CLASSIC AORTIC ARCH REPLACEMENT

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Disclosure

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I have the following potential conflicts of interest to report:

- ☐ Consulting
- ☐ Employment in industry
- ☐ Stockholder of a healthcare company
- ☐ Owner of a healthcare company
- ☐ Other(s)

- ☑ I do not have any potential conflict of interest

Access

Conventional median sternotomy

Mini-sternotomy

Left thoracotomy

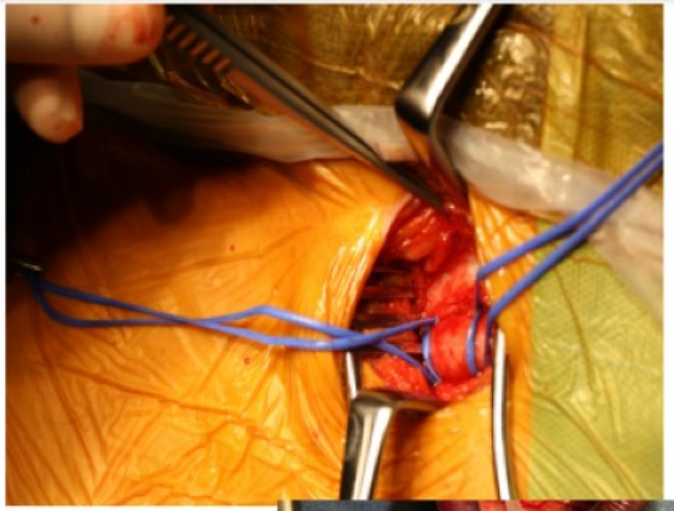
Clamshell

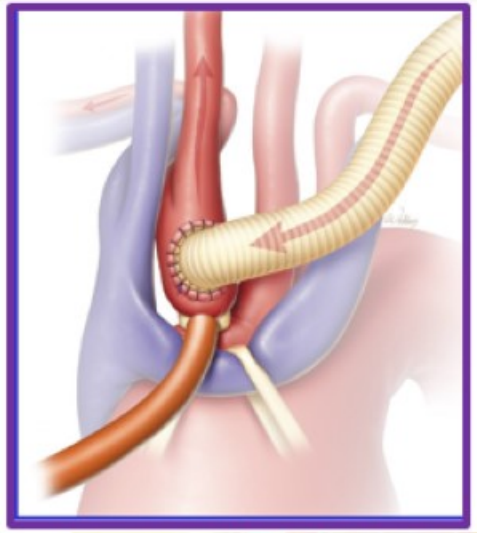
Cannulation Strategy

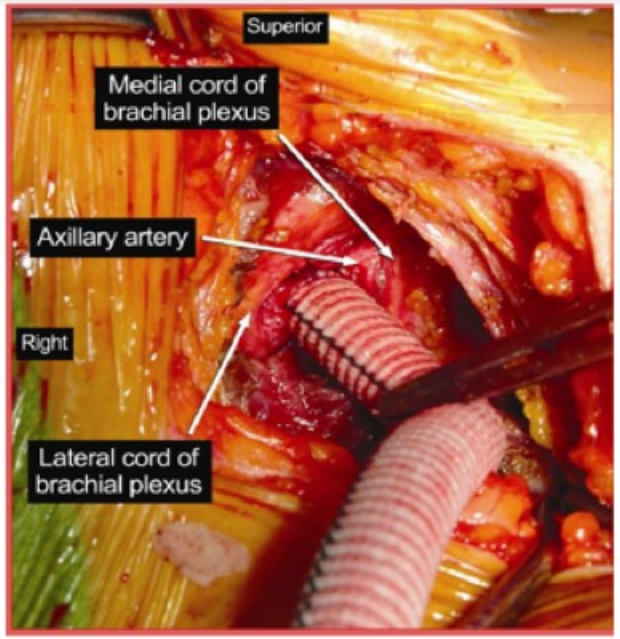
Cannulation for CBP in arch surgery depends on anatomy and pathology present.

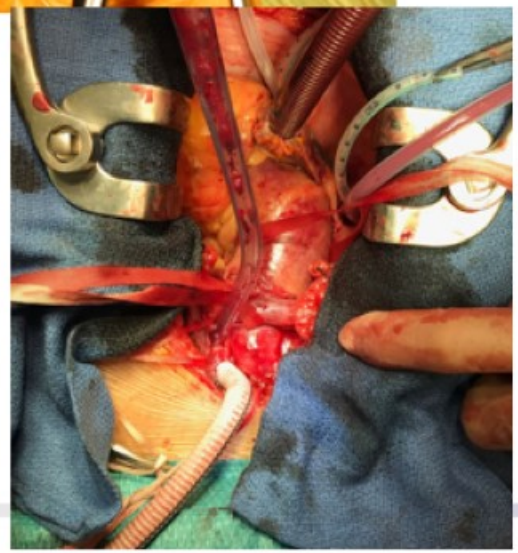
Various cannulation sites have been described, each with its own advantages and disadvantages.

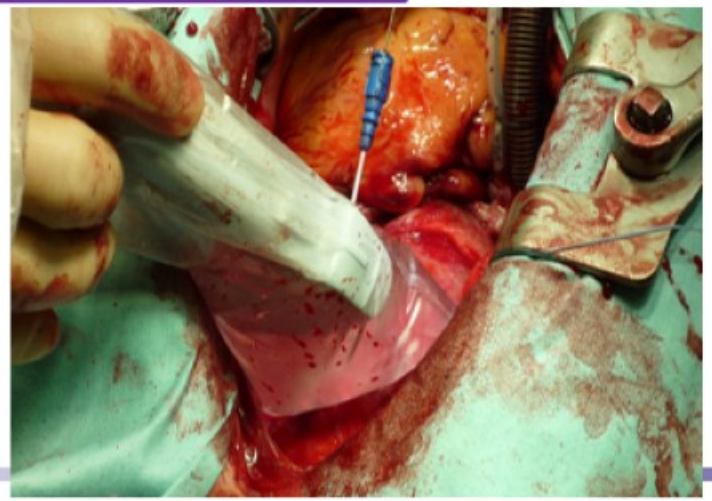
Cannulation Strategy











Cerebral Protection Strategy

Moderate Hypothermia

20 – 22°C

Cerebral Saturation Monitoring

NIRS

Bilateral Antegrade Cerebral Perfusion

Via axillary artery, Innominate artery or direct cannulation of supra-aortic vessels

10mls/kg/min and >60mmHg

Case Study

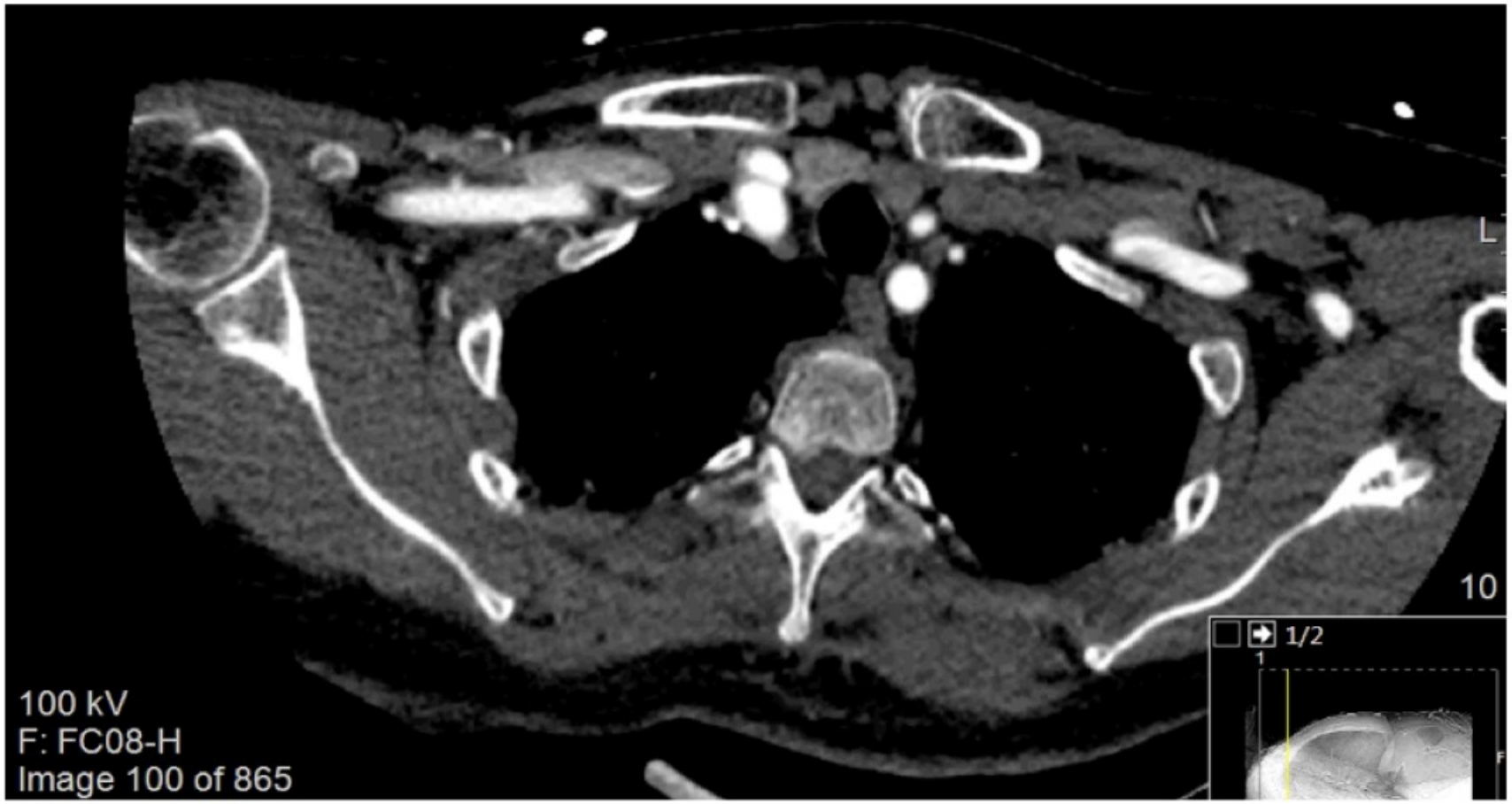
69 year old female presented with collapse

HT
Previous Epilepsy

CT scan - Acute Type A Dissection with tear located in the arch of the aorta.

Planned for emergency surgery.

CT Scan



Operative Strategy

True lumen central aortic cannulation and 2 stage venous drainage

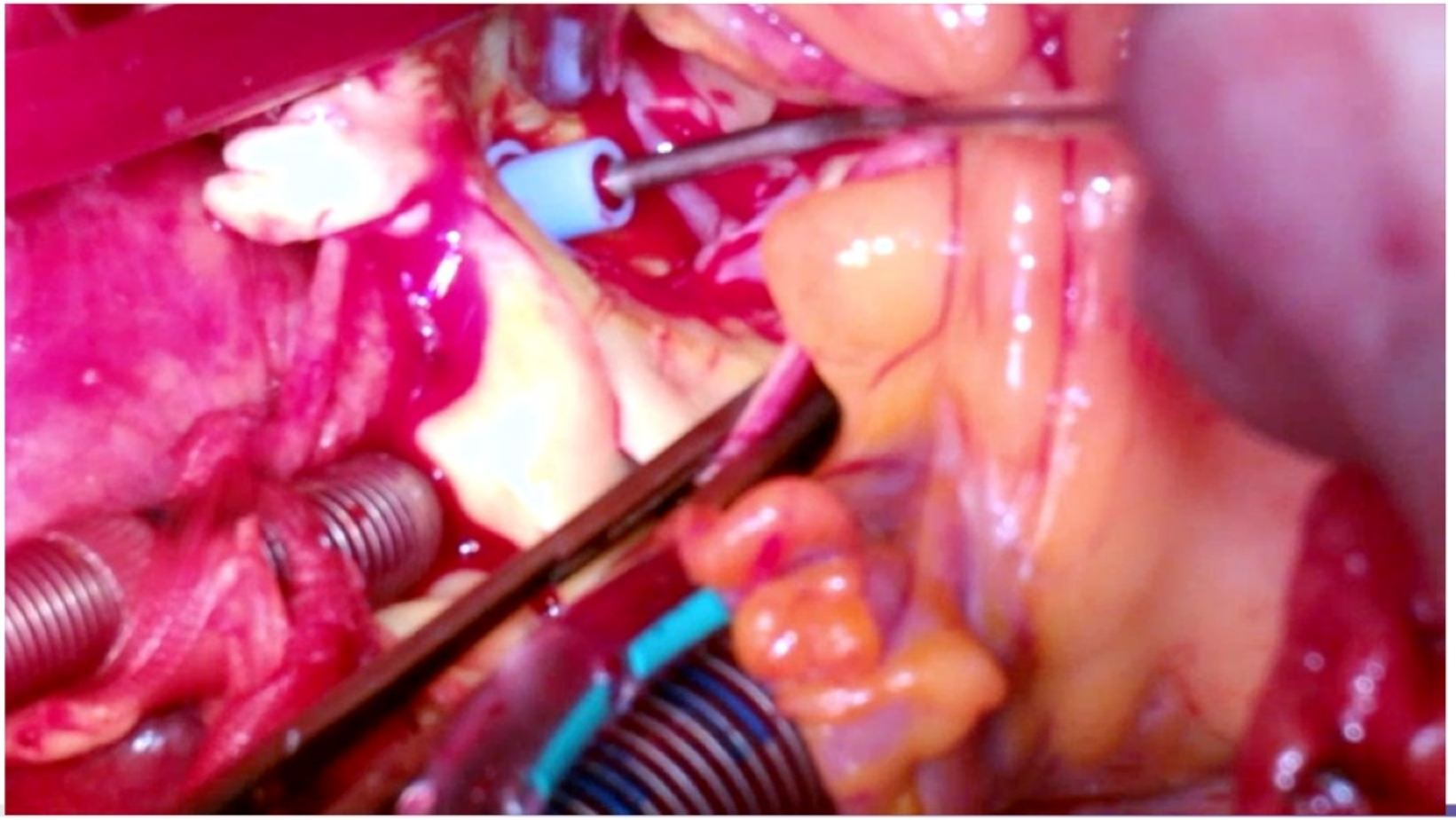
RSVP, CO_2 Flooding of operative field

Cooling to 22 degrees

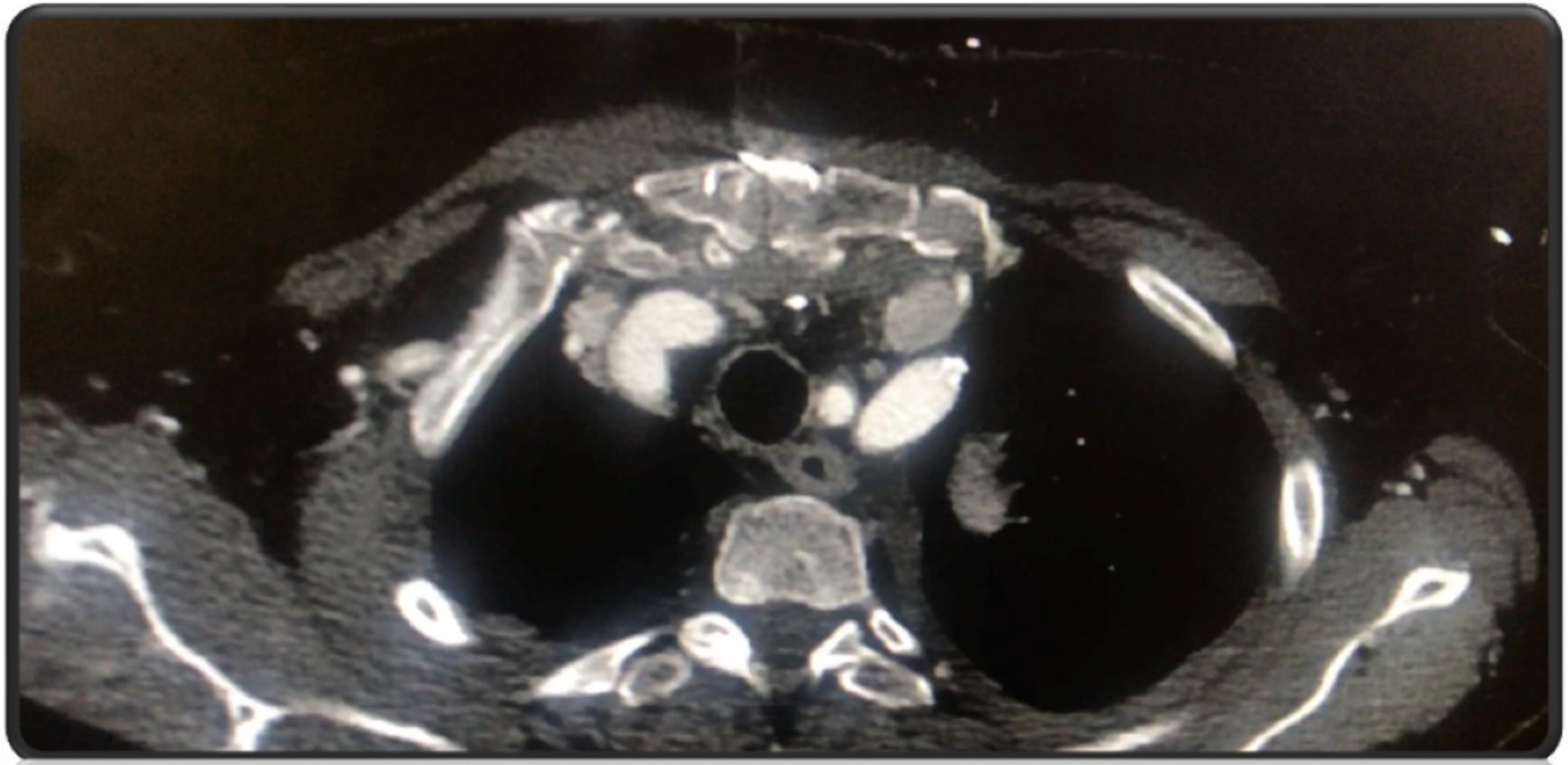
Circulatory arrest, two vessel SACP

Myocardial protection using antegrade cold blood cardioplegia into coronary ostia

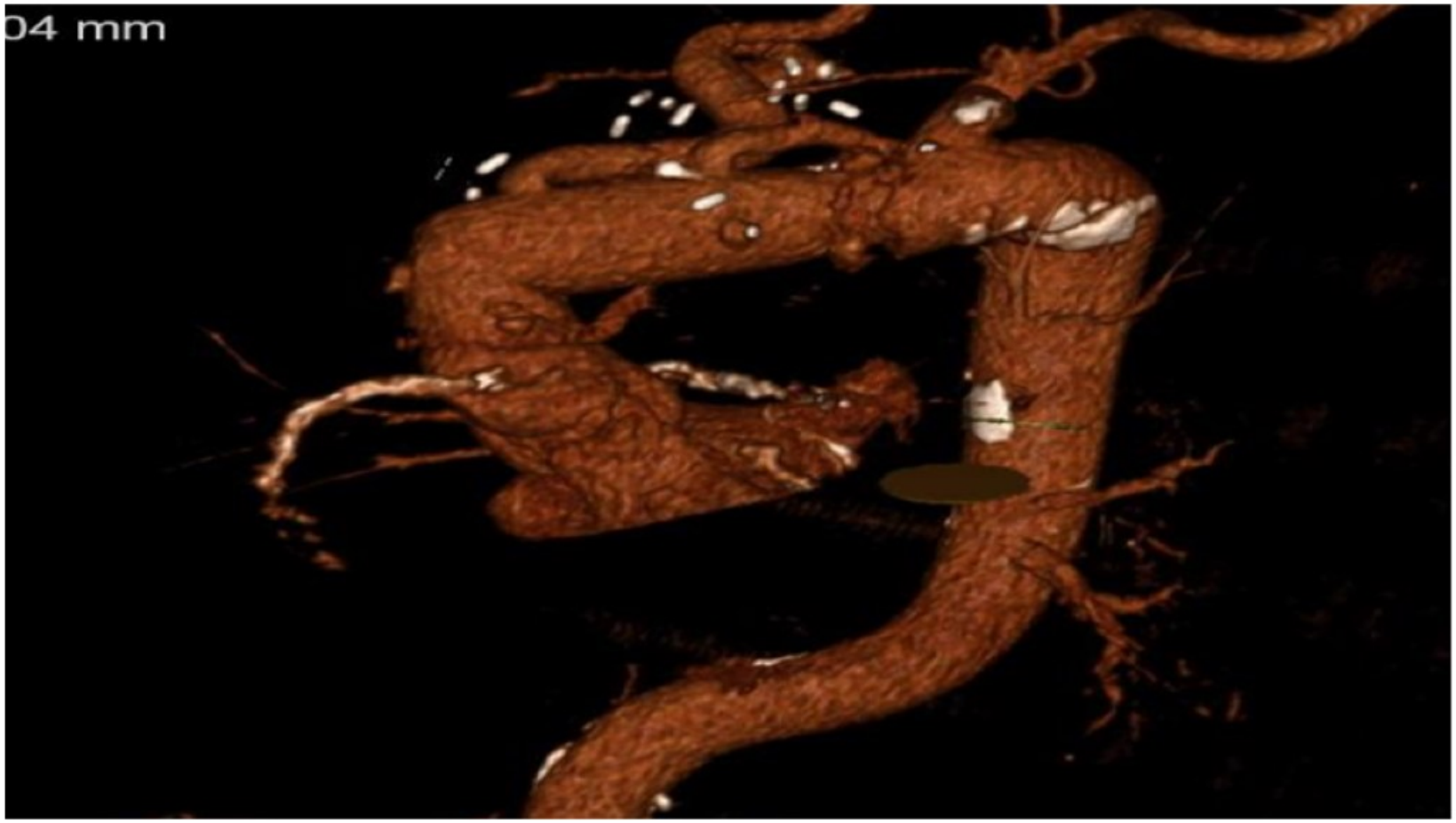
Conduct of Operation



Postoperative CT scan



Postoperative CT scan



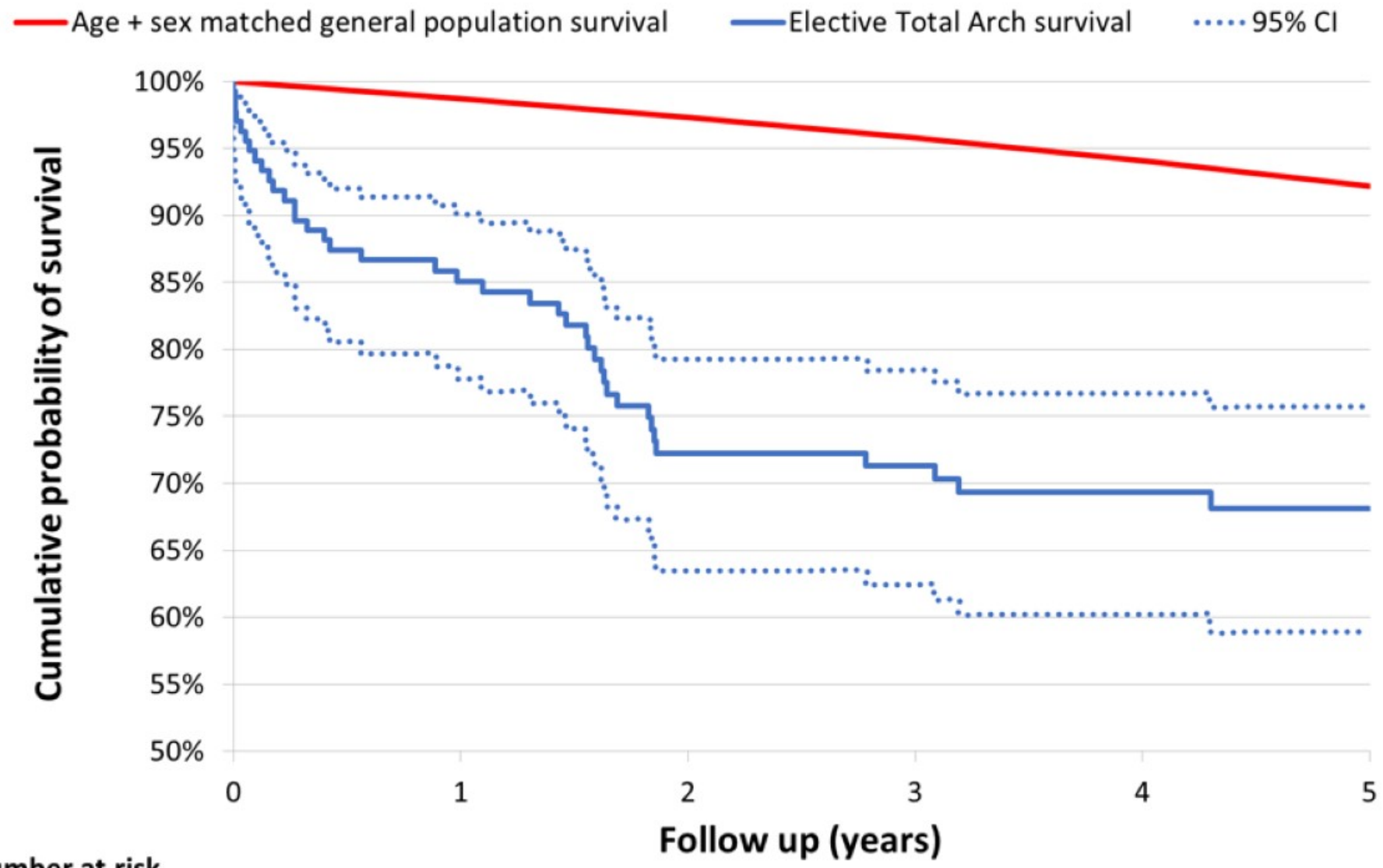
LHCH aortic arch operations (Jun-99 to Sep-17): Demographics

Variables	All AAR (n=578)	Elective HAAR (n=259)	Elective TAAR (n=136)	p-value	Non-elective HAAR (n=90)	Non-elective TAAR (n=93)	p-value
Age at operation (years)	65 (55, 72)	66 (59, 72)	65 (52, 71)	0.01	65 (58, 72)	64 (54, 72)	0.32
Female gender	235 (40.7)	91 (35.1)	67 (49.3)	0.007	38 (42.2)	39 (41.9)	0.97
Comorbidities							
Body mass index (kg/m2)	27.5 (24.5, 30.6)	27.8 (24.9, 30.9)	26.8 (23.6, 30.5)	0.04	27.7 (25.4, 31.4)	26.7 (23.7, 29.1)	0.04
Unstable angina	24 (4.2)	11 (4.3)	3 (2.2)	0.40	8 (8.9)	2 (2.2)	0.06
NYHA class ≥ III	139 (24.1)	70 (27.0)	27 (19.9)	0.12	25 (27.8)	17 (18.3)	0.13
Current smoker	63 (10.9)	23 (8.9)	14 (10.3)	0.65	8 (8.9)	18 (19.4)	0.04
Diabetes	33 (5.7)	15 (5.8)	8 (5.9)	0.97	5 (5.6)	5 (5.4)	>0.99
Hypercholesterolaemia	256 (44.3)	131 (50.6)	61 (44.9)	0.28	30 (33.3)	34 (36.6)	0.65
Hypertension	353 (61.1)	151 (58.3)	87 (64.0)	0.27	58 (64.4)	57 (61.3)	0.66
Cerebrovascular disease	48 (8.3)	21 (8.1)	6 (4.4)	0.17	11 (12.2)	10 (10.8)	0.76
Respiratory disease	89 (15.4)	33 (12.7)	24 (17.7)	0.19	19 (21.1)	13 (14.0)	0.20
Peripheral vascular disease	105 (18.2)	18 (7.0)	49 (36.0)	<0.001	15 (16.7)	23 (24.7)	0.18
Renal dysfunction	113 (19.6)	44 (17.0)	22 (16.2)	0.84	22 (24.4)	25 (26.9)	0.71
Left ventricular ejection fraction 30-50%	89 (15.4)	44 (17.0)	12 (8.8)	0.03	17 (18.9)	16 (17.2)	0.77
Left ventricular ejection fraction < 30%	22 (3.8)	11 (4.3)	3 (2.2)	0.40	6 (6.7)	2 (2.2)	0.16
Previous cardiac surgery	131 (22.7)	37 (14.3)	59 (43.4)	<0.001	14 (15.6)	21 (22.6)	0.23
Concomitant procedures							
Aortic valve replacement	416 (72.0)	232 (89.6)	70 (51.5)	<0.001	71 (78.9)	43 (46.2)	<0.001
CABG	91 (15.7)	51 (19.7)	14 (10.3)	0.02	15 (16.7)	11 (11.8)	0.35
Operative times							
Circulatory arrest	46 (30, 78)	31 (25, 39)	82 (66, 107)	<0.001	42 (32, 57)	85 (70, 112)	<0.001
Cardiopulmonary bypass	326 (270, 394)	292 (242, 340)	353 (299, 424)	<0.001	338 (272, 415)	397 (338, 467)	<0.001
Aortic crossclamp	187 (143, 241)	182 (146, 217)	204 (135, 266)	0.01	185 (136, 235)	217 (142, 277)	0.05

LHCH aortic arch operations (Jun-99 to Sep-17): Outcomes

Variables	All AAR (n=578)	Elective HAAR (n=259)	Elective TAAR (n=136)	p-value	Non-elective HAAR (n=90)	Non-elective TAAR (n=93)	p-value
In-hospital mortality	47 (8.1)	6 (2.3)	9 (6.6)	0.03	15 (16.7)	17 (18.3)	0.77
90 day mortality	59 (10.2)	9 (3.5)	12 (8.8)	0.02	18 (20.0)	20 (21.5)	0.80
1 year mortality	81 (14.0)	17 (6.6)	20 (14.7)	0.008	20 (22.2)	24 (25.8)	0.57
3 year mortality	116 (20.1)	30 (11.6)	36 (26.5)	<0.001	23 (25.6)	27 (29.0)	0.60
5 year mortality	132 (22.8)	37 (14.3)	39 (28.7)	<0.001	26 (28.9)	30 (32.3)	0.62
All stroke	55 (9.5)	16 (6.2)	12 (8.8)	0.33	11 (12.2)	16 (17.2)	0.34
CVA	45 (7.8)	12 (4.6)	10 (7.4)	0.26	9 (10.0)	14 (15.1)	0.30
TIA / RIND	10 (1.7)	4 (1.5)	2 (1.5)	>0.99	2 (2.2)	2 (2.2)	>0.99
Confusion	41 (7.1)	16 (6.2)	14 (10.3)	0.14	7 (7.8)	4 (4.3)	0.32
Return to theatre	64 (11.1)	24 (9.3)	14 (10.3)	0.74	14 (15.6)	12 (12.9)	0.61
Return to theatre for bleeding/tamponade	49 (8.5)	17 (6.6)	11 (8.1)	0.57	11 (12.2)	10 (10.8)	0.76
Acute renal failure	46 (8.0)	11 (4.3)	13 (9.6)	0.04	7 (7.8)	15 (16.1)	0.08
Deep sternal wound infection	4 (0.7)	2 (0.8)	2 (1.5)	0.61	0 (0)	0 (0)	-
Superficial sternal wound infection	11 (1.9)	5 (1.9)	4 (2.9)	0.50	1 (1.1)	1 (1.1)	>0.99
Intubation time (hours)	16 (10, 48)	15 (9, 24)	16 (11, 49)	0.17	18 (10, 96)	48 (14, 120)	0.07
Prolonged ventilation (> 48h)	91 (15.7)	22 (8.5)	26 (19.1)	0.02	18 (20.0)	25 (26.9)	0.27
Re-intubation	46 (8.0)	12 (4.6)	15 (11.0)	0.02	12 (13.3)	7 (7.5)	0.20
ITU stay (days)	3 (2, 7)	2 (1, 5)	4 (2, 8)	<0.001	5 (2, 12)	6 (2, 12)	0.58
Post-operative stay (days)	12 (8, 20)	10 (7, 15)	13 (9, 23)	<0.001	13 (9, 23)	17 (10, 26)	0.13

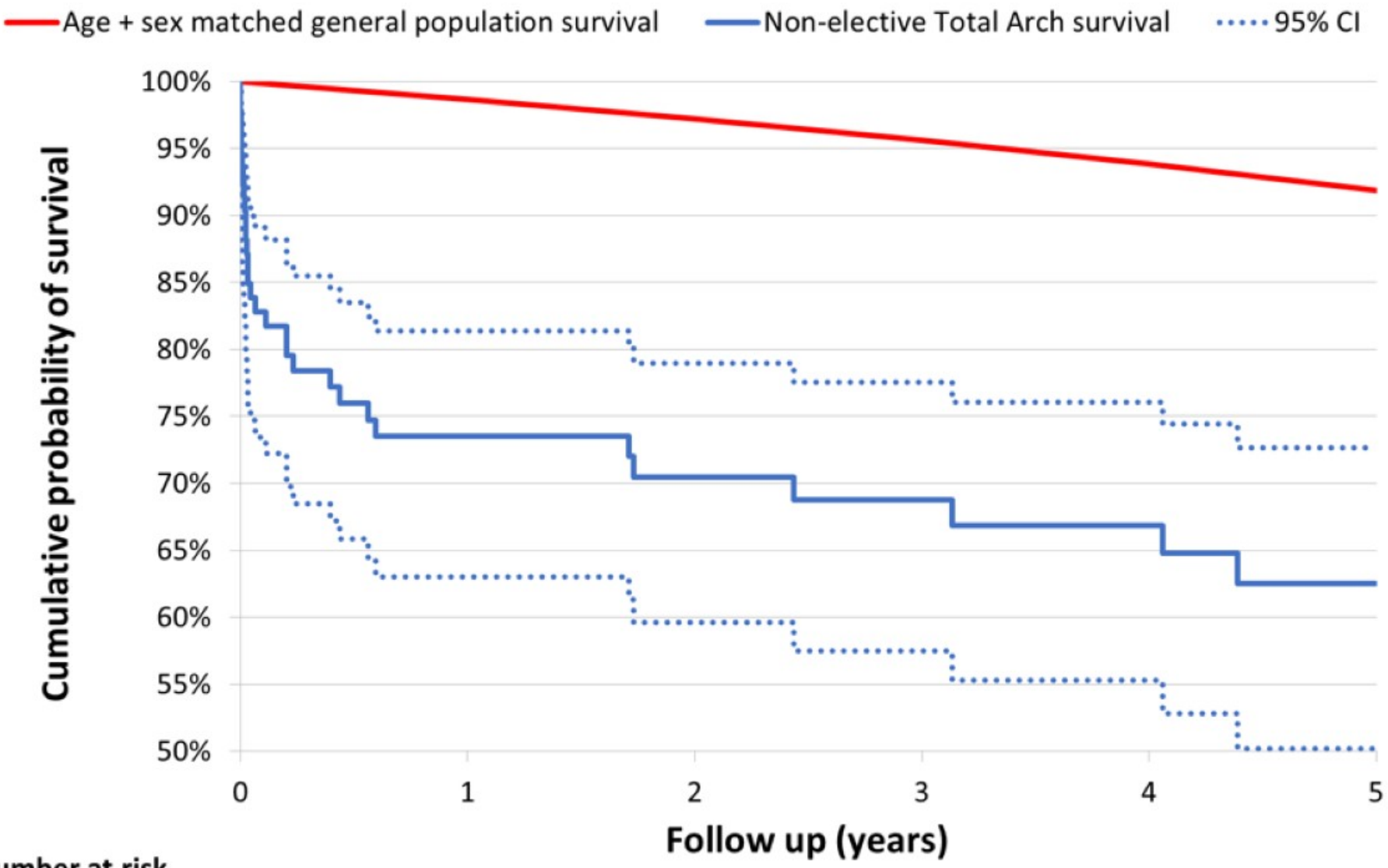
LHCH aortic arch operations (Jun-99 to Sep-17): Elective total arch 5-year survival **(NB: truncated y-axis)**



Number at risk

Elective Total Arch	135	107	81	72	63	52

LHCH aortic arch operations (Jun-99 to Sep-17): Non-elective total arch 5-year survival **(NB: truncated y-axis)**



Number at risk

Non-elective Total	93	55	44	38	32	24

Teamwork

Conclusion

- Classic arch replacement remained gold standard with satisfactory early outcomes and good medium survival
- New endovascular therapies must be evaluated against this standard prior to adoption for extended application

William Harvey Heart Centre

BAVS