

Συμπόσιο Ομάδων Εργασίας 29-30 Απριλίου 2017



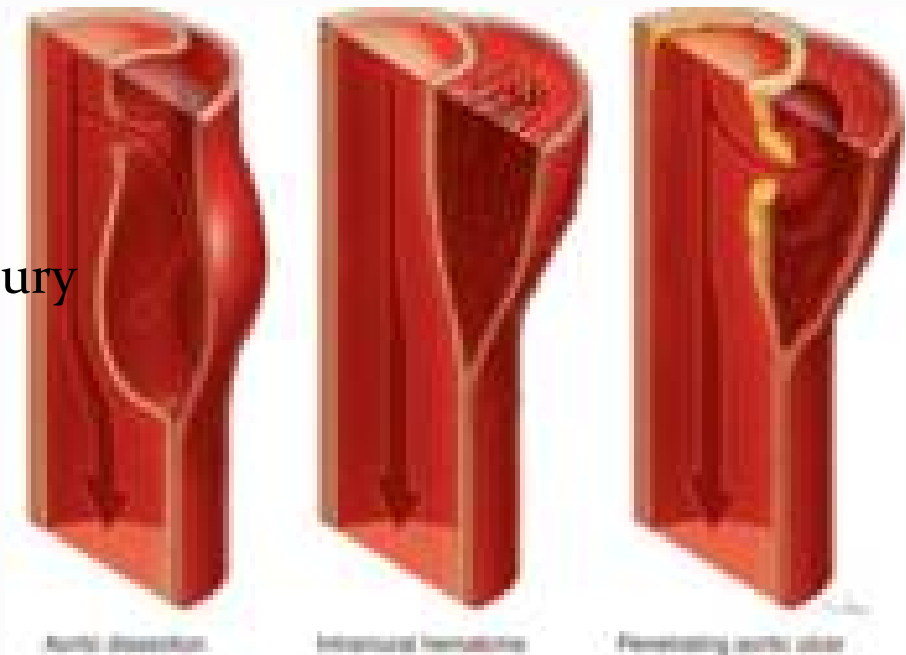
Επίσημο Πρόγραμμα Συμπόσιου Ομάδων Εργασίας

Επίσημο Πρόγραμμα Συμπόσιου Ομάδων Εργασίας

Ιωάννης Κοκοτσάκης, MD, PhD, FETCS
Καρδιοχειρουργός Διευθυντής
Καρδιοχειρουργικής Κλινικής
ΓΝΑ «Ο Ευαγγελισμός»

The term acute aortic syndrome (AAS), coined by Vilacosta et al in 1998, refers to a heterogeneous group of conditions that cause a common set of signs and symptoms, the foremost of which is aortic pain.

- Acute aortic dissection (AAD)
- Intramural haematoma (IMH)
- Penetrating aortic ulcer (PAU)
- Acute traumatic/iatrogenic aortic injury
- Degenerative aneurysm rupture



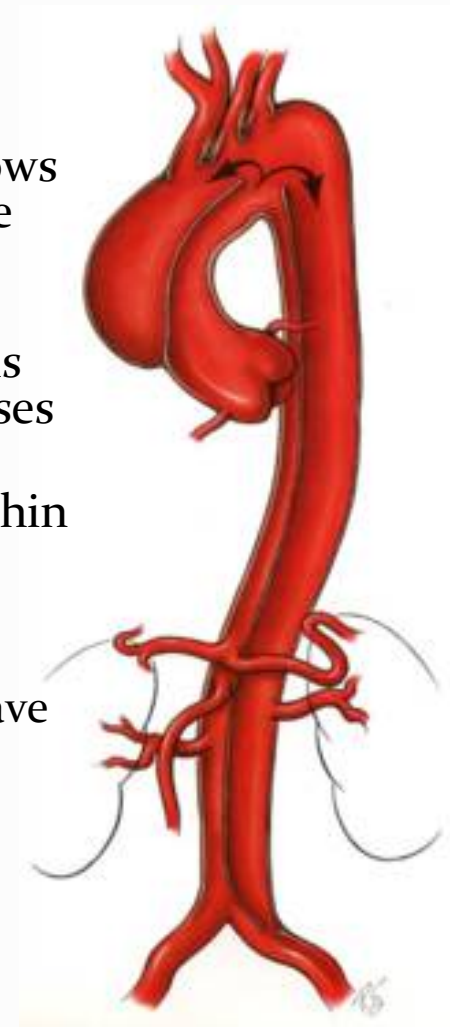
AAD usually results from a **tear in the aortic intima**, which allows a pressurized hematoma to form within the media between the inner two-thirds and outer one-third of the aorta.

The blood typically **propagates rapidly along the length of the aorta, ante or retrograde** and often compromises branch vessels along its path and/or disrupts aortic valve function, which causes aortic insufficiency.

Because the blood in the false lumen is contained by only the thin outer third of the media and the loose adventitial connective tissue, **rupture into the pericardial space, pleural space, or mediastinum is common.**

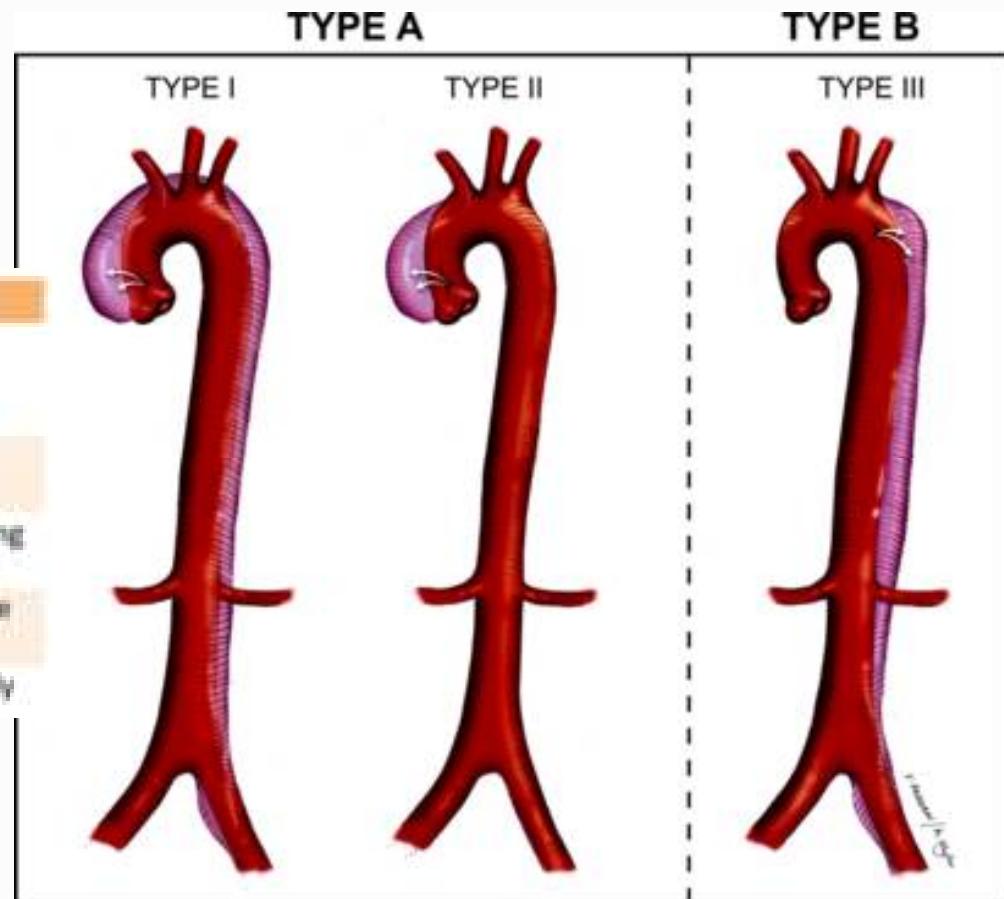
AAD represents a medical condition where a small tear can have dreadful consequences and represents a **surgical emergency.**

- 3,5-6/100.000 people per year in general population
- Up to 10/100.000 in elderly

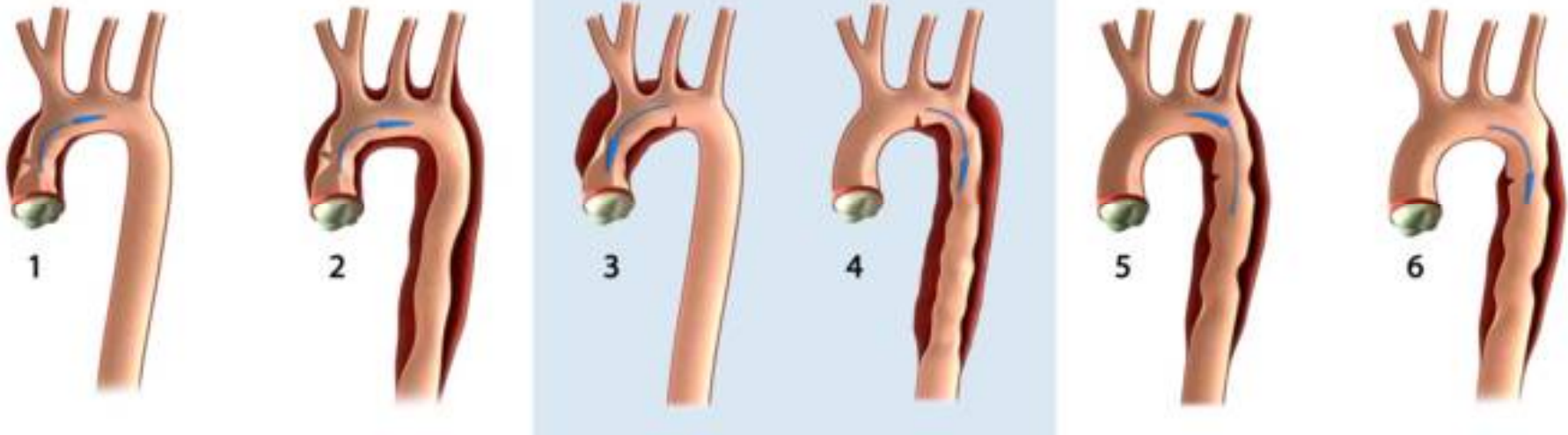


Aortic Aneurysm Dissection (AAD) Classification

	Type	Characteristic
DeBakey ¹ (1965)	I	Originates in the ascending aorta, but extends distally and involves the descending aorta
	II	Originates in and is confined to the ascending aorta
	III	Originates in and involves the descending aorta
Stanford ² (1970)	A	Involves the ascending aorta irrespective of the site of origin
	B	Involves the descending aorta exclusively



Contemporary Classification of Aortic Dissection



11%	47%	11%	7%	4%	20%
(n=157)	(n=673)	(n=161)	(n=98)	(n=58)	(n=280)

IRAD

1427 patients

- 954 male
- mean age 61.7 years

DISSECT

A New Mnemonic-based Approach to the Categorization of Aortic Dissection

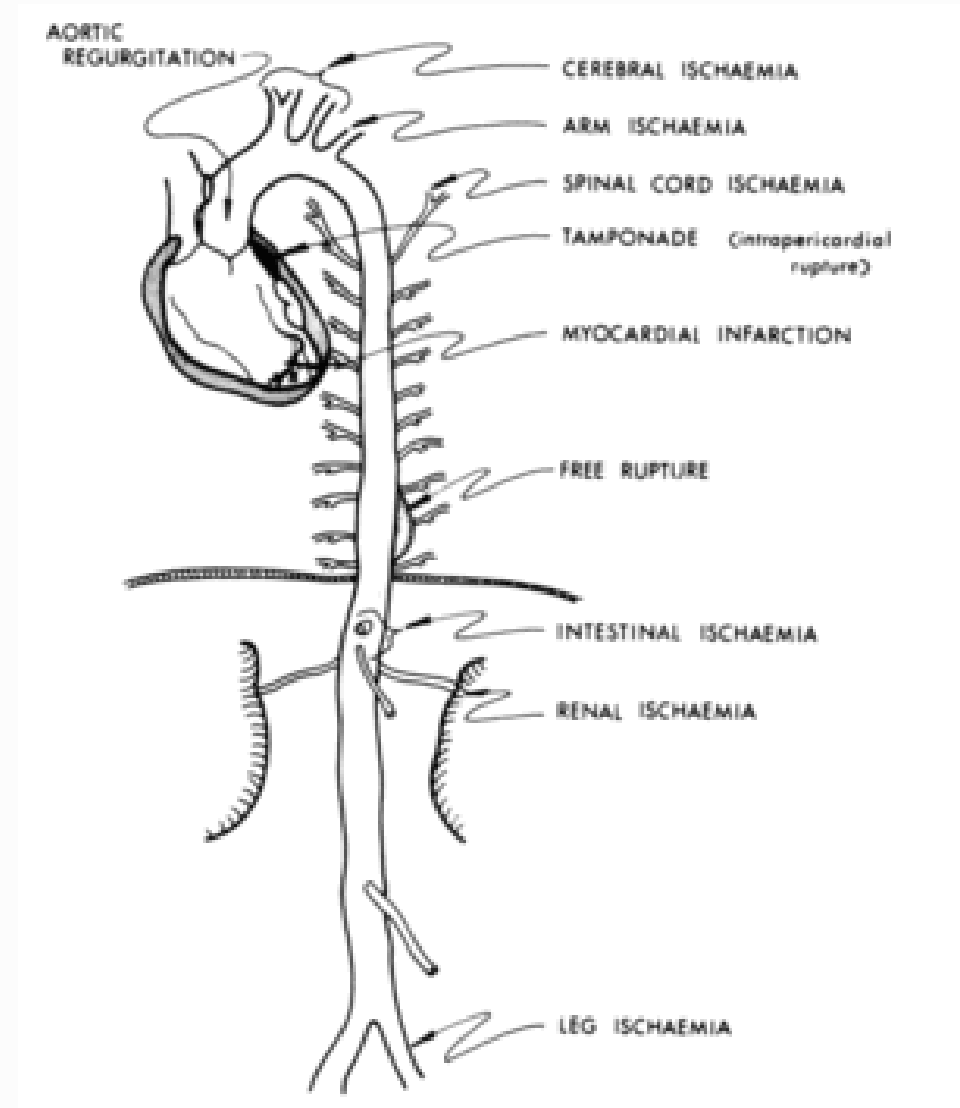
- *D*uration
- *I*ntimal tear location
- *S*ize of the dissected aorta
- *S*egmental *E*xtent of aortic involvement
- *C*linical complications of the dissection
- *T*hrombus within the aortic false lumen

M.D. Dake et al., EJVES, 46,2, Aug2013

Signs and symptoms of Aortic Dissection other than chest pain

Variable presentation with wide range of clinical manifestations

“The Great Masquerader”



SPONTANEOUS MORTALITY

48 hours : 50%

7 days : 60%

30 days: 90%

Anagnostopoulos CE : Acute Aortic Dissection. 1975; Baltimore : University Park Press.

« ...acute type A dissection is an inherently lethal condition.
Our first job is to produce a live patient. »

John Elefteriades. J. Thorac. Cardiovasc. Surg. 2002, 123; 201-3

THE PRE-OPERATIVE PATIENT'S KILLERS:

- TAMPONADE



- MAJOR MALPERFUSION



Coronary arteries



Supra-aortic vessels



Visceral arteries



- ACUTE AORTIC REGURGITATION



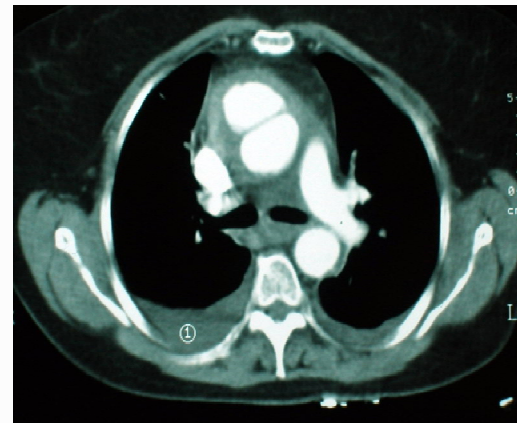
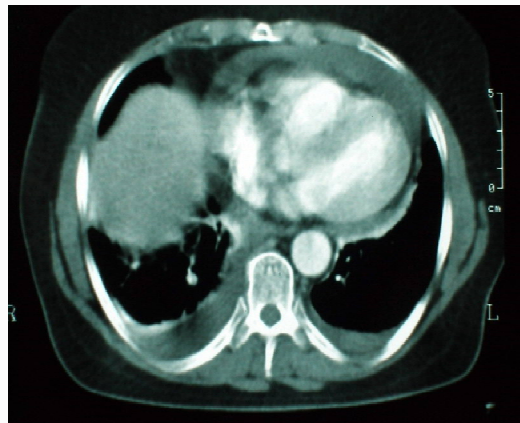
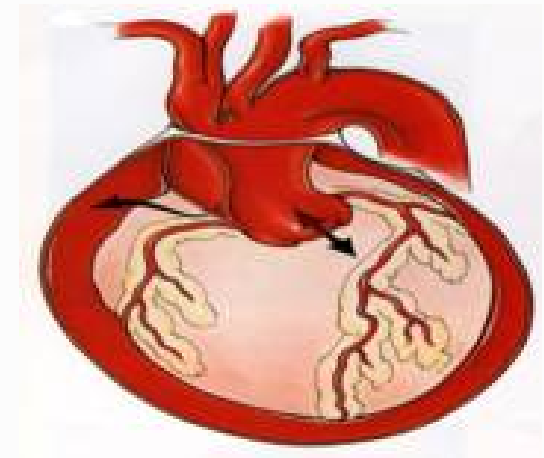
THE TAMPONADE

PRESENT IN MOST CASES

DOES NOT MEAN AORTIC RUPTURE

MIGHT KILL THE PATIENT AT ANY TIME

MAY BE DRAINED OFF BEFORE SURGERY WHENEVER NECESSARY

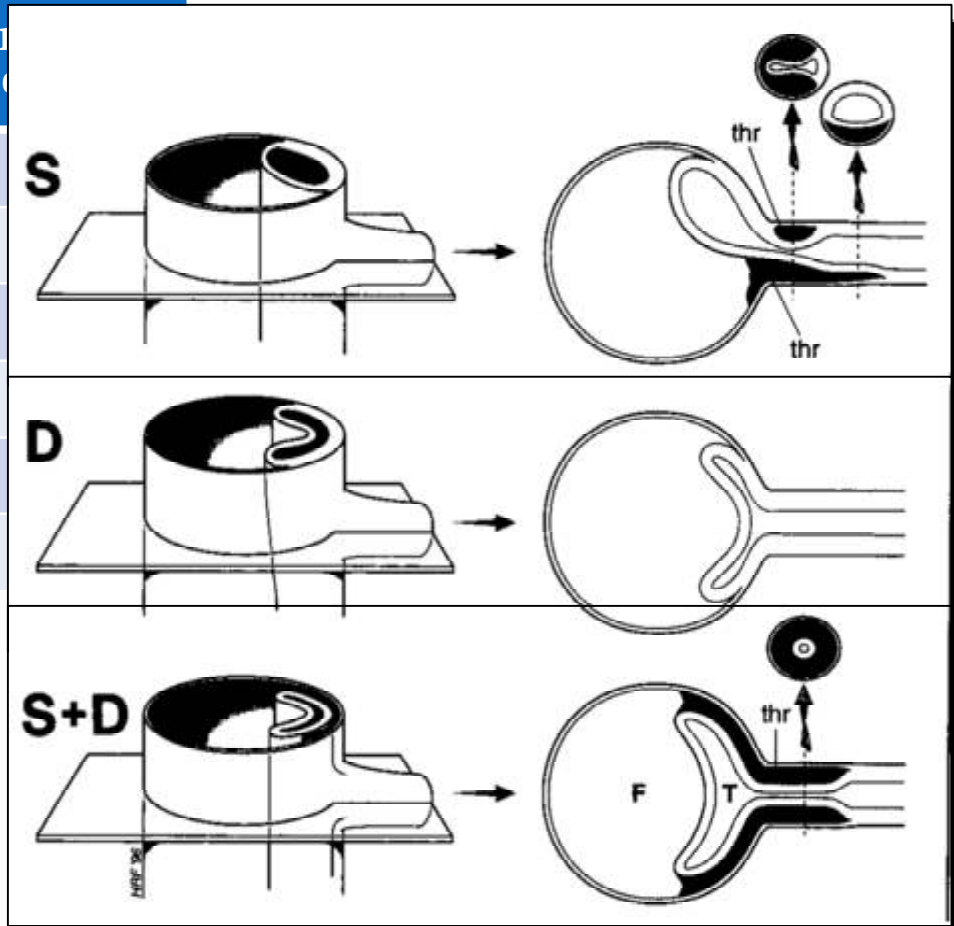


ORGAN MALPERFUSION

Vascular system	Frequency of organ malperfusion (%)
Coronary	5-11
Brachiocephalic	3-13
Spinal	2-9
Mesenteric	10-20
Renal	23-75
Limbs	25-60

MAY BE...

- **STATIC**
- **DYNAMIC**
- **MIXED**

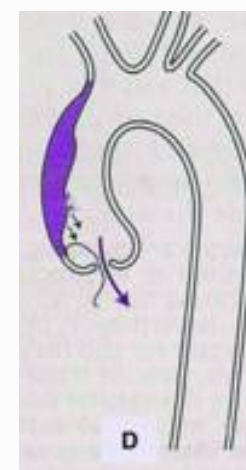
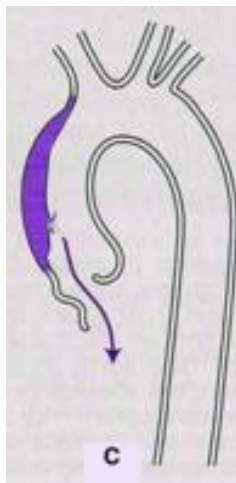
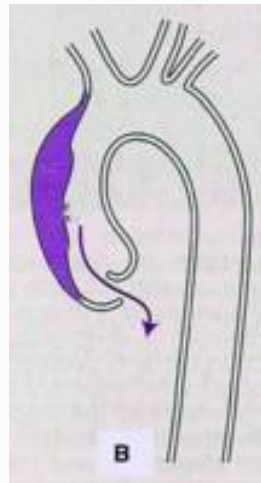
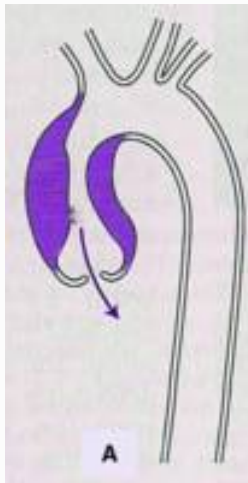
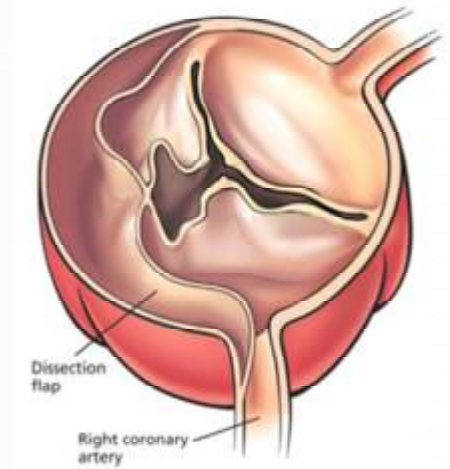


Williams DE et al. *The Dissected Aorta. Part III: Anatomy and radiologic diagnosis of branched-vessel compromise.* Radiology 1997; 203: 37-44

ACUTE AORTIC REGURGITATION

Mechanisms involved

- A. Dilatation of the aortic root and annulus
- B. Pressure of a false lumen on 1 cusp causing asymmetrical cusp coaptation
- C. Flail of an aortic cusp attributable to annular support disruption
- D. Prolapse of a mobile intimal flap through the aortic valve





SURGERY MUST BE UNDERTAKEN AS SOON AS POSSIBLE

Medical treatment

SBP control

- β -blockers to reduce shear stress on the aortic wall and reduce cardiac contractility by controlling BP and HR. Target systolic BP 100-120 and HR 60bpm
- β -blockers are associated with improved survival regardless of surgical therapy

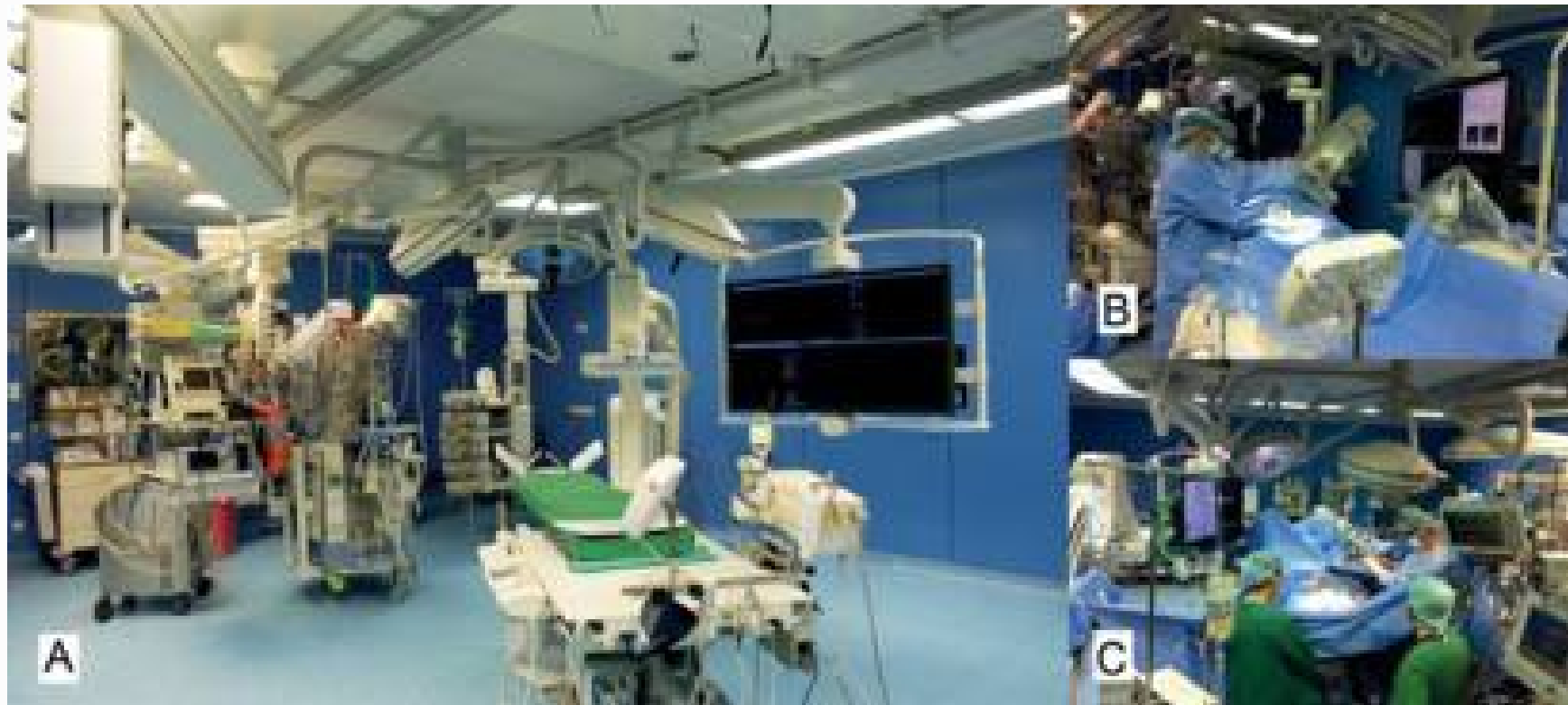
Note: Significant AR must be excluded by TEE before initiation of β -blockers since they may inhibit compensatory tachycardia

- Calcium channel blockers are good alternatives

Pain must be eliminated or deeply reduced

- Central sedation
- Morphine-like drugs

Hybrid OR



SURGERY MUST BE UNDERTAKEN AS SOON AS POSSIBLE

PATIENT PREPARATION IN OR

- Venous lines
- Arterial pressure lines
 - Rt. Radial
 - Lt. Radial
 - Femoral
- Urinary Catheter / Temperature probe
- TEE
- NIRS / EEG
- PA catheter

Approach to a patient with aortic dissection

THE CHALLENGE

ARTERIAL ACCESS & TYPE OF PERFUSION

- Ideally
 - True lumen perfusion
 - No pressurization of false lumen
- Practically
 - At least both lumina equally perfused

ARTERIAL CANNULATION IS OF
MAJOR IMPORTANCE

THE PROXIMAL REPAIR

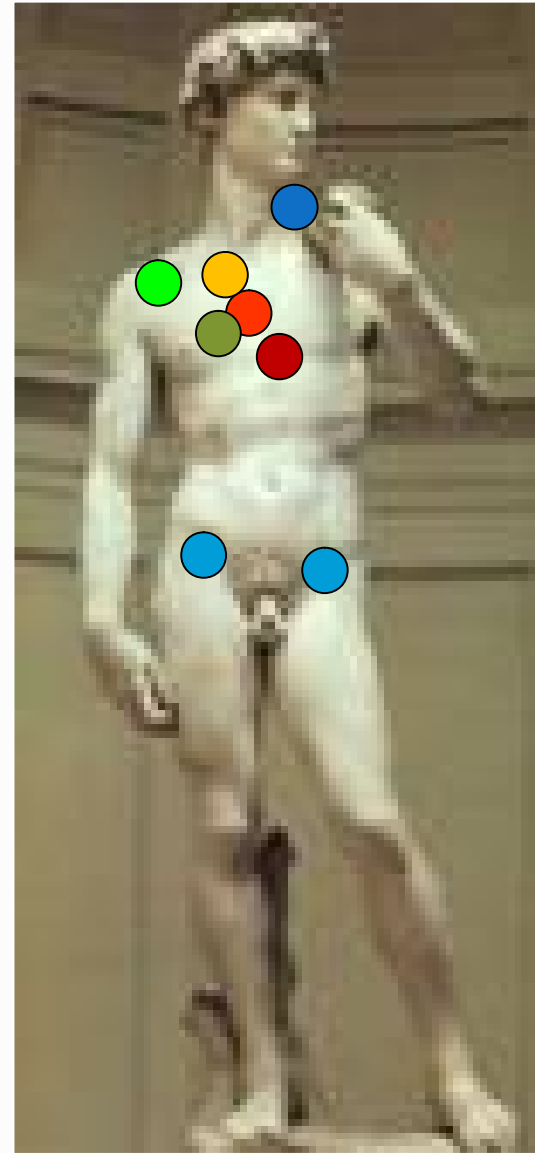
- The valve
- The aortic root

THE DISTAL REPAIR

- Cerebral protection
- Open distal anastomosis
- Hemi-arch replacement
- Total arch replacement \pm classical/frozen elephant trunk

PERIPHERAL CATHETERS

-  **FEMORAL ARTERIES**
-  **RIGHT AXILLARY ARTERY**
-  **INNOMINATE ARTERY**
-  **ASCENDING AORTA**
-  **LEFT COMMON CAROTID ARTERY**
-  **LV APEX**
-  **RSPV**



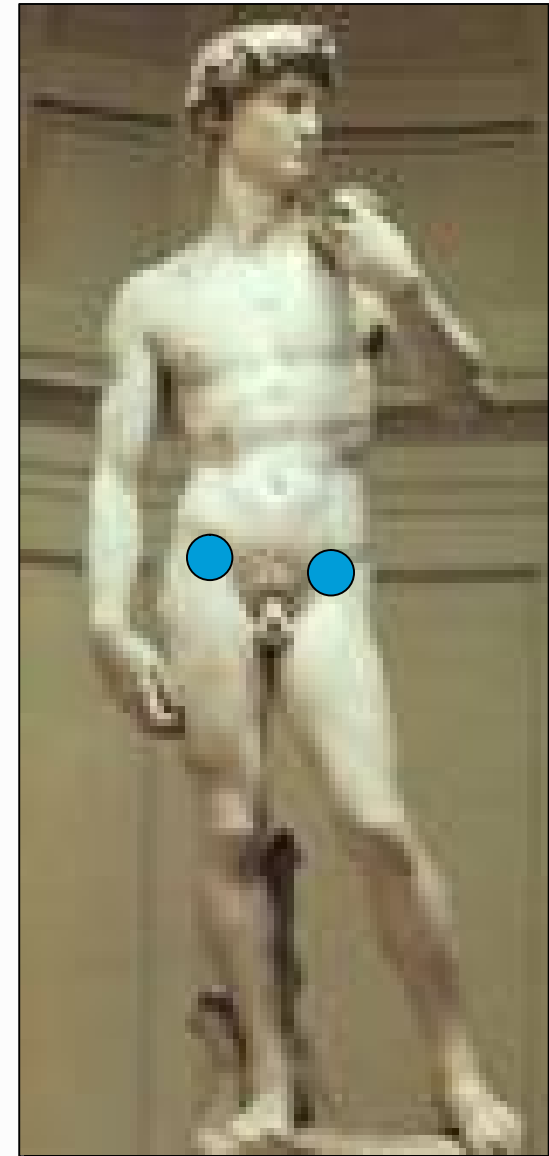
PERIPHERAL VENOUS CANNULATION

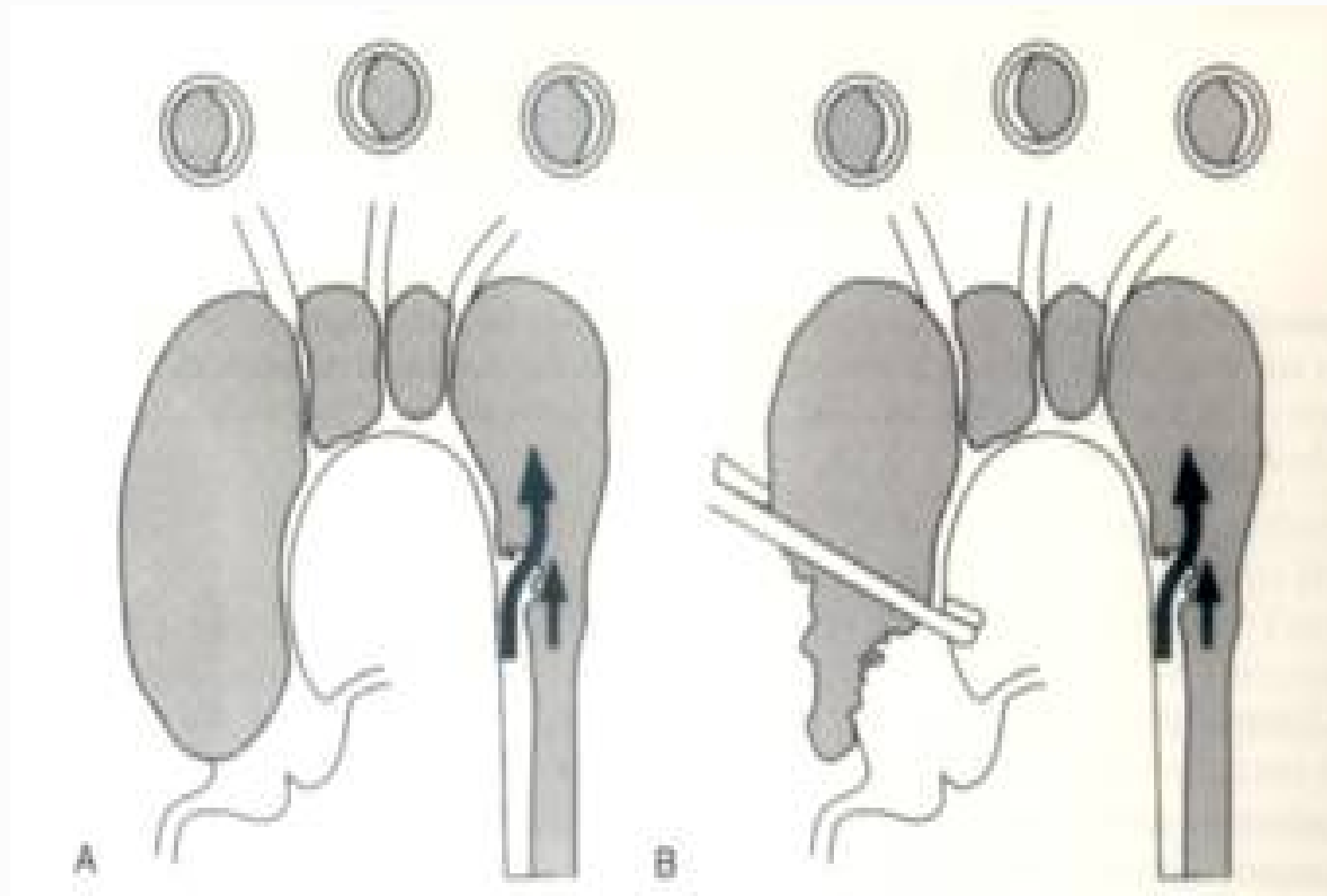
ADVANTAGES

- Easy & conventional
- Cannulation first
- Two sites (Rt./Lt.)
- Possibility of simultaneous venous cannulation

DISADVANTAGES

- Retrograde perfusion
- Dissected vessel
- Two incisions
- Potentially contaminated area





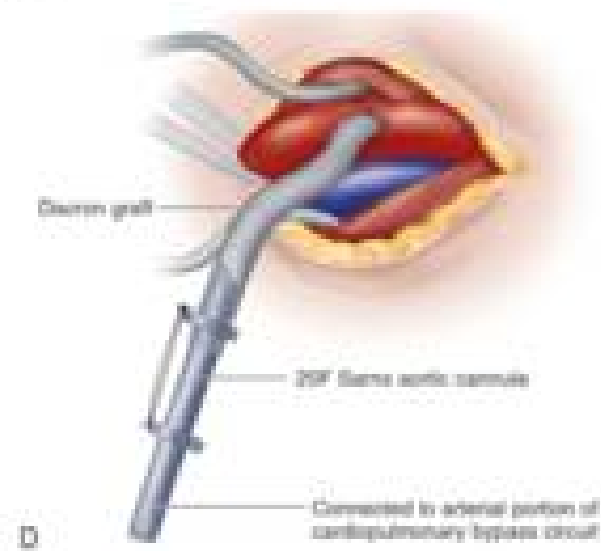
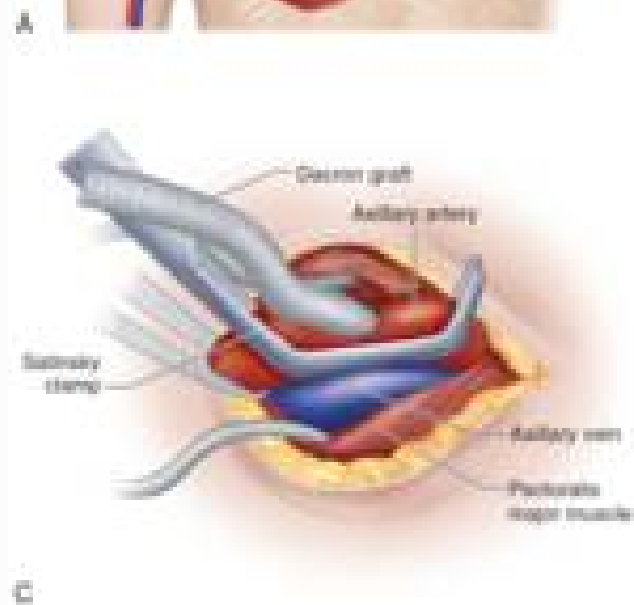
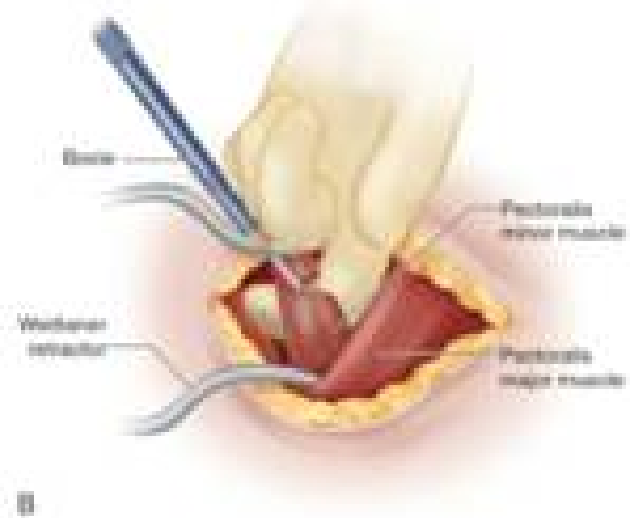
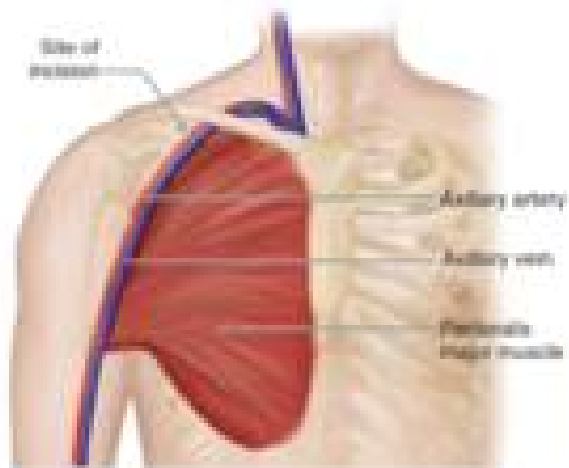
ADVANTAGES

- Cannulation first
- Antegrade perfusion
- Usually not dissected vessel
- Antegrade cerebral perfusion

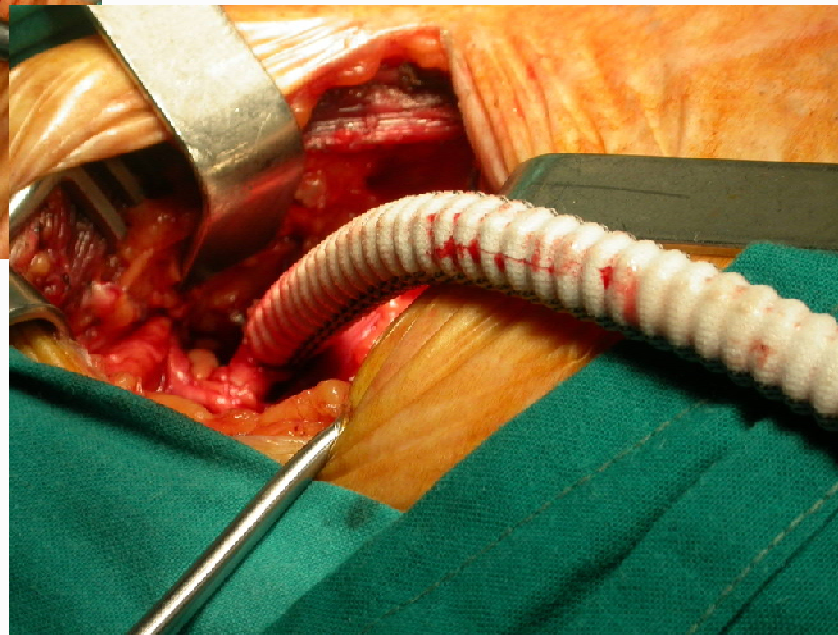
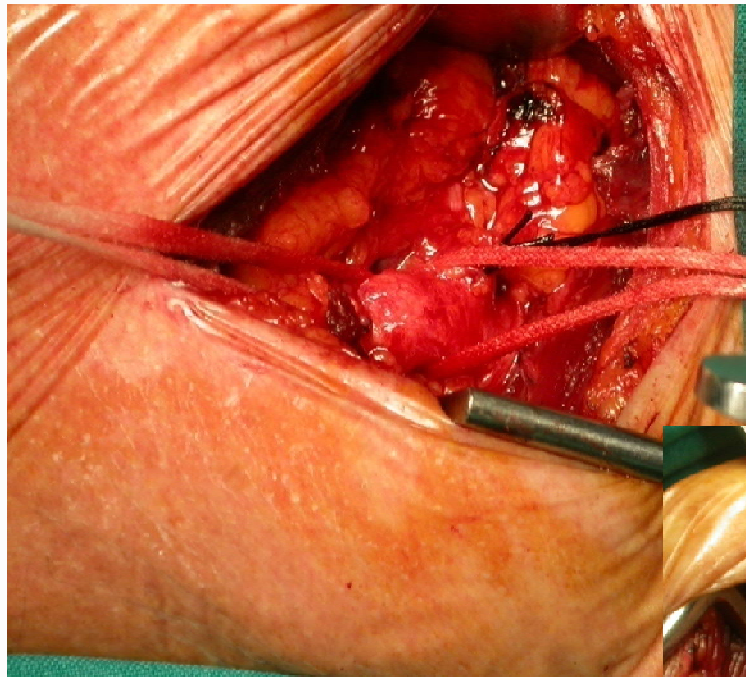
DISADVANTAGES

- Time consuming
- Impossible CNS perfusion if dissected
- Brachial plexus injury
- Vascular complications (fragile vessel)
- Prosthetic graft infection

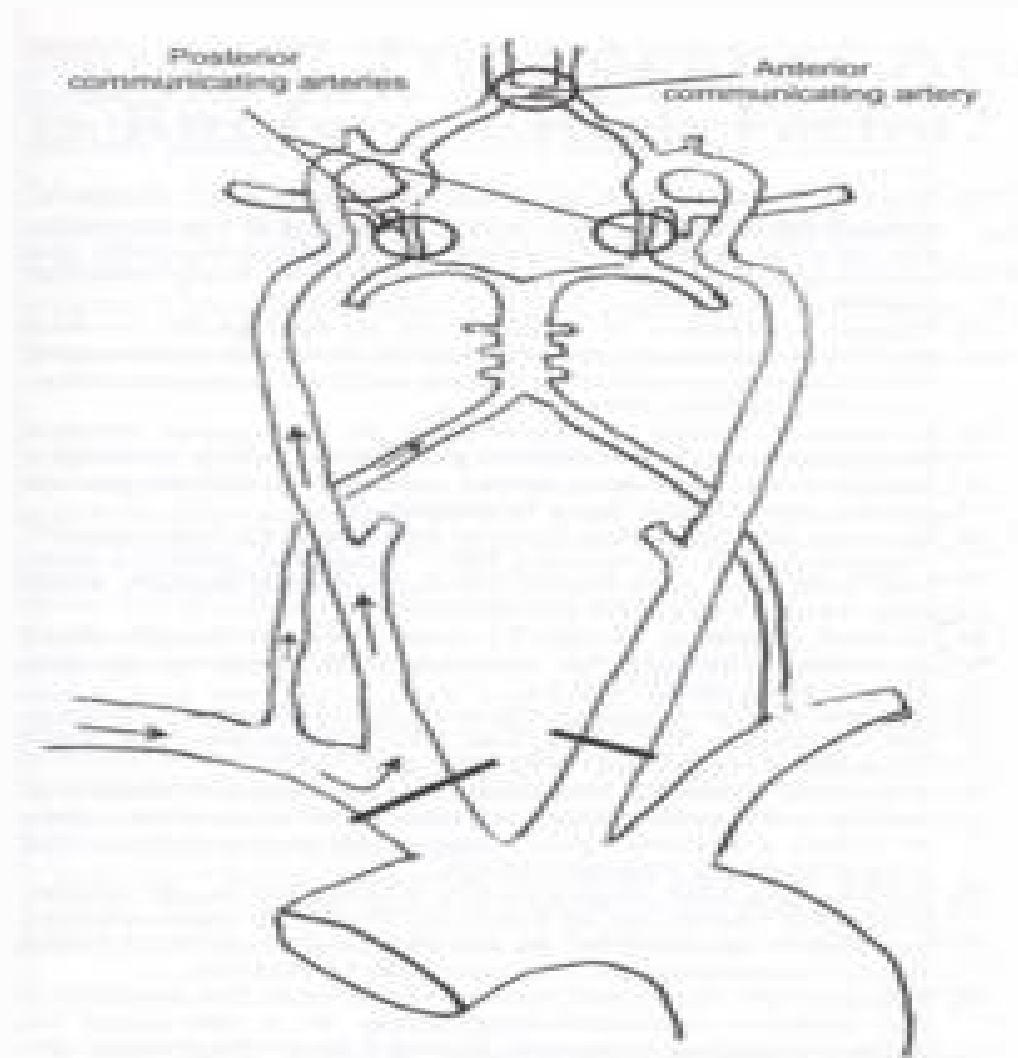




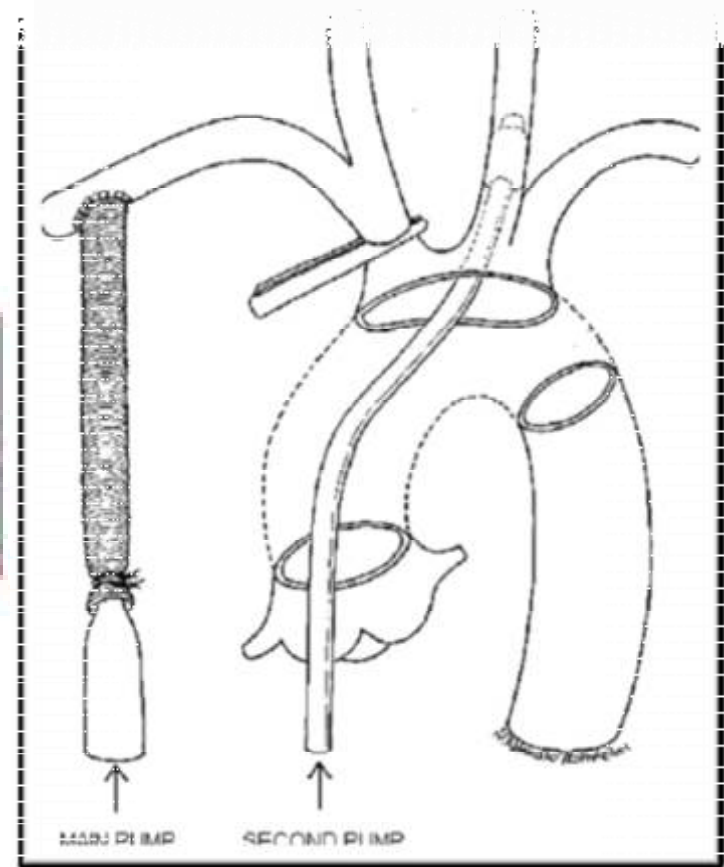
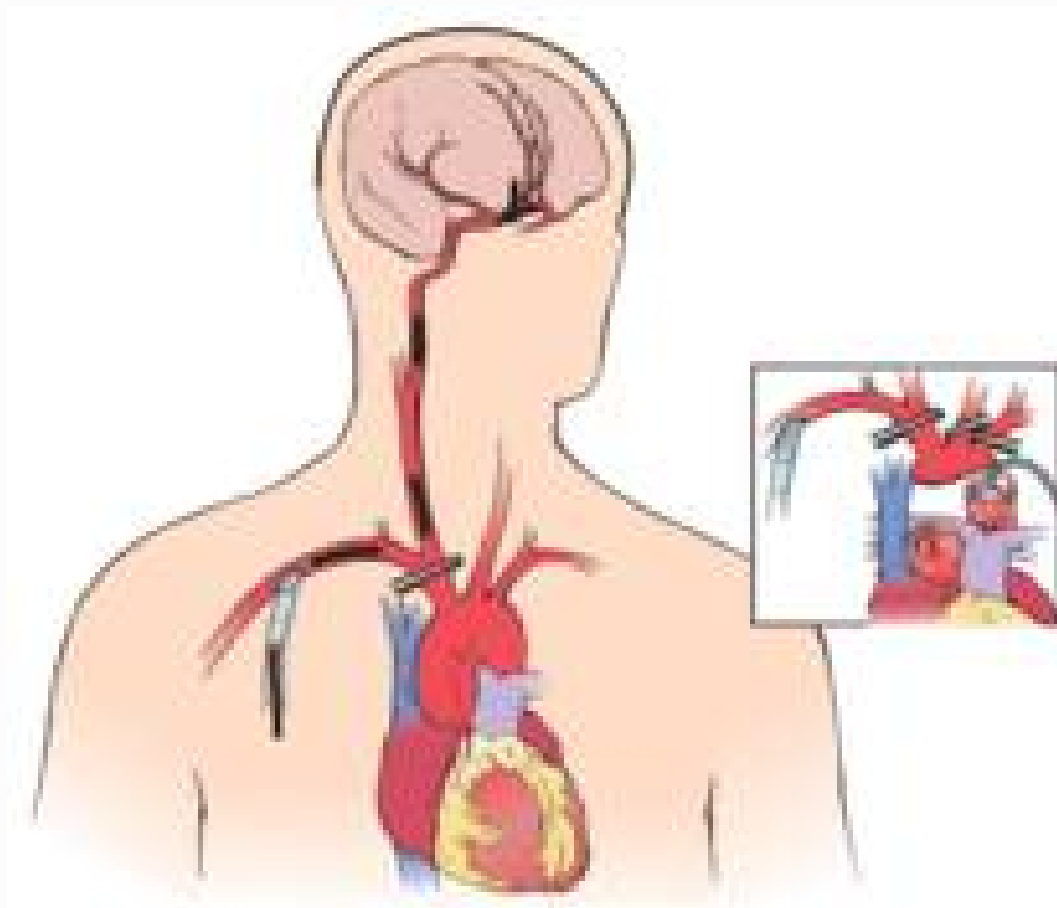
TRACHEAL CARCINOMA



RT. AXILARY CANNULATION 1509



EXTRACORPOREAL CIRCULATION



ADVANTAGES AND DISADVANTAGES OF

DIFFERENT TYPES OF CPB

	Advantage	Disadvantage
Femoral artery cannulation	Quick to establish CPB	Possible more malperfusion due to retrograde aortic flow
	Easy to access even with closed chest	Possible atherosclerotic emboli
	Less likely to be dissected	
The right axillary artery cannulation	Antegrade flow	More time-consuming
	Can be used for antegrade cerebral perfusion rout	Technically demanding in some cases
		Possible injury to the brachial plexus
Central aortic cannulation	Antegrade flow	Possible false lumen perfusion
	Quick to establish CPB	Possible aortic rupture
Transapical cannulation	Antegrade flow	Technically unfamiliar to many surgeons
	Quick to establish CPB	Dangerous in patients with aortic stenosis
	Less likely to cause aortic rupture	

SPECIAL CONSIDERATIONS IN CANNULATION

THEORY

Theoretically, four aspects differ among the cannulation strategies.
These include

- the time needed to establish cardiopulmonary bypass
- malperfusion during the cooling period,
- possible exacerbation of aortic dissection during cannulation and the cooling period.
- possible differences in the brain protection strategy during circulatory arrest

SPECIAL CONSIDERATIONS IN CANNULATION

PERFUSION


No perfusion strategy is perfect or free from complications

Since malperfusion syndrome is strongly associated with poor post-operative outcomes, **every effort should be made to solve the problem.**

New malperfusion can also occur after the initiation of CPB, probably due to a dynamic obstruction mechanism.


Intraoperative malperfusion occurs less often with axillary artery cannulation than with femoral artery cannulation.

Multimodal real-time monitoring of organ malperfusion has an important role **and a swift response to adverse events are necessary.**

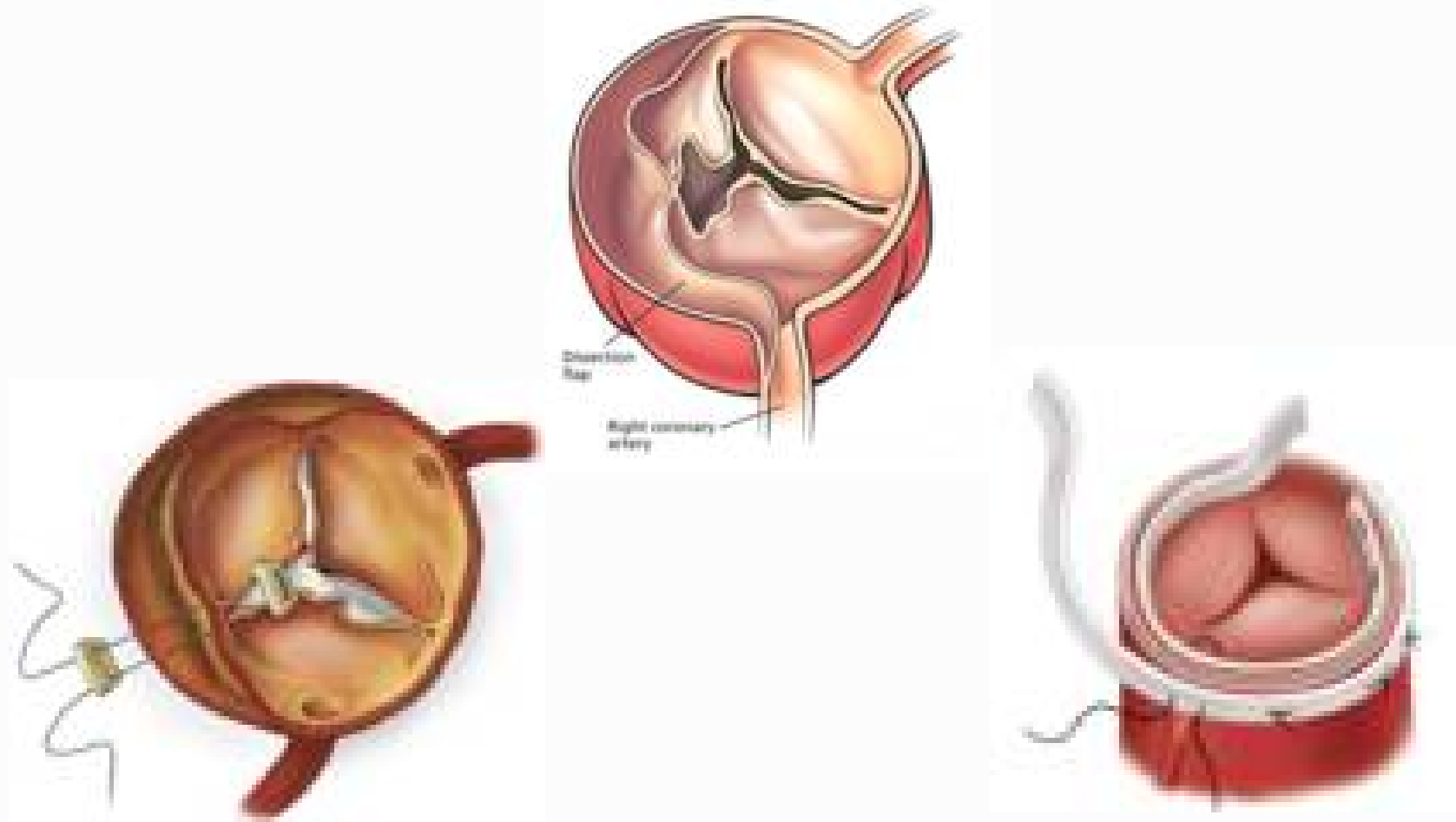
- 
- Excision of intimal tear (entry point)
 - Restoration of aortic valve competence
 - Obliteration FL
 - Reconstitution of aorta with interposition graft +/- coronary reimplantations

Unfortunately this objective is **rarely achieved** except for DeBakey type II dissection (involving only the ascending aorta)



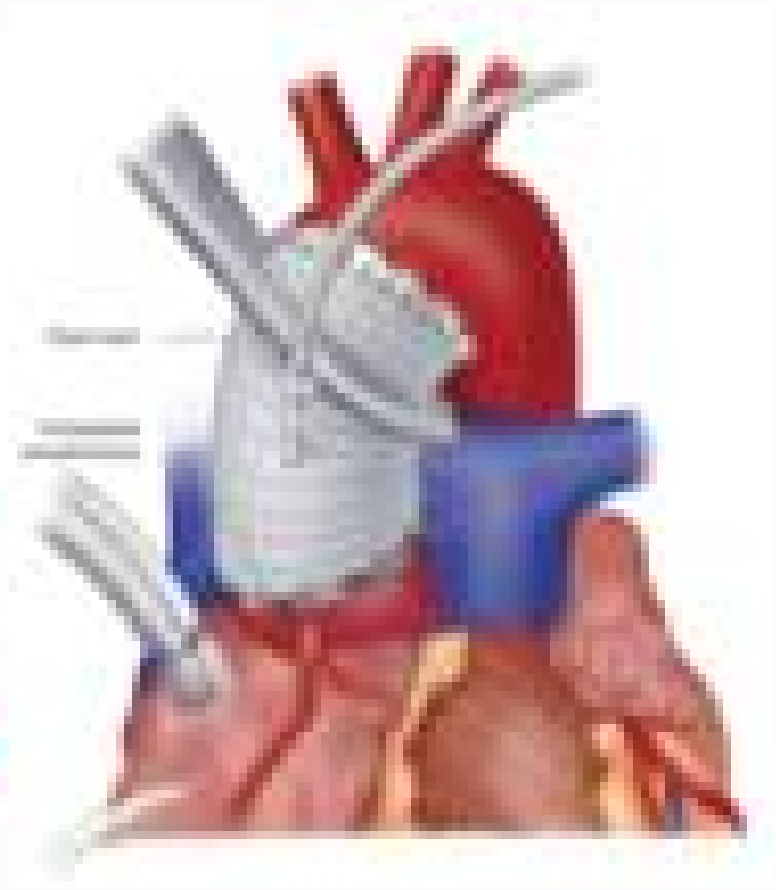
- 
- supracommissural ascending aorta replacement (ascending aortic replacement)
 - composite valve graft root replacement
 - aortic valve-sparing root replacement

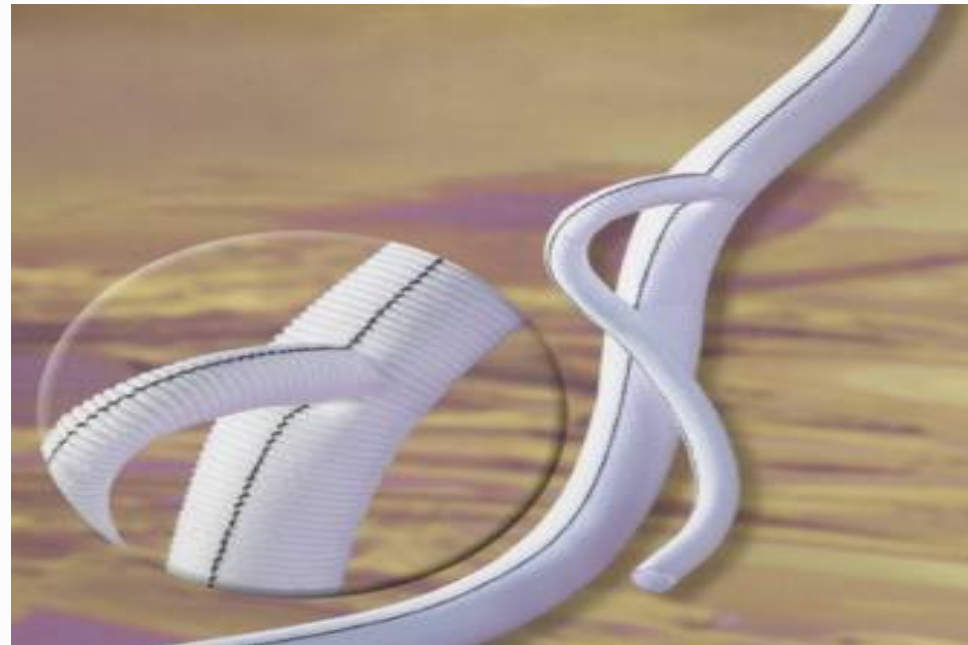
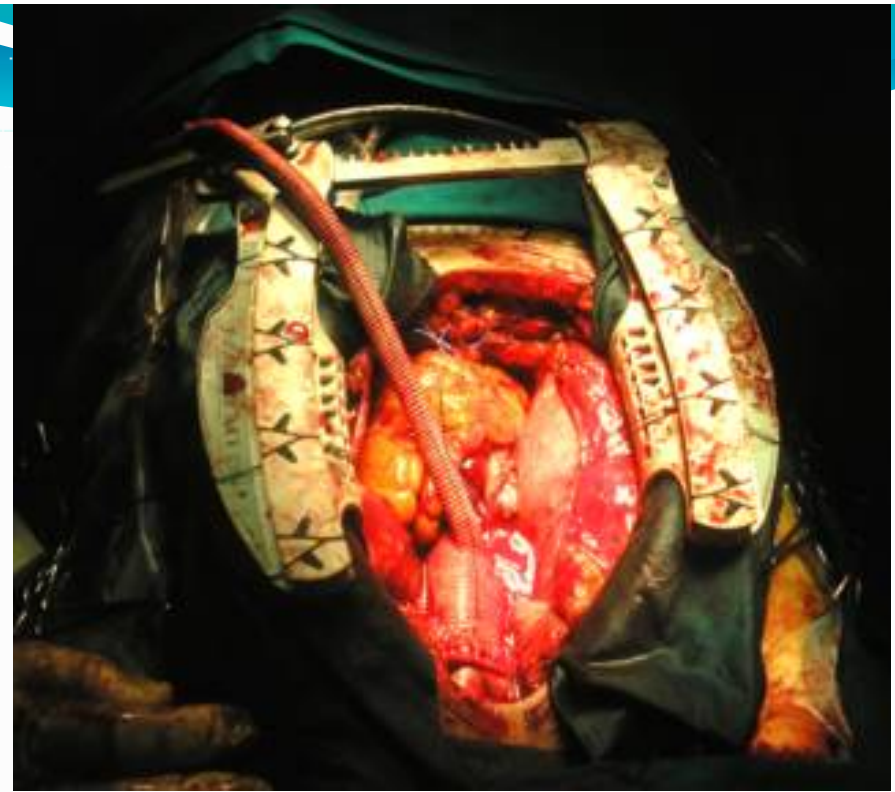
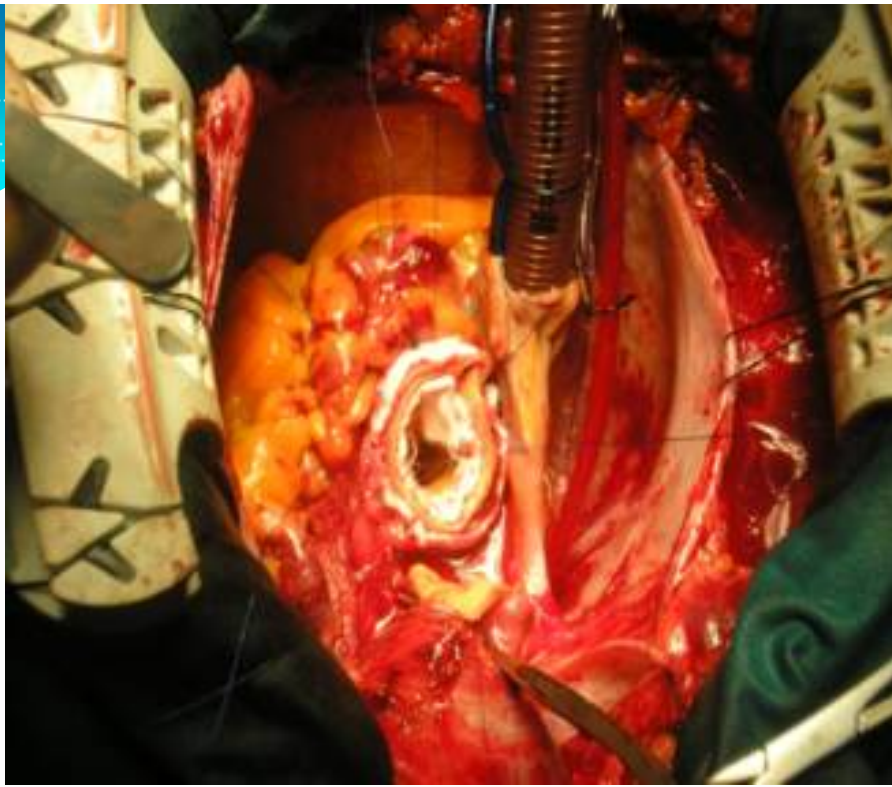
PERICARDIAL EFFUSION OR PNEUMOTHORAX OR BOTH



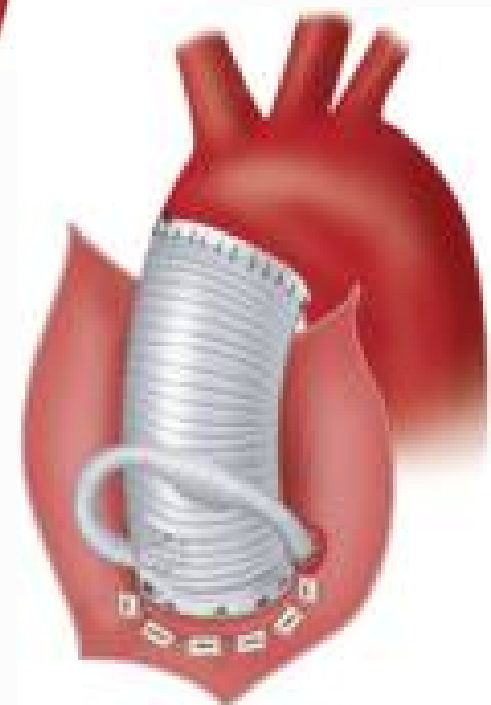
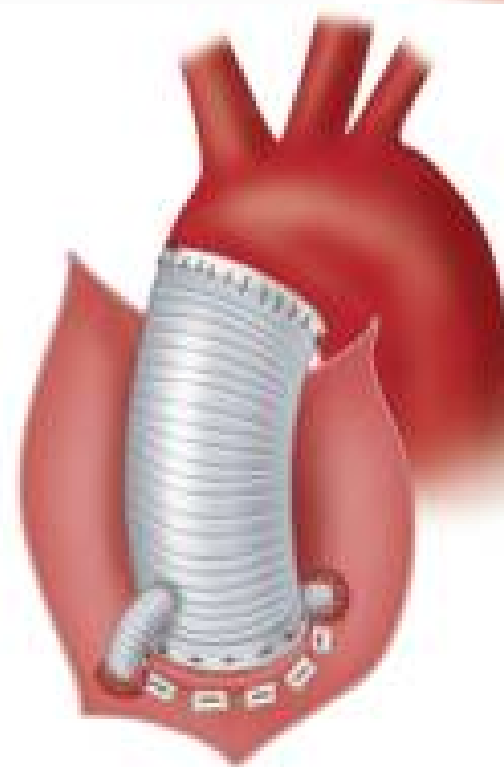
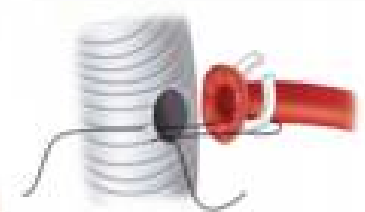
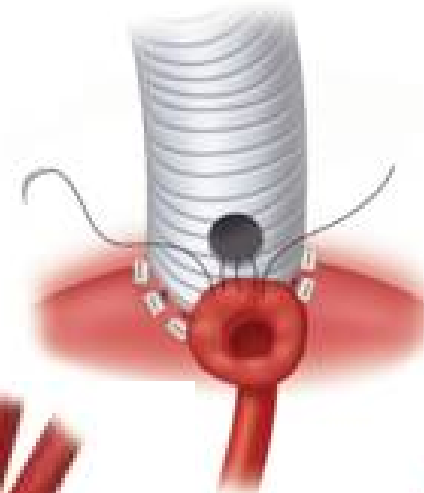
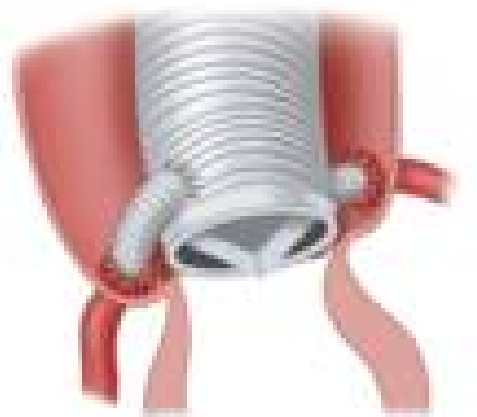
THE HISTORY OF THE HUMAN HEART

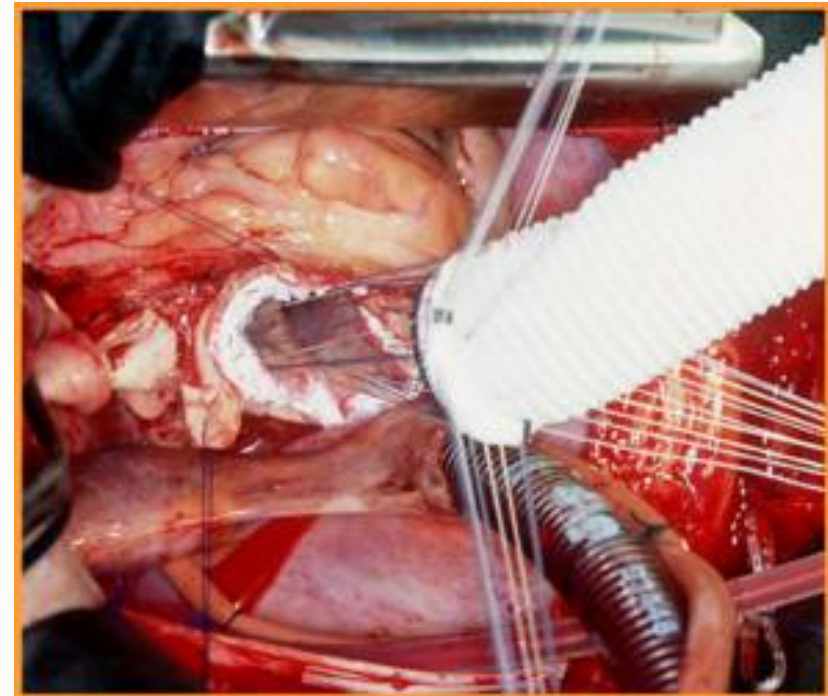
The human heart is a complex organ that has been the subject of study and discovery for centuries. It is the central pump of the circulatory system, responsible for circulating blood throughout the body. The heart's structure and function have been the focus of numerous scientific investigations, leading to a deeper understanding of its role in human health and disease.

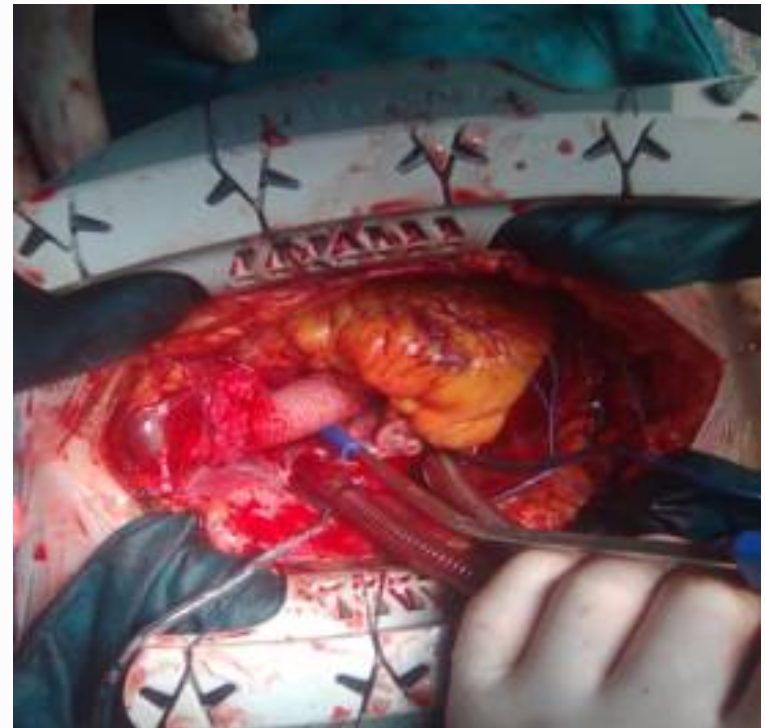
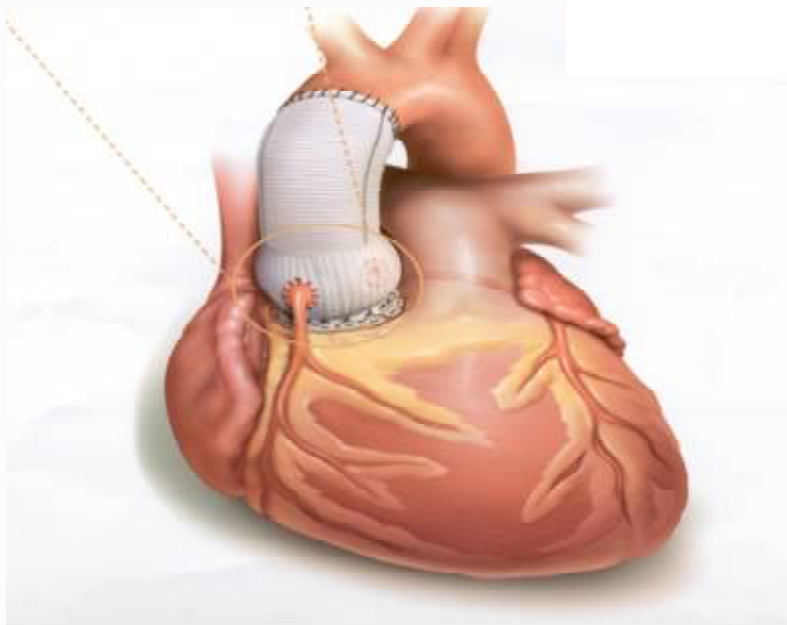




Transcatheter Valve Implantation (TAVI) / TAVR

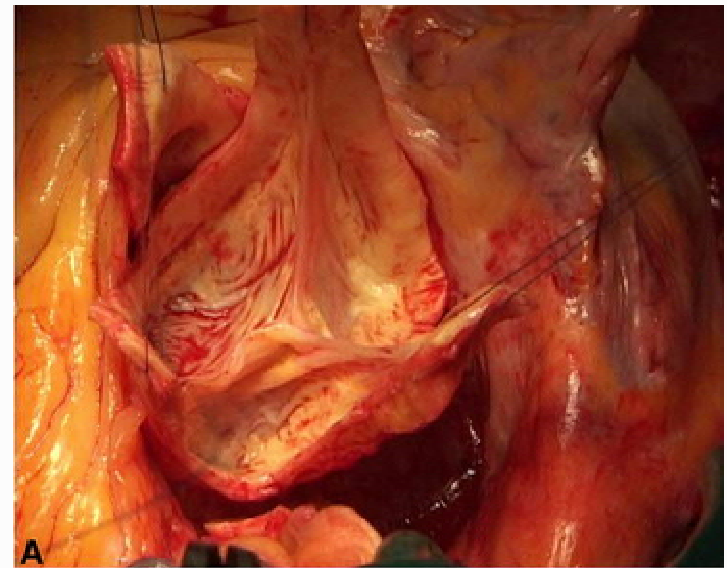
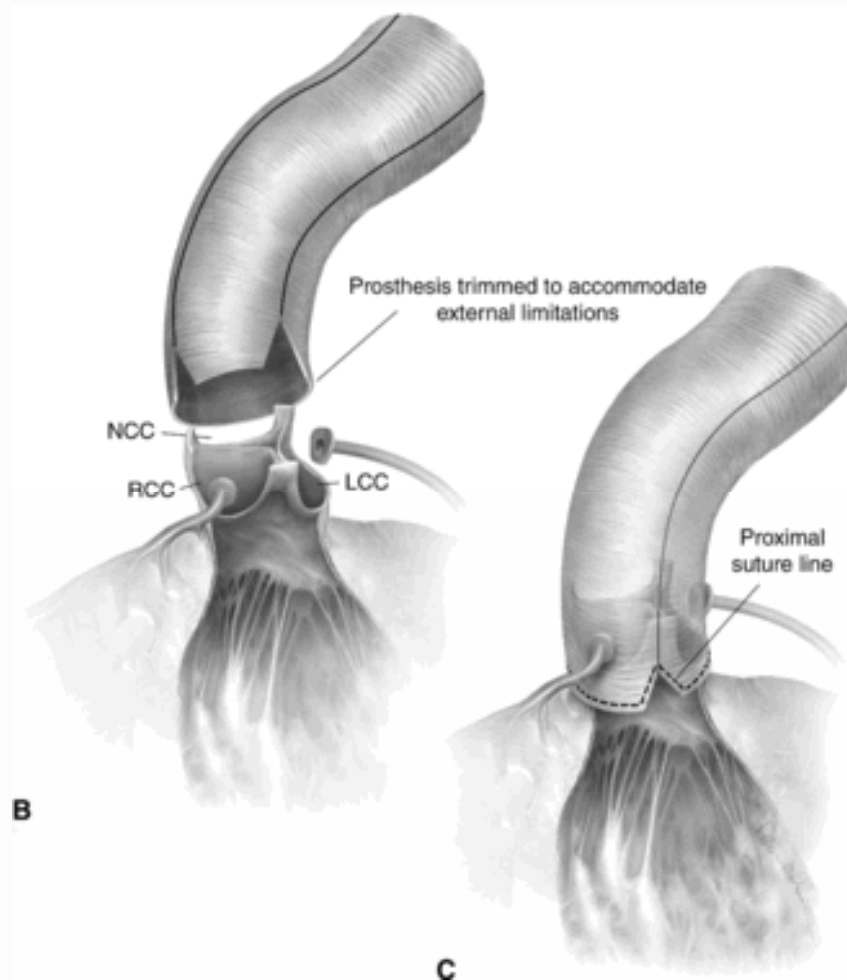


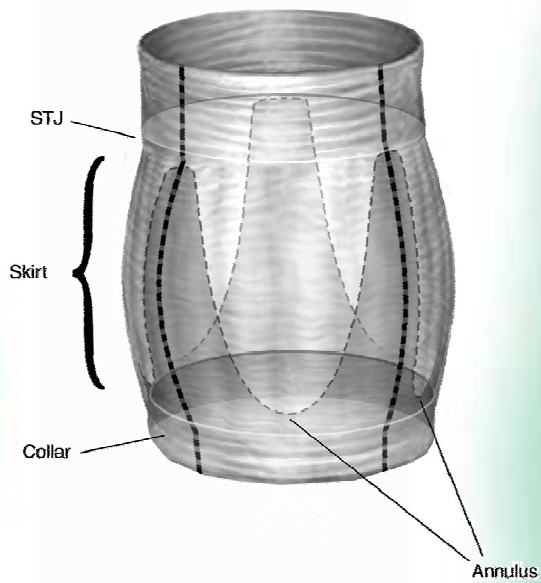
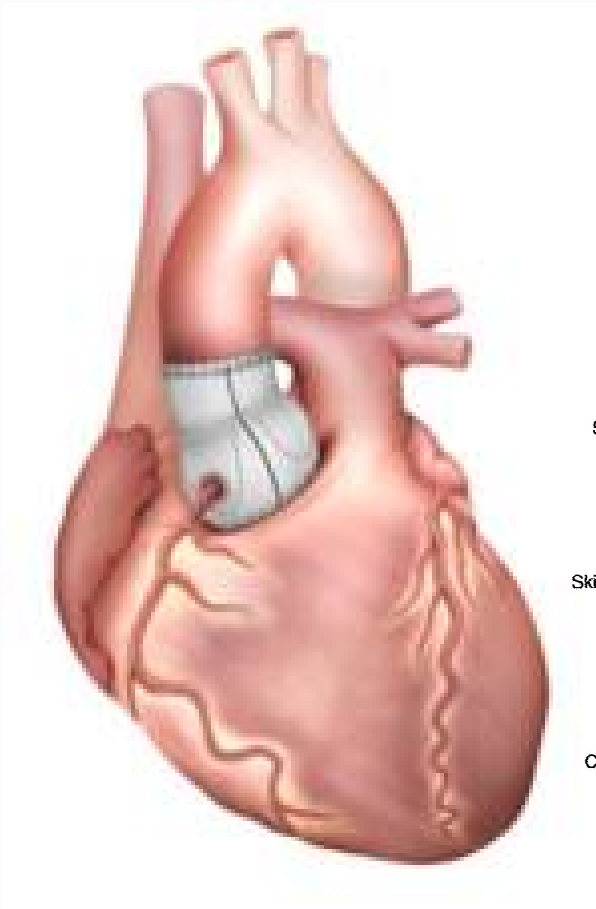


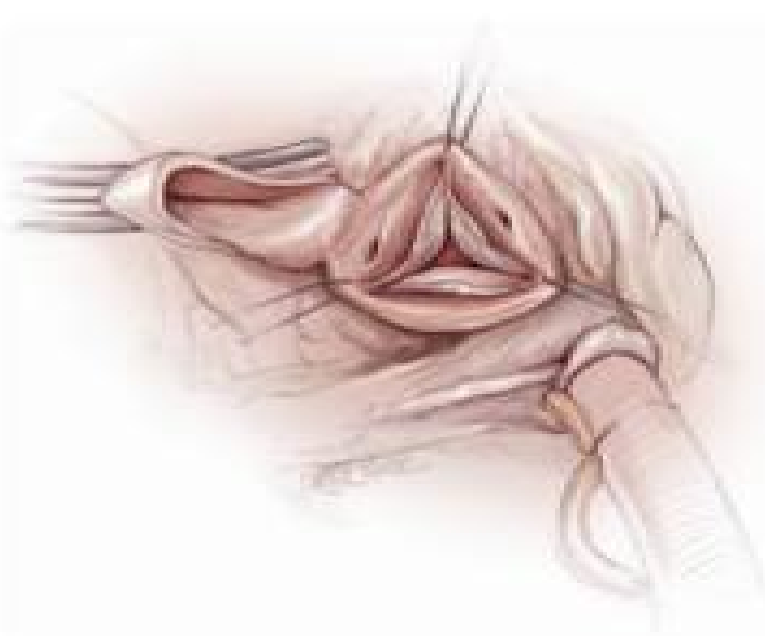


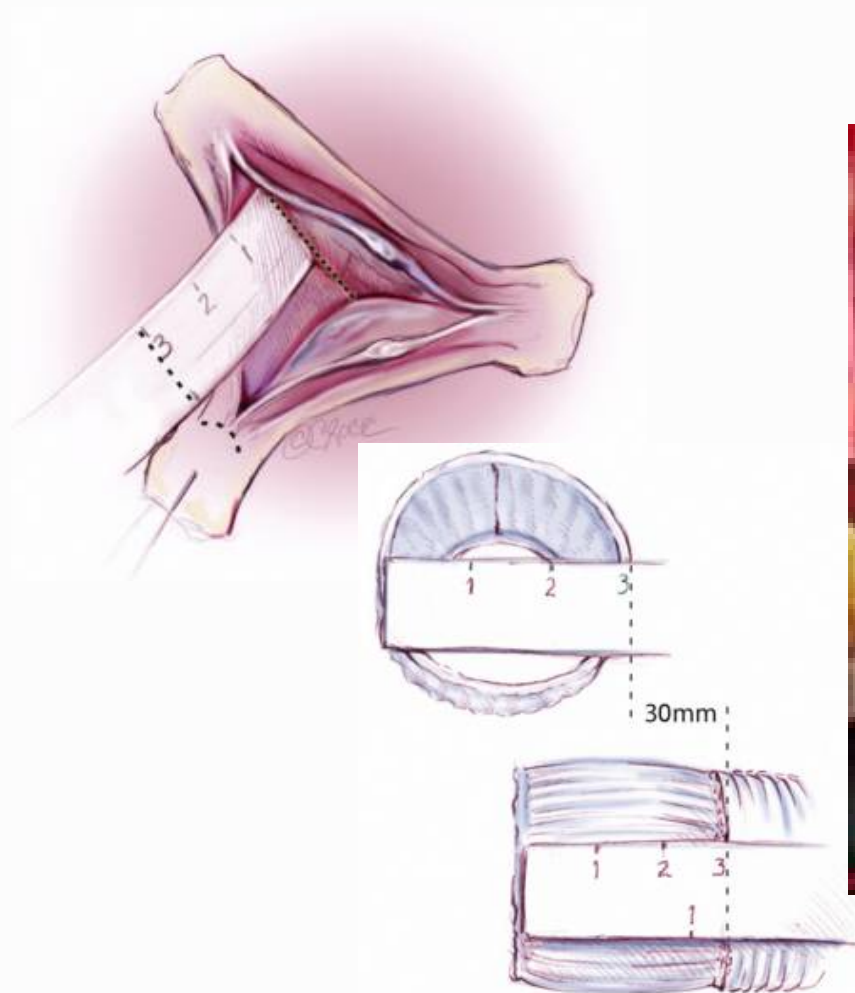


Valve-Sparing Aortic Root Replacement





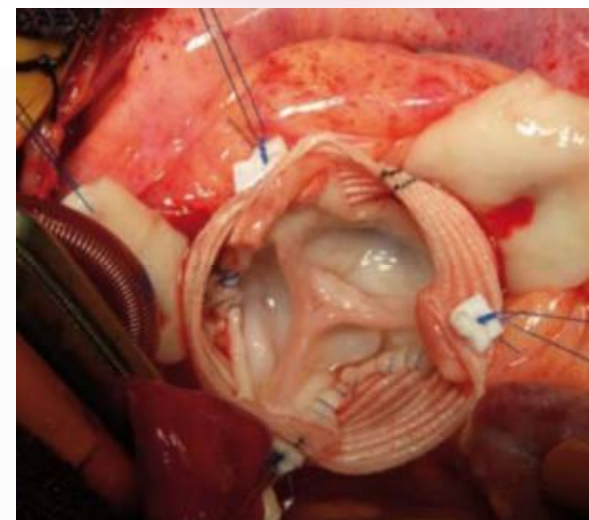


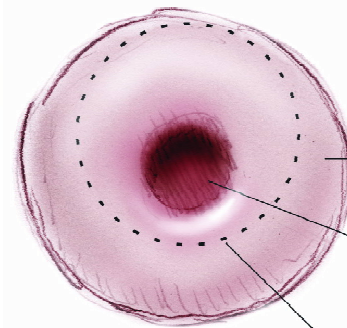


1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100







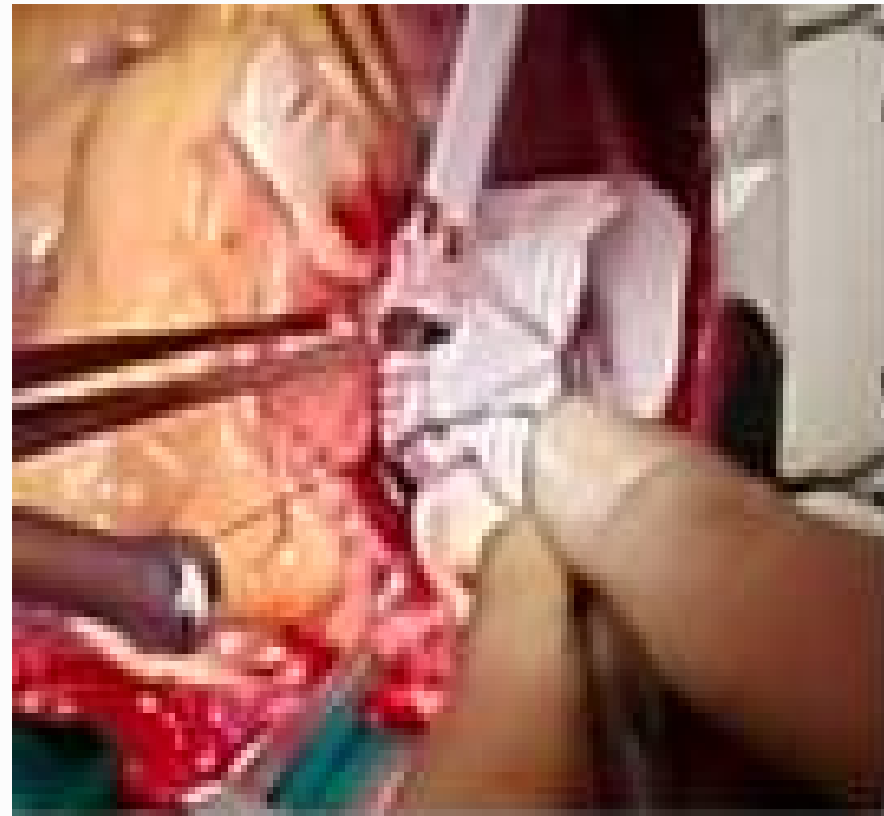
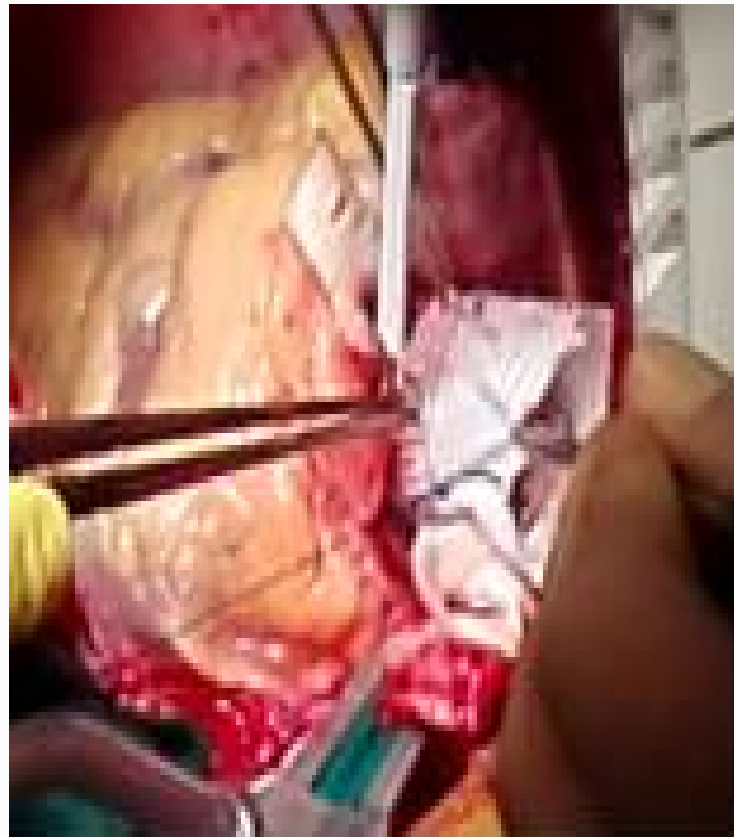


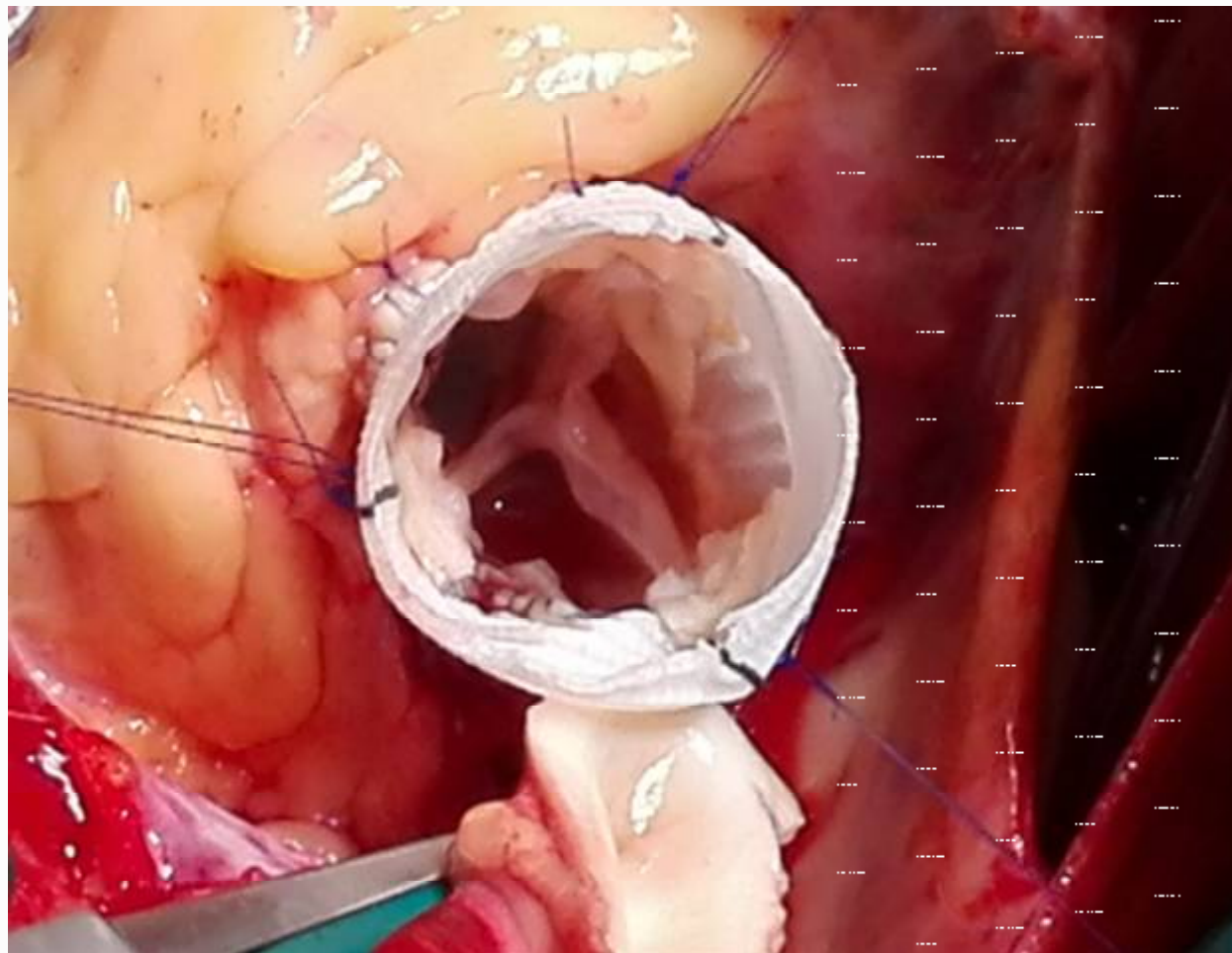
coronary
button

coronary
ostia

pathway of
running suture







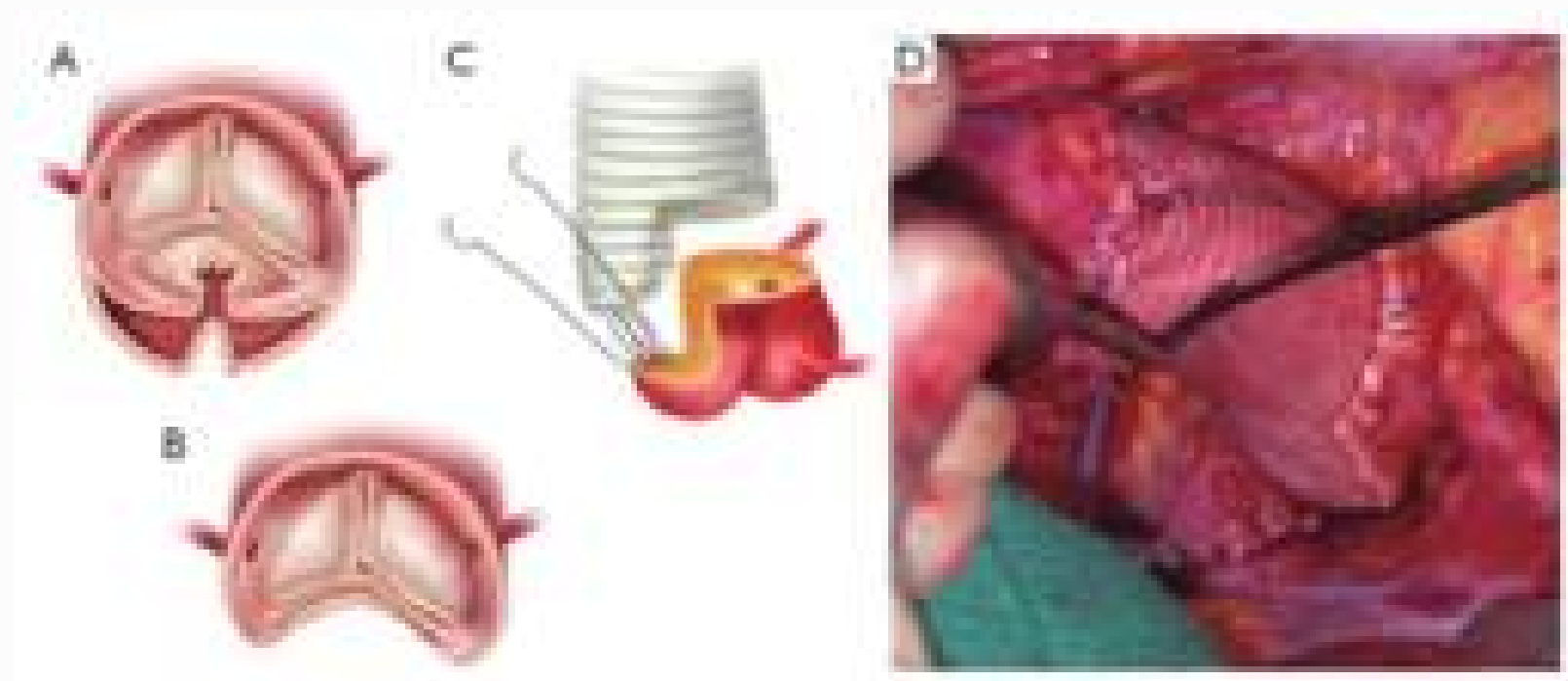
Management of Aortic Root Aneurysm



V-SARR in selected patients

Aortic valve re-suspension

Aortic root replacement



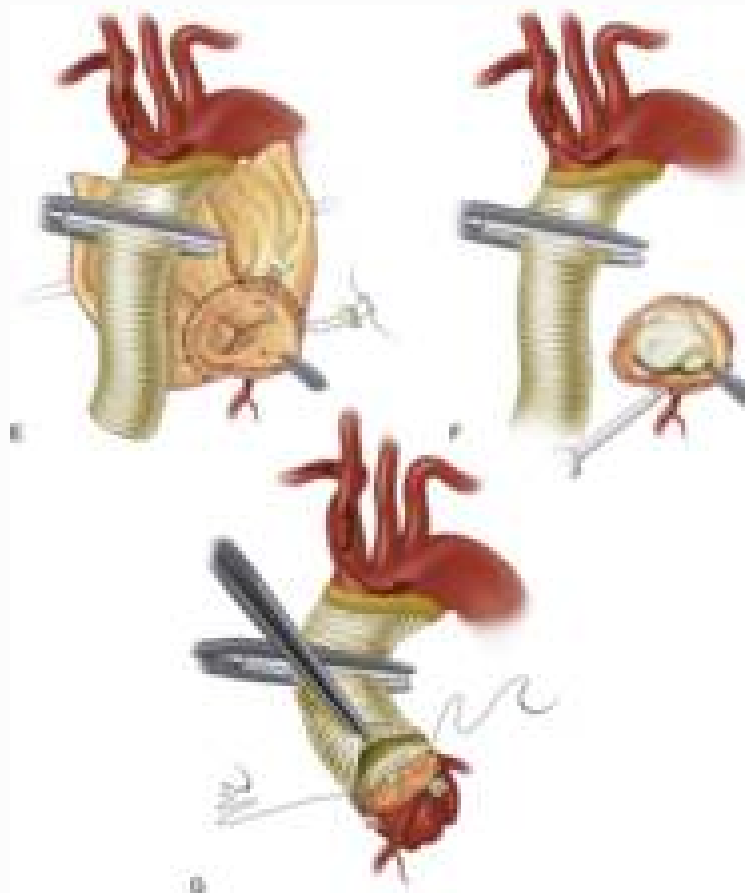


IS THERE AN IDEAL TECHNIQUE ?

The Open Distal Anastomosis...

- Allows checking the aortic arch
- Prevents from cross-clamp injuries
- Requires circulatory arrest and brain Protection

Distal aortic anastomosis: how to deal with the arch?



Modified Sandwich Technique for Acute Aortic Dissection

Technique (Step 1) Step 2 Step 3 Step 4 Step 5 Step 6 Step 7 Step 8 Step 9 Step 10 Step 11 Step 12 Step 13 Step 14 Step 15 Step 16 Step 17 Step 18 Step 19 Step 20 Step 21 Step 22 Step 23 Step 24 Step 25 Step 26 Step 27 Step 28 Step 29 Step 30 Step 31 Step 32 Step 33 Step 34 Step 35 Step 36 Step 37 Step 38 Step 39 Step 40 Step 41 Step 42 Step 43 Step 44 Step 45 Step 46 Step 47 Step 48 Step 49 Step 50 Step 51 Step 52 Step 53 Step 54 Step 55 Step 56 Step 57 Step 58 Step 59 Step 60 Step 61 Step 62 Step 63 Step 64 Step 65 Step 66 Step 67 Step 68 Step 69 Step 70 Step 71 Step 72 Step 73 Step 74 Step 75 Step 76 Step 77 Step 78 Step 79 Step 80 Step 81 Step 82 Step 83 Step 84 Step 85 Step 86 Step 87 Step 88 Step 89 Step 90 Step 91 Step 92 Step 93 Step 94 Step 95 Step 96 Step 97 Step 98 Step 99 Step 100

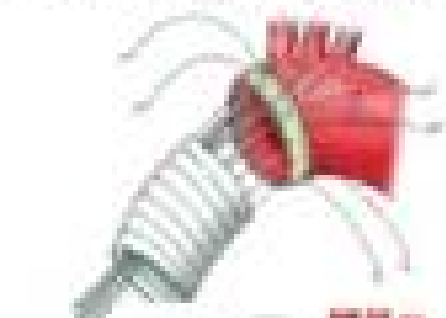


Figure 1



Figure 2

Technique (Step 1) Step 2 Step 3 Step 4 Step 5 Step 6 Step 7 Step 8 Step 9 Step 10 Step 11 Step 12 Step 13 Step 14 Step 15 Step 16 Step 17 Step 18 Step 19 Step 20 Step 21 Step 22 Step 23 Step 24 Step 25 Step 26 Step 27 Step 28 Step 29 Step 30 Step 31 Step 32 Step 33 Step 34 Step 35 Step 36 Step 37 Step 38 Step 39 Step 40 Step 41 Step 42 Step 43 Step 44 Step 45 Step 46 Step 47 Step 48 Step 49 Step 50 Step 51 Step 52 Step 53 Step 54 Step 55 Step 56 Step 57 Step 58 Step 59 Step 60 Step 61 Step 62 Step 63 Step 64 Step 65 Step 66 Step 67 Step 68 Step 69 Step 70 Step 71 Step 72 Step 73 Step 74 Step 75 Step 76 Step 77 Step 78 Step 79 Step 80 Step 81 Step 82 Step 83 Step 84 Step 85 Step 86 Step 87 Step 88 Step 89 Step 90 Step 91 Step 92 Step 93 Step 94 Step 95 Step 96 Step 97 Step 98 Step 99 Step 100

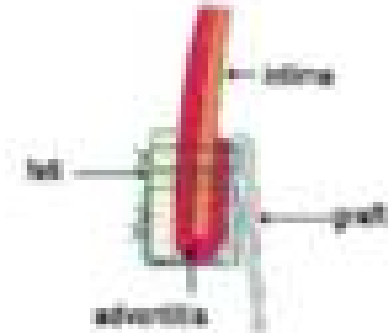
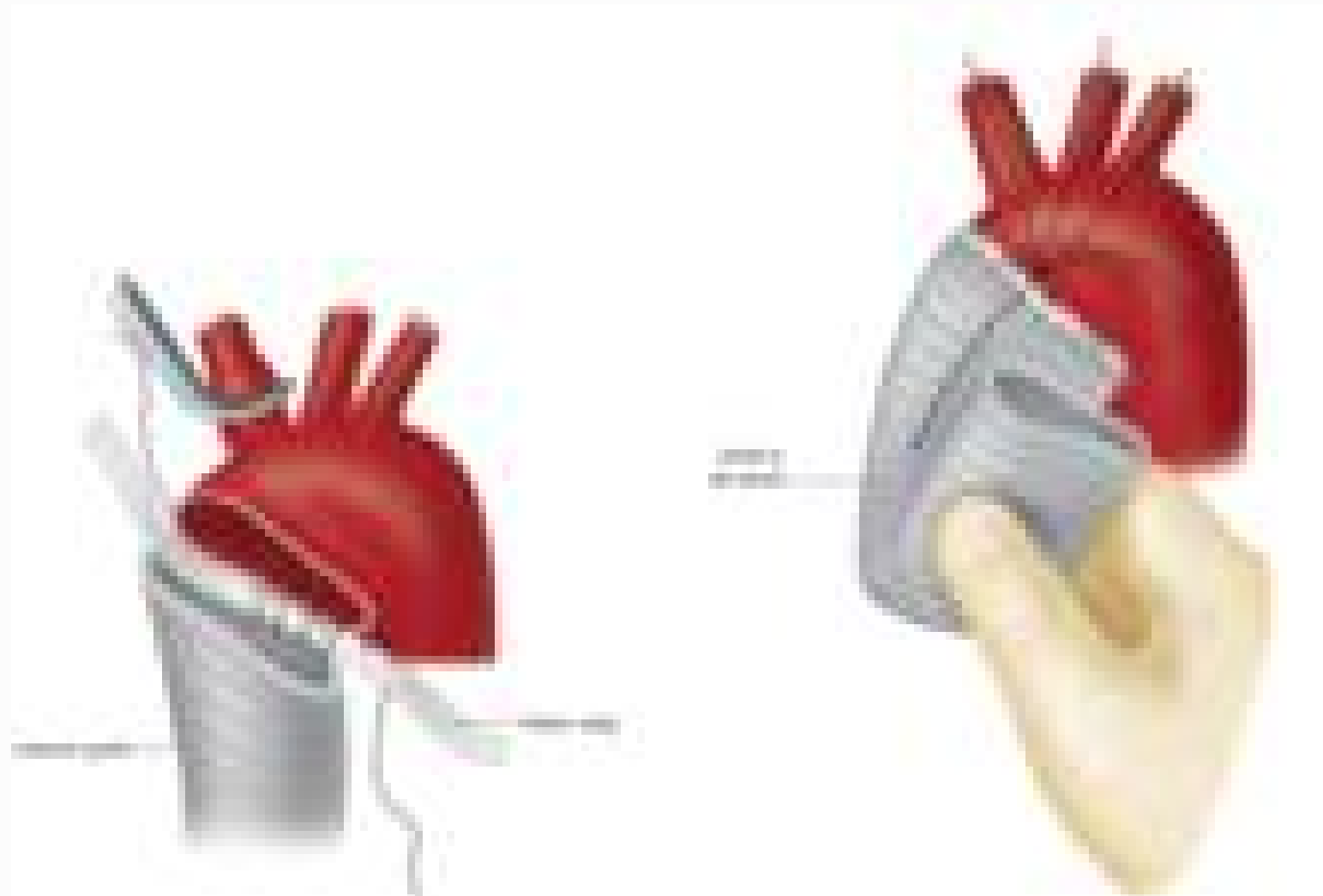
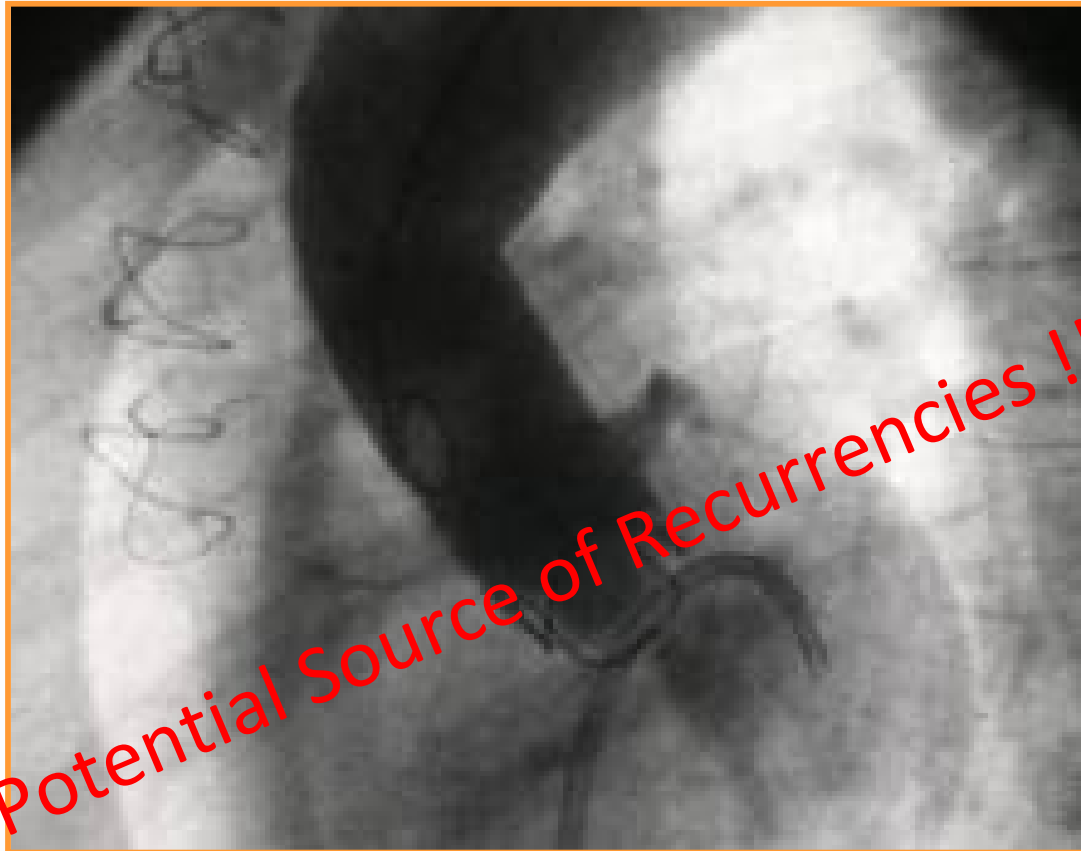


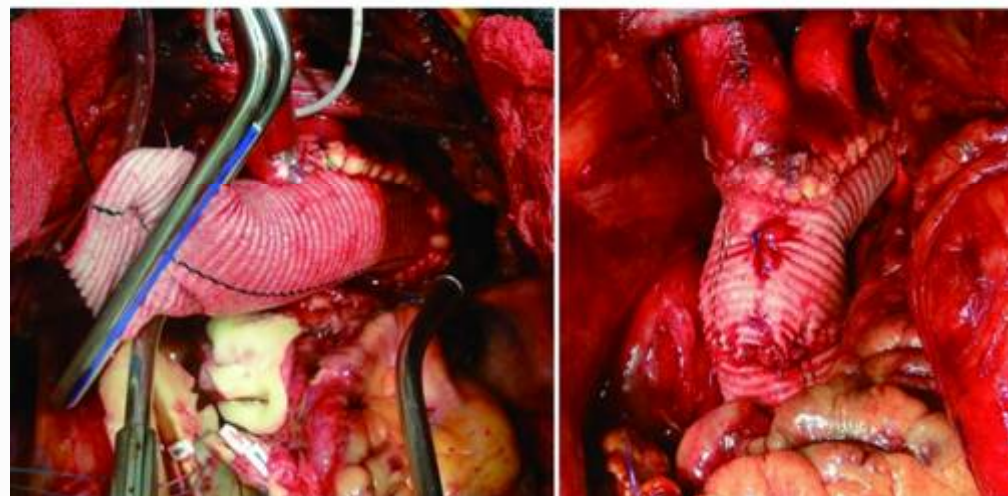
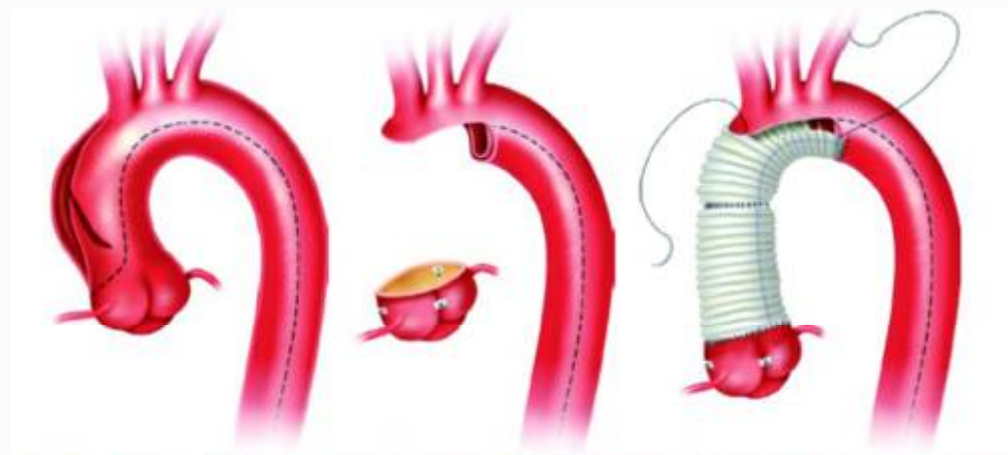
Figure 3

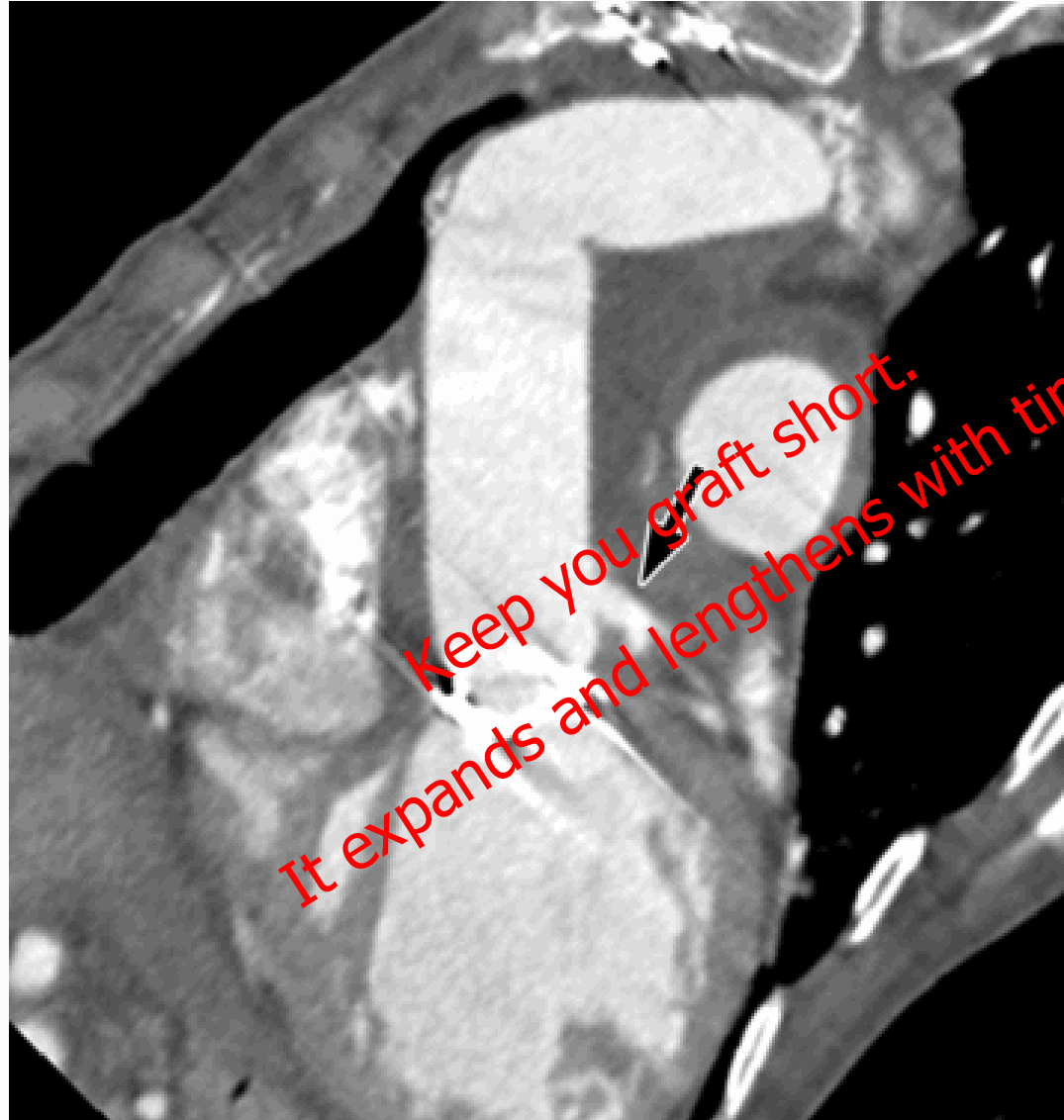


Arteriovenous fistula in AA treated in AA



- Due to this risk , a more aggressive approach with hemi-arch or complete arch replacement has been proposed





Keep you graft short.
It expands and lengthens with time!!

HOW MUCH RESECT?

The false lumen (DeBakey 1) in the arch and descending aorta remains untreated.

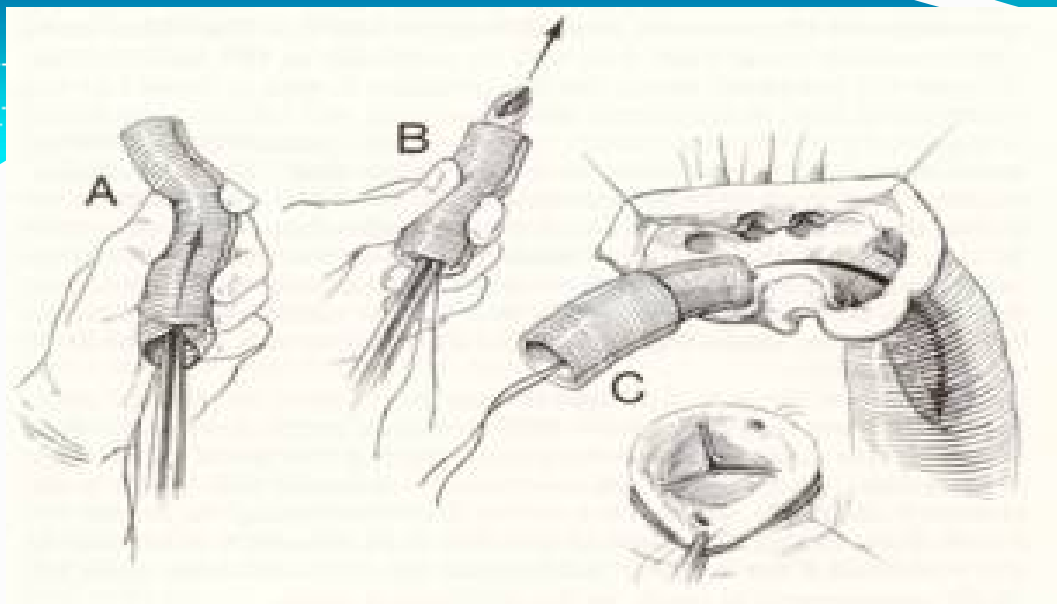
- Aneurysmal (thoraco-abdominal) formation 10%
- Rupture 10%
- Malperfusion 10-30%
- Redo-surgery ?%

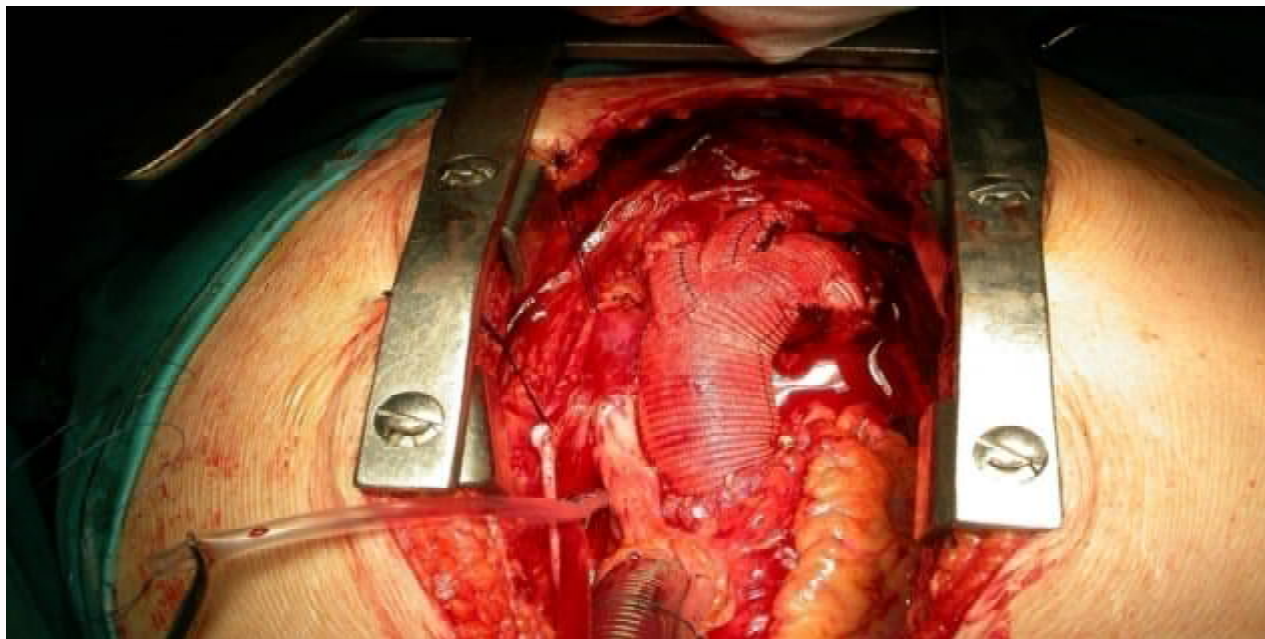
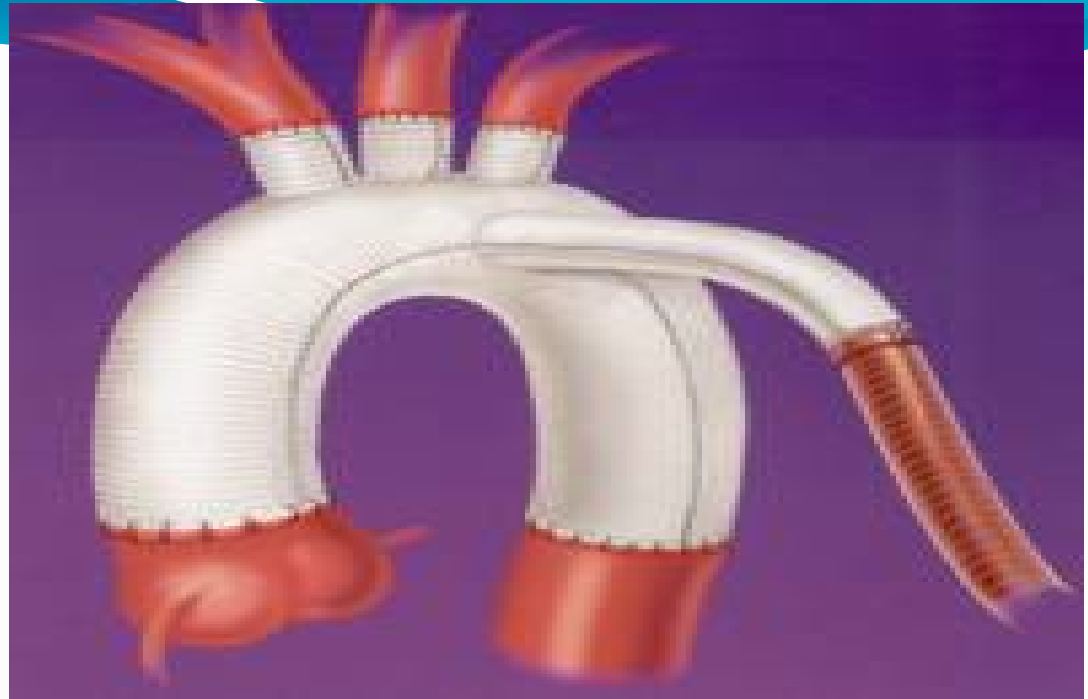
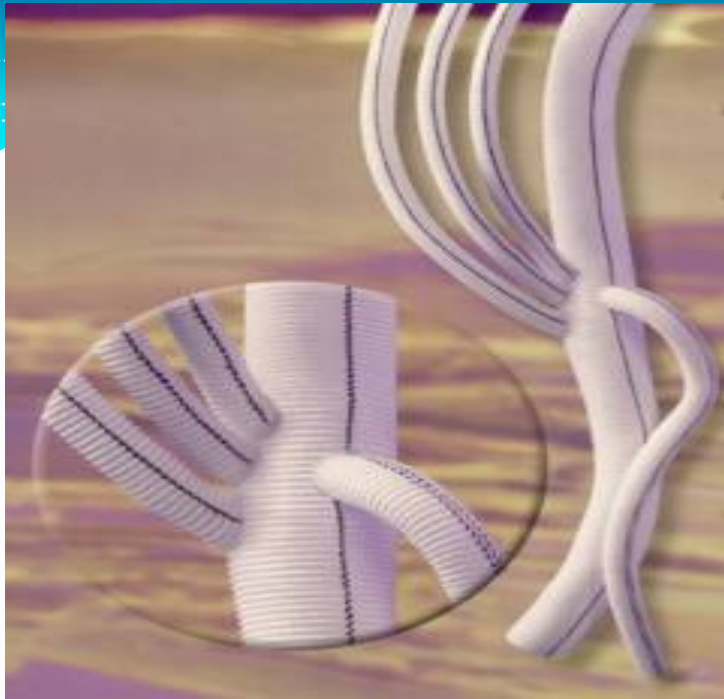


Possible solution? → ***elephant trunk***

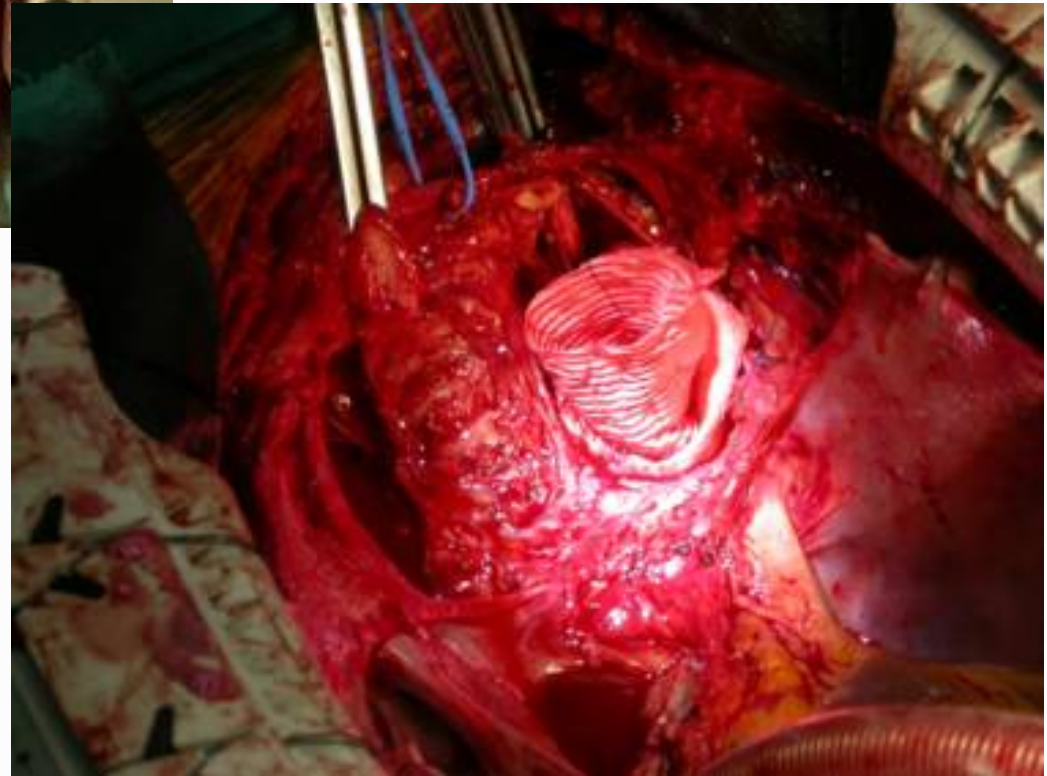
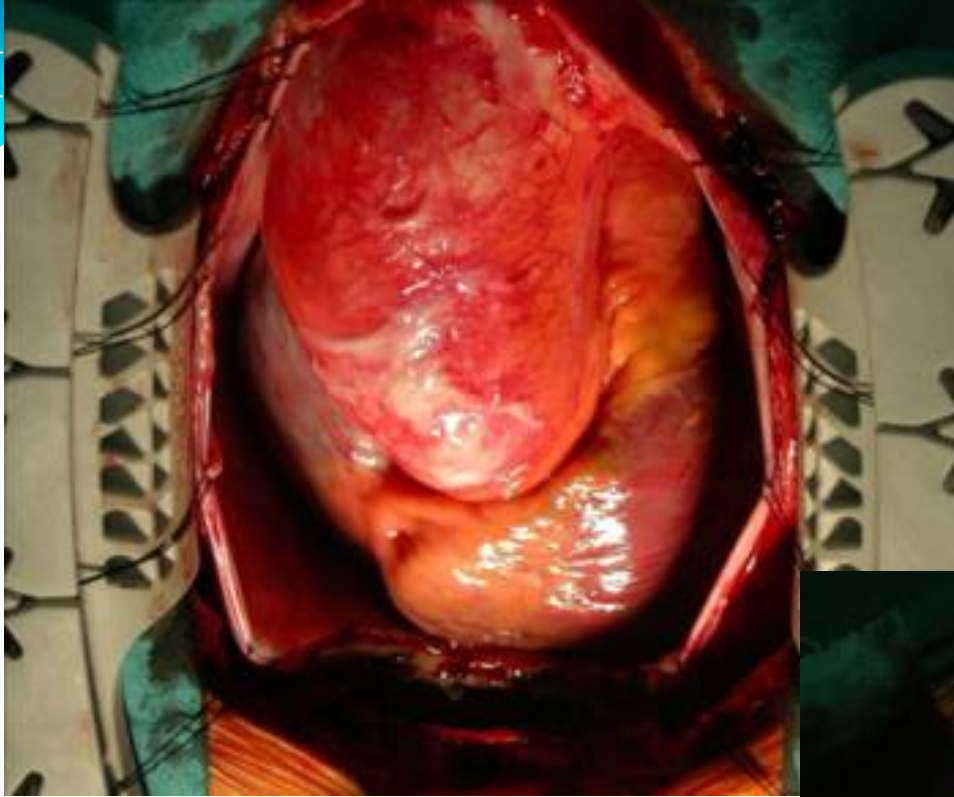
Advantages:

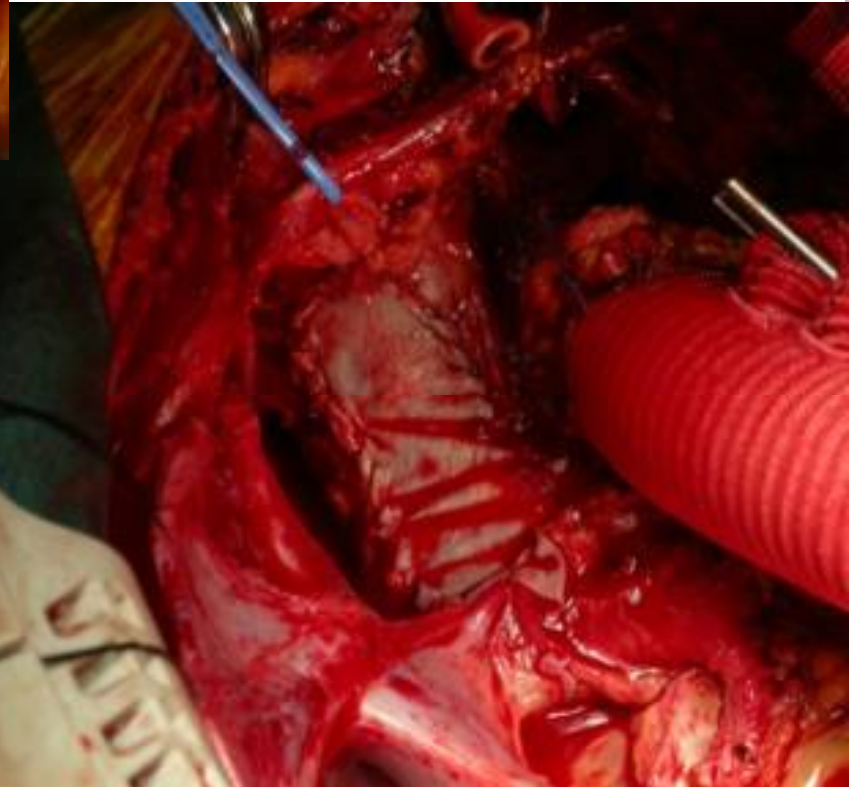
- Replacement of the aortic arch
- Preparing future replacement of descending aorta providing a landing zone for a stent graft

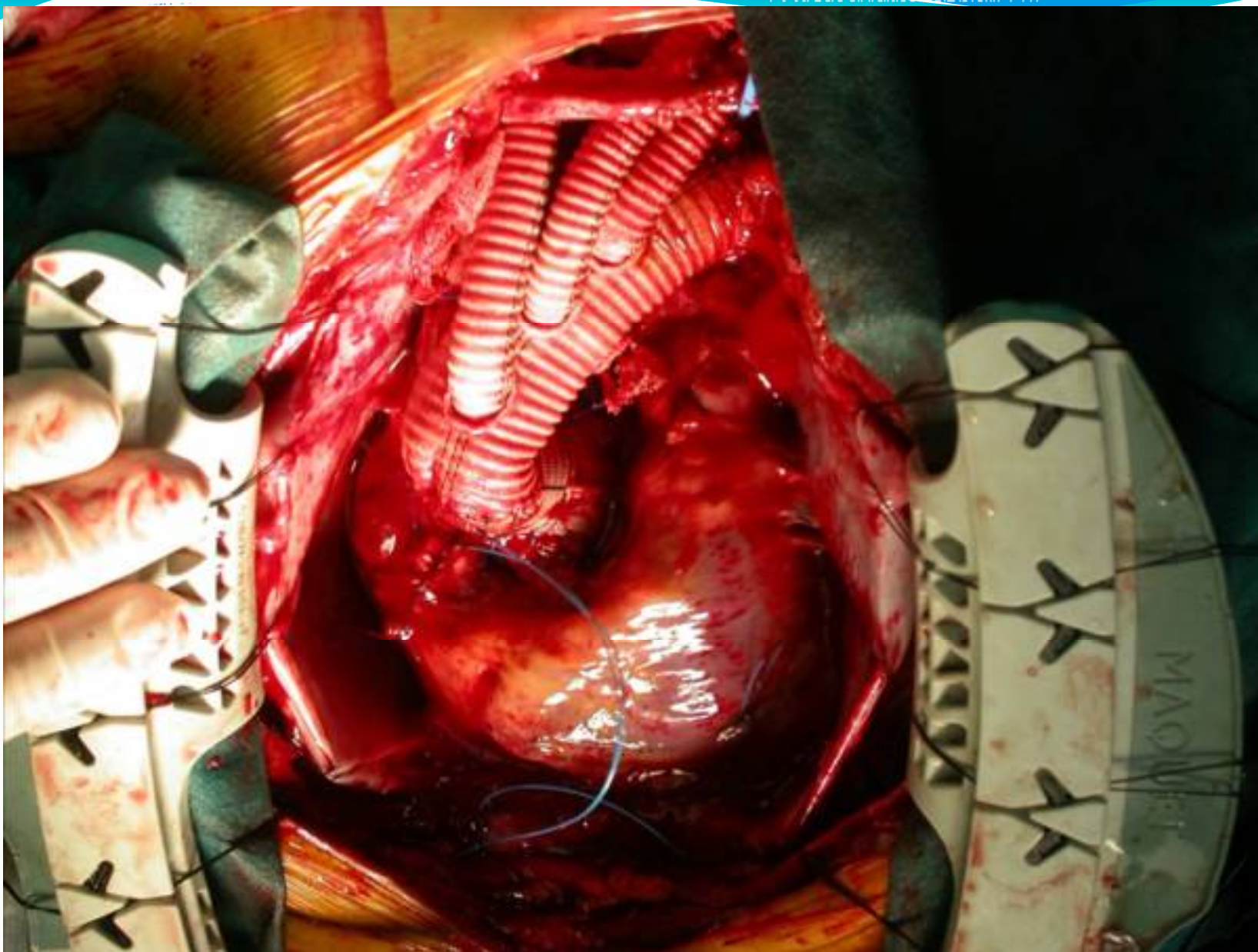












The most recent development of the classic “elephant trunk” technique is the combination of an EVSG with a conventional surgical graft for hybrid procedures at the three levels of the thoracic aorta (ascending, arch and descending).

Kato et al; Circulation. Nov 1996

This new option was established with the term

“Frozen Elephant Trunk”





Disease-related

- Complex primary and re-entry intimal tears, involving distal arch and/or proximal DTA
- Distal arch/DTA false-lumen impending rupture
- Distal aortic malperfusion due to DTA true lumen compression or collapse
- Aneurysmal arch and proximal DTA (>35 mm)
- Severely damaged aortic arch or poor aortic tissue quality (whereby distal aortic arch anastomosis could not be safely performed)



Patient-related

- Patient with adequate performance status, able to withstand TAR (as deemed by the operating surgeon)

Institution- or surgeon-related

- Adequate equipment and surgical/endovascular expertise



E-vita Open plus (Jotec, Germany)



Thoraflex (Vascutek, UK)



Cronus® (MicroPort Medical, China)

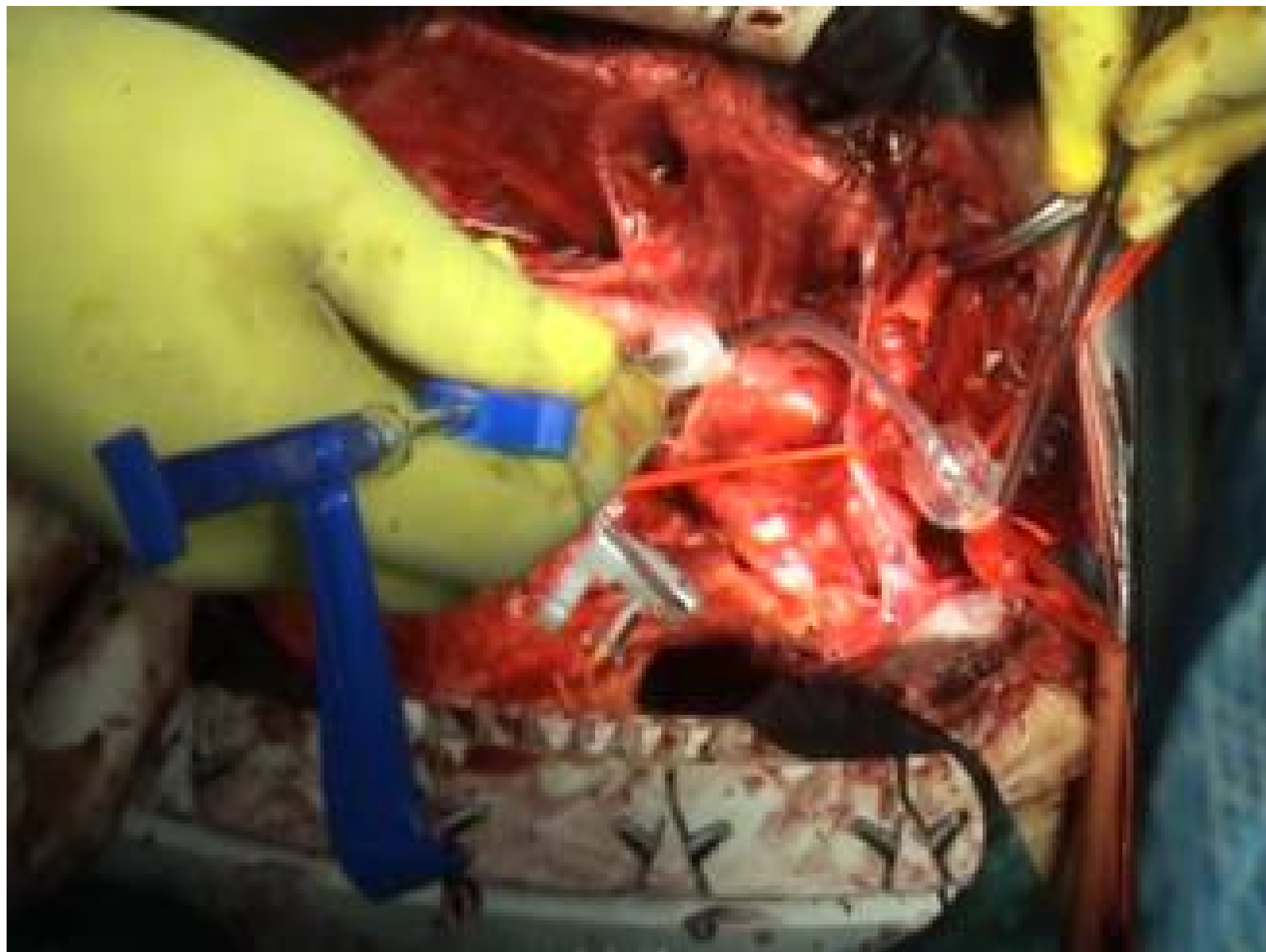


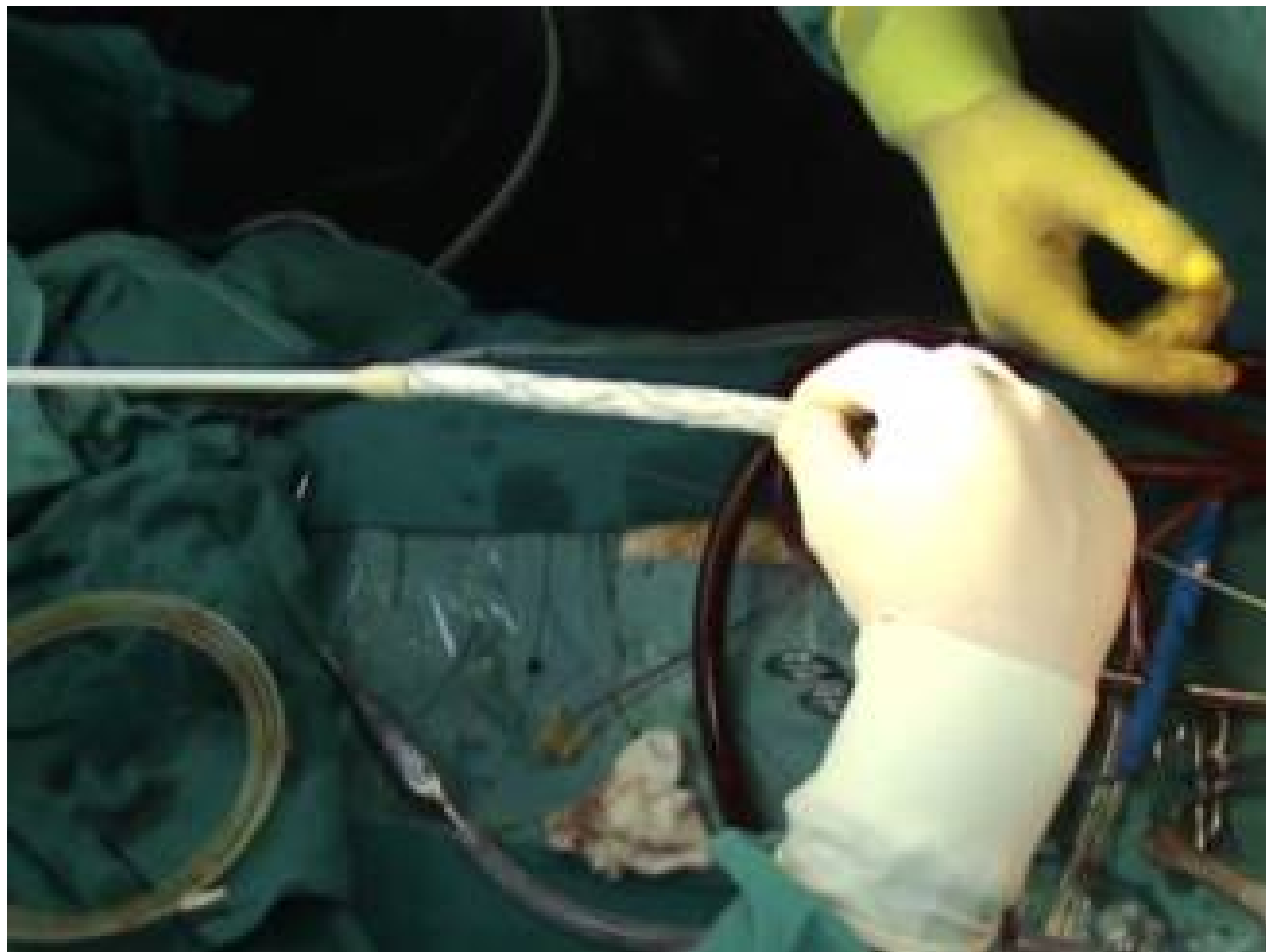
Frozenix® (LifeLine, Japan)

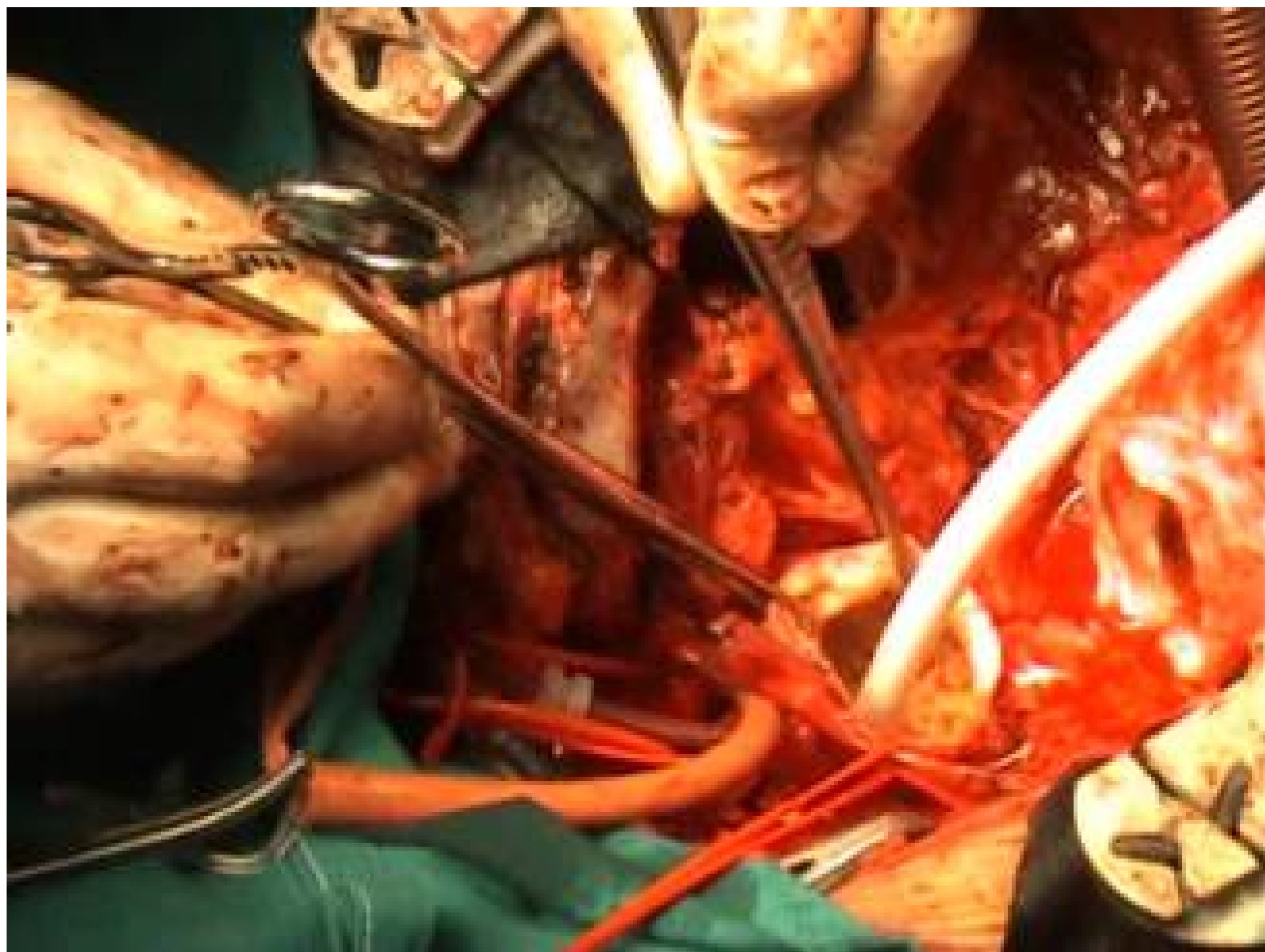
2019-2021 Systematic Review Results in AAS

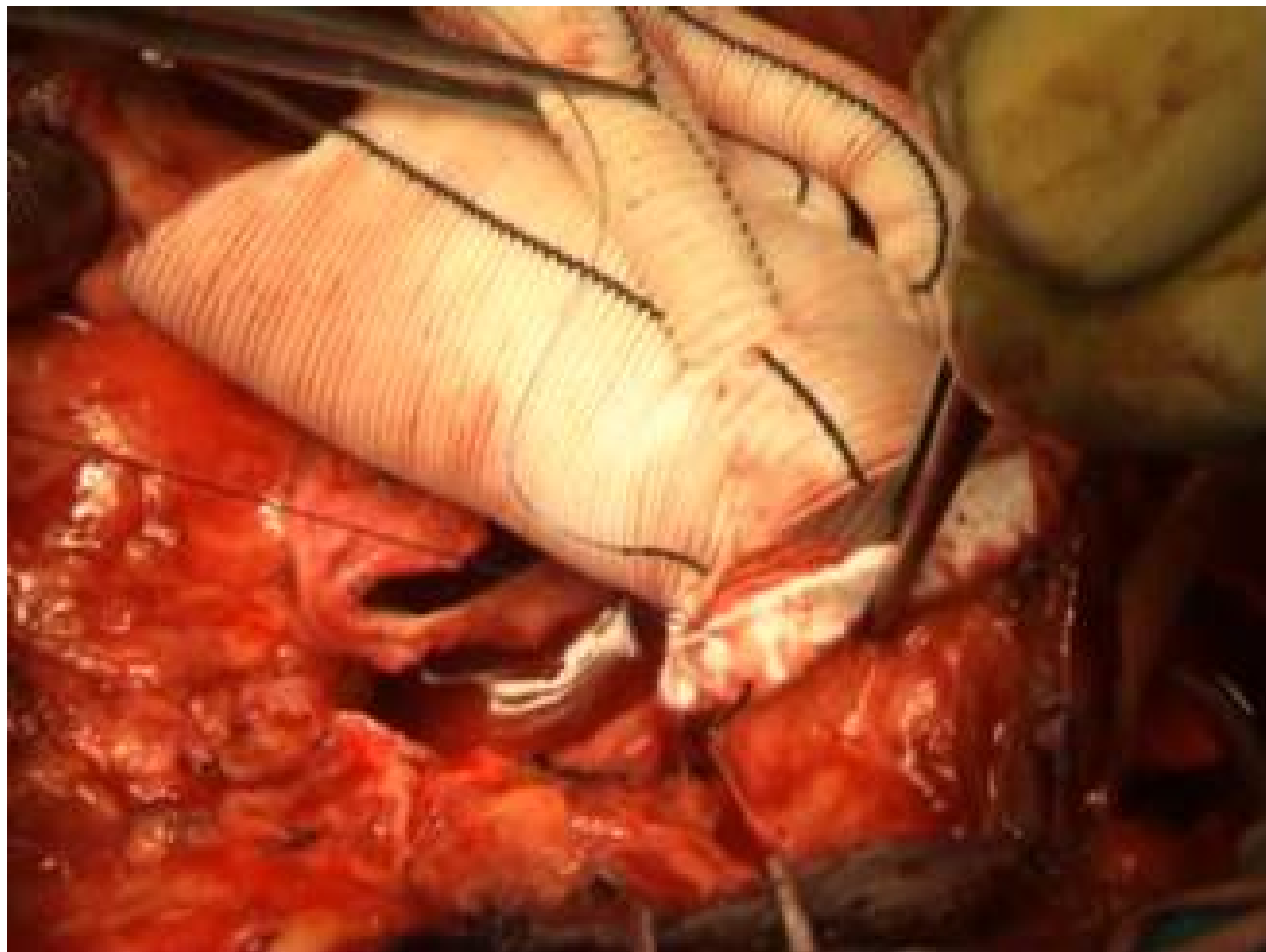
Author	In-hospital mortality	PND	SCI	Renal failure	Respiratory failure
Jakob <i>et al.</i>	2 (9.0)	2 (9.0)	0	12 (54.5)	10 (45.5)
Shimamura <i>et al.</i>	2 (9.0) ^a	(N/A)	4 (13.8)	N/A	N/A
Pochettino <i>et al.</i>	5 (14.0)	1 (3.0)	3 (9.0)	6 (17.0)	–
Chen <i>et al.</i>	4 (11.1)	2 (11.1)	0	2 (7.4)	1 (3.7)
Jakob <i>et al.</i>	6 (18.0)	5 (6.0)	5 (6.0)	32 (36.4)	33 (38.0)
Sun <i>et al.</i>	7 (4.7)	2 (2.7)	3 (2.0)	1 (0.7)	14 (9.5)
Uchida <i>et al.</i>	4 (5.0)	2 (2.5)	0	3 (3.8)	6 (7.5)
Shi <i>et al.</i>	1 (2.2)	0	0	–	–
Shen <i>et al.</i>	2 (9.1)	–	0	–	2 (9.1)
Shrestha <i>et al.</i>	5 (27.7)	N/A	0	–	–
Roselli <i>et al.</i>	0	2 (12.0)	0	3 (19.0)	2 (12.0)
Pooled average	10.0%	4.8%	4.3%	10.2%	16.7%
Minimum	0%	0%	0%	0%	3.7%
Maximum	27.7%	12%	13.8%	54.5%	45.5%

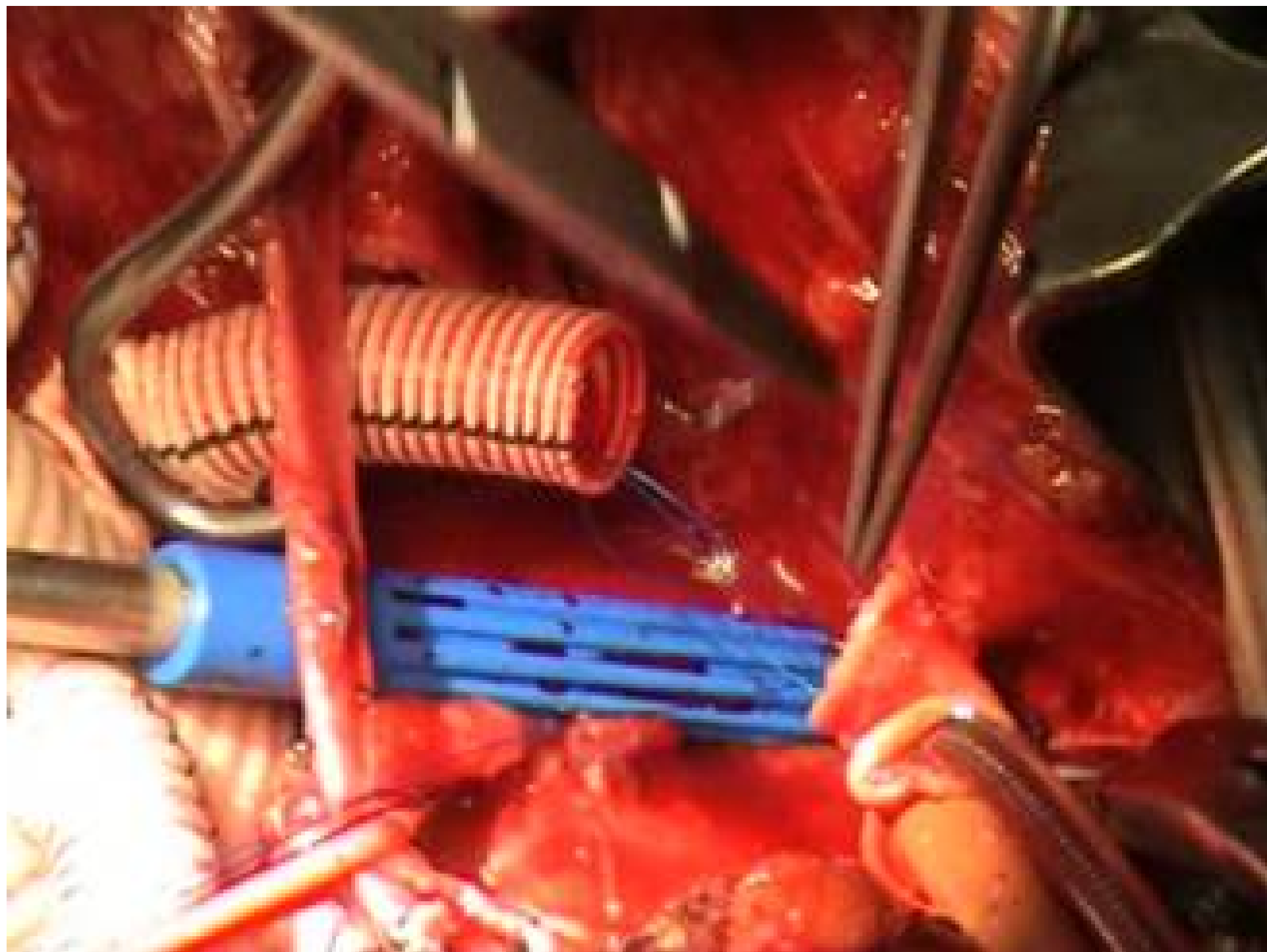
No it doesn't...
...in selected patients, and
selected Institutions

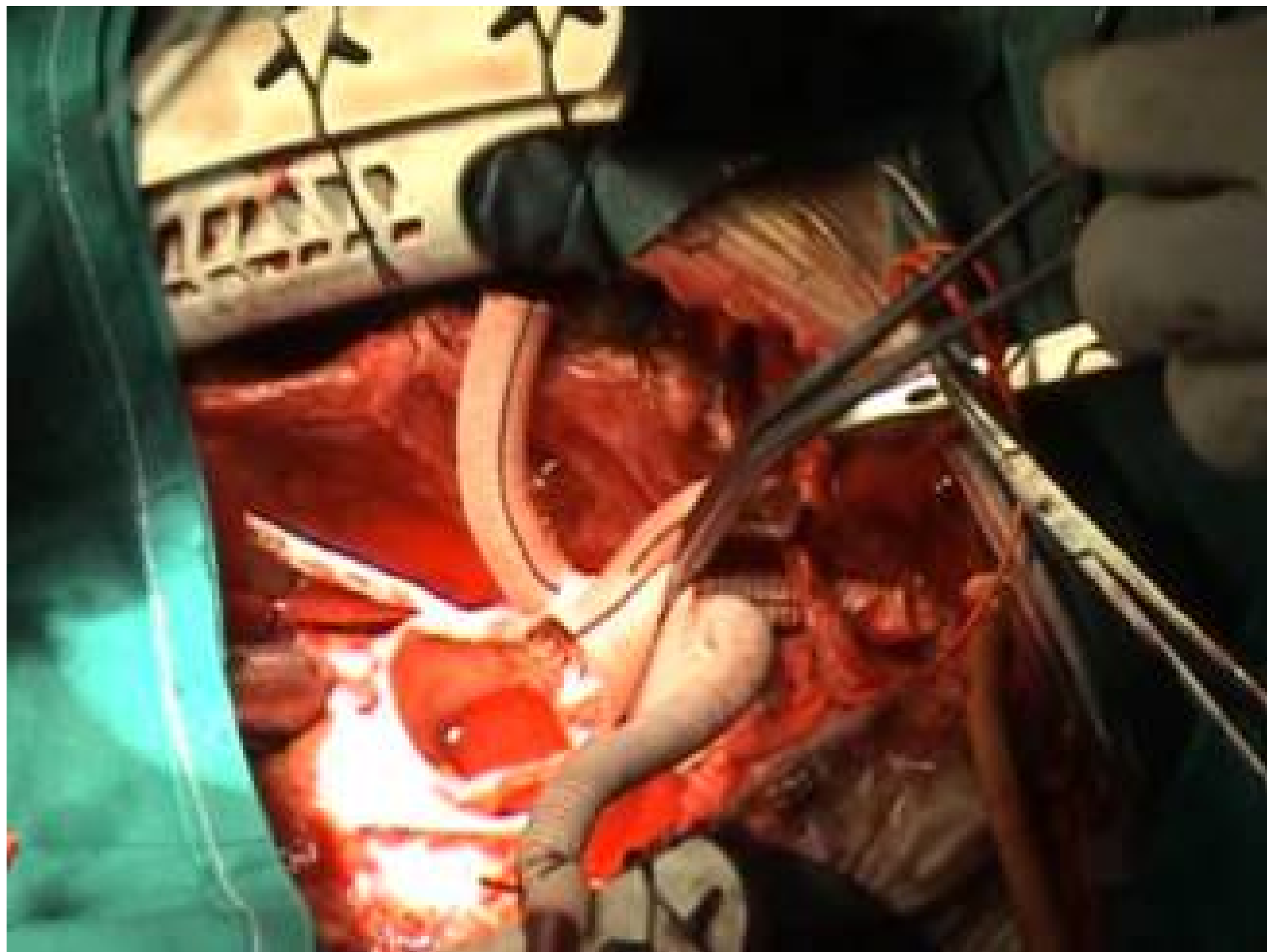


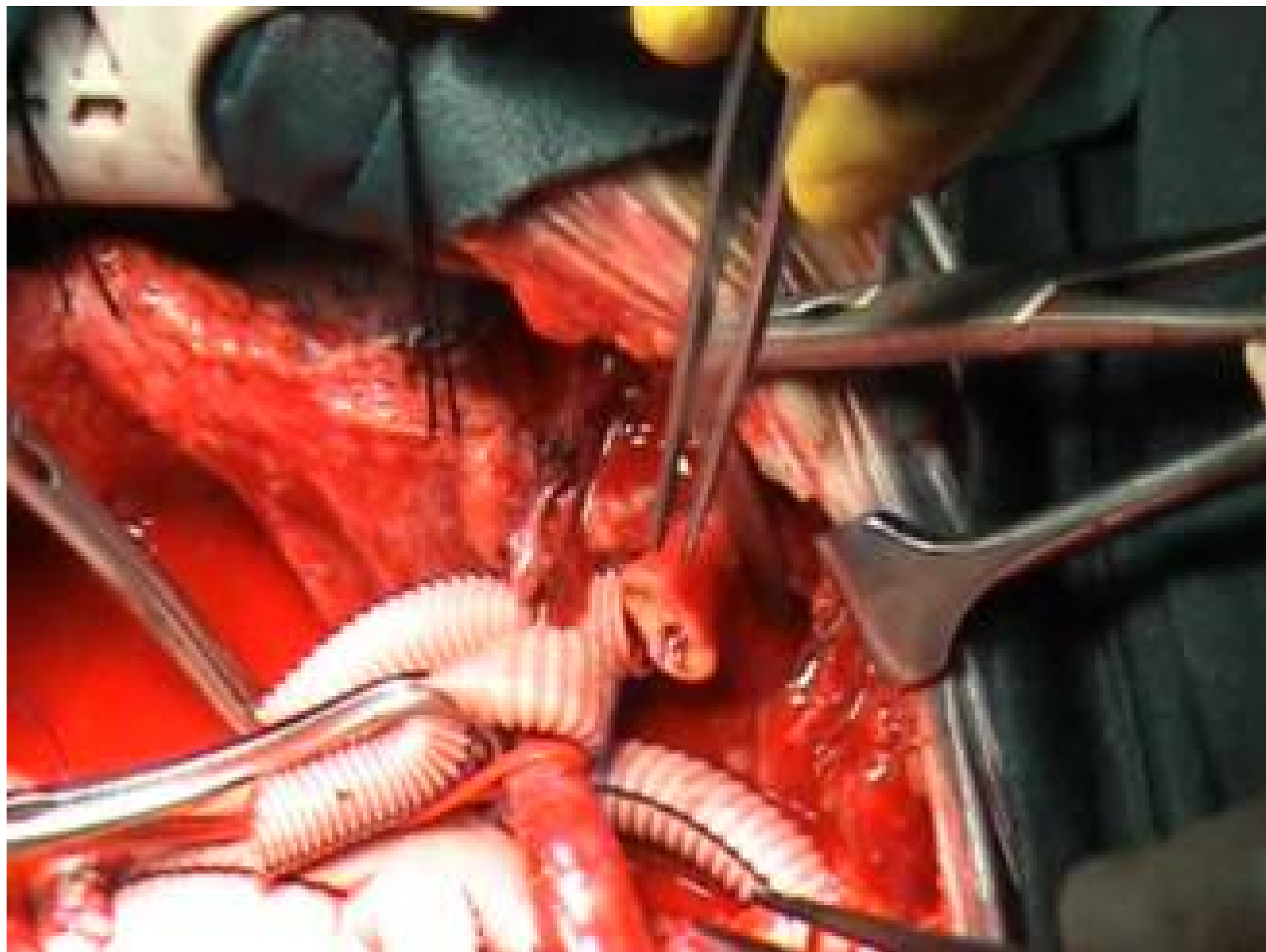


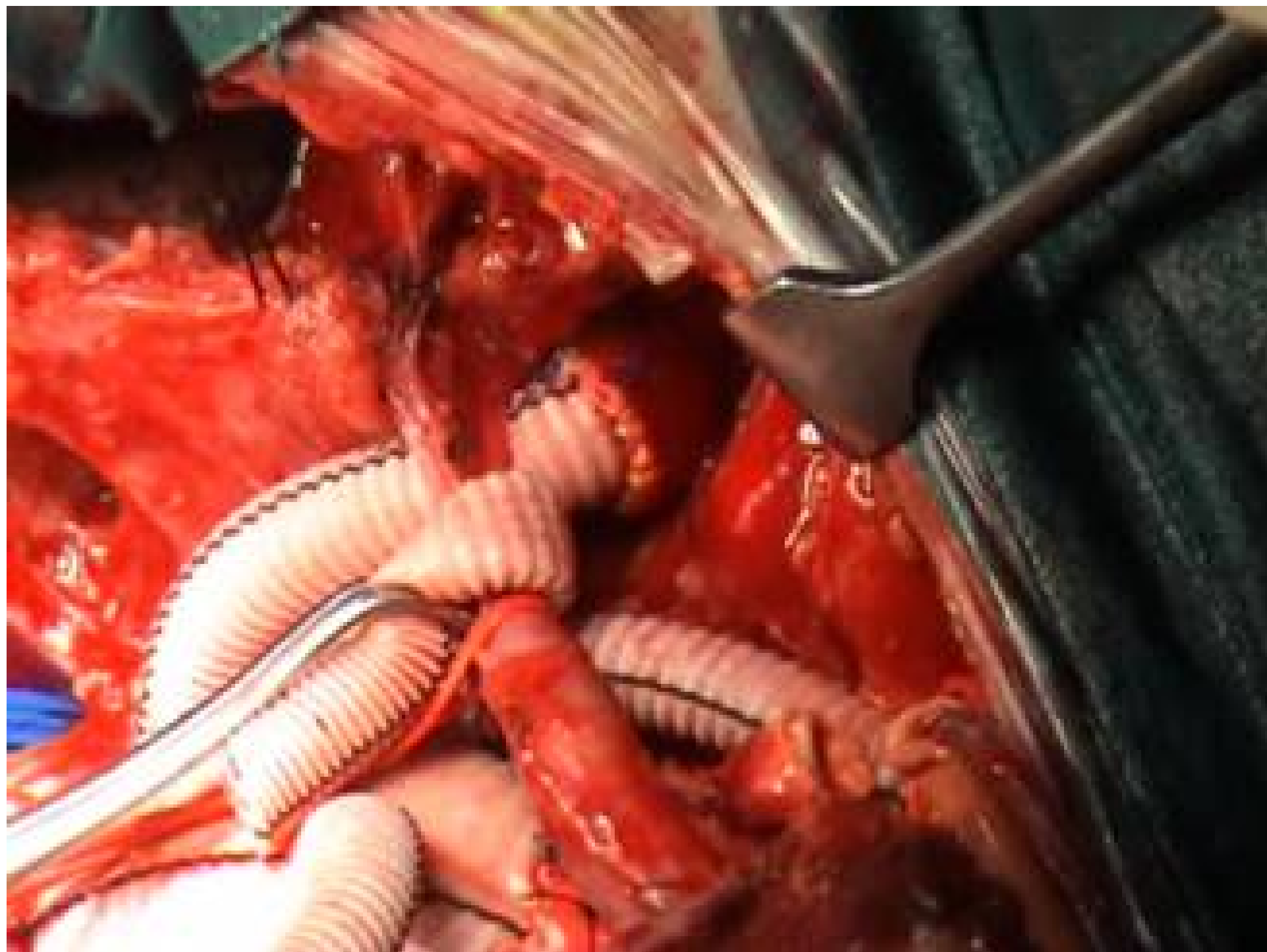


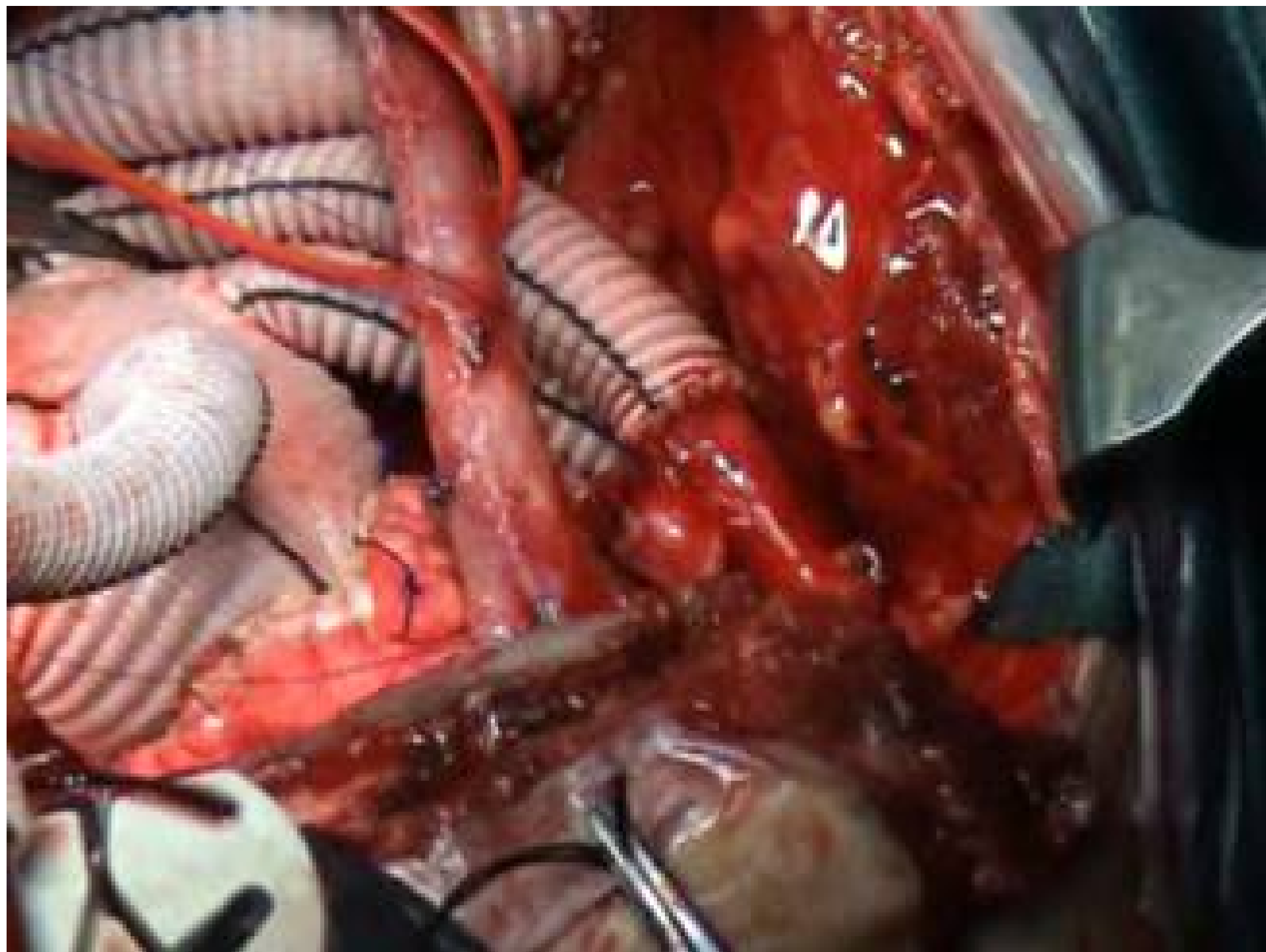


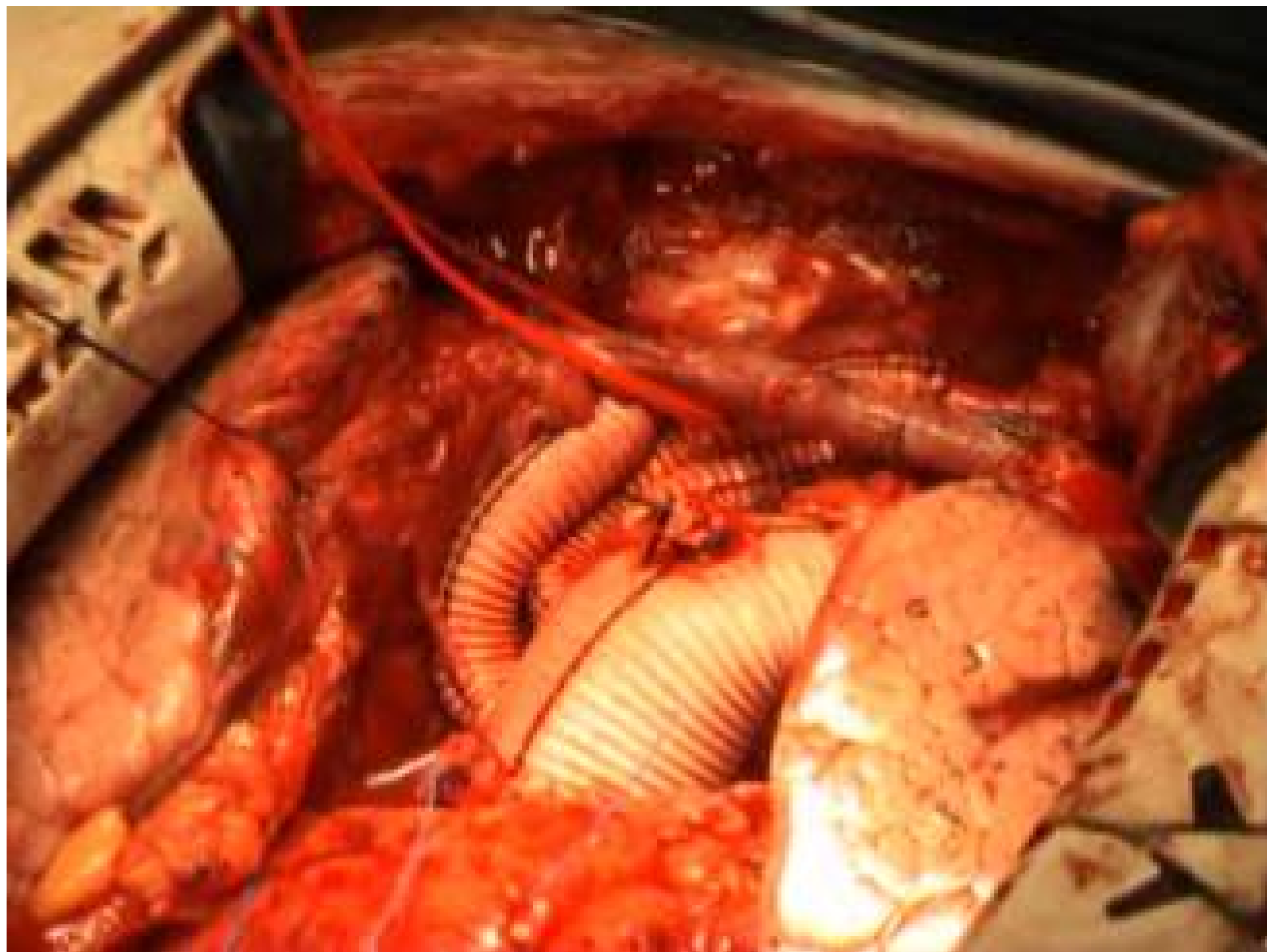


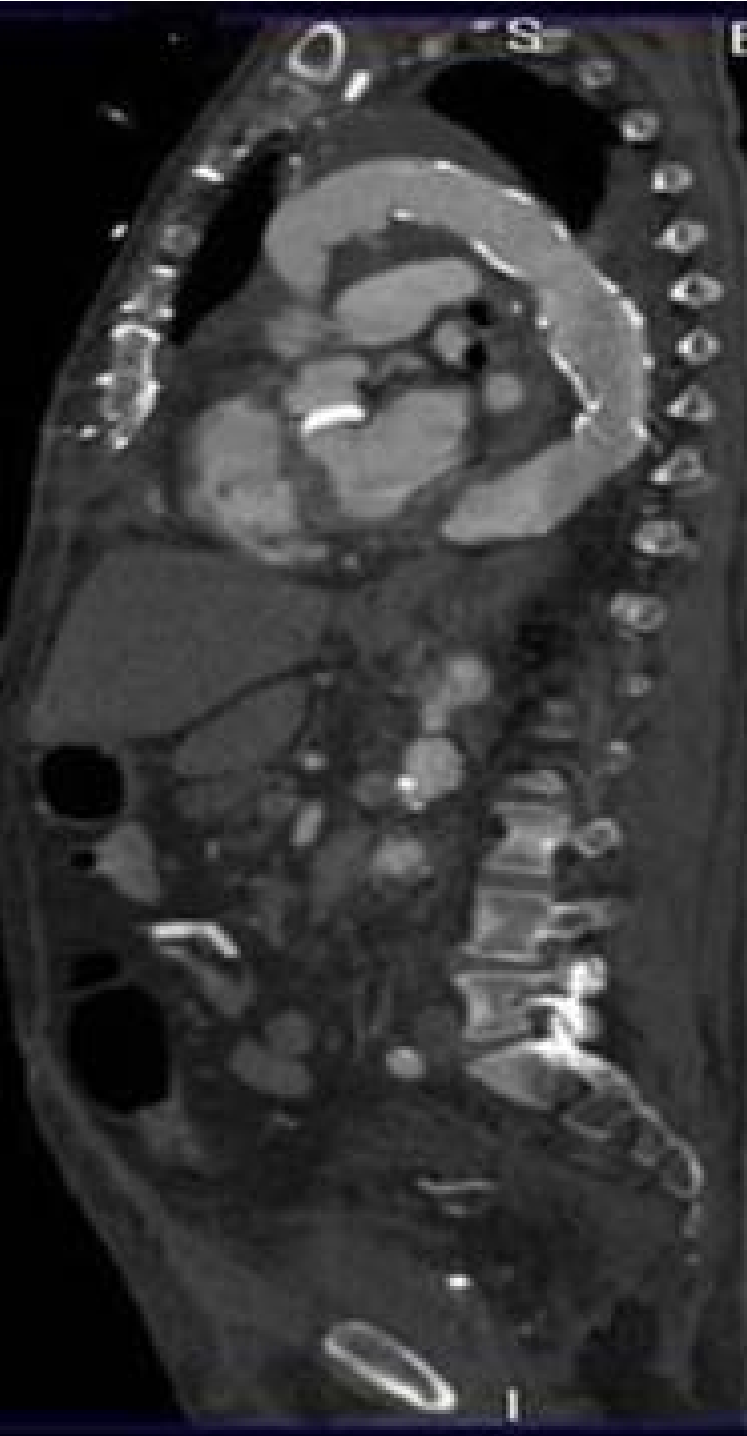
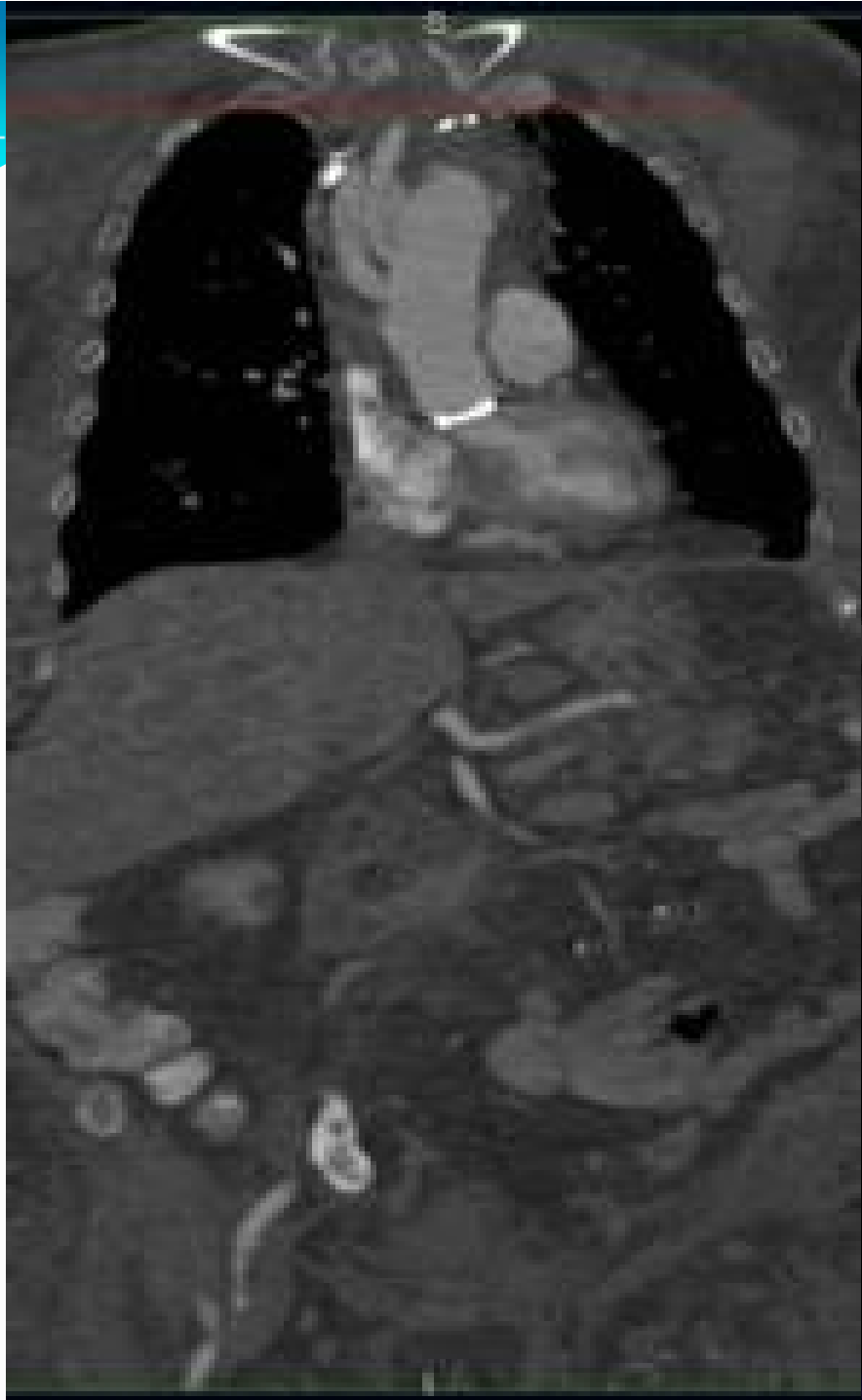




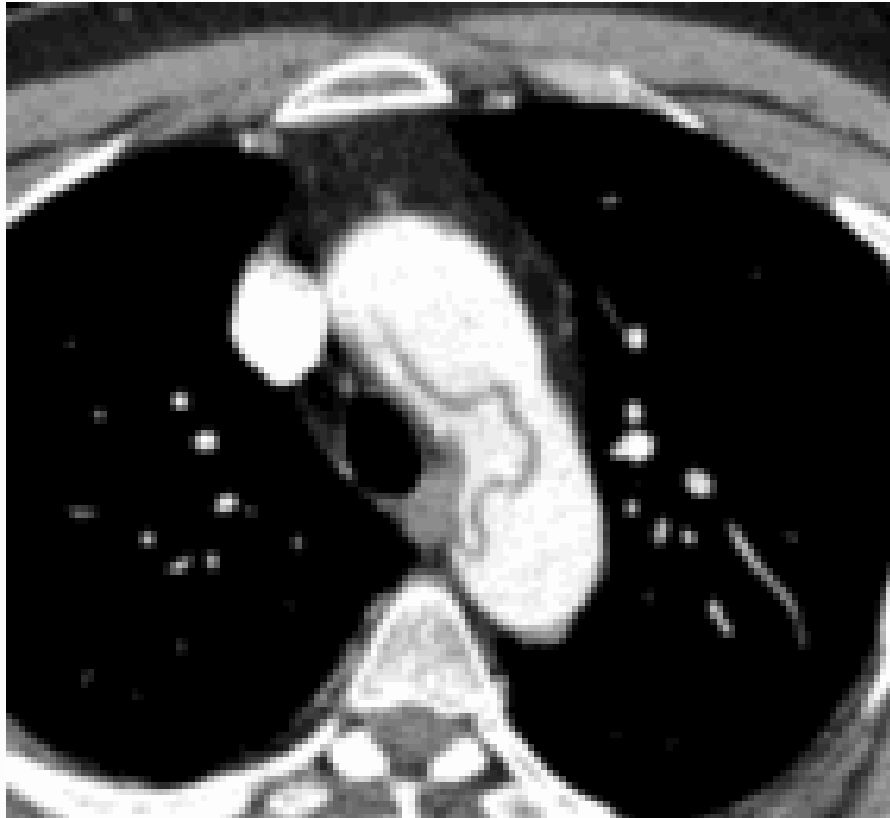


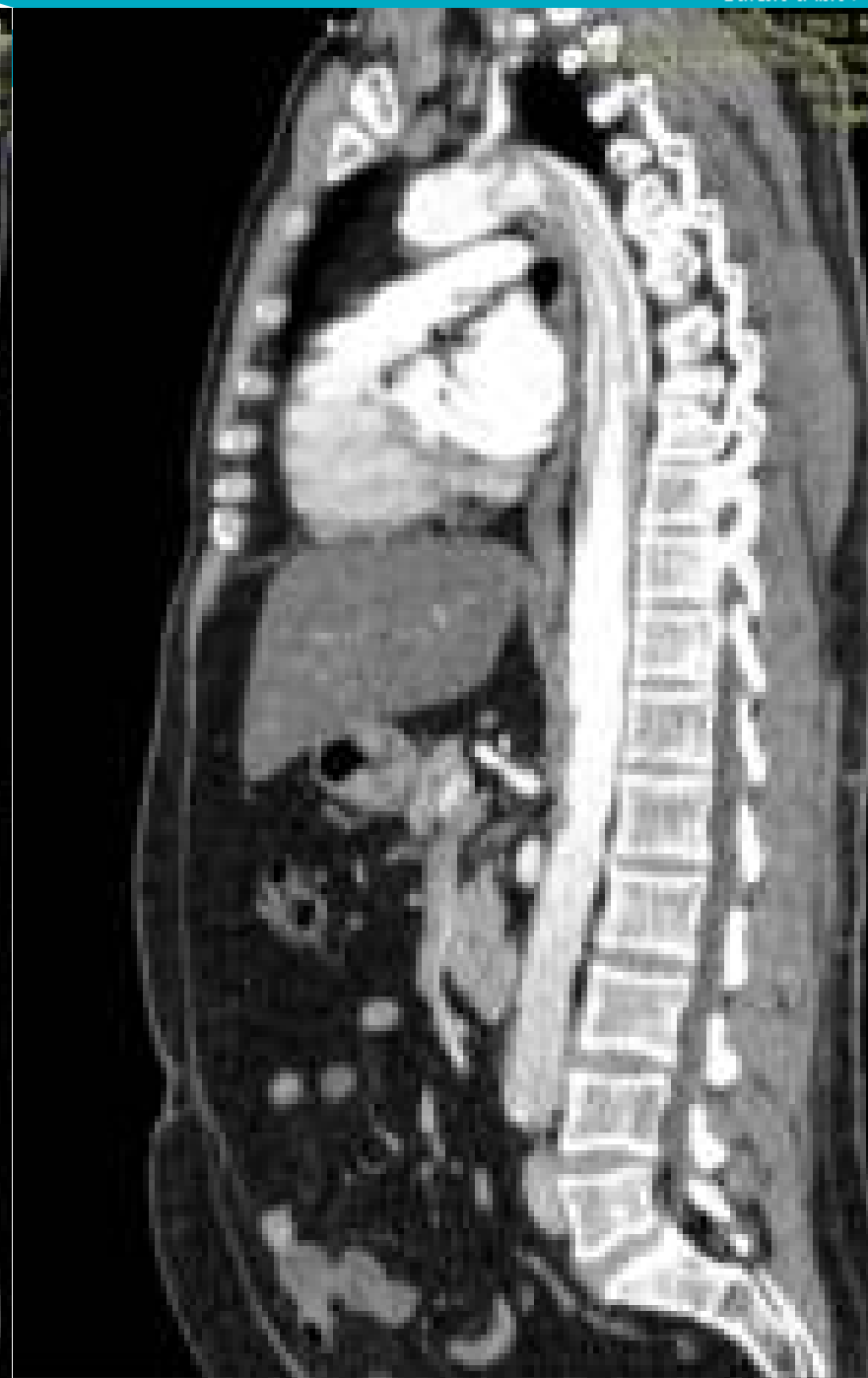
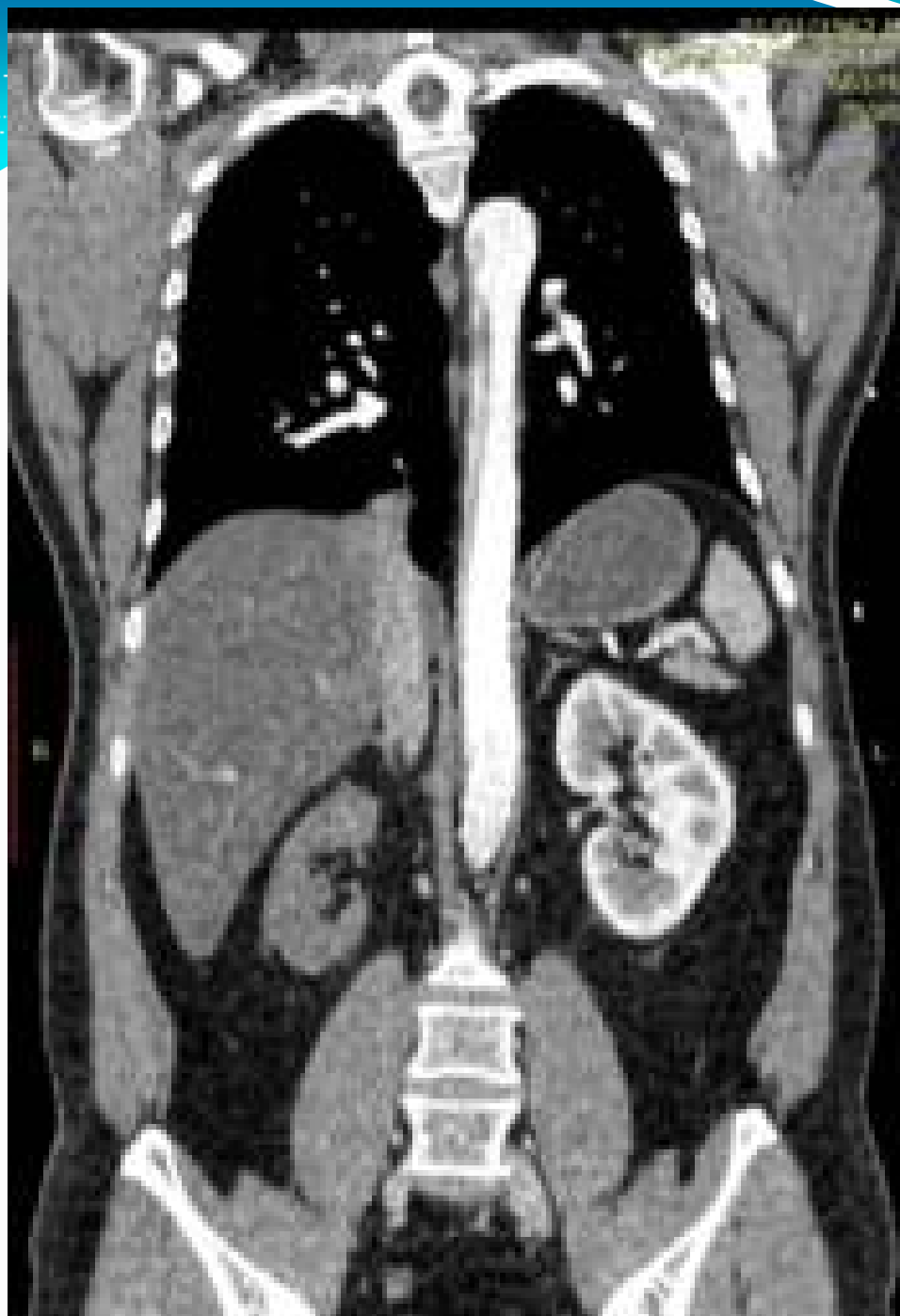






Frozen Elephant Trunk in Acute Type A Dissection







Surgical repair of distal arch pseudoaneurysm from ruptured penetrating aortic ulcer with the frozen elephant trunk technique.

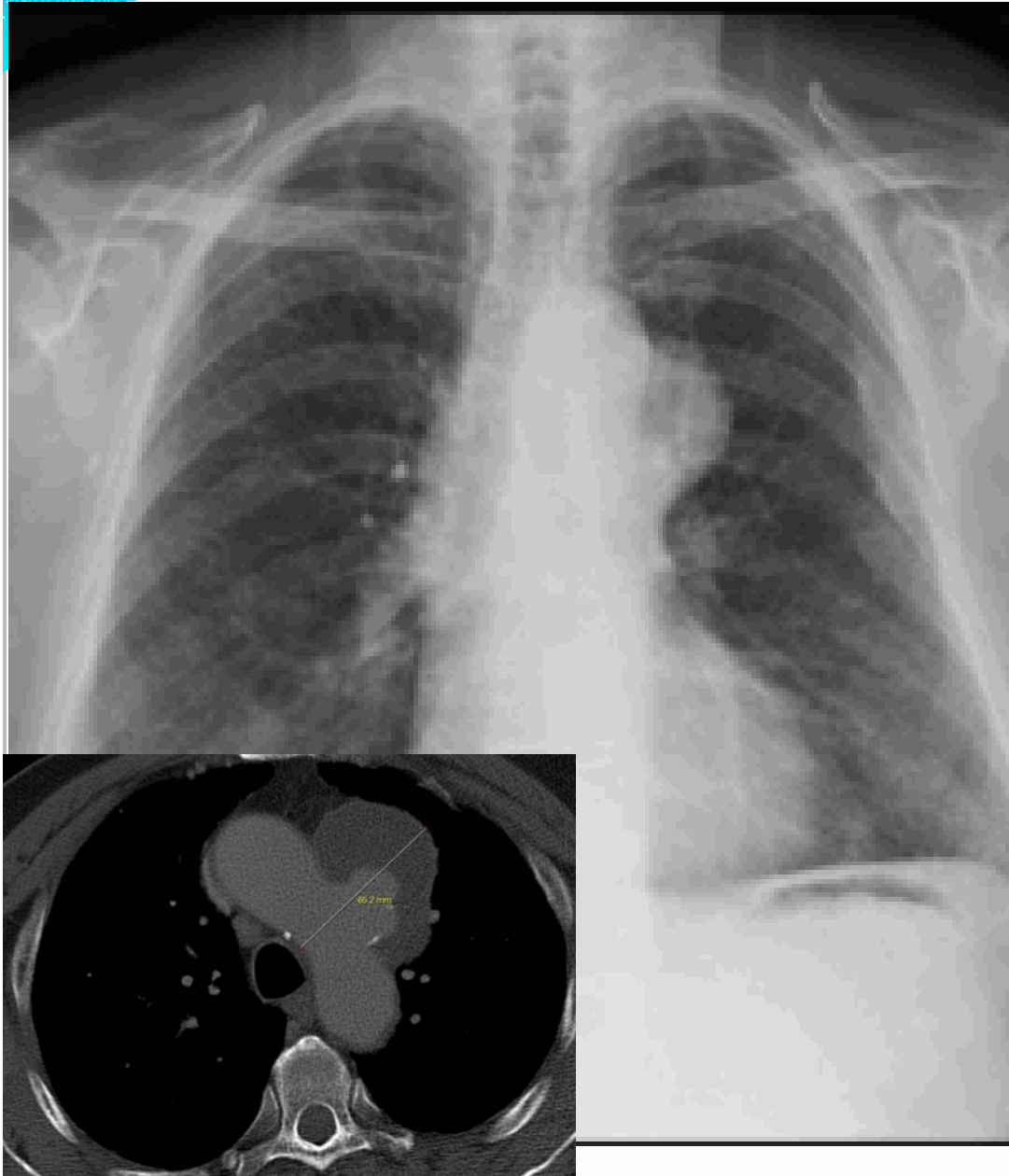
Kokotsakis J, Tassopoulos D, Ttofi J, Harling L, Ashrafian H, Velissarios K, Kratimenos T, Anagnostou S, Athanasiou T.

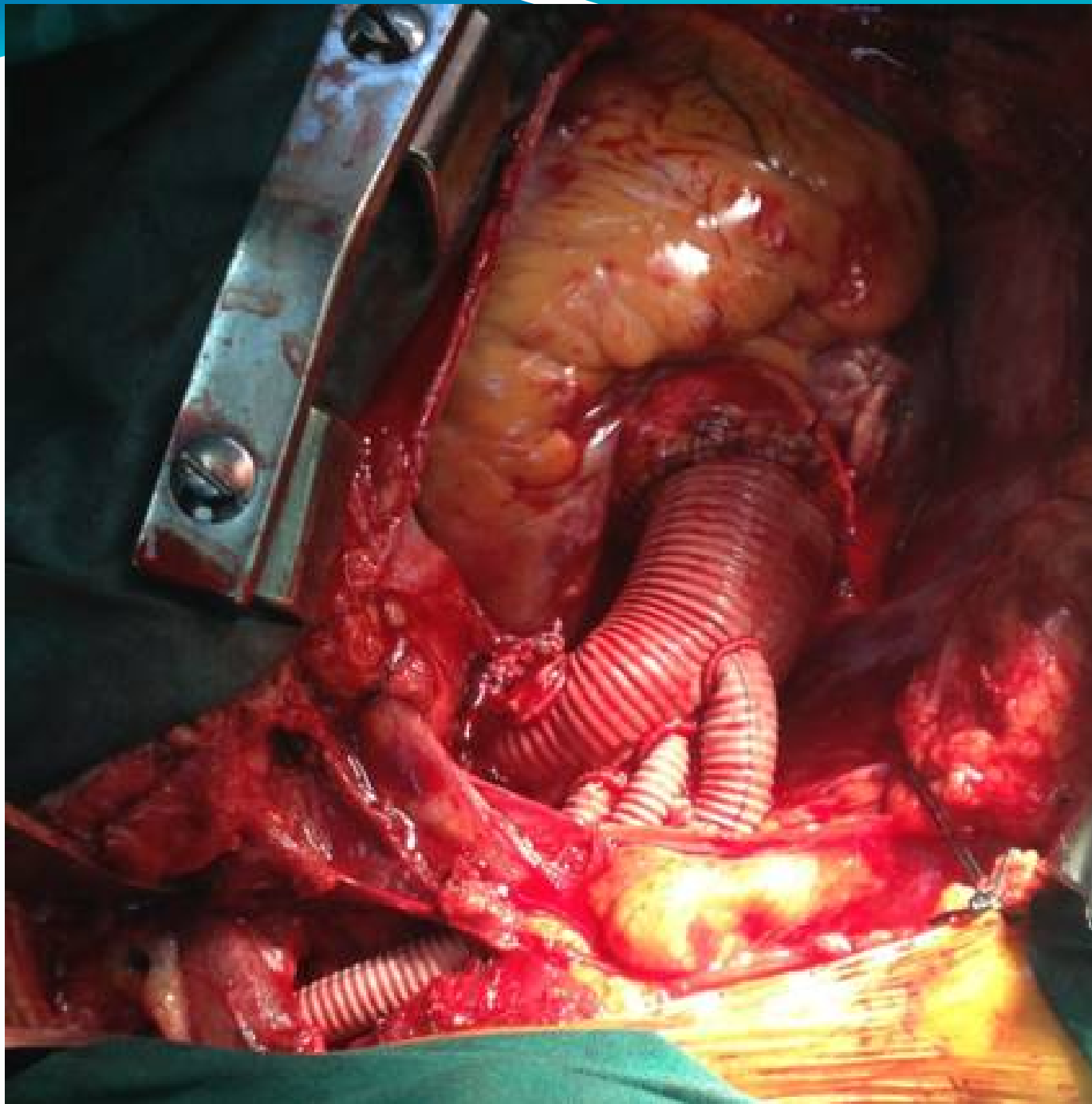
J Cardiothorac Surg. 2014 Apr 5;9:68

Abstract

Ruptured Penetrating Ulcer and aortic arch pseudo-aneurysm is a rare condition but one which carries a high risk of rupture. We report the case of a 74-year-old man with aortic arch pseudo-aneurysm, in which a Frozen Elephant Trunk procedure was successfully performed. There were no postoperative complications at 6 months follow-up.

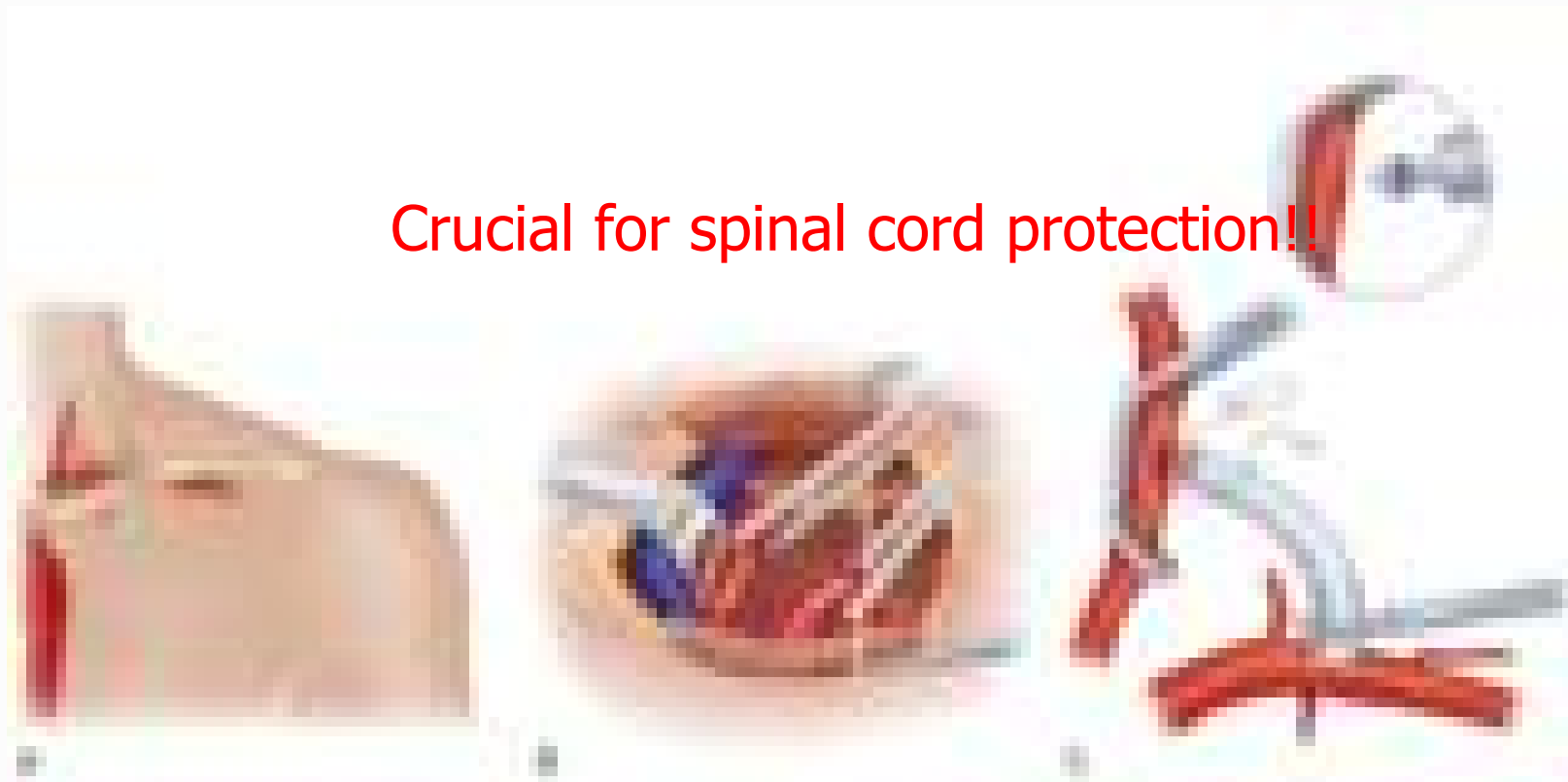
The Computed Tomography Angiogram demonstrated thrombus formation in the pseudo-aneurysm lumen, with no endoleak on the stented part of the descending thoracic aorta and complete patency of all branches of aortic arch. This case demonstrates that the Frozen Elephant Trunk technique may be the treatment of choice when treating such complex aortic arch lesions provided there is no absolute contraindication to radical surgical intervention. However, long-term clinical efficacy and safety have yet to be confirmed.

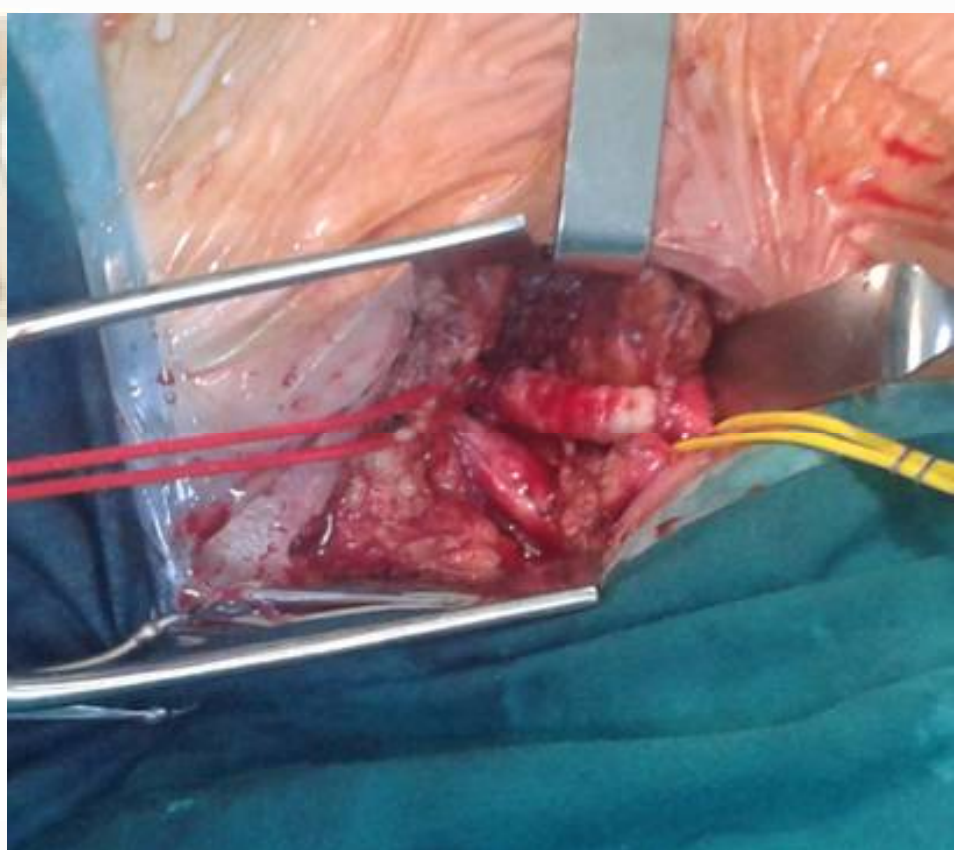
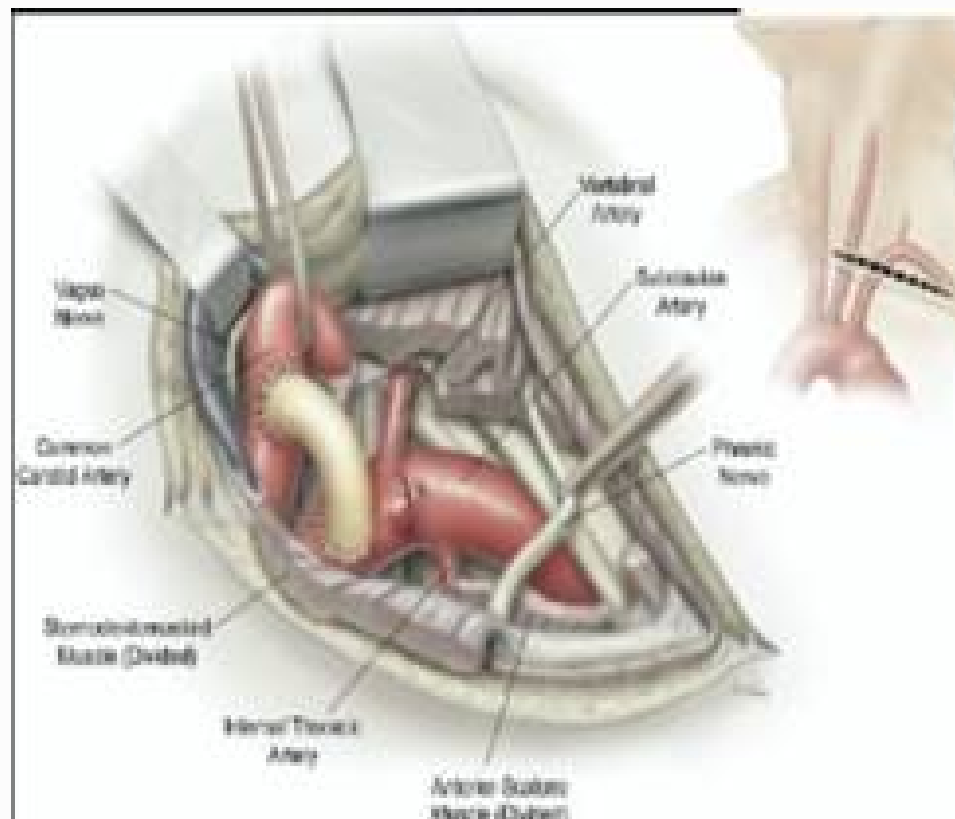






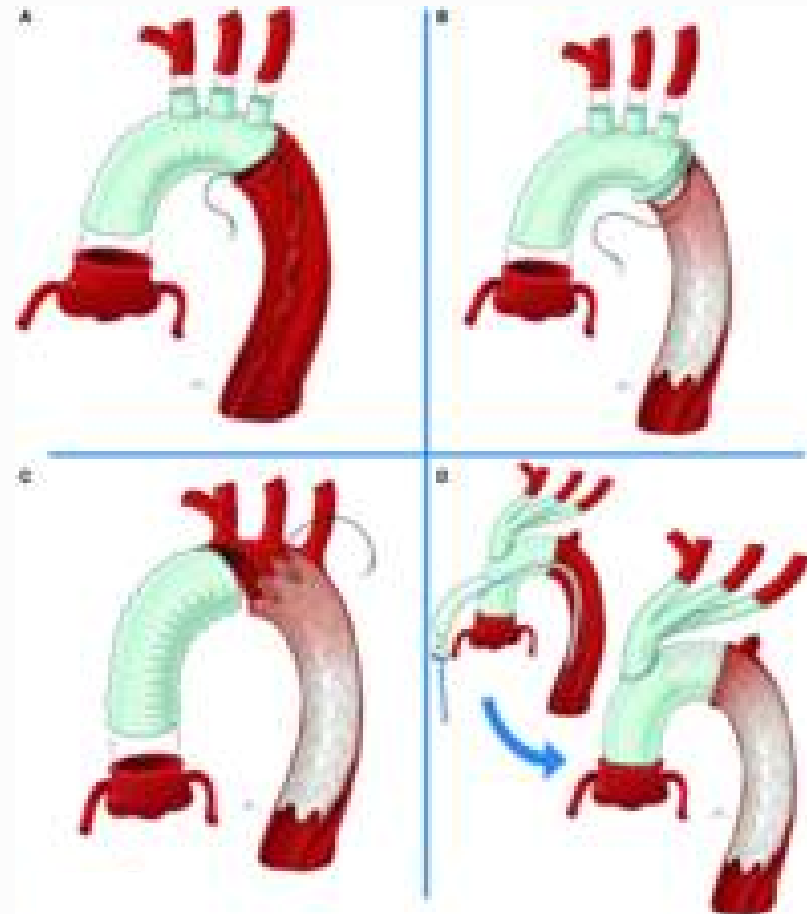
Crucial for spinal cord protection!!



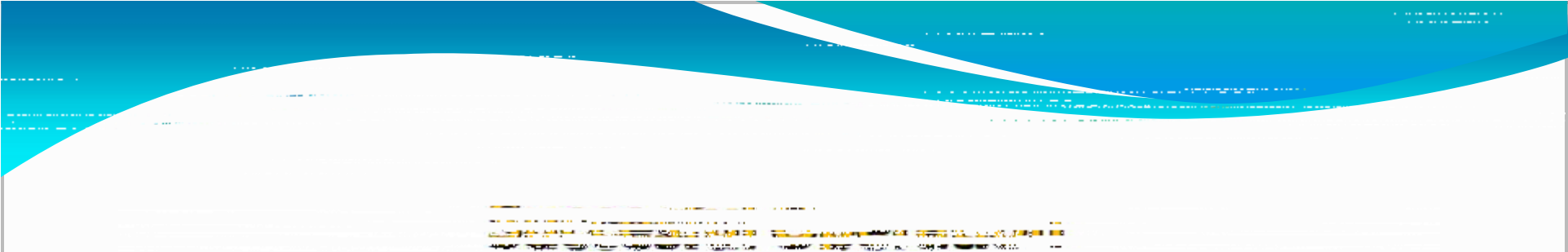


Classification and outcomes of extended arch repair for acute Type A aortic dissection

- A) Total arch replacement \pm standard elephant trunk without descending thoracic aortic stent grafting.
- (B) Total arch replacement and descending thoracic aortic stent grafting with frozen stent graft placed under circulatory arrest.
- (C) Hemi-arch replacement and descending thoracic aortic stent grafting with the stent graft placed under circulatory arrest.
- (D) Total arch replacement with stent graft placed after coming off cardiopulmonary bypass and with the use of fluoroscopy to identify landing zones.



Holly N.Smith et.al., ICVTS, 2017

- 
- Reconstructed/replaced root
 - Well-functioning aortic valve
 - Completely replaced ascending aorta
 - Partially/completely replaced aortic arch
 - True lumen patency in the arch vessels
 - Distal “type B-like” residual aorta?
 - FET ?

INTERNATIONAL REGISTRY OF AORTIC DISSECTION (IRAD)



International Registry of Aortic Dissection (IRAD)

Results

1995 – 2013

2952 pts with type A in 28 centres from all over the world

Presented at JACC April, 2015

- In hospital mortality per treatment
- Surgical 19.7%
- Medical 57.1%
- Endovascular 70.6%
- Hybrid 13.9%

NB: surgical treatment 78,7% → 90,2%
surgical mortality 25% → 18,4%

German Registry for Acute Aortic Dissection Type A

Results

Results

2006 – 2010

2137 pts in 52 centres from Germany, Switzerland, Austria

Presented at NYAATS April, 2014

- Mortality 17% (10-35% based on age quartile)
- Post op Neurodeficits 17% (includes 7% with preop deficit)

NB: In pts with asc ao tear only, & no neuro deficit total arch replacement significantly increased op mortality (14% → 24%)




Patients	N=104
Male	83
Female	21
Age (median, range)	62 (34-85)
AV repair & Asc Aorta & Hemiarch	52
AVR & Asc Aorta & Hemiarch	3
Bentall & Hemiarch	32
Asc Aorta & Total arch	17
Bentall & Total arch	4
AV repair & Asc Aorta & Hemiarch & Antegrade TEVAR	1
Total arch replacement & frozen elephant trunk (FET)	10
Concurrent CABG	9
Operative Mortality	9 (8,65%)
Total Mortality	25 (24,04%)





Patients	N=10
Acute type A aortic dissection	4
Acute type A IMH (ruptured in DTA)	1
Chronic type A aortic dissection (ruptured)	3
Pseudoaneurysm of aortic arch (PAU)	2

Overall Outcomes by Surgical Technique

Patients	N=104
Asc Aorta & Hemiarch	55 (52,78%)
Sub-group mortality	10 (18,18%)
Aortic root replacement (Bentall)	32 (30,77%)
Sub-group mortality	12 (37,50%)
Aortic root replacement (Bentall) & total arch	4(3,85%)
Sub-group mortality	1 (25,00%)
Total arch replacement	17 (16,35%)
Sub-group mortality	3 (17,65%)
Total arch replacement & frozen elephant trunk (FET)	10 (9,62%)
Sub-group mortality	1 (10,00%)
Concurrent CABG	9 (8,65%)
Sub-group mortality	5 (55,56%)

- 
- AcA-AoD is a surgical emergency associated with very high morbidity and mortality.
 - Early outcome of emergency surgical repair has not improved substantially over the last 20 years.
 - Repeatedly debates regarding operative extent and optimal conduct of the operation.
 - The question remains: are patients suffering from too large an operation or too small?

- 
- Distally, open replacement of most of the transverse arch is best in most patients.
 - The need for late aortic re-intervention has not been shown to be affected by more extensive distal operative procedures, but the contemporary enthusiasm for a distal frozen elephant trunk (FET) only seems to build.
 - It must be remembered that the first and foremost goal of the operation is to have an operative survivor; additional measures to reduce late morbidity are secondary aspirations.

- 
- With increasing experience, true contraindications to emergency surgical operation have dwindled, but patients with advanced age, multiple comorbidities, and major neurological deficits do not fare well.
 - The endovascular revolution, moreover, has spawned innovative options for modern practice, including ascending stent graft and adaptations of the old flap fenestration technique.
 - Despite the increasingly complex operations and ever expanding therapies, this life-threatening disease remains a stubborn challenge for all cardiovascular surgeons.
 - Development of specialized thoracic aortic teams and regionalization of care for patients with AcA-AoD offers the most promise to improve overall results.

BLOOD
TOIL
TEARS
AND SWEAT

Western Crete



