

70TH ESCVS CONGRESS & 7TH IMAD MEETING

20 | 23 JUNE 2022



CARDIAC SYMPOSIUM 9 |
HOW TO REVASCULARIZE PATIENTS WITH ISCHEMIC CARDIOMYOPATHY

Revascularization of patients with acute MI and chronic heart failure

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Acute MI with iCMP - CASE EXAPMLE:

Case History:

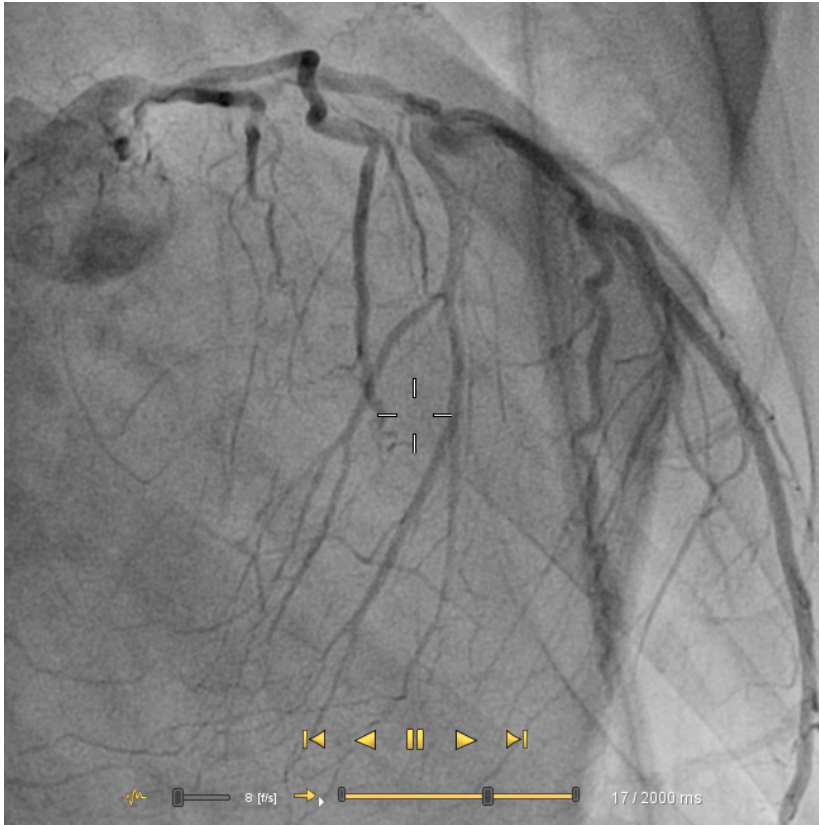
- **Age/Sex.** 59 y.o., male. 3-vessel CAD, NSTEMI, iCMP, HFrEF, severely reduced LVEF (15%)
- **Co-morbidities & ASCVD RF.** aHTN, COPD, partial thrombosed infrarenal AAA, nicotine abuse, family history
- **Limitations in daily life.** chronic alcohol abuse, St.a. thigh amputation due to traumatic injury
- **Elective.** NSTEMI, Severe 3-vessel CAD, distal (>50%) left-main stenosis, significant OM1 stenosis, CTO dist. LCX, CTO prox. RCA.
- **Presentation.** Urgent referral to surgical revascularization by CABG; discussed and agreed amongst heart-team
- **Examination.** NIBP 110/70 mmHg with inotropic support, HR sinusrhythm, 100 bpm, SpO₂ 98% with supplemental oxygen (6l/min). Heart sounds without murmurs, bilateral pleural effusions.

Relevant investigations:

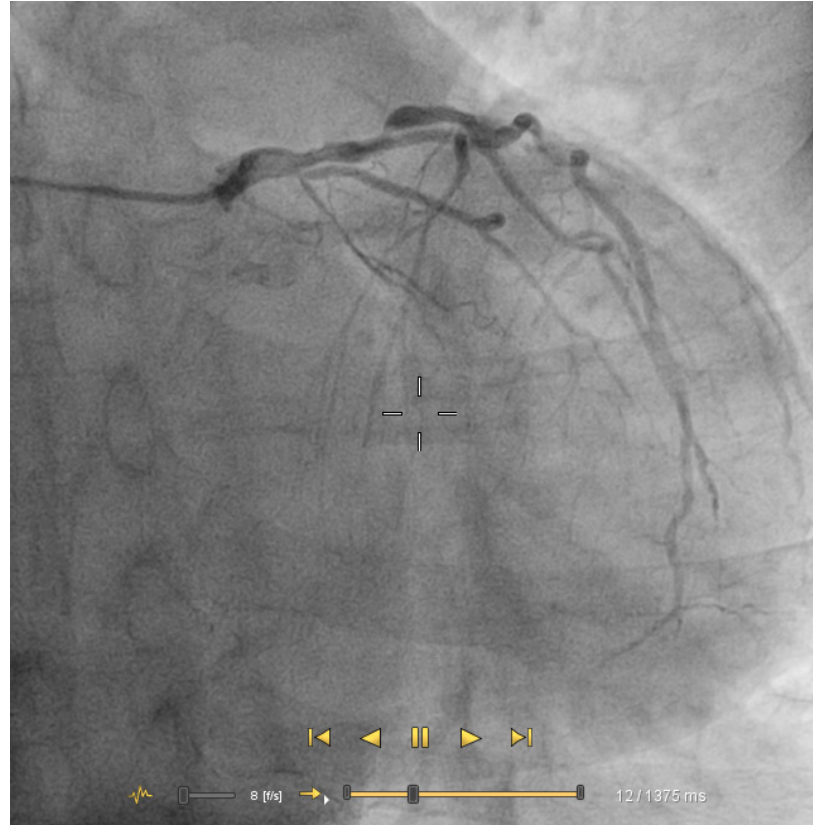
- **hsTnI admission 2800 ng/L, CK 4528 U/L, NTproBNP 4812pg/ml**
- **Arterial lactate 5 mmol/L, pO₂ 80 mmHg**
- **Serum creatinine 136 µmol/L (eGFR 57 ml/min/1.73 m²).**
- **Hb 11.4 g/dL, RBC 13.74 x10¹²/L, PLT 355 x 10⁹/L, Fibrinogen 845 mg/dl, CRP 13.5 mg/dl, PCT 0.14 ng/ml**

Relevant investigations:

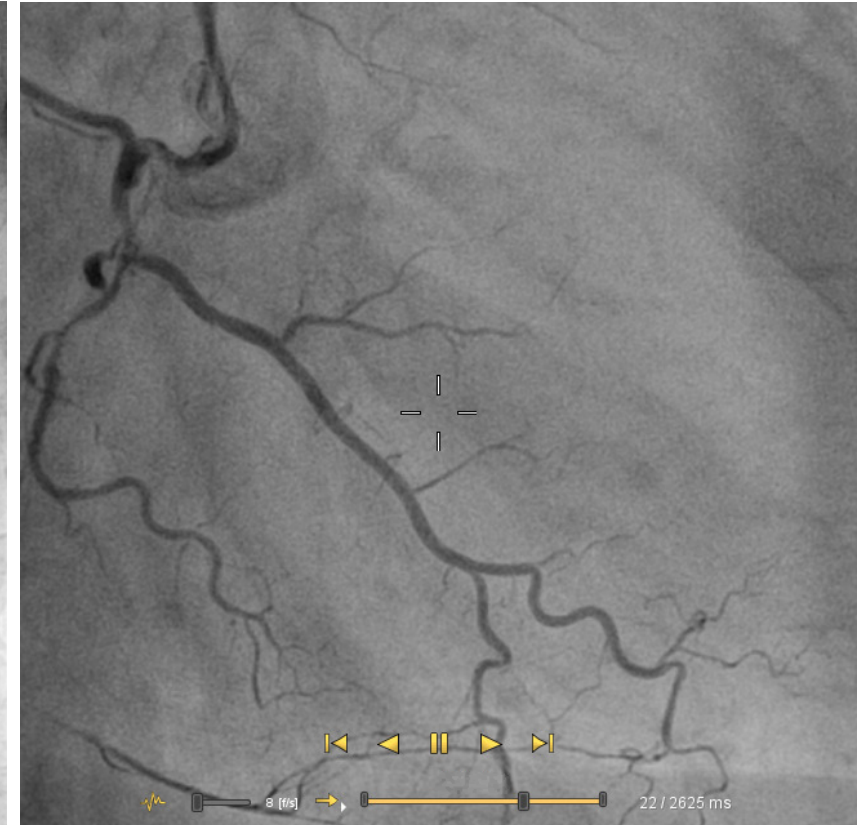
➤ Coronary angiography



Distal LM stenosis



RD1 & OM1 stenosis, CTO LCX

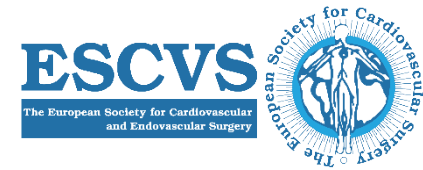


CTO RCA



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EUROPEAN
SOCIETY OF
CARDIOLOGY



2018 ESC/EACTS Guidelines on myocardial revascularization

FAVOURS PCI

Clinical characteristics

Presence of severe co-morbidity (not adequately reflected by scores)

Advanced age/frailty/reduced life expectancy

Restricted mobility and conditions that affect the rehabilitation process

Anatomical and technical aspects

MVD with SYNTAX score 0-22

Anatomy likely resulting in incomplete revascularization with CABG due to poor quality or missing conduits

Severe chest deformation or scoliosis

Sequelae of chest radiation

Porcelain aorta^a

FAVOURS CABG

Clinical characteristics

Diabetes

Reduced LV function (EF \leq 35%)

Contraindication to DAPT

Recurrent diffuse in-stent restenosis

Anatomical and technical aspects

MVD with SYNTAX score \geq 23

Anatomy likely resulting in incomplete revascularization with PCI

Severely calcified coronary artery lesions limiting lesion expansion

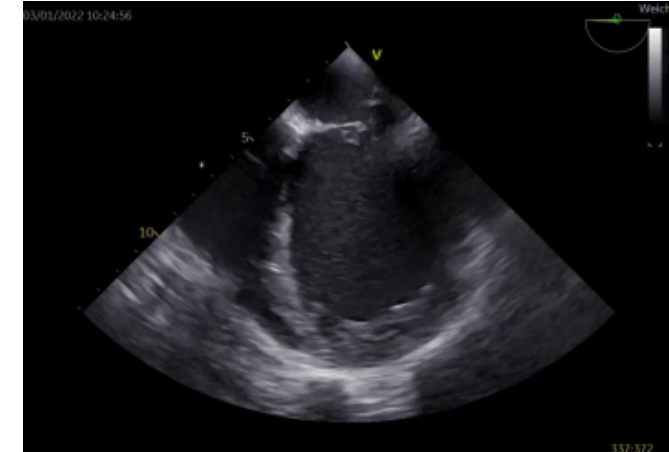
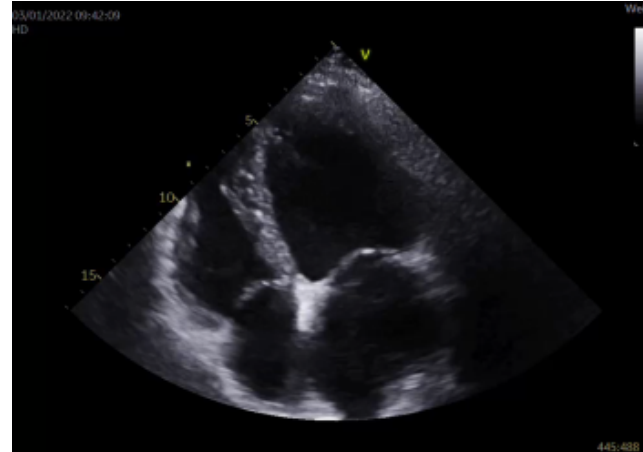
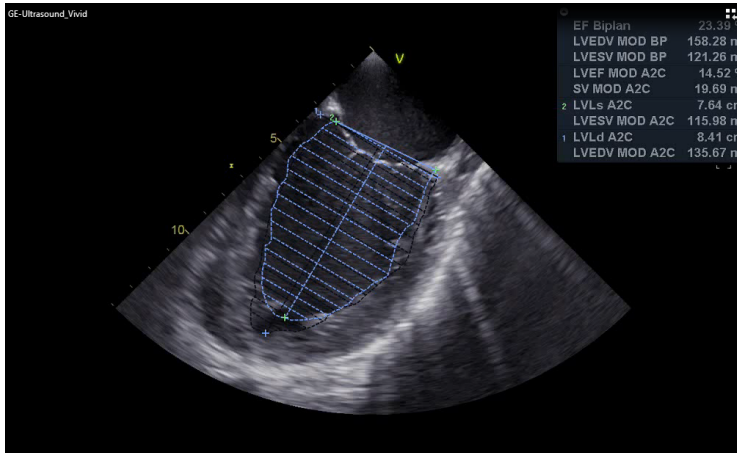
Need for concomitant interventions

Ascending aortic pathology with indication for surgery

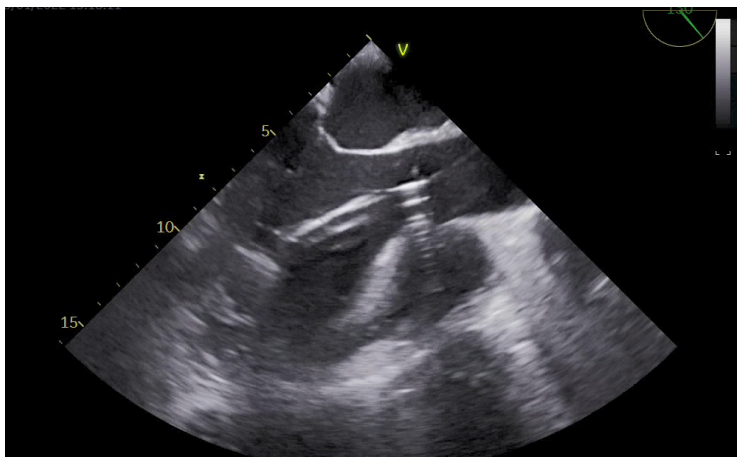
Concomitant cardiac surgery

Relevant investigations:

➤ Intraoperative TEE before Impella 5.5 & CABG surgery (*under dobutamine support*)



➤ Intraoperative TEE after Impella 5.5 & CABG surgery



Diagnosis: NSTEMI, Triple-vessel CAD, iCMP, severely reduced LVEF (15 %)
EuroScore II: 9.71 % , STS score: 14.9 % , SYNTAX Score I: 62.5

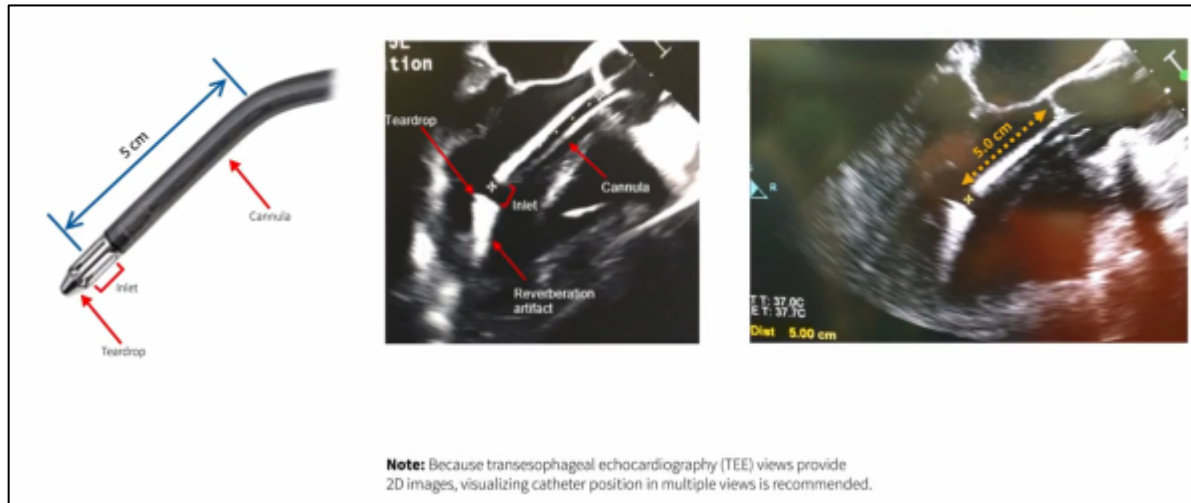
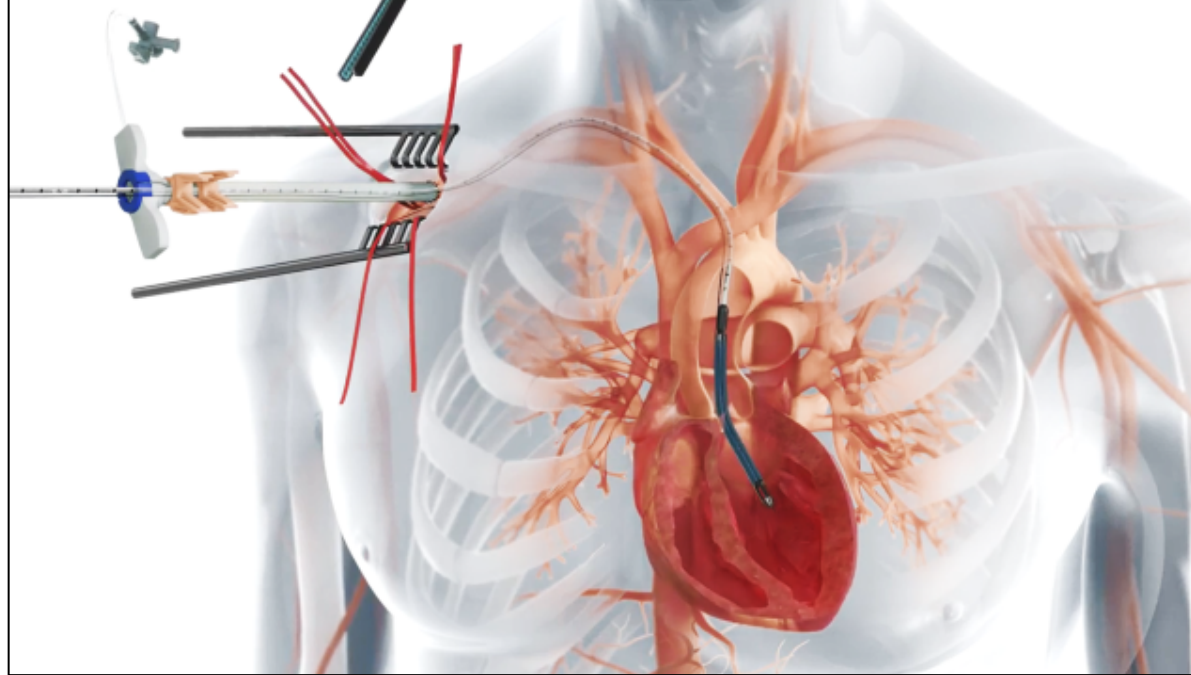
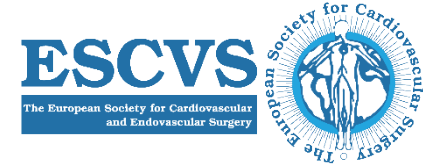
Heart-team transcript:

- **Surgeon's Perspective:** High-risk CABG procedure
- **Interventional Cardiologist's Perspective:** unsuitable for PCI, futile/unreasonable high-risk
- **Heart Team recommendation:** after Heart-Team evaluation >> CABG



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Impella 5.5[®] insertion via right axillary artery



Courtesy of Abiomed Europe

Surgical strategy:

High-risk CABG under CPB and Impella 5.5[®] support:

- Impella 5.5 via right axillary artery (P8-mode >> CO: 5.4 l/min)
- With cardio-pulmonary bypass as ,empty beating-heart‘
 - CABG with
 - LITA to LAD (TTFM 135ml/min)
 - SVG to RCA (TTFM 75ml/min)
 - SVG to OM1 (TTFM 88ml/min)

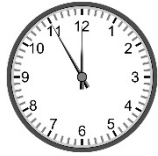
Postoperative course :

- Impella 5.5 support with CO: 5.4 l/min
- Low inotropic support
- Extubation on POD 1 and mobilization in bed
- Weaning from Impella support until POD 6
- Increase of LVEF 35%



Why to initiate a surgical ACS Registry ?

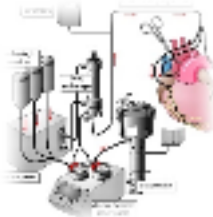
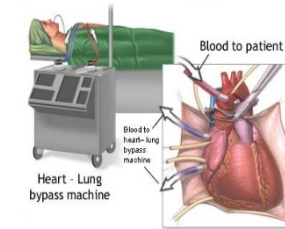
- Evidence for surgical strategies only exist from a plethora of small, monocentric reports sometimes suggesting the opposite, such as...



“postponing surgery vs. emergency surgery” ?



“off-pump or beating heart vs. on-pump” ?



“blood vs. crystalloid cardioplegic arrest” ?



....and indeed such strategies seem to vary widely, not only in Germany !



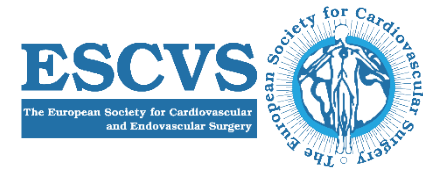


Purpose of this surgical myocardial infarction registry...

- to evaluate ***current state-of-the-art*** and ***clinical outcomes*** in patients undergoing CABG with ACS, including ST-elevation (STEMI) or non ST-elevation myocardial infarction (NSTEMI) or unstable angina (UA).



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‘The North-Rhine-Westphalia (NRW) Surgical Myocardial Infarction Registry’ 01/2010 – 12/2021

University of Münster •

University of Duisburg-Essen •

University of Cologne •

University of Bonn •

*University Hospital Cologne, Th. Wahlers
University Hospital Münster, S. Martens
University Hospital Bonn, A. Welz
University Hospital Essen, H. Jakob*



Registry turnout = 4 von 7 University hospitals = 57.1%



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Completeness of data

2616 ACS patients reported & entered



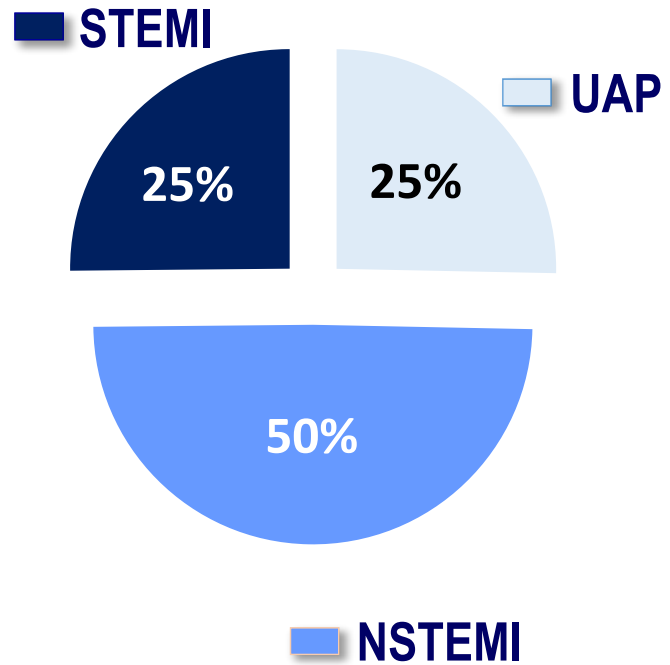
2432 complete data sets
with respect to primary and secondary outcome



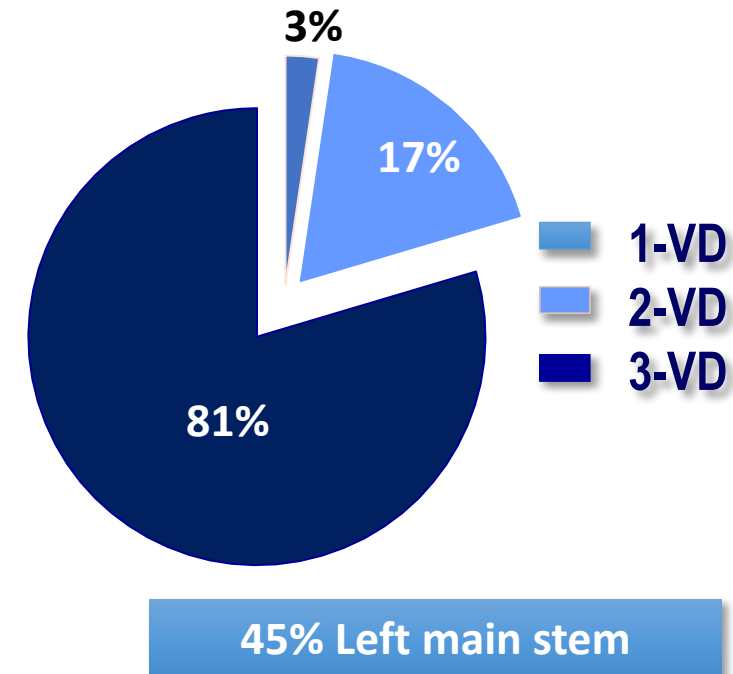
90.4% completeness



ACS subtypes

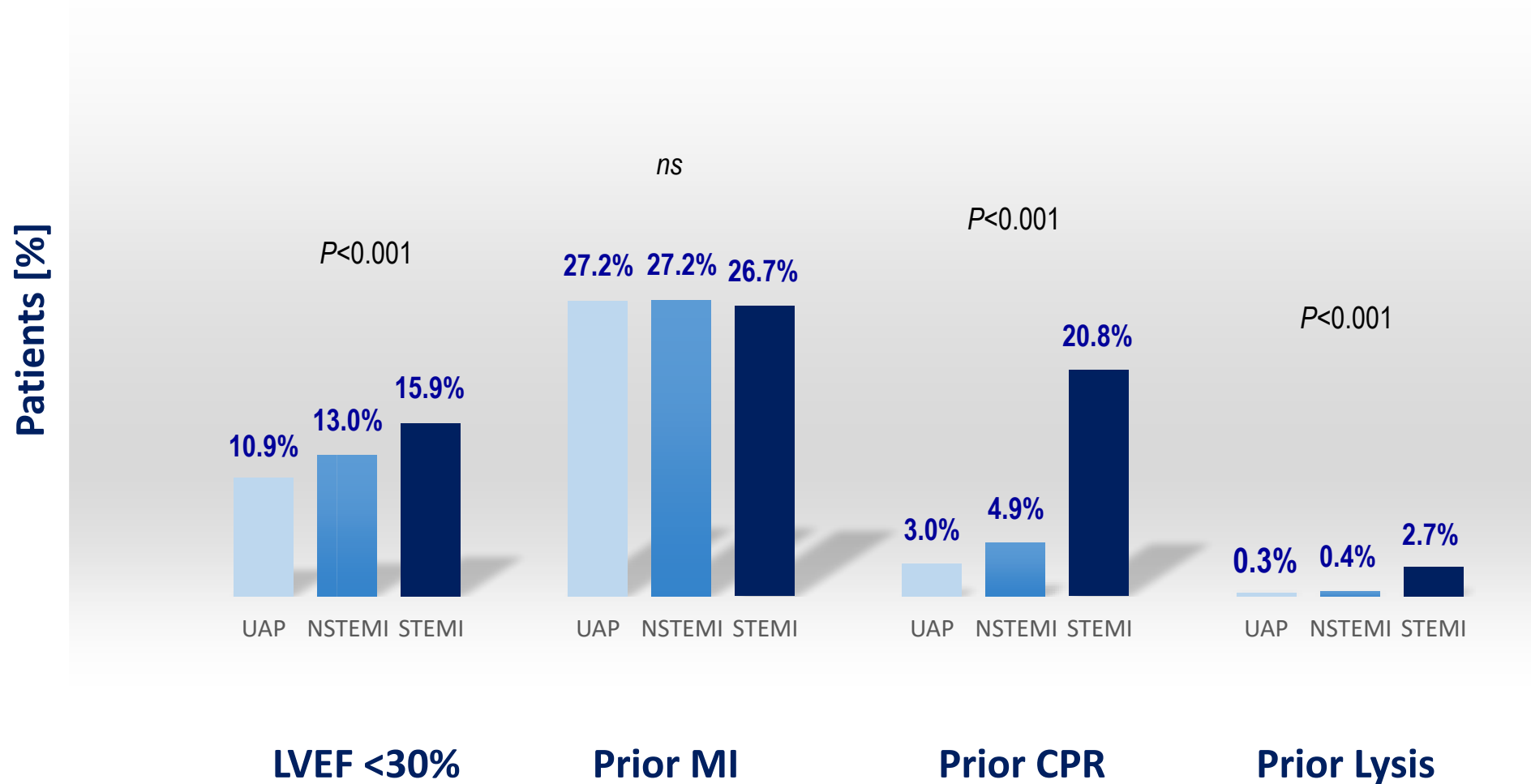


CAD subtypes



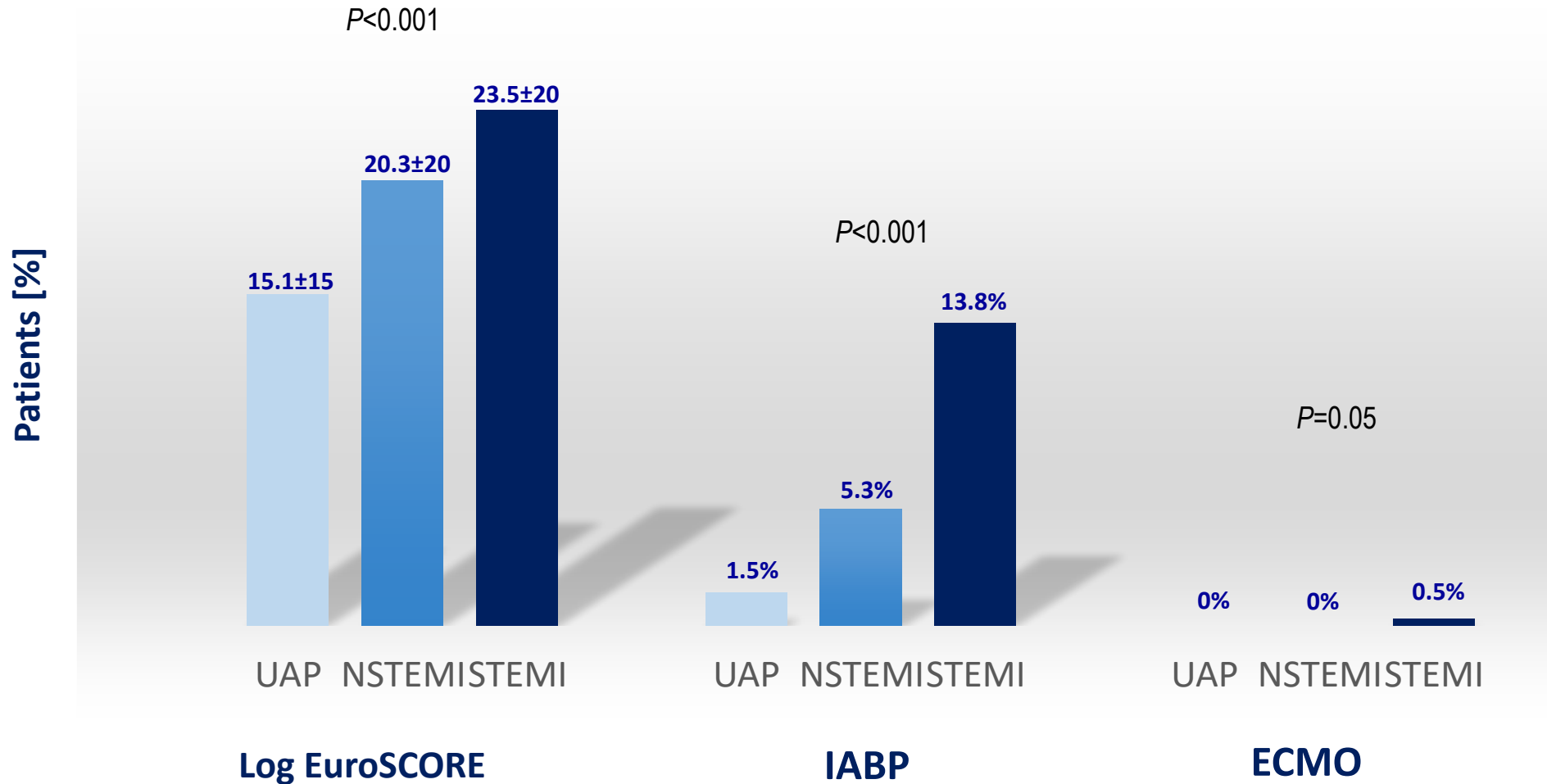


Cardiac history





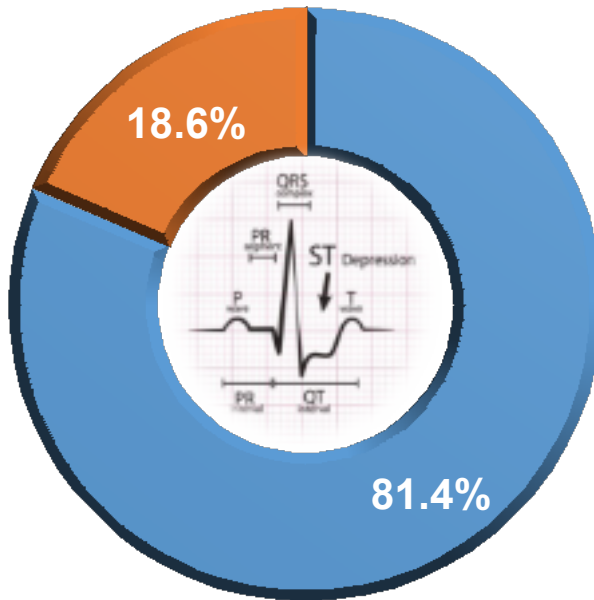
Status on admission (preoperative)



Cardiogenic shock

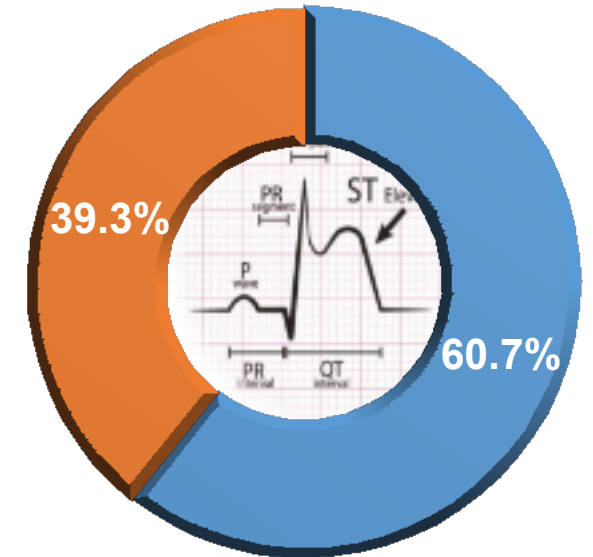
■ NSTEMI (-CS) ■ NSTEMI (+CS)

**NSTEMI
+CS**



■ STEMI (-CS) ■ STEMI (+CS)

**STEMI
+CS**



$P < 0.001$

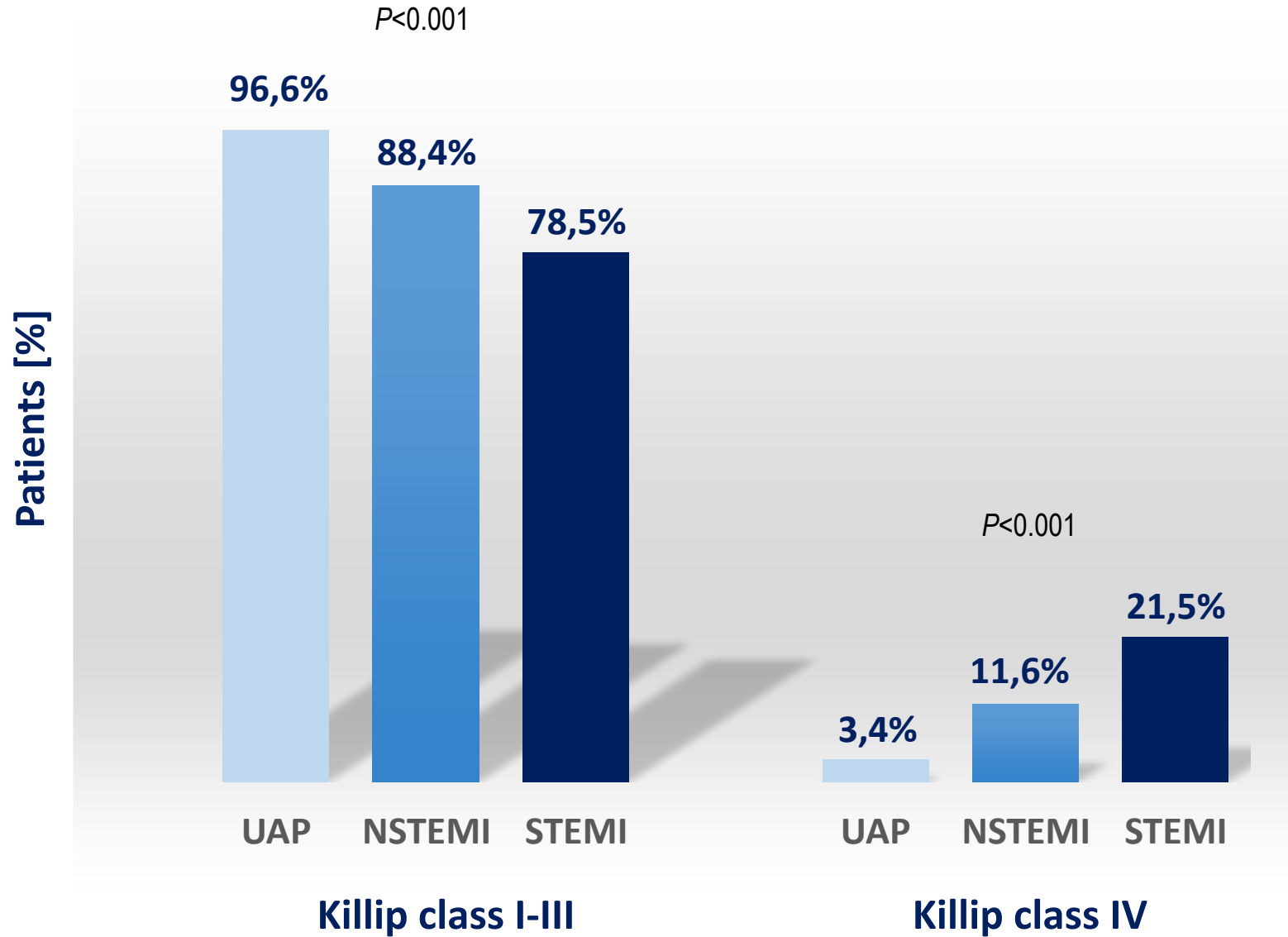
Definition of cardiogenic shock (AHA criteria)*

- Hypotension requiring IV inotropic support (syst. BP <90 mmHg; CI <2.0 L/m²/min)
- MCS support (IABP or V/A-ECMO)
- Cardiac arrest with CPR
- End-organ hypoperfusion (lactate levels >3mmol/L)

*Van Diepen et al. Circulation 2017



Kilipp classification





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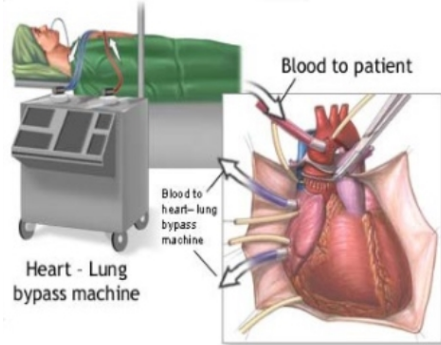


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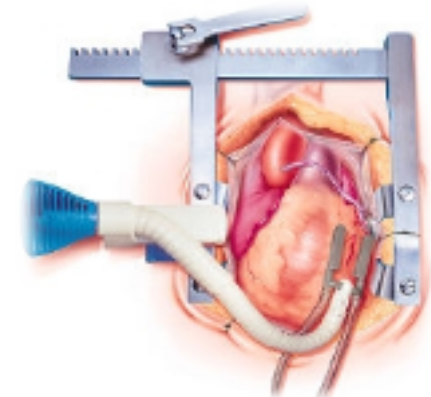
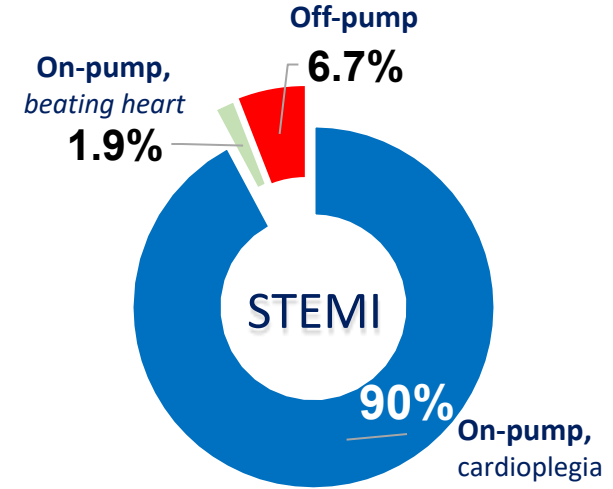
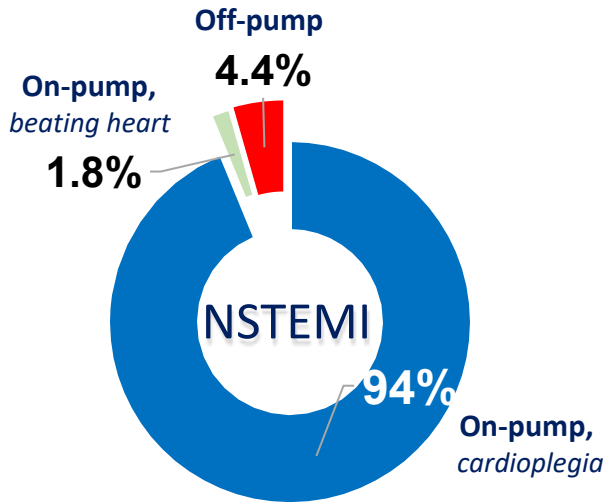
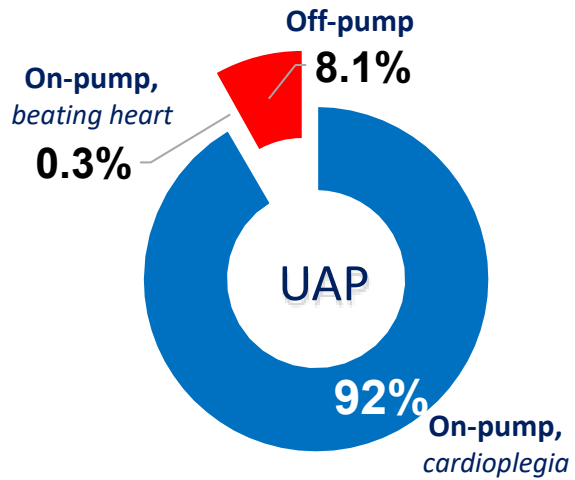


Surgical technique

(On-pump / Off-pump)



On-pump



Off-pump



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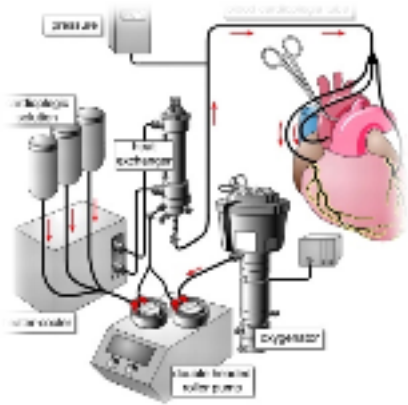
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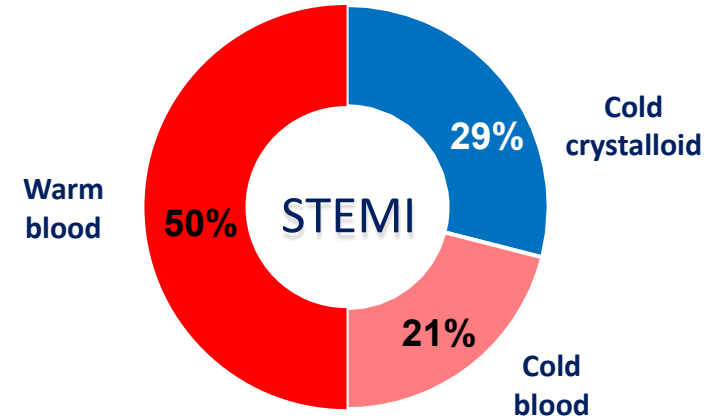
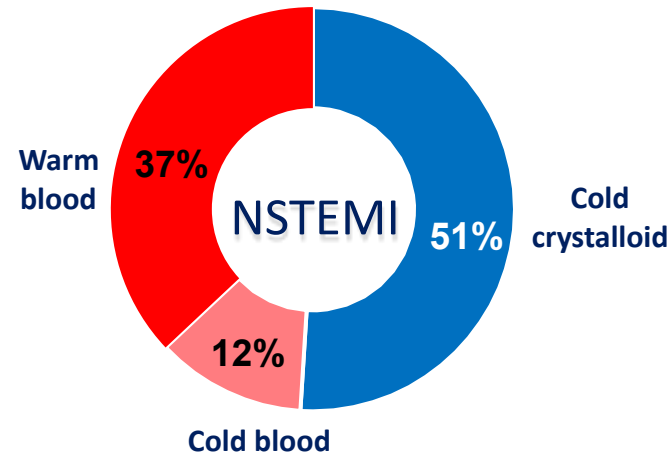
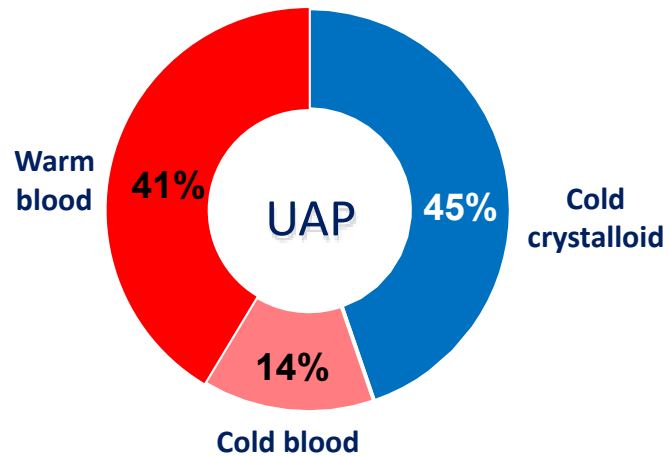
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Type of cardioplegia



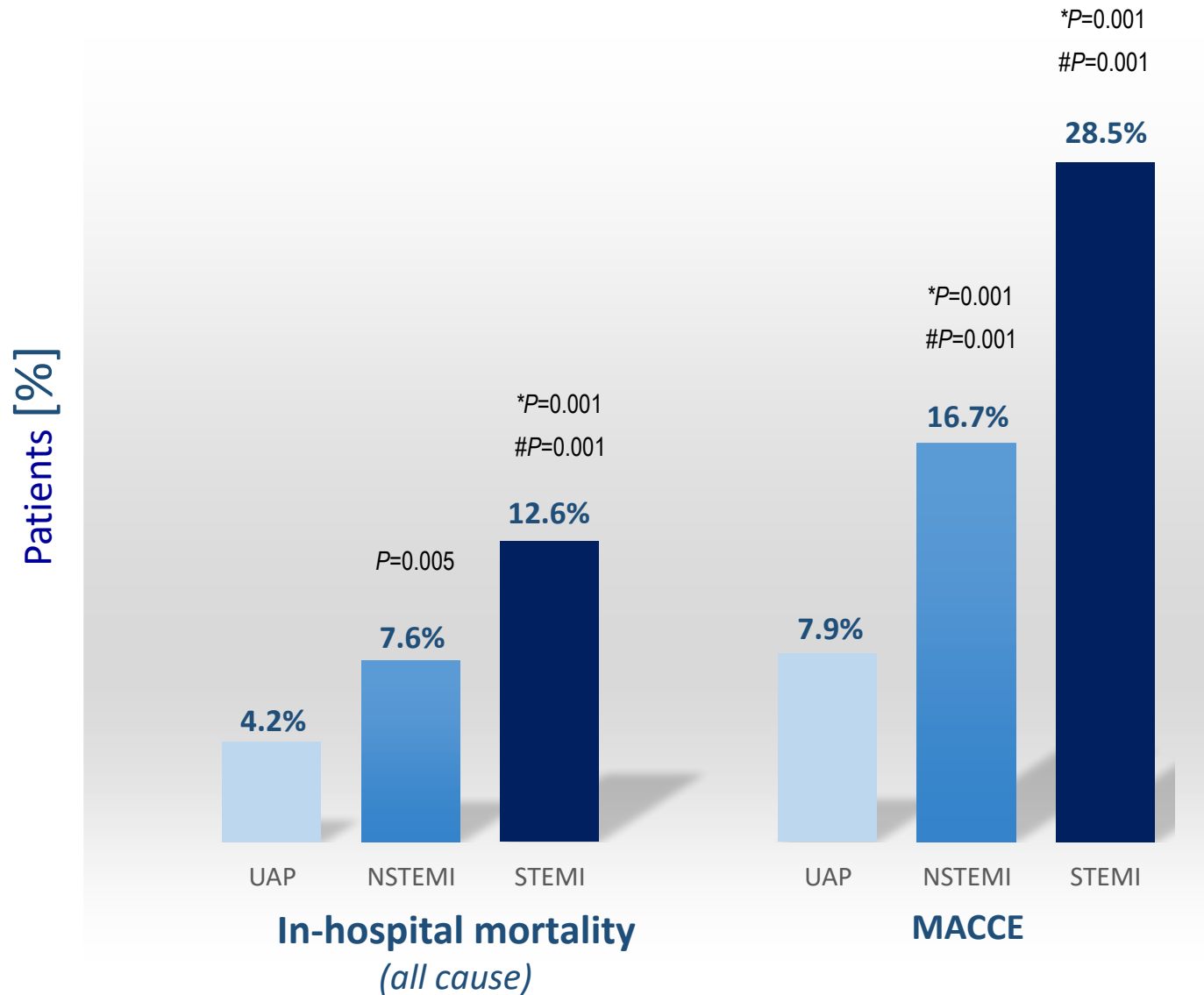
Blood
cardioplegia



Crystalloid
cardioplegia

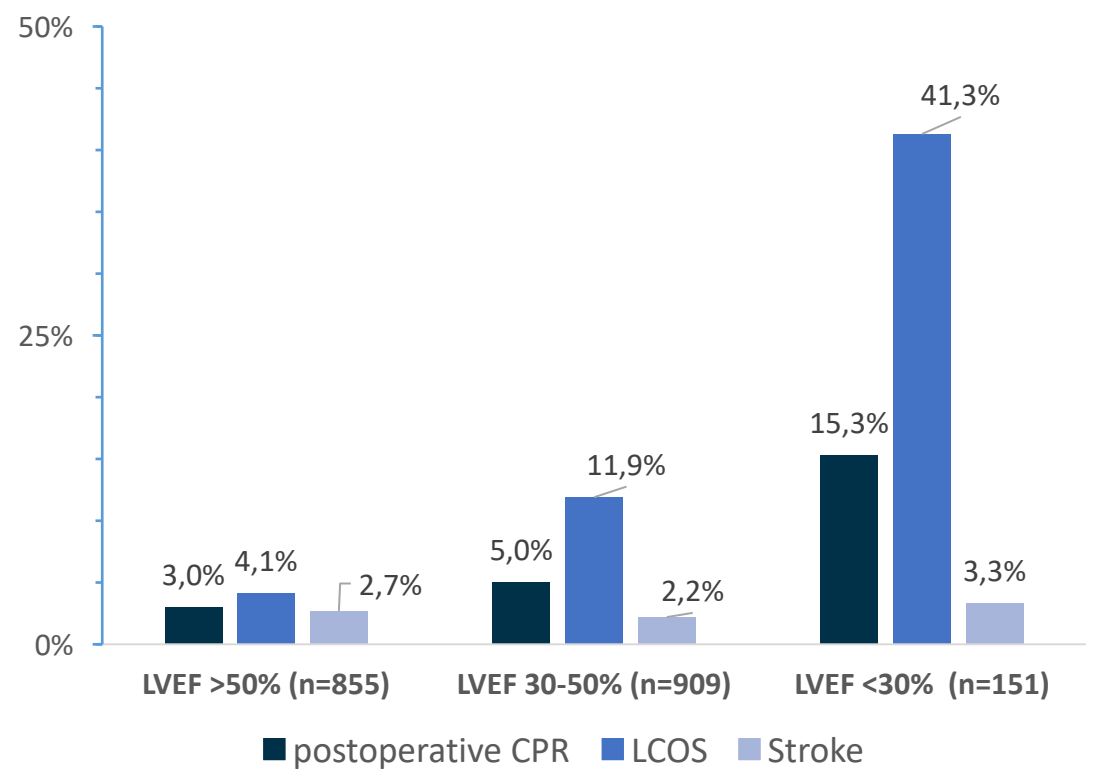
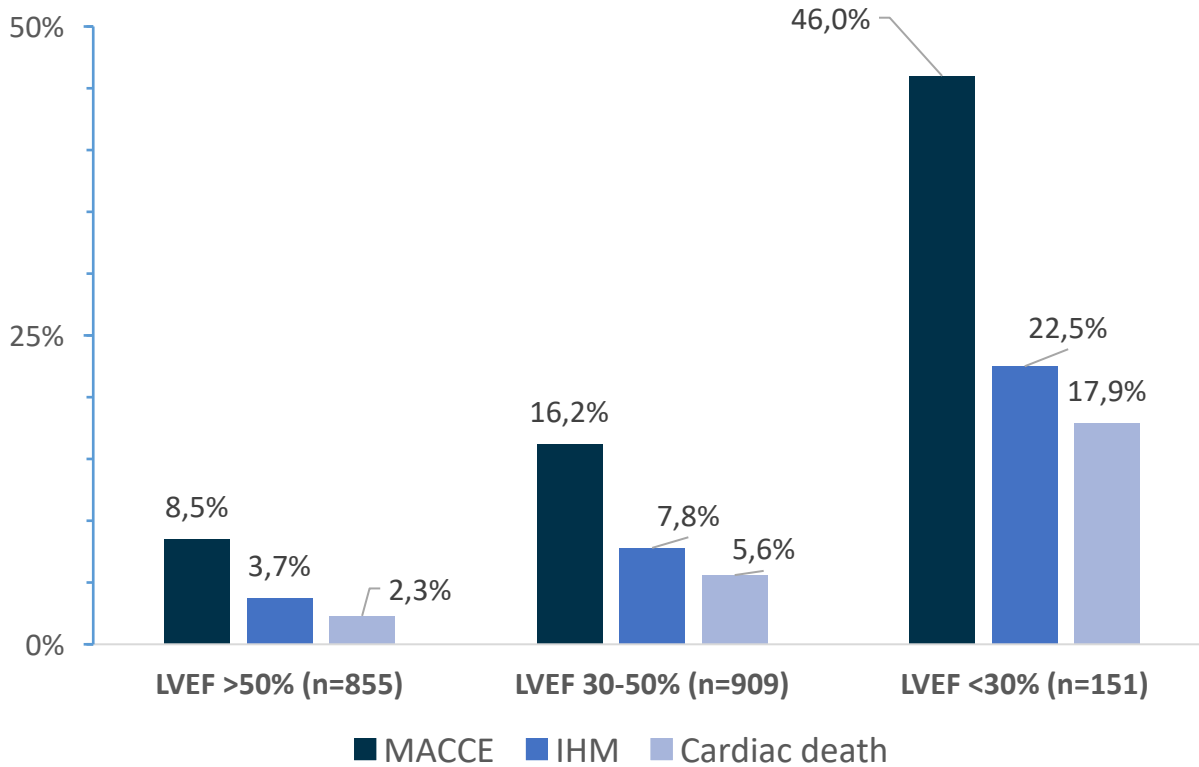


In-hospital mortality (IHM) & MACCE





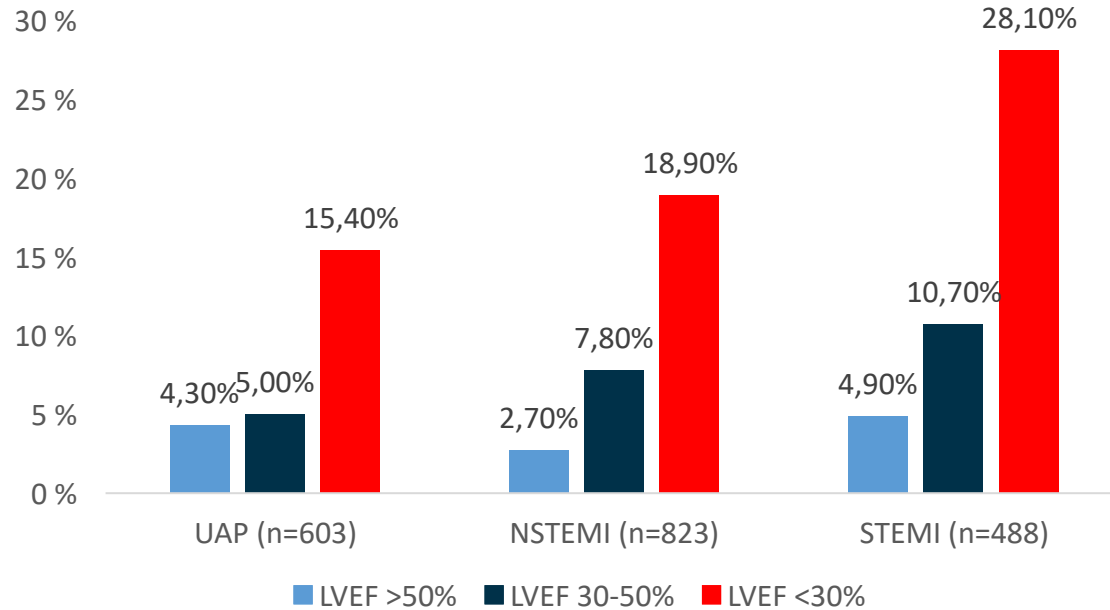
IHM & MACCE stratified by LVEF%



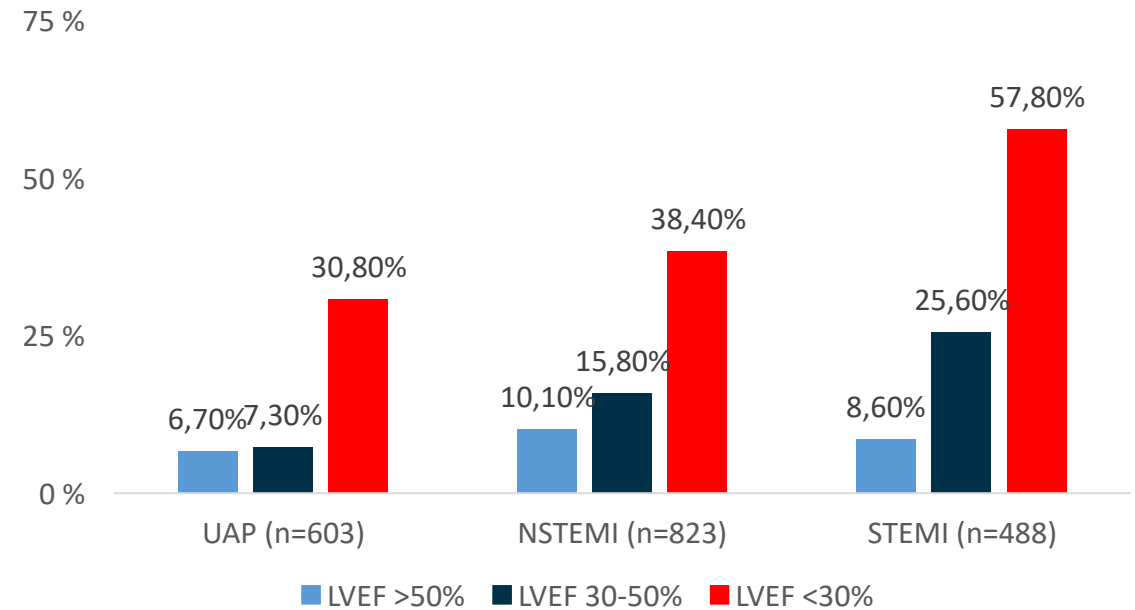


IHM & MACCE stratified by LVEF% & ACS subtypes

IHM

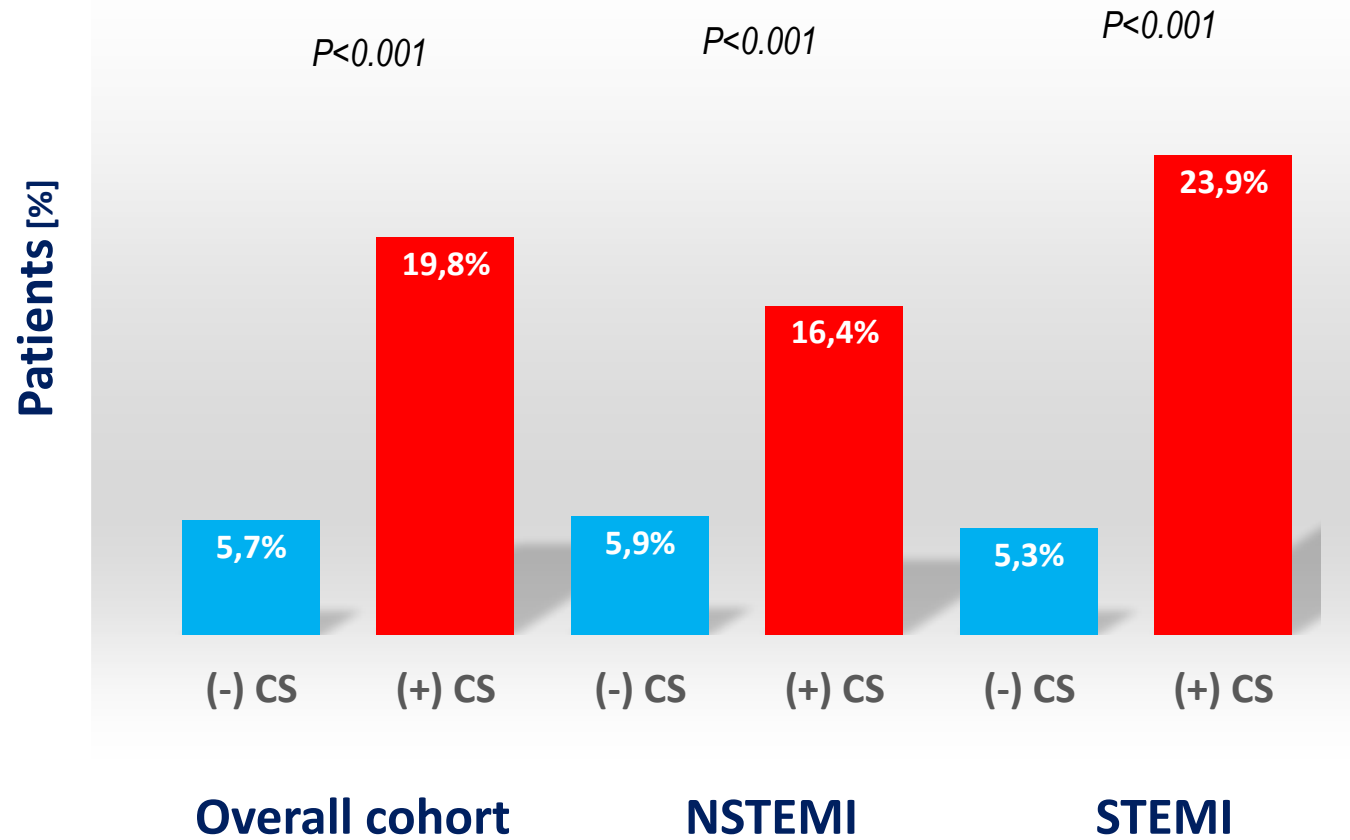


MACCE





Mortality related to cardiogenic shock



Conclusions

- Surgical strategies for patients undergoing CABG with ACS seem to vary widely, not only in Germany.
- Our prospective multicentric registry demonstrates surgical outcomes of CABG in ACS are good and although being a 'negative selection' comparable with those undergoing primary PCI.
- CABG remains a viable option for ACS patients with CS who are not amenable to primary PCI, but is still associated with a substantial IHM and MACCE.
- Distinct differences with worse surgical outcomes were observed in patients with CS, particularly in STEMI with CS
- On-pump surgery with cardioplegic arrest, single ITA use, multiple venous grafting is currently considered the be the safest strategy in this high-risk surgical patient cohort.
- Risk of LVEF, prior PCI, Timing of CABG, preop cTnl & T, preop DAPT & Bleeding, as well as type of cardioplegia do have impact on ACS patients outcome
- Of note, the preoperative use of IABP or ECMO, On-pump or Off-pump surgery were not associated with IHM or MACCE.



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**...on behalf of the NRW
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