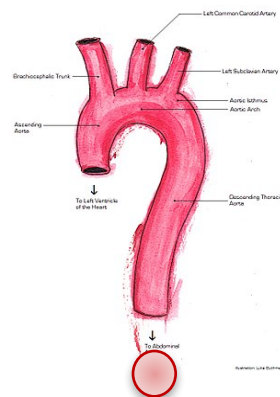


SHOULD WE ALWAYS REVASCULARIZE THE SUBCLAVIAN ARTERY IN THE ENDOVASCULAR TREATMENT OF THE AORTIC ARCH



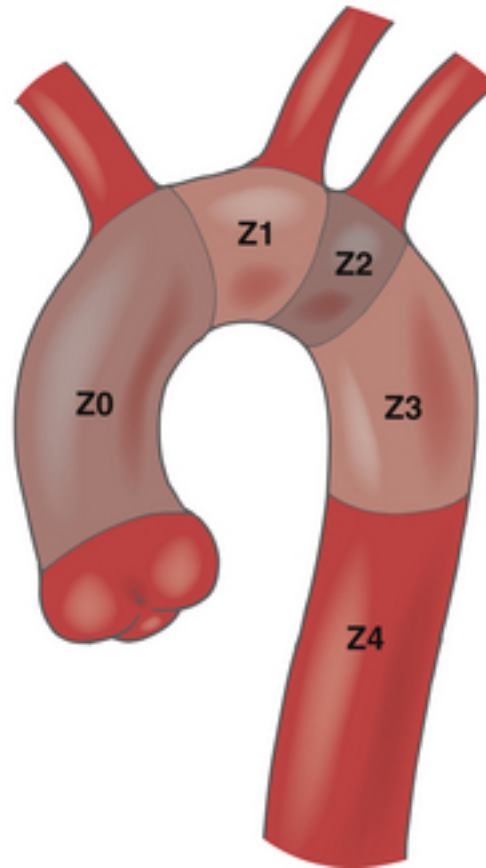
NOVAS FRONTEIRAS EM MEDICINA CARDIOVASCULAR

FEB 22-24 2019

PRAIA D'EL REY - ÓBIDOS

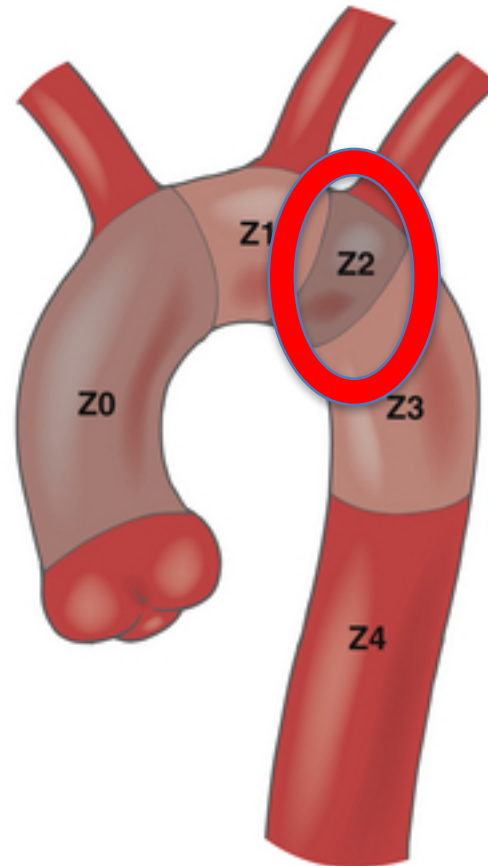
Frederico Bastos Gonçalves, MD, PhD, FEBVS

Aortic arch landing zones



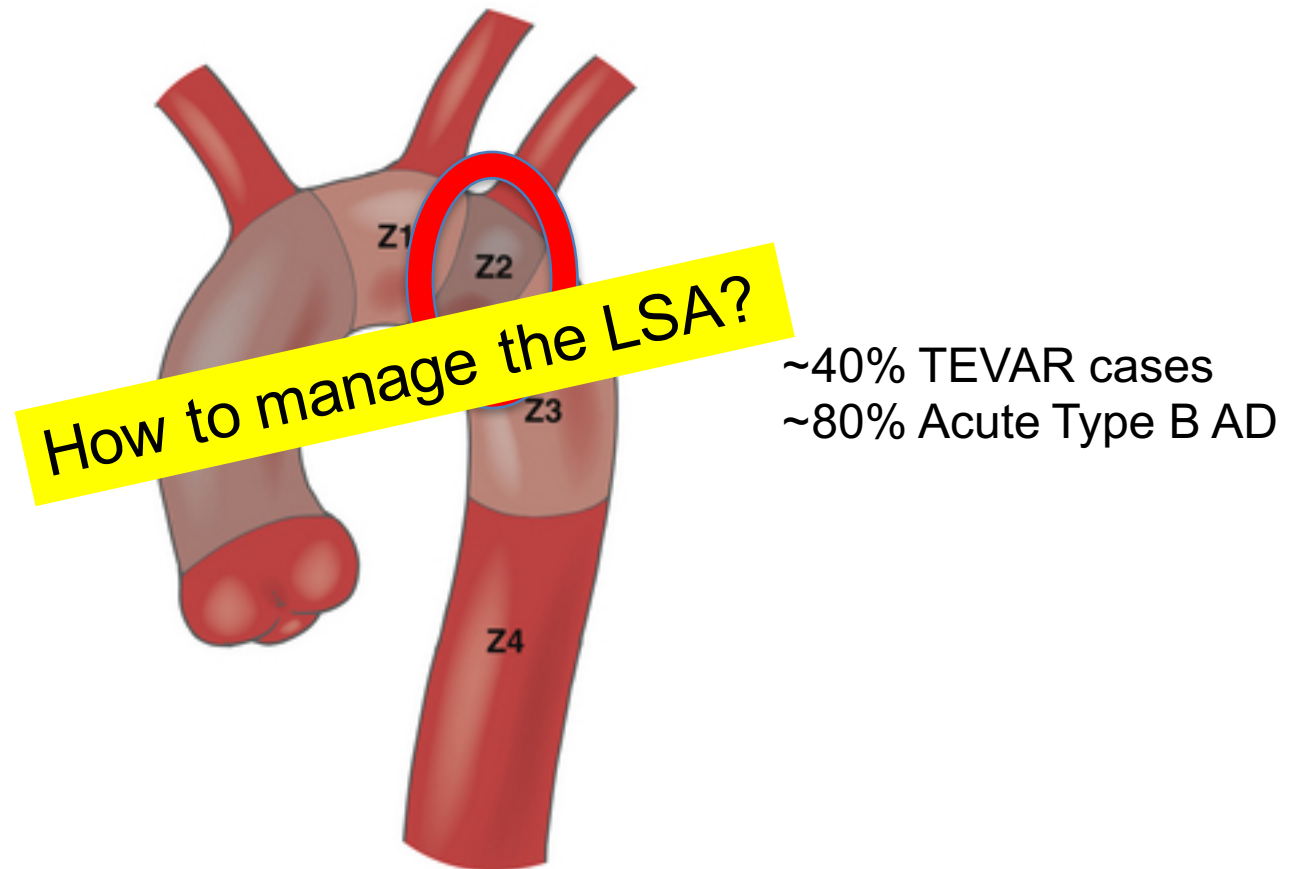
~40% TEVAR cases
~80% Acute Type B AD

Aortic arch landing zones



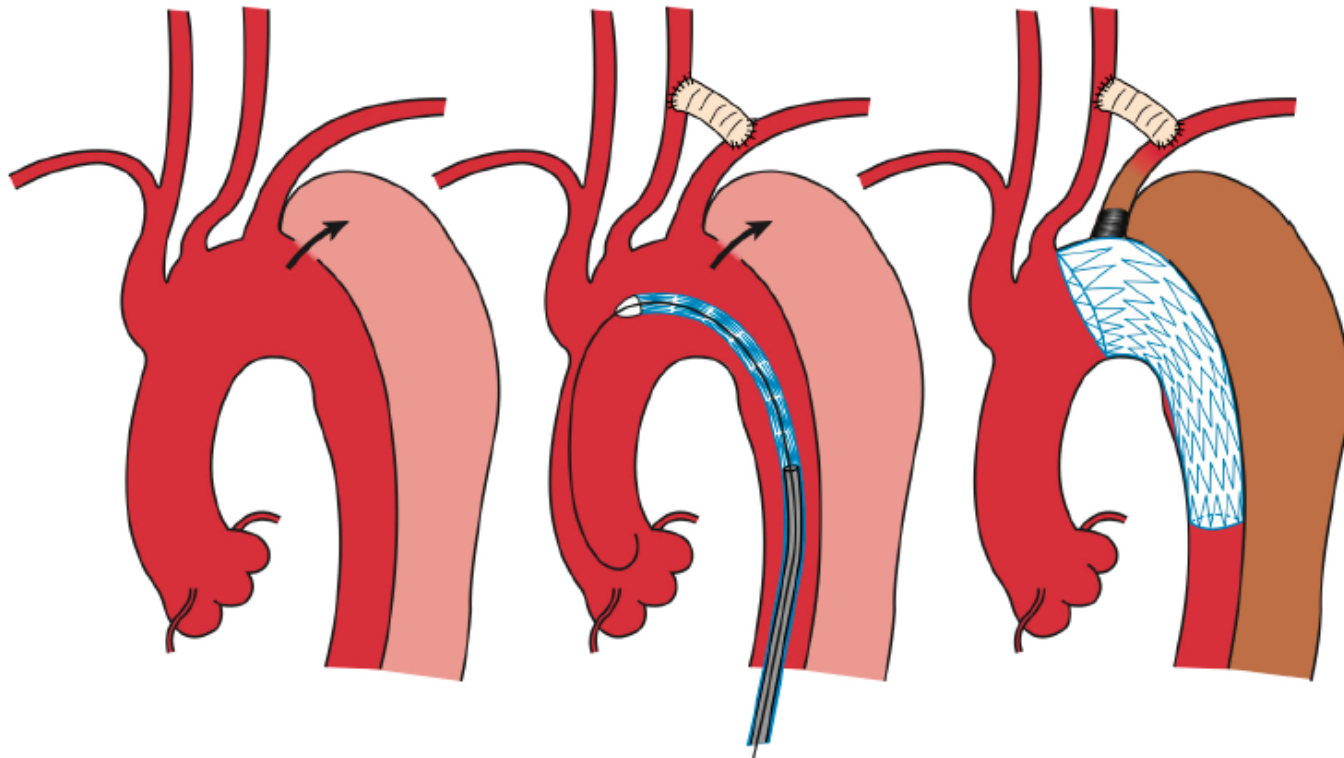
~40% TEVAR cases
~80% Acute Type B AD

Aortic arch landing zones



Optimal sealing in TEVAR >2cm

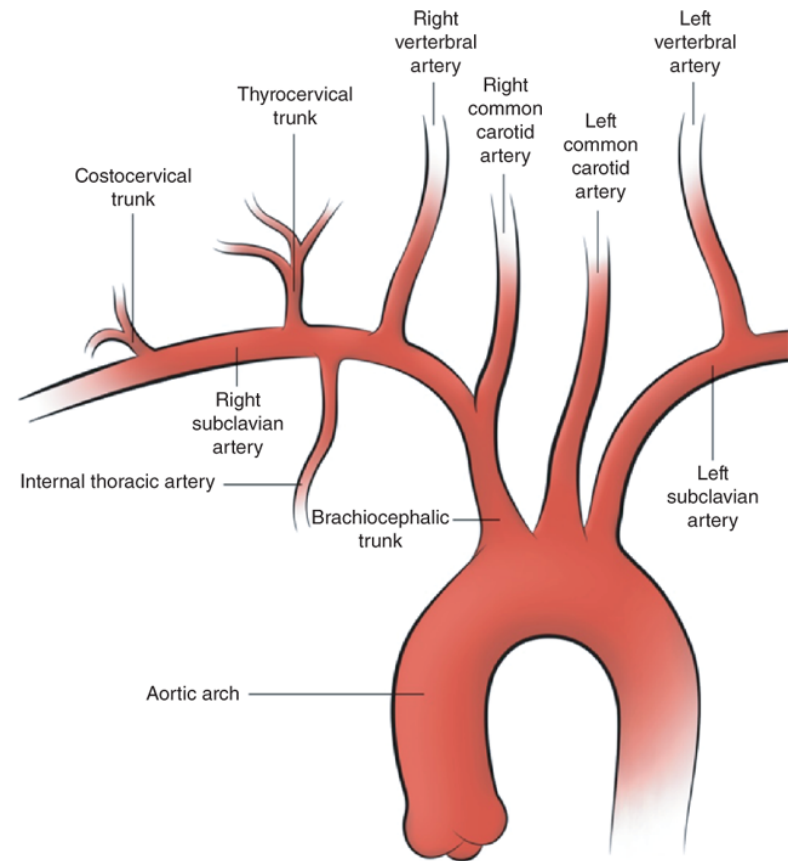
Eur Heart J 2014



LSA

Main blood supply for the left upper extremity

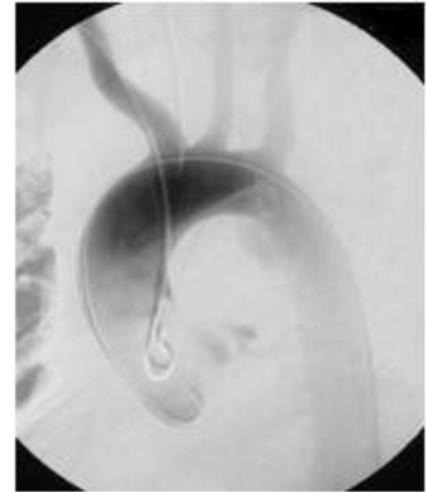
Blood supply to the brain via vertebral artery and collateral flow to spinal chord



Source: R. R. Baliga, Scott M. Lilly, William T. Abraham:
Color Atlas and Synopsis of Interventional Cardiology
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Potential consequences of LSA coverage

- Left upper limb mal-perfusion
- Posterior stroke
- Spinal chord Ischaemia



Potential consequences of LSA coverage

- Left upper limb malperfusion
 - Usually benign (mild claudication) in > 50%
 - Steal syndrome (rare)
 - Up to 5% with acute arm ischaemia

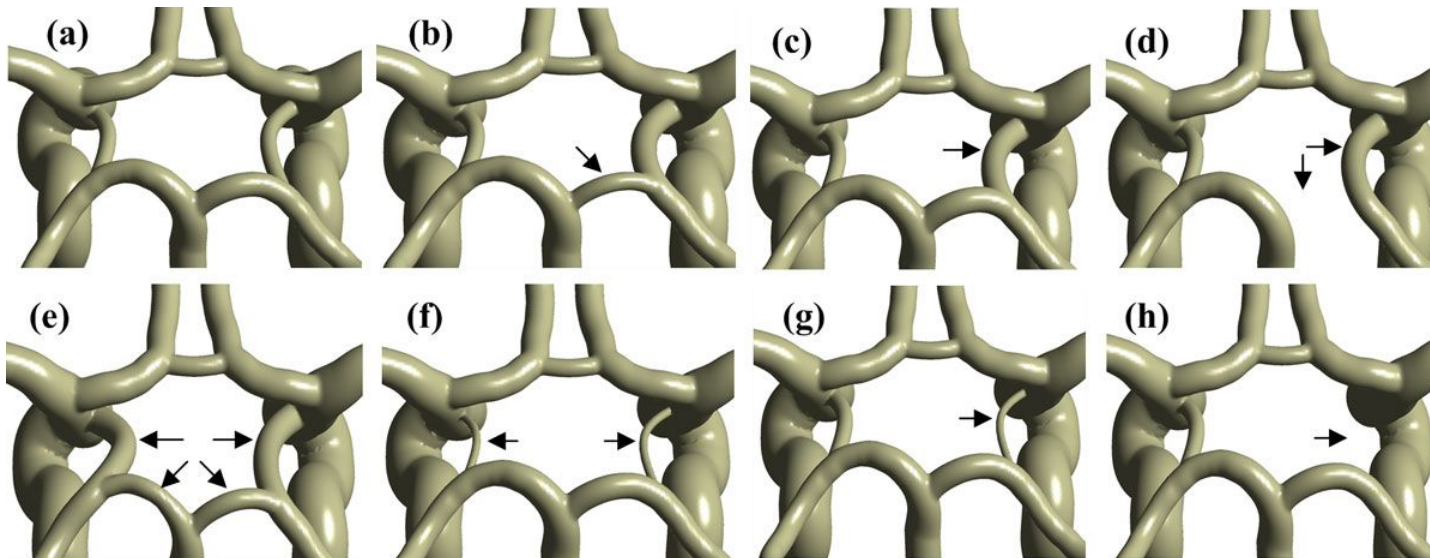
Saouti N, Hindori V, Morshuis WJ, Heijmen RH. Left subclavian artery revascularization as part of thoracic stent grafting. Eur J Cardiothorac Surg. 2015 Jan;47(1):120-5

Stroke and TEVAR

- 3-8% clinically evident stroke
- 16% in branched arch TEVAR
- >60% silent brain infarctions in TAVI

Stroke and TEVAR

- Small proportion of perioperative strokes are due to incomplete Circle of Willis

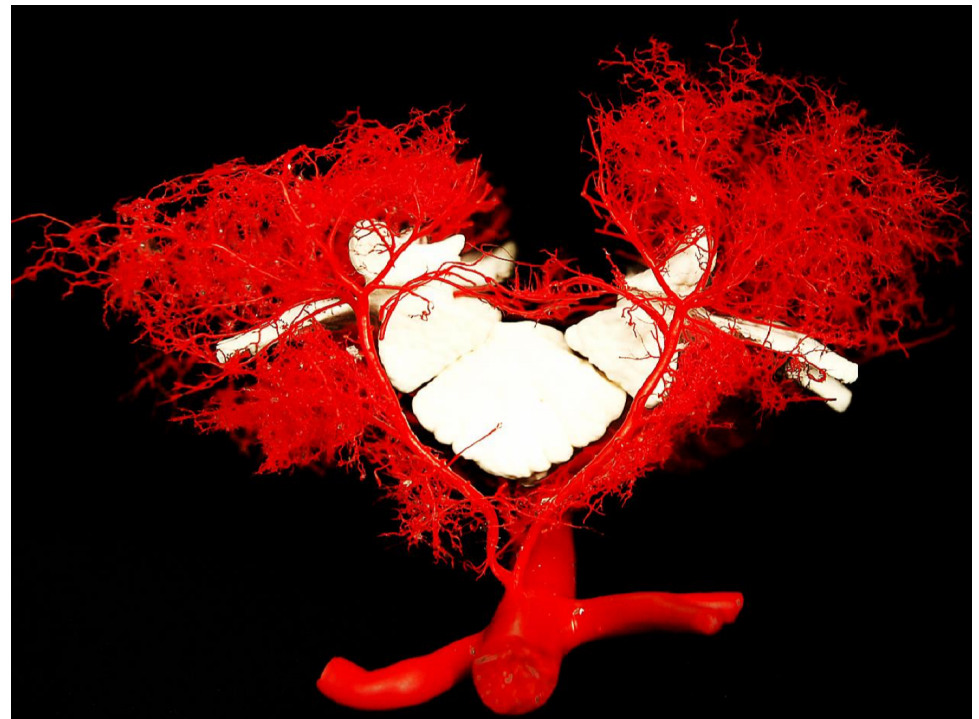
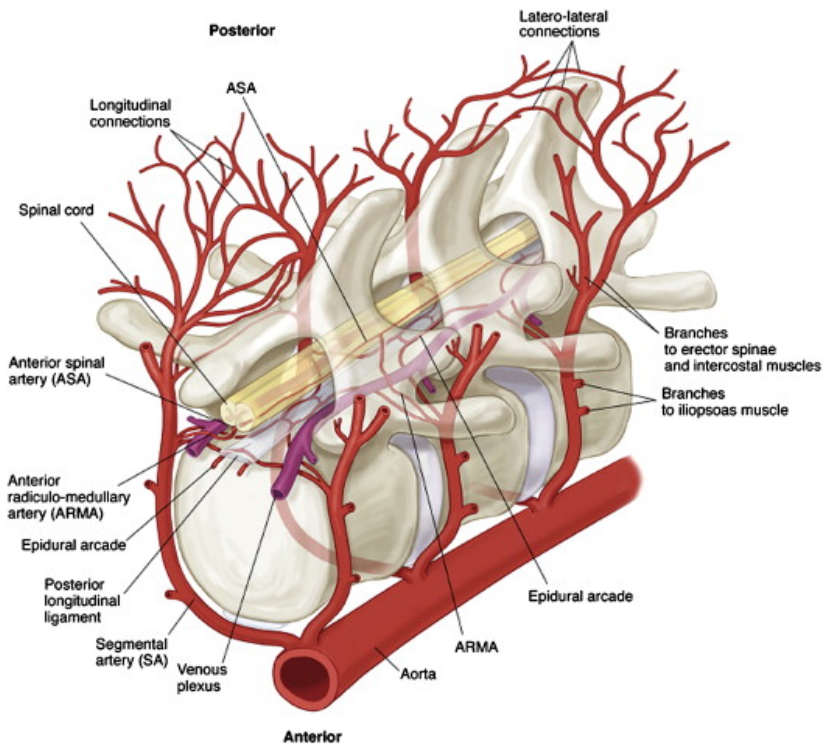


Up to 20% will depend on Left Vertebral Artery perfusion

LSA revasc reduces perioperative stroke rate from **7.8% to 5.4%**

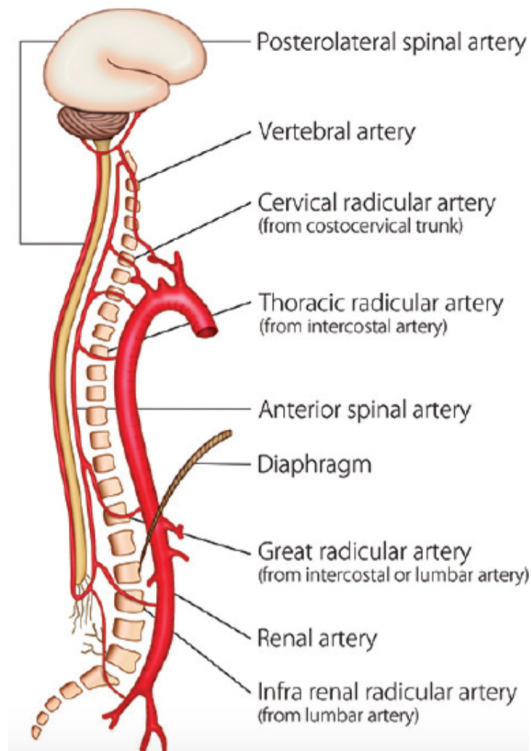
SCI and LSA coverage

Spinal cord perfusion - collaterals



SCI and LSA coverage

Spinal cord perfusion - collaterals



The evidence

Eur J Vasc Endovasc Surg (2018) 56, 644–651

REVIEW

Effect of Left Subclavian Artery Revascularisation in Thoracic Endovascular Aortic Repair: A Systematic Review and Meta-analysis

Qun Huang, Xiao M. Chen, Han Yang, Qiu N. Lin, Xiao Qin *

Department of Vascular Surgery, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

N=2600

All retrospective data

Study	Year	Country	Study design	LSA revascularisation procedures	Age (y) ^a	Patients (revascularisation/without revascularisation)	Types of repair	Types of pathology	Outcomes
Teixeira et al. ²	2017	USA	RC	Transposition, bypass, endo	NA	508 (299/209)	Elective, emergency	TAA, TAD, TAT	Stroke, SCI, mortality, paraplegia
Bradshaw et al. ³	2017	USA	RC	Transposition, bypass, endo	62 ± 15.9	96 (54/42)	Elective, emergency	TAA, TAD, TAU, TAH, TAT	Stroke, SCI
Zhang et al. ⁶	2015	China	RC	Bypass, endo	56.2 ± 9.6	109 (57/52)	Elective, emergency	TAD	Stroke, mortality, paraplegia
Zamor et al. ¹¹	2015	USA	RC	Transposition, bypass	59.9 (18–99)	80 (60/20)	Elective, emergency	TAT, TAD, TAP, TAT	Stroke, SCI, mortality
Contrella et al. ¹²	2015	USA	RC	Bypass	62 (13–91)	98 (44/54)	Elective, emergency	TAA, TAD, TAP, TAT, TAU	Stroke, SCI, mortality
Baba et al. ⁷	2015	Japan	RC	Bypass	75.6 ± 2.1	121 (12/109)	Elective	TAA	Stroke, paraplegia
Patterson et al. ¹³	2014	UK	PC	Bypass	70.9 (15–89)	453 (135/318)	Elective	TAA, TAD, TAT, TAH, TAU	Stroke, SCI, mortality, paraplegia
Maldonado et al. ⁴	2013	USA	RC	Transposition, bypass	67.8 (17–93)	385 (173/212)	Elective, emergency	TAA, TAD, TAU, TAT, TAC	Stroke, SCI, mortality
Melissano et al. ¹⁴	2012	Italy	RC	Transposition, bypass	68.8 ± 9.2	143 (75/68)	NR	TAD, TAA, TAH, TAU	Stroke
Lee et al. ¹⁵	2011	USA	RC	Bypass	62 ± 15	145 (32/113)	Elective, emergency	TAA, TAD	Stroke, mortality, paraplegia
Holt et al. ¹⁶	2010	UK	RC	Bypass	65 (33–86)	78 (35/43)	Elective, emergency	TAA	Stroke, mortality, paraplegia
Kotelis et al. ¹⁷	2009	Germany	RC	Transposition, bypass	64 (19–84)	88 (22/66)	Elective, emergency	TAA, TAD, TAT, TAU, TAP, TAH	Stroke, paraplegia
Preventza et al. ¹⁸	2008	USA	RC	Transposition, bypass	71(23–91)	71 (15/56)	NR	TAA, TAD, TAU	Stroke
Reece et al. ¹⁹	2007	USA	RC	Transposition, bypass	60.4 (29–82)	27 (7/20)	NR	TAA, TAT, TAD, TAP	Stroke
Buth et al. ²⁰	2007	Netherlands	PC	Transposition, bypass	63.2 (13–91)	159 (40/119)	Elective, emergency	TAA, TAD, TAT, TAP	Stroke, paraplegia
Peterson et al. ²¹	2006	USA	RC	Transposition, bypass	62 (22–85)	30 (22/8)	NR	TAA, TAD, TAT, TAP, TAU	Stroke

NOVA

MEDICAL SCHOOL
FACULDADE DE CIÊNCIAS MÉDICAS

The evidence

Eur J Vasc Endovasc Surg (2018) 56, 644–651

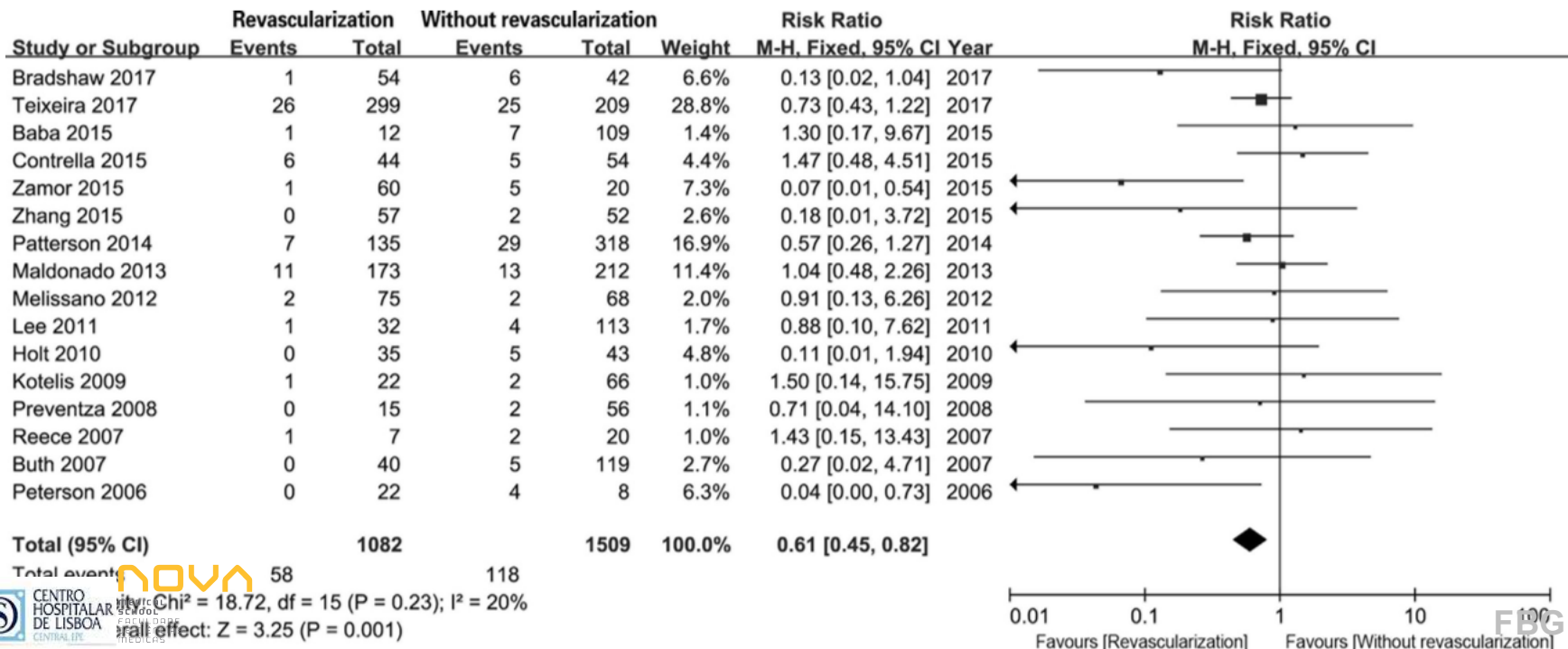
REVIEW

Effect of Left Subclavian Artery Revascularisation in Thoracic Endovascular Aortic Repair: A Systematic Review and Meta-analysis

Qun Huang, Xiao M. Chen, Han Yang, Qiu N. Lin, Xiao Qin *

Department of Vascular Surgery, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

Nearly half the risk of perioperative stroke



The evidence

Eur J Vasc Endovasc Surg (2018) 56, 644–651

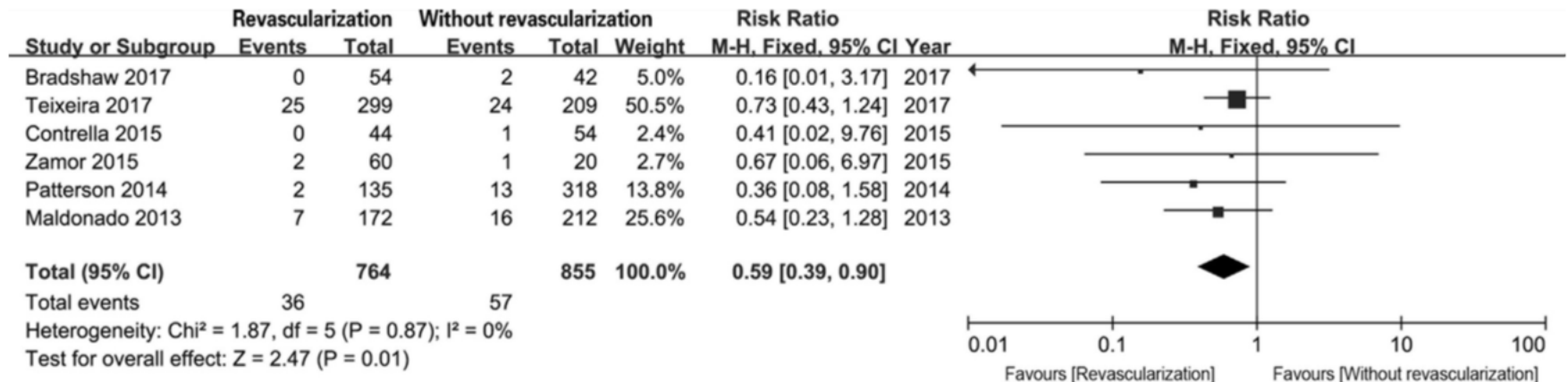
REVIEW

Effect of Left Subclavian Artery Revascularisation in Thoracic Endovascular Aortic Repair: A Systematic Review and Meta-analysis

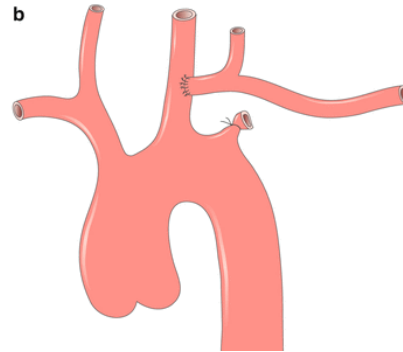
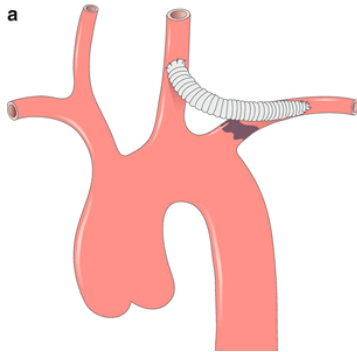
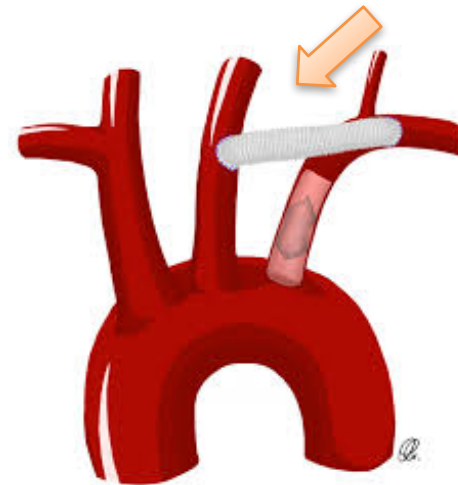
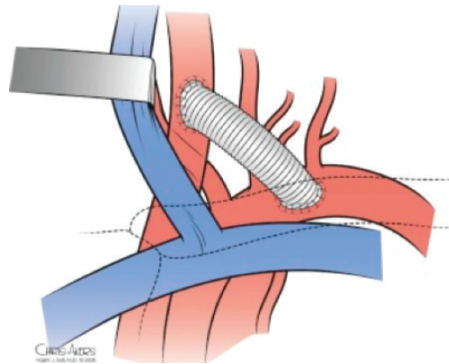
Qun Huang, Xiao M. Chen, Han Yang, Qiu N. Lin, Xiao Qin *

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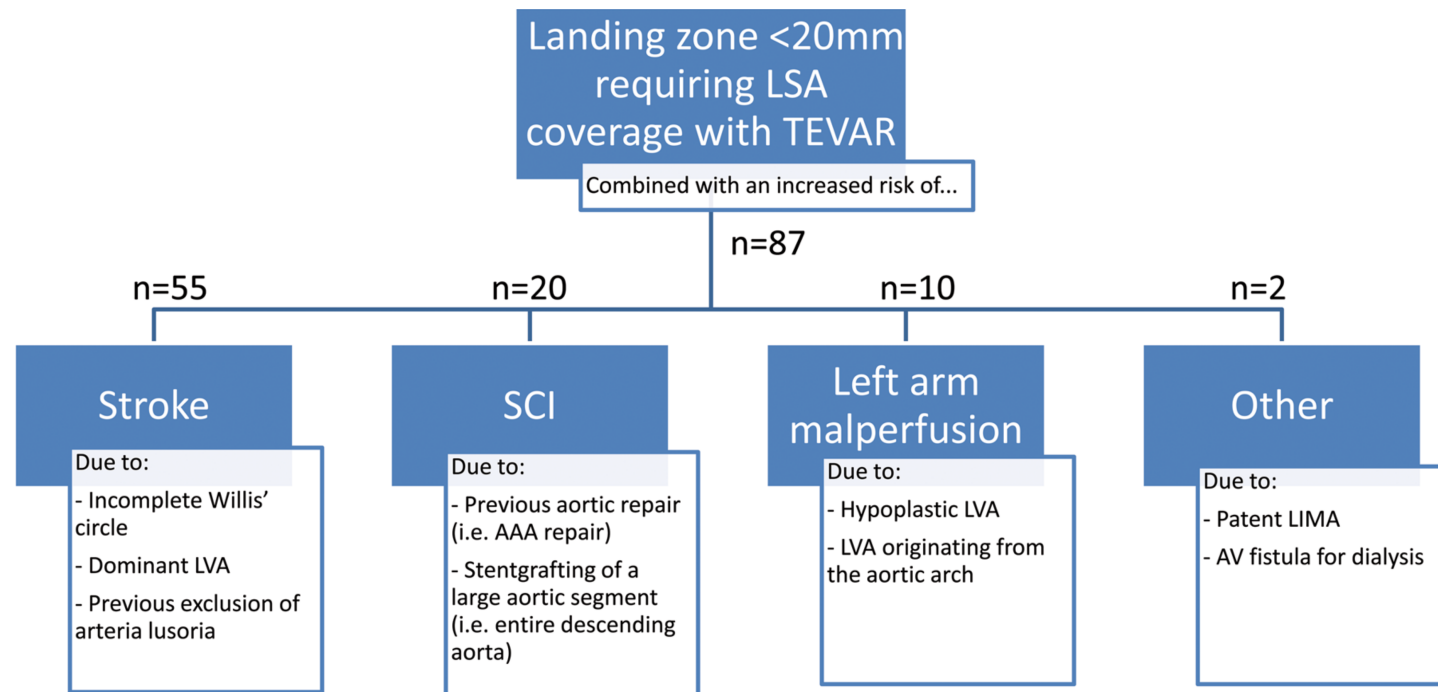
Nearly half the risk of SCI



Preemptive surgical revascularization of the LSA



Preemptive surgical revascularization of the LSA



- **Surgical left subclavian artery revascularization for thoracic aortic stent grafting: a single-centre experience in 101 patients** Emma van der Weijde Nabil Saouti Jan Albert Vos Selma C Tromp Robin H Heijmen *Interactive CardioVascular and Thoracic Surgery*, Volume 27, Issue 2, 1 August 2018, Pages 284–289

Preemptive surgical revascularization of the LSA

- Mortality 0%
- Stroke 2% (TEVAR related)
- Neurological complications
 - Recurrent nerve lesion 2%
 - Phrenic nerve lesion 2%
 - Horner Syndrome 3%
- Chyle 5%
- Bleeding 2%
- Occlusion 1%
- **Surgical left subclavian artery revascularization for thoracic aortic stent grafting: a single-centre experience in 101 patients** Emma van der Weijde Nabil Saouti Jan Albert Vos Selma C Tromp Robin H Heijmen *Interactive CardioVascular and Thoracic Surgery*, Volume 27, Issue 2, 1 August 2018, Pages 284–289

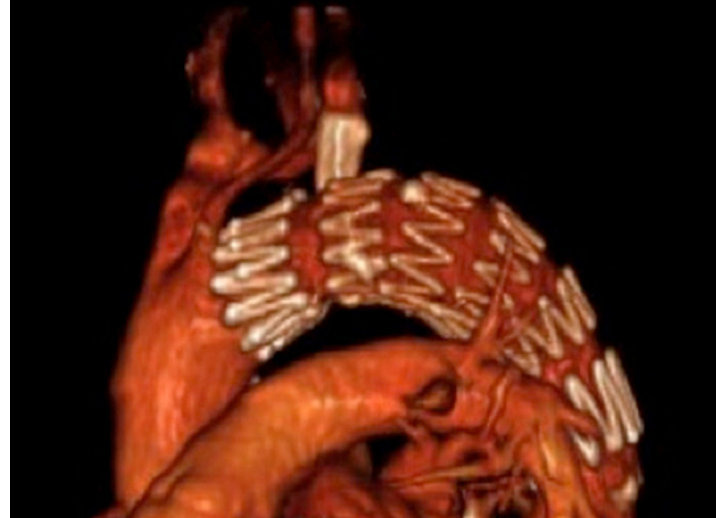
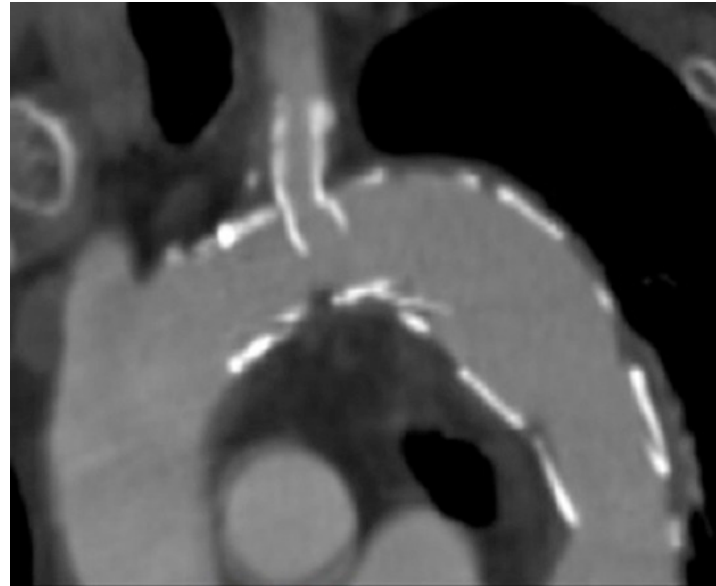
Endovascular solutions for LSA preservation

- Chimney



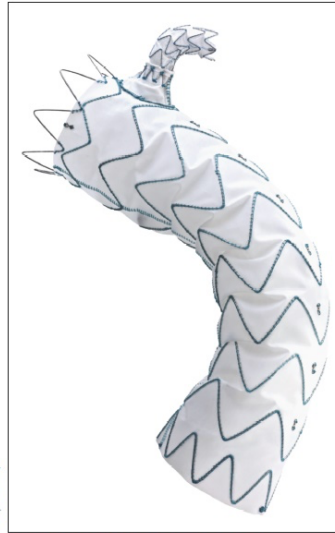
Endovascular solutions for LSA preservation

- Chimney
- In situ fenestration



Endovascular solutions for LSA preservation

- Chimney
- In situ fenestration
- Single branched



Courtesy of Medtronic, Inc.

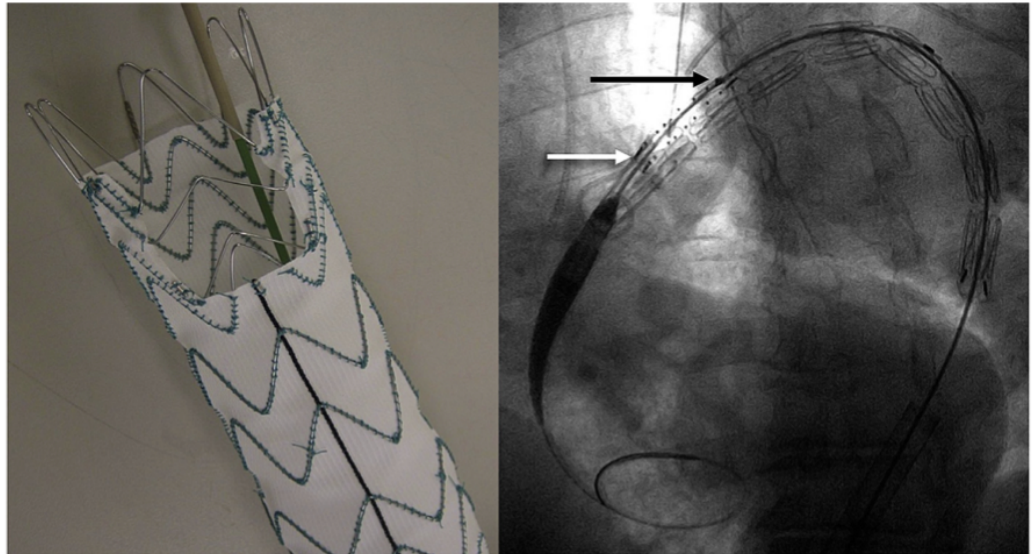
Figure 8. Valiant Mona LSA thoracic stent graft.



© 2016 W. L. Gore & Associates, Inc. Used with permission.

Endovascular solutions for LSA preservation

- Chimney
- In situ fenestration
- Single branched
- Scallop

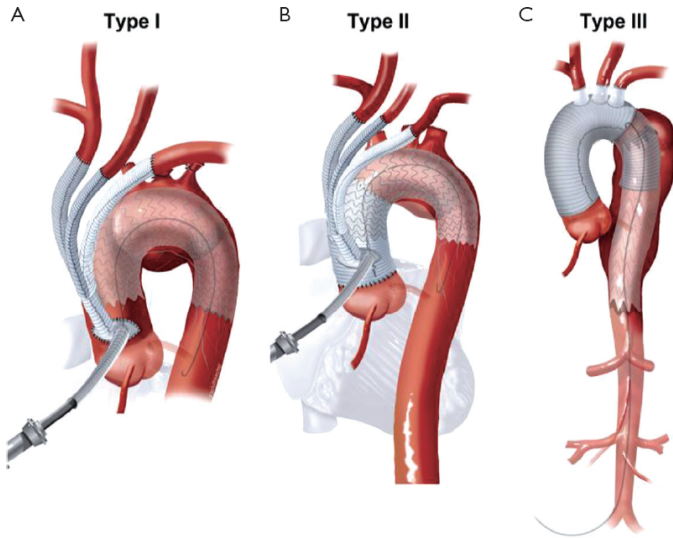


Endovascular solutions for LSA preservation

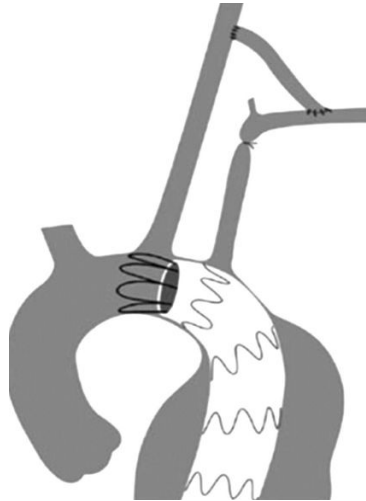
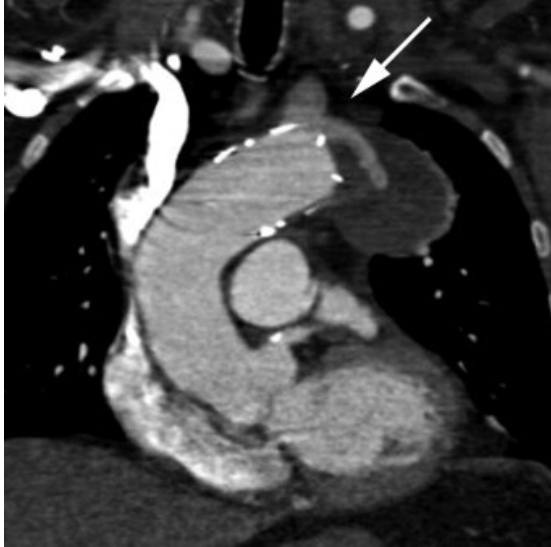
- Chimney
- In situ fenestration
- Single branched
- **Scallop**



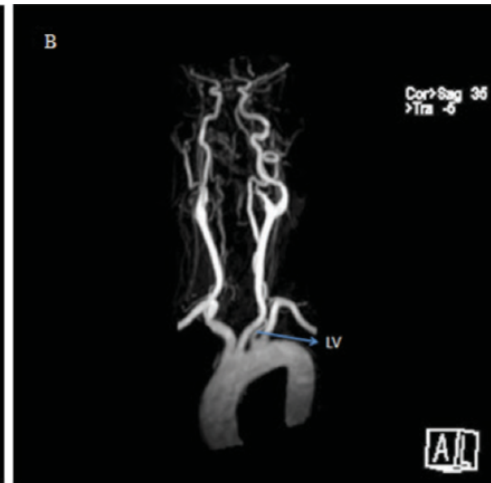
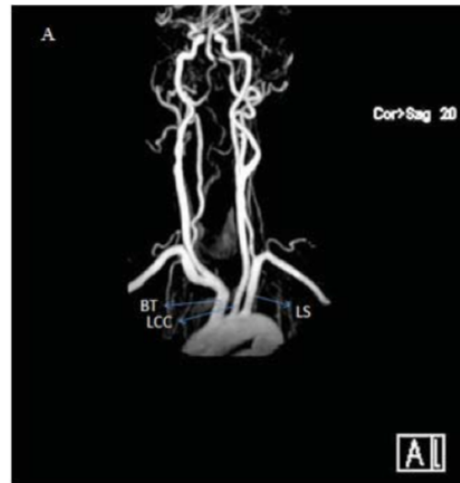
Total aortic arch debranching



Type II EL from LSA



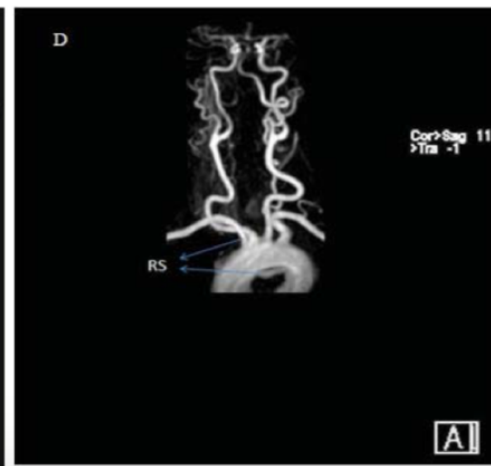
Anatomical variations of the aortic arch



3%

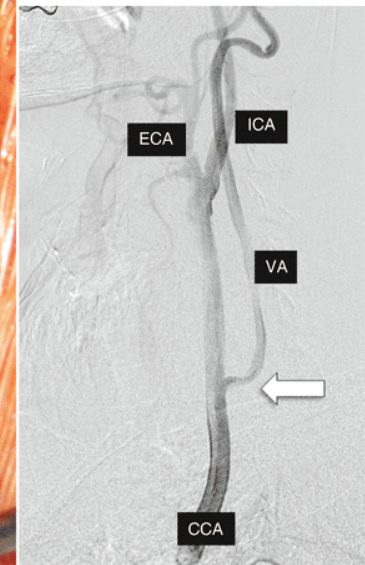
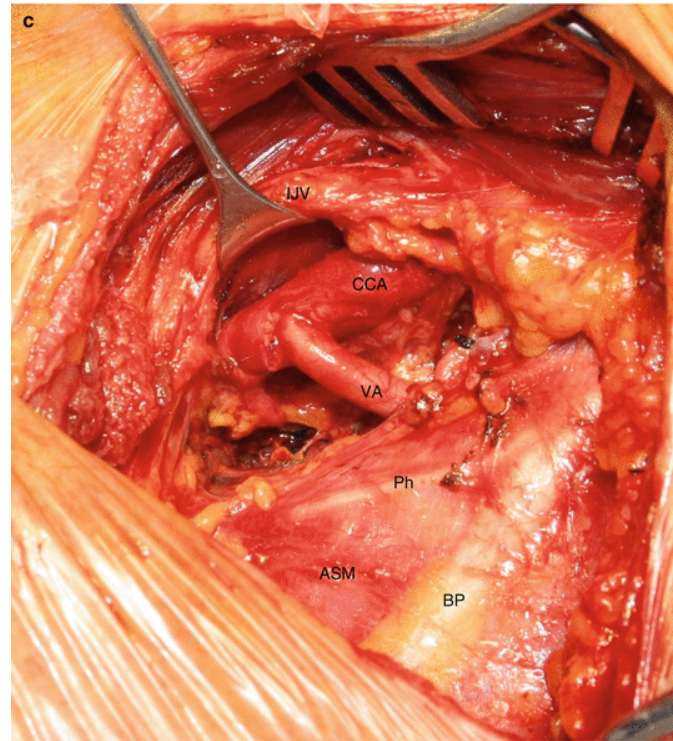
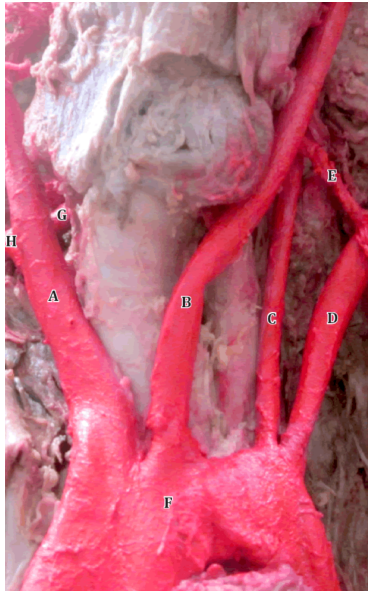


9%



1%

Anatomical variations of the aortic arch

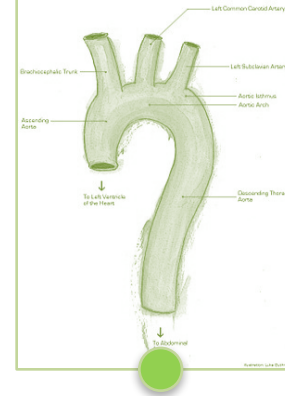


in: [Jalali Kondori B¹](#), [Asadi MH²](#), [Rahimian E³](#), [Tahsini MR³](#).

Anatomical Variations in Aortic Arch Branching Pattern [Arch Iran Med](#). 2016 Jan, 19(1):72-4.

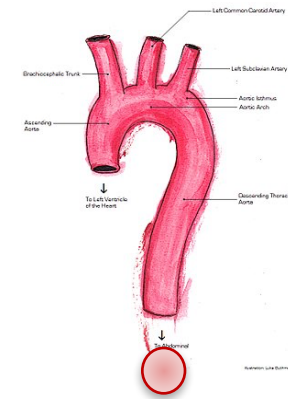
ERC 2019

When to *always* revascularize the LSA



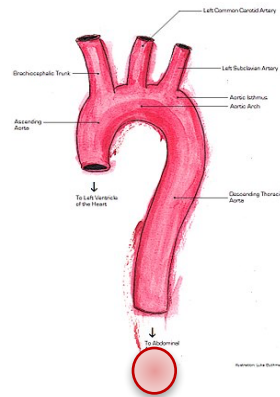
- LIMA / HD Fistula
- Dominant VA
- Incomplete COW
- Extensive coverage of SC collaterals
- Prior descending aortic surgery
- Absent SC collateralization (hypogastric)

When *not* to revascularize the LSA?



- Very limited aortic coverage
- Elderly, less active patient
- LVA is hypoplastic or occluded
- Very high surgical risk

THANK YOU



NOVAS FRONTEIRAS EM MEDICINA CARDIOVASCULAR

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PRAIA D'EL REY - ÓBIDOS

Frederico Bastos Gonçalves, MD, PhD, FEBVS