

# TECHNIQUES FOR SPINAL CORD PROTECTION DURING TAAA REPAIR

VLADIMIR MAKALOSKI, FEBVS

DEPARTMENT FOR CARDIOVASCULAR SURGERY, UNIVERSITY HOSPITAL BERN, SWITZERLAND



# Disclosure

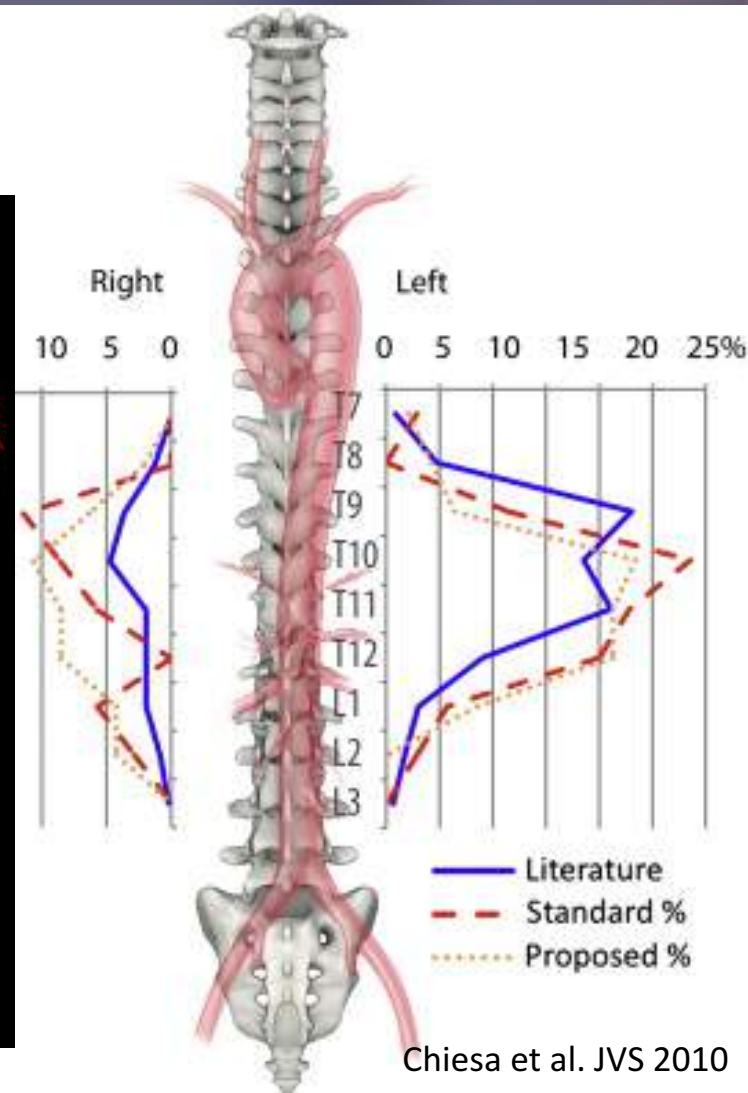
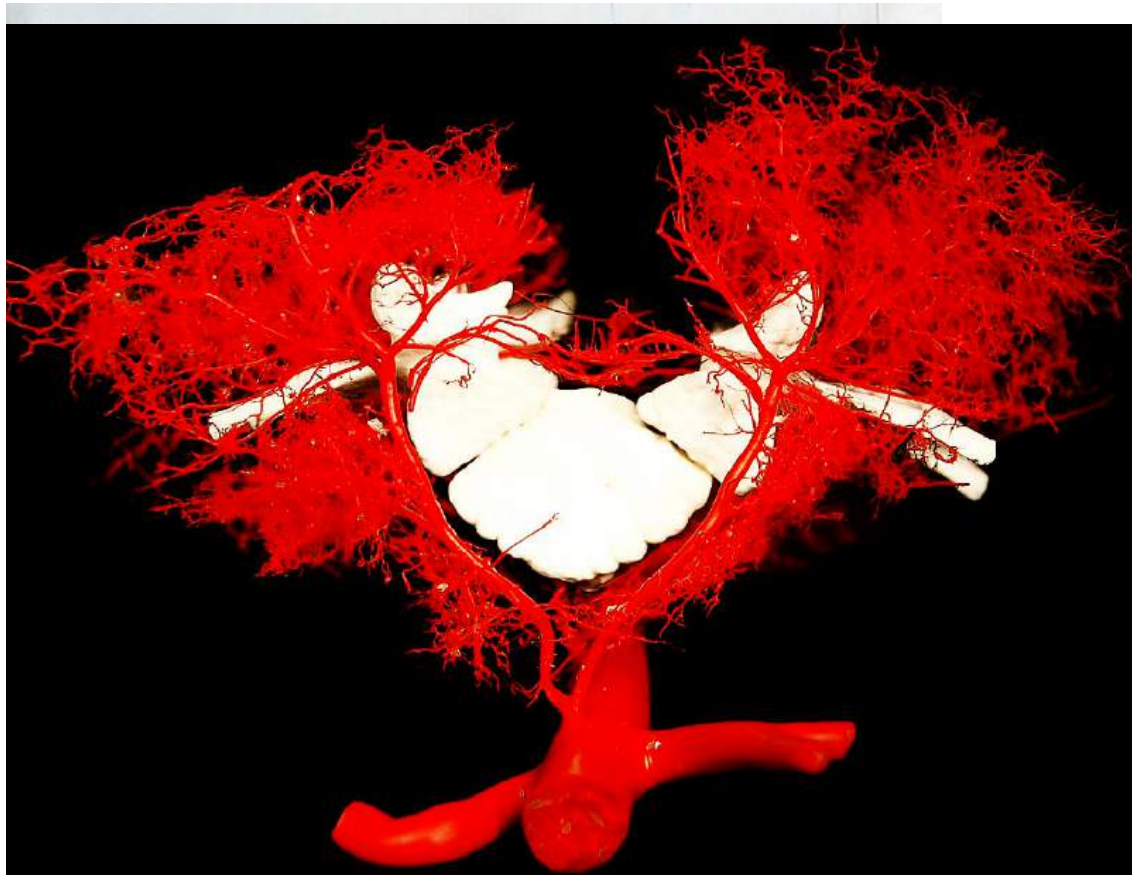
Speaker name:

Vladimir Makaloski

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)
  
- I do not have any potential conflict of interest

# Anatomy



# Implications of anatomical concept

## A. radicularis magna (A. Adamkiewicz)

Reimplantation of segmental artery

Collateral network (Etz 2010)

- intraspinal and peripheral collaterals
- compensation within 5 days

Preoperative occlusion of segmental arteries (PAPAartis)

4-region concept (Gottardi 2010)

- Subclavian artery
- Intercostal arteries
- Lumbar arteries
- Internal iliac arteries

Preserve subclavian and internal iliac arteries

# Preoperative strategy

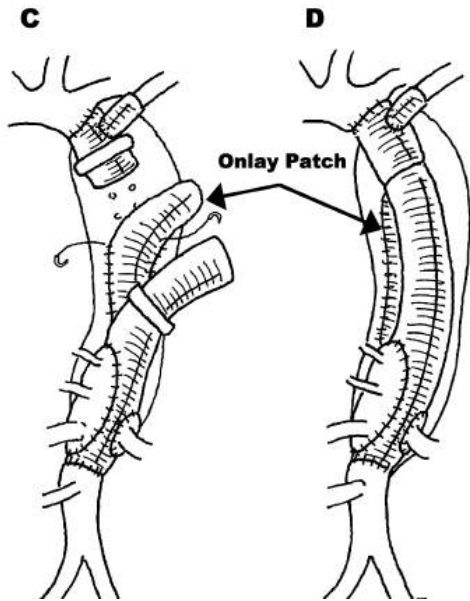
- CT-angiography
- MR-angiography of the segmental arteries
- Planing of the procedure (evtl. staging)
- Sequential embolisation of segmental arteries (PAPAartis)



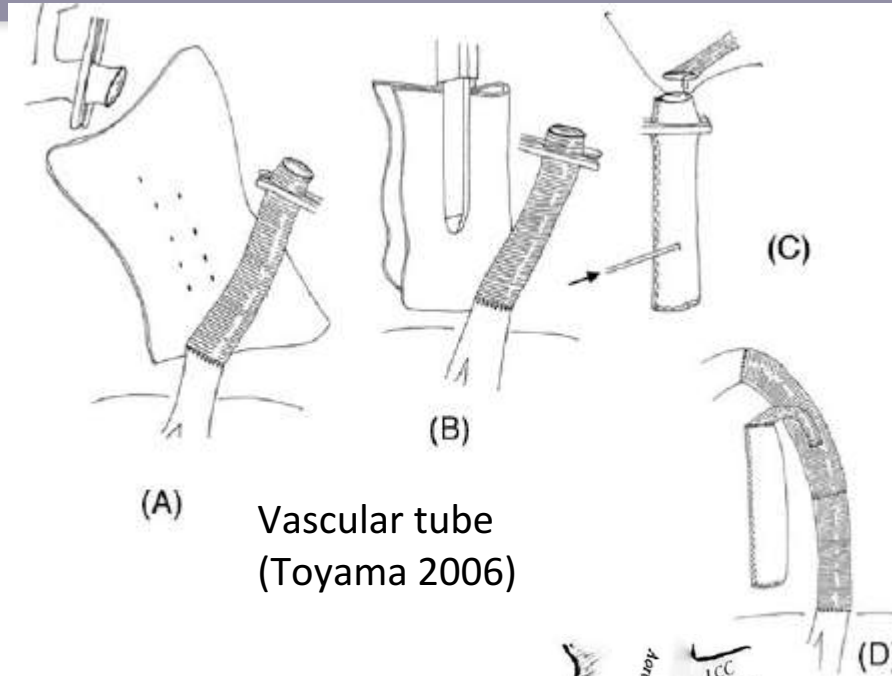
# Intraoperative strategy

	AHA 2010	ESC 2014	ESVS 2017
CSF-drainage	Class I (Level B)	Class I (Level B)	Class IIa (Level B)
Distal perfusion with left heart bypass	Class IIa (Level B)	Class IIa (Level C)	Class IIa (Level C)
Moderate systemic hypothermia	Class IIa (Level B)		Class IIb (Level C)
Neurophysiologic monitoring	Class IIb (Level B)		Class IIb (Level C)
Adjunctive techniques to improve tolerance	Class IIb (Level B)		

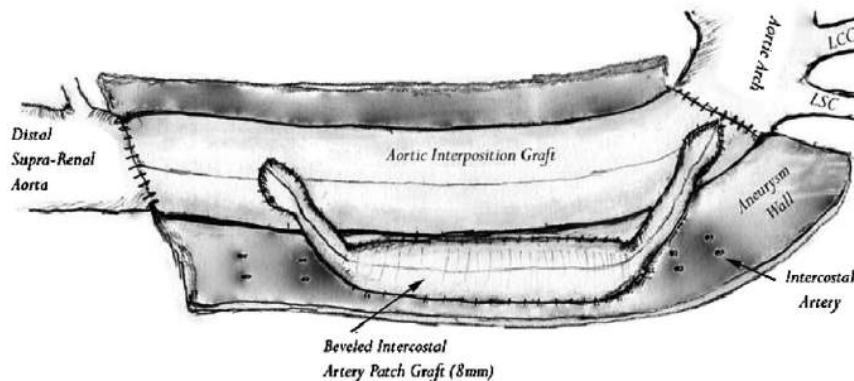
# Replantation techniques for the segmental arteries



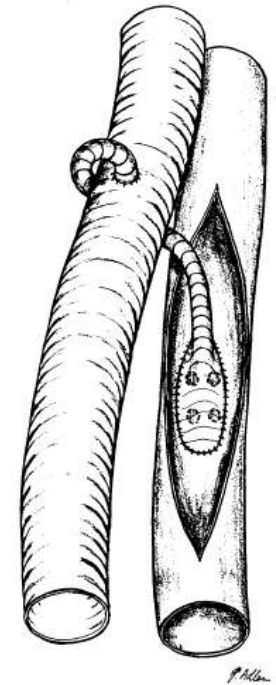
Complete onlay patch  
(Abe de Anda 2005)



Vascular tube  
(Toyama 2006)



Parallel graft (Woo 2007)



Cobrahead  
(Elefteriades 2010)

# Postoperative strategy

- Paraplegia prevention protocol
- Maintain spinal cord perfusion pressure
- Optimize cardiac function (MAP ≥ 80mmHg)

$$\text{SCPP} = \frac{(\text{HR} \times \text{SV}) \times \text{SVR}}{\text{MAP}} - \text{CSFP}$$

The perfusion pressure required to prevent ischaemia.

Qualifying factors:

- Autoregulation / patency of the collateral network
- Metabolic requirements (anaesthetic drugs, hypothermia)
- Time

↑ aortic clamp  
↑ cord ischaemia  
↓ csf drain  
or  
CVP  
(the higher of the two)

Lindsay et al. 2016



# Video case

- 65y female patient
- Open repair of aortic root/ascending aorta (type A-dissection 2003)
- Open arch repair due to aneurysm 2016 with elephant trunk technique
- Post-dissection type II TAAA aneurysm 60mm

# Preoperative imaging



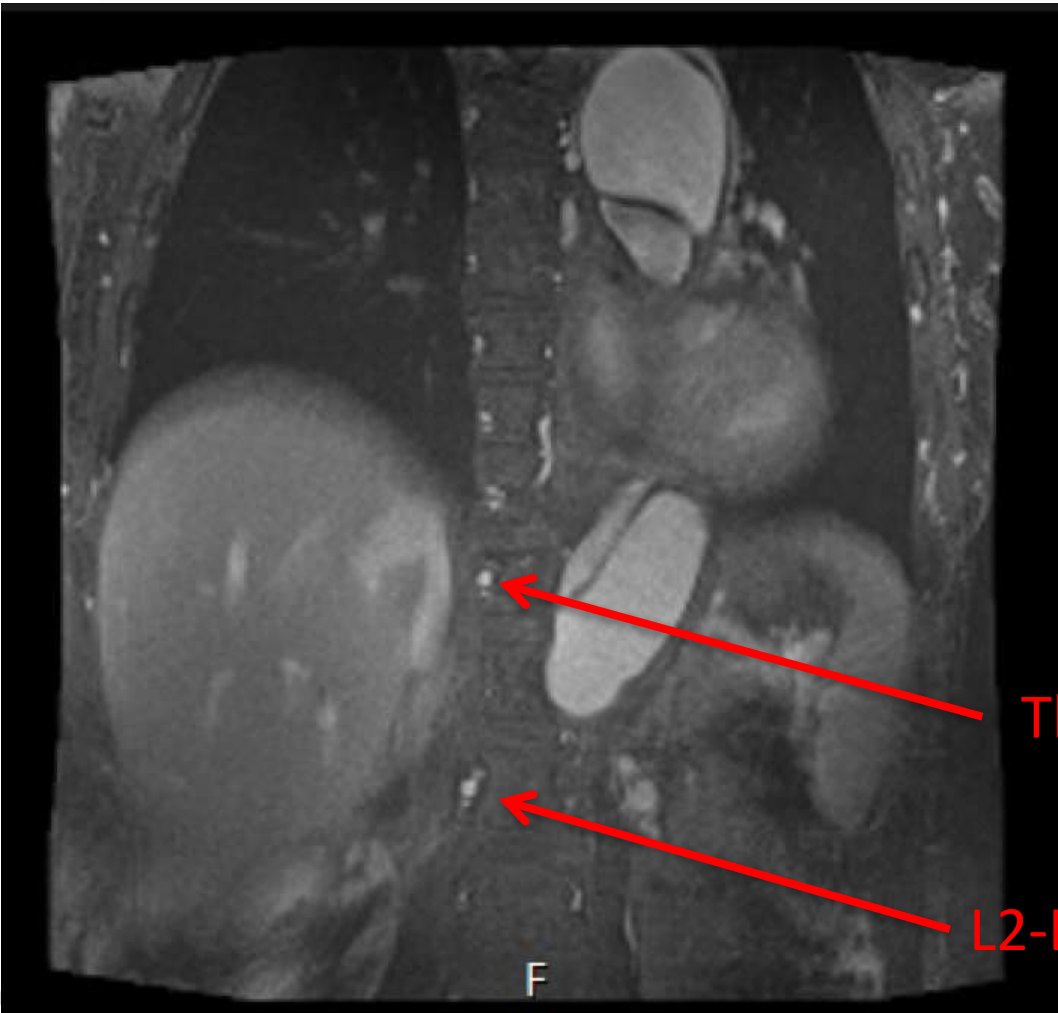
60mm

Elephant trunk  
prosthesis

38mm

25mm

# Preoperative imaging

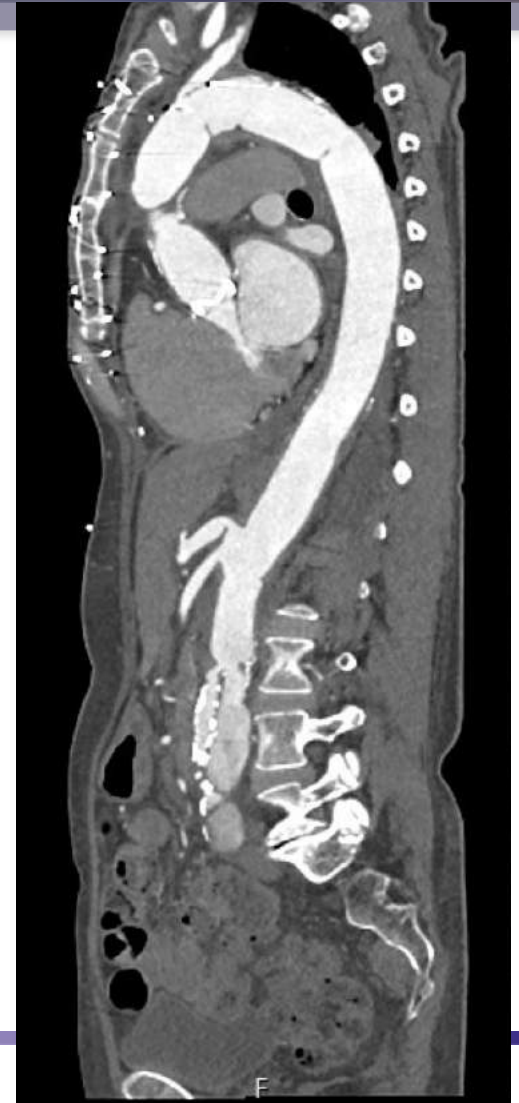


# Intraoperative strategy

- Distal anastomosis 4cm below the LRA
- Left heart bypass via side-branch/left lower pulmonary vein
- Balloon-occlusion of the segmental arteries
- Selective perfusion/replantation of the CT, SMA and RRA
- Remote MEP monitoring (Maastricht)
- Replantation of the segmental arteries at Th 11
- Rapid pacing, opening of the proximal descending aorta, mobilizing the elephant trunk graft and end-to-end anastomosis
- Replantation of the LRA
- Evtl. Replantation of other segmental arteries

# Postoperative course

- Uneventful
- No neurologic deficit
- Normal renal function
- Discharge on 14<sup>th</sup> day postoperative
- CT-angiography after 6Mt without issues



Thank you for your attention