

Branch First Arch Replacement in the management of Acute and Chronic Aortic Pathology – A New Zealand Perspective

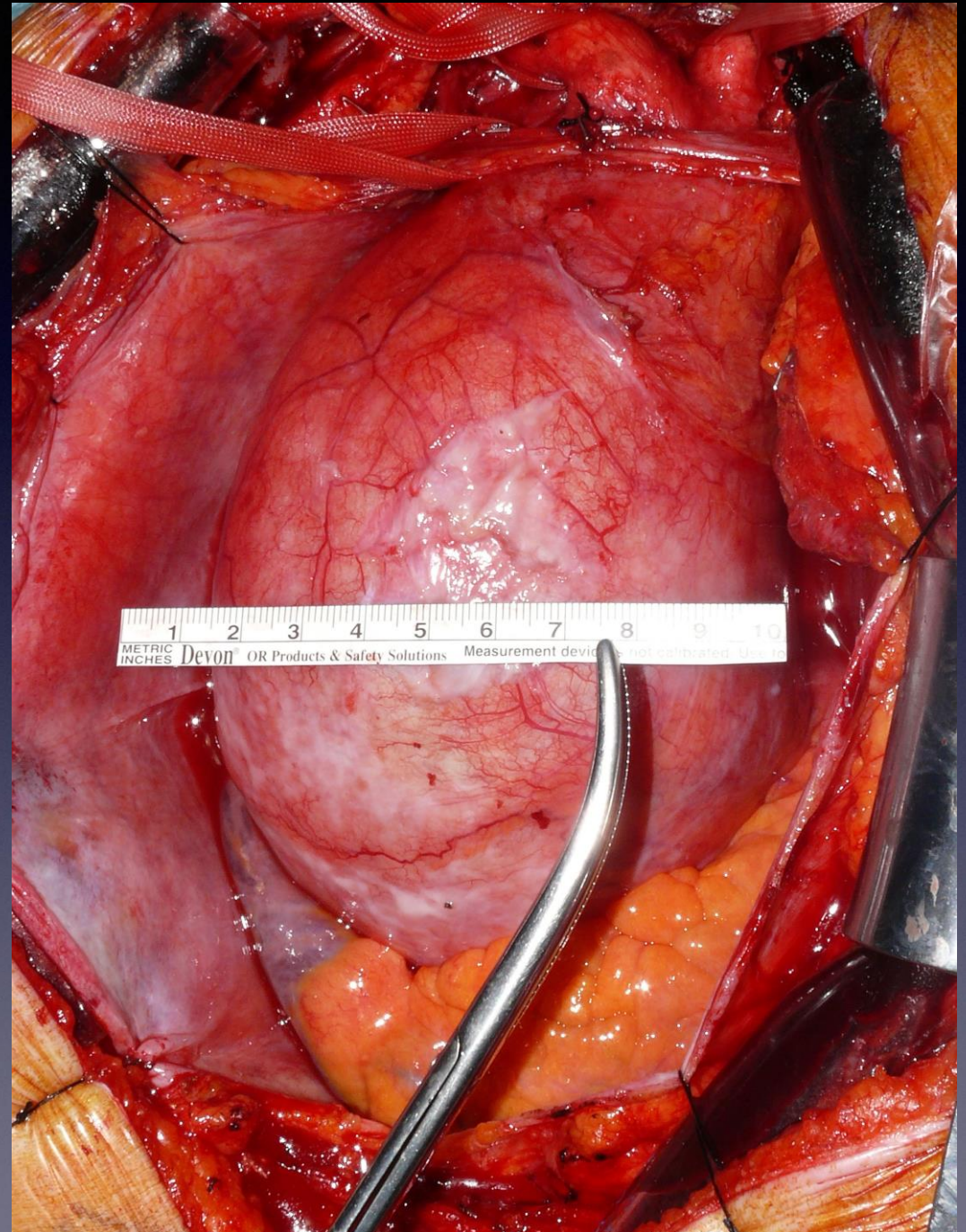
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The Aortic Arch

- Challenging surgery
- Historically Outcomes not as good as surgery on the more proximal aorta
- Cerebral and other end organ dysfunction most common complication



Groups of Arch surgery Patients

- Acute Type A Aortic Dissection (ATAAD)
- Persistent perfusion of the false lumen after ATAAD with distal complications (Acute - malperfusion, chronic = aneurysms)
- Primary arch pathology
- Disease extending into arch from front or back

Historical attempts to limit cerebral and other vital organ injury during periods of circulatory arrest

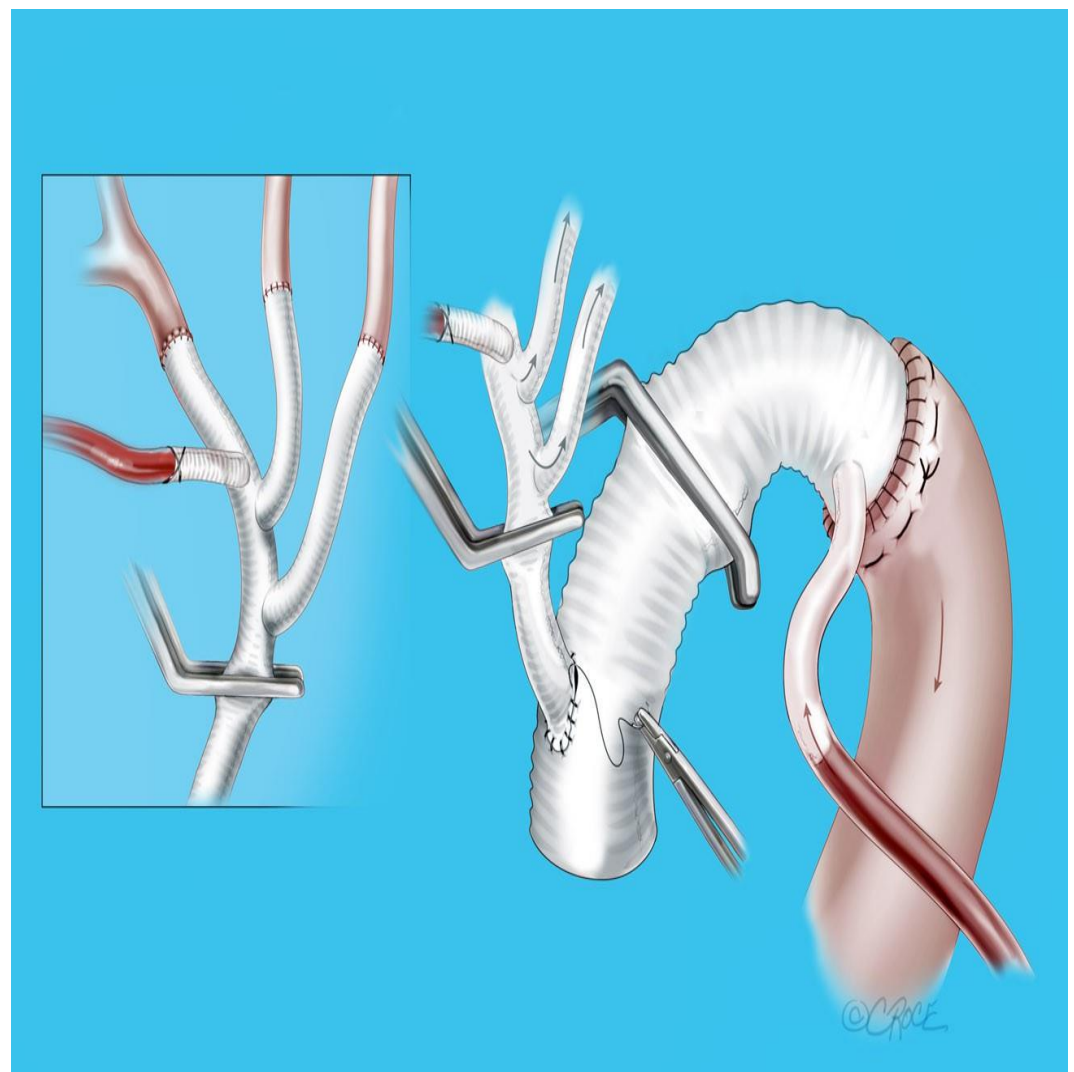
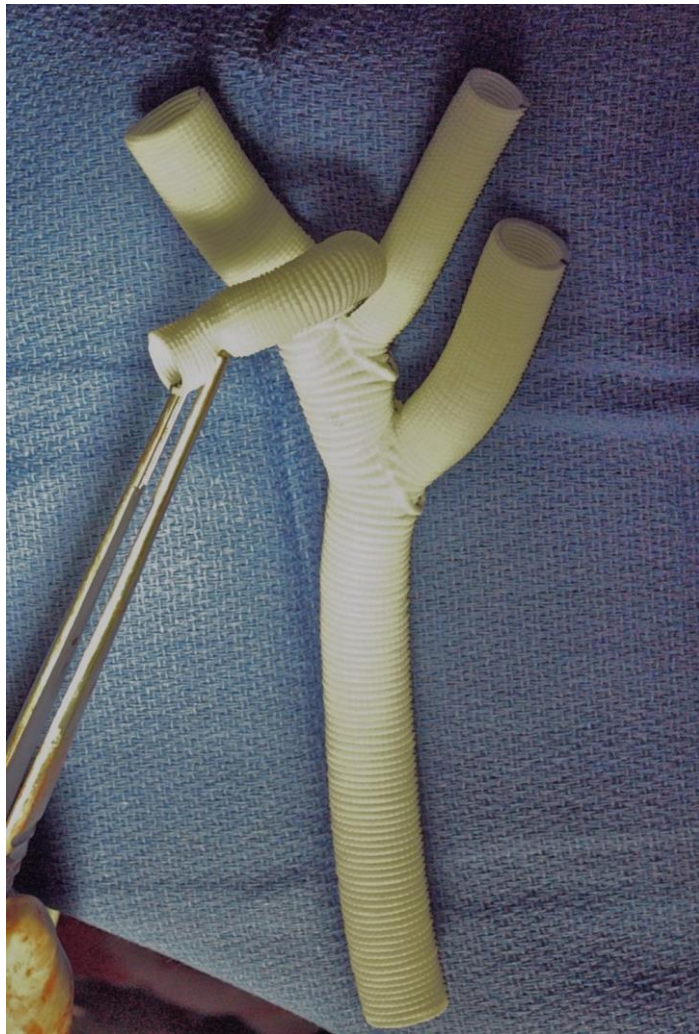
- Profound hypothermia (16-18°C) reduces metabolic demand during periods of circulatory arrest and limits cellular injury
- Addition of ancillary methods of cerebral perfusion (antegrade and / or retrograde) in an attempt to limit cerebral injury and prolong the period of “safe” circulatory arrest
- Morbidity from deep hypothermia and inadequate organ protection

“Branch-first” continuous perfusion aortic arch replacement and its role in intra-operative cerebral protection

George Matalanis, Sean D. Galvin

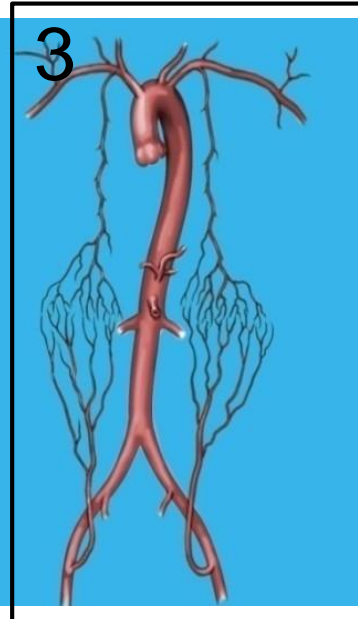
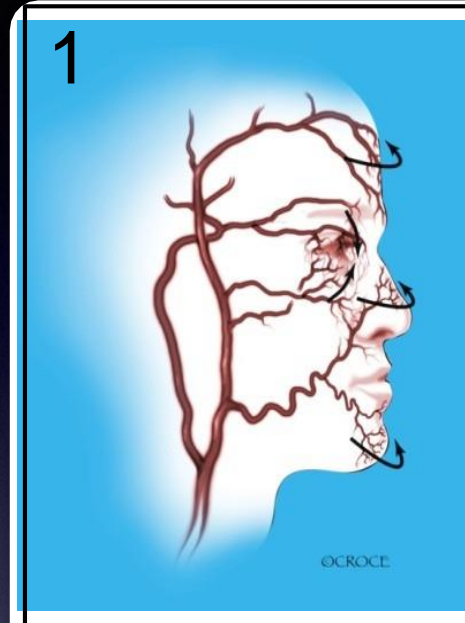
Continuous perfusion “Branch-first” aortic arch replacement: a technical perspective

Sean D. Galvin, George Matalanis



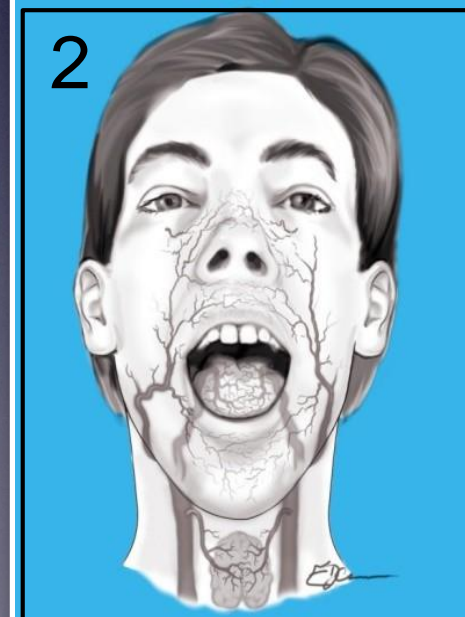
Collateral Network Allows Individual Arch Branch Clamping

External and Internal carotid arteries



The upper and lower body

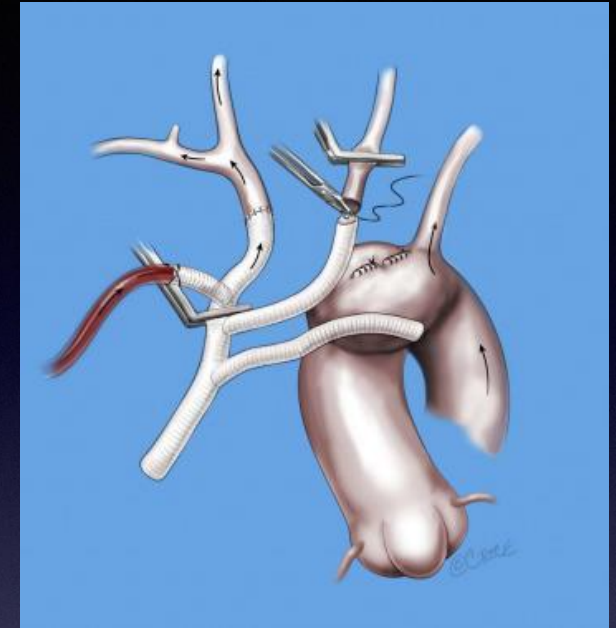
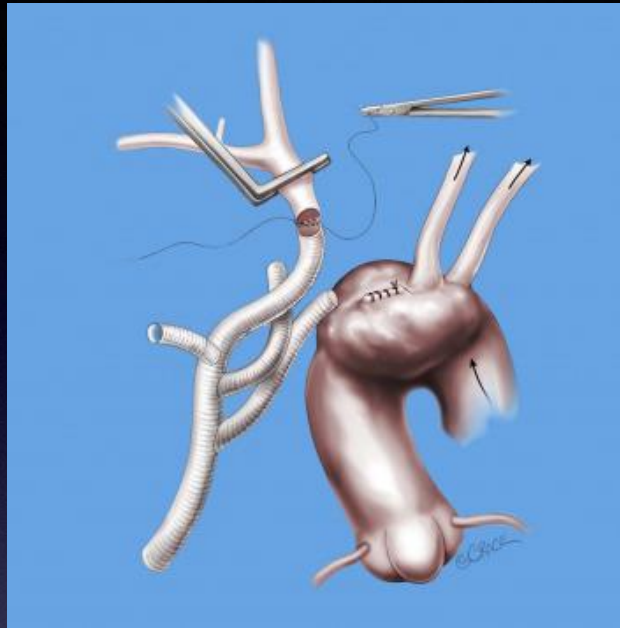
Right and Left Carotid Arteries



The Subclavian and carotid arteries

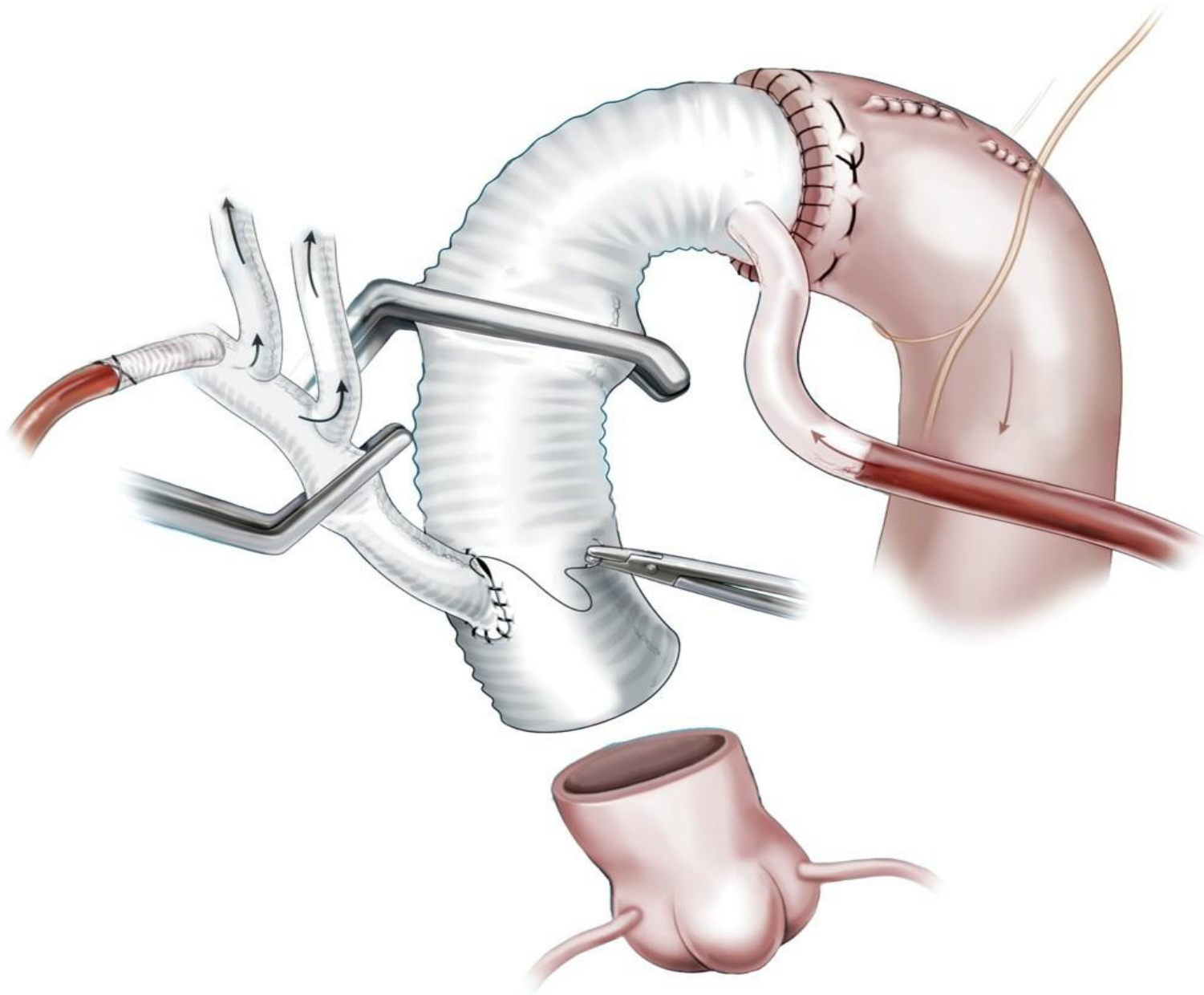
Key Operative Steps

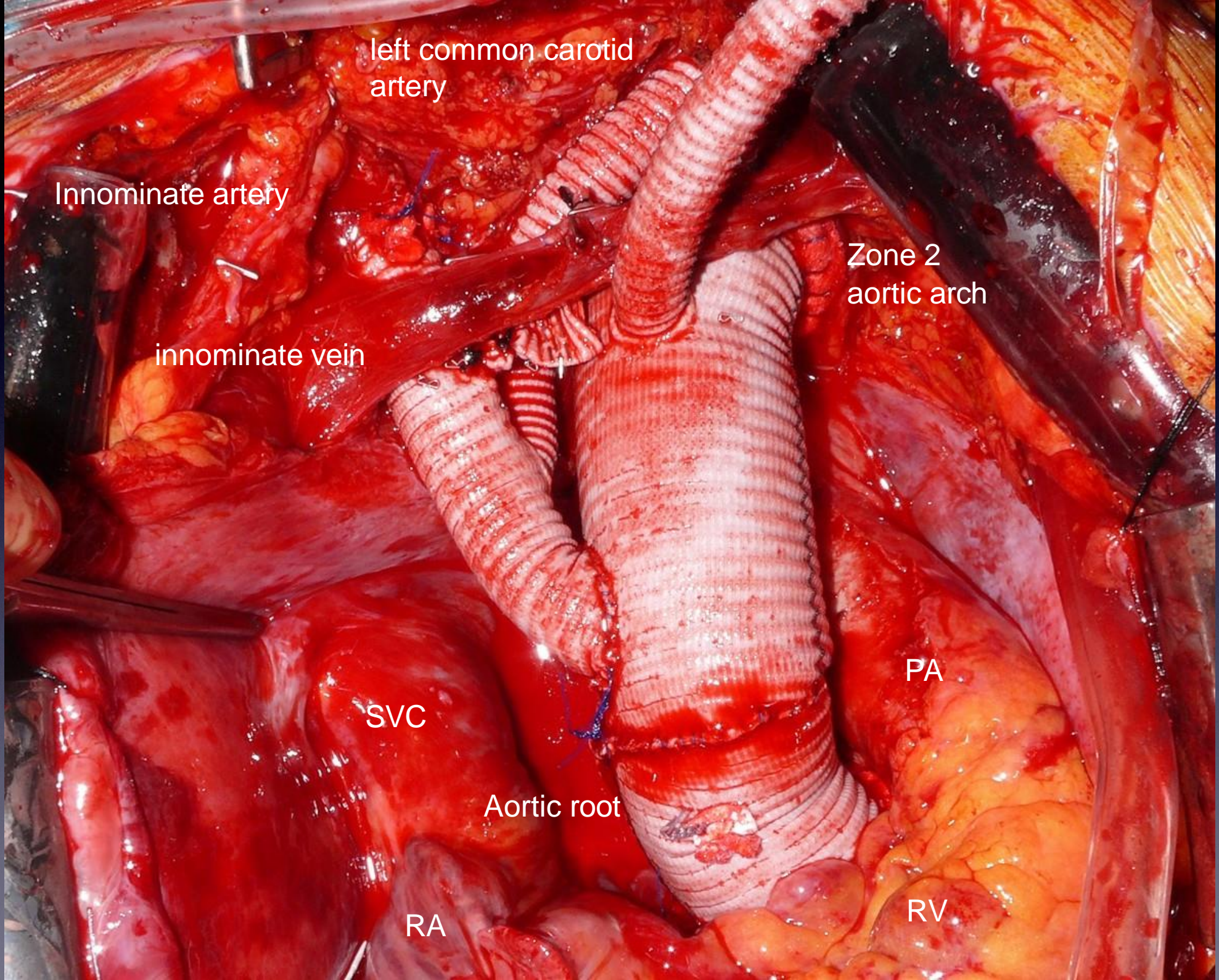
- **Monitoring:**
 - Bilateral radial and femoral artery lines
 - Nasopharyngeal and bladder temperature
 - Transoesophageal echo
 - Bispectral Index
 - Cerebral oximetry
- Femoral or central inflow
- On pump beating heart arch debranching
- Minimises cardiac ischaemic time
- Eliminates cerebral ischaemic time



- Separate head and systemic circuits (reduces risk of malperfusion)
- Moderate hypothermia. Typically 26 - 28 degrees, 20 - 24 for Frozen elephant trunk (FET_). Occasionally require DHCA at 18 - 20 degrees for complex distal arch pathology
- Always aim unclamped open distal anastomoses for dissections, occasionally clamped for primary aneurysms
- After completing distal arch anastomoses, proximal systemic perfusion commenced via anteflow limb
- During re-perfusion ensure to deair the trifurcation graft

Proximal Translocation of common stem for arch vessels





left common carotid artery

Innominate artery

innominate vein

Zone 2 aortic arch

SVC

Aortic root

PA

RA

RV

Additional Benefits of the branch first technique

- Suture lines are easily accessible.
- Anastomoses are performed more distally in the arch vessels with improved tissue quality.
- Arch branches and the trifurcation graft (TAPP) are easily relocated out of the operative field improving access to the distal aortic anastomosis.
- Placement of the common stem of the TAPP graft proximally on the ascending graft increases landing zone for subsequent second stage TEVAR if required.

Cases Numbers (Dec 2014 - Dec 2023)

140 Branch First Arch Cases in unit, 84 by Single Surgeon

	N
Total	84
Emergencies	45
Elective	39
Extent of surgery	
Innominate only	14
Innominate + LCCA	45
Innominate + LCCA + LSCA	25
+ Bentall	26
+ AV resuspension	20
Frozen Elephant trunk	19
AVR	14
CABG	12

Redo	Emergency	Elective
15	4	11

Patient Outcomes (N=84)

	Emergency (n=45)	Elective (n=39)
Mortality	6/45	0/39
Stroke	2/45	0/39
Return to Theatre	6/45	0/39
Tracheostomy	1/45	0/39
Renal Support	5/45	1/39
PPM	0/45	1/39