

CABG Using CPB

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조민섭

CABG

- w/ CPB
 - Conventional CABG
 - On pump beating CAB
 - Heart-lung Machine
 - ECMO
- w/o CPB
 - OPCAB

Conventional CABG

- Standard method
- Combined valve surgery
- LV Aneurysm
- Septal rupture
- Conversion from OPCAB

Advantage

- Easy and accurate anastomosis
- Hemodynamically stable

Disadvantage

- Cx of CPB
- Sytemic inflammatory reaction
- Bleeding
- Neurologic Cx
- Respiratory Cx
- Renal Cx
- ACC에 의한 ischemia

Goal

- Minimize CPB time and ACC time
- Prevent CVA

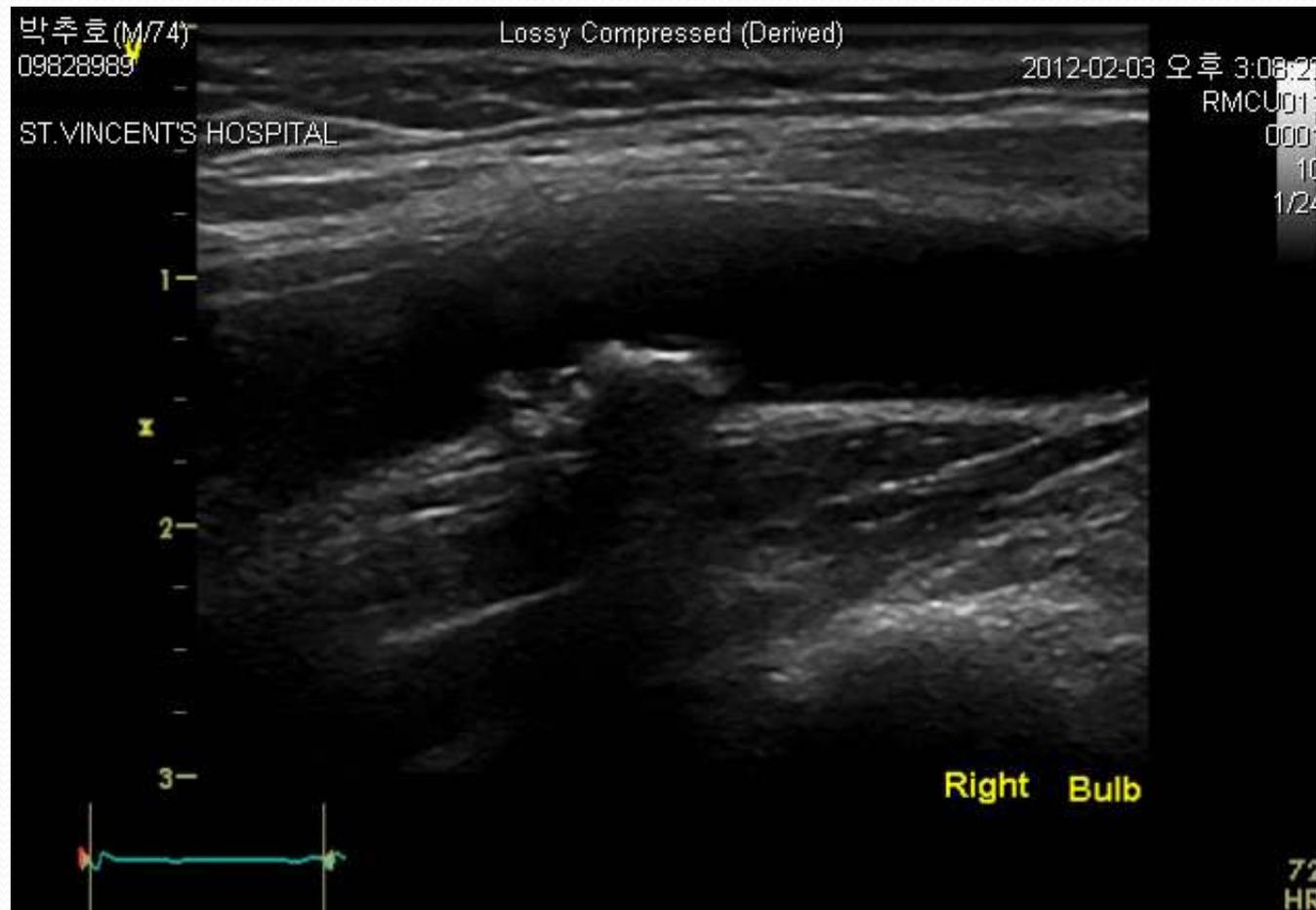
CVA

- Cerebral Hypoperfusion
 - Perfusion rate
 - Perfusion pressure
- Microembolism
- Inflammatory response

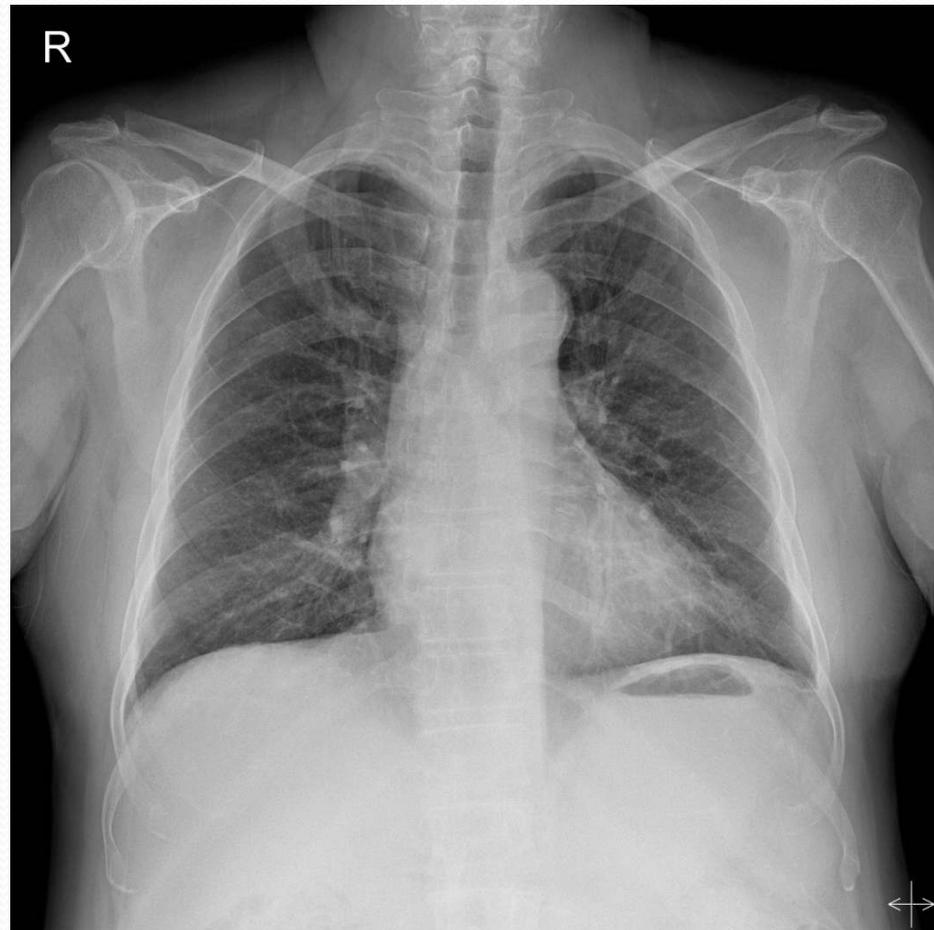
Preoperative check list

- Carotid doppler
- TCD
- Brain MRA
- Brain CTA and Brain MRI
- Chest PA
- C-angio
- Chest CT

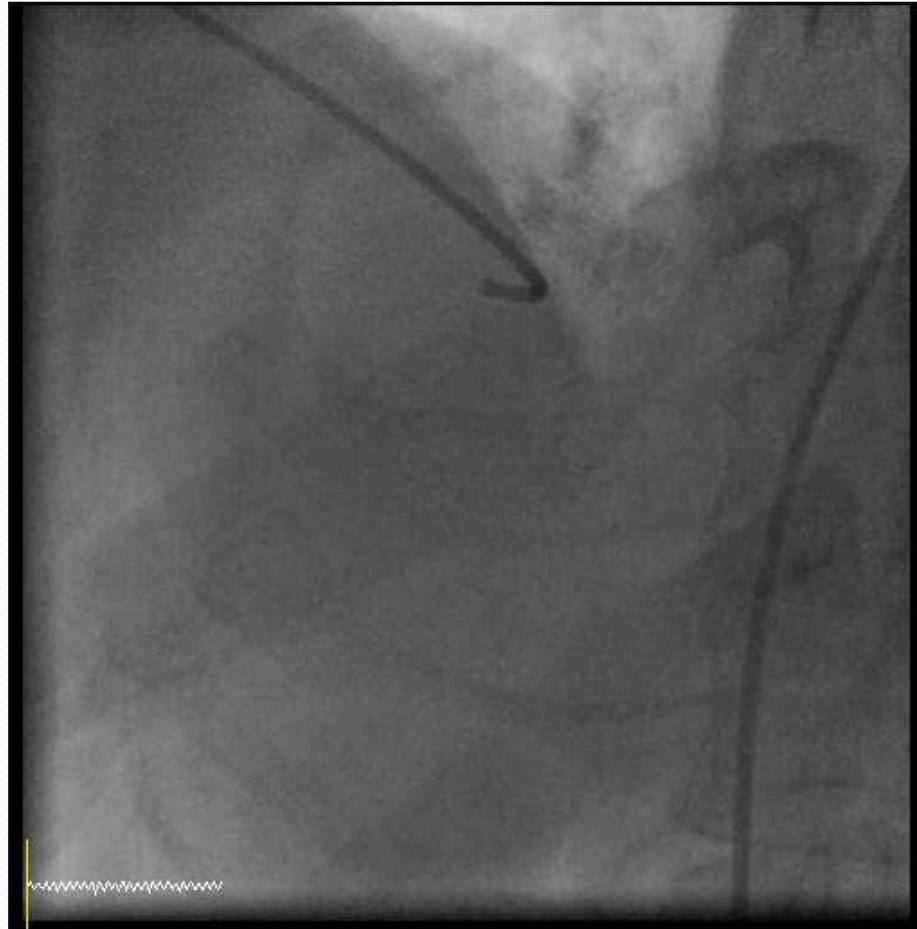
Carotid Doppler



Chest PA

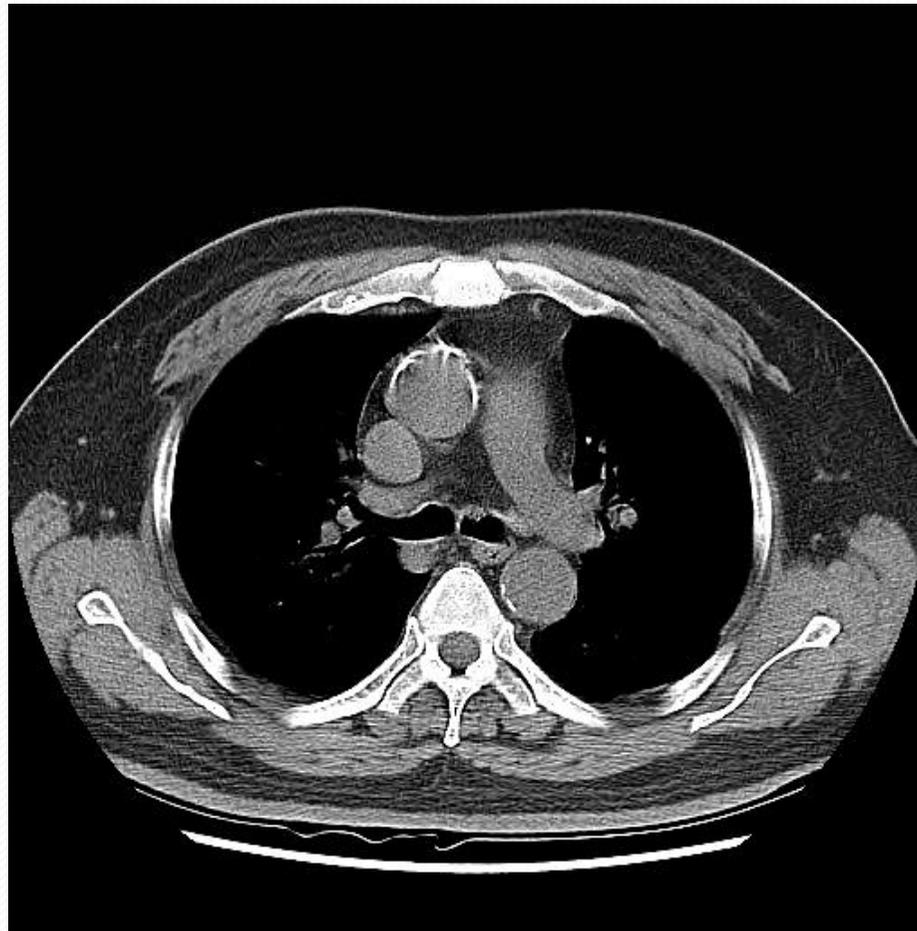


C-angio



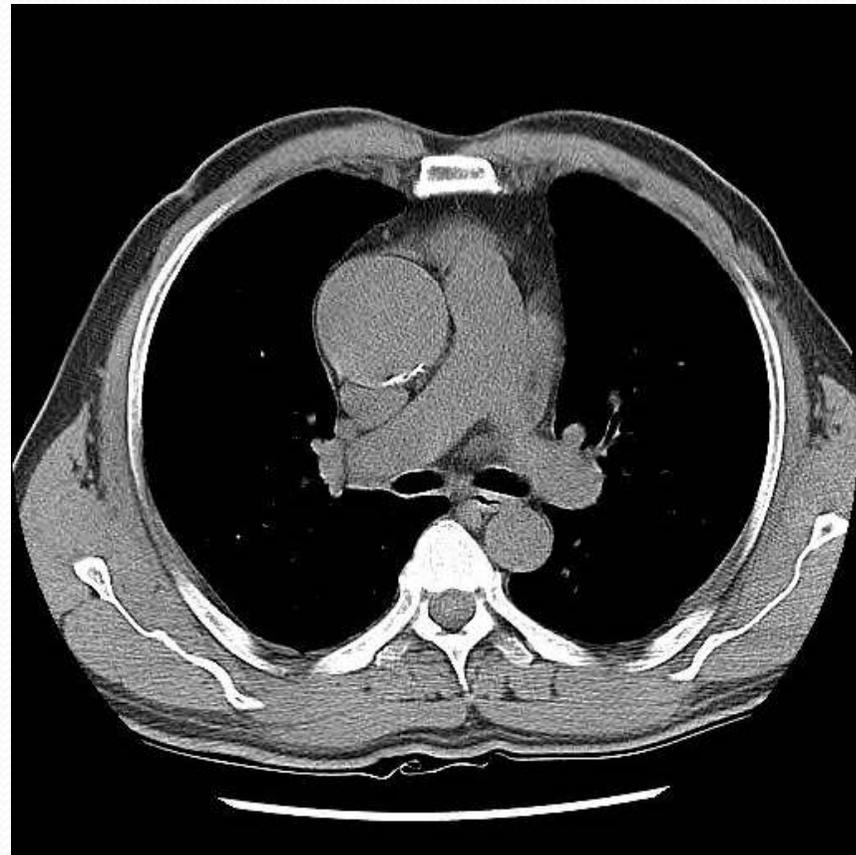
제7차 전공의 학술세미나

Chest CT

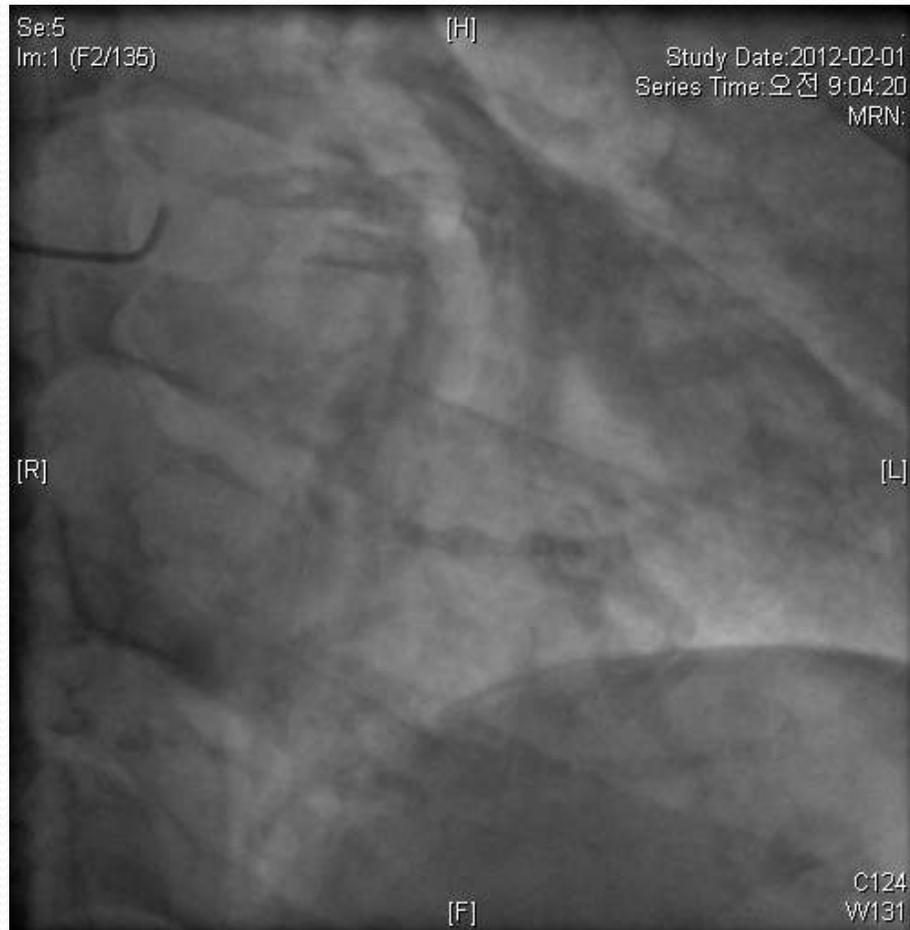


제7차 전공의 학술세미나

Chest CT



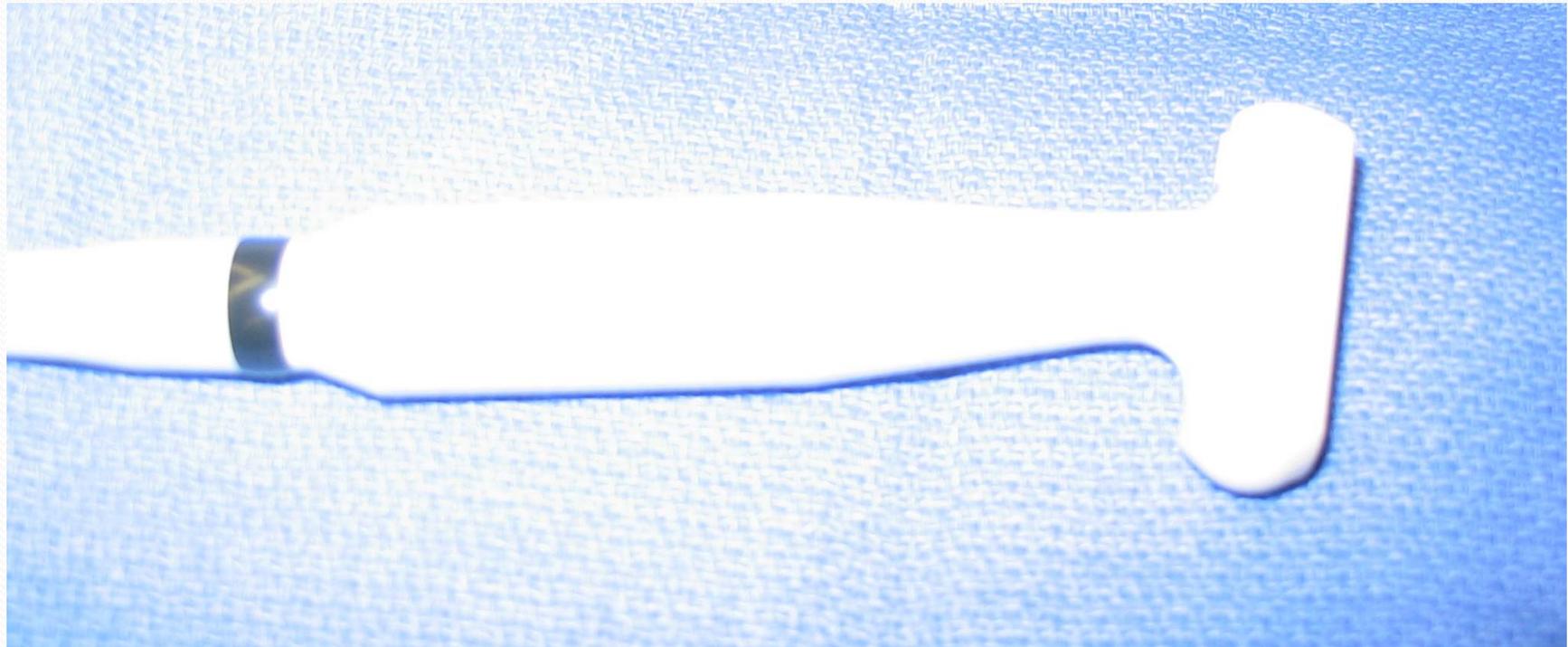
C-angio



Ascending Aorta

- Palpation
- Epiaortic US
- OPCAB
- On-pump beating CABG w/ alternative aortic cannulation
- Proximal anastomosis
- Single Cross-clamp
- Replacement of AA

Epiaortic US - Probe

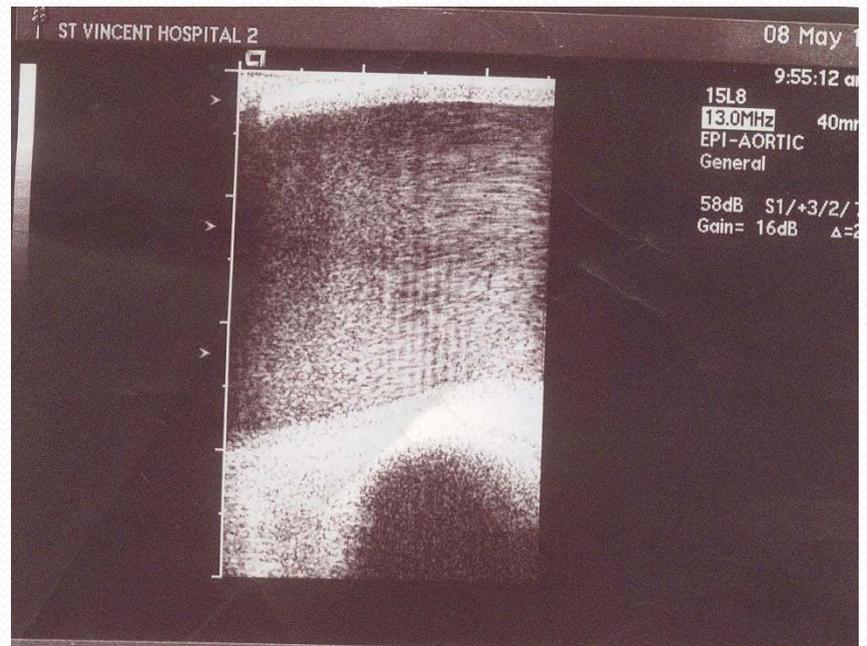


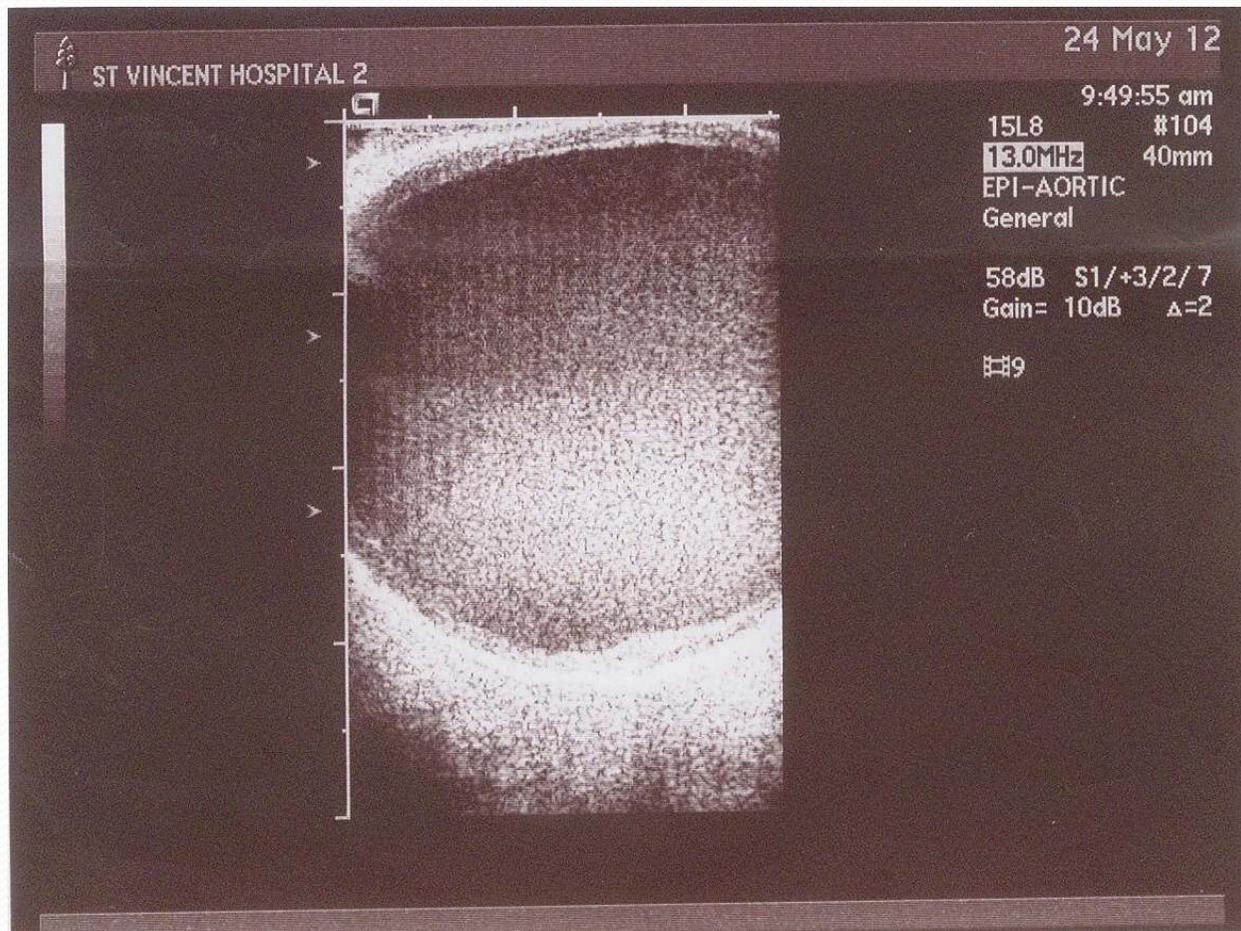
Epiaortic US - Probe





제7차 전공의 학술세미나





제7차 전공의 학술세미나

OPCAB

- No touch
- Hemodynamically unstable
- Combined surgery

On-pump beating CABG

- Cannulation site
 - AA
 - Aortic arch
 - Brachiocephalic artery
 - Axillary artery
 - FA
- No ACC
- Proximal anastomosis ?

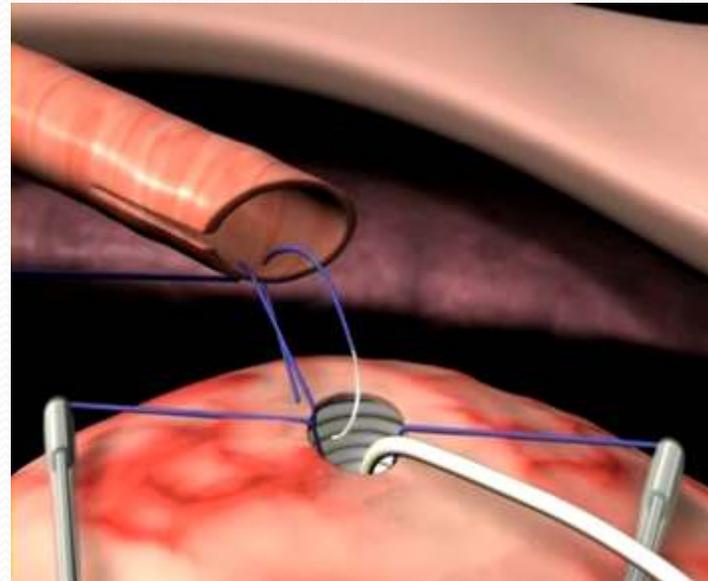
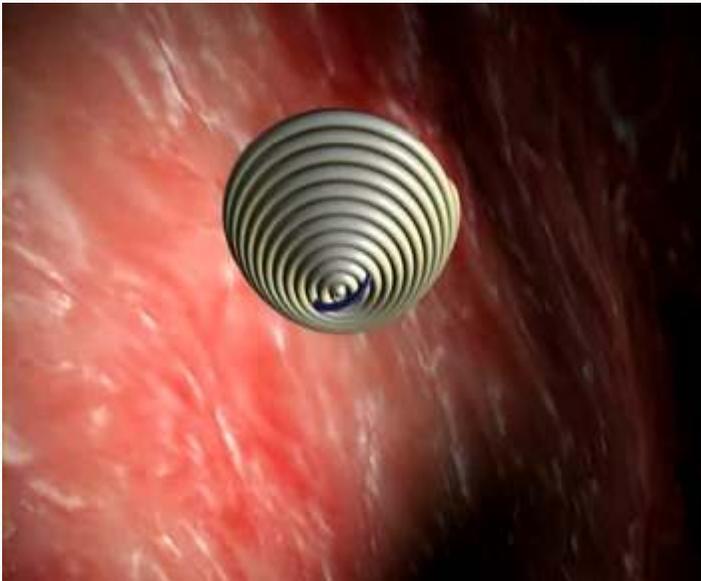
Proximal anastomosis

- Single ACC
- Avoid anastomosis to AA
 - LITA, RITA, REA,
- Heart-String
- Aortic connector

Single Cross-clamp

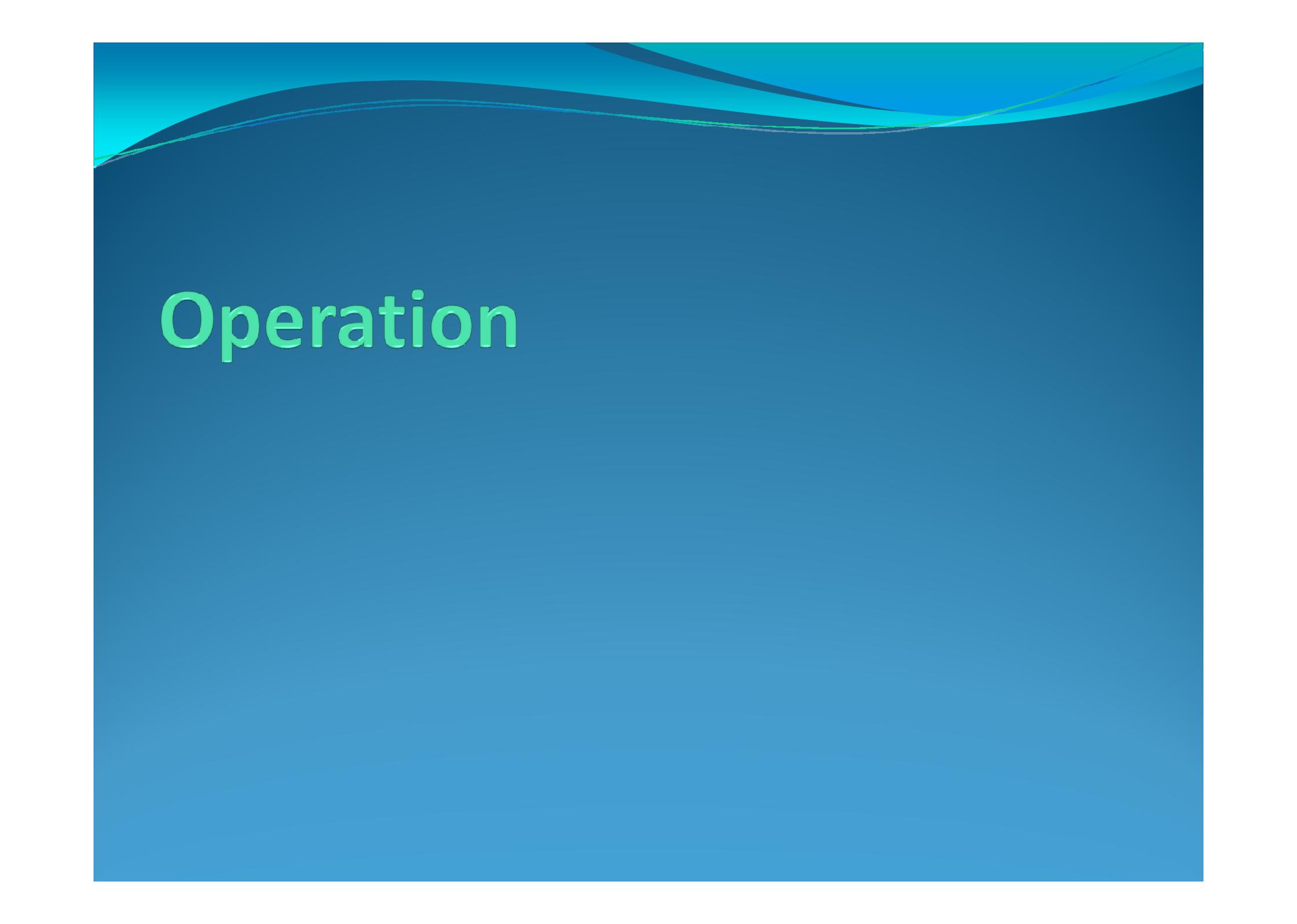
- Side clamp
 - Aortic dissection
 - Embolic risk ↑
 - 문합부위가 aorta의 전방부에 국한
 - ACC time 을 줄일수 있다
- Single Cross-clamp
 - *Avoidance of additional aortic manipulation*
 - Longer ACC time
 - Need to de-air

Heartstring



Perfusion

- Perfusion rate
 - 2.2 ~ 2.4 L/min/m²
- Perfusion pressure
 - Mean 50mmHg
 - Carotid stenosis, Old age, HTN ; mean 80mmHg 이상



Operation

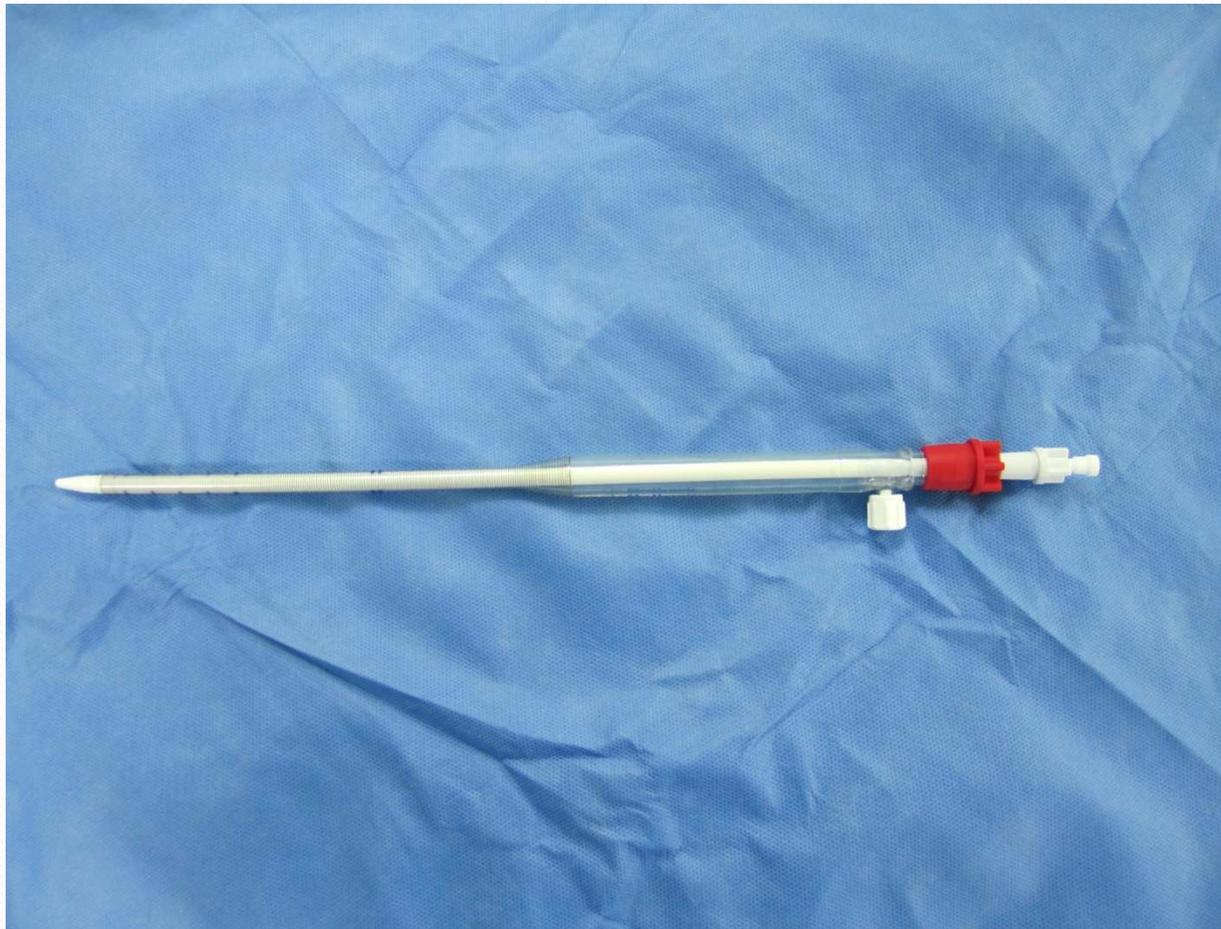
Circuit

- RA to AA bypass
- Normothermia
- Myocardial protection
 - Antegrade and Retrograde Coronary perfusion
 - Blood or Crystalloid CPS
 - Cold or warm induction
 - Intermittent or continuous infusion
 - Warm shot
- LV vent

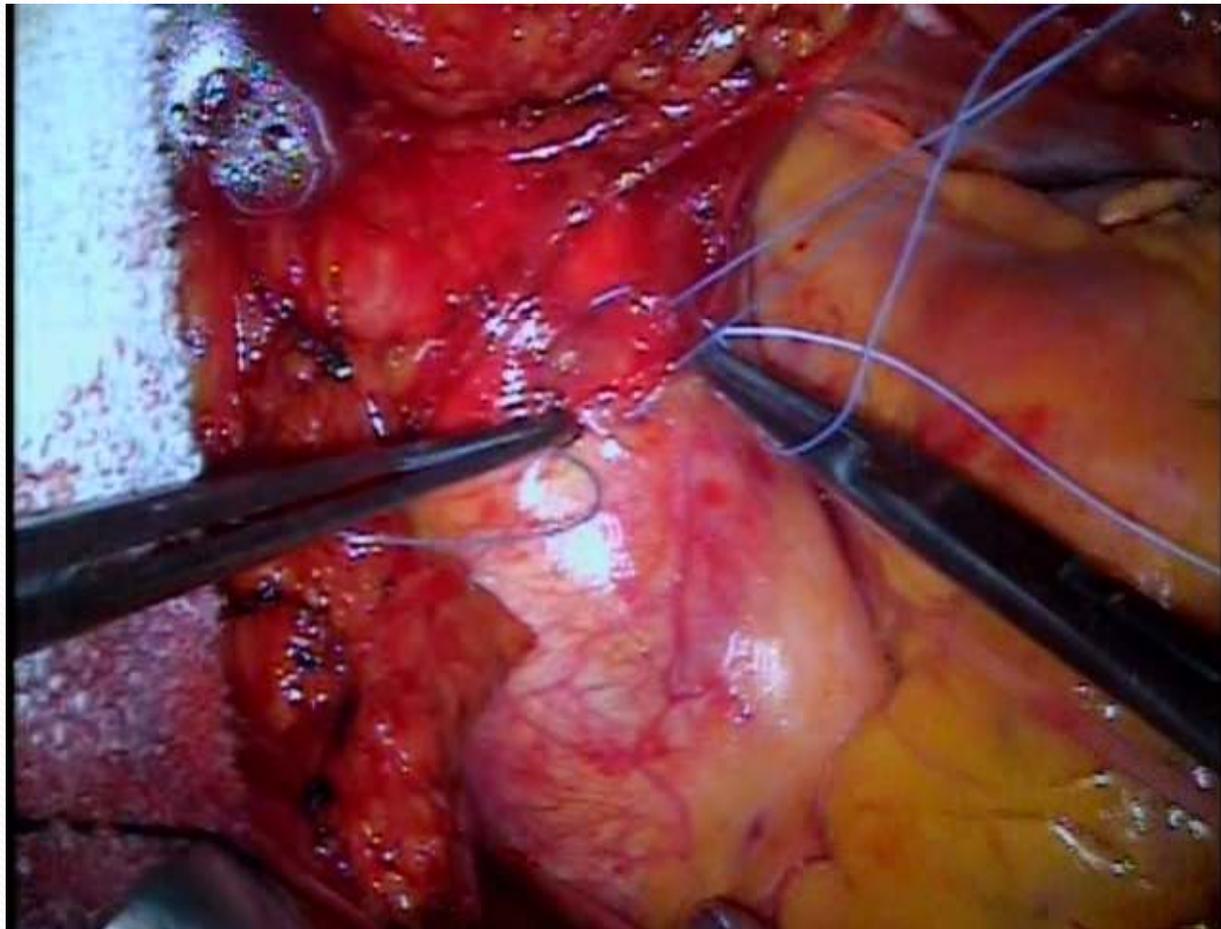
Aortic cannula

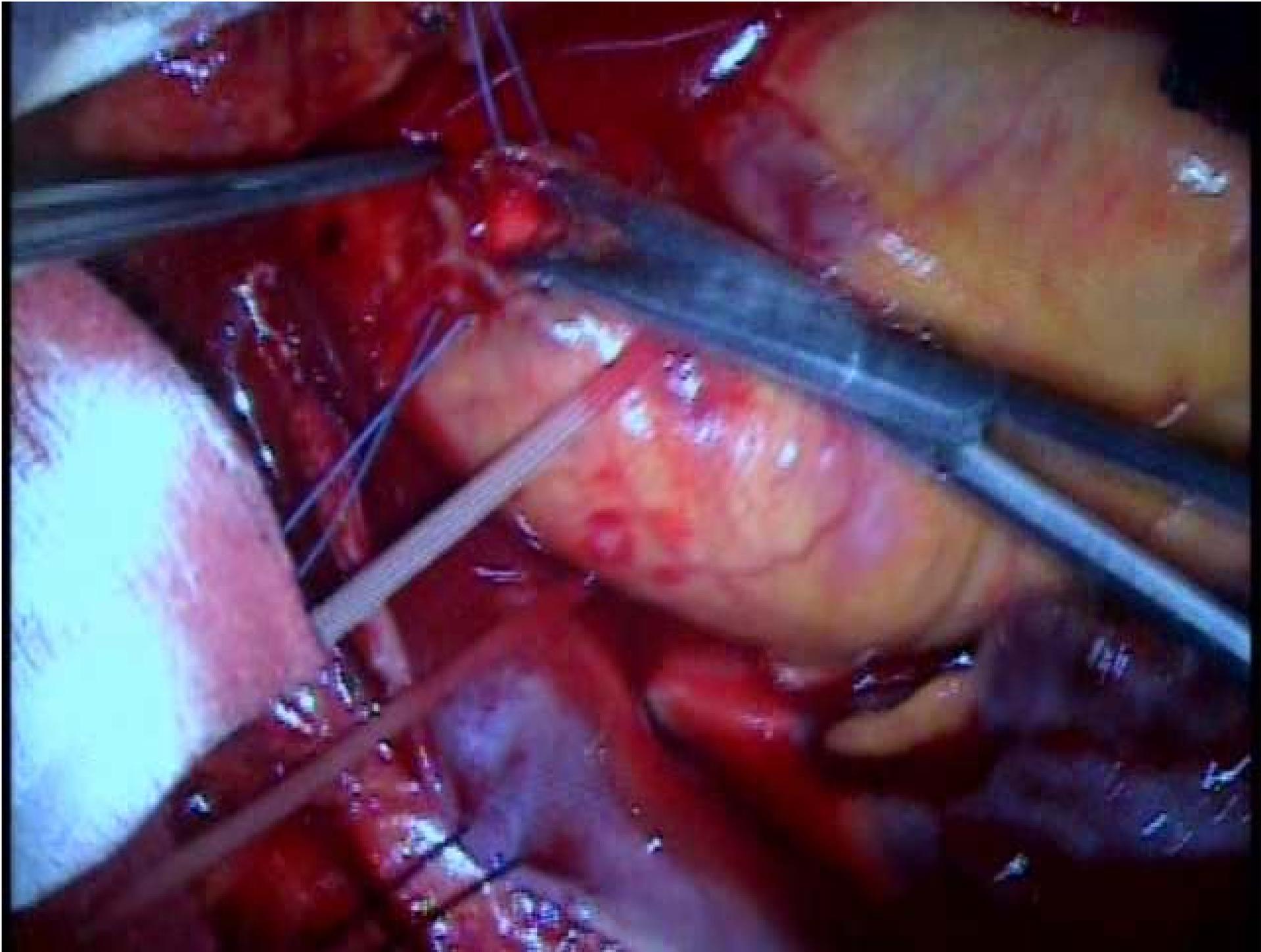


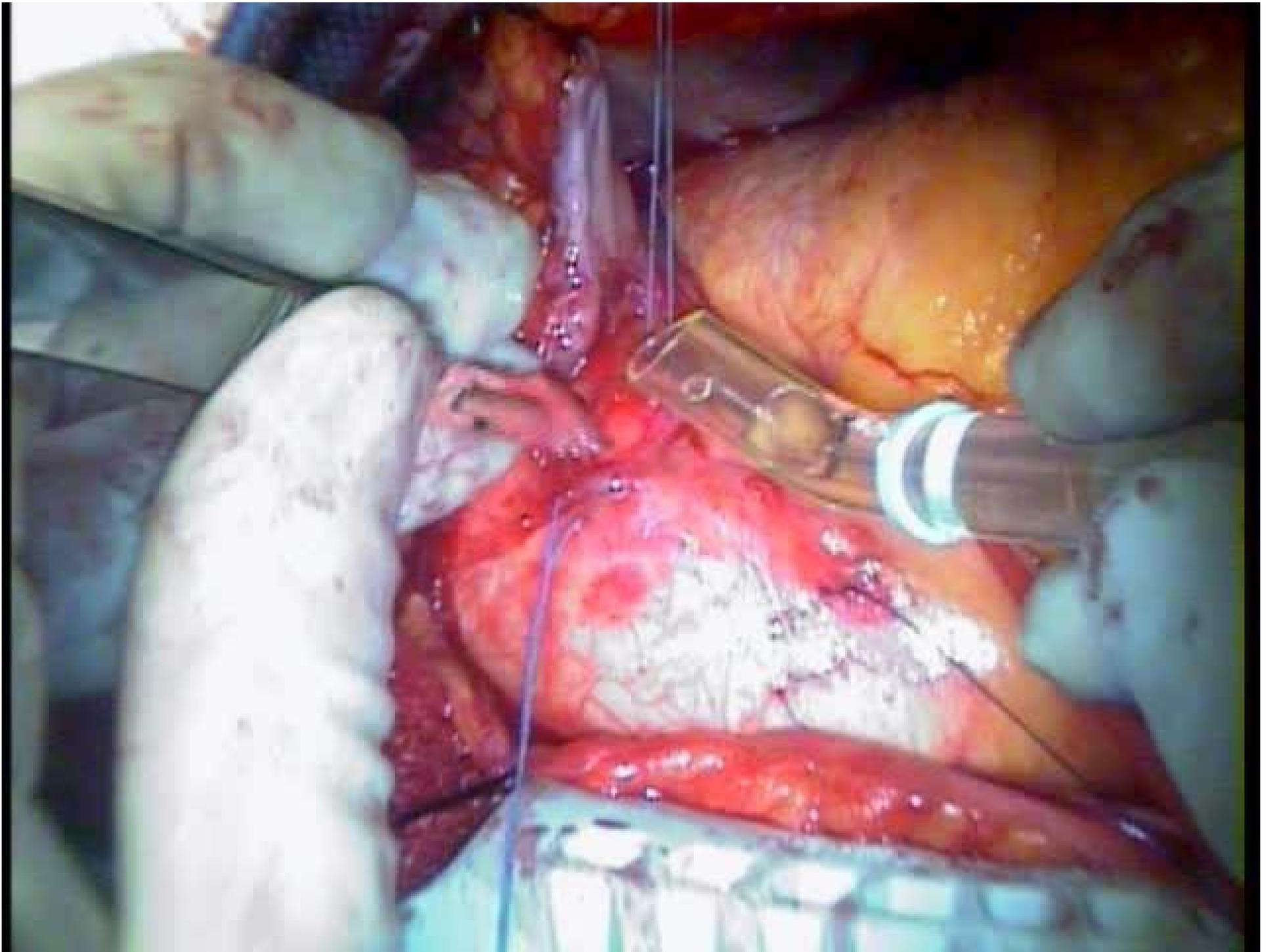
Aortic cannula



Aortic cannulation



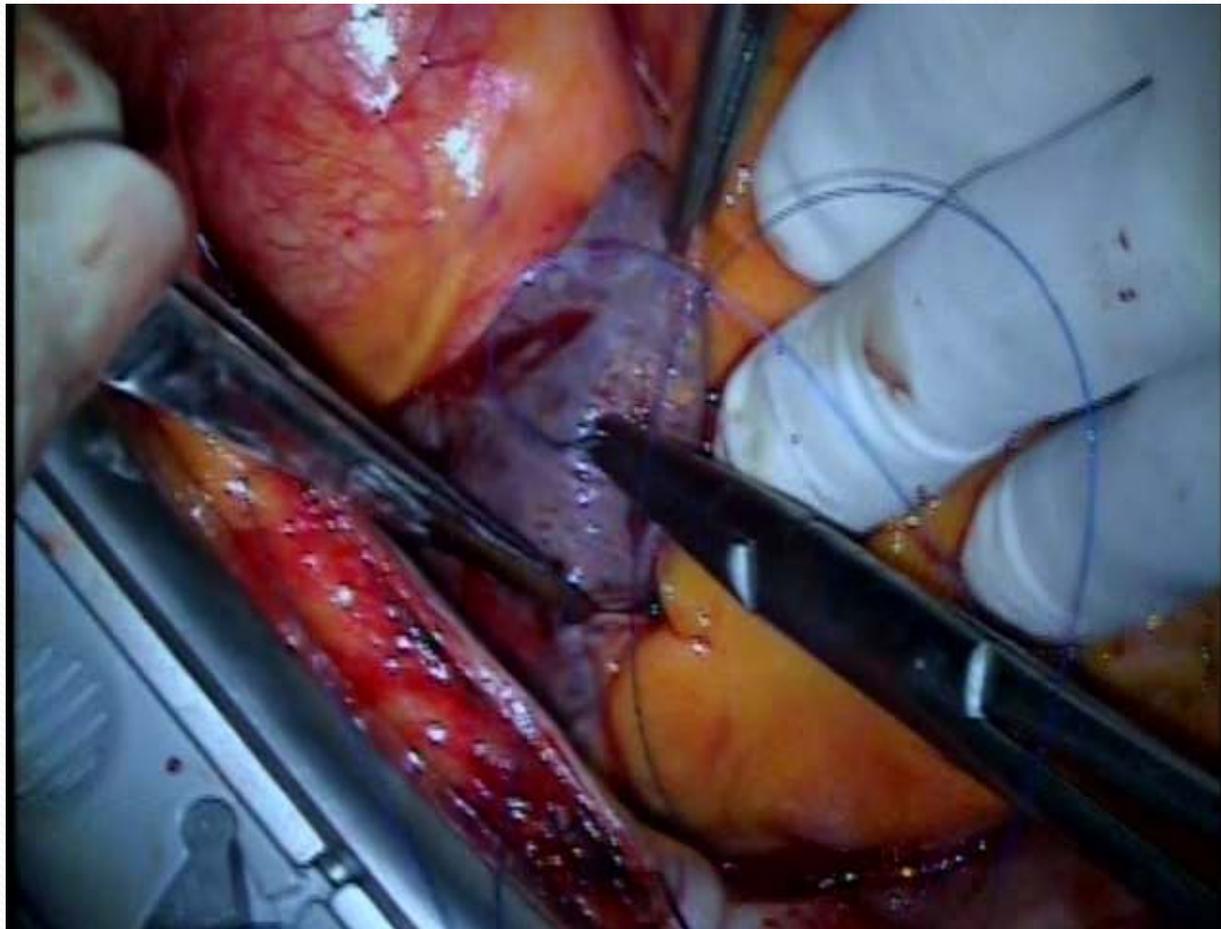


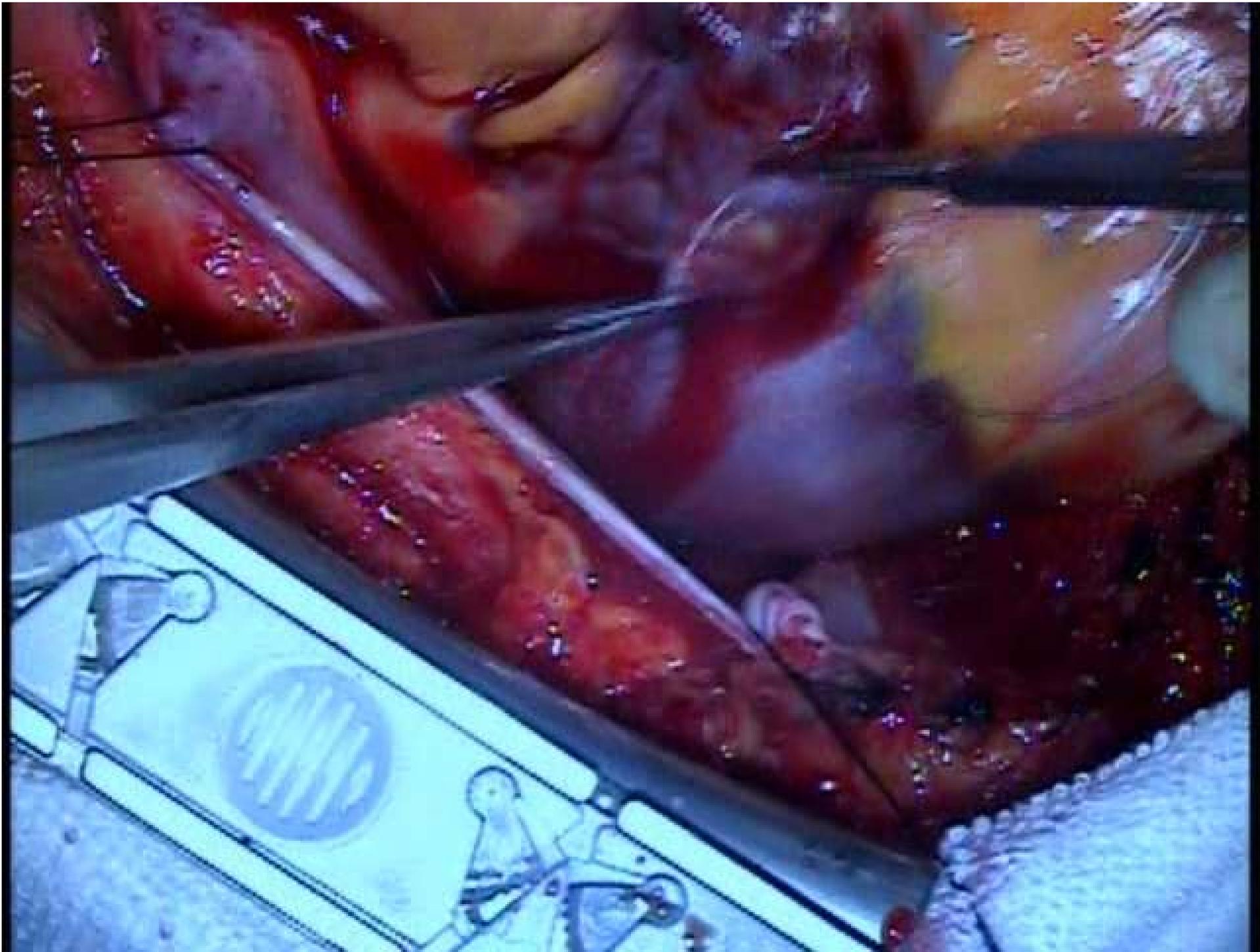


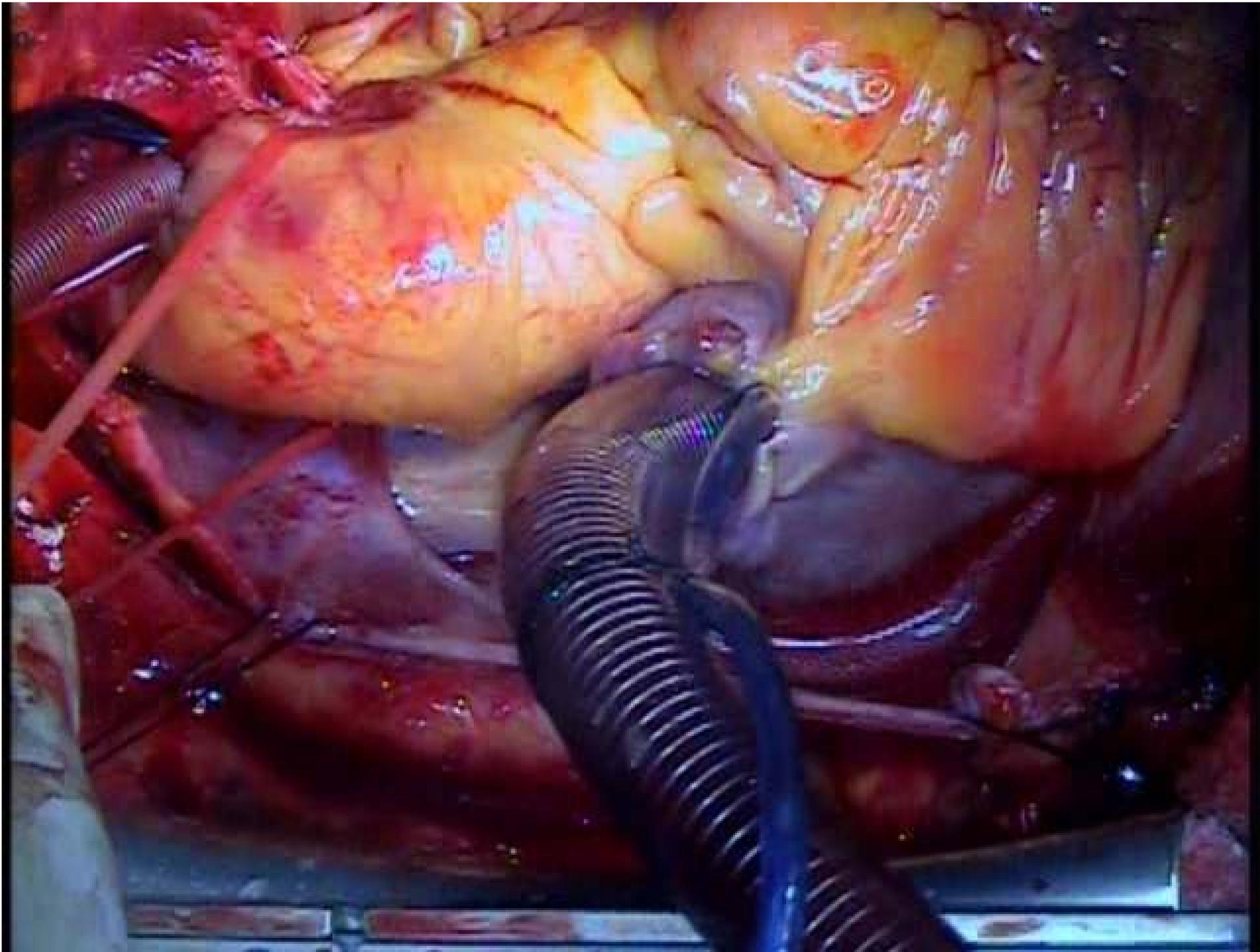




Venous Cannulation



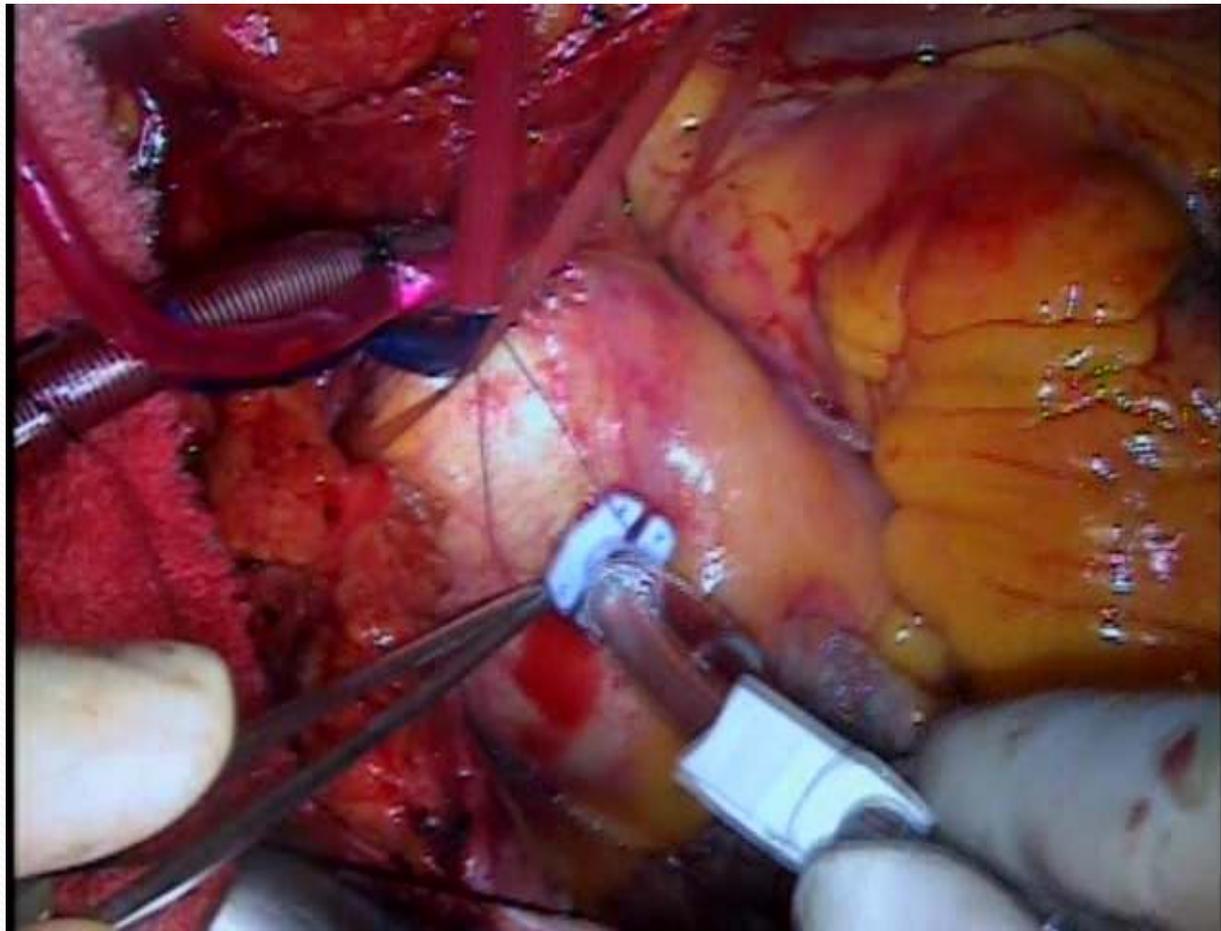




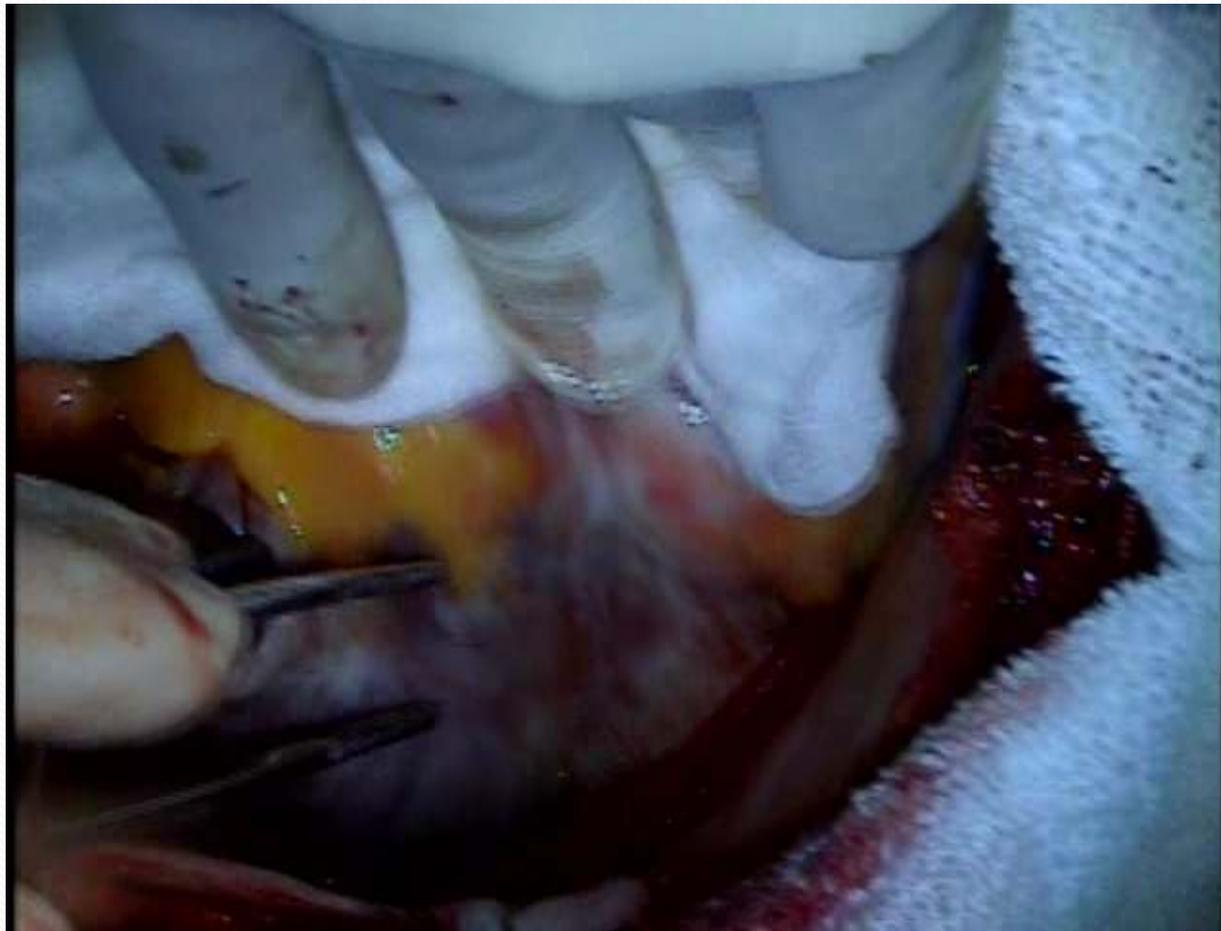
Venous cannula

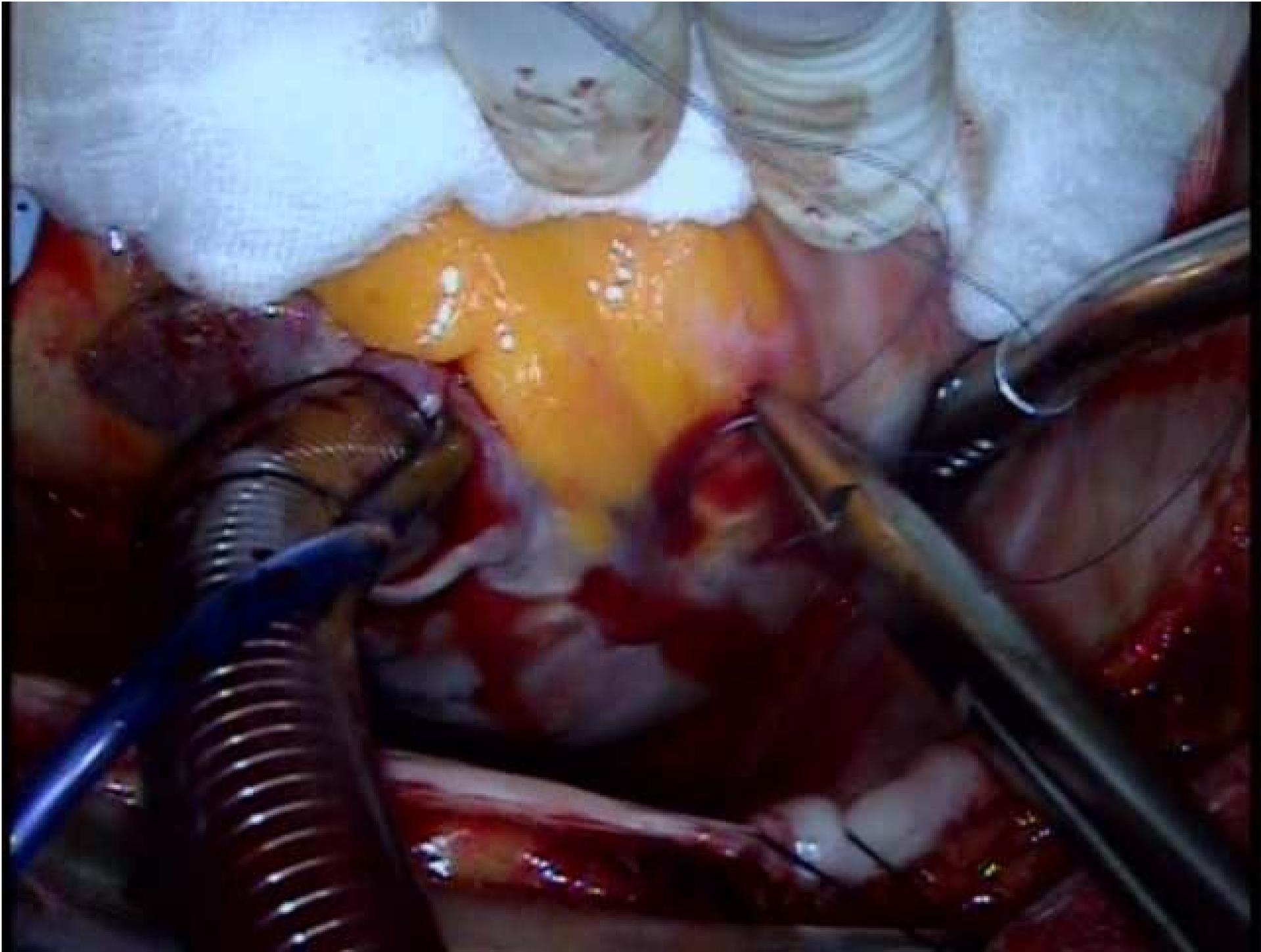


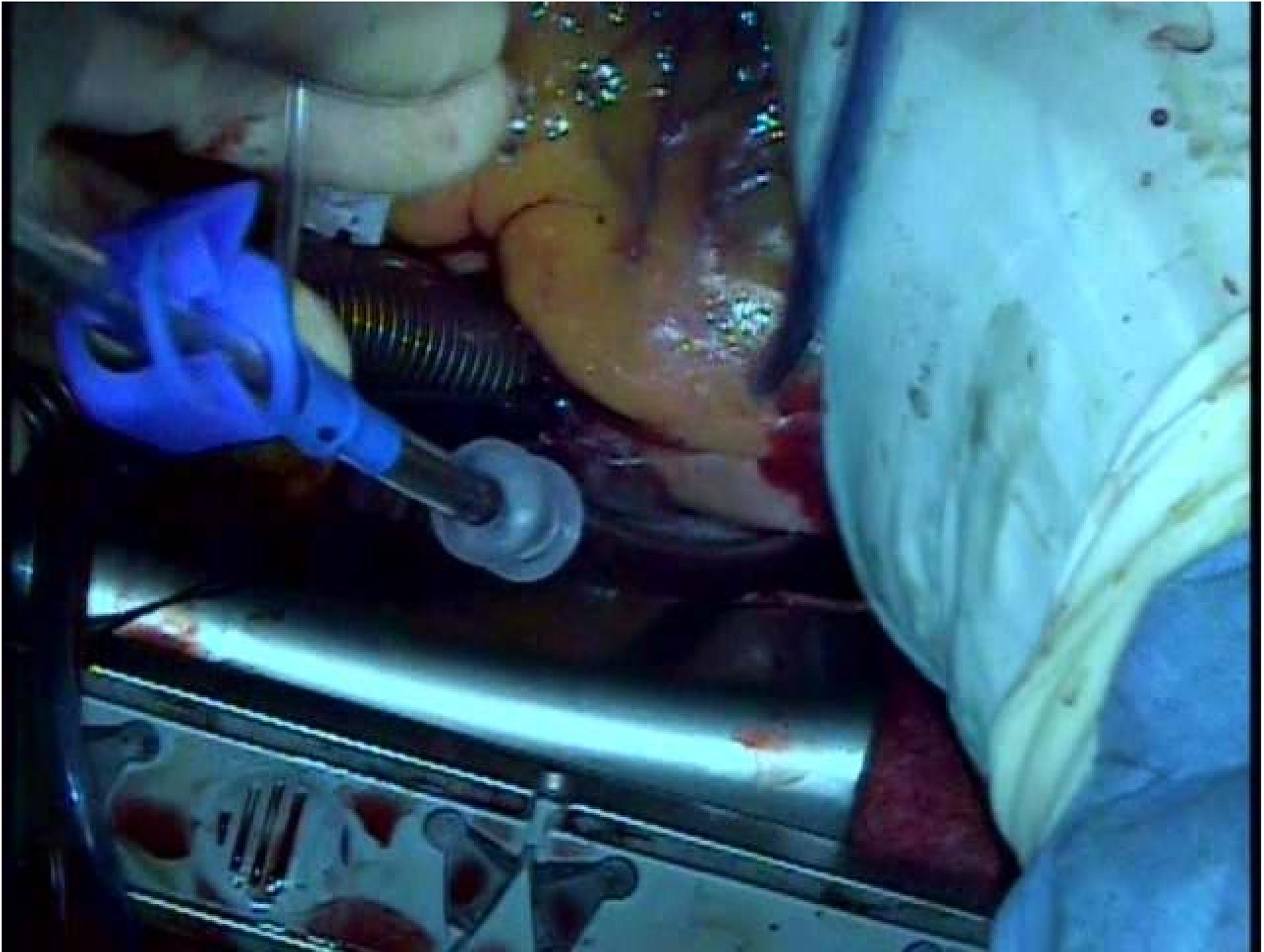
Root cannulation



Retrograde cannulation







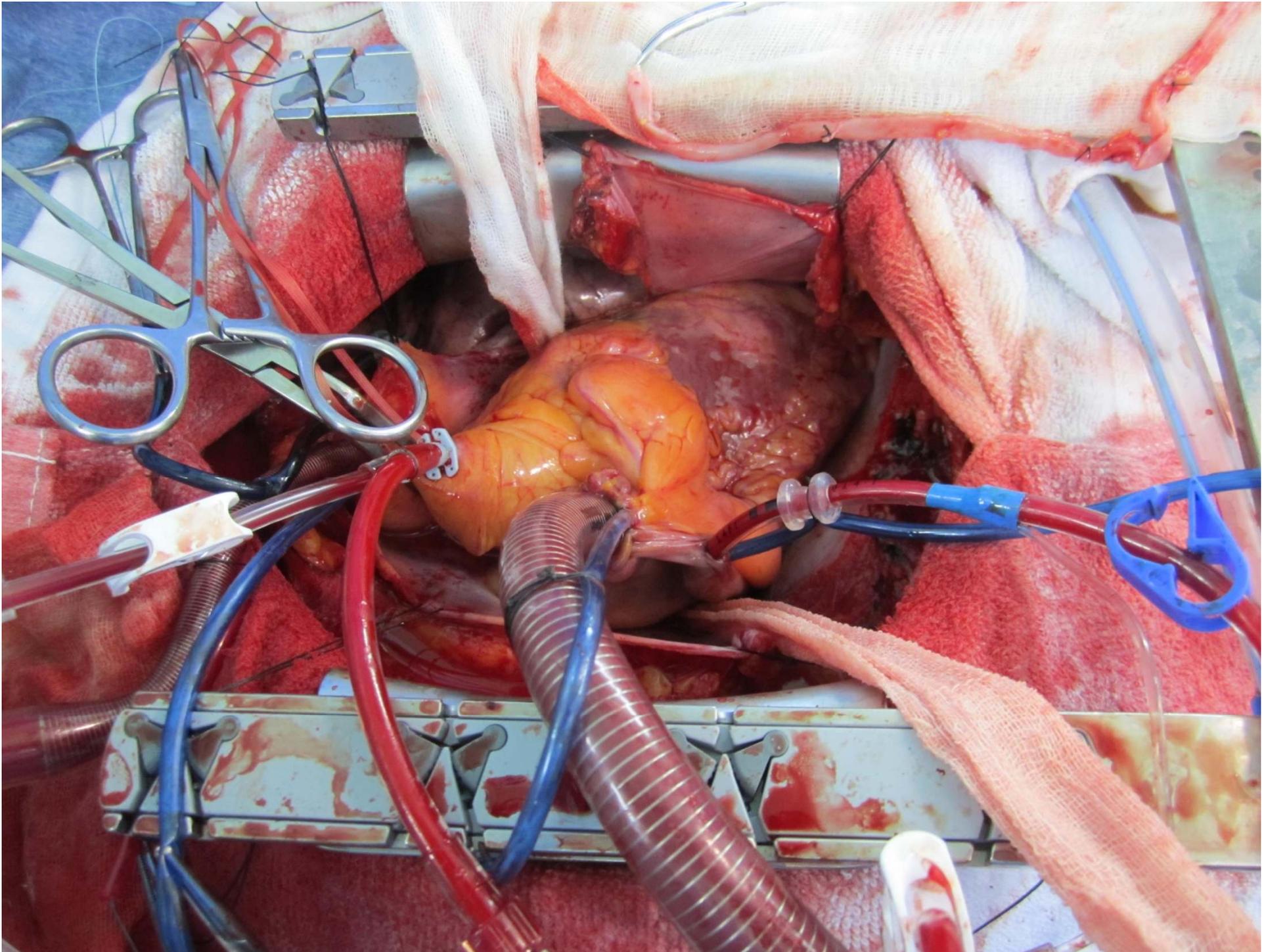
ACC



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ACC





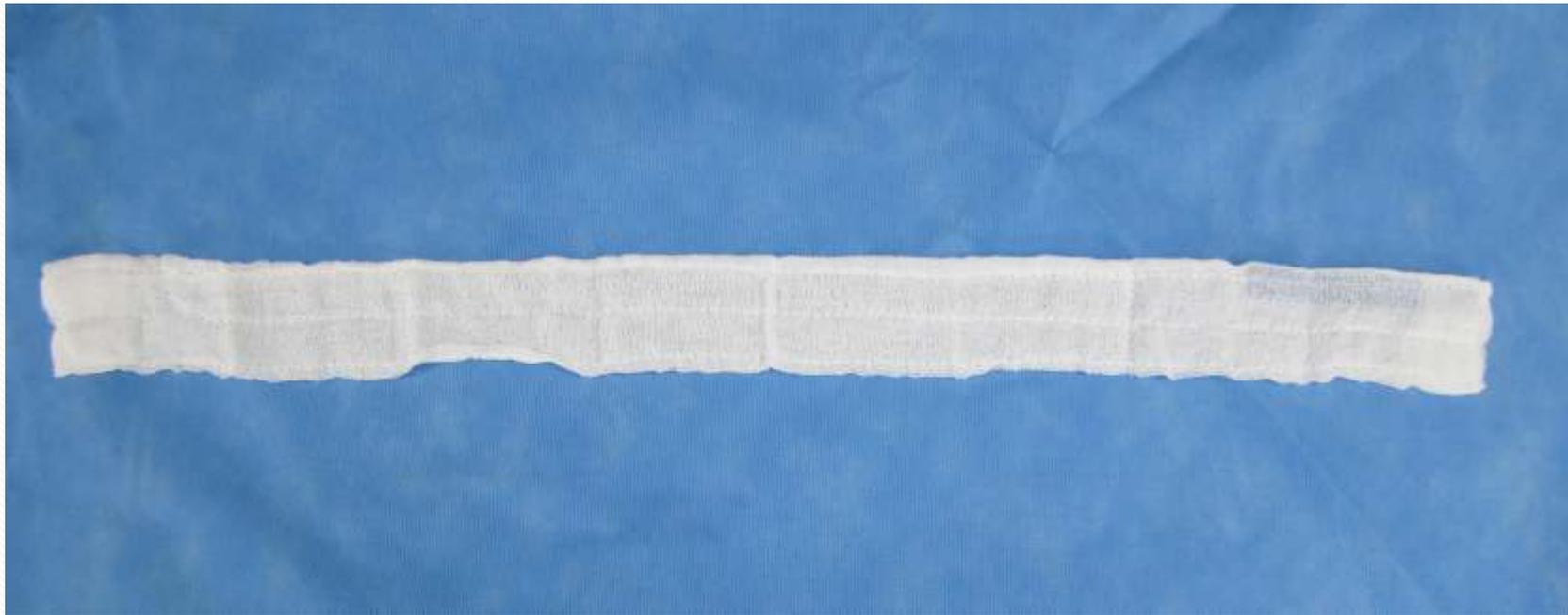
Distal anastomosis

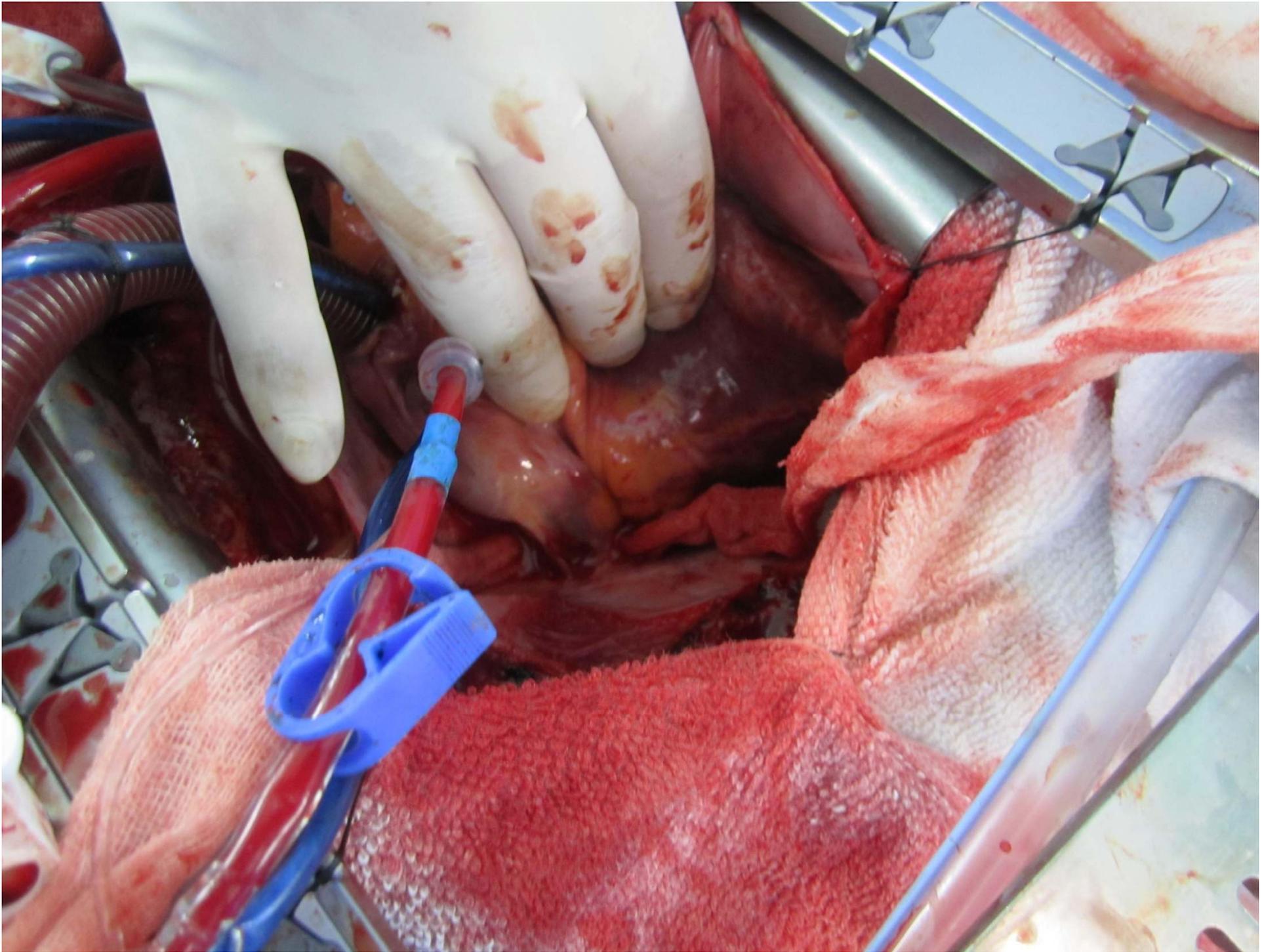
- >1.25mm
- Calcification, Atheroma ; Endarterectomy
- 순서
 - Conventional CABG ; RCA or PDA 부터 Left side로 순차적으로
 - Beating CABG ; LAD 먼저

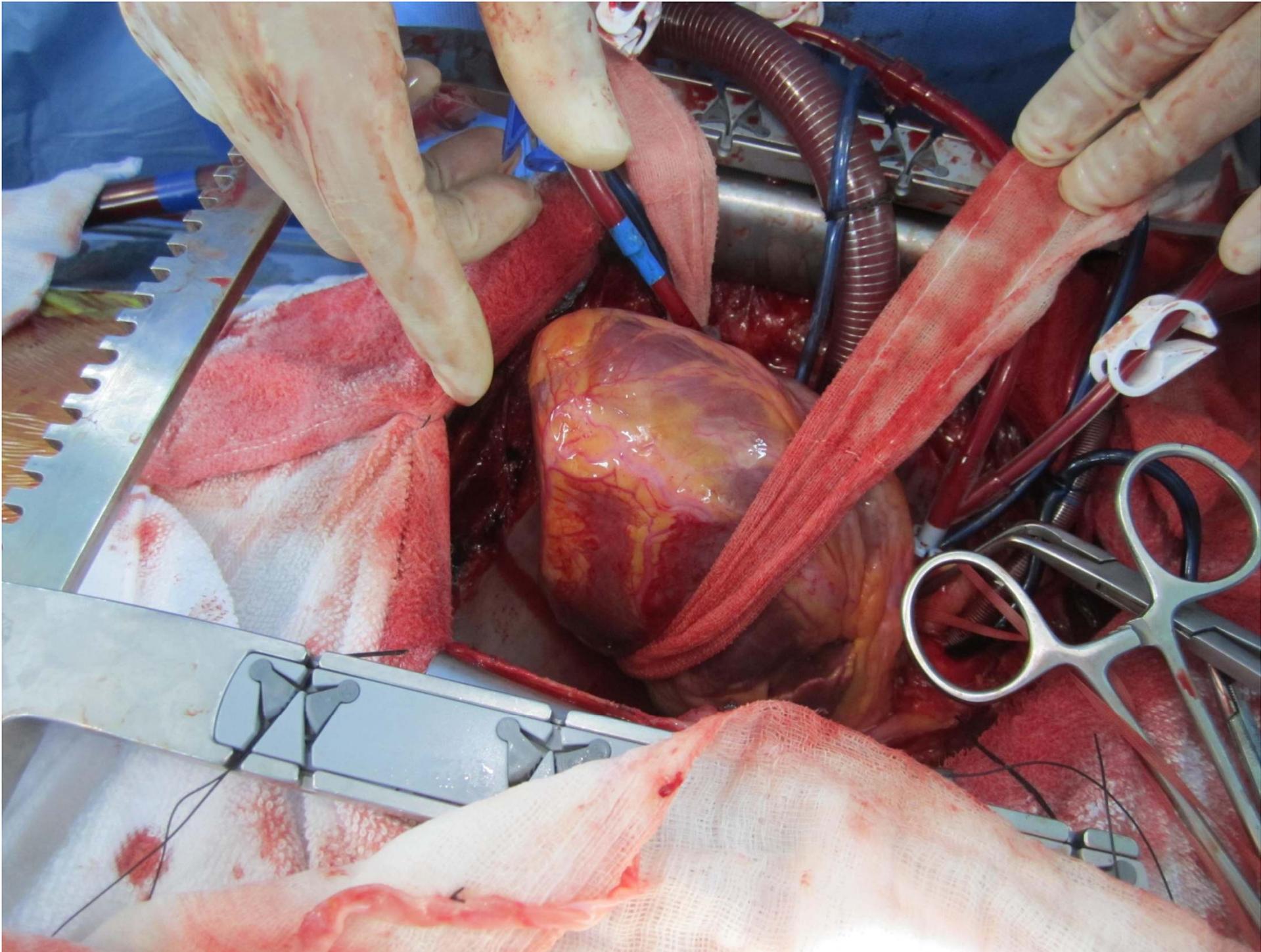
Exposure

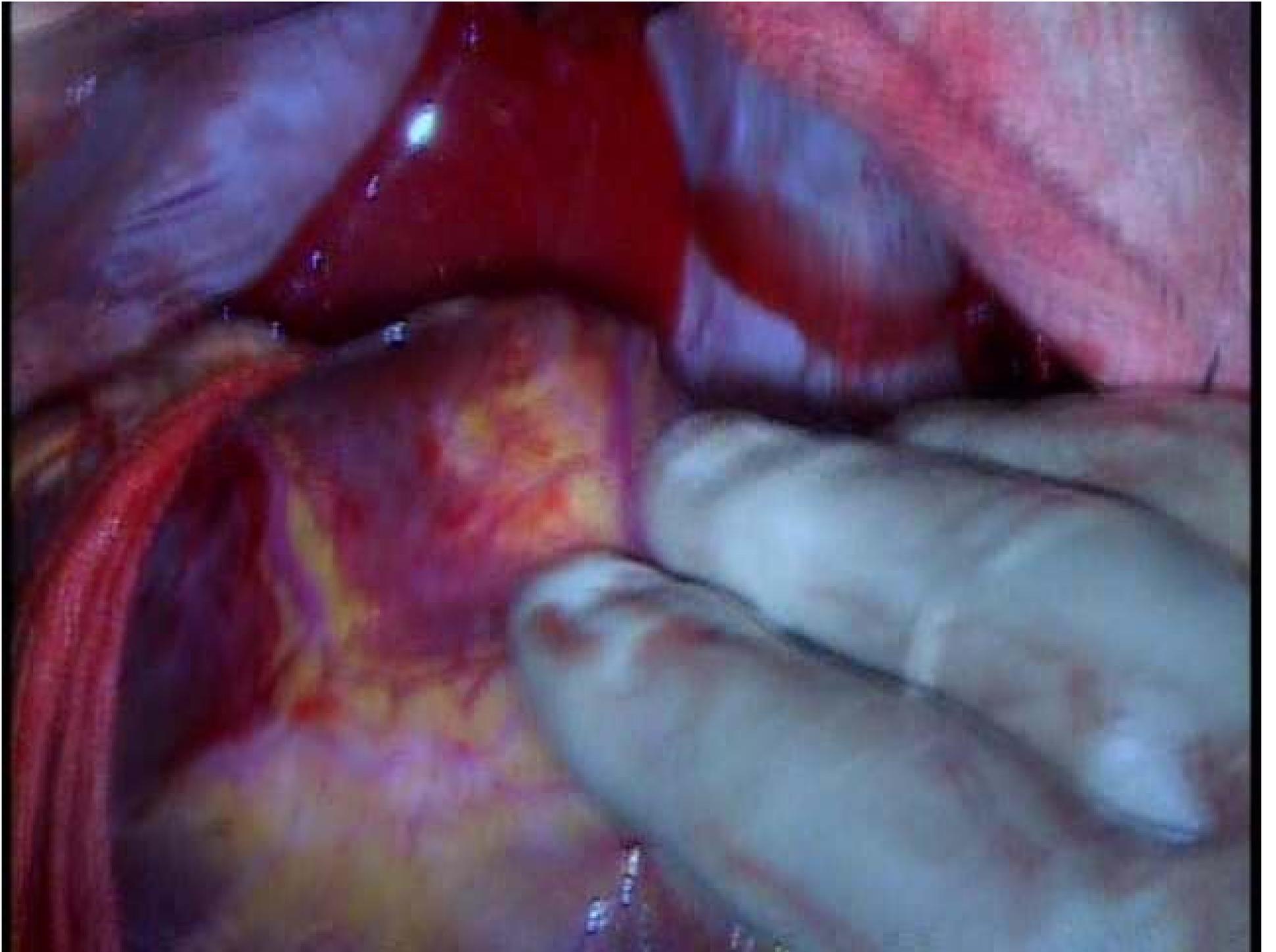
- CABG gauze
- Hand retraction
- Duval lung clamp
- Stabilizer and Apical Vacuum

CABG gauze

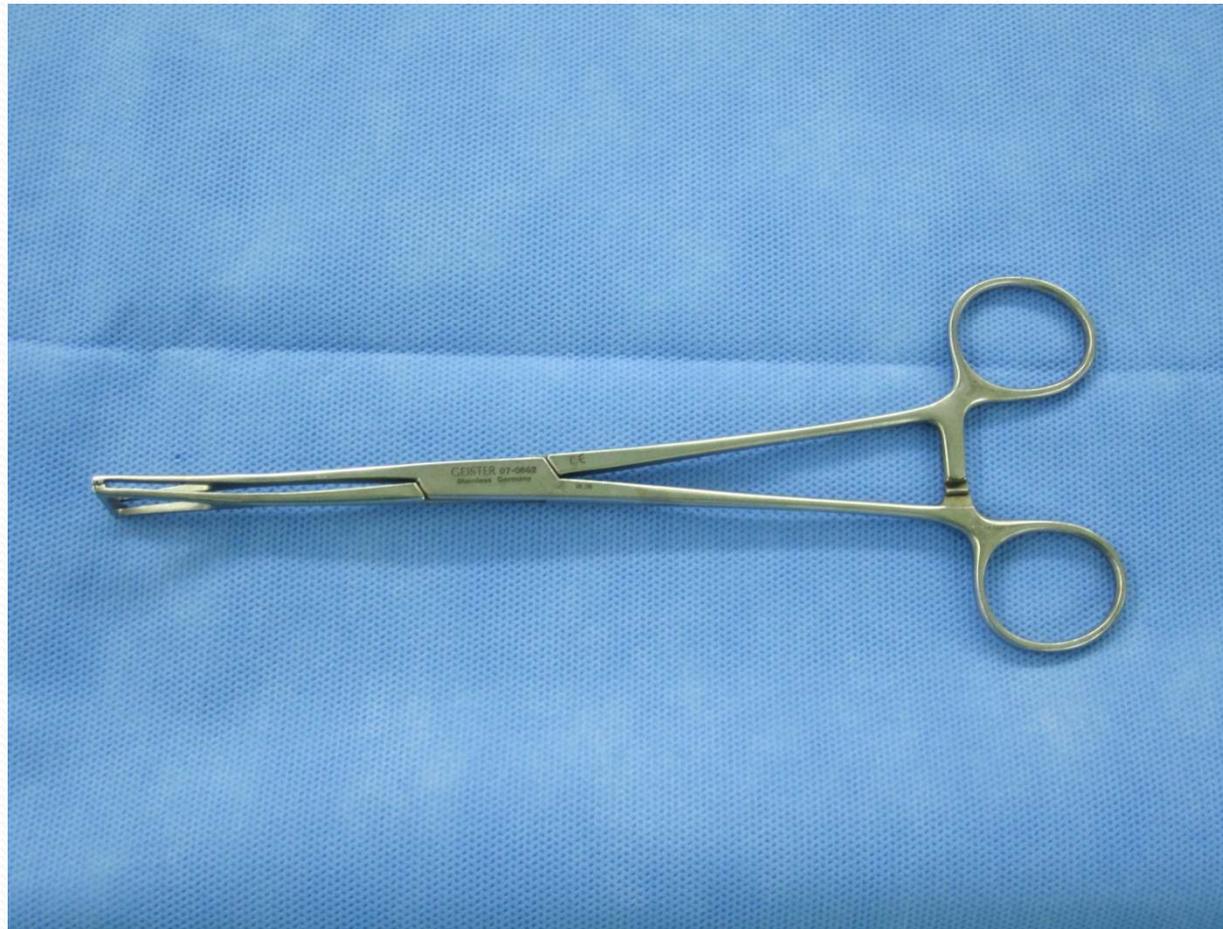


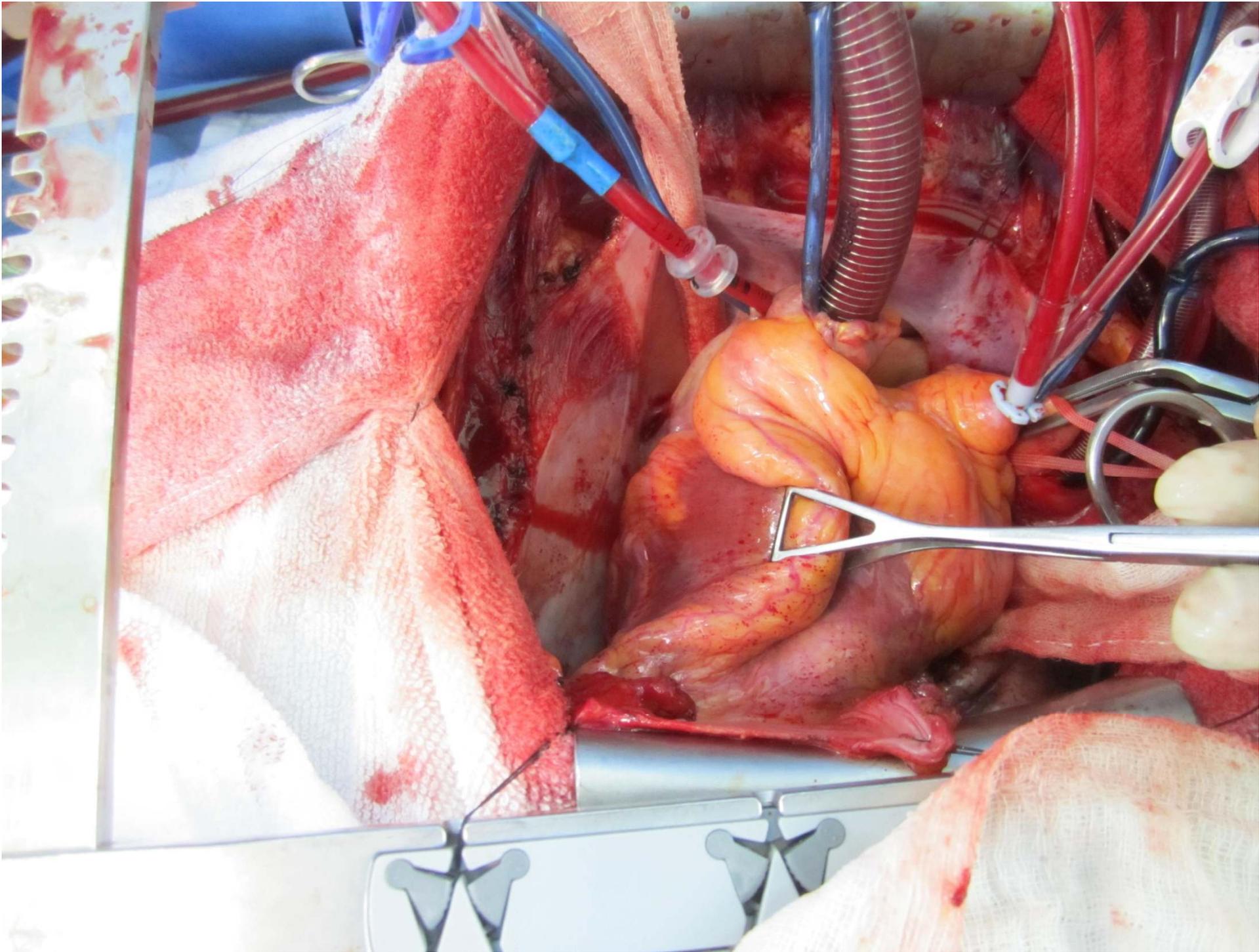


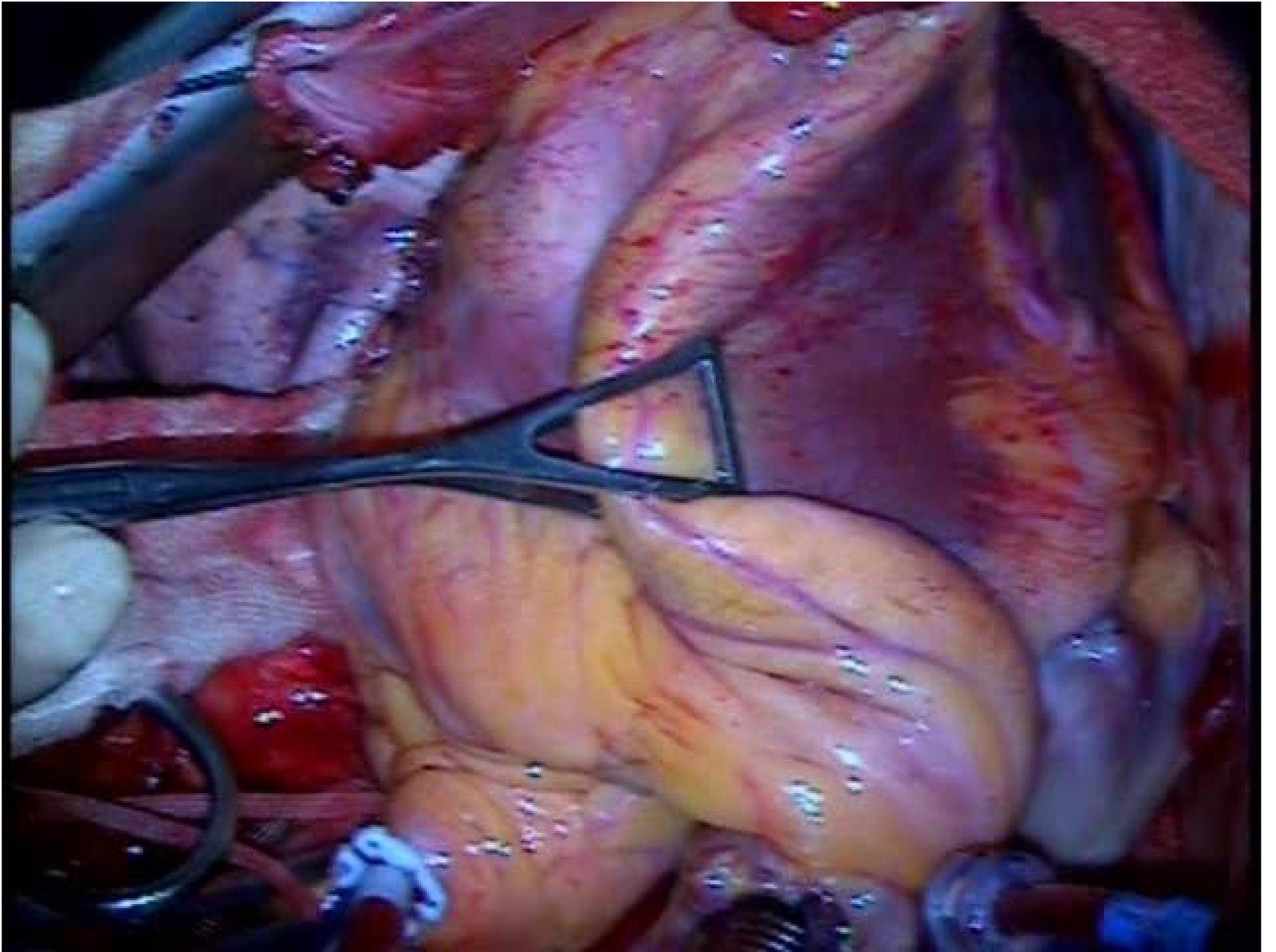




Duval Lung Clamp





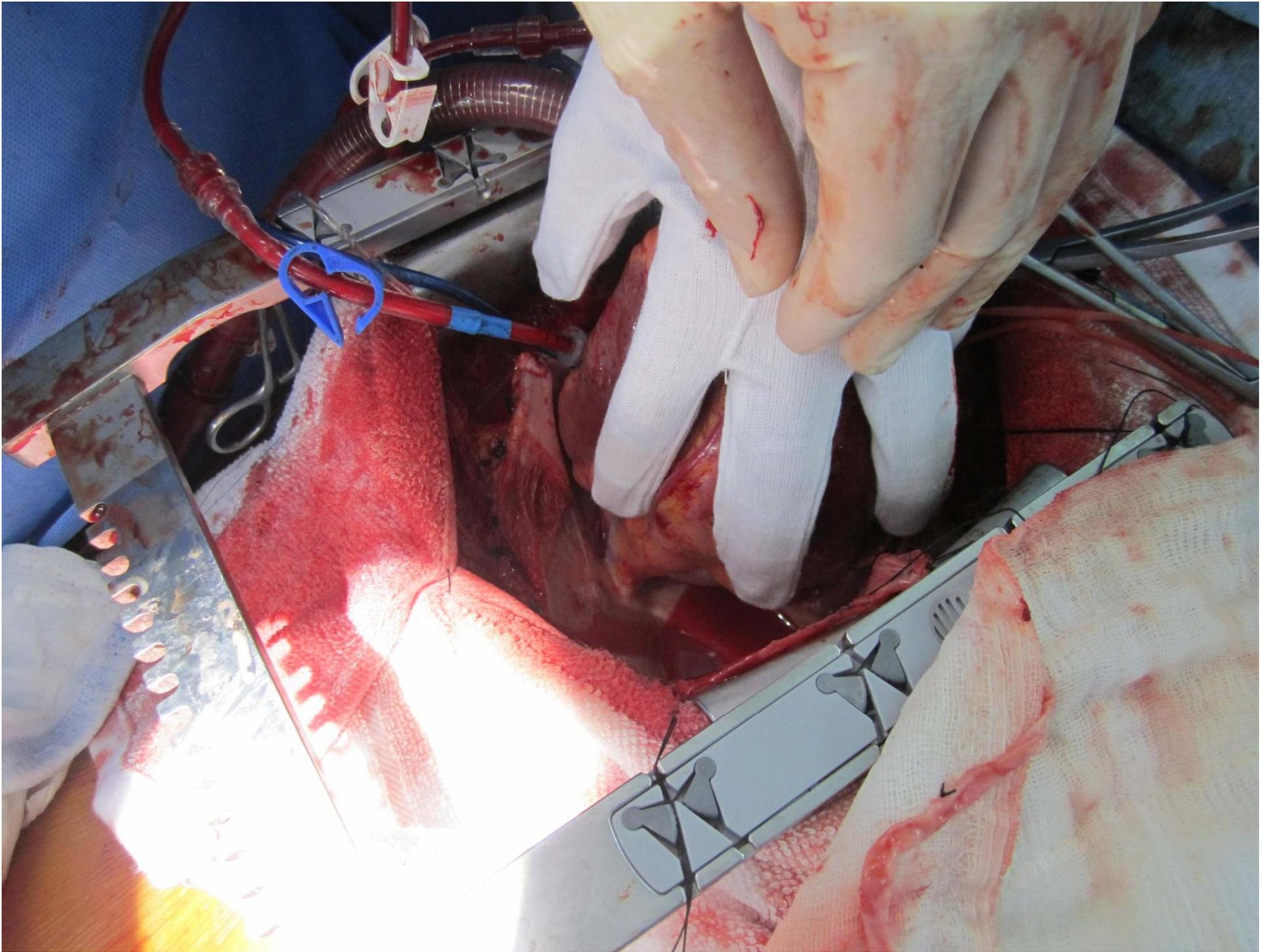


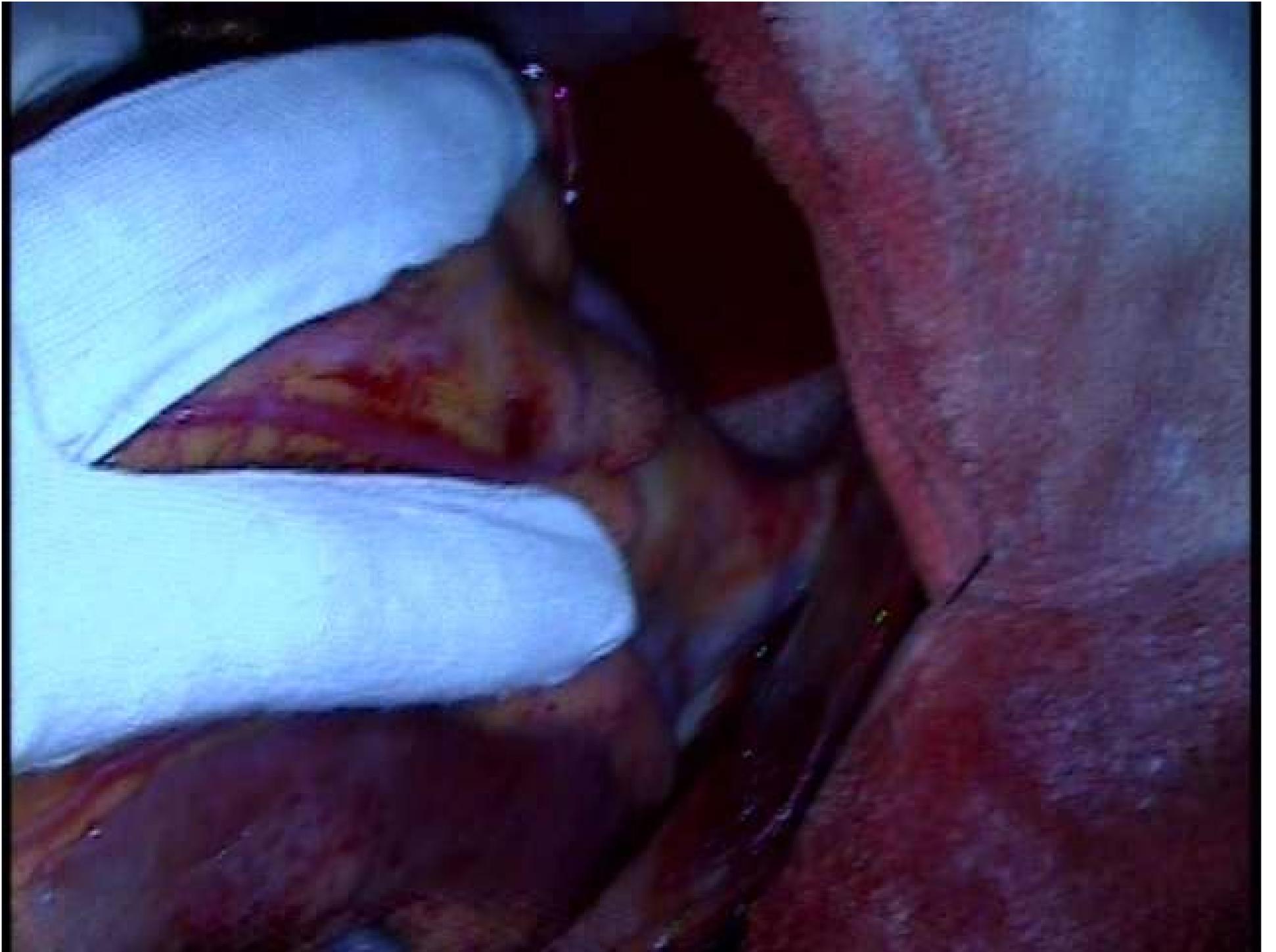


Hand exposure



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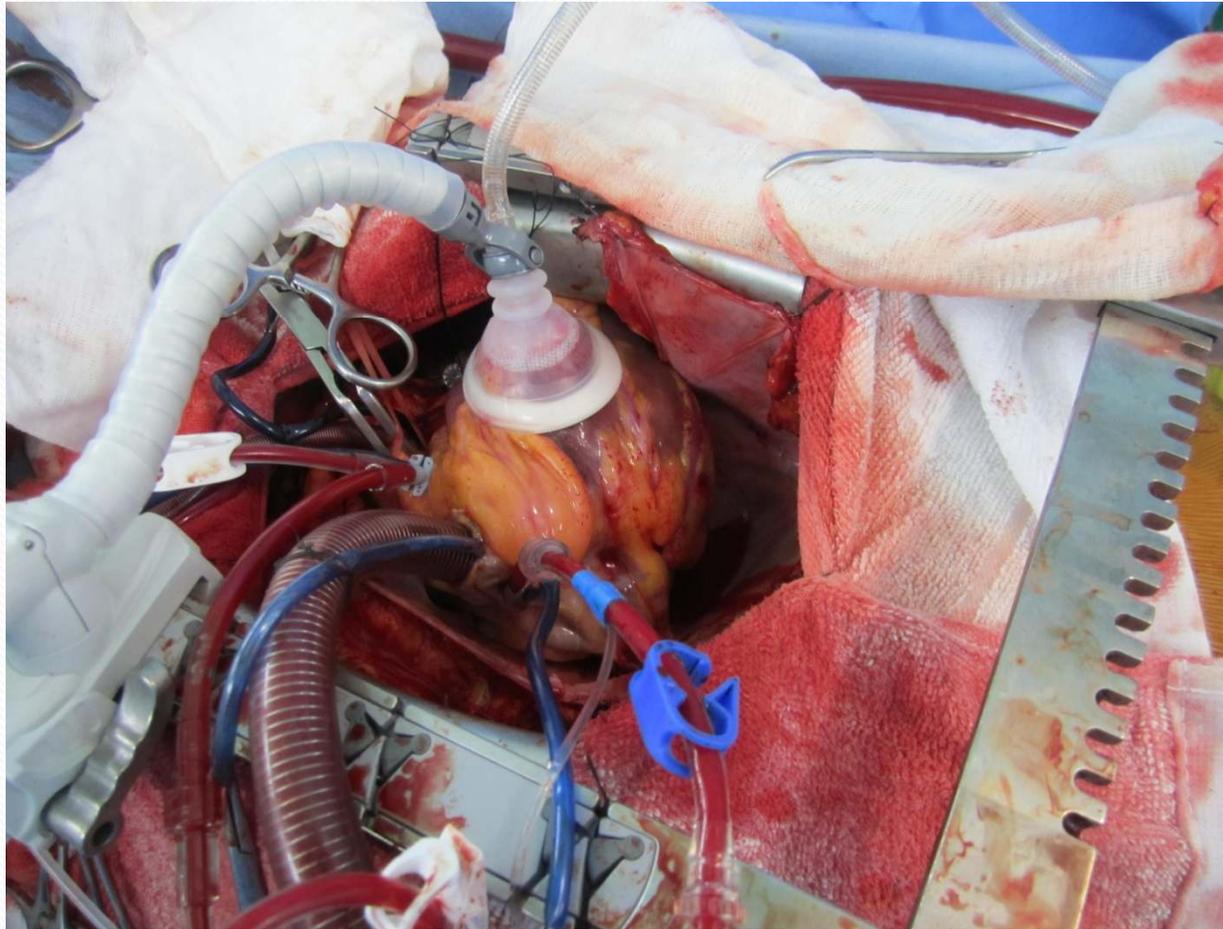




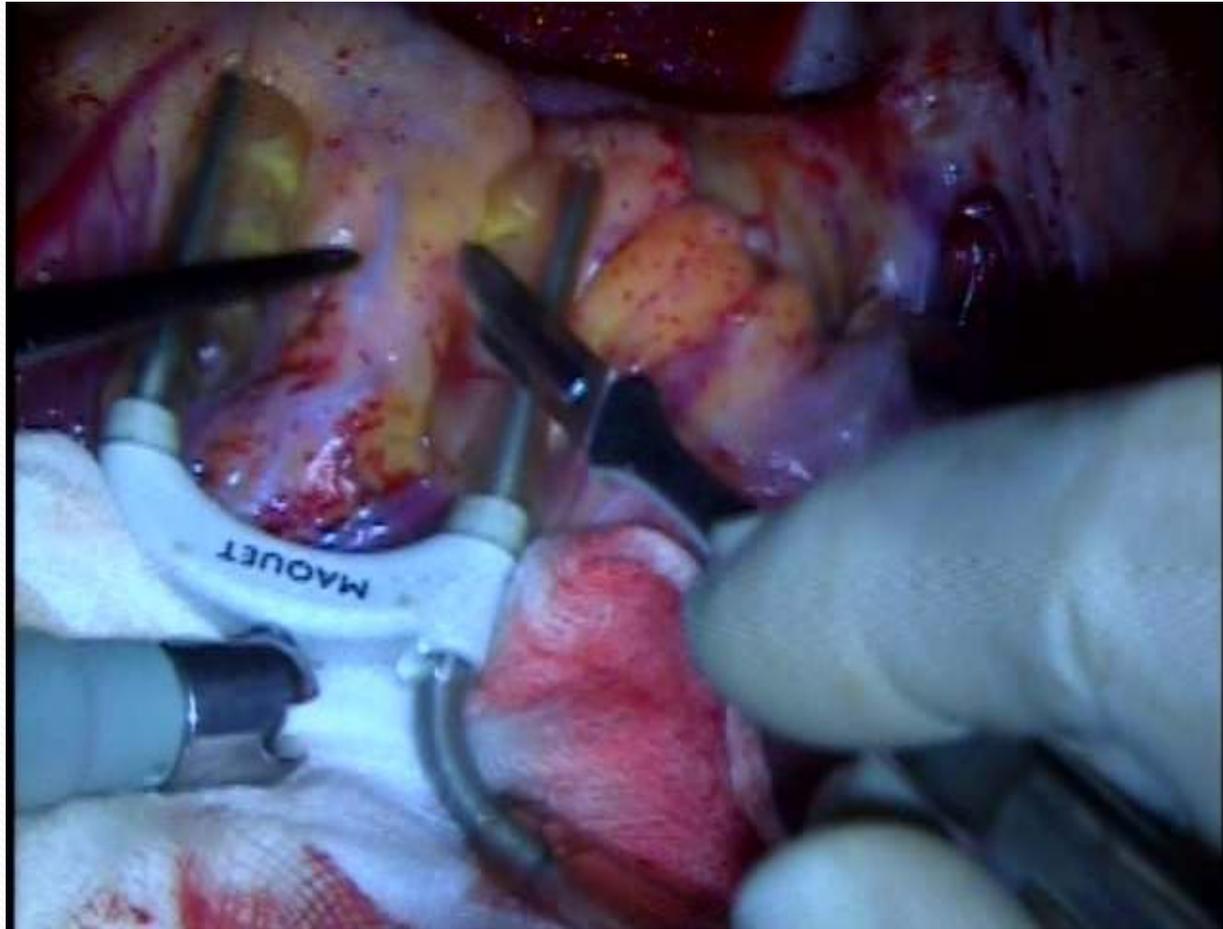
Gauze packing for LAD exposure



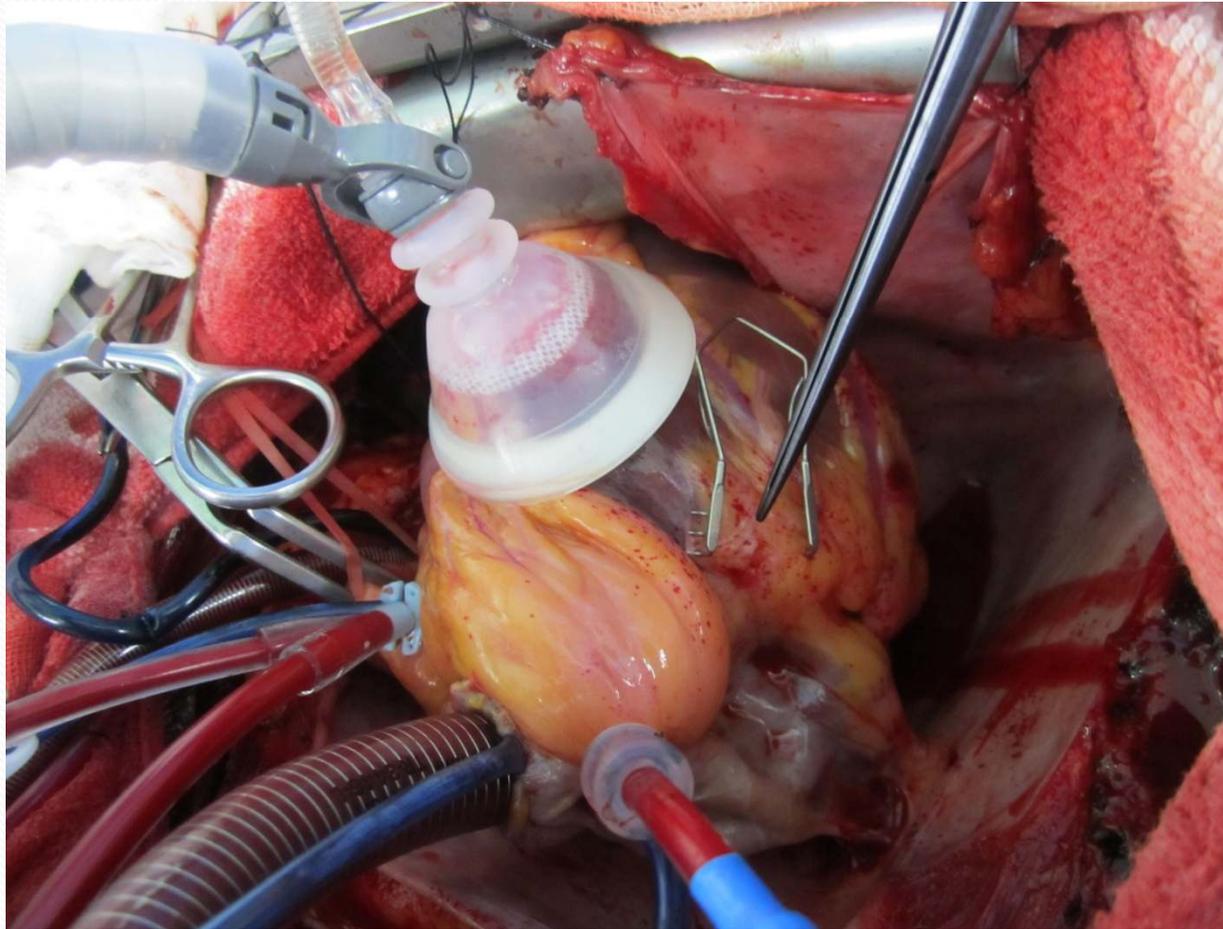
Apical Vacuum



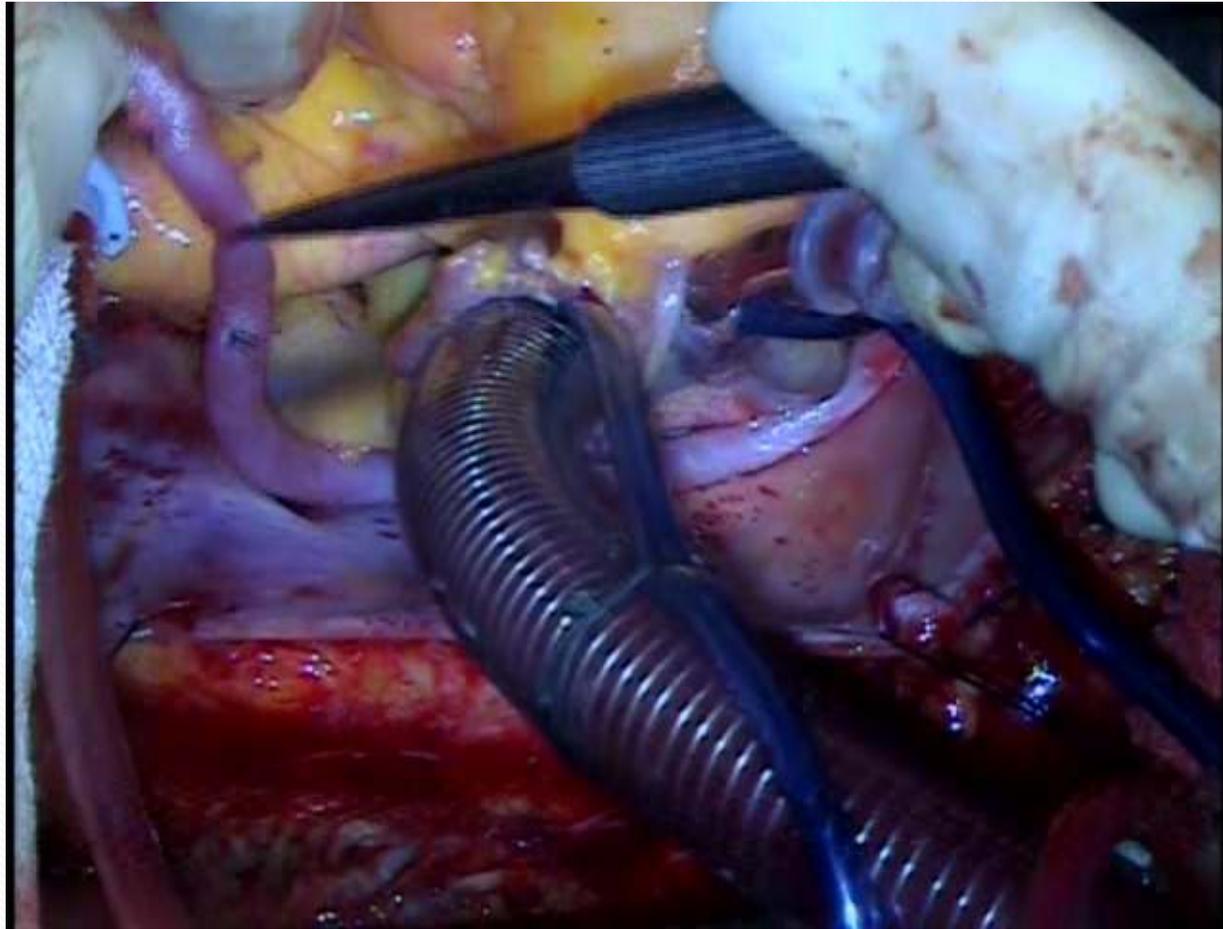
Stabilizer



Epicardial retractor



Measure vein length



Proximal anastomosis

- **Single ACC**
- **문합순서**
 - **Distal → Proximal → Distal → Proximal → LITA**
 - **Distal → Distal → Proximal → Proximal → LITA**
 - **Distal → Distal → LITA → Proximal → Proximal**

