EXTENDED AORTIC ANEURYSM REPAIR WITH ARCH REPLACEMENT IS FEASIBLE AND SAFE WITHOUT CIRCULATORY ARREST AND HYPOTHERMIA

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Current outcomes after open arch repair

Author	No Pts.	Perioperative mortality	Stroke rate
Strauch	120	13%	8%
		8%	15%
		15%	17%
		3%	3%
		6%	10%
Okita	246	20%	11%

Mean mortality: 10.8%

Mean stroke: 10.6%

Wolfe et al., Eur J Vasc Endovasc Surg 2010

Brain protection - 1

Hypothermic circulatory arrest remains an acceptable approach

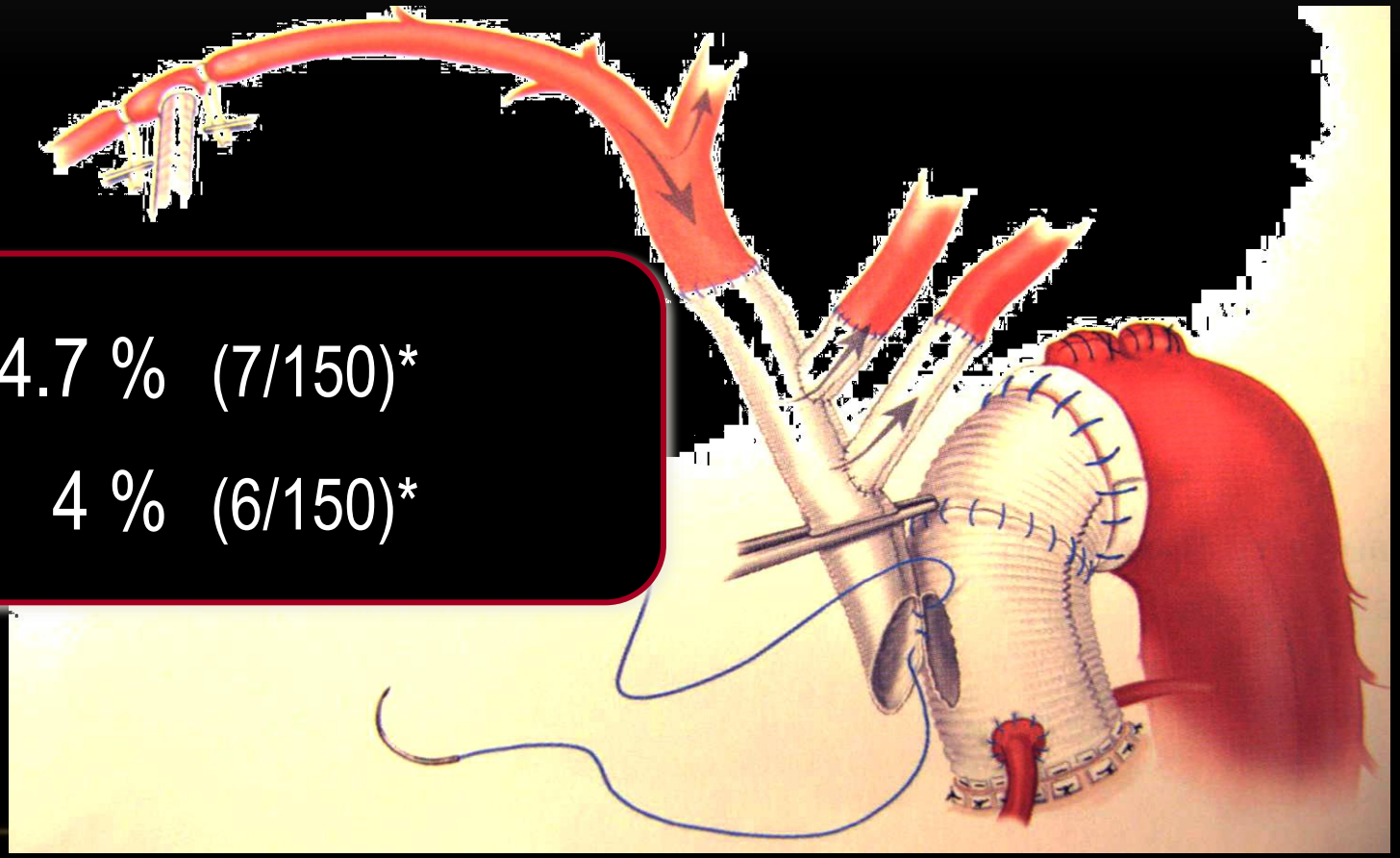
HCA used during aortic surgery in 656 patients

- > 40 min → increased stroke rate 7%
- > 65 min → increased mortality rate 10%

Svensson et al ▪ J Thorac Cardiovasc Surg 1993

Brain protection (ACP) - 2

Trifurcated technique: for continuous cerebral perfusion



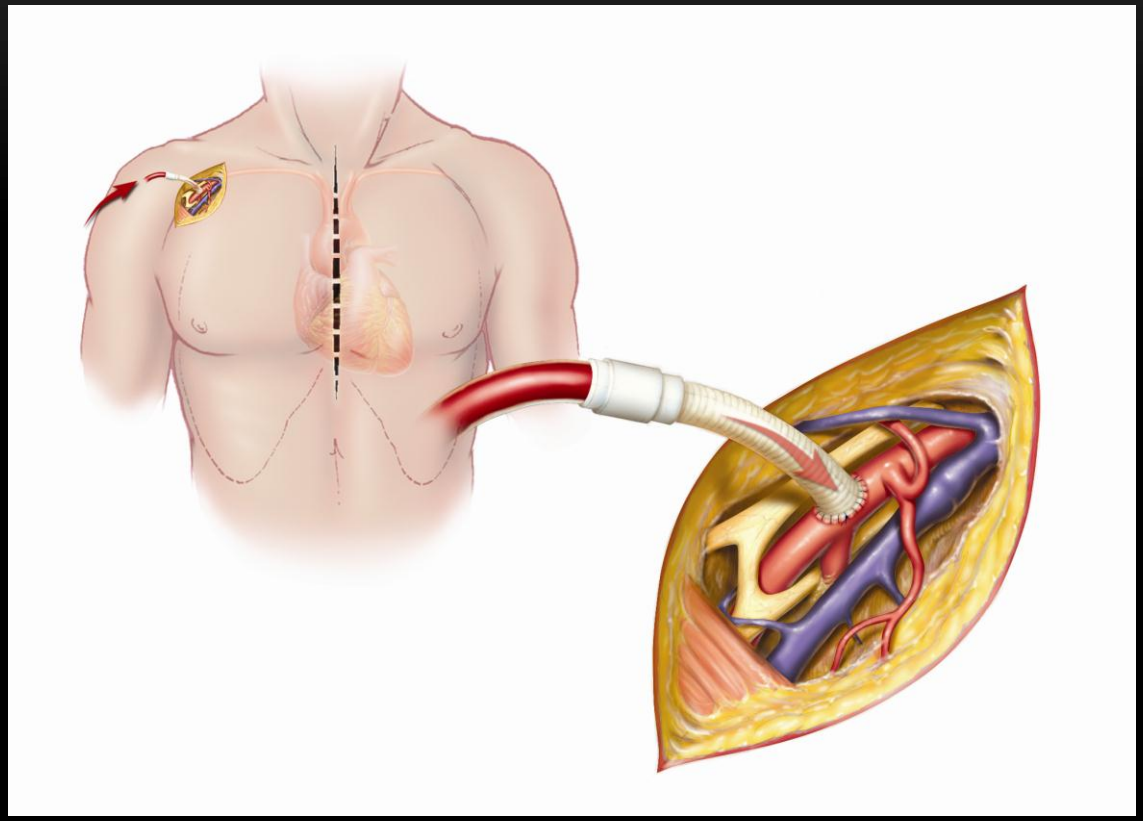
Mortality 4.7 % (7/150)*

Stroke 4 % (6/150)*

Spielvogel et al, Ann Thor Surg 2001-2007*

Coselli et al., Tex Heart Inst J 2009

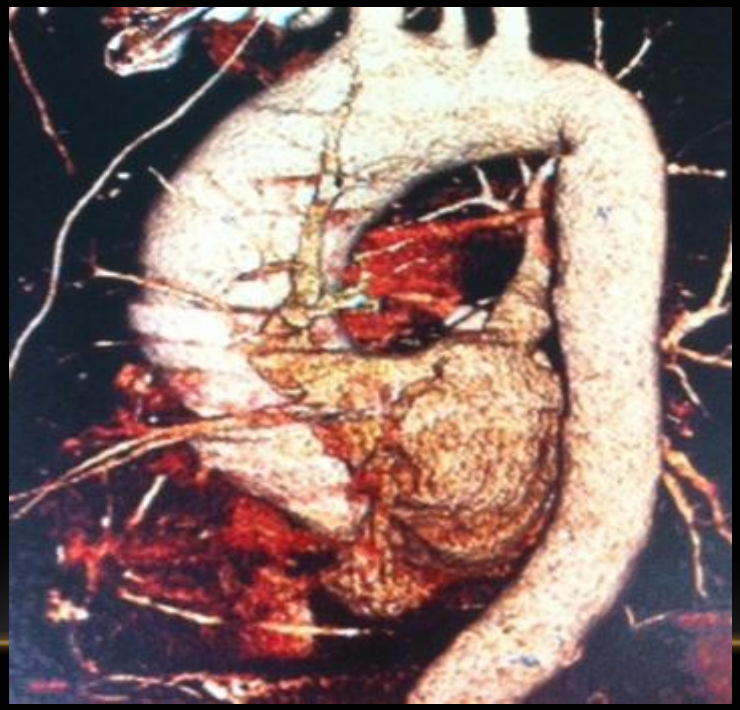
Brain protection (ACP) - 3



- Simplifies delivery of antegrade cerebral perfusion
- Avoids malperfusion
- ACP via axillary artery has emerged as the method of choice

HOW WE DO IT

- A 67 year old male known for aortic valve insufficiency and aortic arch aneurysmal dilatation (56 mm) presented with orthopnea
- He had a EF of 30% and dual chambers PM
- Other comorbid conditions were: essential hypertension.



HOW WE DO IT

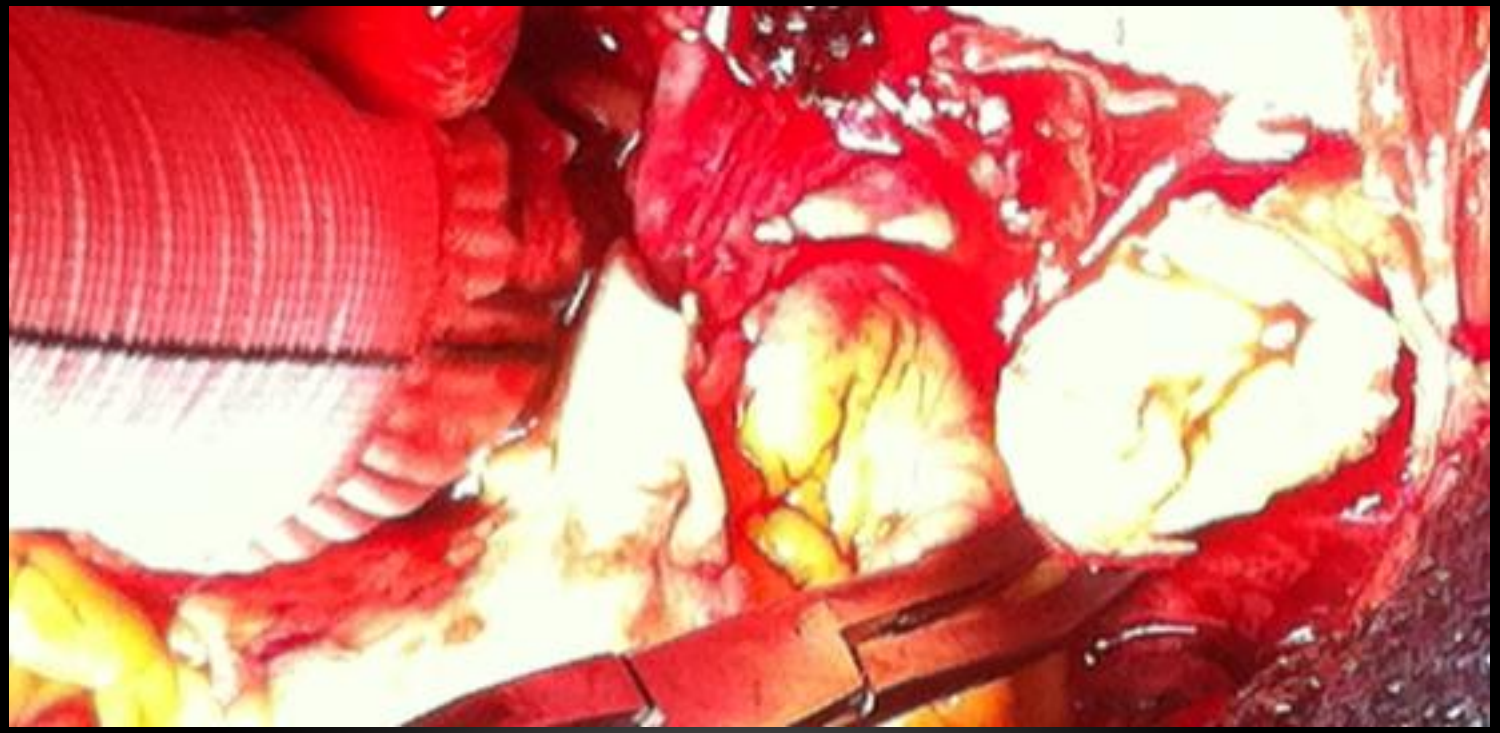
- The right common femoral artery was exposed for cannulation. This alowed cerebral/visceral arteries perfusion during arch clamping
- Trough a median sternotomic approach heart, the aortic root and the entire aortic arch were exposed. By extending the incision cranially it was possible to isolate the proximal portion of all supra aortic vessels.
- An atrial-caval cannulation have been performed.

HOW WE DO IT

- A customized trifurcated graft was built, using a 12 mm Intervascular Intergard ® and other two branches of 7 mm and 8 mm diameter
- An “Y” derivation from the retrograde aortic perfusion cannula (femoral) was inserted in this graft

HOW WE DO IT

- A distal aortic clamp have been positioned proximally to the ostium of the innomiate artery and the proximal aortic anastomosys was performed by using a 27 mm valved tube (St. Jude Valsalva)



HOW WE DO IT

- The IA was sectioned from its ostium and anastomized in a termino-teriminal manner to the 12 mm graft
- By sequential clamping and suturing the same was done for the LCCA and the LSA

HOW WE DO IT

- The distal aortic clamp was then positioned at the level of the isthmus and the aortic arch aneurysm could have been completely resected.
- Circulatrion in new aortic arch is restored

HOW WE DO IT

- The proximal anastomosys between the customized graft and the aortic arch graft was then performed by side clamping
- Cerebral perfusion cannula is removed

HOW WE DO IT

Bilateral cerebral oxymetry

HOW WE DO IT

Final result

HOW WE DO IT

Postoperative CT scan

EXPERIENCES IN THIS SETTING

Total arch replacement under normothermic beating heart surgery

Chang J-C et al - Ann Thorac Surg 2008

Normothermic total arch replacement without hypothermic circulatory arrest to treat aortic distal arch aneurysm in a patient with cold agglutinin disease

Ishida N. et al. - ICTVS 2011

Totally normothermic aortic arch replacement without circulatory arrest (29 pts)

Touati G. D. et al. - Eur. J. Cardio-Thoracic Surg 2007

Clinical and biochemical outcomes for additive 30°C mesenteric and lower body perfusion during hypothermic circulatory arrest for complex total aortic arch replacement surgery

Fernandes P. et al. - Perfusion 2012

PROS

1 - Avoid neurologic and neurocognitive consequences

2 - No need of blood derivates (plasma, platelets) usually provided to patients undergoing: platelet depletion, DIC.

3 - No need of bowel, liver and kidneys pharmacological protection

which are related to:

- Degree of cooling
- Pump time
- Cooling time
- Antegrade brain perfusion
- Circulatory arrest time

LESSONS LEARNED

In this case

- SAFER - Avoid risks related to long period ECC and HCA
- EASYER & FASTER - Direct perfusion of SAVs. No need of axillary artery dissection and cannulation (pay attention to the cannula!!)
- SPECIFIC - Femoral perfusion thoraco-abdomonal aorta maybe indicated in aneurysmal disease but it is to avoid in aortic dissections

HOWEVER…

Present studies can be termed as important addition to the ongoing efforts to standardize cerebral / visceral protection during aortic arch surgery.

However, the true merit of totally normothermic aortic arch replacement will be fully understood only when it will be critically judged against the other prevailing strategies, of which moderate hypothermic SCP has fared the best.

Teruhisa Kazui