HUMANITAS
RESEARCH HOSPITAL

MINI CORSO: RIANIMAZIONE

I VAD

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UO di Cardiochirurgia

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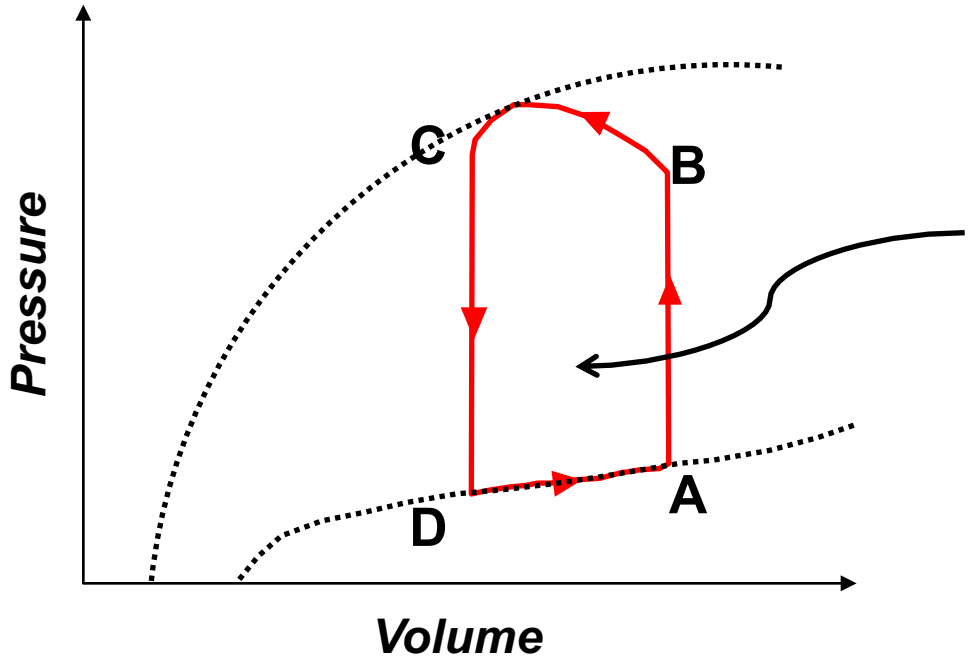
"Scaricare" ...Riduzione del Lavoro (= consumo di O2) Miocardico

Curva "Pressione – Volume" del Ciclo Cardiaco



A. Fine Diastole – Chiusura della Valvola Mitrale
B. Apertura della Valvola Aortica
C. Fine Sistole - Chiusura della Valvola Aortica
D. Apertura della Valvola Mitrale

- **Lavoro = Pressione x Volume**
- **"Lavoro" Ventricolare = Area della curva L-V; proporzionale al Consumo di O2**
- **Scaricare il Ventricolo= Ridurre l'Area della Curva P-V**

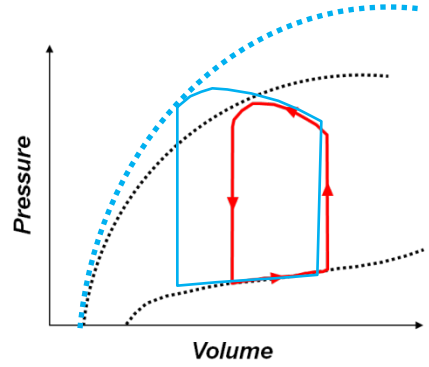
"Scaricare"…

Riduzione del Lavoro?

Riduzione dell'area della curva?

Farmaci Inotropi

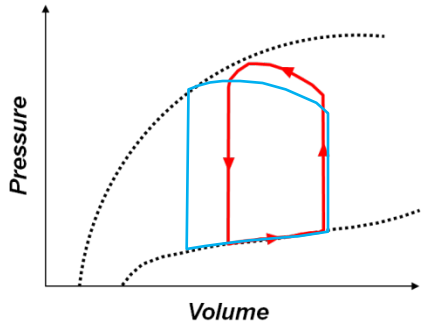
- **Aumento della Gittata Sistolica**



No: L'area della curva P-V aumenta

Contropulsazione

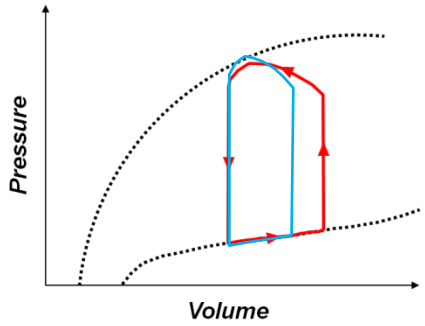
- **Riduzione della pressione Telediastolica**
- **Minimo Aumento della Gittata Sistolica**



No: L'area è mantenuta stabile dal rapporto fra ↓ P ed ↑ V

VAD

- **Scarica il Ventricolo**
- **Riduce il Volume Telediastolico**



SI: la ↓ del Volume cpmporta una riduzione dell'aera

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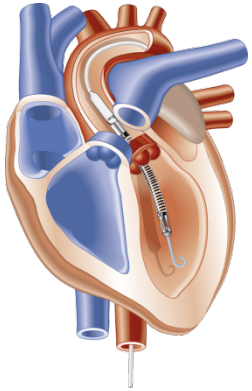
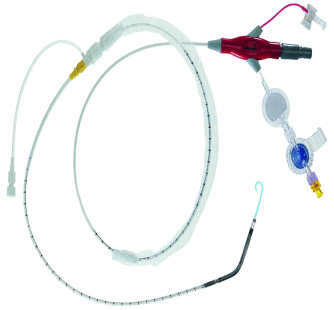
Quale VAD?

- Rapidamente Disponibile
- Facile da Gestire
- Facile da Ottimizzare
  - Ridotta Necessità di “Aggiustamenti”
- Elevata Efficienza Emodinamica
- Biocompatibile
  - Bassa Anticoagulazione
- Facilità di Modulazione dei Flussi per lo Svezzamento

Supporto Circolatorio Meccanico Percutaneo



- Impella 2.5: in grado di generare fino a 2.5 litri/minuto (portata nominale)



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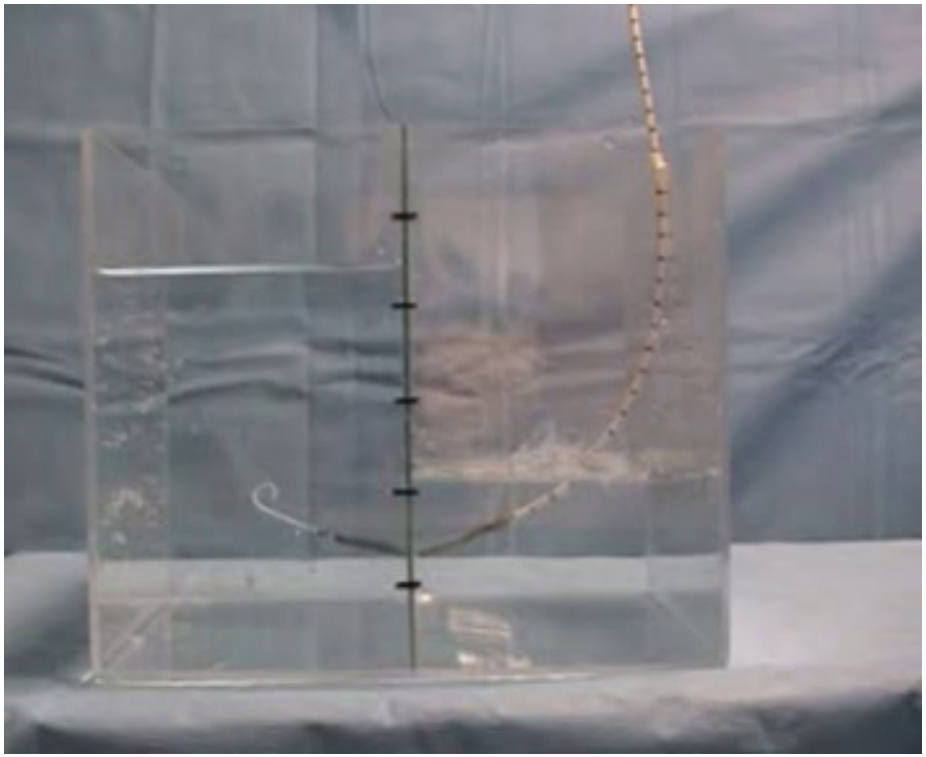
Impella® Scarica Direttamente il Ventricolo Sinistro



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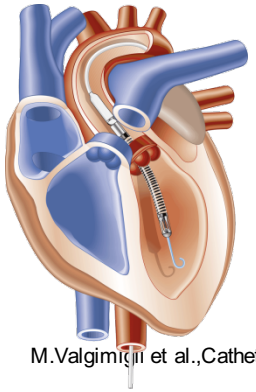

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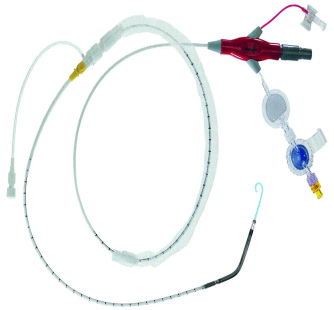

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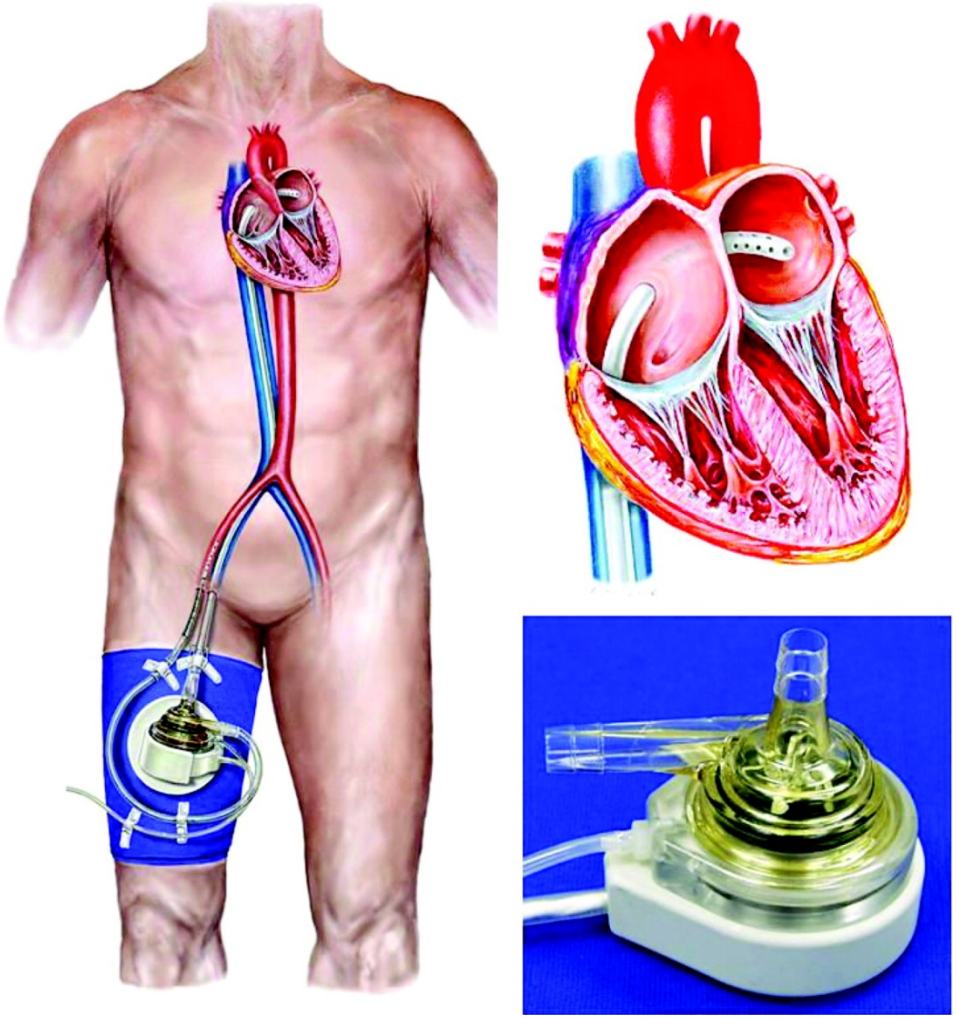
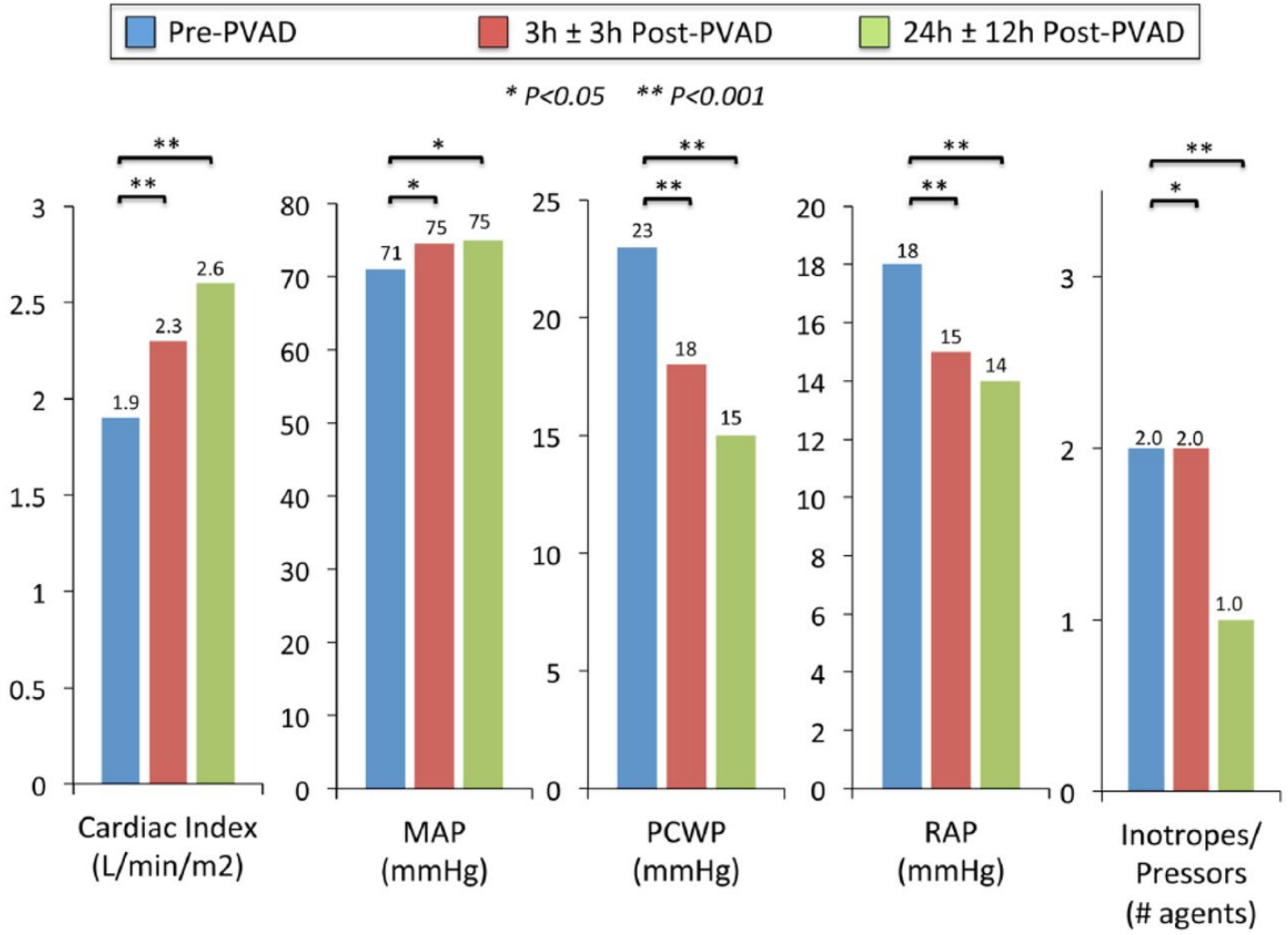
M.Valgimigli et al.,Catheterization & Cardiovascular Interventions 65:263–267 (2005)

TandemHeart consists of a 21F inflow cannula in the left atrium after femoral venous access and transseptal puncture and a 15F to 17F arterial cannula in the iliac artery.



Srihari S. Naidu Circulation. 2011;123:533-543

Figure 2. Hemodynamics prior to percutaneous ventricular assist device placement and at three hours (± 3h) and 24 hours (± 12h) after placement.



David D Berg et al. European Heart Journal: Acute Cardiovascular Care 2015;5:108-116

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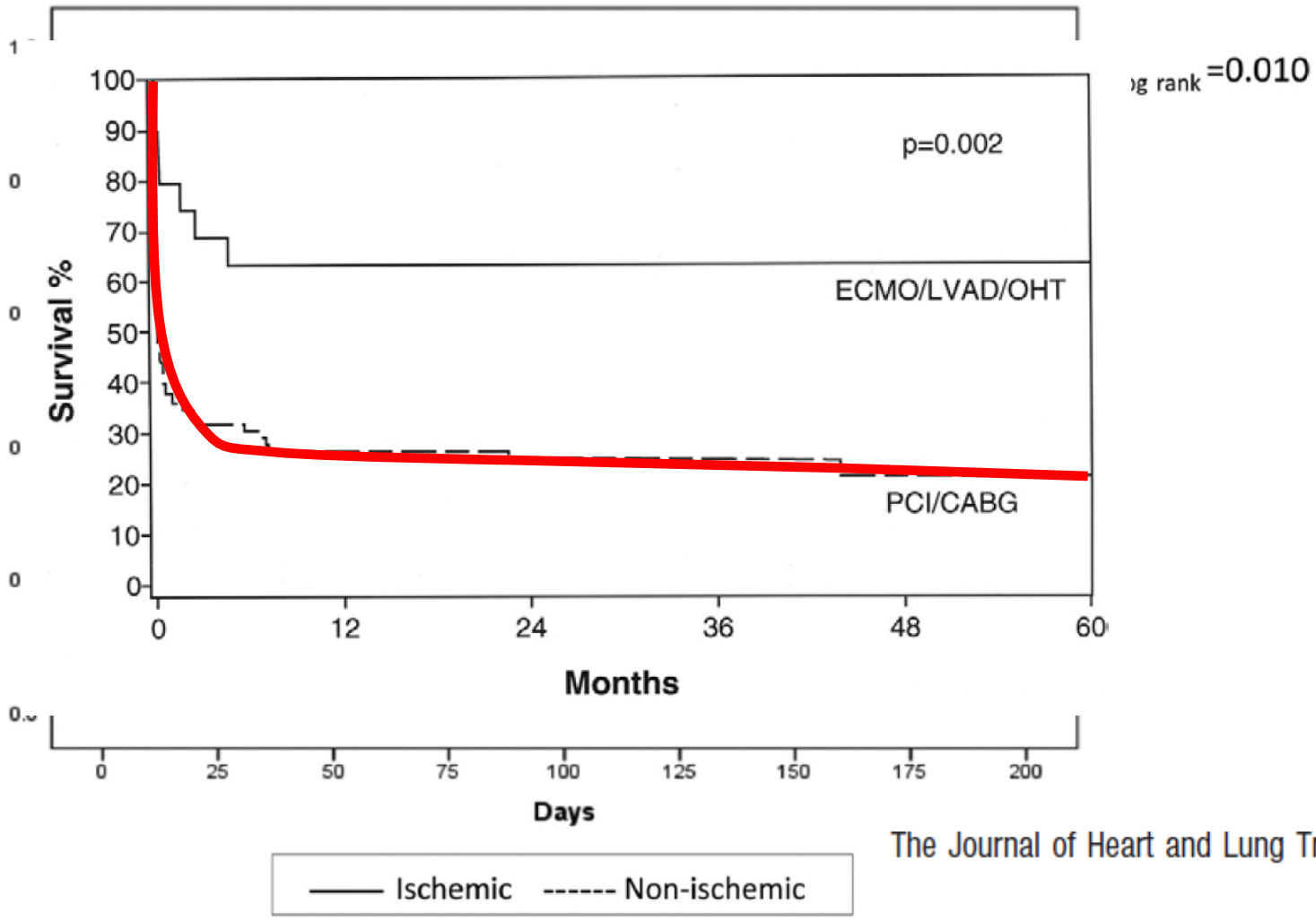
Figure 3. Kaplan–Meier estimates of survival stratified by ischemic and non-ischemic cardiomyopathy.



The Journal of Heart and Lung Transplantation
May 2006

David D Berg et al. European Heart Journal: Acute Cardiovascular Care 2015;5:108-116

Table 4. Destinations of survivors to hospital discharge stratified by cardiomyopathy type.

Table 4. Destinations of survivors to hospital discharge stratified by cardiomyopathy type.

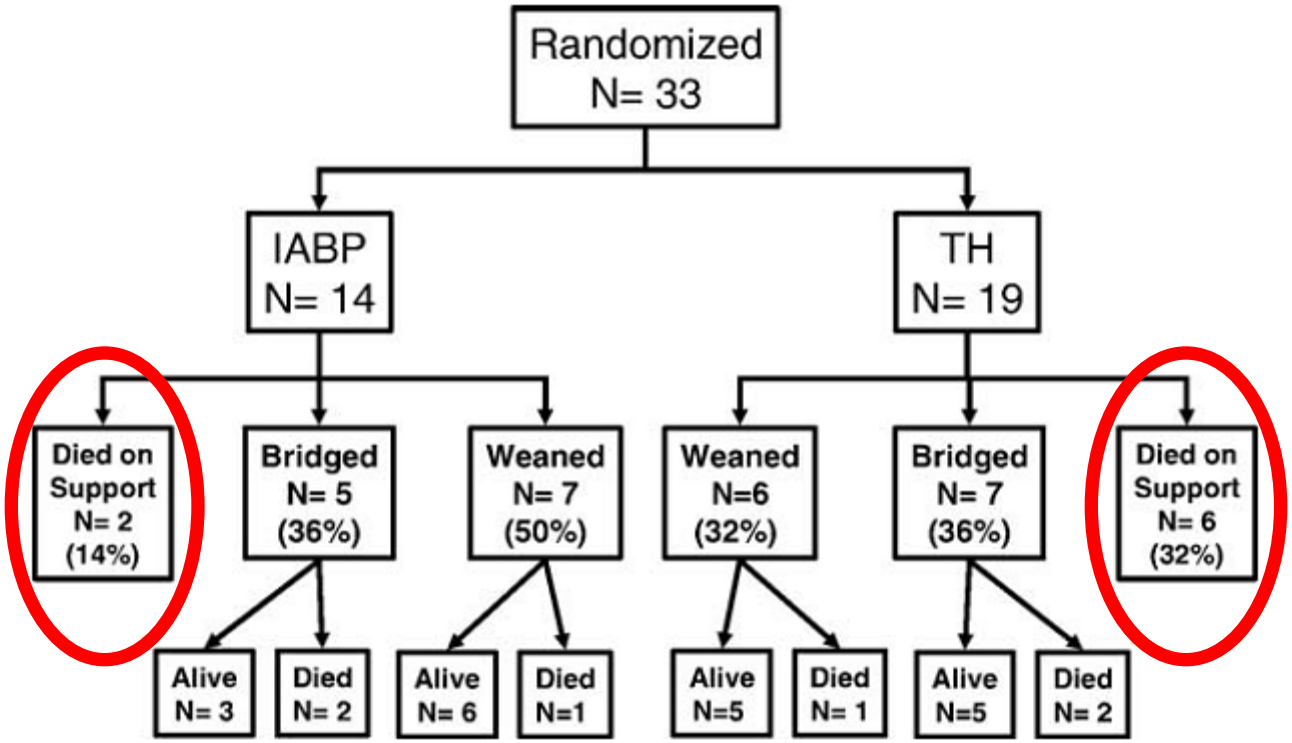
	Ischemic (*N*=13)	Non-ischemic (*N*=19)
Recovery	7	13
Surgical LVAD	2	3
Surgical BiVAD	2	1
Valve surgery	1	1
LVAD/transplant	0	1
VSD/valve surgery	1	0

LVAD: left ventricular assist device; BiVAD: biventricular assist device; VSD: ventricular septal defect.

David D Berg et al. European Heart Journal: Acute Cardiovascular Care 2015;5:108-116

A randomized multicenter clinical study to evaluate the safety and efficacy of the TandemHeart percutaneous ventricular assist device versus conventional therapy with intraaortic balloon pumping for treatment of cardiogenic shock

Daniel Burkhoff, MD, PhD,[a] Howard Cohen, MD,[b] Corinna Brunckhorst, MD,[c] and William W. O'Neill, MD,[d] for the TandemHeart Investigators Group[e] *Orangeburg and New York City, NY; Zurich, Switzerland; and Royal Oak, MI*



(Am Heart J 2006;152:469.e1-469.e8.)

Sopravvivenza???

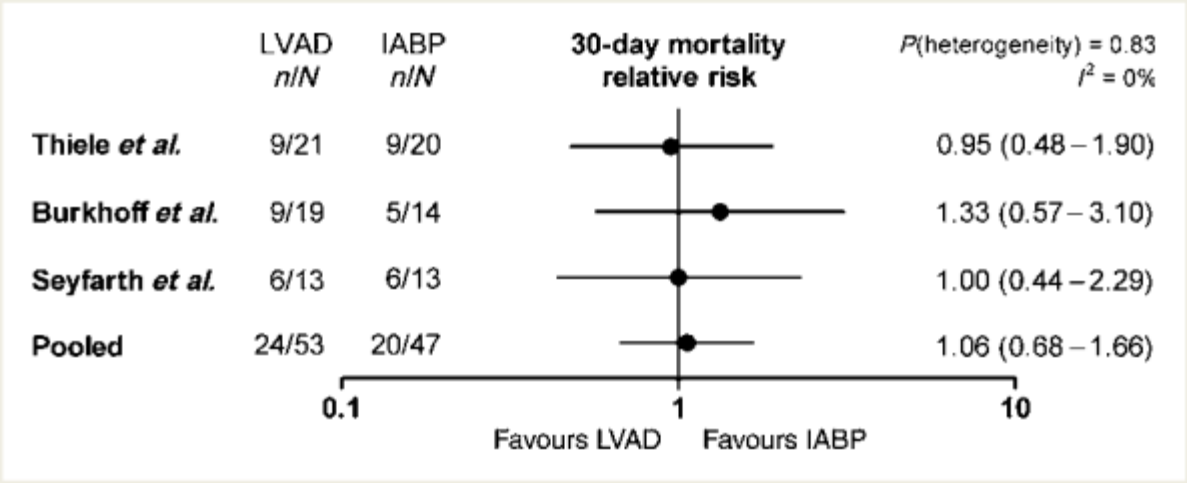


Figure 3 Meta-analysis showing the relative risk of crude 30-day mortality with use of percutaneous left ventricular assist devices. Random effects model was used for meta-analysis. Relative risks with 95% confidence intervals ar right of the figure. IABP, intra-aortic balloo ventricular assist device.

European Heart Journal
doi:10.1093/eurheartj/ehp292

CLINICAL RESEARCH

Percutaneous left ventricular assist devices vs. intra-aortic balloon pump counterpulsation for treatment of cardiogenic shock: a meta-analysis of controlled trials

Jin M. Cheng, Corstiaan A. den Uil*, Sanne E. Hoeks, Martin van der Ent, Lucia S.D. Jewbali, Ron T. van Domburg, and Patrick W. Serruys

Department of Cardiology, Erasmus Medical Center, Thoraxcenter, 's-Gravendijkswal 230, Room V-017, 3015 CE Rotterdam, the Netherlands

Improved Survival After Acute Myocardial Infarction Complicated by Cardiogenic Shock With Circulatory Support and Transplantation: Comparing Aggressive Intervention With Conservative Treatment

Wakkas Tayara, MD,[a] Randall C. Starling, MD, MPH,[b] Mohamad H. Yamani, MD,[b] Oussama Wazni, MD,[b] Fuad Jubran, MD,[b] and Nicholas Smedira, MD[c]

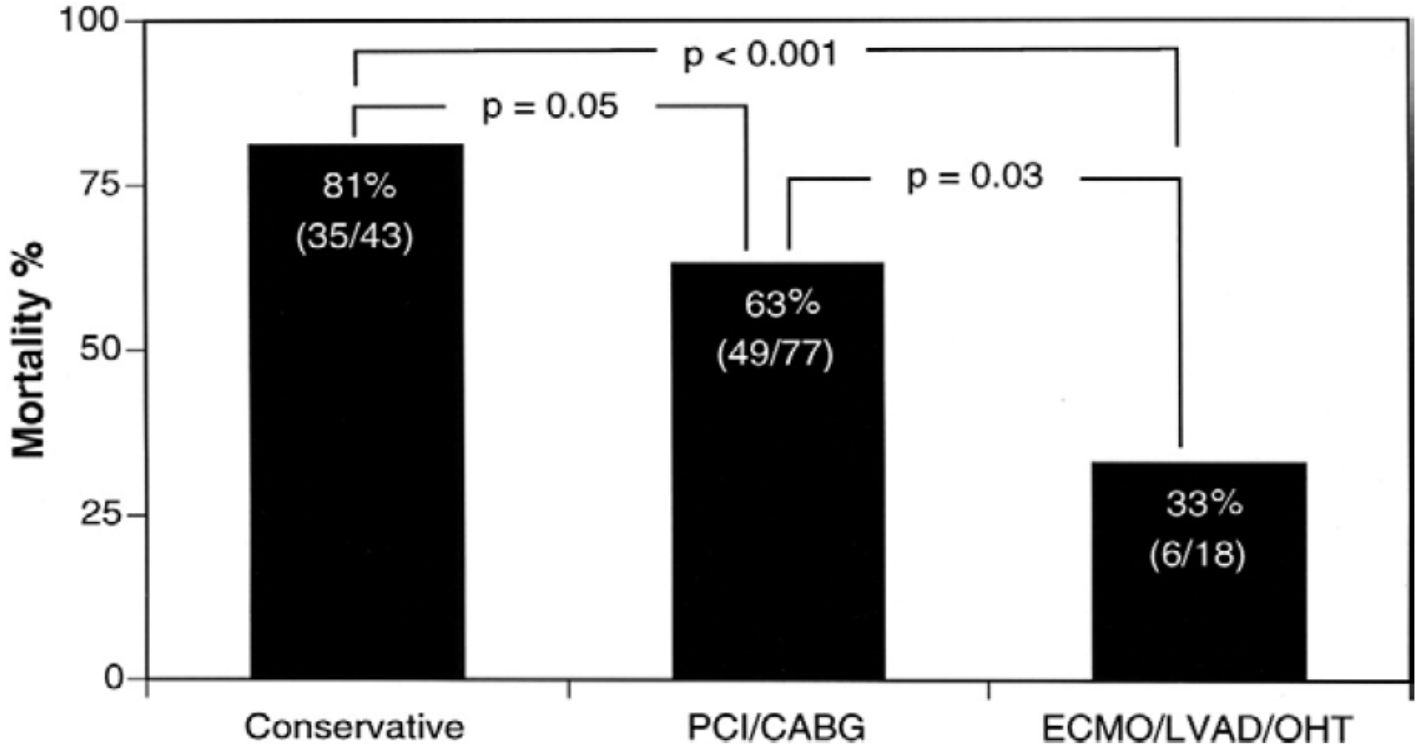


Figure 1. In-hospital mortality rates for the conservative and aggressive groups of patients. PCI, percutaneous coronary intervention; CABG, coronary artery bypass graft; ECMO, extracorporeal membrane oxygenation; LVAD, left ventricular assist device; OHT, orthotopic heart transplant.

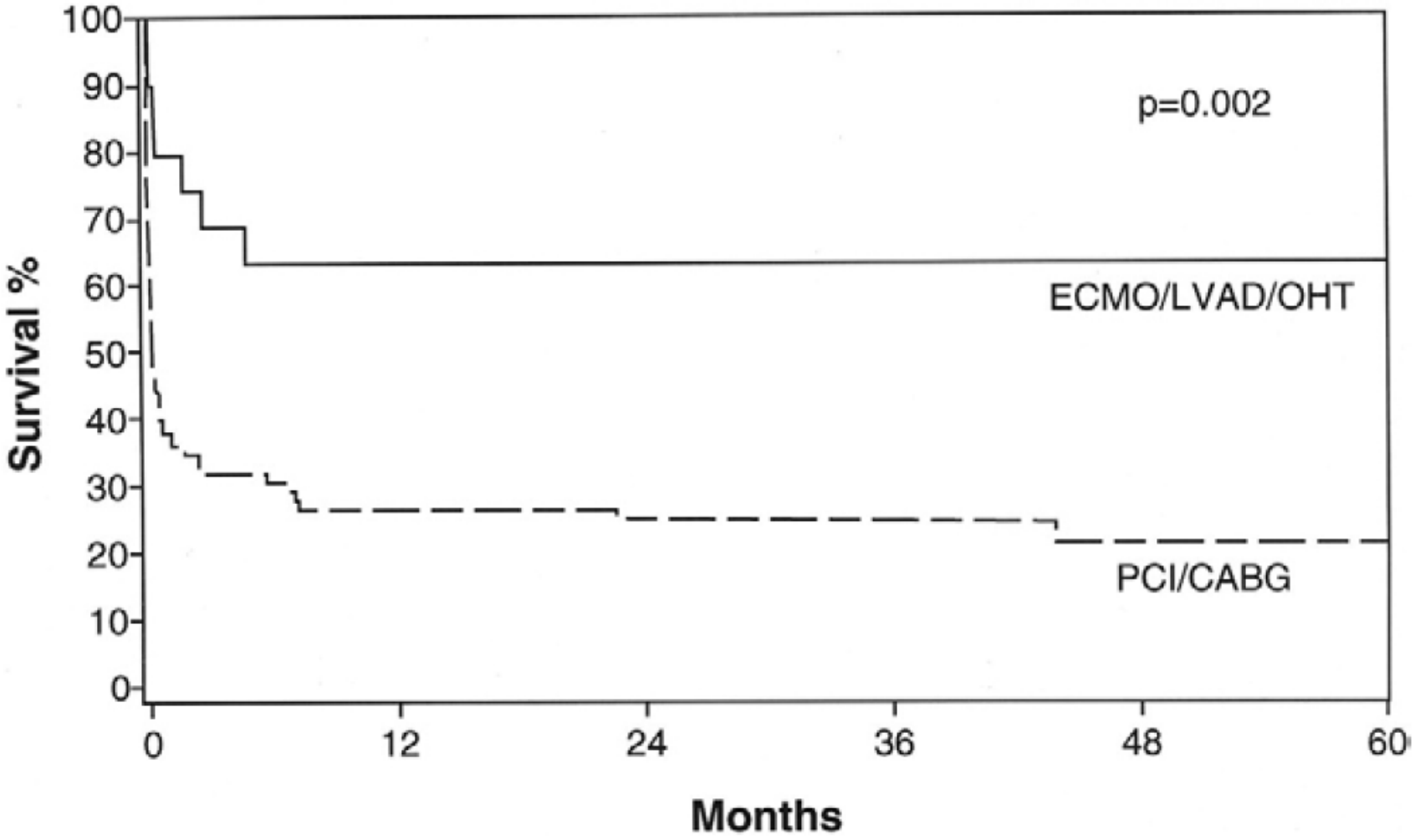
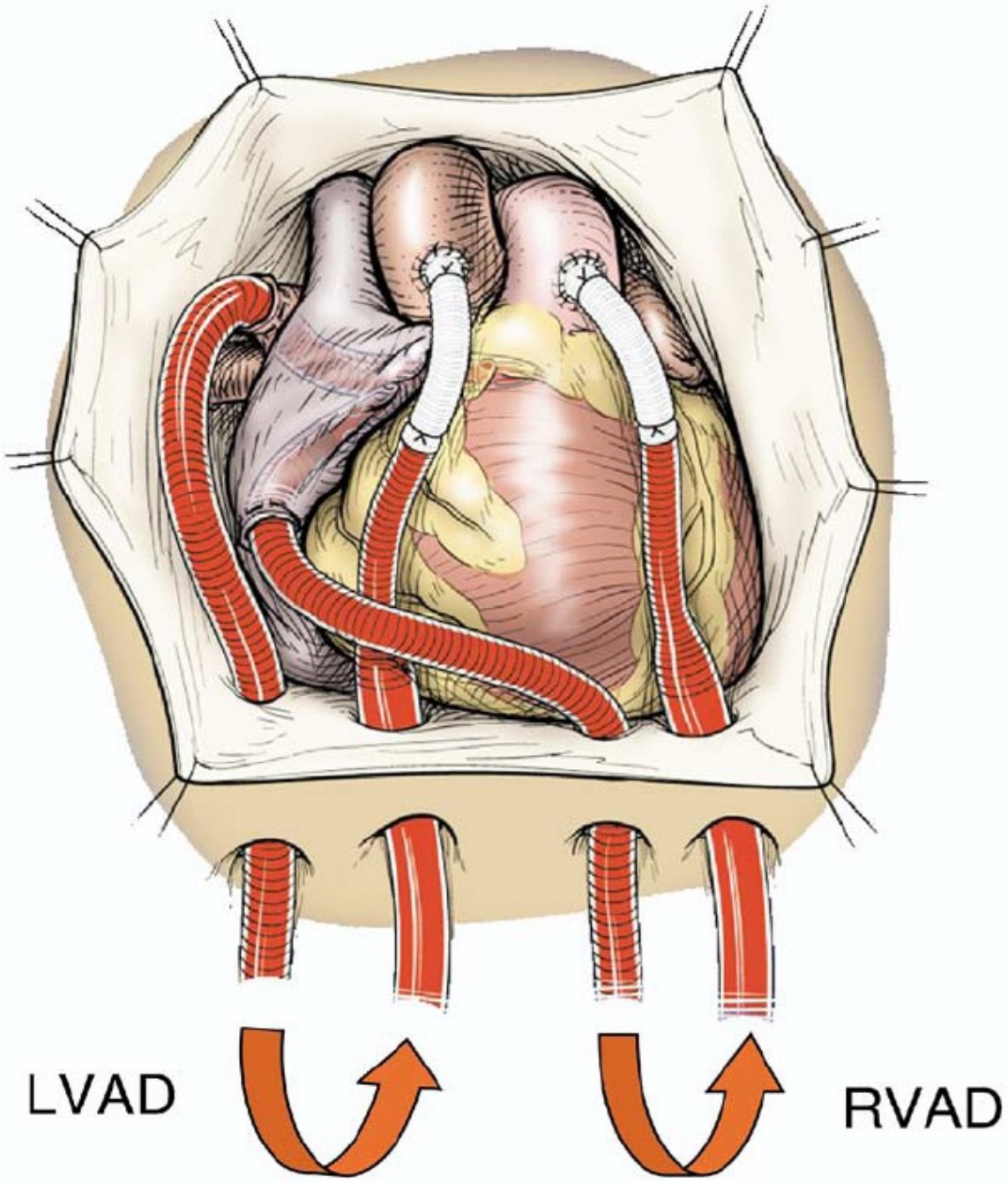
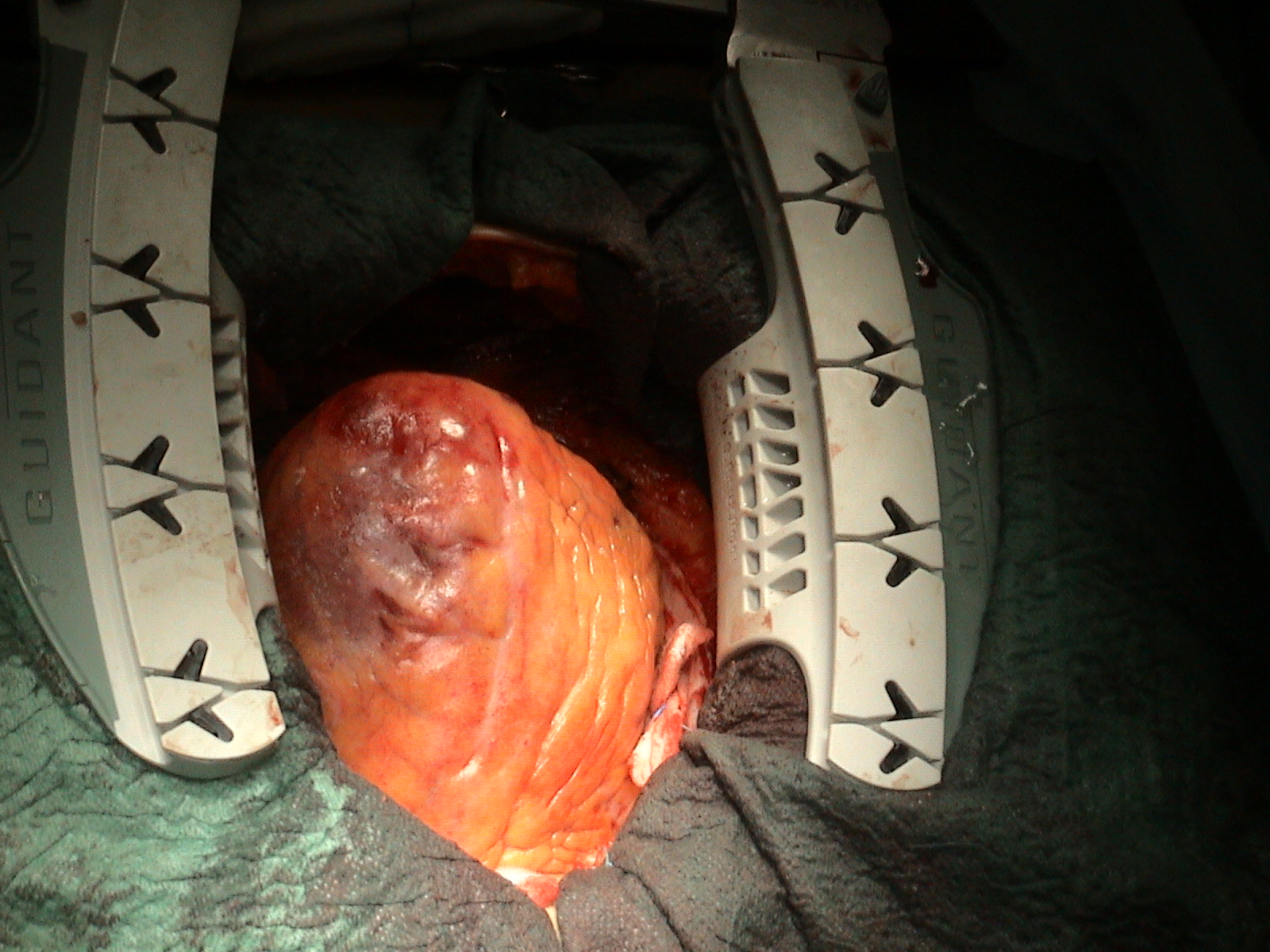
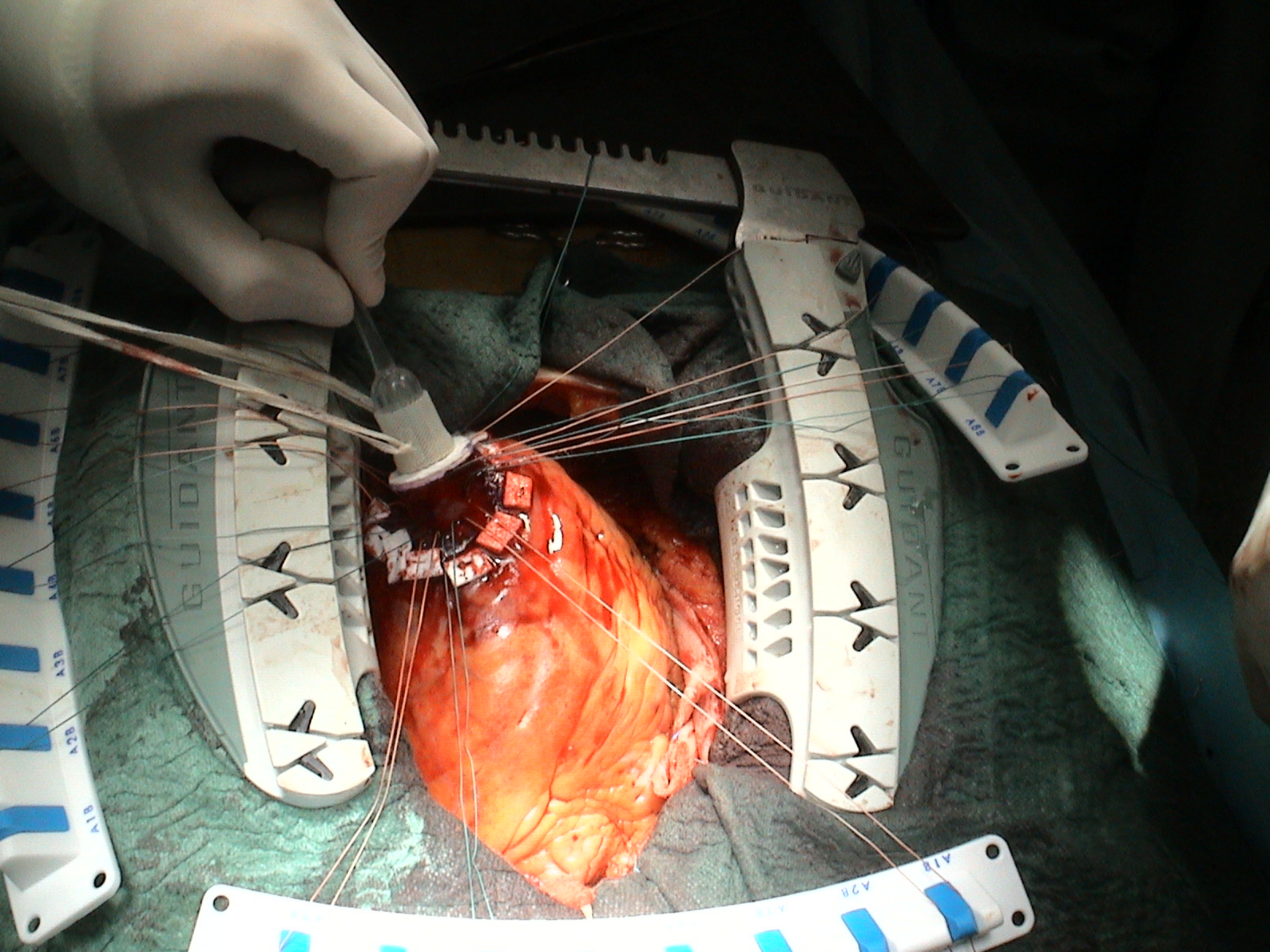
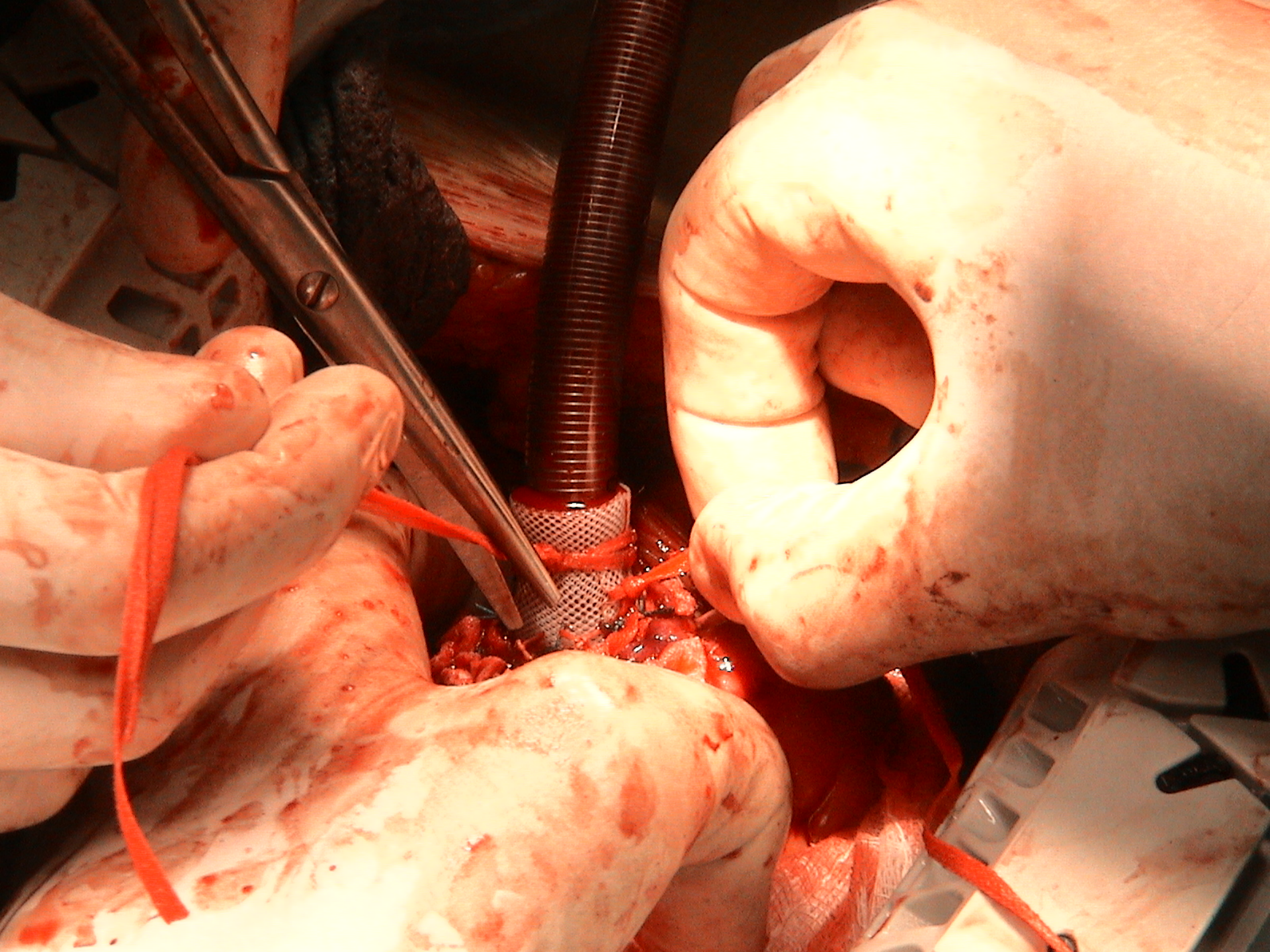


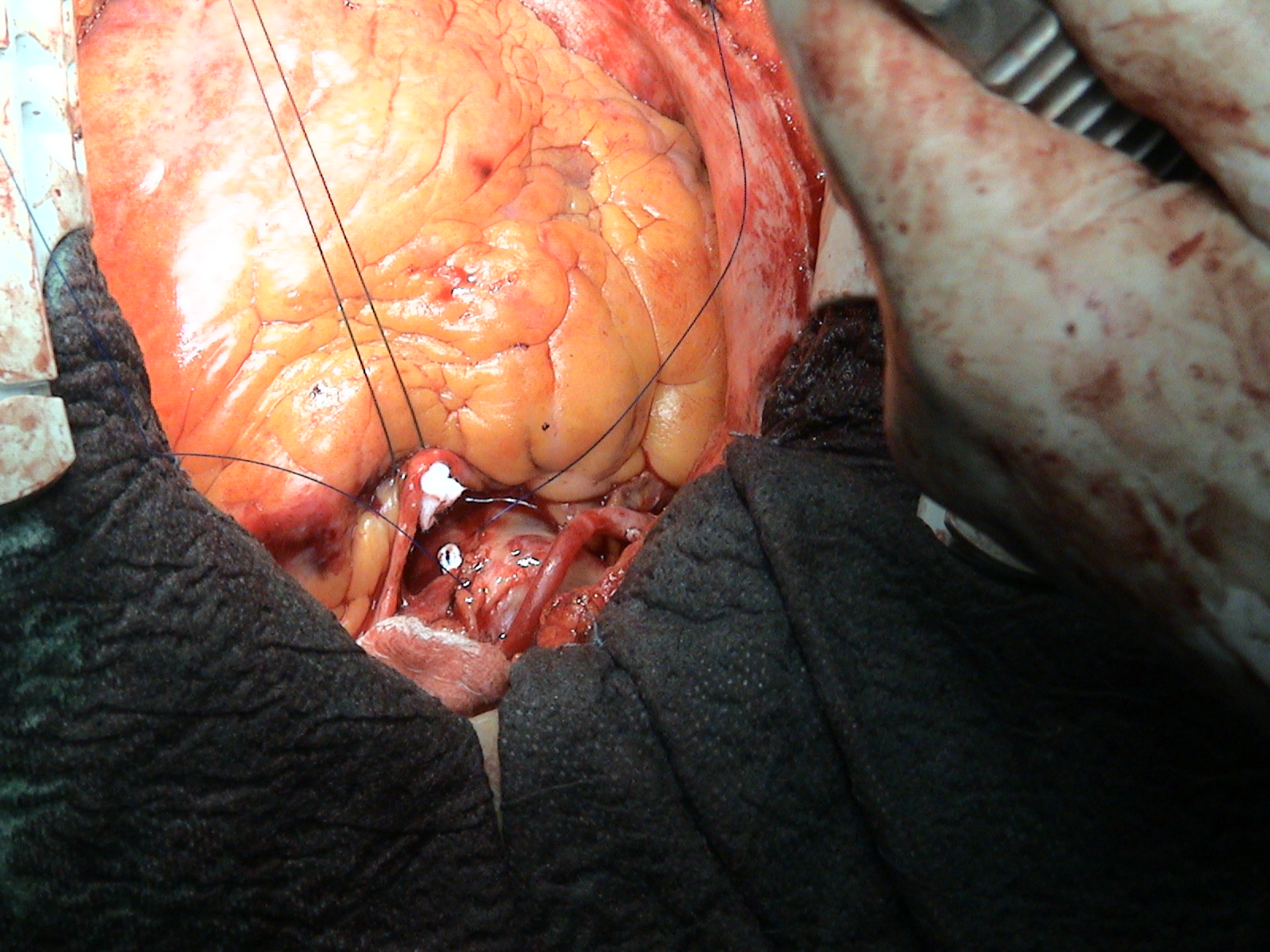
Figure 3. Kaplan–Meier 5-year survival for the aggressive sub-groups of patients. Abbreviations as in Figure 1.

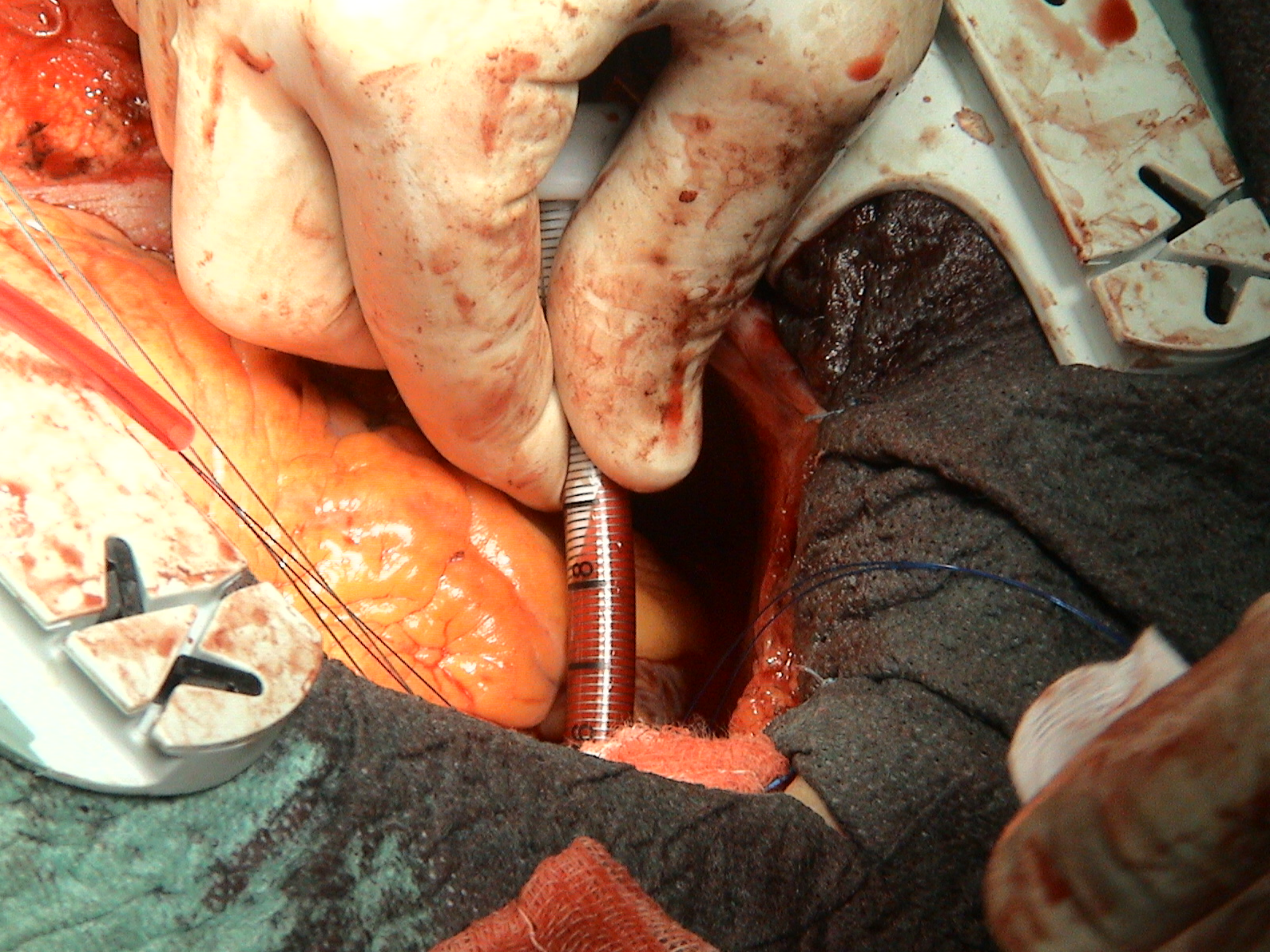

LVAD
RVAD

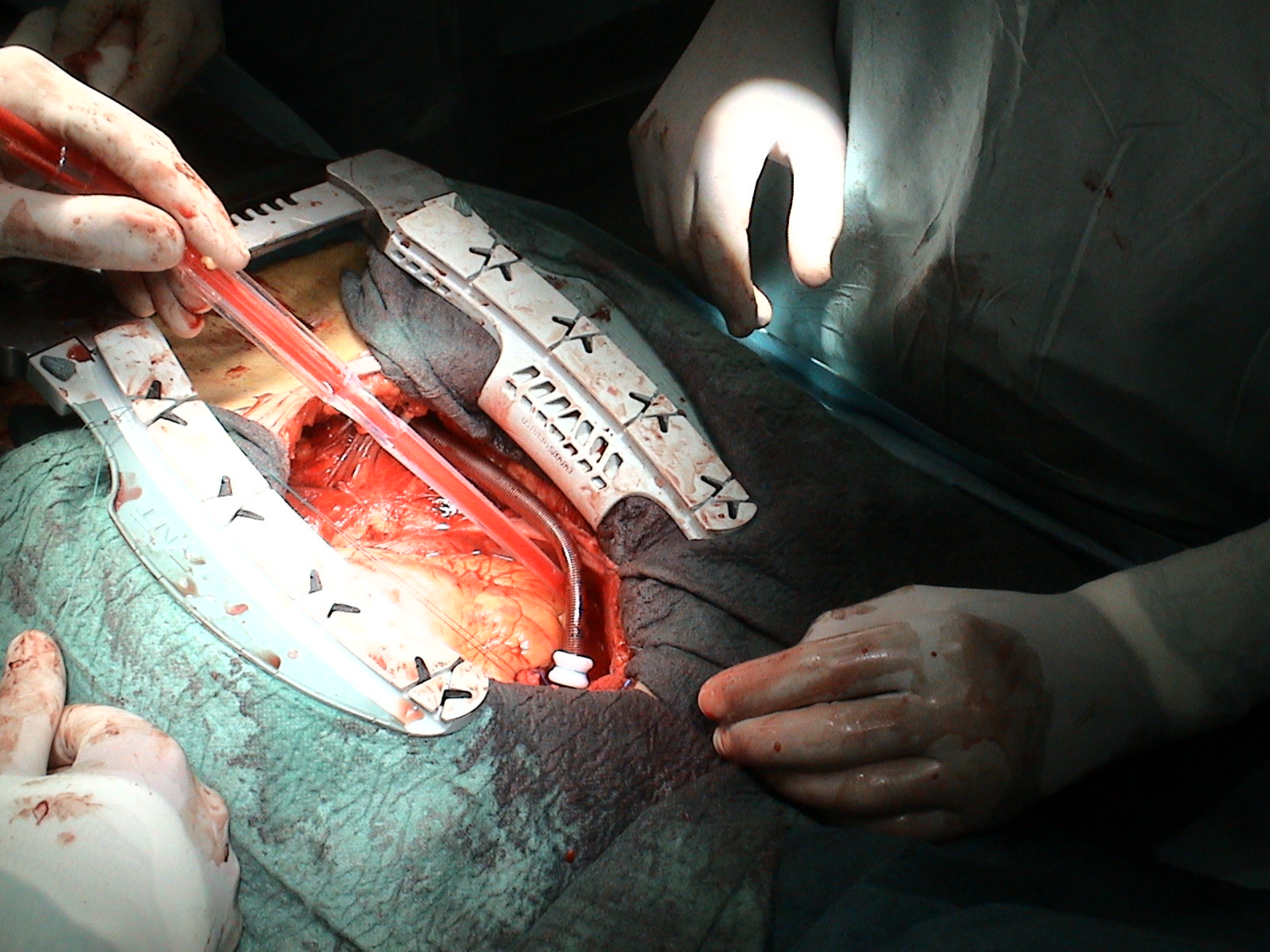

GUIDANT

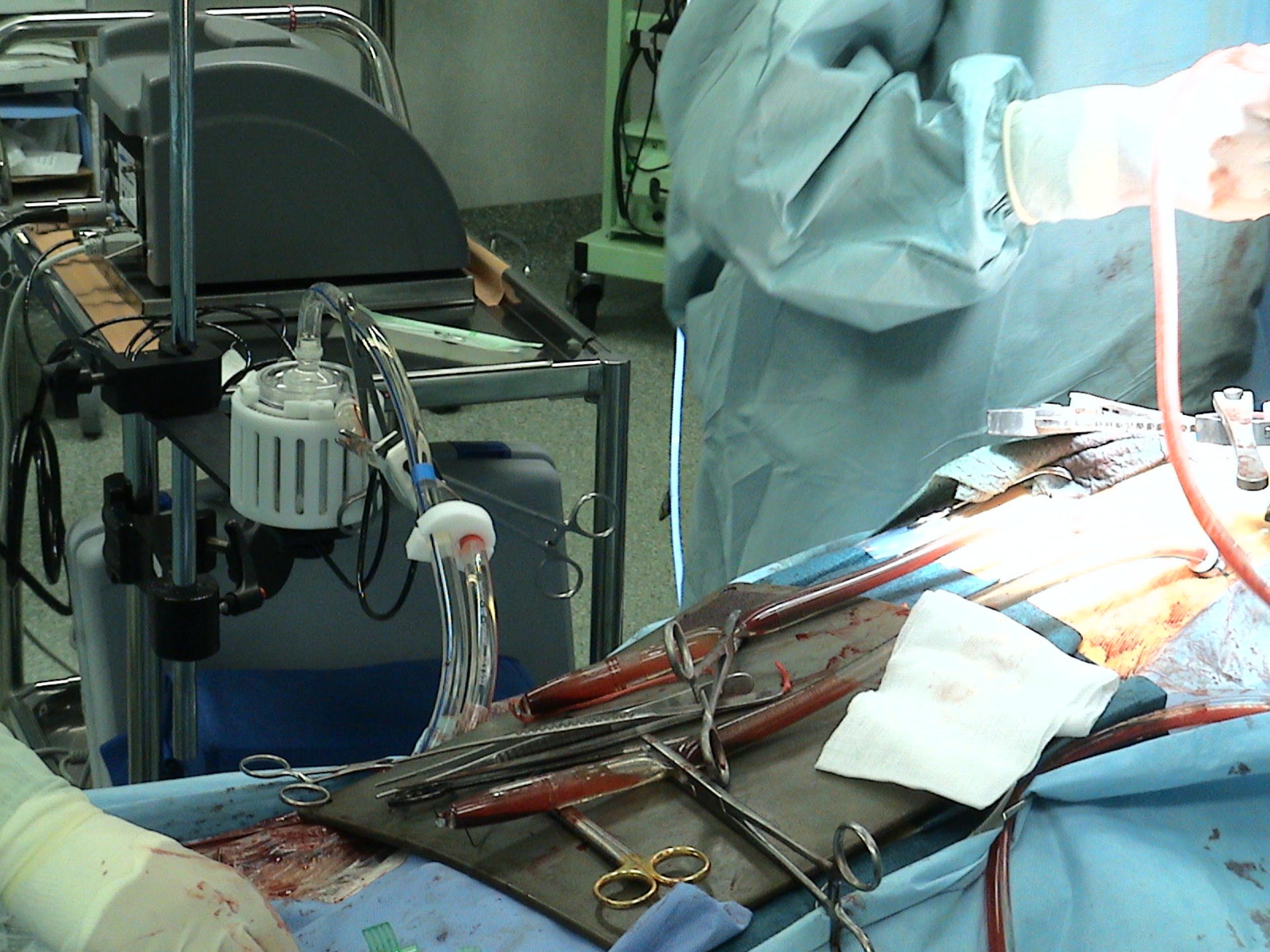

GUIDANT
A1B
A2B
A3B
A4B
A5B
A6B
A7B
A8B
A1H
A2H

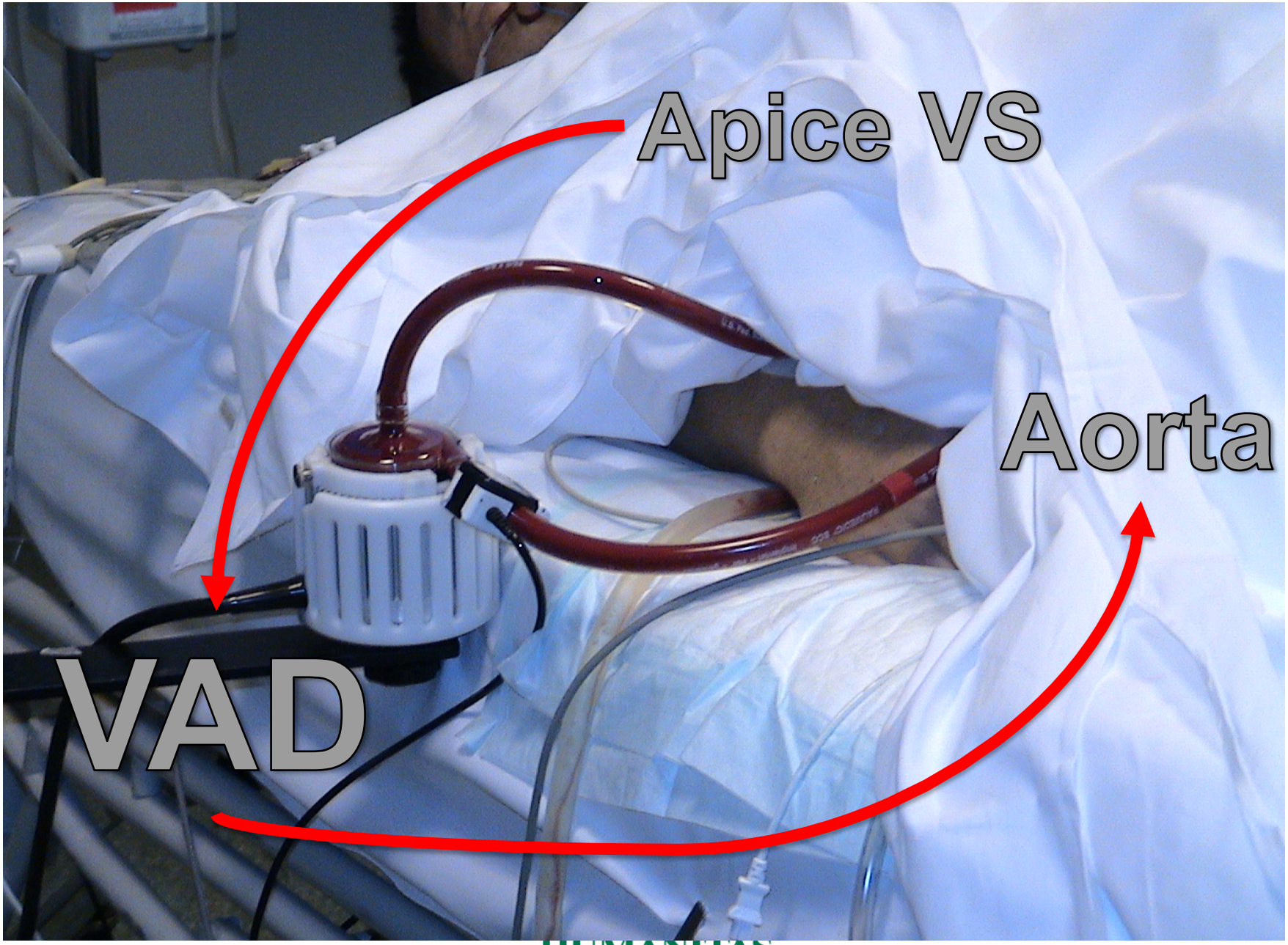




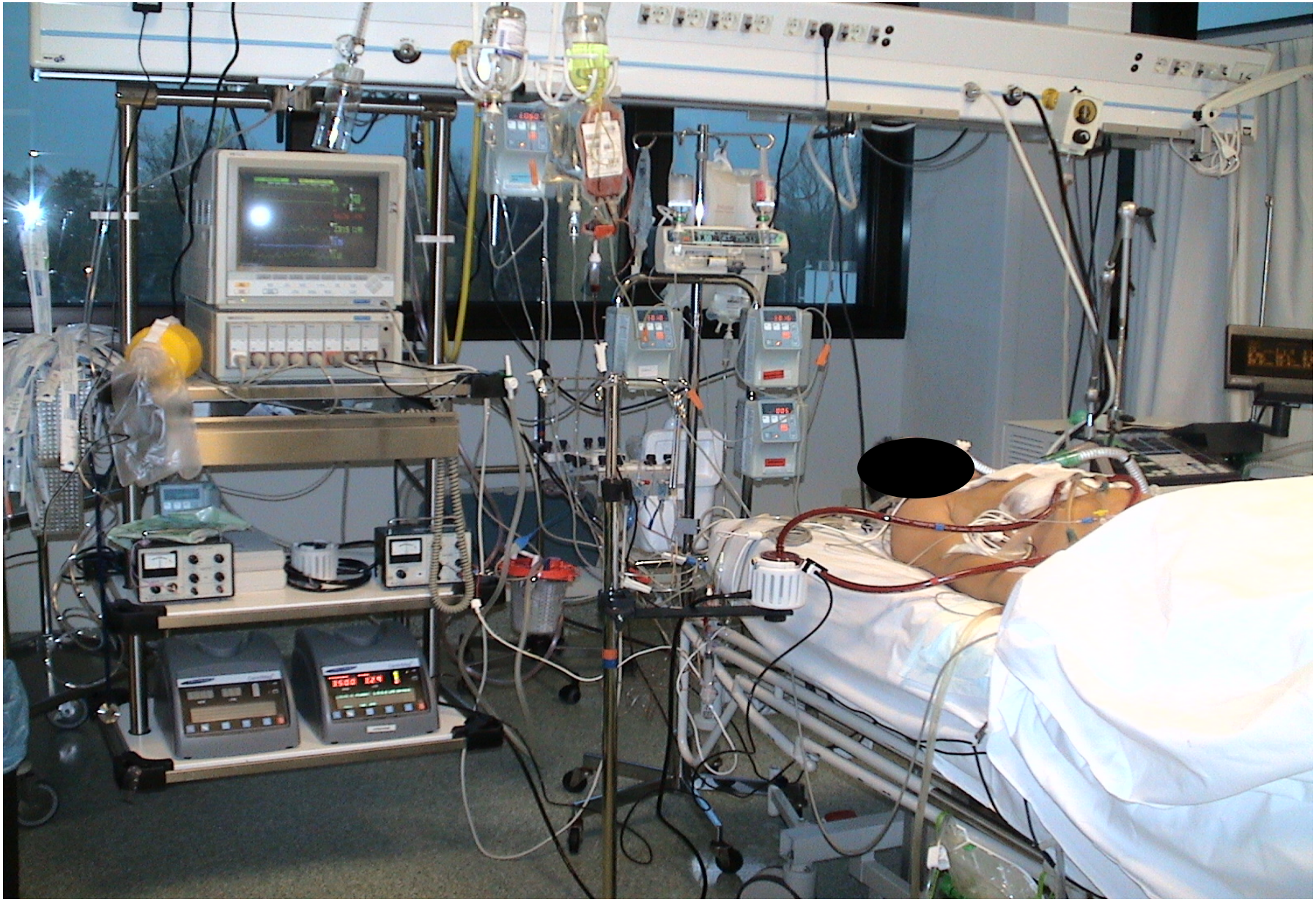






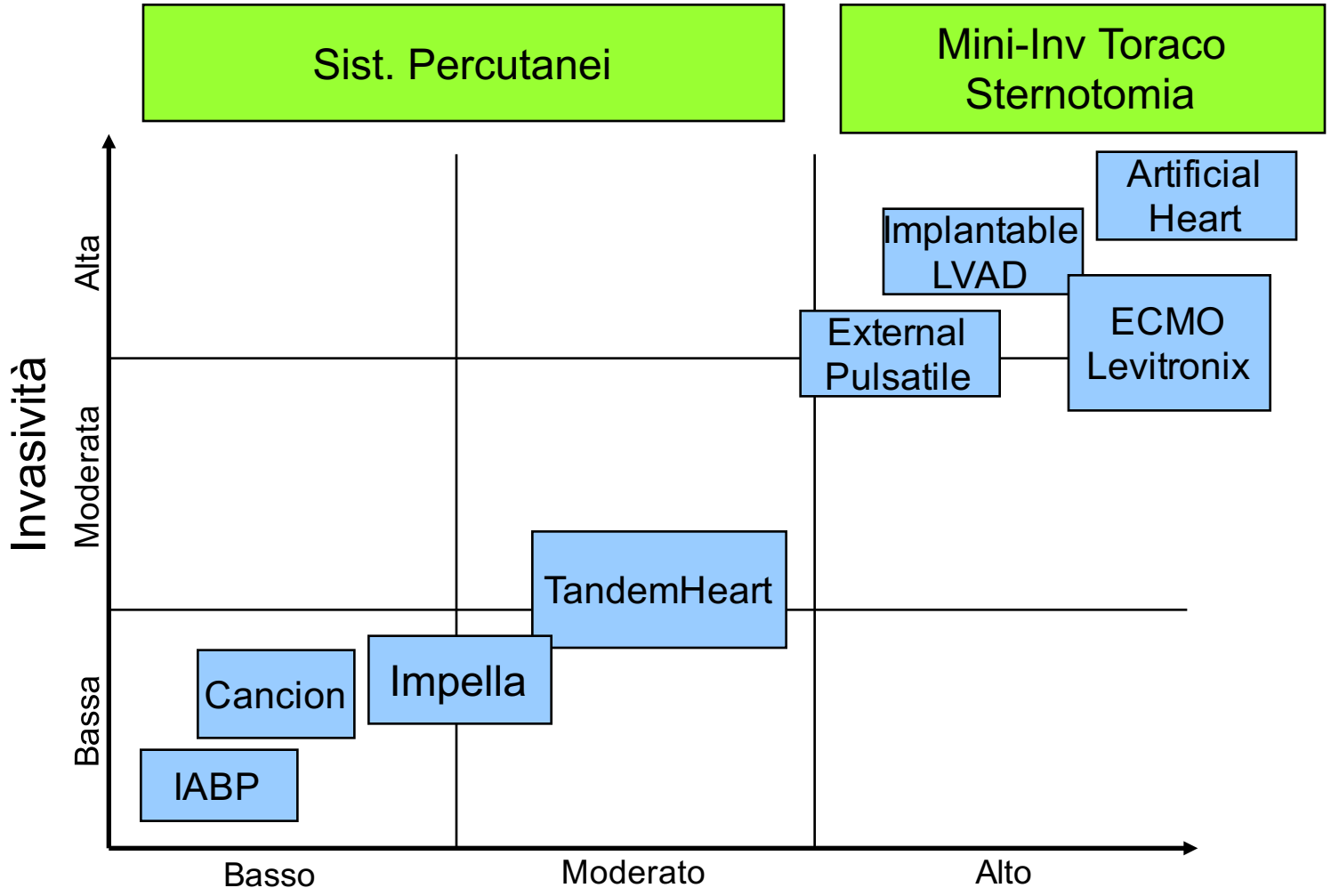

Apice VS
Aorta
VAD

TIC setup

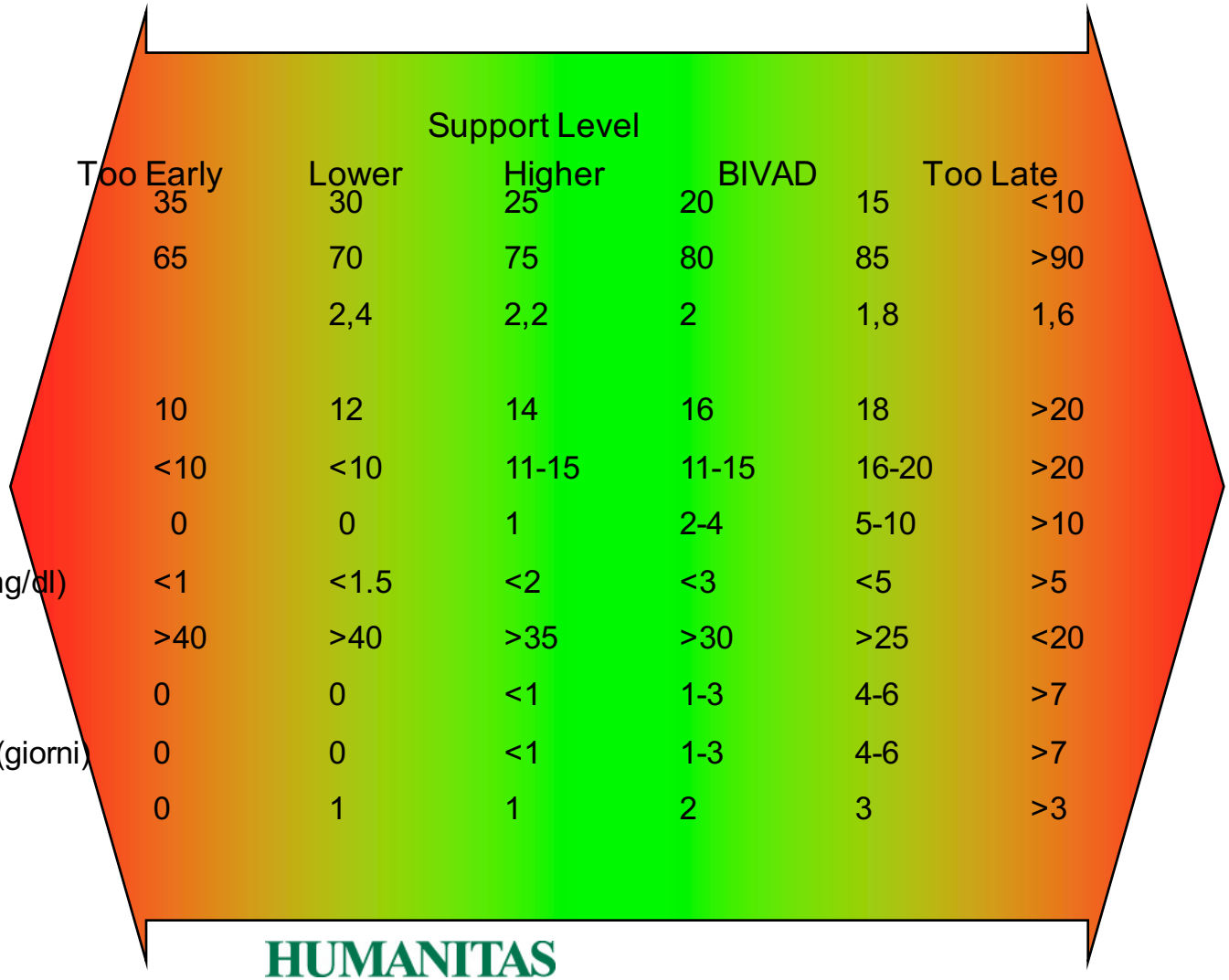


ilizzazione

Assistenza Meccanica al Circolo



When is too early –too late?



	Support Level				
	Too Early	Lower	Higher	BIVAD	Too Late
LVEF (%)	35	30	25	20	15	<10
LVEDD (mm)	65	70	75	80	85	>90
Indice Cardiaco (l/min/m^2)		2,4	2,2	2	1,8	1,6
1,4						
PVC	10	12	14	16	18	>20
APACHE II	<10	<10	11-15	11-15	16-20	>20
Inotropi (giorni)	0	0	1	2-4	5-10	>10
Insufficienza Epatica (bil mg/dl)	<1	<1.5	<2	<3	<5	>5
RVF (RVFAC)%	>40	>40	>35	>30	>25	<20
Ventilazione (giorni)	0	0	<1	1-3	4-6	>7
Altro supporto meccanico (giorni)	0	0	<1	1-3	4-6	>7
MOF (organs)	0	1	1	2	3	>3

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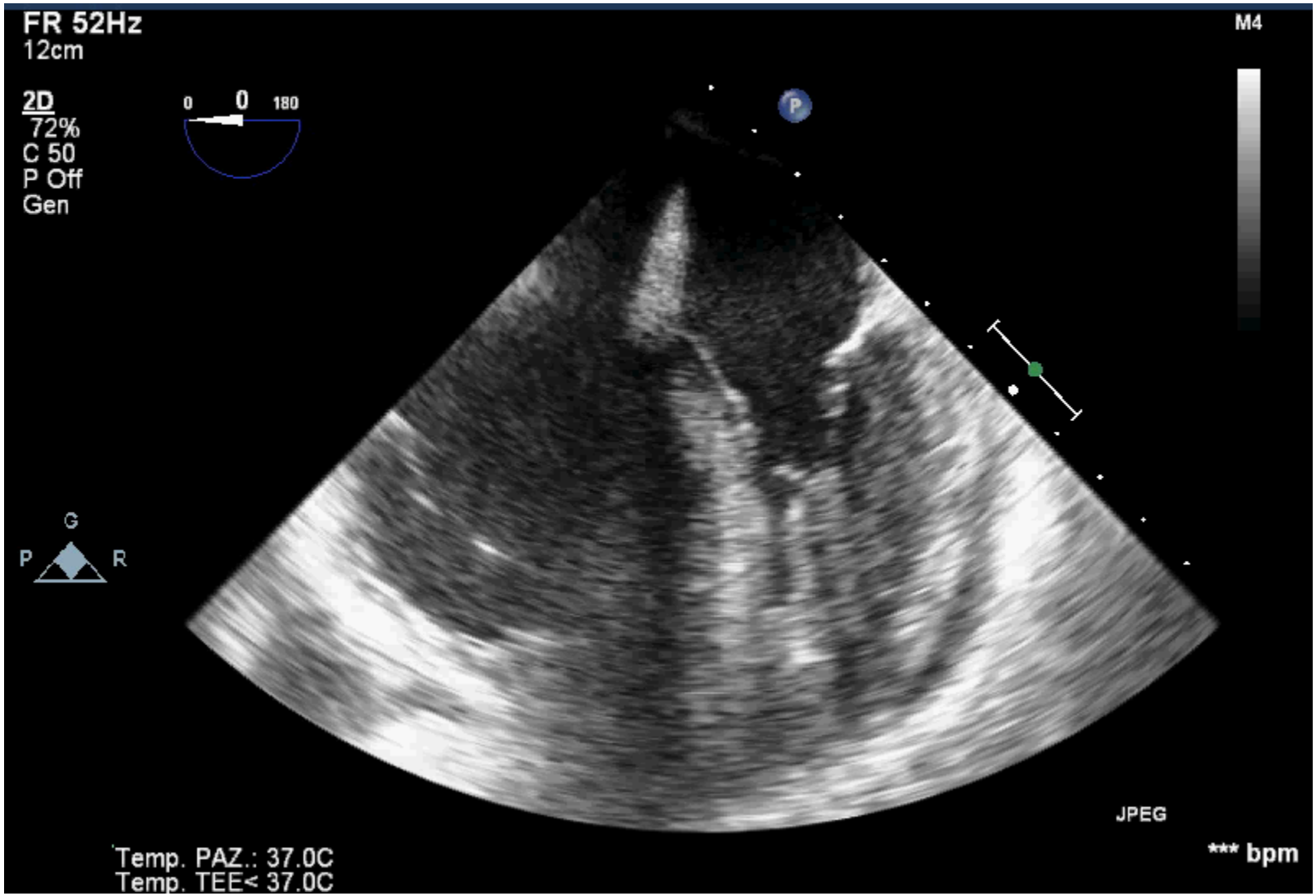
Riadattato da El Banayosi, U Penn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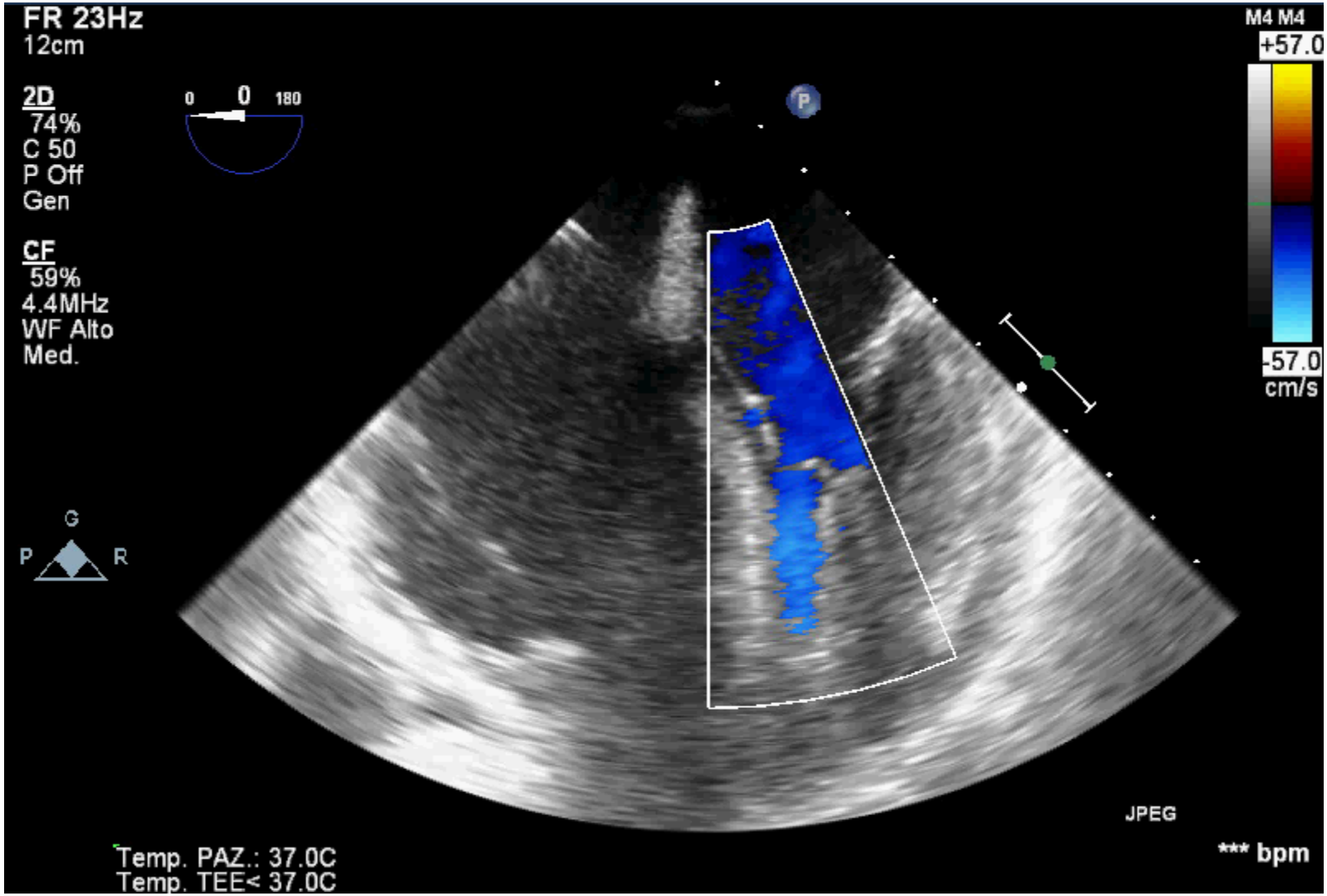
12cm
M4
2D
72%
C 50
P Off
Gen
0
0
180
P
G
P
R
JPEG
Temp. PAZ.: 37.0C
Temp. TEE< 37.0C
*** bpm

HUMANITAS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C 50
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Gen
CF
59%
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WF Alto
Med.
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0
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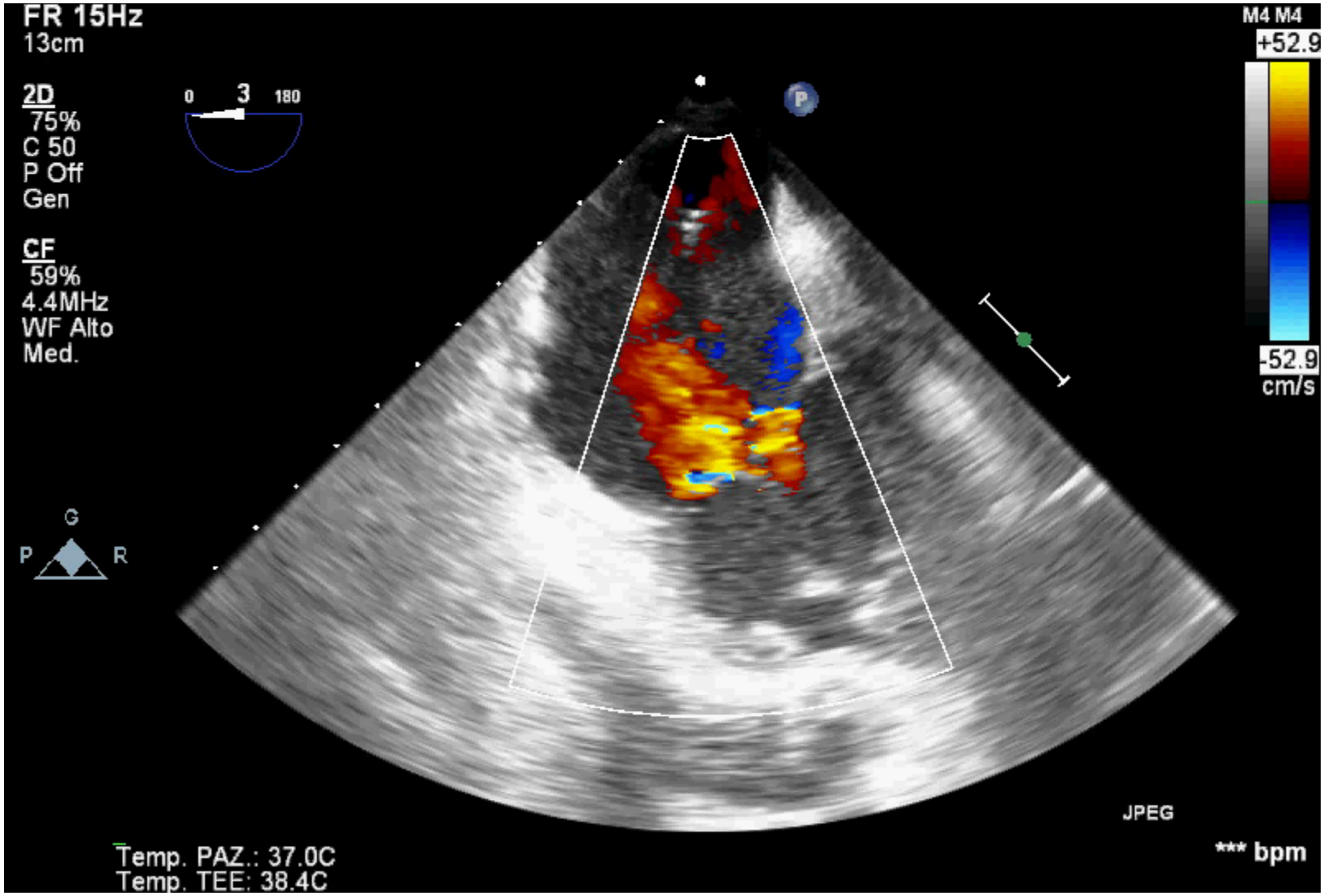
G
P
R
M4 M4
+57.0
-57.0
cm/s
JPEG
*** bpm
Temp. PAZ.: 37.0C
Temp. TEE< 37.0C

HUMANITAS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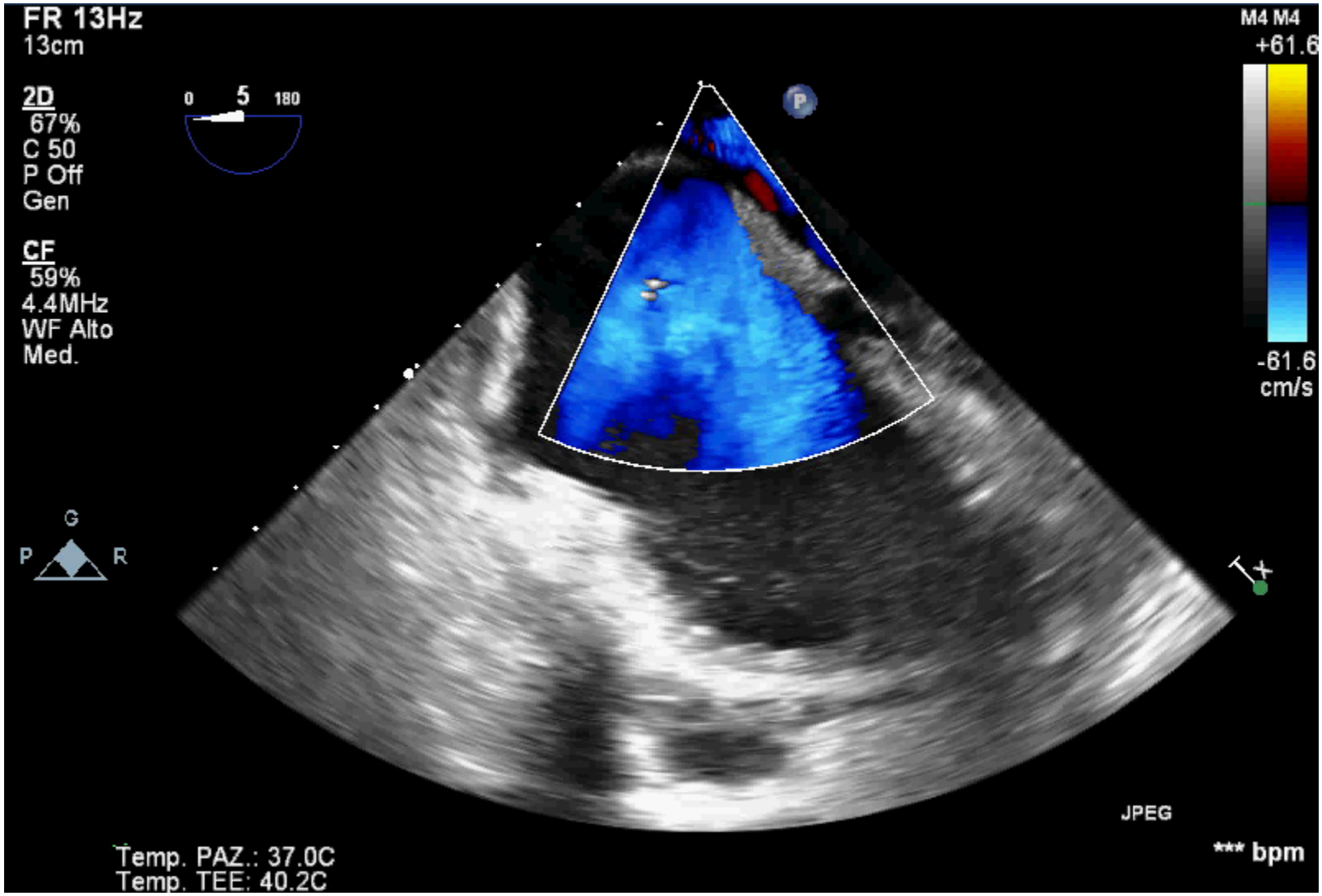
13cm
2D
75%
C 50
P Off
Gen
CF
59%
4.4MHz
WF Alto
Med.
0
3
180
G
P
R
M4 M4
+52.9
-52.9
cm/s
JPEG
*** bpm
Temp. PAZ.: 37.0C
Temp. TEE: 38.4C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CF
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Med.
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M4 M4
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cm/s
G
P
R
JPEG
*** bpm
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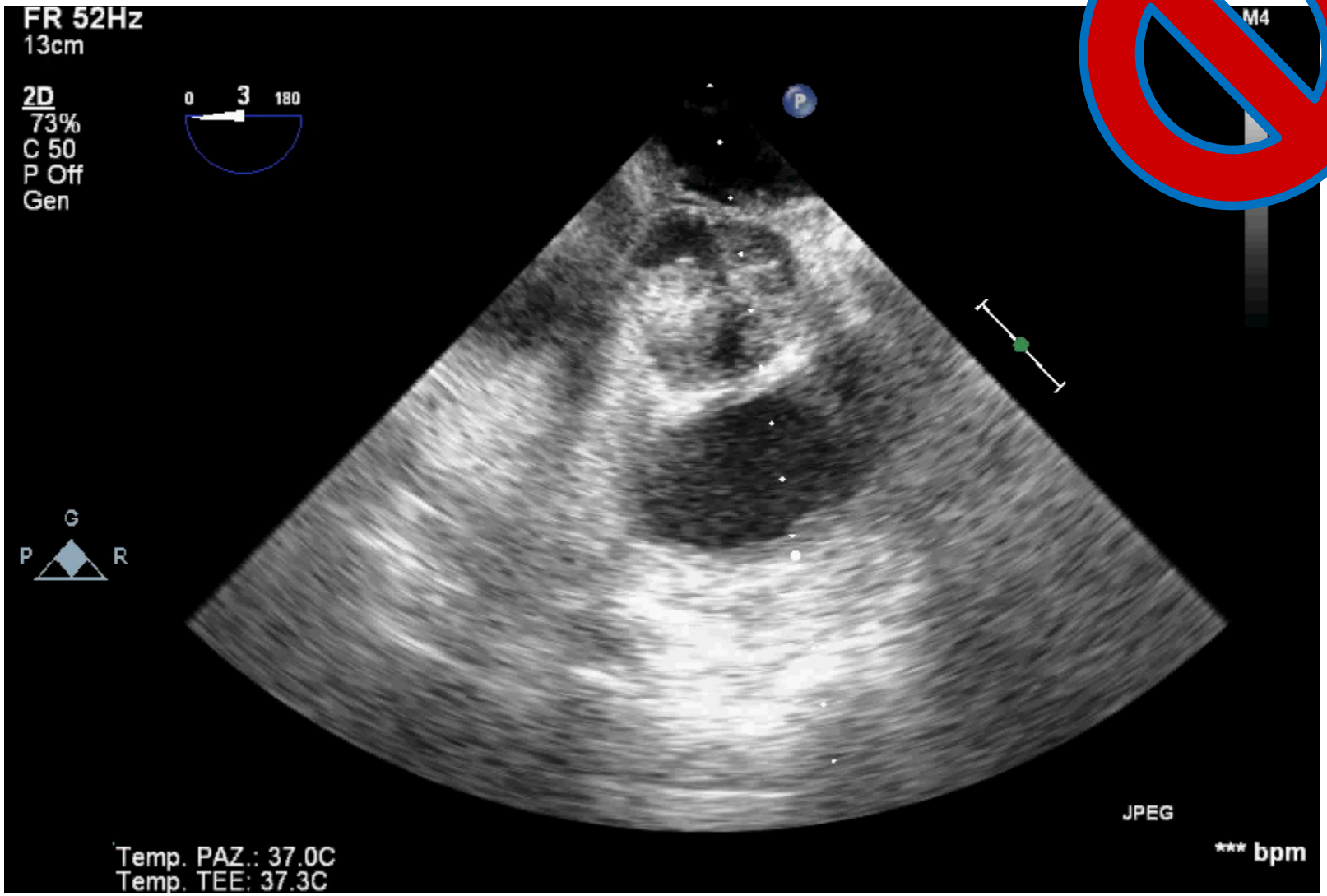
HUMANITAS


FR 52Hz
13cm
2D
73%
C 50
P Off
Gen
0
3
180
M4
G
P
R
JPEG
Temp. PAZ.: 37.0C
Temp. TEE: 37.3C
*** bpm

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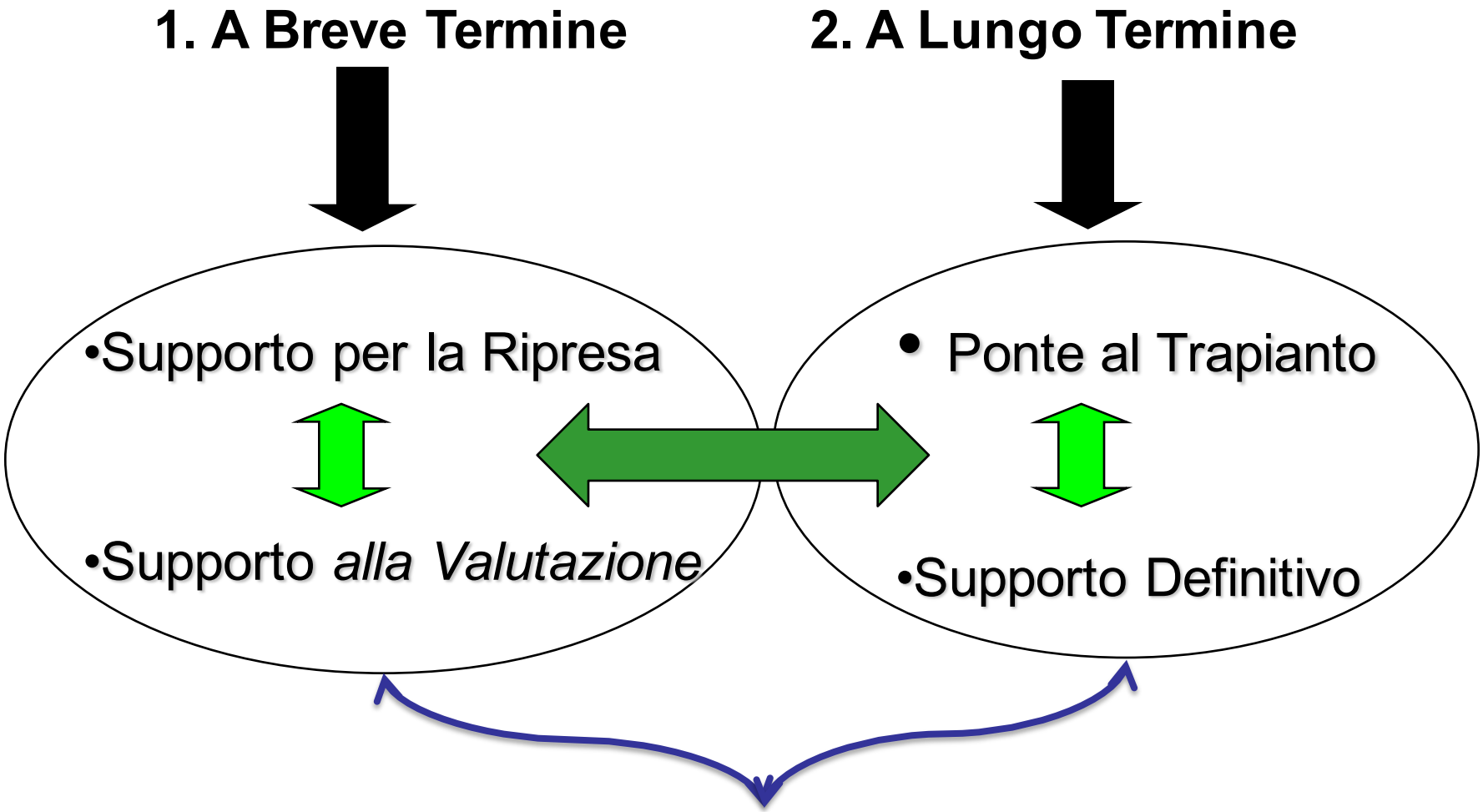
VAD in Rianimazione



VAD Come la Dialisi

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Algoritmo per impianto di Assistenza Ventricolare a Breve Termine in Shock Cardiogeno

Modified From: L.E. Samuels et al.
(Ann Thorac Surg 2001;71:S67–72)

Precardiotomy → Shock Cardiogeno ← Postcardiotomy

Shock Cardiogeno → Inotropi → I.A.B.P. → VAD a Breve Termine

Sindrome da bassa portata con 2 o più farmaci

Sindrome da bassa portata con 2/3 farmaci ad alte dosi

30 min dopo il primo tentativo di svezzamento dalla CEC

1 h dopo il primo tentativo di svezzamento dalla CEC

VAD a Breve Termine

- Assistenza Ventricolare Sinistra
- Assistenza Ventricolare Destra
- Supporto Bi-Ventricolare

La maggior parte dei casi può essere superata con la sola assistenza sinistra. Se l'impianto viene ritardatoil rischio di assistenza bieventricolare è aumentato.