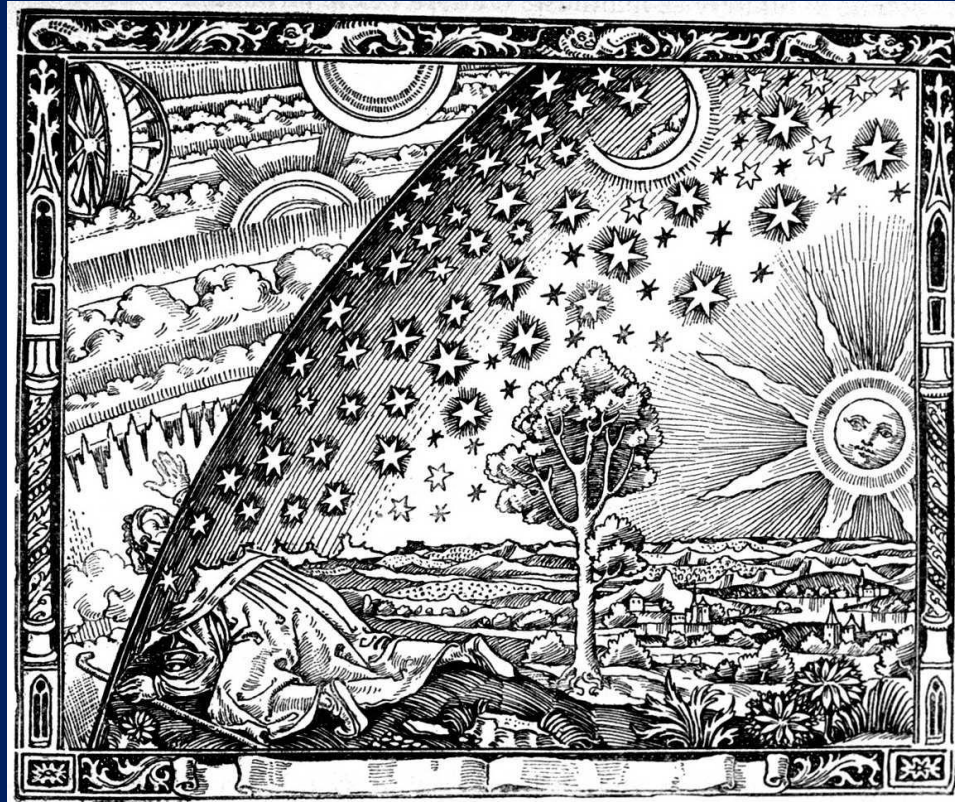


Carotid Cannulation in Aortic Surgery



Paul Urbanski



Carotid Cannulation
P. Urbanski, Bad Neustadt, Germany

Carotid Cannulation in Aortic Surgery

I do not have any potential conflict of interest

Paul Urbanski



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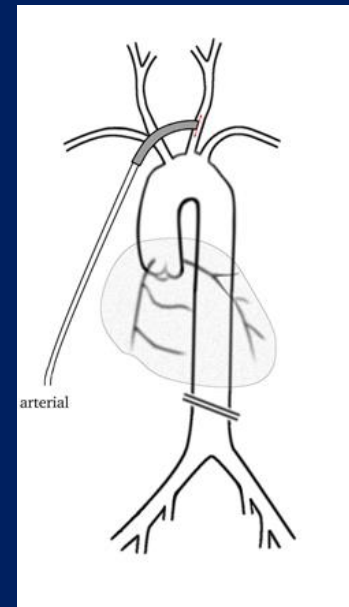
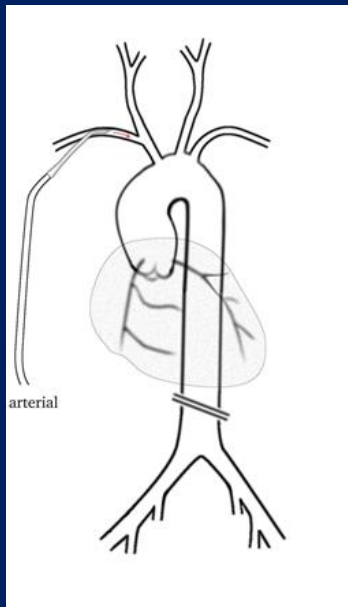
Factors impacting choice of arterial cannulation

- arterial wall pathology (arteriosclerosis, dissection etc.)
- flow direction (antegrade, retrograde)
- efficiency of perfusion
- technical challenge of surgical approach
- usefulness for cerebral perfusion
- risk of local injury (arterial wall, adjoining nerves and vessels)
- risk of infection



Cannulation of arch artery

- offers choice of several arteries
- provides antegrade perfusion during CPB
- no need of any interruption of cerebral perfusion
- no need of additional manipulation on arch arteries, at least on one side



Sabik J. et al. Axillary artery cannulation. J Thorac Cardiovasc Surg 1995; 109:885-91.

Tasdemir O. et al. Aortic arch repair with brachial artery perfusion. Ann Thorac Surg 2002; 73:1837-42.

Urbanski P. et al. Carotid artery cannulation in aortic surgery. J Thorac Cardiovasc Surg 2006; 132:1398-403



Cannulation strategy
P. Urbanski, Bad Neustadt, Germany

Supra-aortic cannulation

Brachiocephalic A.

- one side limitation
- approach through sternotomy
- very good efficiency of perfusion
- frequently involved into pathology with increased risk of vulnerability and embolism

Axillary A.

- one side limitation
- approach time consuming
- limited efficiency of perfusion
- fragile vessel with increased risk of vulnerability

Carotid A.

- **no side limitation**
- **fast approach**
- **good efficiency of perfusion**
- **very low vulnerability**



Arterial cannulation

in aortic arch surgery in Bad Neustadt (07/2002 – 11/2014)
n = 1000

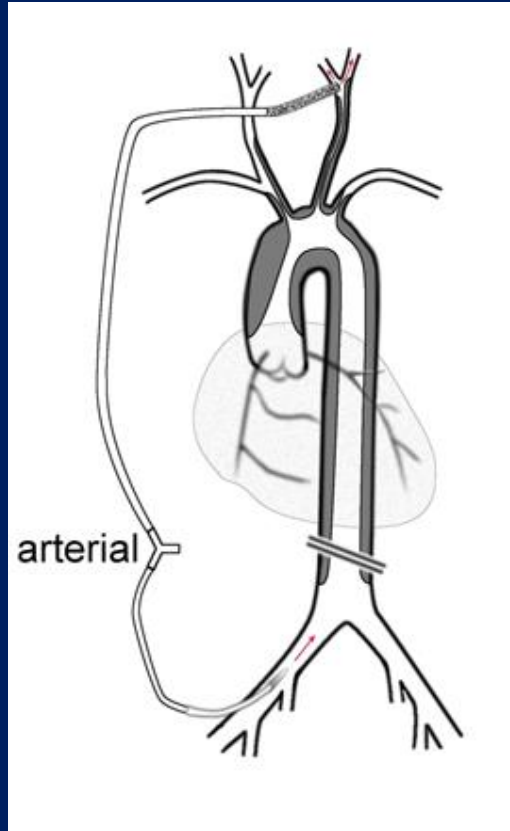
Aneurysm/atherosclerosis	798 (80%)
Aortic dissection	184 (18%)
Others (e.g.: inflammatory)	18 (2%)
Artery cannulated	
Right carotid	685 (68.5%)
Left carotid	180 (18.0%)
Innominate artery	94 (9.4%)
Carotid + femoral	37 (3.7%)
Innominate + left carotid	1 (0.1%)
Innominate + femoral	1 (0.1%)
Distal arch	2 (0.2%)
Flow (L/min)	4.7±0.5 (3.0-6.7)
Injury of artery cannulated	0



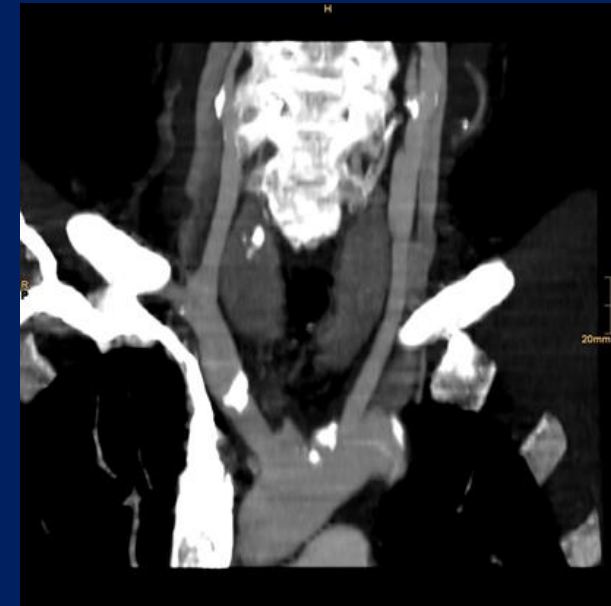
Double cannulation in aortic dissection with cerebral malperfusion



**Cerebral
malperfusion**



**Perfusion
strategy**

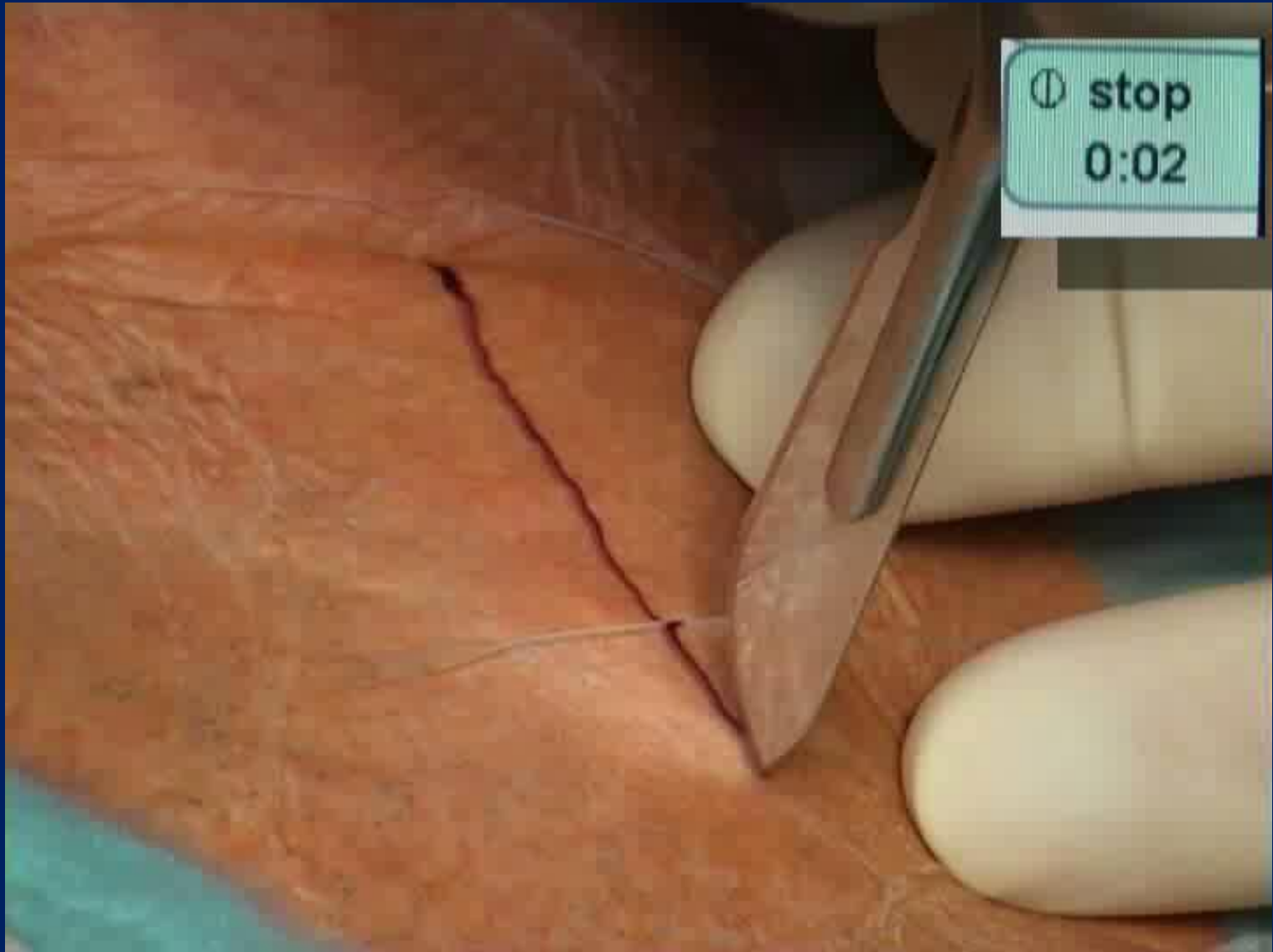


**Surgical
result**

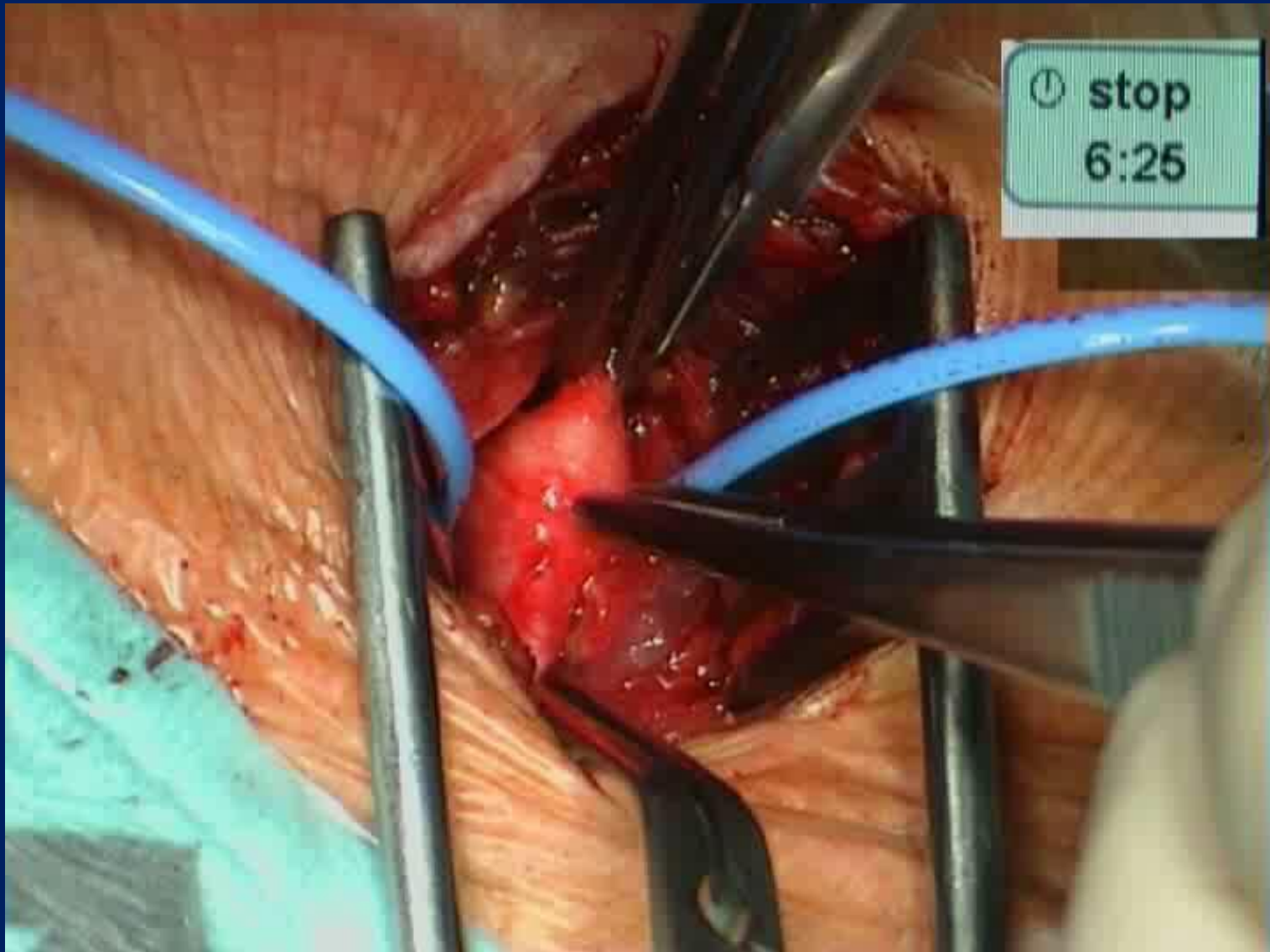
Urbanski P. Carotid artery cannulation in acute aortic dissection with malperfusion. J Thorac Cardiovasc Surg 2006; 131: 1398-9.



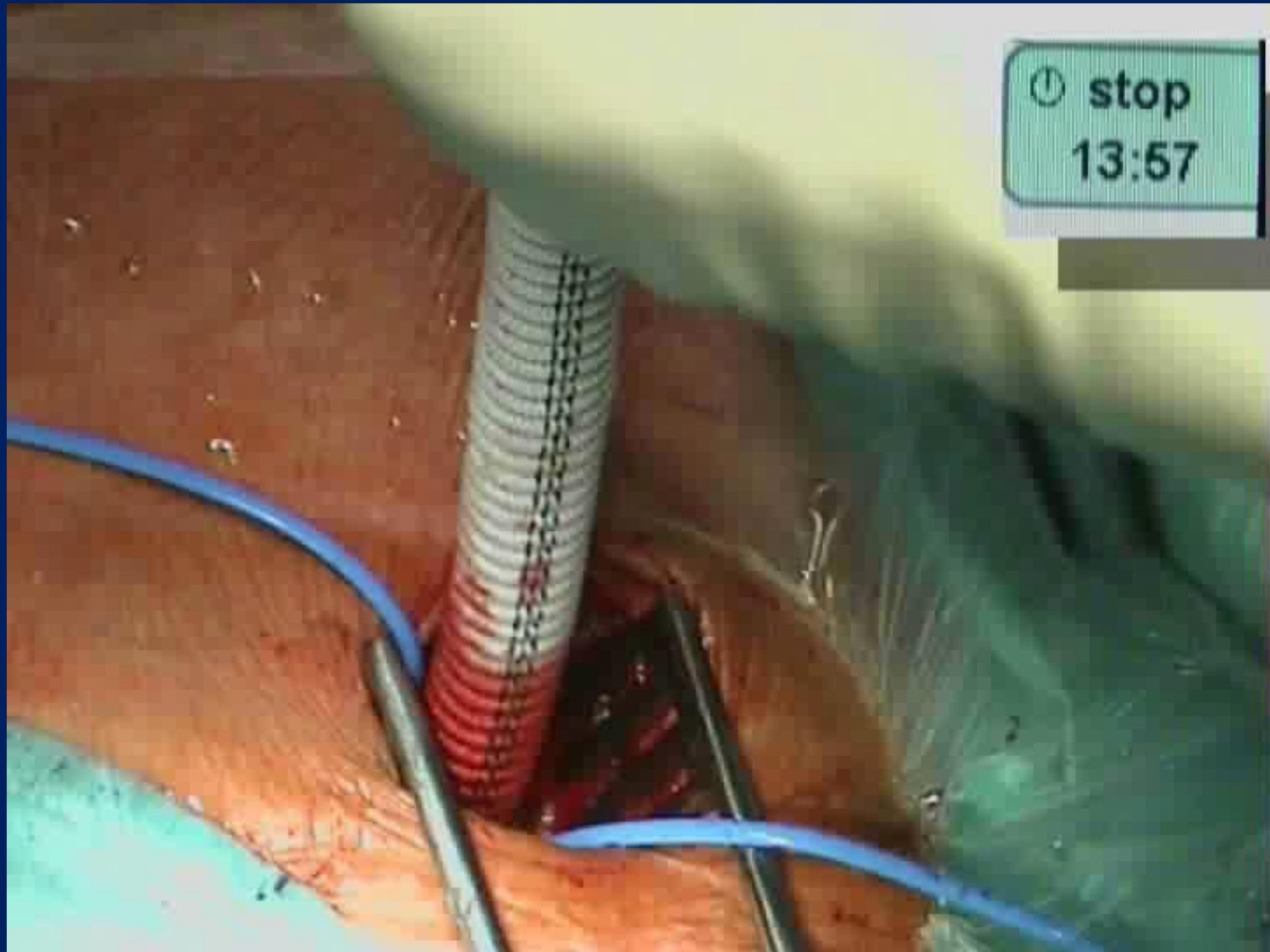
Cannulation strategy
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Cannulation strategy in complex aortic pathologies



Choice of cannulation site in acute aortic dissection involving arch arteries



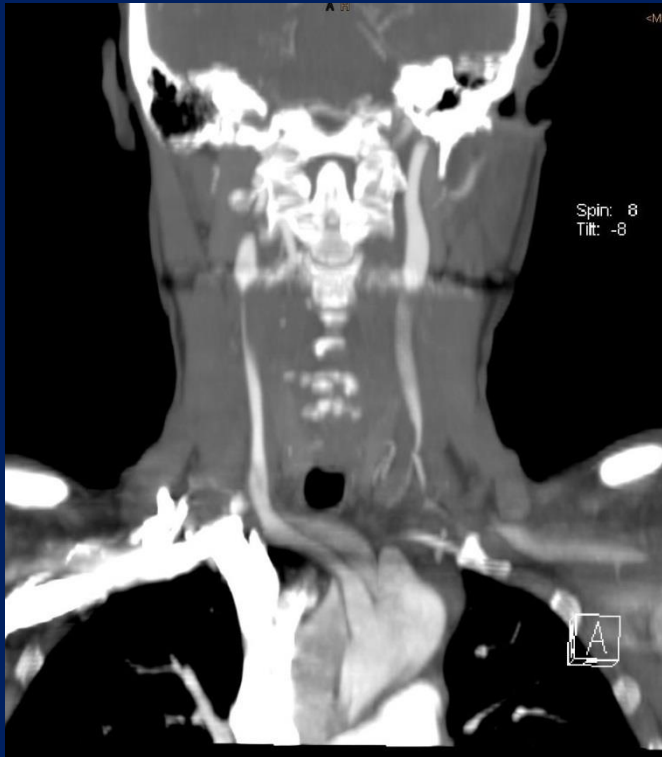
Dissection of
innominate, right
axillary, and left carotid
arteries



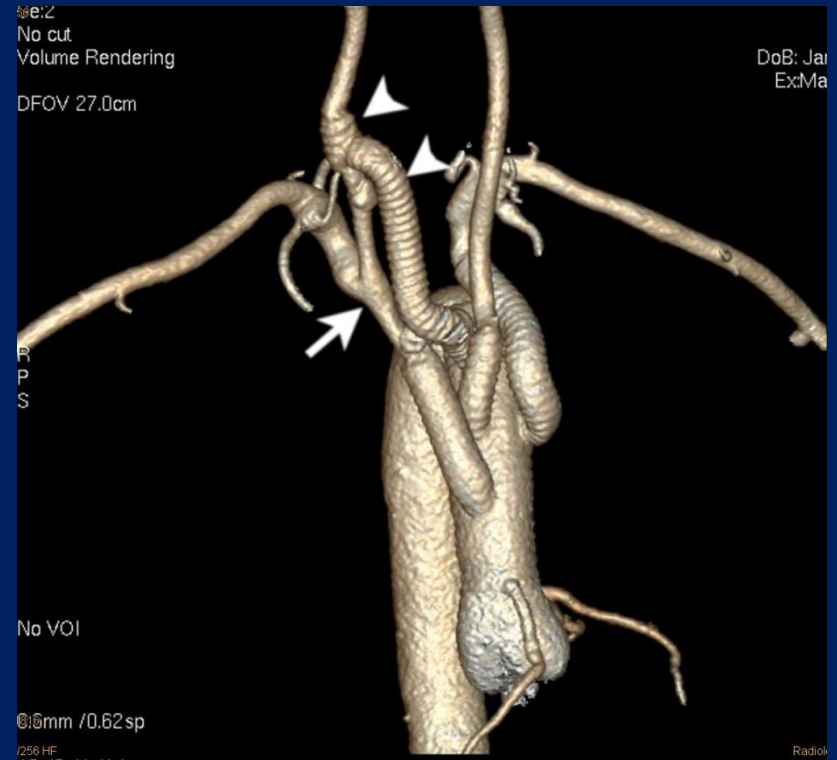
Surgical
result



Choice of cannulation site in acute aortic dissection involving arch arteries



**Dissection of both
carotid arteries**



**Surgical
result**



Acute dissection involving brachiocephalic artery



Dissection
involving
brachiocephalic
artery



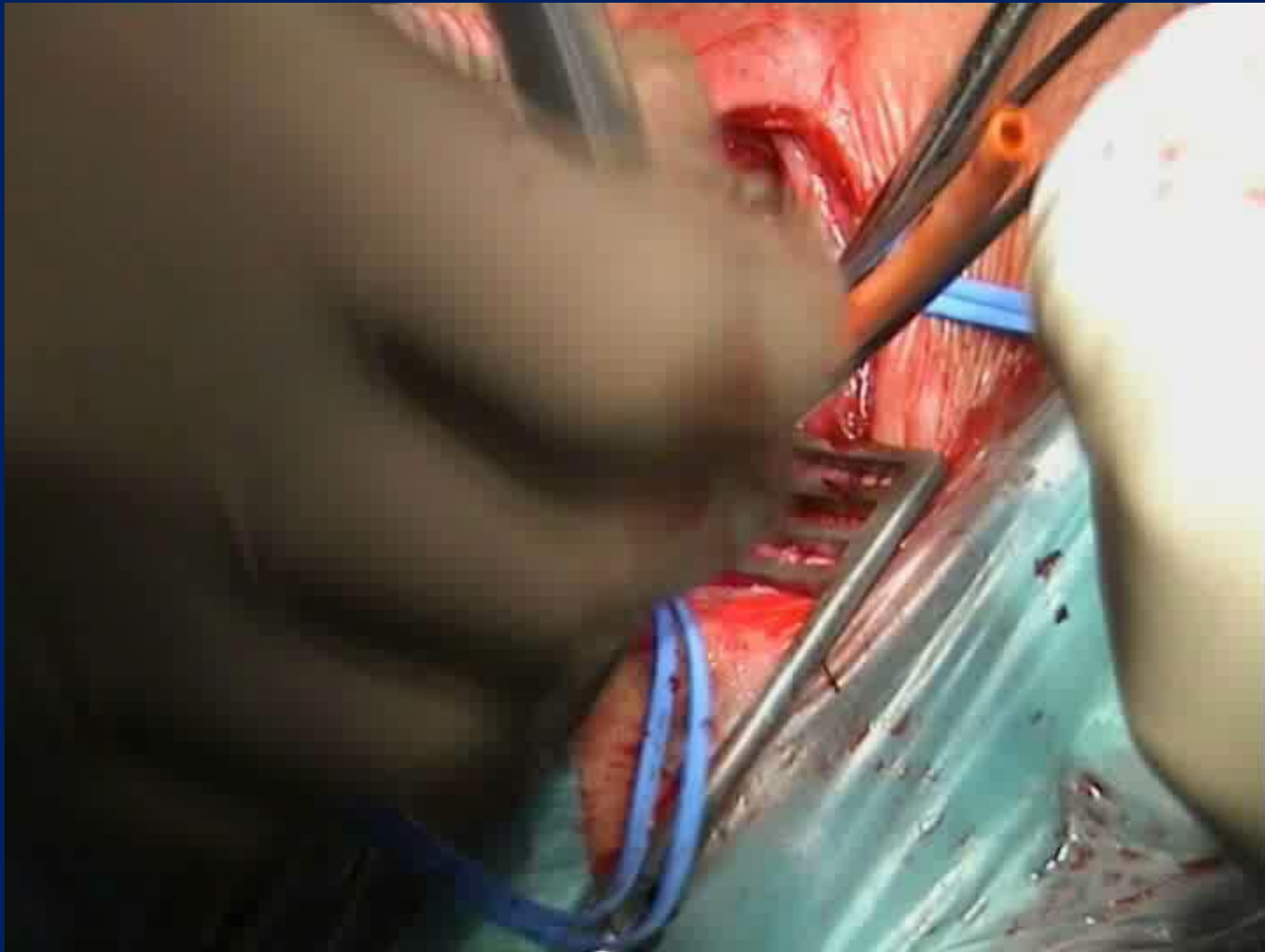
Resulting in
subtotal occlusion



Aorto-carotid
bypass using
cannulation graft



Cannulation strategy in aneurysms contacting sternum



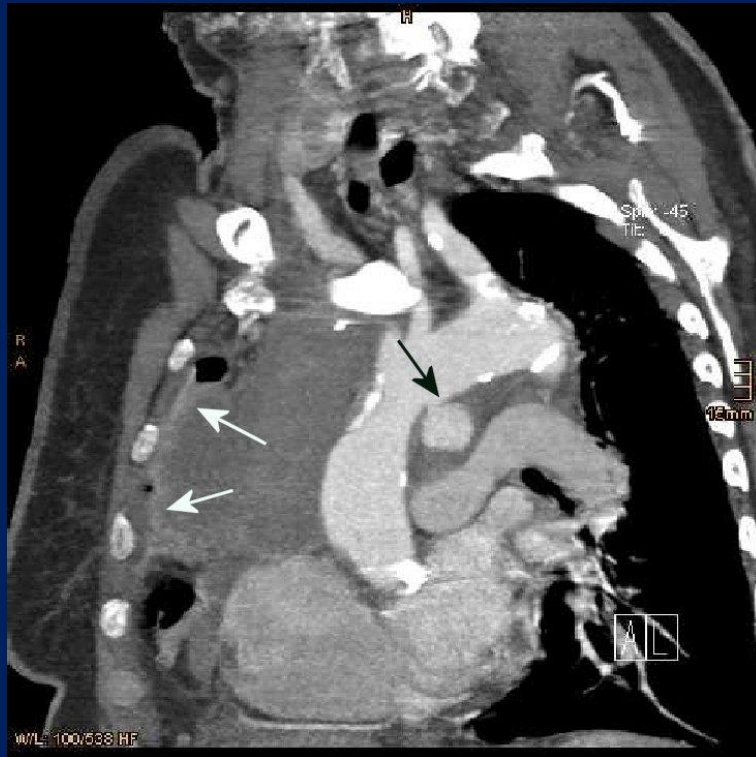
Carotid artery and jugular vein cannulation



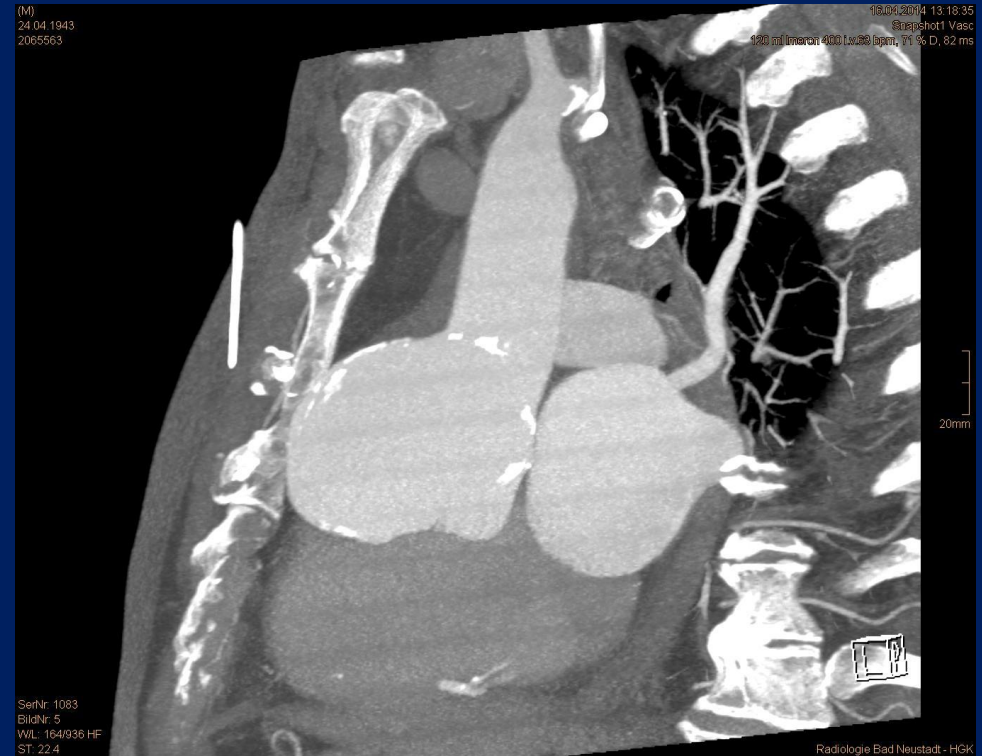
Carotid Cannulation
P. Urbanski, Bad Neustadt, Germany

Cannulation strategy in aneurysms contacting sternum

False aneurysm



True aneurysm



Conclusions

- CCA almost completely fulfills all requirements that an artery should offer for optimal arterial cannulation
- CCA cannulation is a very fast, safe, and efficient method of arterial cannulation, even in very obese patients
- CCA cannulation facilitates application of cerebral perfusion and enables dealing with several pathologies and/or unexpected surgical problems
- I am convinced that experience with CCA cannulation will increasingly grow and the results achieved by others will prove that this cannulation method should be a preferred option in all cases of hostile aorta



Well-considered surgical strategy includes choice of cannulation site and is key to successful aortic surgery



Thank you for your attention



Carotid Cannulation
P. Urbanski, Bad Neustadt, Germany

Carotid artery cannulation

Right

Before CPB

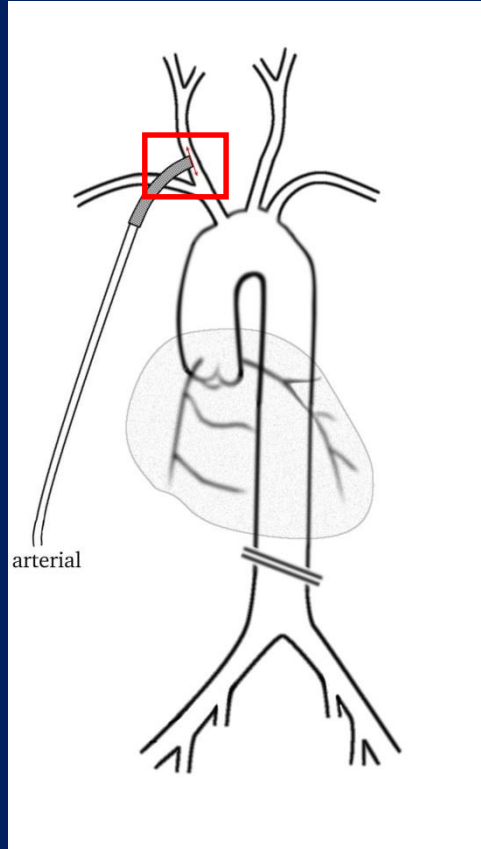
Flow

$F = 0,26 \text{ L/min}$



Pressure

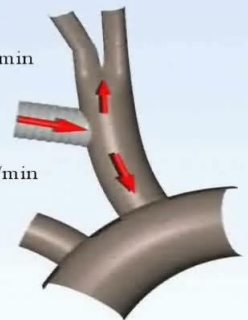
$P = 122 \text{ mmHg}$



During CPB

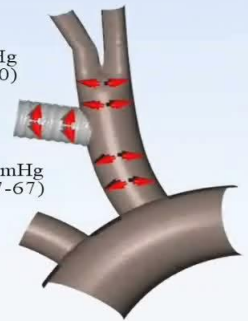
Flow

$F = 0.6 \text{ L/min}$
(13 %)
 $F = 4.6 \text{ L/min}$
(range 3.5-5.8)
 $F = 4.0 \text{ L/min}$
(87%)



Pressure

$P = 112 \text{ mmHg}$
(range 90-140)
 $P = 198 \text{ mmHg}$
(range 155-220)
 $P = 45 \text{ mmHg}$
(range 37-67)



Urbanski P. et al. Use of a carotid artery for arterial cannulation: side-related differences. Thorac Cardiovasc Surg 2010;58:276-279.

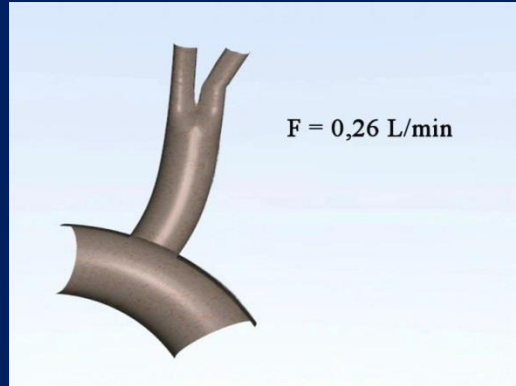


Carotid Cannulation
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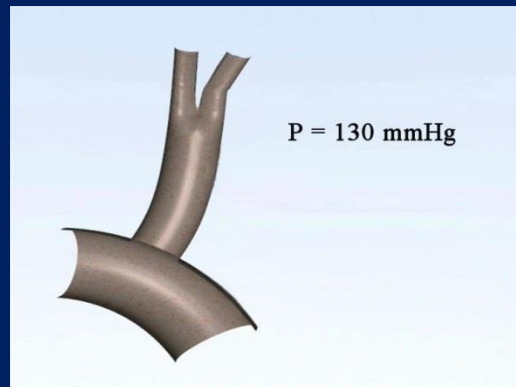
Carotid artery cannulation

Before CPB

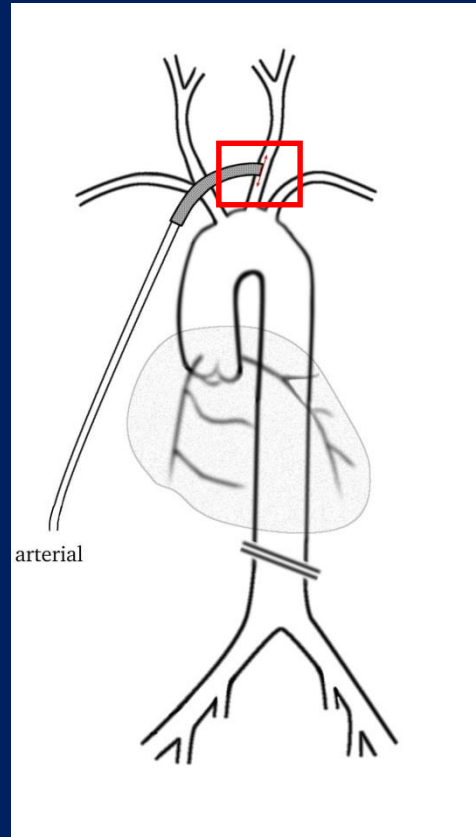
Flow



Pressure

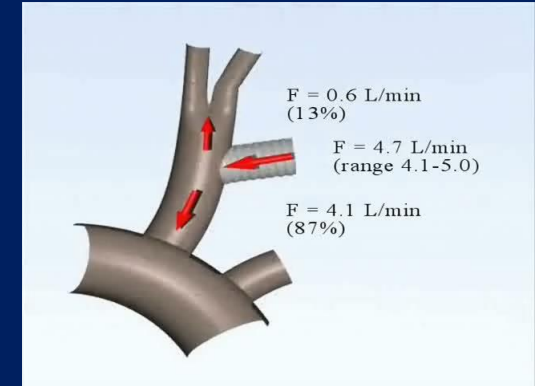


Left

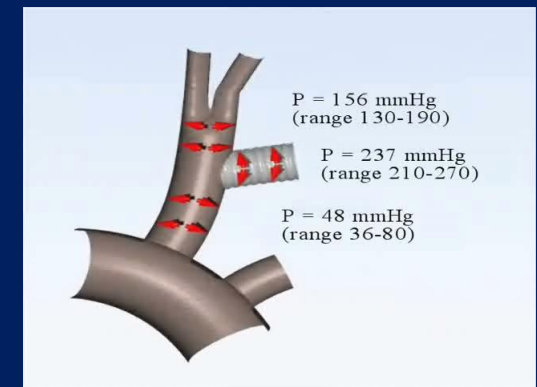


During CPB

Flow



Pressure



Urbanski P. et al. Use of a carotid artery for arterial cannulation: side-related differences. Thorac Cardiovasc Surg 2010;58:276-279.

