Spinal cord injury prevention: what can we do to make sure patient walk out of the hospital

Blandine MAUREL, S.HAULON, M. DAVIS, TM. MASTRACCI

The Royal Free Hospital NHS Foundation Trust, London, UK
University Hospital Centre, Lille, France

20TH INTERNATIONAL EXPERTS SYMPOSIUM
CRITICAL ISSUES
in aortic endografting 2016
www.critical-issues-congress.com

Disclosures

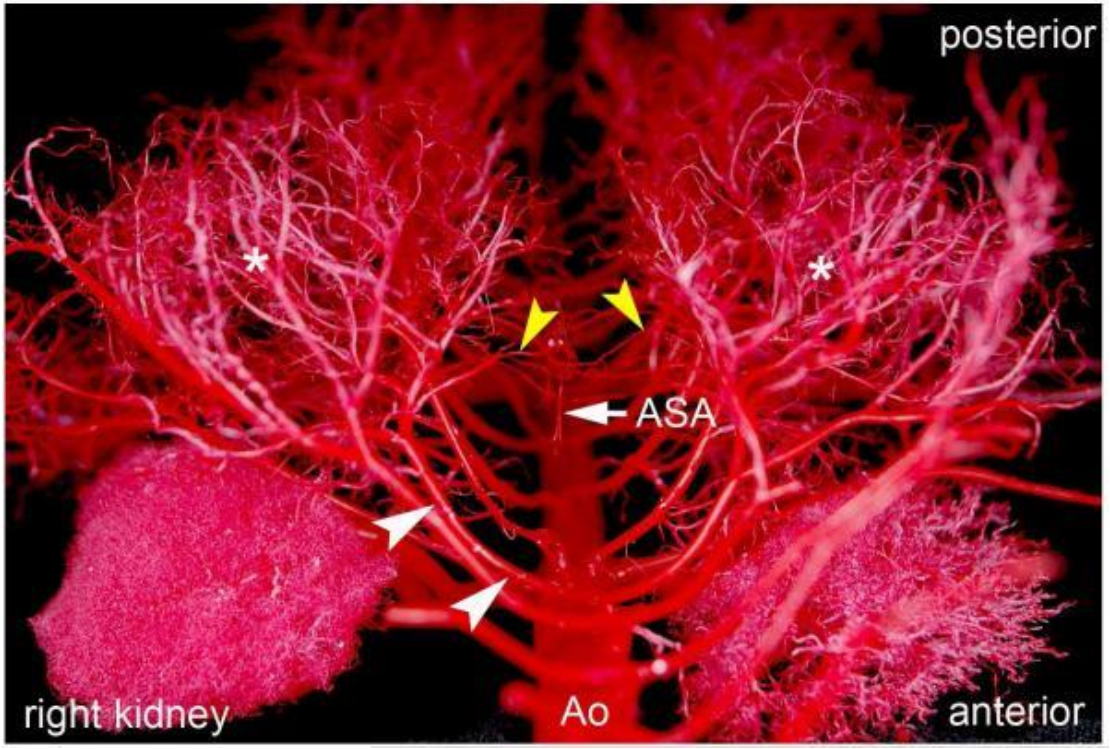
- S Haulon is consultant for GE Healthcare & Cook Medical
- TM Mastracci is consultant for Cook Medical

SPINAL CORD ISCHEMIA

- **Thoracic and TAAA endo and open repairs**
- **Variable spinal cord protection protocols and inconsistent implementation**
- **Low survival rate of patients experiencing SCI without functional impairment** *(25% at 12 months)*

Wong et al. JVS 2012
Desart et al. JVS 2013

VASCULAR COLLATERAL NETWORK: NEW MEASURES FOR SPINAL CORD PRESERVATION



Etz CD et al. J Thorac Cardiovasc Surg. 2011 Apr;141(4):1029-36

OPTIMIZATION OF SPINAL CORD PROTECTION

Technique :

early restoration of the blood flow to the pelvis and lower limbs

OPTIMIZATION OF SPINAL CORD PROTECTION

Staging procedures to encourage spinal cord preconditioning

OPTIMIZATION OF SPINAL CORD PROTECTION

Staging procedures

Staged endovascular repair of thoracoabdominal aortic aneurysms limits incidence and severity of spinal cord ischemia

Adrian O'Callaghan, MD, Tara M. Mastracci, MD, and Matthew J. Eagleton, MD, *Cleveland, Ohio*

	SCI
Total	22%
Single-stage repair	37%
Two-stage repair	11%
Unintentionally staged repair	14%

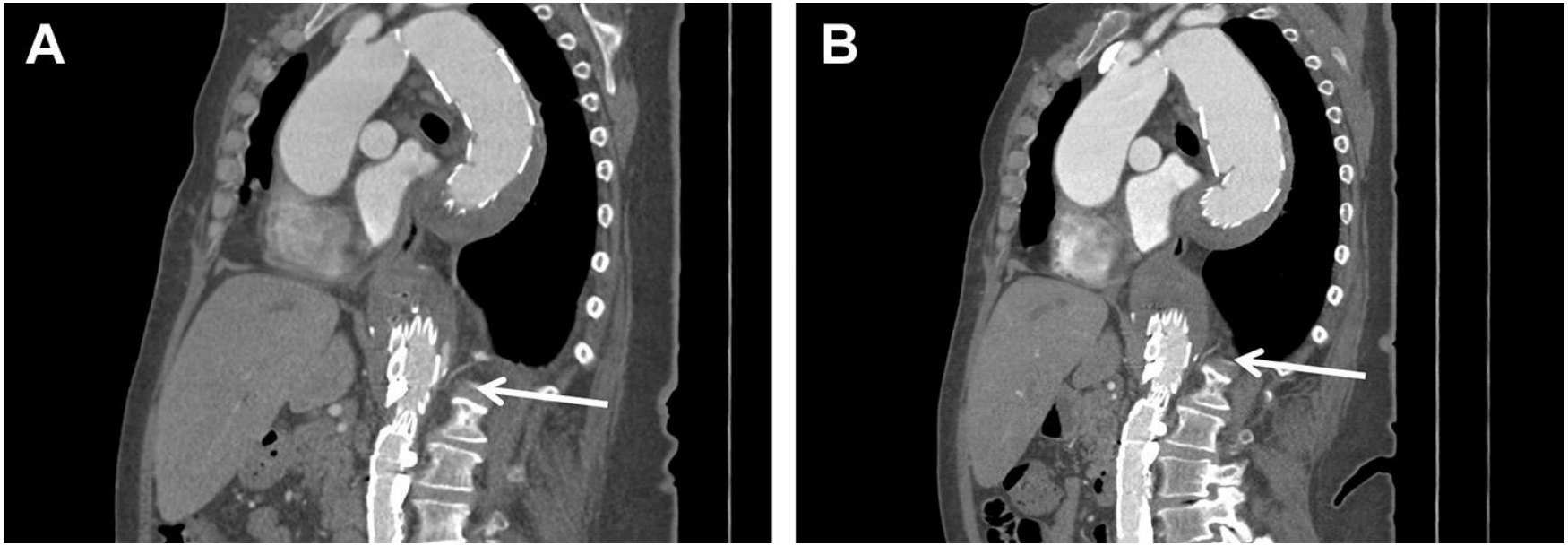
O'Callaghan et al. JVS 2015

OPTIMIZATION OF SPINAL CORD PROTECTION

Staging procedures

Temporary aneurysm sac perfusion :

- **Risk of embolic event in the target vessel**
- **Risk of rupture in the interim**



Kasprzak et al. EJVS 2014

OPTIMIZATION OF SPINAL CORD PROTECTION

Preservation of collateral network (left subclavian & internal iliac arteries)

OPTIMIZATION OF SPINAL CORD PROTECTION

Preservation of left subclavian and internal iliac arteries

Hypogastric and subclavian artery patency affects onset and recovery of spinal cord ischemia associated with aortic endografting

Matthew J. Eagleton, MD, Samir Shah, MD, Dan Petkosevek, BS, Tara M. Mastracci, MD, and Roy K. Greenberg, MD, *Cleveland, Ohio*

	Immediate SCI (n=15)	Delayed SCI (n=21)
≥ 1 collateral bed occluded	73%*	14%
≥ 2 collateral bed occluded	13%	5%

Eagleton et al. JVS 2014

OPTIMIZATION OF SPINAL CORD PROTECTION

Cerebrospinal fluid drainage

cut off : 40 mm of coverage above coeliac trunk

Twelve-year results of fenestrated endografts for juxtarenal and group IV thoracoabdominal aneurysms

Tara M. Mastracci, MD, Matthew J. Eagleton, MD, Yuki Kuramochi, BScN, Shona Bathurst, and Katherine Wolski, MPH, *Cleveland, Ohio*

	SCI	Free from SCI
Patients (n=610)	1.16%	
Mean length of coverage above CT	52 +/- 21 mm	33 +/- 21 mm

Mastracci et al. JVS 2015

OPTIMIZATION OF SPINAL CORD PROTECTION

MEDICAL CONSIDERATIONS / DEDICATED TEAM

Transfusions:

- Prothrombin Time > 50%
- Plasma fibrinogen > 2 g/l
- Platelets > 100 G/L
- Hb > 10 g/dl

Hemodynamic goals

- MAP 85-90 mmHg
- Central venous oxygen saturation >75%

Maurel et al. EJVS 2015

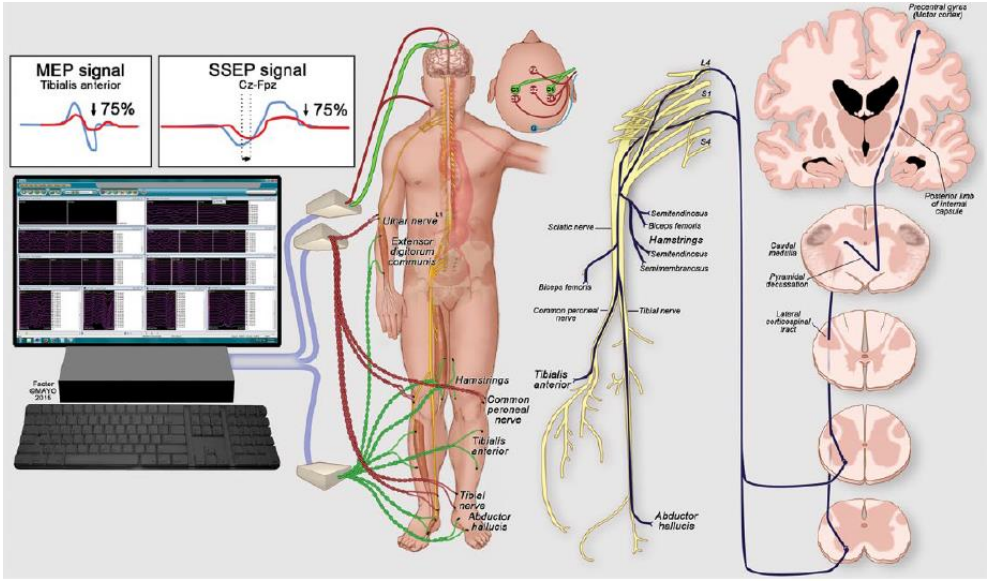
OPTIMIZATION OF SPINAL CORD PROTECTION

- **NEUROMONITORING (MEPs and SSEPs)**

if significant change : standardized protocol to optimize SC perfusion

1) *MAP up to 100 mmHg / CSF drain pressure from 10 to 5 or 0 mmH2O*
2) *Restoration blood flow in lower limbs*
3) *Procedure termination*

- **NIRS**



Banga et al. JEVT 2016

OPTIMIZATION OF SPINAL CORD PROTECTION

High volume centres

TRANS-ATLANTIC DEBATE

Thomas L. Forbes, MD, and Jean-Baptiste Ricco, MD, PhD, Section Editors

Debate: Whether fenestrated endografts should be limited to a small number of specialized centers

Stéphan Haulon, MD, PhD,[a] David Barillà, MD,[a] Mark Tyrrell, MD,[b] Nikolaos Tsilimparis, MD,[c] and Joseph J. Ricotta II, MD, MS,[c] *Lille, France; London, United Kingdom; and Atlanta, Ga*

OUR SINGLE CENTRE EXPERIENCE OF TAAA ENDOVASCULAR REPAIR IN LILLE

Eur J Vasc Endovasc Surg (2015) 49, 248–254

Editor's Choice – The Impact of Early Pelvic and Lower Limb Reperfusion and Attentive Peri-operative Management on the Incidence of Spinal Cord Ischemia During Thoracoabdominal Aortic Aneurysm Endovascular Repair

B. Maurel [a], N. Delclaux [a], J. Sobocinski [a], A. Hertault [a], T. Martin-Gonzalez [a], M. Moussa [a], R. Spear [a], M. Le Roux [a], R. Azzaoui [a], M. Tyrrell [b], S. Haulon [a,*]

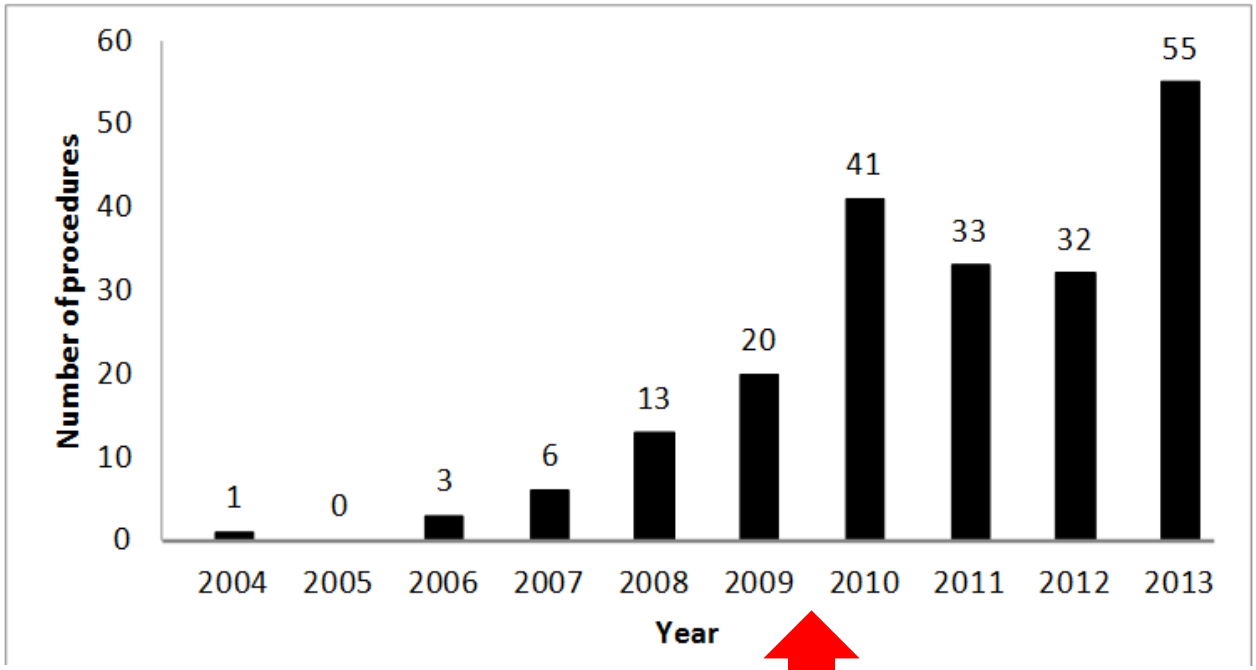
[a] Aortic Centre, Hôpital Cardiologique, CHRU de Lille, INSERM U1008, Université Lille Nord de France, 59037 Lille Cedex, France
[b] King's Health Partners, London, UK

WHAT THIS PAPER ADDS

This paper reports the impact of an optimized spinal cord protection strategy on spinal cord ischemia rates after endovascular thoracoabdominal aneurysm repair performed in a high volume center.

world class expertise aortic care

TAAA ENDOVASCULAR REPAIR : SINGLE CENTRE EXPERIENCE



EARLY experience (N=43)

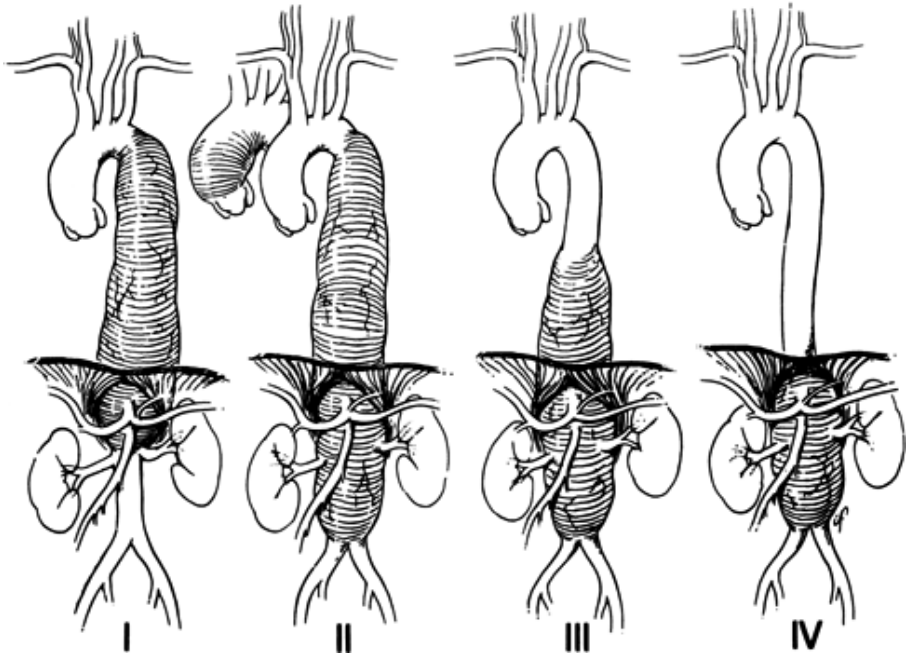
- low volume
- no dedicated medical protocol
- no stage repair
- CSF electively
- no early withdrawal of large iliac sheaths

LATE experience (N=161)

- high volume of patients >30/y
- dedicated ICU team
- Implementation of measures for preservation of spinal cord integrity

world class expertise aortic care

POPULATION



58% **42%**

N= 204 (43 early experience, 161 late experience)
Groups comparable (age/comorbidities)

RESULTS : 30 DAYS

	EARLY exp. (n=43)	LATE exp. (n=161)
Mortality	11.6%	5.6%
SCI	14%	1.2% *
Major Complications	35%	24%

RESULTS : 30 DAYS EXCLUDING TYPE IV

	EARLY exp. (n=24)	LATE exp. (n=95)
Mortality	21%	7.5%
SCI	25%	2% **
Major Complications	50%	28% *

RESULTS : PATIENTS EXPERIENCING SCI

	EARLY exp. (n=6)	LATE exp. (n=2)
TEVAR proximally	6/6	2/2
High volume blood loss	3/6	
IIA occlusion	2/6	1/2
MOF		1/2

LITERATURE REVIEW : TAAA ER

	N	SCI
Ferrer, 2016	84	9.2%
Eagleton, 2016	354	4% (perm.)
Katsargyris, 2015	218	10.4%
Dias, 2015	Early = 34	39%
	Late = 38	23%
		9.8% (perm.)
Lille experience, 2015	Early = 43	25%
	Late = 161	2%

CONCLUSION

To reduce SCI, we recommend :

- **A high annual volume**
- **An early restoration of blood flow to the pelvis**
- **A staged repair whenever possible**
- **A preservation of collateral network**
- **The use of spinal drain when coverage of more than 40mm above CT**
- **A dedicated ICU focusing on spinal cord protection**

THANK YOU