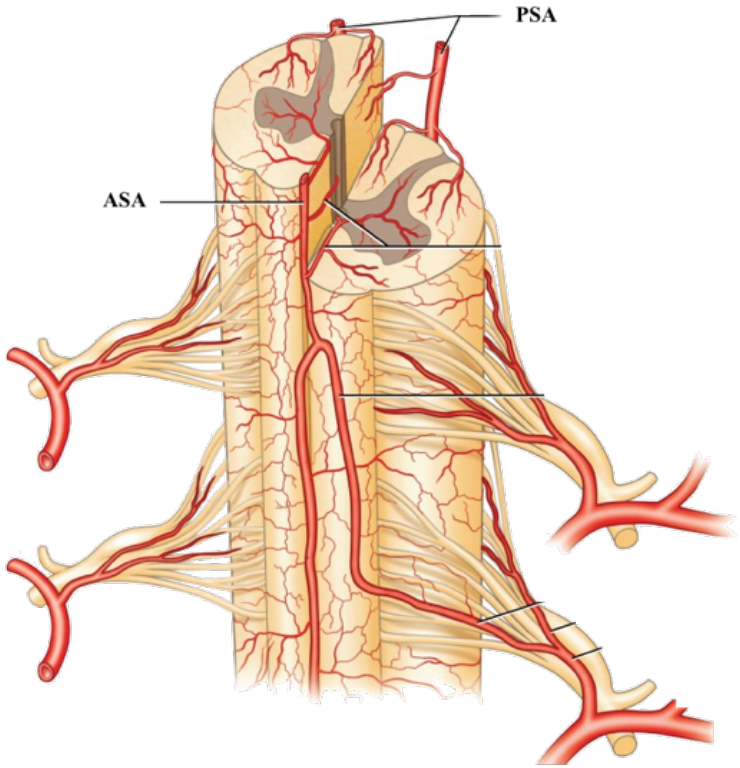



In "Endovascular Aortic Repair", Oderich *et al*

# SCI IN TAA REPAIR - ANATOMY

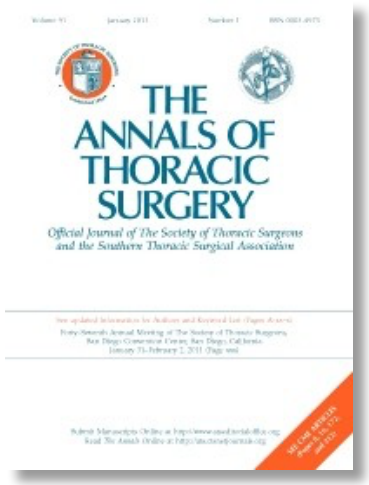
## ARTERY OF ADAMKIEWICZ

- Many attempts were made to preserve this vessel intra-operatively
  - Pre-operative identification of the vessel in high-resolution CTA
  - Intra-operative re-implantation




**LACK OF IMPROVEMENT IN PARAPLEGIA RATES**

# SCI IN TAA REPAIR - ANATOMY


Imaging of vascular remodeling after simulated thoracoabdominal aneurysm repair

Sarah Geisbüsch, MD,[a] Deborah Schray,[a] Moritz S. Bischoff, MD,[a] Hung-Mo Lin, ScD,[b] Randall B. Griepp, MD,[a] and Gabriele Di Luozzo, MD[a]

**There is NO UNIQUE SA whose INTERRUPTION results in cord ischemia**

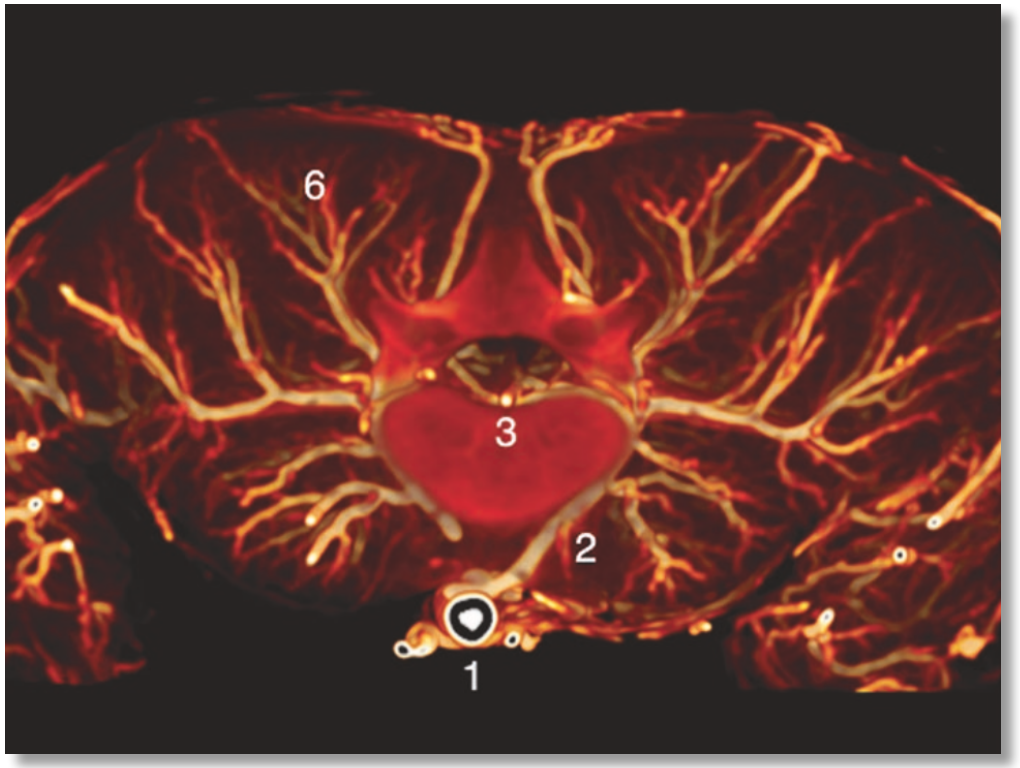
Thoracic and Thoracoabdominal Aneurysm Repair: Is Reimplantation of Spinal Cord Arteries a Waste of Time?

Christian D. Etz, MD, James C. Halstead, MA (Cantab), MRCS, David Spielvogel, MD, Rohit Shahani, MD, Ricardo Lazala, MD, Tobias M. Homann, MS, Donald J. Weisz, PhD, Konstadinos Plestis, MD, and Randall B. Griepp, MD

Departments of Cardiothoracic Surgery and Neurosurgery, Mount Sinai School of Medicine, New York, New York

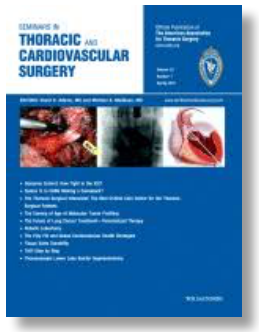
# SCI IN TAA REPAIR - ANATOMY

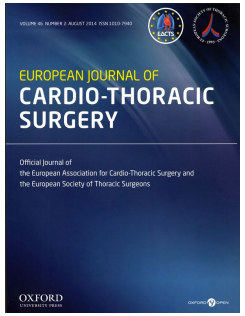
- Blood supply to the spinal cord is part of an **EXTENSIVE NETWORK** of vessels
- Extends into the **para-spinous muscles**
- Multiple connections between major arteries
    - Intercostal
    - Lumbar
    - Subclavian
    - Hypogastric
    - Internal thoracic




In “Endovascular Aortic Repair”, Oderich *et al*

# SCI IN TAA REPAIR - PATHOPHYSIOLOGY


- Several animal studies were performed in order to explain the SCI pathophysiology

**FLOW STUDIES**

**PRESSURE STUDIES**

# SCI IN TAA REPAIR - PATHOPHYSIOLOGY

- Following extensive SA occlusion, **SCBF** and **CNP** **drop dramatically**
- Collateral network allows to restore SCBF and CNP to **baseline levels at 72h**

**WHAT'S THE IMPORTANCE OF OPTIMIZATION OF BLOOD PRESSURE AND CARDIAC FUNCTION IN PREVENTING SCI WITH TAA REPAIRS?**

Vulnerability to spinal cord ischemia **DURS**

**post-operatively and EXTENDS FOR THE FIRST 72H after the operation**

# SCI IN TAA REPAIR


**Directly measuring spinal cord blood flow and spinal cord perfusion pressure via the collateral network: Correlations with changes in systemic blood pressure**

Yuya Kise, MD, Yukio Kuniyoshi, MD, PhD, Hitoshi Inafuku, MD, PhD, Takaaki Nagano, MD, Tsuneo Hirayasu, MD, PhD, and Satoshi Yamashiro, MD, PhD

**By optimizing MAP, one can increase SCBP and avoid spinal cord ischemic lesions during the period in which proper collateralization installs (5h – 72h)**

# SCI IN TAA REPAIR


## Cardiac function is a risk factor for paralysis in thoracoabdominal aortic replacement

**Charles W. Acher, MD, Martha M. Wynn, MD, John R. Hoch, MD,** and **Paul W. Kranner, MD,** *Madison, Wis.*

**The significant drop in the cardiac index in patients with deficits compared with patients without deficits may reflect the important contribution of cardiac function to the collateralized circulation of the spinal cord during and after aortic occlusion**

# CURRENT PROTOCOLS

**Interventions for Reversing Delayed-Onset Postoperative Paraplegia After Thoracic Aortic Reconstruction**

Albert T. Cheung, MD, Stuart J. Weiss, MD, PhD, Michael L. McGarvey, MD, Mark M. Stecker, MD, PhD, Michael S. Hogan, BS, Alison Escherich, MPH, and Joseph E. Bavaria, MD

- MAP was maintained from **75 - 85 mmHg**

**Strategies to Manage Paraplegia Risk After Endovascular Stent Repair of Descending Thoracic Aortic Aneurysms**

Albert T. Cheung, MD, Alberto Pochettino, MD, Michael L. McGarvey, MD, Jehangir J. Appoo, MD, Ronald M. Fairman, MD, Jeffrey P. Carpenter, MD, William G. Moser, RN, Edward Y. Woo, MD, and Joseph E. Bavaria, MD

- MAP was maintained from **75 - 85 mmHg**
- If SCI: MAP was increased to **85 - 100 mmHg**

Prevention of spinal cord injury during endovascular thoracoabdominal repair

Emanuel R. TENORIO [1], Matthew J. EAGLETON [2], Jussi M. KÄRKKÄINEN [1], Gustavo S. ODERICH [1] *

- The goal MAP is targeted at **≥ 80 mmHg**

**Successful reversal of recurrent spinal cord ischemia following endovascular repair of a descending thoracic aortic aneurysm**

J J Appoo,[1] H D Gregory,[2] H D Toeg,[3] C A Prusinkiewicz,[2] W D T Kent,[1] A Ferland,[4] and D V Ha[2]

- MAP was maintained from **> 90 mmHg**

VARIABLE INSTITUTIONAL PROTOCOLS

# STANDARD OF CARE

- **VULNERABILITY TO SCI** seems to **PEAK AT 5 HOURS** post-op and **EXTENDS FOR THE FIRST 72 HOURS**
- During this time, especially during the first 24h, it is **IMPERATIVE** to keep **MAP** at **HIGH NORMAL LEVELS**
- In patients with **PREVIOUS KNOWN HYPERTENSION**:
  - MAP may need to be at **HIGHER LEVELS THAN NORMOTENSIVE PATIENTS**
  - Function – by means of motor evoked potentials or neurological examination - should be watched

# CONCLUSION

- **Blood pressure** and **cardiac function optimization** are important factors in SCI prevention during TAA repairs

- Successful prevention of SCI requires an **extensive multidisciplinary approach**

**Blood pressure and cardiac function optimization represent ONLY A PART OF IT !!**

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