Emerging Issues

대한심장혈관흉부외과학회
The Korean Society for Thoracic & Cardiovascular Surgery
The 38th KTCVS Spring Meeting 2024 SEOUL
The 4th AAPCHS
May 31st - June 1st
Seoul Dragon City Hotel

New Era of Impella 5.5 in Korea

Jae-Seung Jung, MD, PhD

Professor

Depart of Thoracic and Cardiovascular Surgery,

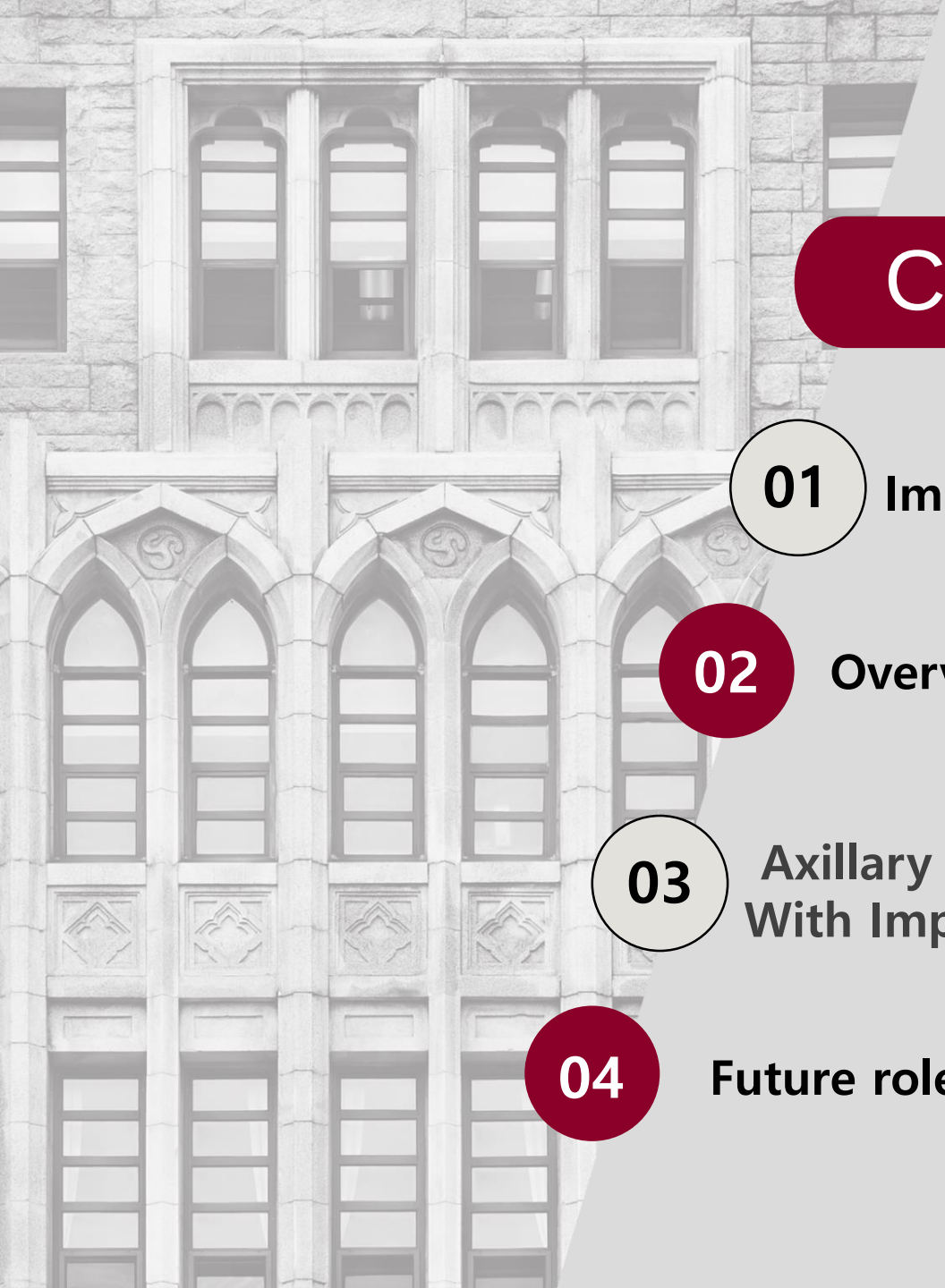
Director of ECMO team

Director of Bloodless Medicine and Surgery Center

Anam-Hospital, Korea University Medicine

ENABLING
FUTURE MEDICINE

No disclosure



Contents

Impella Product line

01

Confidential – Restricted use only. Do not distribute.

ABIOMED Product lines

Abiomed is committed to leading in technology and innovation, and improving patient outcomes by developing smaller, smarter and more connected technology

Impella Heart Pumps	2.5	Impella CP (with SmartAssist)	Impella 5	Impella LD	Impella 5.5 (with SmartAssist)	Impella RP (with SmartAssist)	Abiomed Breethe Oxy-1 system
Pics							
Indications	HRPCI & CS	HRPCI & CS	CS	CS	CS	RHF or decompensation	
Access	Percutaneous femoral or Axillary	Percutaneous femoral or Axillary	Femoral cutdown or Axillary	Direct insertion into AA	Axillary cutdown or Direct insertion into AA	Percutaneous femoral Vein(to PA)	
Maximum average flow (l/min)	2.5	4.3 (Maximum mean 3.7L/min)	5	5.3	5.5	4.4	A portable external respiratory assistance device in patients with CS, Respiratory Failure(20'FDA clearance)
Fr	12Fr	14Fr	21Fr		23Fr	23Fr	
Speed		0 – 46,000 rpm	0 – 33,000 rpm	0 – 33,000 rpm	0 – 33,000 rpm	0 – 33,000 rpm	
Maximum duration of support	HRPCI : ≤6hrs CS : ≤4days	HRPCI : ≤6hrs CS:≤4days (FDA) CS:≤5days (CE)	14 days	14 days	14 days(FDA) 29 days(CE)	14 days	

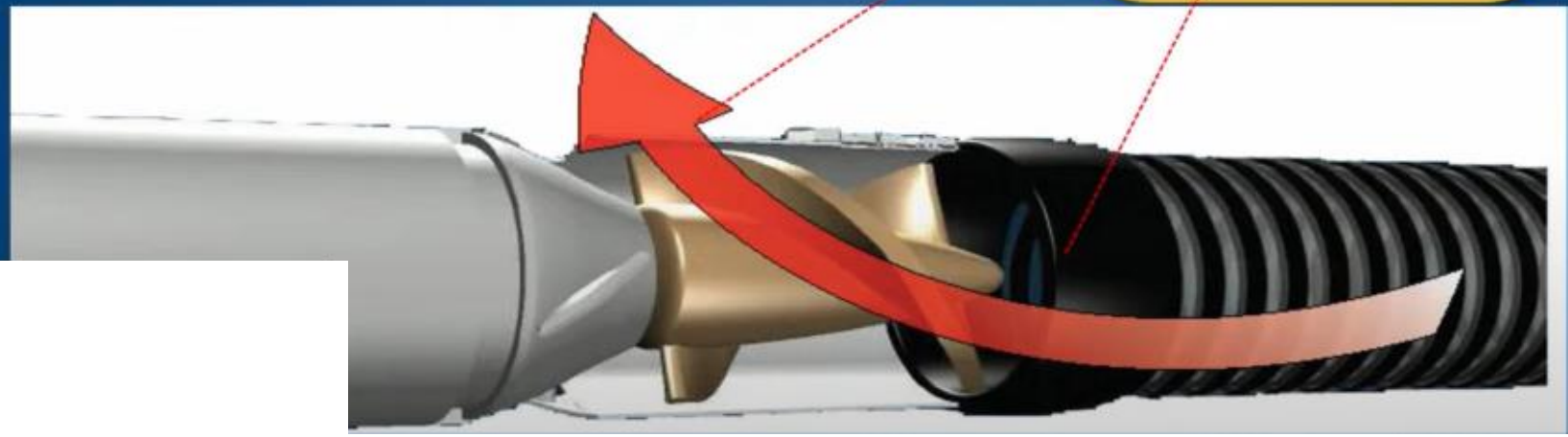
J&J MedTech

*Ref. ABIOMED Website

MOVING THE BLOOD

- *Rotating impeller pulls blood through the cannula*
- *Automated Impella Controller controls how fast the impeller rotates*
- *Rotation speed is proportional to flow:*

Faster rotation = Higher flow



Meta-analyses (Impella vs. IABP)

Study	Studies (N)	Patients (N)	Impella versus IABP
Ouweneel *et al*[21] JACC 2017	3[10–12]	95	► No difference in 30-day mortality (RR 0.99, 95% CI 0.62 to 1.58, p=0.95) ► or 6-month mortality (RR 1.15, 95% CI 0.74 to 1.48, p=0.53)
Wernly *et al*[24] Clin Res Cardiol 2019	4[10 11 22 23]	588	► No difference in in-hospital or 30-day mortality (RR 0.84, 95% CI 0.57 to 1.24, p=0.38) ► No difference in stroke risk (RR 1.00, 95% CI 0.36 to 2.81, p=1.00) ► Major bleeding increased in Impella group (RR 3.11, 95% CI 1.50 to 6.44, p=0.002) ► Peripheral ischaemia complications increased in Impella group (RR 2.58, 95% CI 1.24 to 5.34, p=0.01)

- IABP에 비해 survival benefit이 없음.....
- 오히려 Bleeding risk, peripheral ischemia complication 증가

McGovern L. Heart 2021;0:1–6.

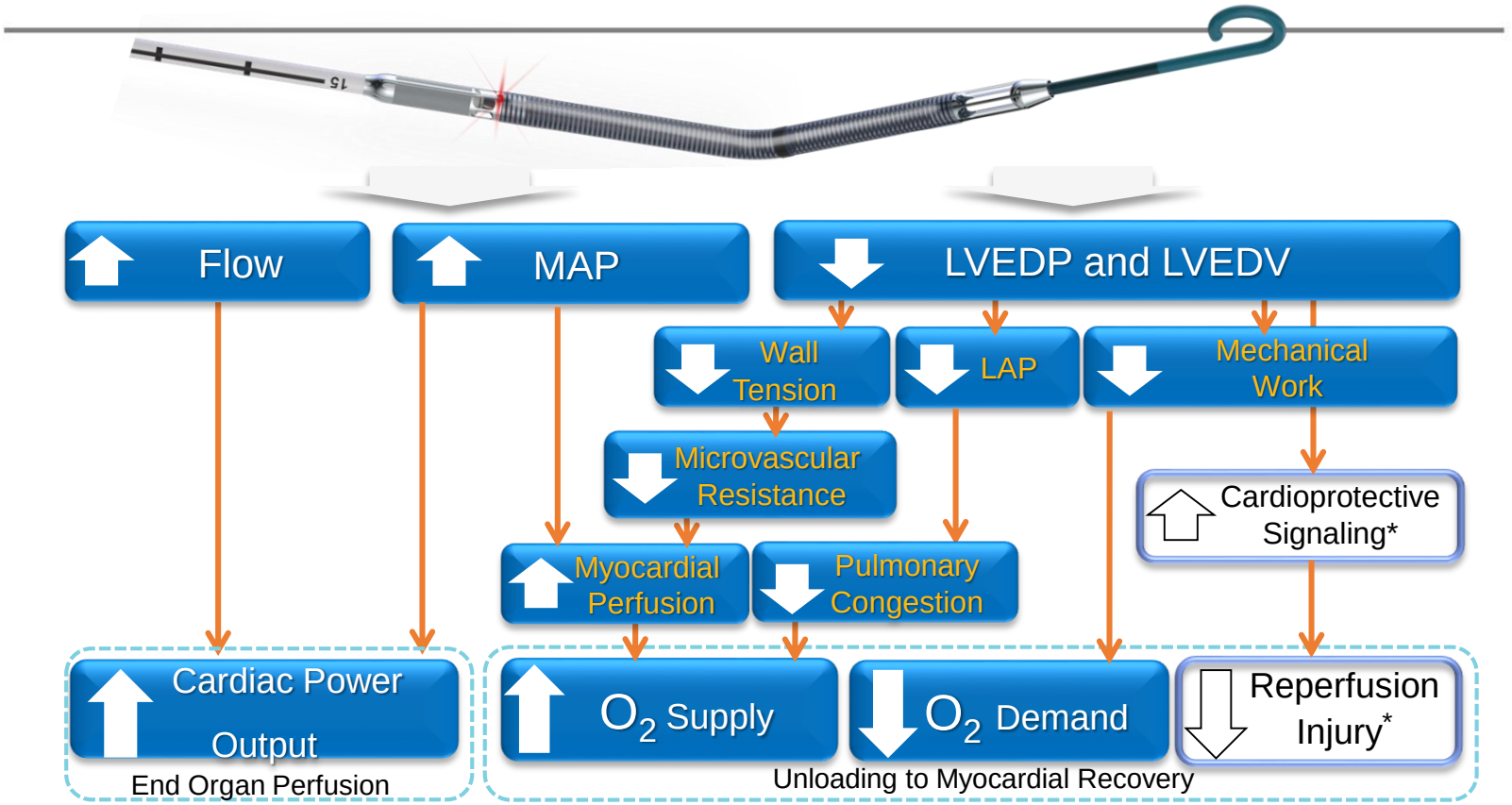
Impella platform

	Impella 2.5	Impella CP	Impella 5.0/ LD	Impella 5.5	Impella RP
Access technique	Percutaneous	Percutaneous	Surgical	Surgical	Percutaneous
Access artery	Femoral artery	Femoral artery	Axillary or femoral artery	Axillary or femoral artery	Femoral vein
Output (max)	2.5 L/min	4.3 L/min	5.0 L/min	6.0 L/min	4.0 L/min
Catheter diameter	9F	9F	9F	9F	11F
Motor pump size	12F	14F	21F	19F	22F

Or Ascending Aorta
with sternotomy

McGovern L. Heart 2021;0:1–6.

Hemodynamic Effects of Impella Devices



* Under study

Fincke J, et al. J Am Coll Cardiol 2004
den Uil CA, et al. Eur Heart J 2010
Mendoza DD, et al. AMJ 2007
Torgersen C, et al. Crit Care 2009
Torre-Amione G, et al. J Card Fail 2009

Suga H. et al. Am J Physiol 1979
Suga H, et al. Am J Physiol 1981
Burkhoff D. et al. Am J Physiol Heart Circ 2005
Burkhoff D. et al. Mechanical Properties Of The Heart And Its Interact ion With The Vascular System. (White Paper) 2011

Sauren LDC, et al. Artif Organs 2007
Meyns B, et al. J Am Coll Cardiol 2003
Remmelink M, et al. Catheter Cardiovasc Interv 2007
Aqel RA, et al. J Nucl Cardiol 2009
Lam K,. et al. Clin Res Cardiol 2009

Reesink KD, et al. Chest 2004
Esposito M, et al JACC 2018
Remmelink M. et al. Catheter Cardiovasc Interv 2010
Naidu S. et al. Novel Circulation.2011
Weber DM, et al. Cardiac Interventions Today Supplement Aug/Sep 2009

IMPELLA SURGICAL SUITE OF PRODUCTS

Impella RP

Impella 5.0

Impella LD

Impella 5.5
with SmartAssist

고려대학교의료원
KOREA UNIVERSITY MEDICINE

Improved clinical outcomes associated with the Impella 5.5 compared to the Impella 5.0 in contemporary cardiogenic shock and heart failure patients

Danny Ramzy, MD, PhD,[a] Edward G. Soltesz, MD, MPH,[b] Scott Silvestry, MD,[c] Mani Daneshmand, MD,[d] Manreet Kanwar, MD,[e] and David A. D'Alessandro, MD[f]

5.5

Rigid, shorter pump

5.0

Flexible, longer pump

J Heart Lung Transplant 2023;42:553–557

Table 2 Clinical Outcomes through Device Explant in AMICS, Cardiomyopathy, and PCCS Patients Treated with the Impella 5.5 or 5.0

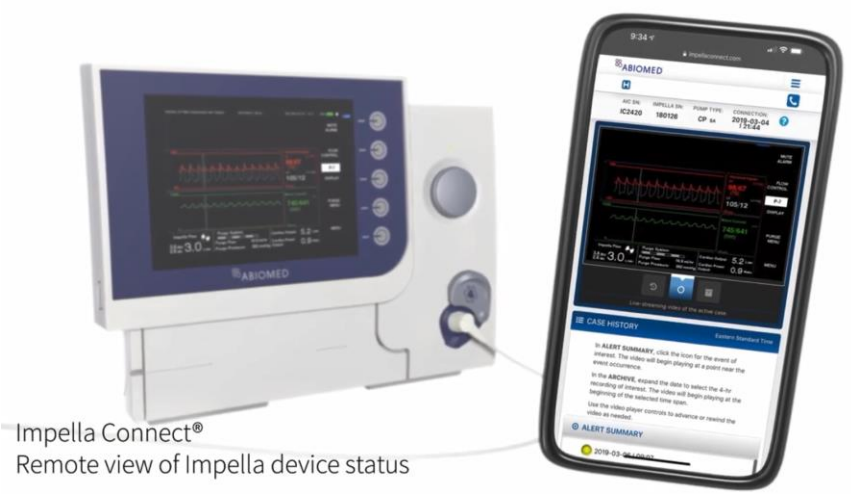
	AMICS			Cardiomyopathy			PCCS		
	Impella 5.5 (N=156)	Impella 5.0 (N=278)	*p*-value	Impella 5.5 (N=270)	Impella 5.0 (N=225)	*p*-value	Impella 5.5 (N=117)	Impella 5.0 (N=88)	*p*-value
Successfully weaned or bridged to heart replacement therapy	110/156 (70.5)	158/278 (56.8)	0.005	238/270 (88.1)	173/225 (76.9)	0.001	89/117 (76.1)	49/88 (55.7)	0.003
Successfully weaned	78/156 (50.0)	118/278 (42.4)	0.133	91/270 (33.7)	79/225 (35.1)	0.776	82/117 (70.1)	46/88 (52.3)	0.013
Bridged to therapy	32/156 (20.5)	40/278 (14.4)	0.108	147/270 (54.4)	94/225 (41.8)	<0.001	7/117 (6.0)	3/88 (3.4)	0.521
Expired on support or withdrawal of care	46/156 (29.5)	120/278 (43.2)	0.005	32/270 (11.9)	52/225 (23.1)	0.001	28/117 (23.9)	39/88 (44.3)	0.003
Expired on support	21/156 (13.5)	58/278 (20.9)	0.069	10/270 (3.7)	15/225 (6.7)	0.152	13/117 (11.1)	27/88 (30.7)	<0.001
Withdrawal of care	25/156 (16.0)	62/278 (22.3)	0.134	22/270 (8.1)	37/225 (16.4)	0.005	15/117 (12.8)	12/88 (13.6)	>0.99
Hemolysis	5/156 (3.2)	10/278 (3.6)	>0.99	8/270 (3.0)	21/225 (9.3)	0.003	2/117 (1.7)	1/88 (1.1)	>0.99
CVA	5/156 (3.2)	3/278 (1.1)	0.143	6/270 (2.2)	2/225 (0.9)	0.301	2/117 (1.7)	1/88 (1.1)	>0.99
Bleeding	1/156 (0.6)	5/278 (1.8)	0.426	3/270 (1.1)	5/225 (2.2)	0.478	3/117 (2.6)	6/88 (6.8)	0.177
Vascular injury	1/156 (0.6)	0/278 (0.0)	0.359	0/270 (0.0)	1/225 (0.4)	0.455	0/117 (0.0)	0/88 (0.0)	>0.99
Duration of support, days									
Mean ± SD (N)	13.2 ± 20.2 (156)	8.7 ± 9.5 (278)	0.008	15.1 ± 13.4 (270)	11.4 ± 10.6 (225)	<0.001	10.2 ± 23.5 (117)	6.6 ± 8.3 (88)	0.127
Median (range)	9.2 (0.04-233.3)	6.1 (0.01-87.1)		10.7 (0.03-71.1)	8.1 (0.3-64.1)		6.0 (0.0007-245.9)	4.4 (0.02-49.2)	

모든 군에서 Impella 5.5가 5.0에 비해 평균 4일을 더 유지

모든군에서 생존율이 유의하게 Impella 5.5 군이 우수

Impella - SmarAssist®

New weaning
algorithms designed
to optimize survival
& native heart recovery



Impella Connect®
Remote view of Impella device status

- Real-time displays of critical hemodynamic metrics indicative of left ventricular end-diastolic pressure (LVEDP), mean arterial pressure (MAP), and cardiac power output (CPO). Impella CP with SmartAssist is the only mechanical circulatory support device that calculates and displays pressure signals indicative of LVEDP, MAP and CPO.

SmartAssist® Hemodynamic Sensors

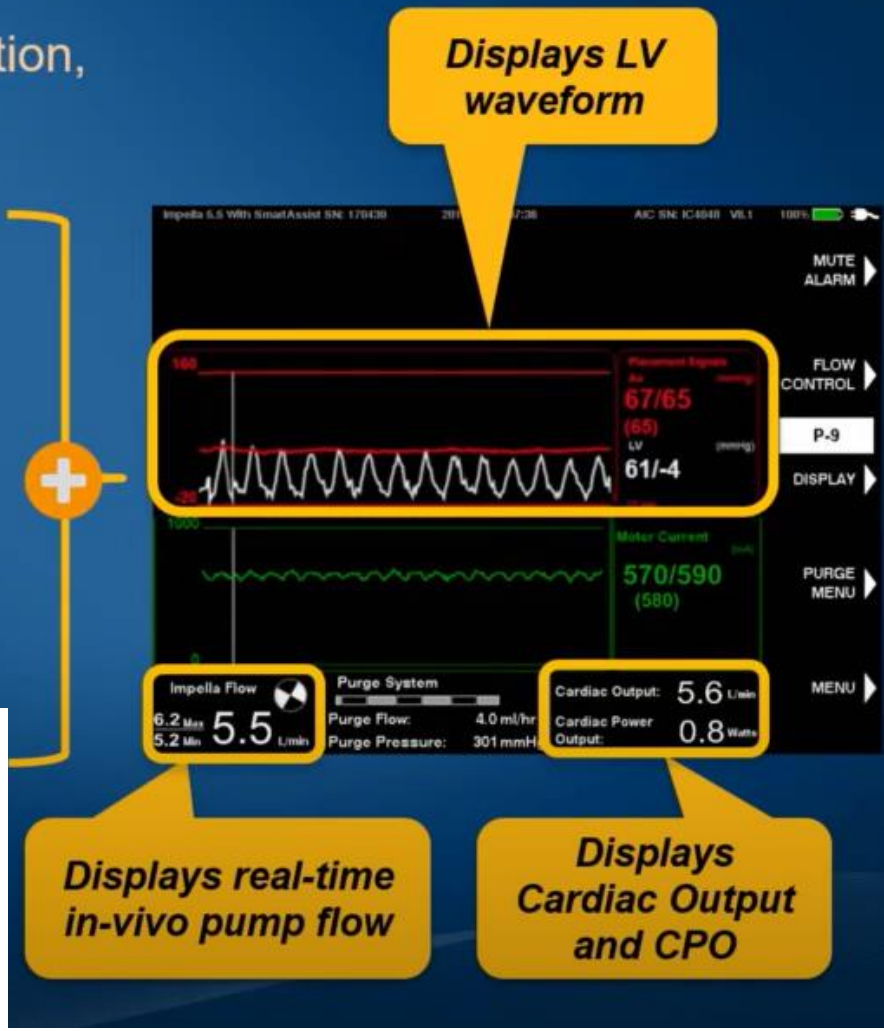
Intelligent pump metrics[1] on console to position, manage, wean

Optical Sensor

- Senses Aortic pressure (Ao)

Micro-axial motor

- Senses pressure difference between Aorta and Left Ventricle



현재 진행 상황

- **희소의료기기 지정을 위한 신청서 접수**
- 심장혈관흉부외과
- 심장내과

지 정 요 건

희소의료기기 지정기준에 해당함을 증명하는 자료
(혹은 용도상 특별한 효용가치를 갖는다는 것을 증명하는 자료)

1. 국내 환자 수(유병인구)가 20,000명 이하인 희귀질환의 치료 또는 진단 목적으로 사용될 것

2. 국내에 그 질환에 대한 대체 의약품 또는 의료기기가 없는 등 적절한 치료방법 또는 진단방법이 없거나 기타 용도상 특별한 효용가치를 갖는다고 식약처장이 인정할 것

해당질환 관련 전문 학회장의 지정추천서. 이 경우 추천경위 및 사유, 대체치료법 또는 대체의료기기 등에 대한 의학적 견해 및 그 근거, 대상 질환에 대한 통계자료 및 그 근거, 기타 참고의견 등의 자료를 포함

- **2023**
  한국 출시 결정
- **희소의료기기지정**
- **의료기기등록 & 신의료기술평가**
- **치료재료 등재 완료**

적응증

심인성 쇼크에만 한정

가격

Impella CP 25,000 USD

Impella 5.5 45,000 USD 예상

Overview of Impella 5.5

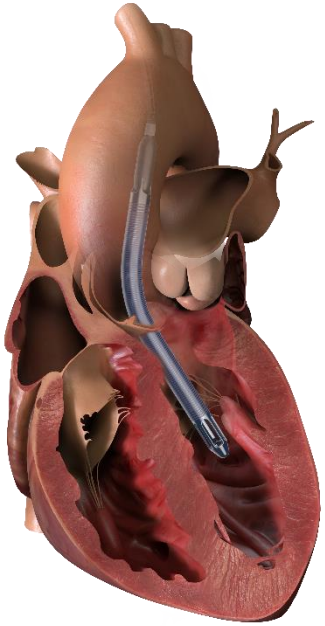
02

Impella 5.5 with SmartAssist Comparison

Feature	Impella 5.0	Impella 5.5 with SmartAssist	Benefit
Flow	5.0 L/min	5.5 L/min	Full Hemodynamic Support
Catheter Length	135cm	70cm* *55cm implantable length	Ambulation
Catheter Construction	Nitinol Wire	Steel Coil	Kink Resistance
Cannula Rigidity	-	**3.5x More Rigid**	Deliverability & Torque Response
Cannula Diameter	21Fr	21Fr	Maintains High Flow
Motor Diameter	21Fr	19Fr	Deliverability
Rigid Length (Motor Housing & Outlet)	42mm	27mm	Deliverability
Motor Bearings	Stainless Steel	**Ceramic**	Durability
Pigtail	Yes	No	Torque Response; in-dwell without adhesion
Sensor	Differential Pressure	**Fiber-Optic**	Placement Accuracy

Hemodynamic Stabilization with Impella Devices

Unloads Left Ventricle & Coronary Perfusion

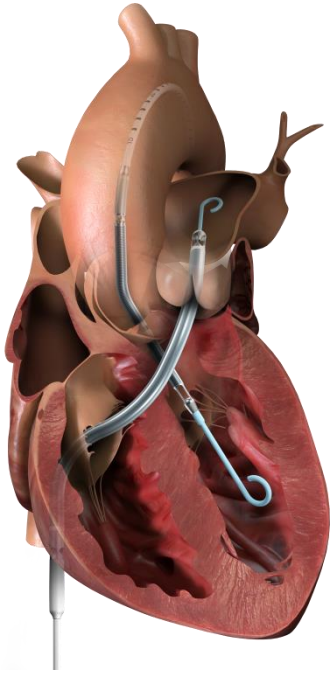


Seyfarth et al., JACC, 2008
Remmelink M et al., Cath Card Interv. 2007

End Organ Perfusion

Lam K. et al,. Clin Res Cardiol, 2009
Casassus et a., JOIC, 2015

Right Side Support



Anderson MB. et al., J Ht Lg Transplant. 2015

Escalation & Ambulation

Lima B. et al., Am J Cardiol 2016

ADVANTAGES OF IMPELLA 5.5

- Full hemodynamic support –peak flows >6.2L/min
- Incorporates Impella SmartAssist Technology
- Ease of implantation
  - Axillary or Direct
  - Early ambulation

IMPELLA 5.5 WITH SMARTASSIST

Minimally invasive heart pump that delivers full support, allowing the heart to rest; enabling heart recovery

The Surgeon's Heart Pump
Ease of insertion via the axillary artery or the anterior aorta

Full Support with Maximum Unloading
Reduces the heart's oxygen demand and workload

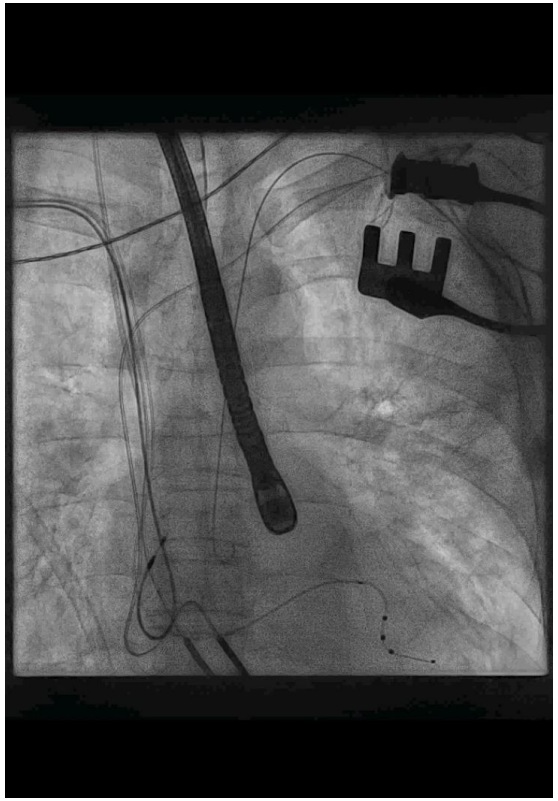
Forward Flow
Provides the patient with coronary and end organ perfusion

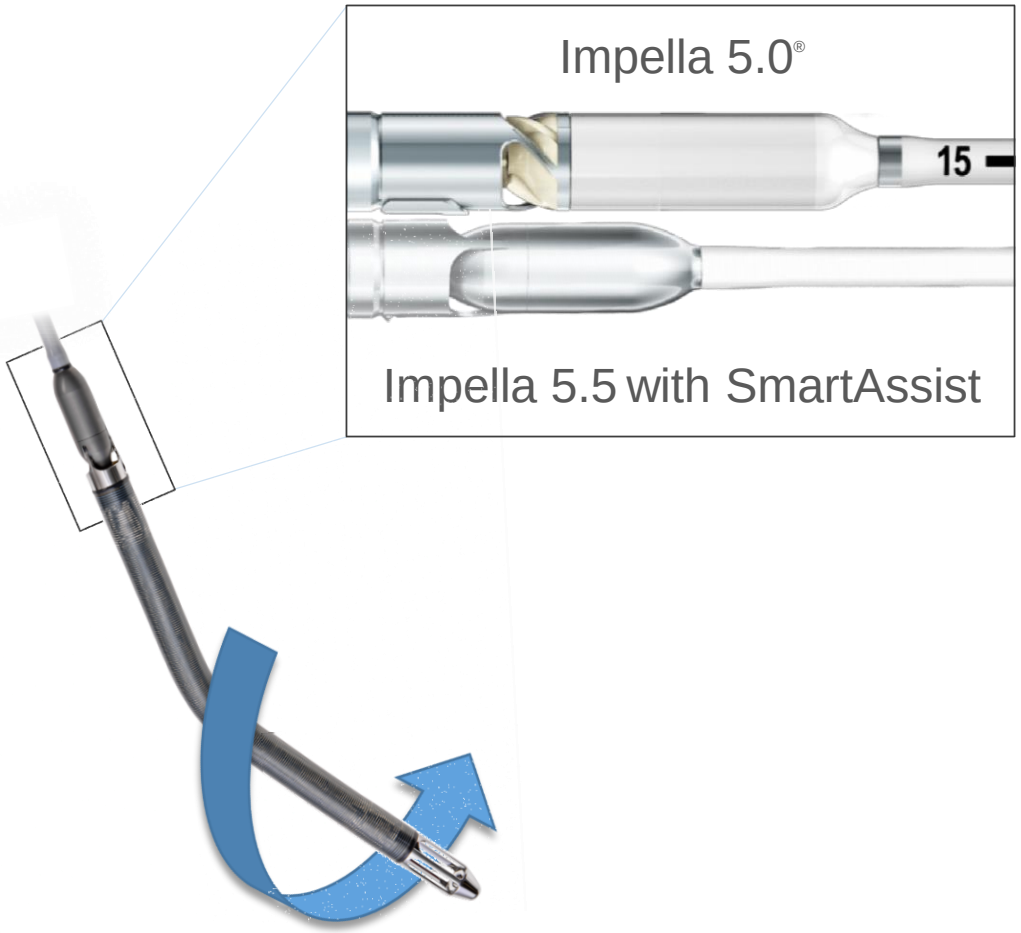
Minimally Invasive
Eliminates the need for a sternotomy or coring of the left ventricle

Equipped with SmartAssist
Designed to optimize survival and native heart recovery

Improved Deliverability and Torque Response

- Ease of insertion
- Torque response
- Long duration support without adhesions

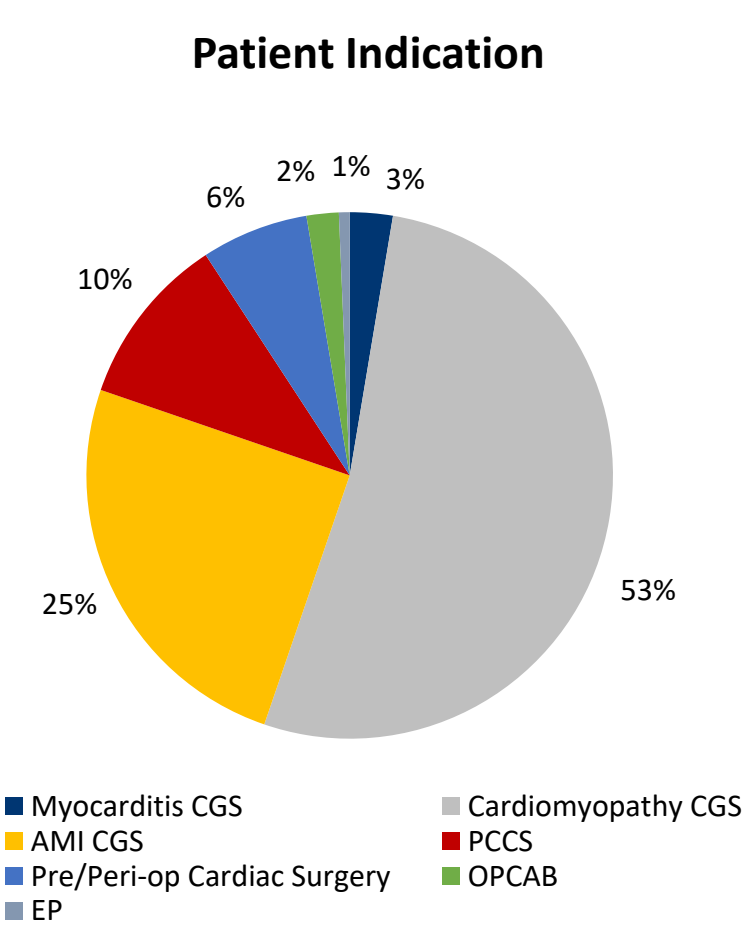


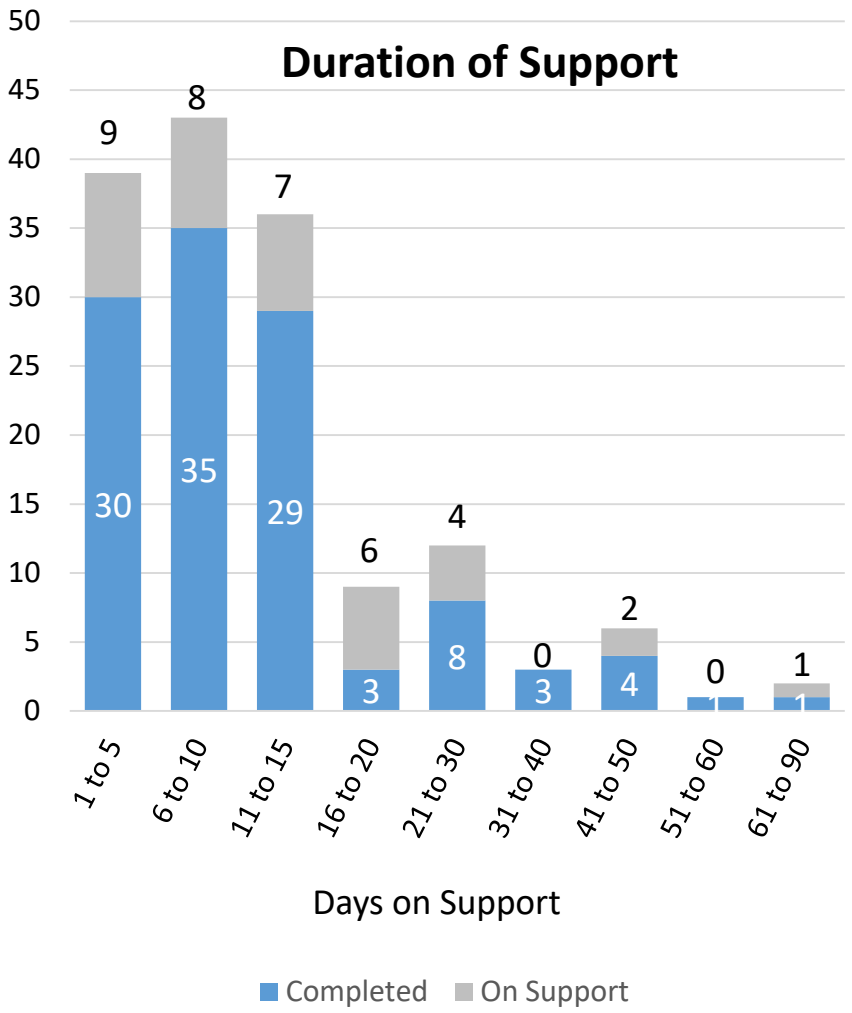


ABIOMED®

Recovering hearts. Saving lives.

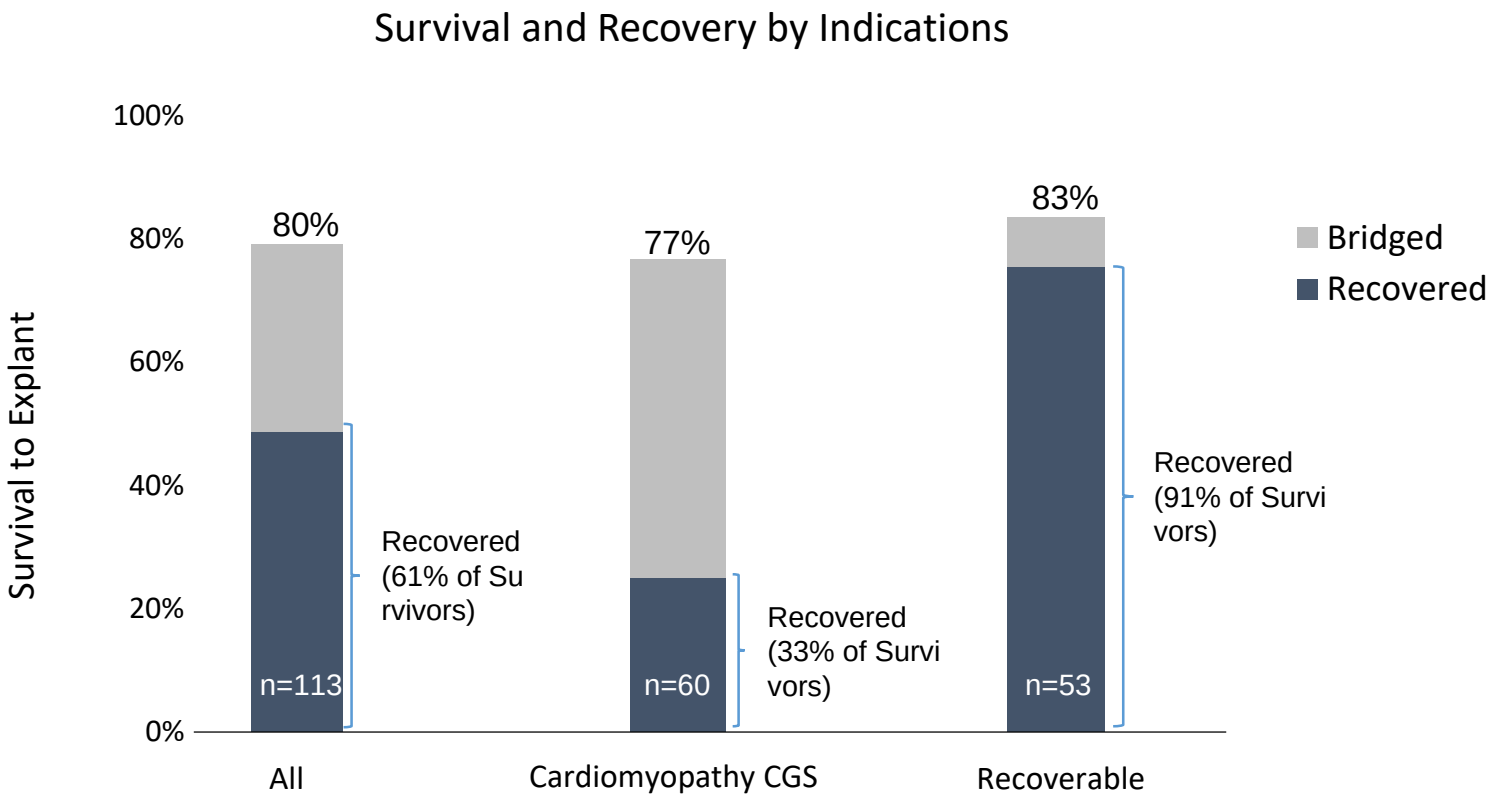
Early Experience





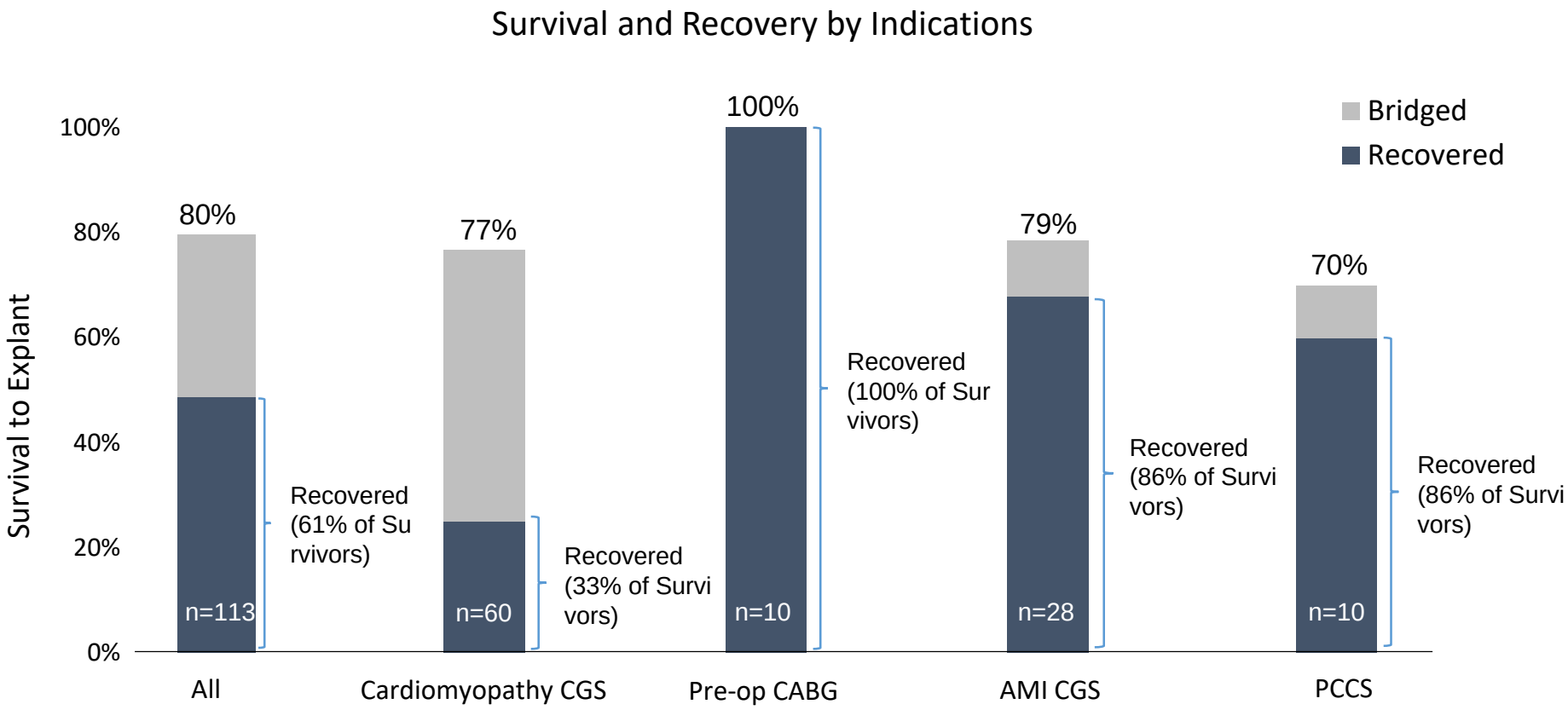
IMP-1014 v7 First 152 Patients as of Feb 11, 2020, Data on File

IMPELLA 5.5 EARLY EXPERIENCE SUMMARY



IMP-1014 v7 First 113 Completed Cases Patients as of Feb 11, 2020, Data on File

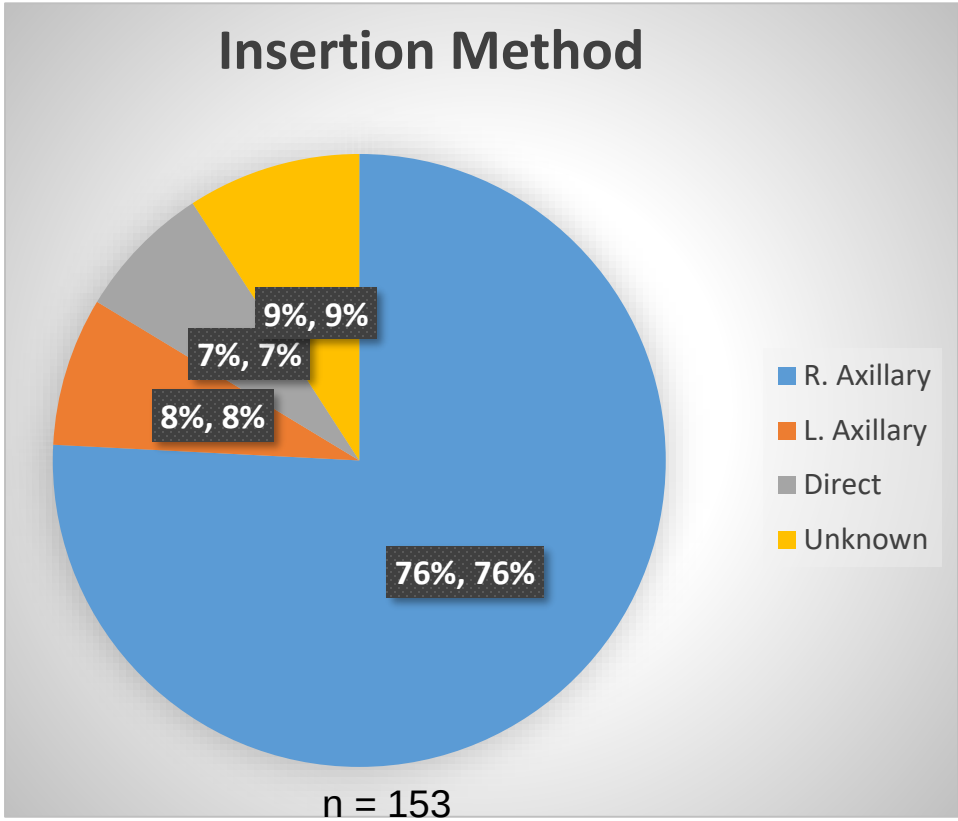
IMPELLA 5.5 EARLY EXPERIENCE SUMMARY



First 113 Completed Cases Patients as of Feb 11, 2020, Data on File
Remaining 5 Patients Categorized as: OPCAB (2), EP (1), Myocarditis (2) ALL Recovered and Not Reflected in Above Data

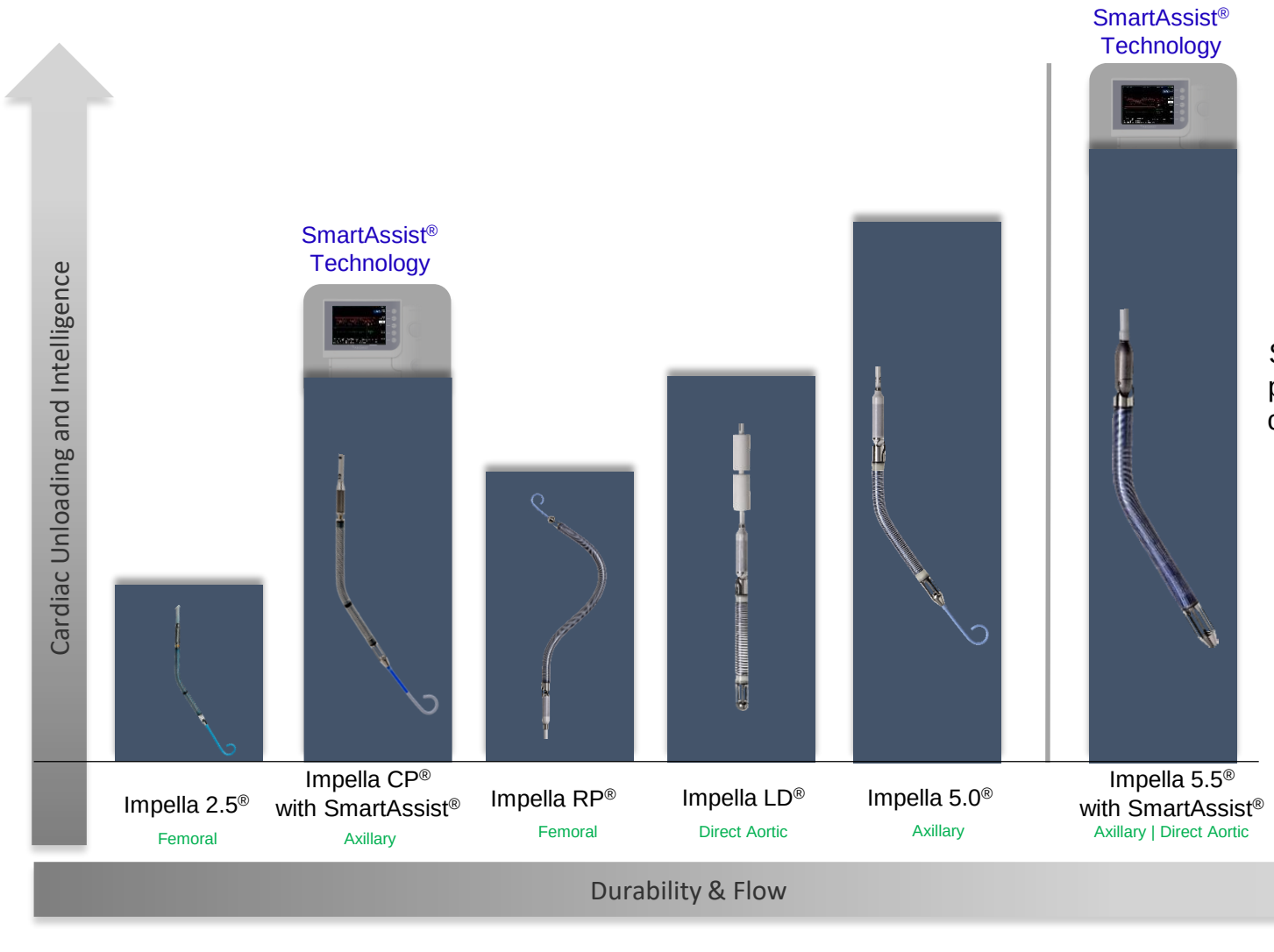
Impella 5.5 Site Access

- Right Axillary Artery: 76%
- Left Axillary Artery: 8%
- Anterior Aortic Root (Open Chest): 7%
- Multiple sub- 7mm axillary arteries successfully implanted



First 153 Patients as of Feb 11, 2020, Data on File

INNOVATION DESIGNED FOR HEART SURGEONS

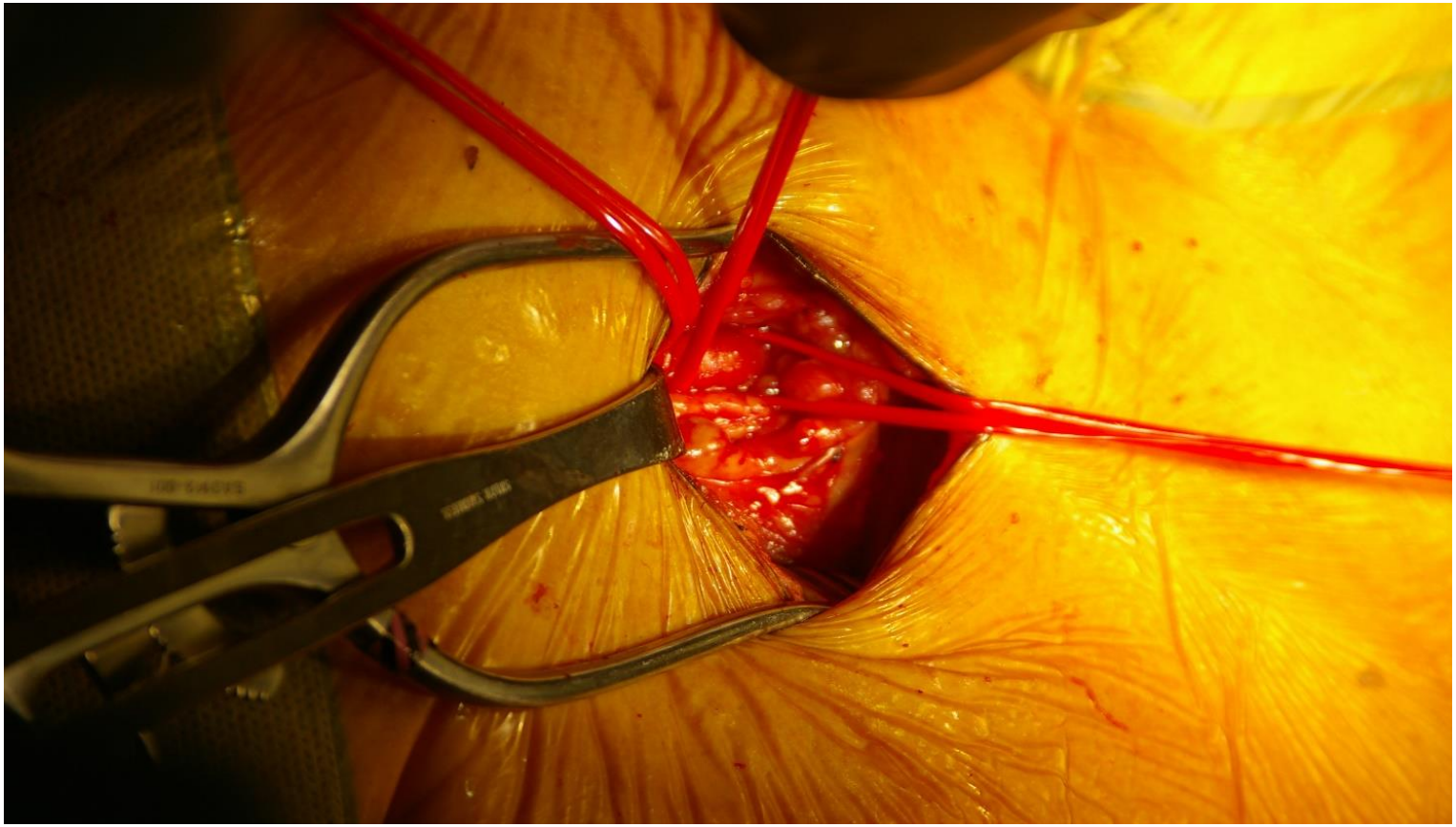


New Technology with SmartAssist Platform, Optical Sensor and Advanced Metrics for better patient outcomes

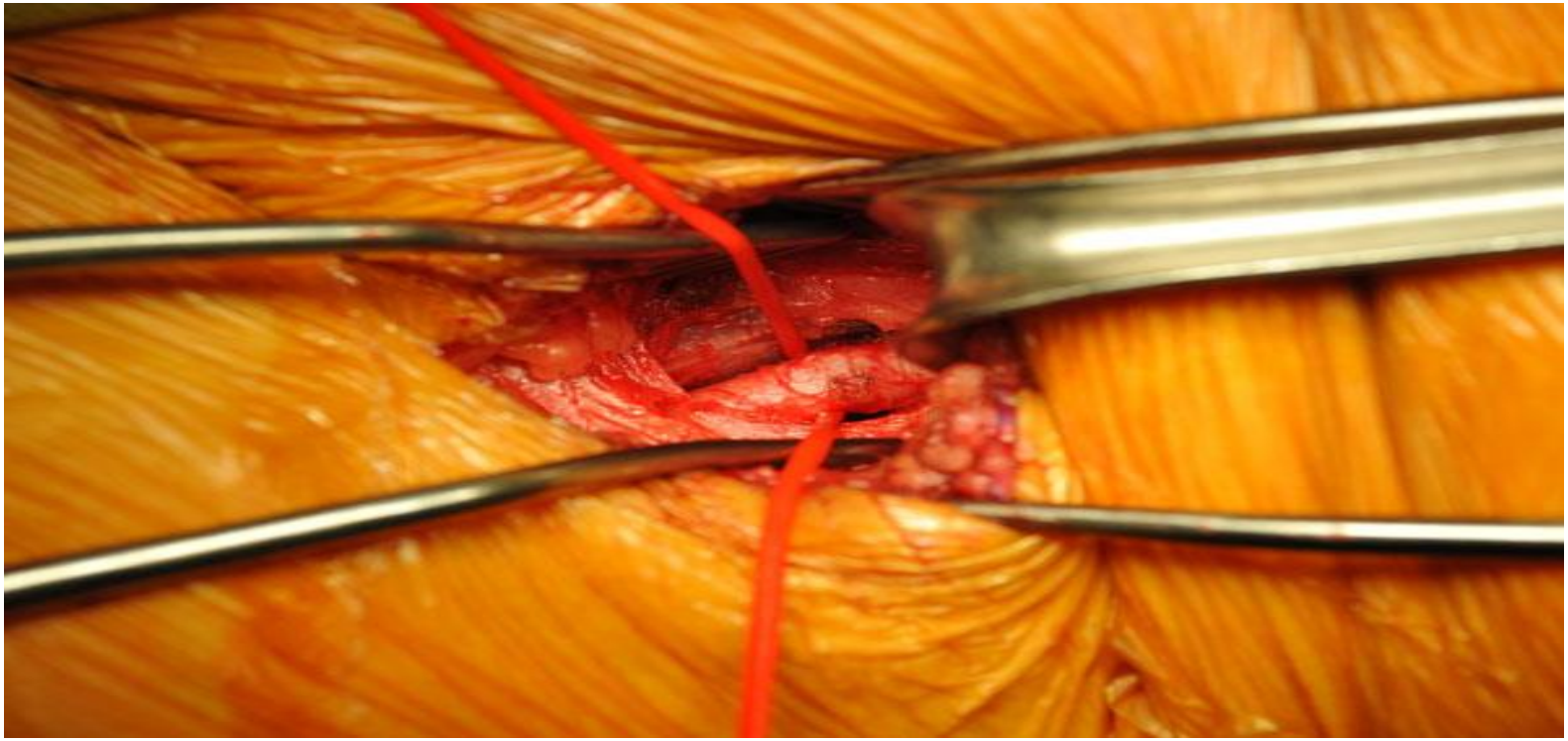
Axillary Cut-Down Technique With Impella 5.5

03

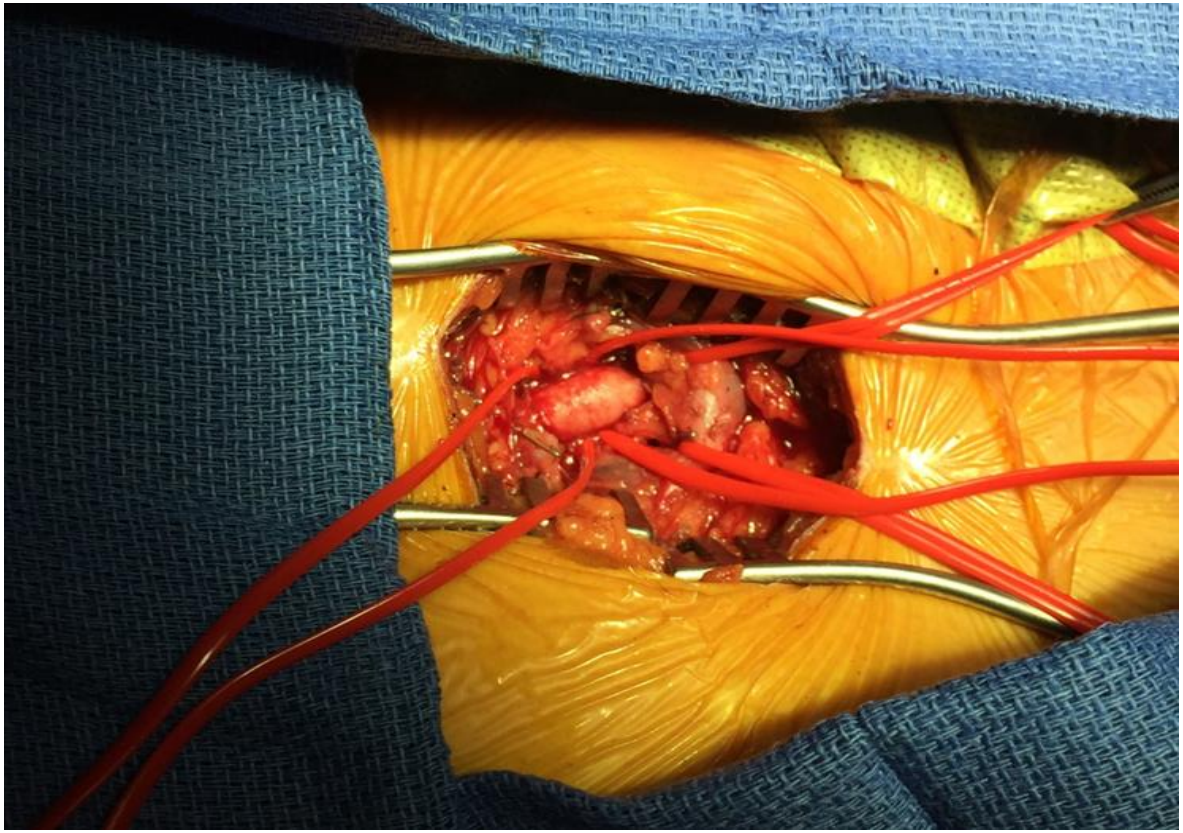
Dissecting out the Axillary Artery



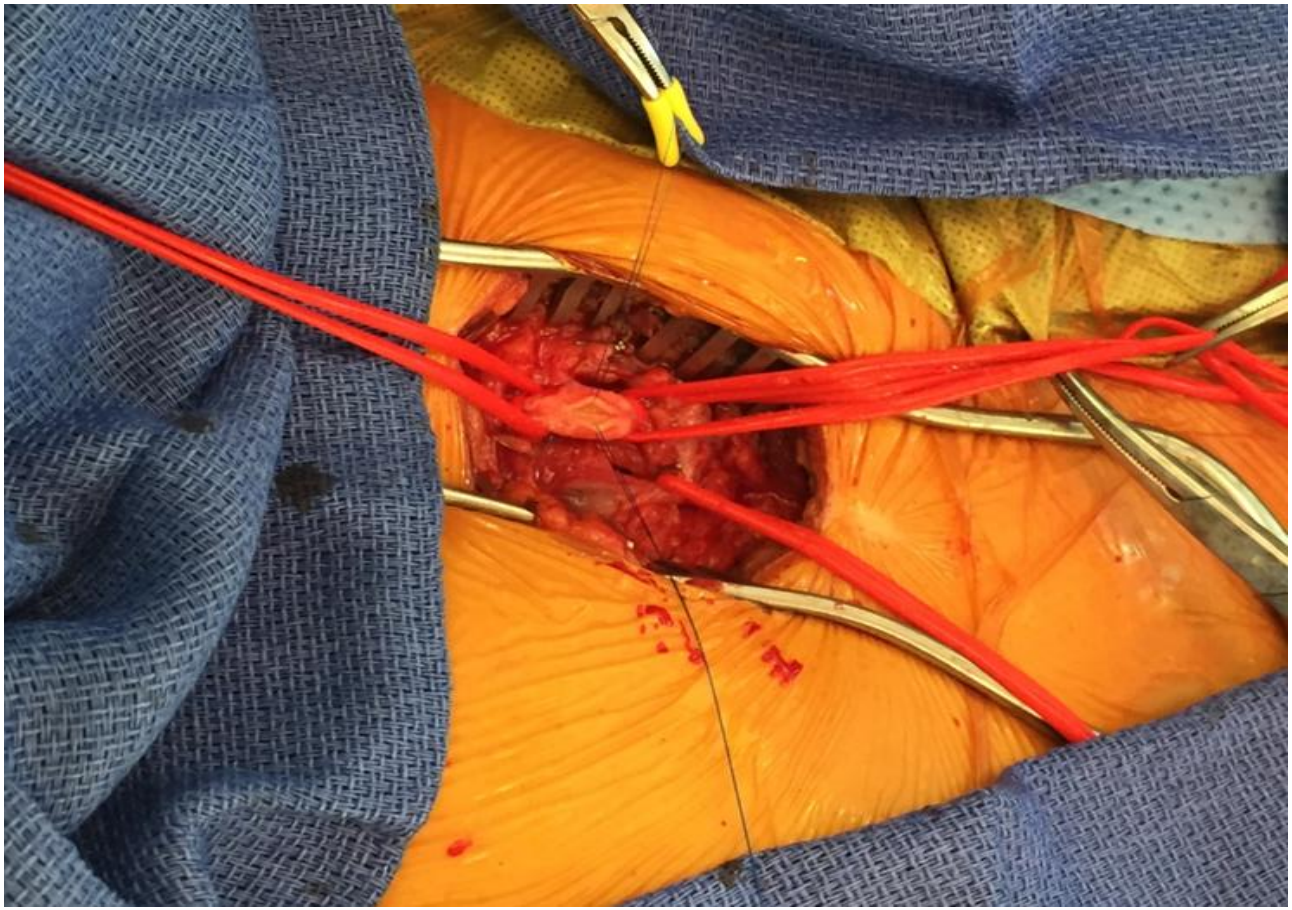
Exposing the Axillary Artery



Vessel Loops Placement

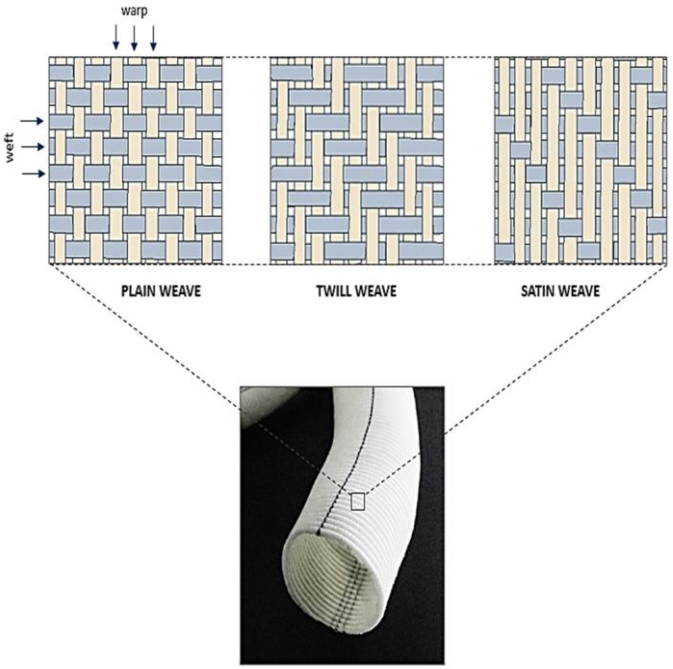


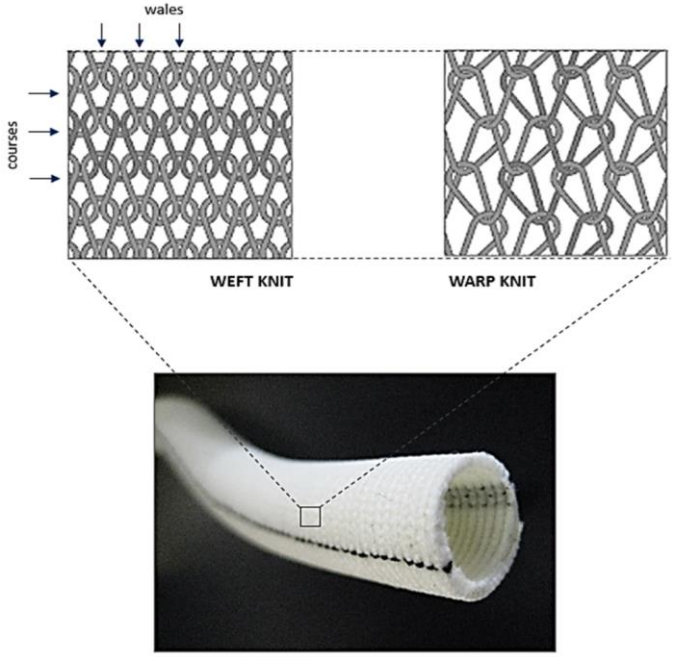
Arteriotomy



Choice of Dacron Graft

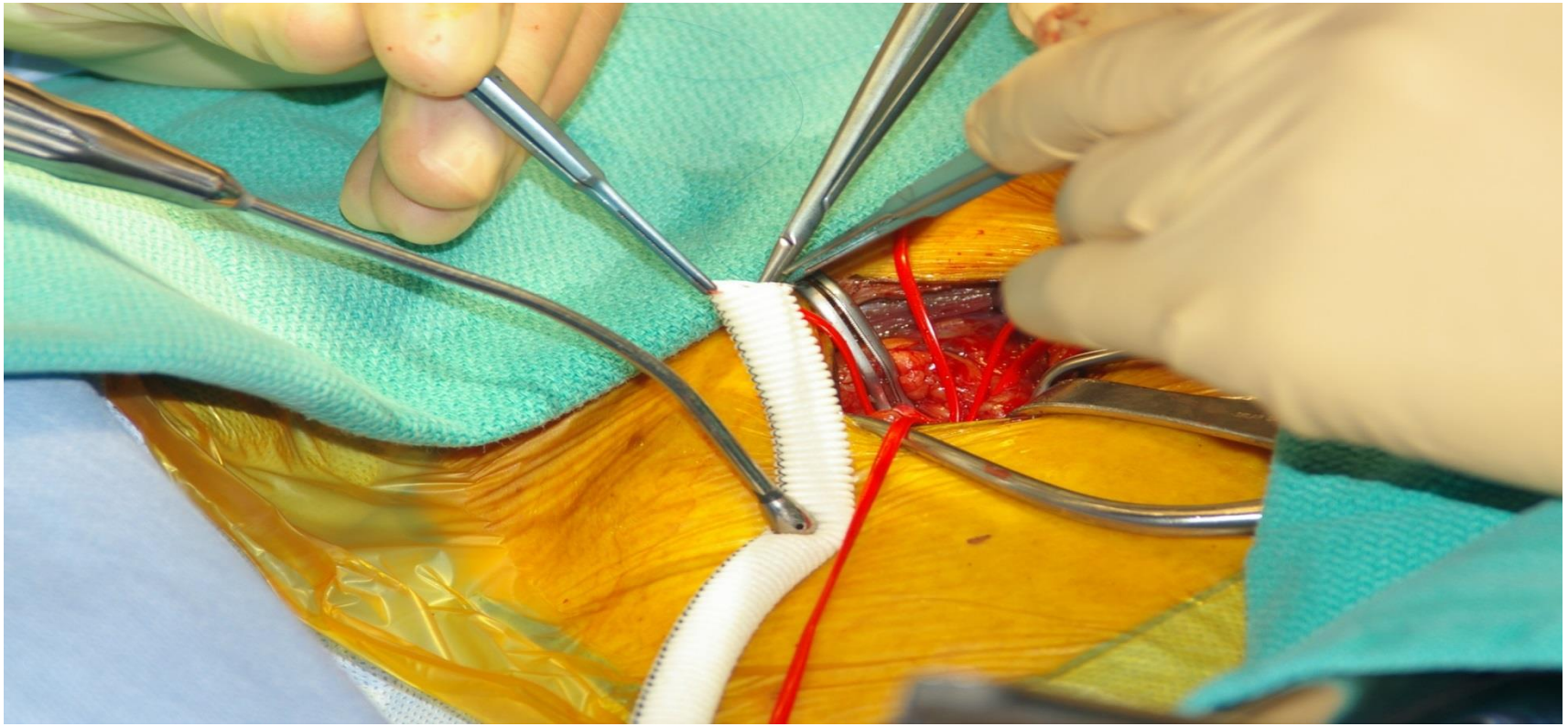
Woven – Nonporous/Doesn't Leak



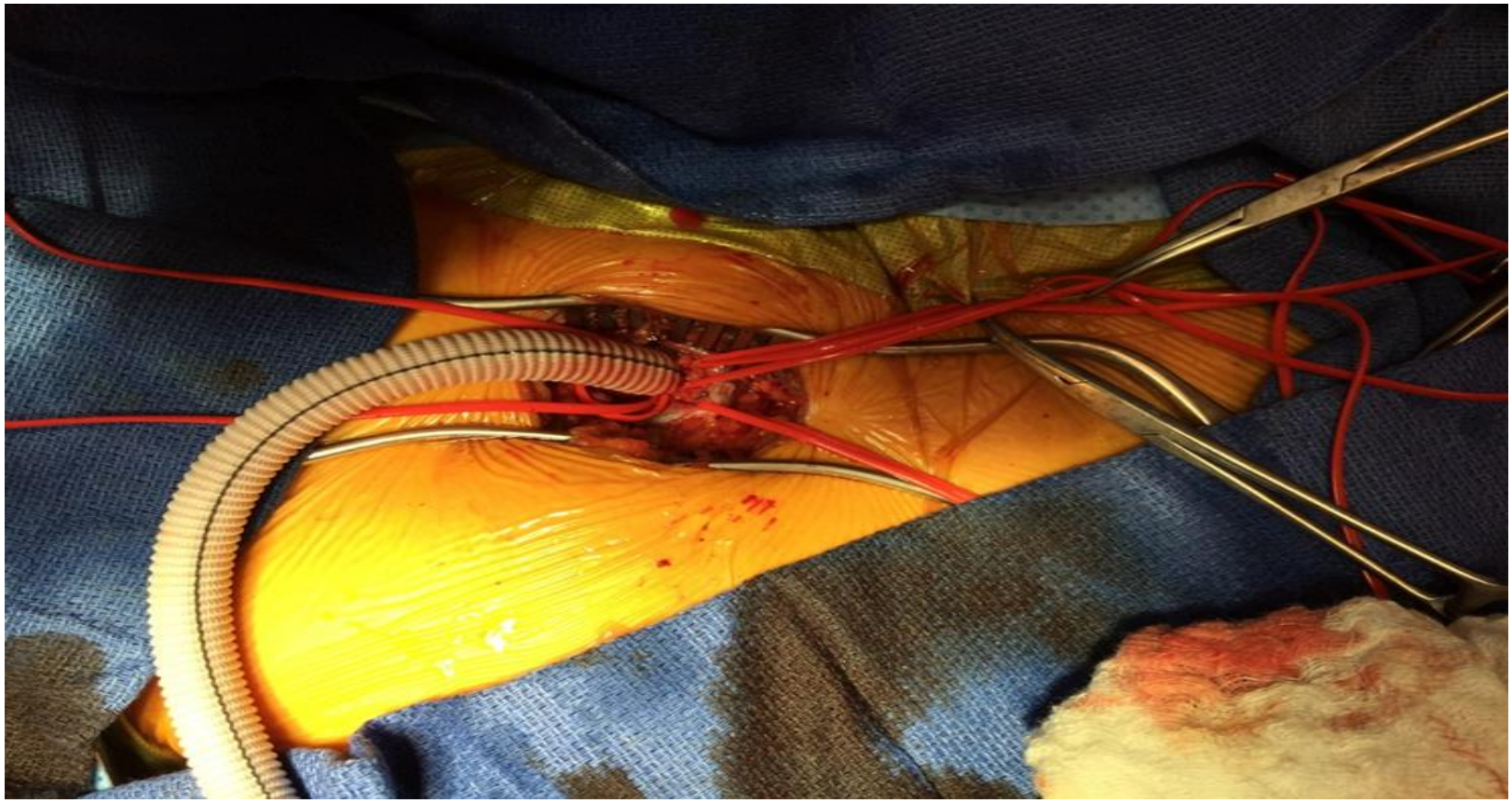


10mm Woven DACRON graft is our recommendation. Hemashield platinum or Vascutek GelWeave. K nitted grafts, while cheaper, are more porous and will leak. In axillary arteries < 7mm, a 6mm graft may be utilized for Impella CP® insertion

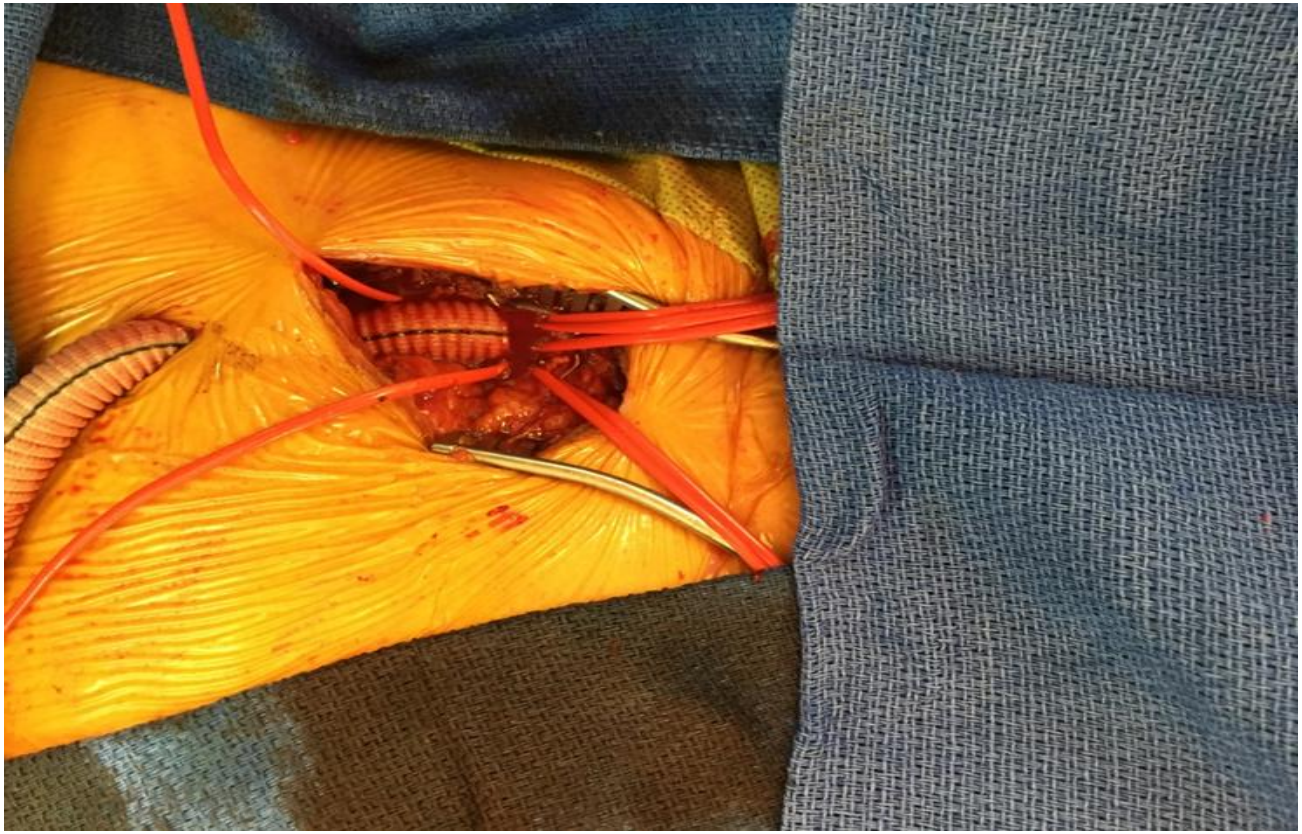
Preparing the Graft



“End to Side” Anastomosis

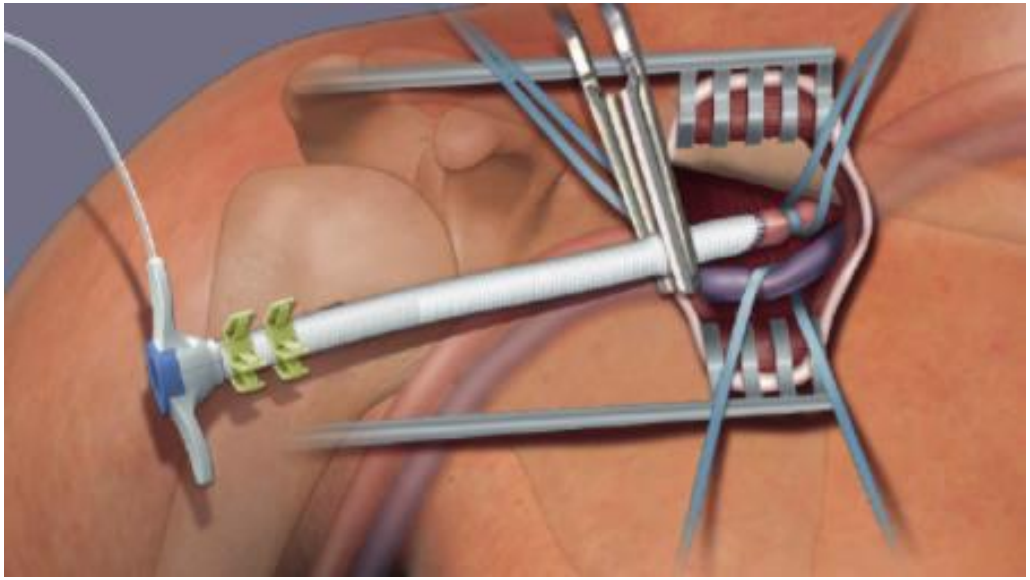


Short Lateral Tunnel



Insertion of the 23Fr Axillary Sheath

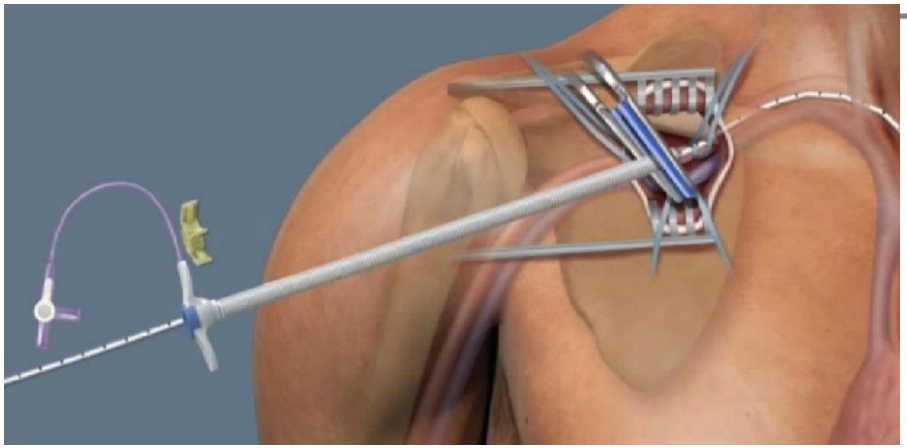
Insertion of the 23Fr Axillary Sheath

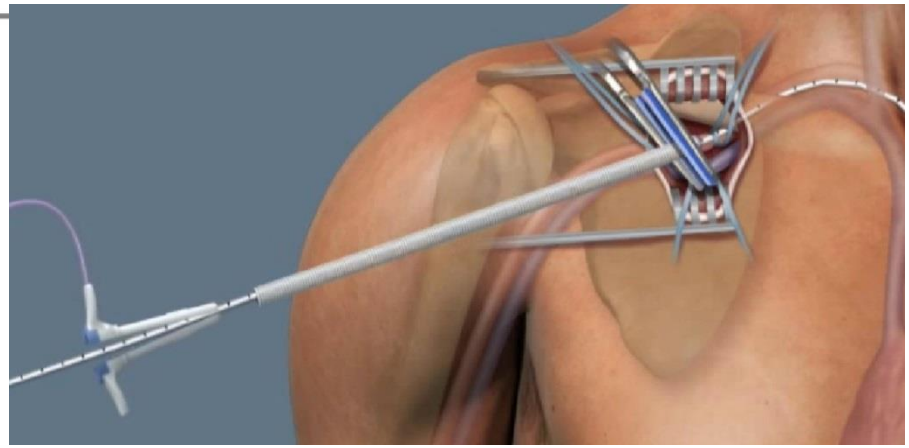


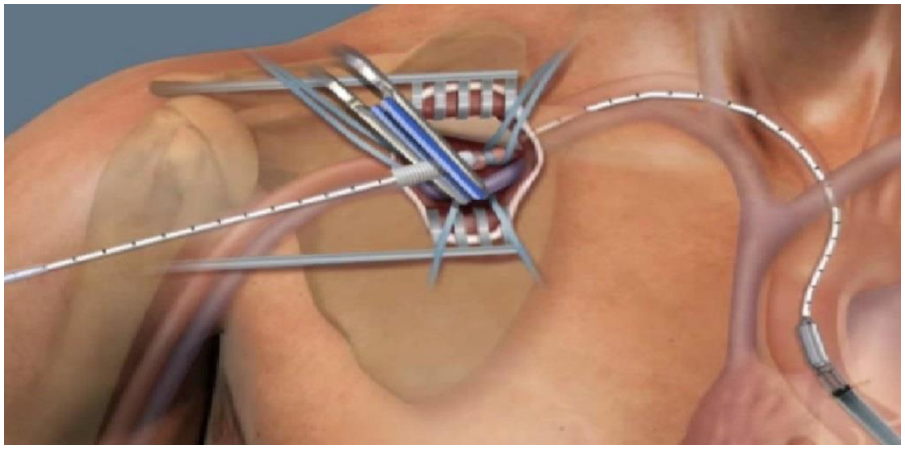
INSERTION OF THE IMPELLA 5.5® WITH FLUOROSCOPIC CONTROL

Note the use of a vascular clamp on the graft above the anastomosis during insertion through the valve to eliminate bleeding

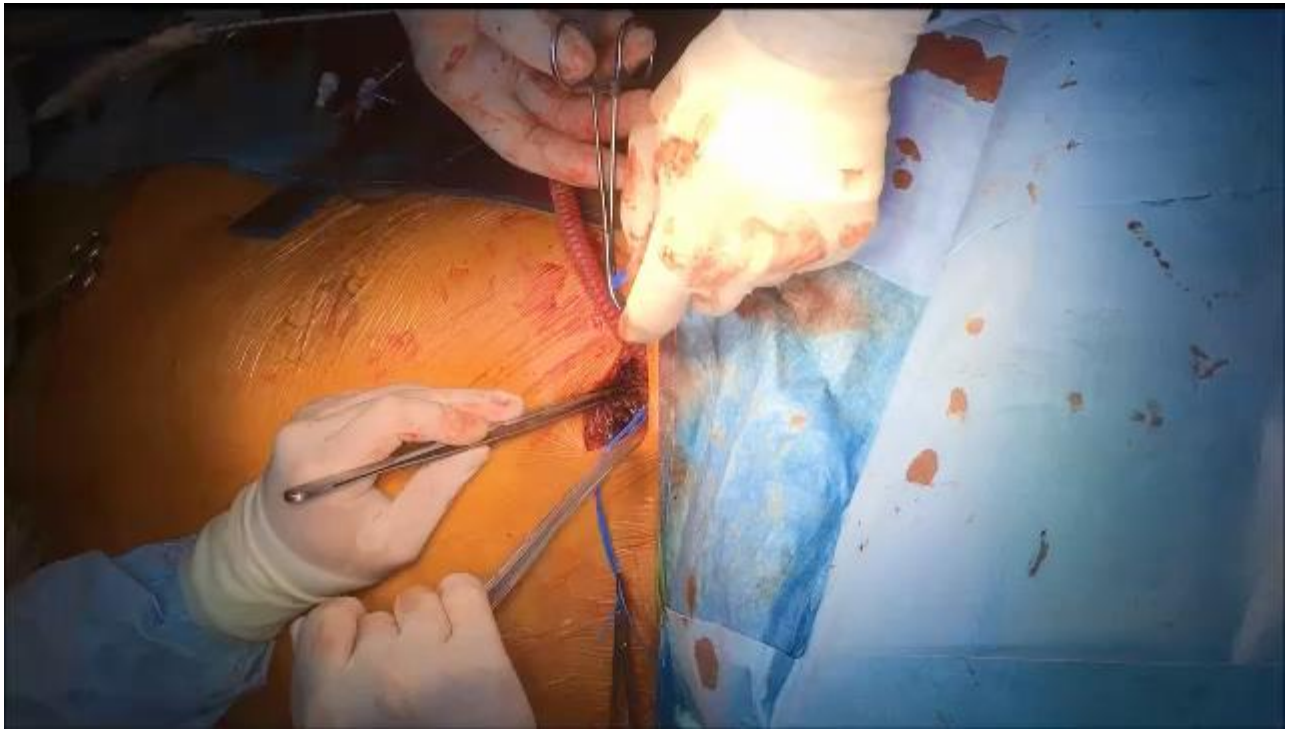
Trimming the Graft





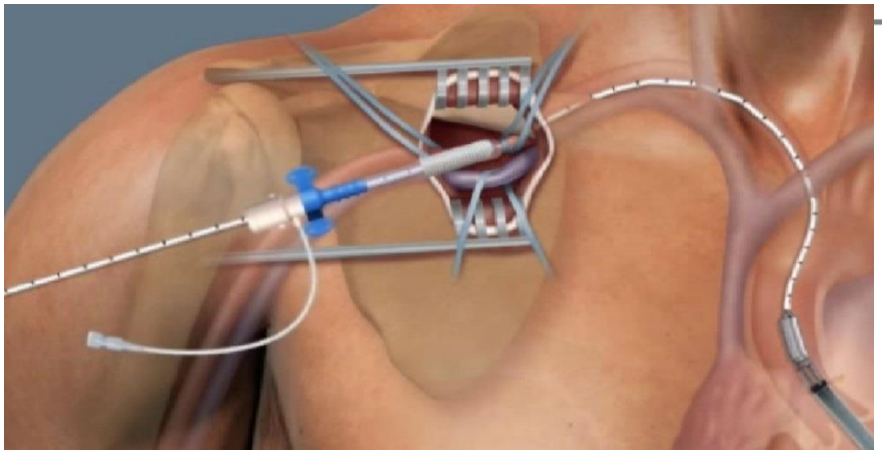


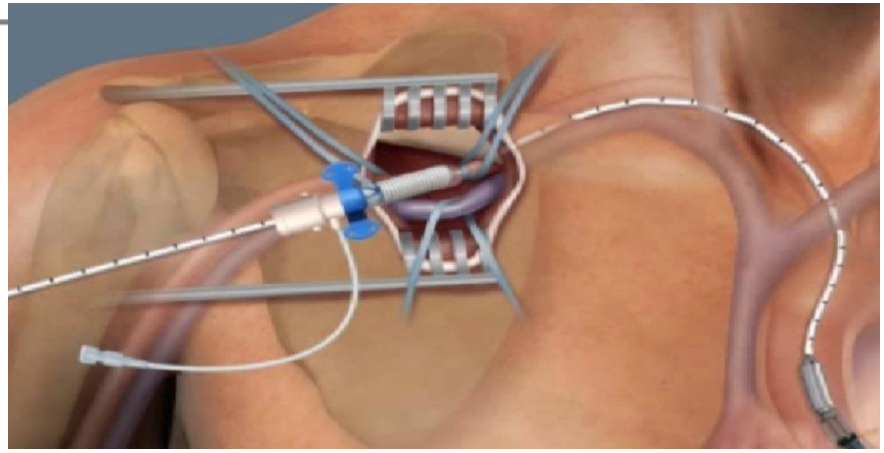
TRIMMING THE GRAFT

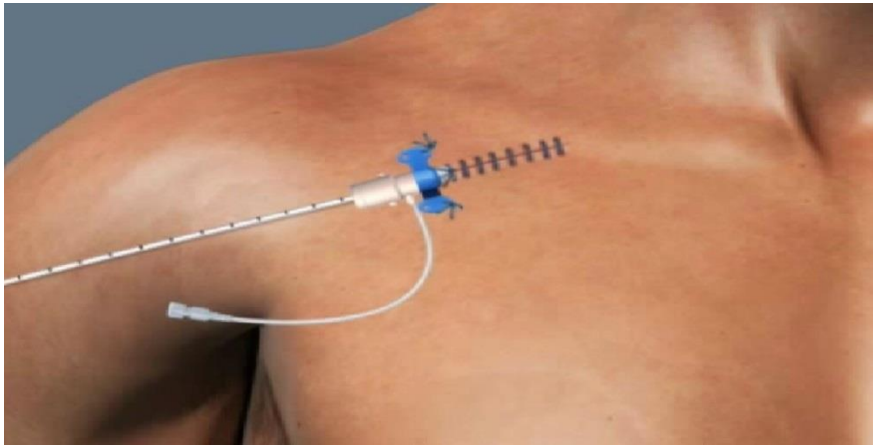


- "Potts Ties" on the vessel loops are tightened with excellent hemostasis
- The peel away sheath is removed after releasing the clamps
- The graft is trimmed to approximately 4cm
- Note that the assistant is providing digital control but the hemostasis is excellent with the vessel loops

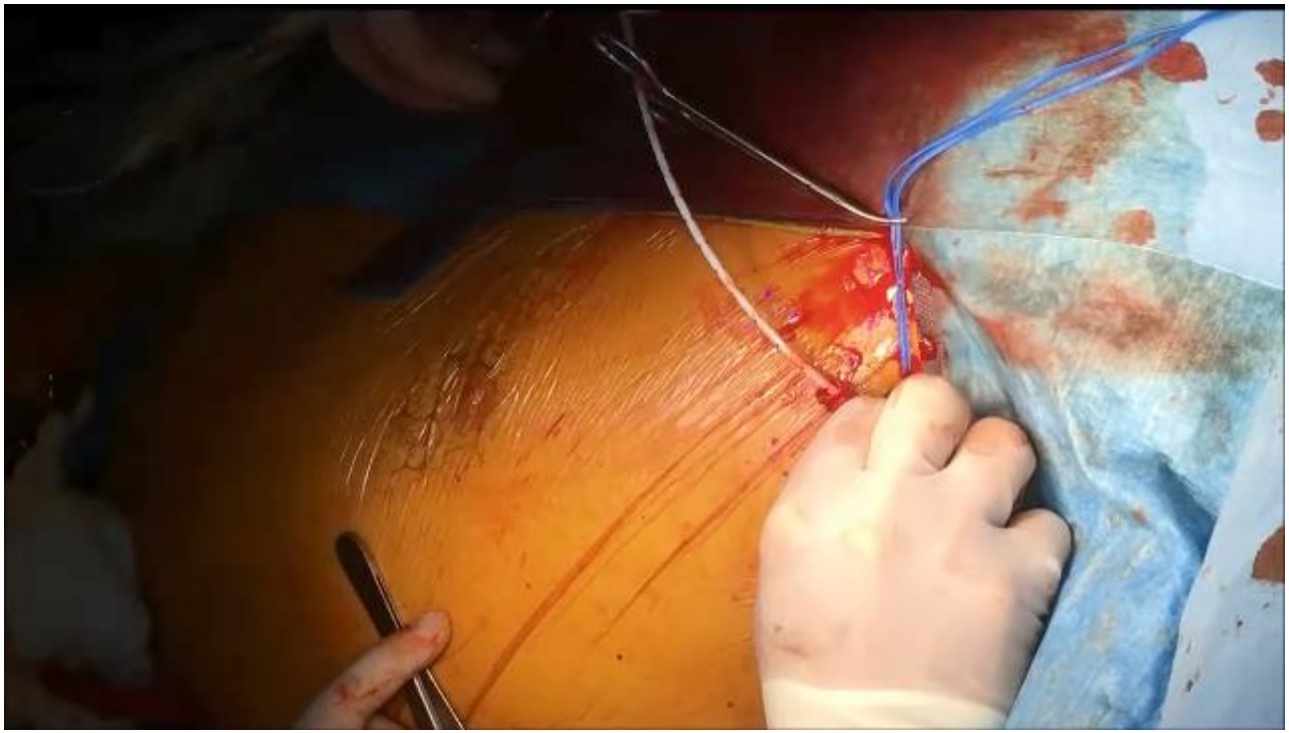
Repositioning Sheath





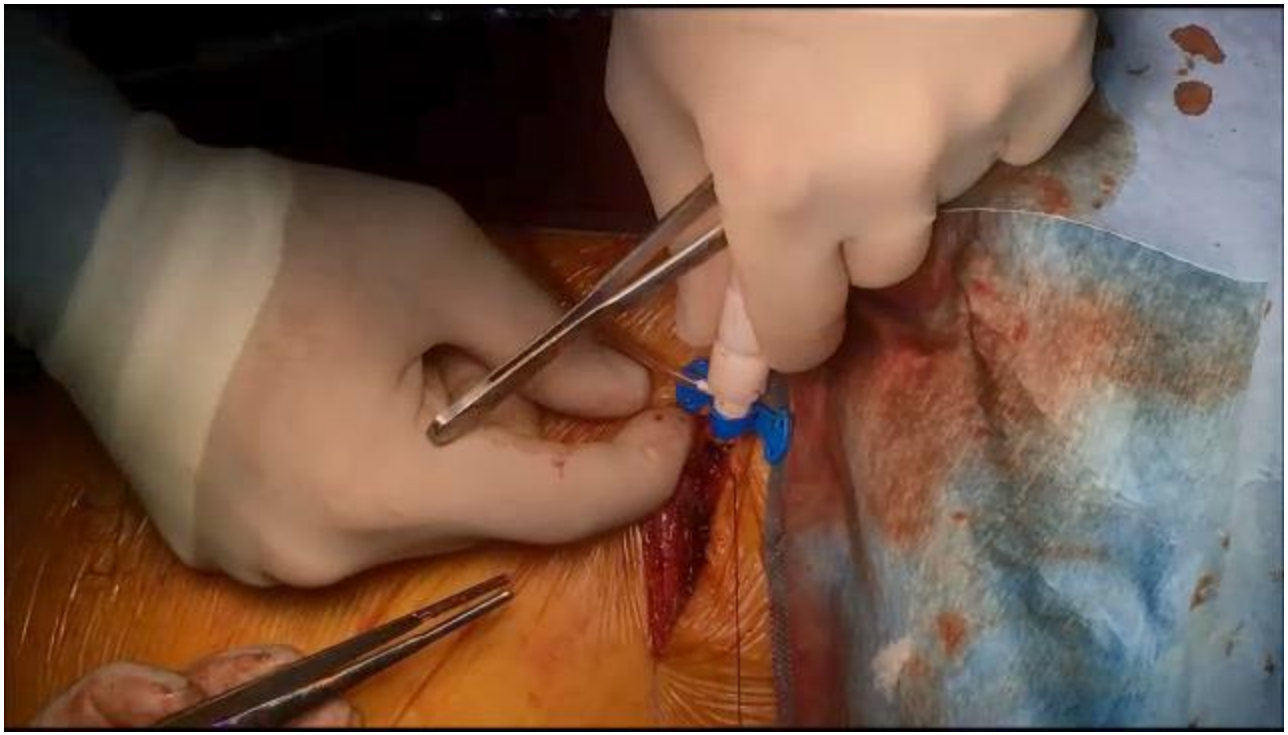


Repositioning Sheath



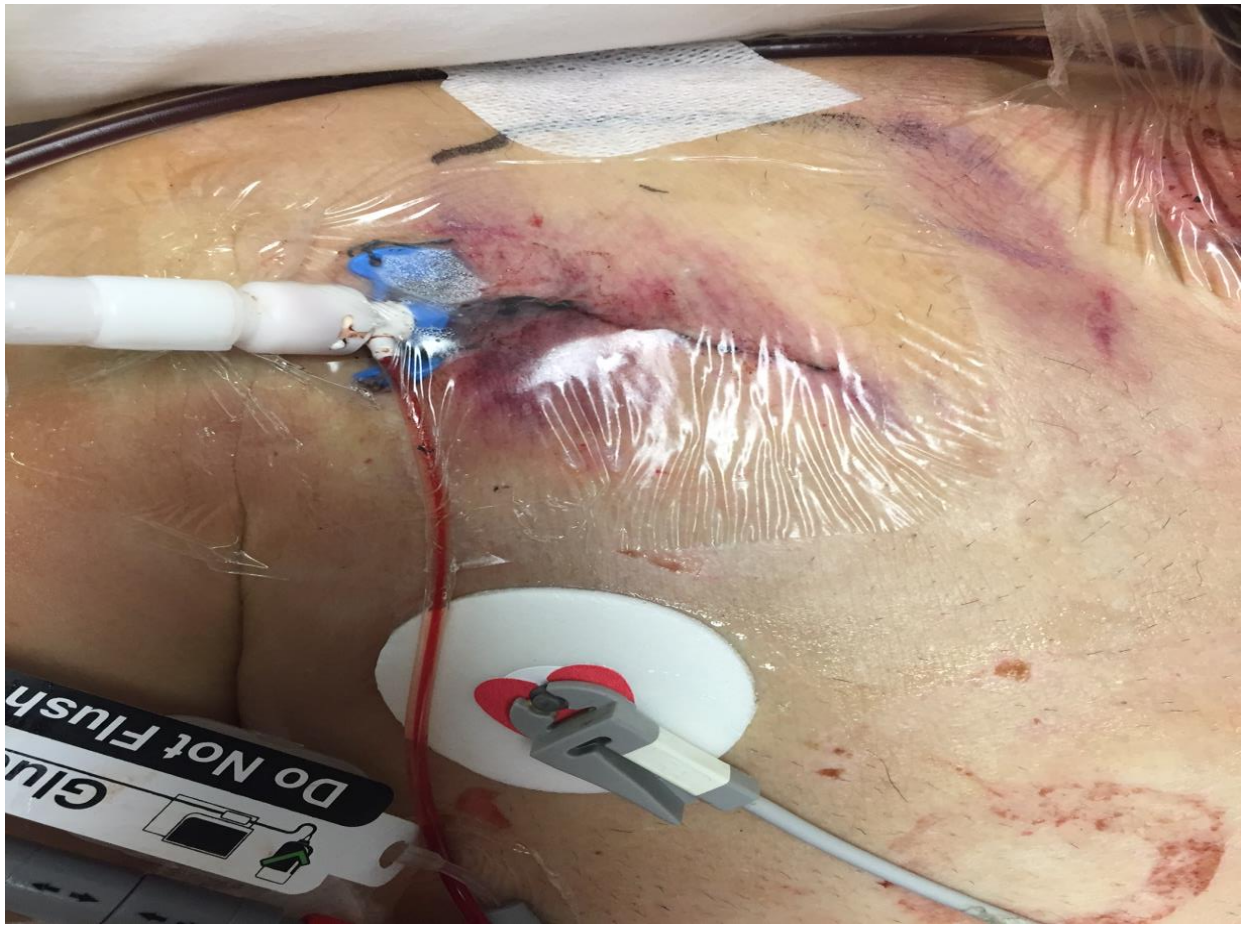
- The repositioning sheath is carefully advanced into the axillary artery
- Care is taken to assure that no movement is applied to the Impella® catheter using fluoroscopic control
- The end of the graft is secured to the suture rib on the blue butterfly hub with two heavy silk ties

Incision Closure



Note the care taken to remove excessive graft material avoiding any exposed graft

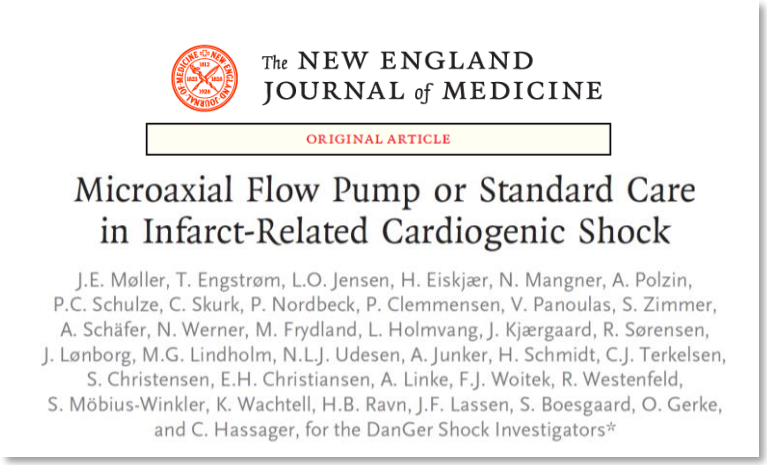
Final Incision Closure



Future role for ECMO and Cardiac Surgeon in Impella Era

04

DanGer Shock RCT



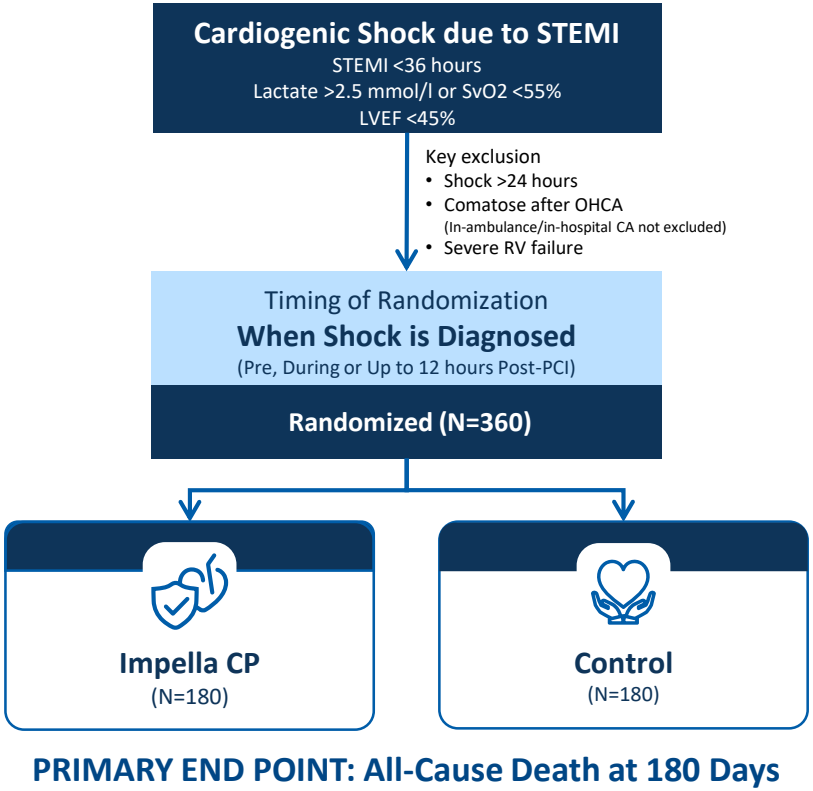
Independent Investigator-Initiated Study

First Completed Impella RCT in AMI-CS

- 360 patients randomized from 2013 to 2023
- 14 centers across Denmark, Germany and UK

MCS Device Trial Hypothesis

Routine Impella CP use reduces mortality in AMI-CS due to STEMI



PRIMARY END POINT: All-Cause Death at 180 Days

Møller J, et al. Microaxial Flow Pump or Standard Care in Infarct-Related CS. N Engl J Med 2024. DOI: 10.1056/NEJMoa2312572.

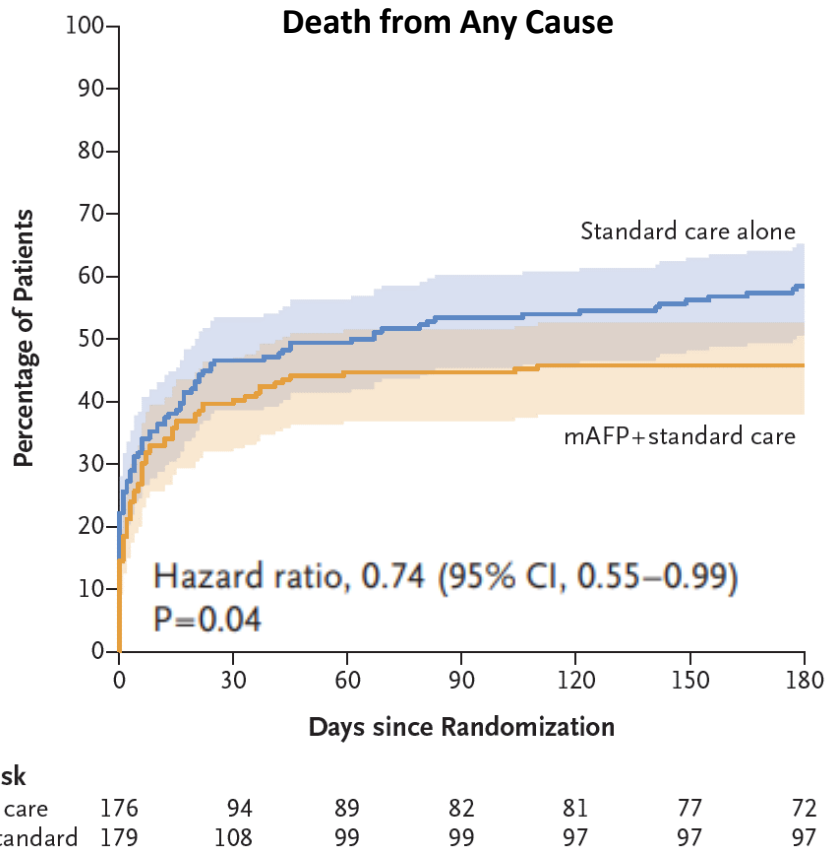
DanGer Shock

Routine Use of Impella Reduces All-Cause Mortality at 180 Days
in AMI Cardiogenic Shock due to STEMI Compared to Standard Care Alone

Absolute 12.7% reduction in mortality – NNT 8

Control
Standard care alone

Impella CP
Microaxial Flow Pump (mAFP)



No. at Risk

Standard care	176	94	89	82	81	77	72
mAFP+standard	179	108	99	99	97	97	97

DanGer Shock

The NEW ENGLAND JOURNAL of MEDICINE

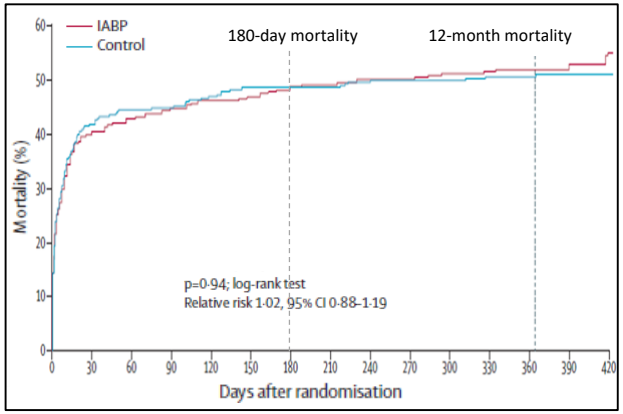
ORIGINAL ARTICLE

Microaxial Flow Pump or Standard Care in Infarct-Related Cardiogenic Shock

Møller J, et al. NEJM 2024. DOI: 10.1056/NEJMoa2312572.

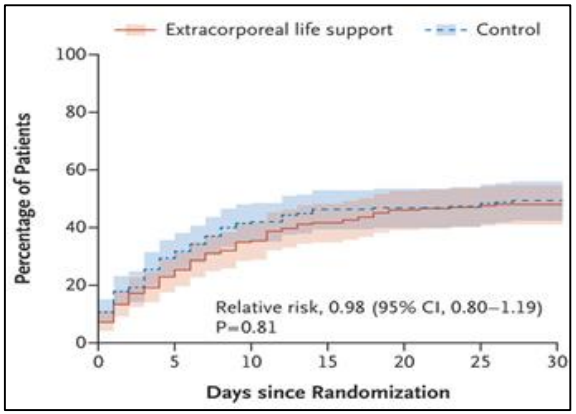
Impella is The Only MCS Shown to Improve Survival in MCS Device Trials
in AMI Cardiogenic Shock Patients

IABP Shock II[1,2]



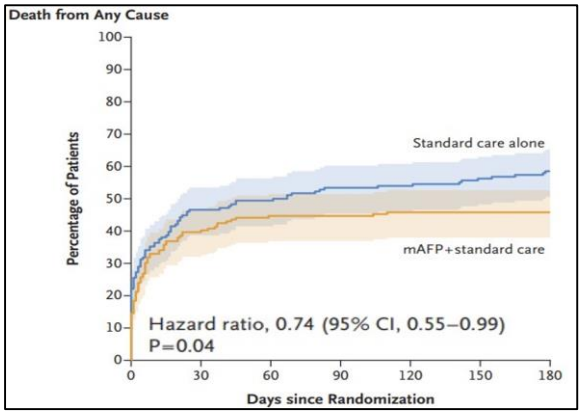
No Difference in 30-Day Mortality (p=0.69)
No Difference in 1-Year Mortality (p=0.91)

ECLS Shock (ECMO)[3]



No Difference in 30-Day Mortality (p=0.81)

DanGer Shock (Impella)[4]

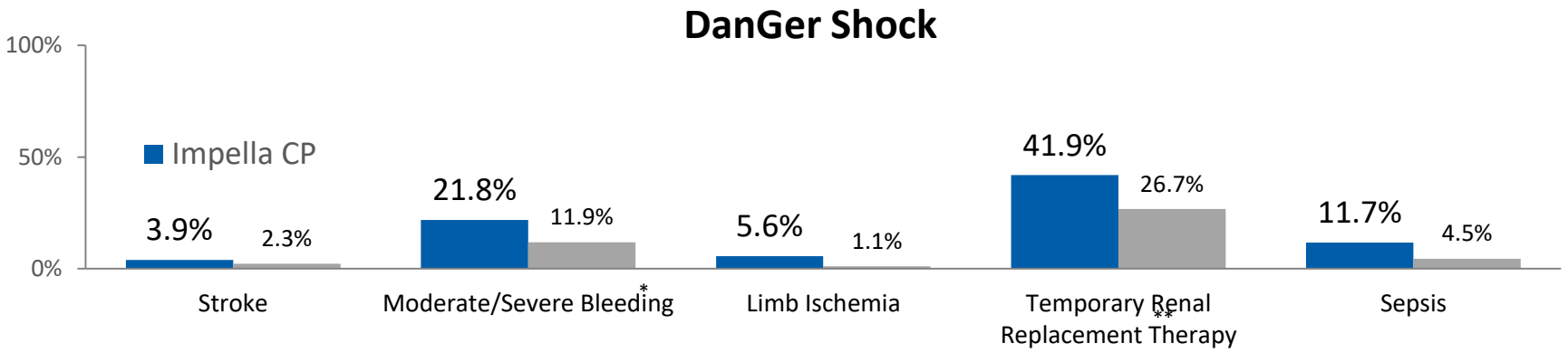


12.7% Absolute Reduction in 180-Day Mortality (p=0.04)

Data presented on this slide to put results from various MSC studies into perspective, and are not intended to imply a direct comparison among the studies.

1. Thiele H, et al. Intraaortic Balloon Support for Myocardial Infarction with Cardiogenic Shock. N Engl J Med 2012. DOI: 10.1056/NEJMoa1208410.
2. Thiele H, et al. IABP-SHOCK II final 12 month results. Lancet 2013. DOI: 10.1016/S0140-6736(13)61783-3.
3. Thiele H, et al. Extracorporeal life support in infarct-related cardiogenic shock. N Engl J Med 2023. DOI: 10.1056/NEJMoa2307227.
4. Møller J, et al. Microaxial Flow Pump or Standard Care in Infarct-Related CS. N Engl J Med 2024. DOI: 10.1056/NEJMoa2312572.

Adverse Events Do Not Overshadow the Significant Reduced Mortality benefit
in AMI Cardiogenic Shock Patients



Use of best practices including vascular and anticoagulation management could further optimize outcomes

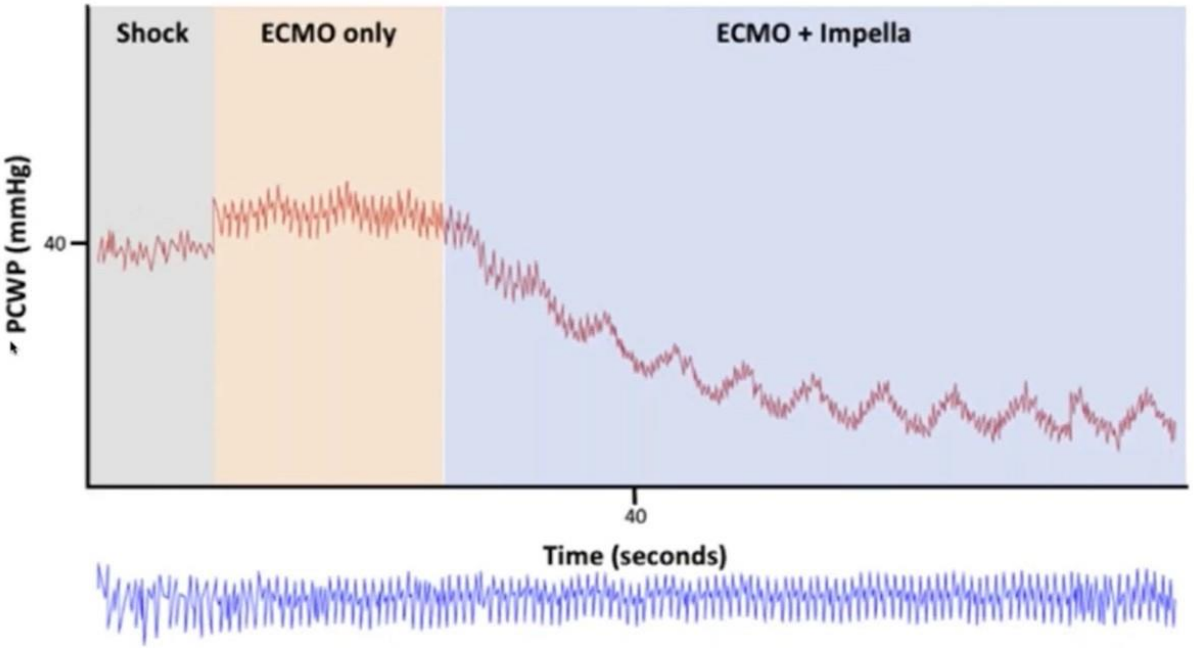
* Bleeding Rates: Control NO ECMO (3.5%), Control WITH ECMO (48.5%), Impella NO ECMO (15.8%), Impella WITH ECMO (67%).
** RRT: Only 3 (1.7%) patients remained in dialysis at >90 days in the Impella group and 1 (0.6%) in the control group.

Møller J, et al. Microaxial Flow Pump or Standard Care in Infarct-Related CS. N Engl J Med 2024. DOI: 10.1056/NEJMoa2312572.
* Data on file. ** CRT Virtual Spring 2024 April 14.

Unloading of the Left Ventricle During Venoarterial Extracorporeal Membrane Oxygenation Therapy in Cardiogenic Shock

Benedikt Schrage, MD,[a,b] Daniel Burkhoff, MD, PhD,[c] Nicole Rübsamen, PhD,[a] Peter Moritz Becher, MD,[a] Michael Schwarzl, MD, PhD,[a,b] Alexander Bernhardt, MD,[d] Hanno Grahn, MD,[a] Edith Lubos, MD,[a] Gerold Söffker, MD,[e] Peter Clemmensen, MD,[a] Hermann Reichenspurner, MD, PhD,[d] Stefan Blankenberg, MD, PhD,[a,b] Dirk Westermann, MD, PhD[a,b]

LV unloading - Percutaneous



"**ECPELLA**" in the US and "**ECMELLA**" in Europe


ABIOMED®
Recovering hearts. Saving lives.®


Current points of discussion
The "hard truth" of RCTs:
If you sub-select a population which is highly likely to benefit from the intervention, and you are right, then patients in the control arm will get treated worse
MEET THE EXPERT
ABIOMED
Benedikt Schrage
Faculty
MEET THE EXPERT
ABIOMED
Prof. Dr. Jae Seung Jung
South Korea

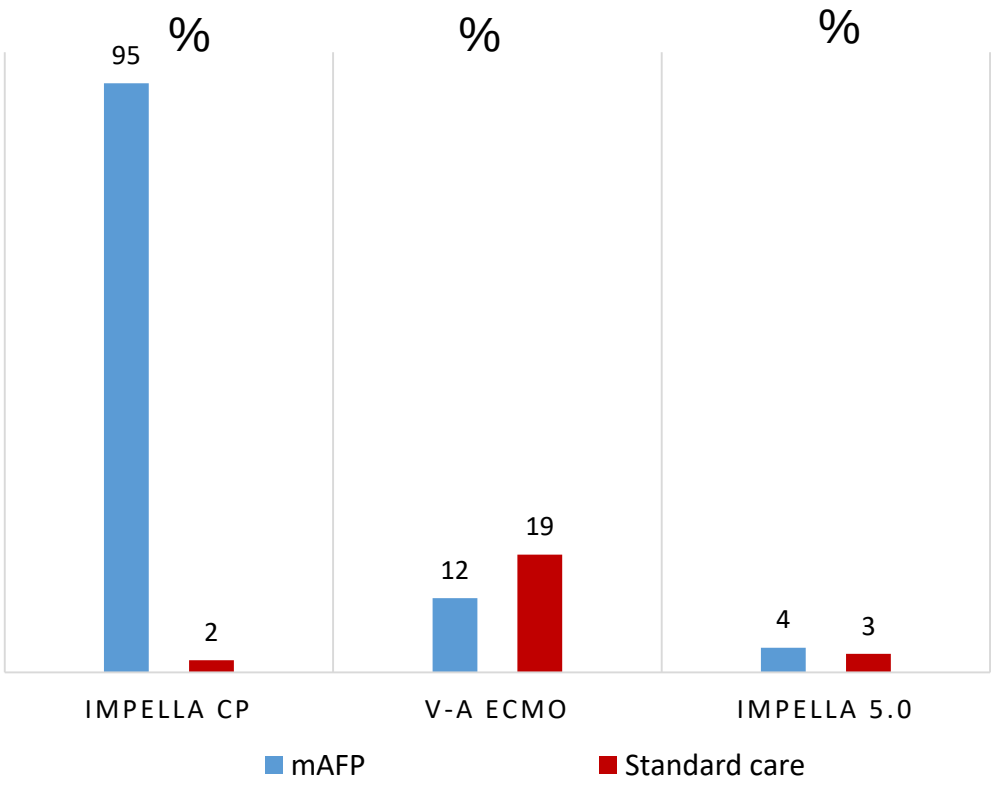

Universitäres
Herz- und Gefäßzentrum
UKE Hamburg
Unloading with Impella – Evolving evidence
Unloading in Cardiogenic Shock Masterclass | 23.04.2024
Benedikt Schrage, MD, PhD, FESC
Universitätsklinikum Hamburg-Eppendorf
UKE


Rationale of the DanGer-SHOCK trial
DanGer Shock
Danish German Cardiogenic Shock trial
Randomized trial of Impella vs. SOC in STEMI-CS with reduced EF
Strict enrollment criteria (no prolonged cardiac arrest)
Strict SOPs for implementation and weaning of MCS (…maybe not so strict…)

Table 3. End Points and Adverse Events in the Intention-to-Treat Population.*

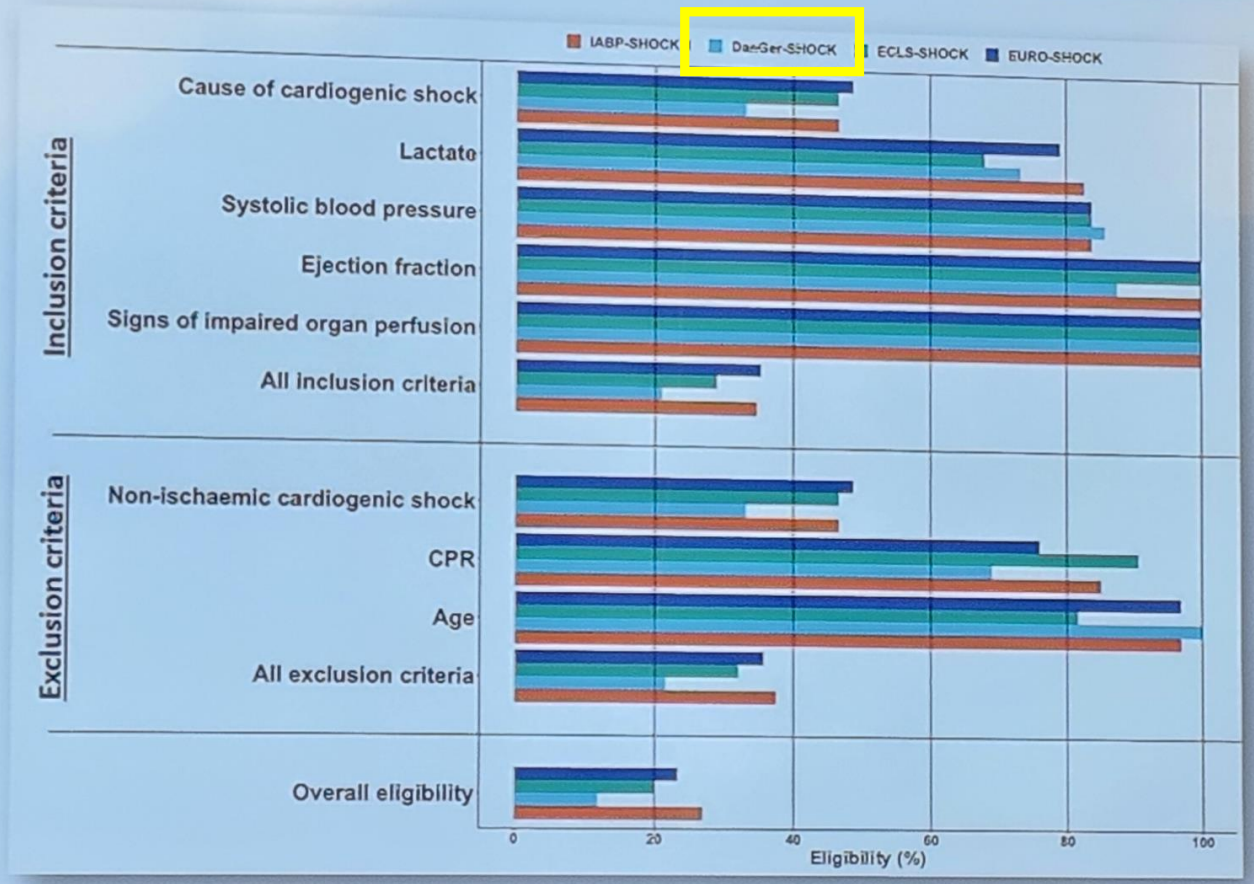
Event	Microaxial Flow Pump plus Standard Care (N=179)	Standard Care Alone (N=176)	Effect Size (95% CI)†
Primary end point: death from any cause at 180 days — no. (%)	82 (45.8)	103 (58.5)	0.74 (0.55 to 0.99)‡
Secondary end point			
Composite cardiac end point — no. (%)§	94 (52.5)	112 (63.6)	0.72 (0.55 to 0.95)
No. of days alive and out of the hospital (range)¶	82 (0 to 177)	73 (0 to 179)	8 (−8 to 25)
Adverse events			
Composite safety end point — no. (%)‖	43 (24.0)	11 (6.2)	4.74 (2.36 to 9.55)
Moderate or severe bleeding — no. (%)**	39 (21.8)	21 (11.9)	2.06 (1.15 to 3.66)
Limb ischemia — no. (%)	10 (5.6)	2 (1.1)	5.15 (1.11 to 23.84)
Renal-replacement therapy — no. (%)	75 (41.9)	47 (26.7)	1.98 (1.27 to 3.09)
Stroke — no. (%)	7 (3.9)	4 (2.3)	1.75 (0.50 to 6.01)
Cardioversion after ventricular tachycardia or fibrillation — no. (%)	59 (33.0)	52 (29.5)	1.17 (0.75 to 1.83)
Sepsis with positive blood culture†† — no. (%)	21 (11.7)	8 (4.5)	2.79 (1.20 to 6.48)

Temporary MCS



Universitäres Herz- und Gefäßzentrum UKE Hamburg

Generalization is the limitation of the DanGer-SHOCK trial



Schrage et al

Universitäres Herz- und Gefäßzentrum UKE Hamburg

Generalization is the limitation of the DanGer-SHOCK trial

36 patients per year
~2 per center per year

2013	2019	2021	2023
First patient in DanShock trial	Extension to Germany DanGer-Shock trial	Extension to UK	Last patient in

A

SIN

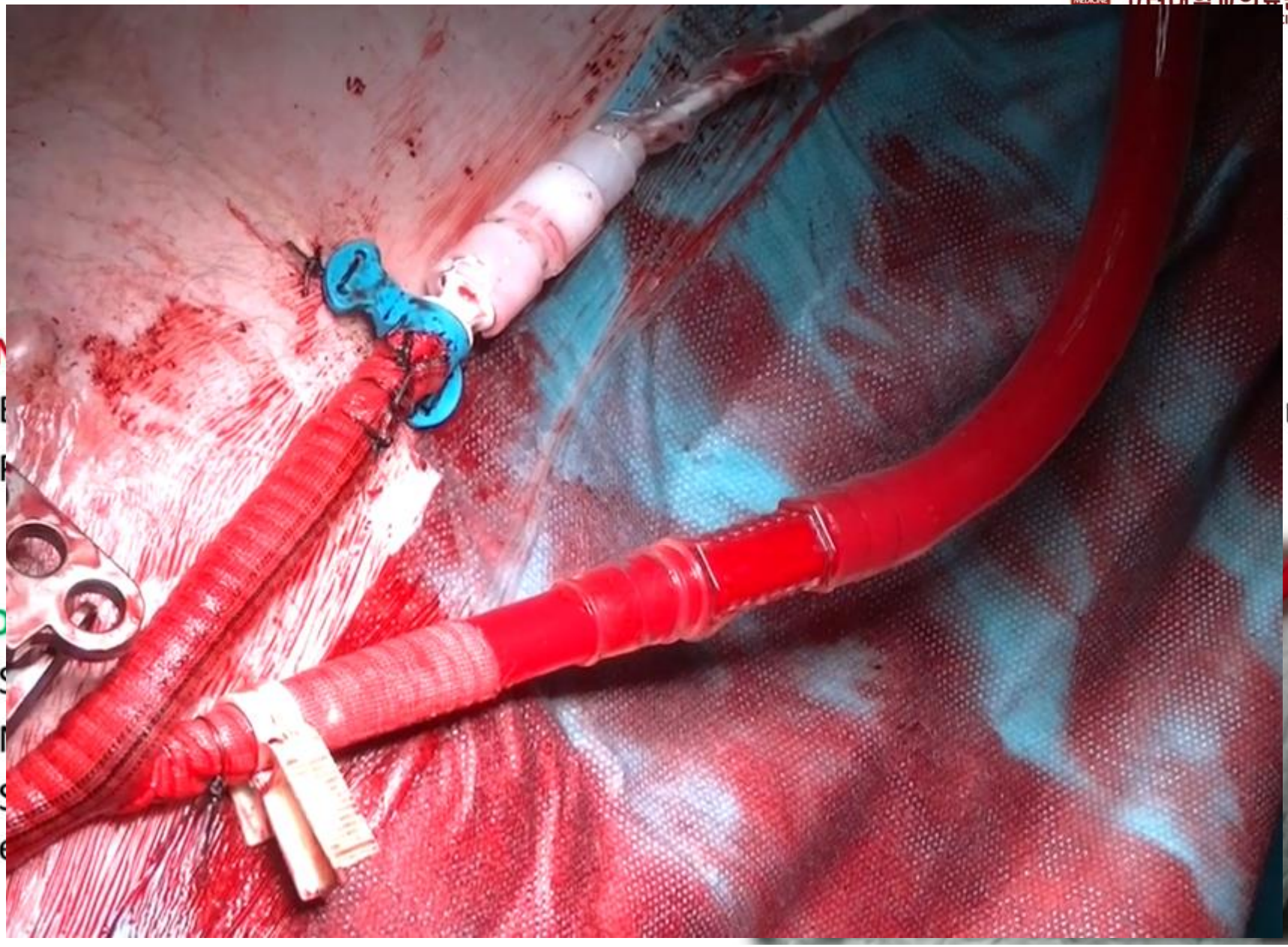
- E
- H

AD

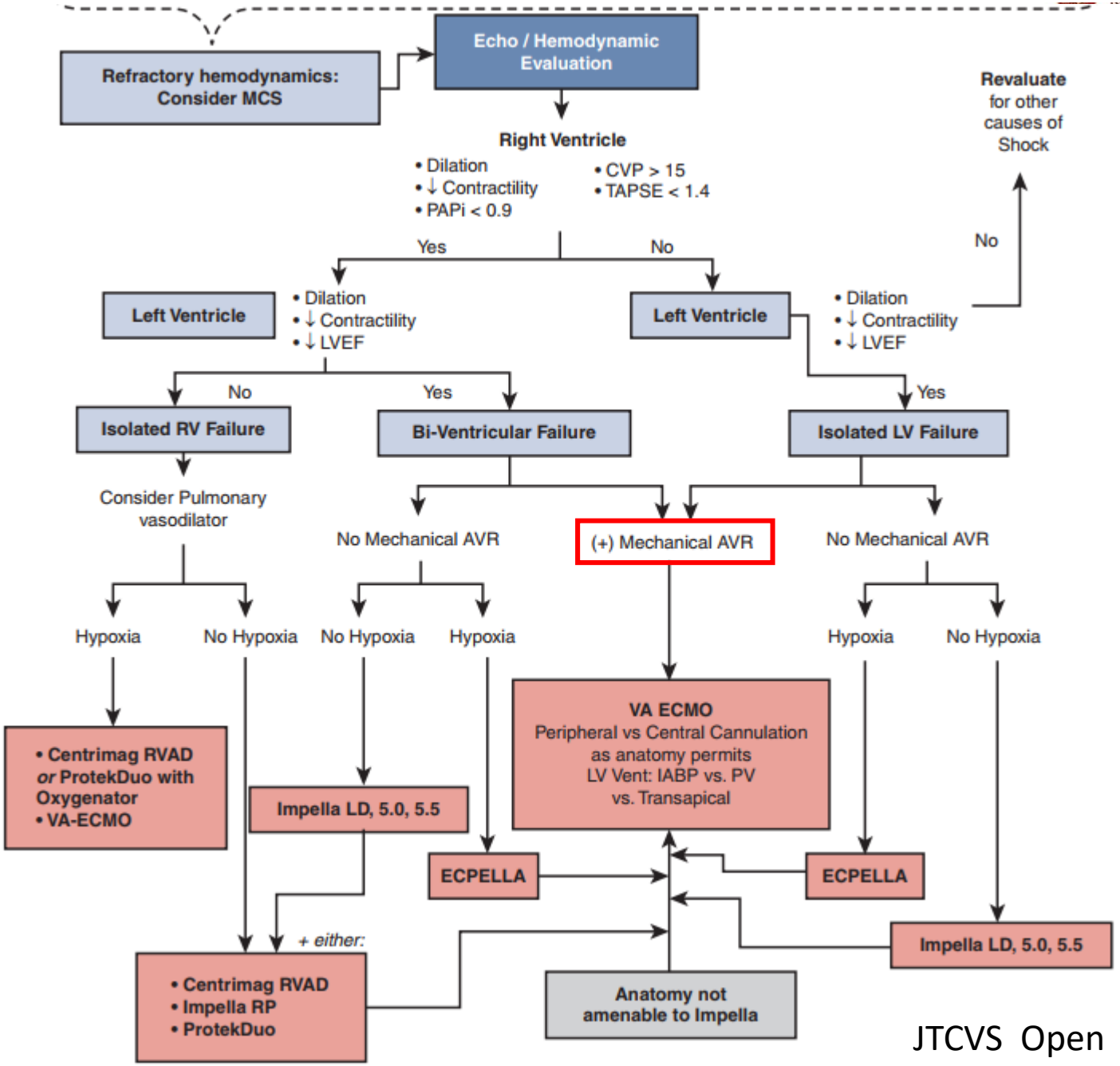
- S
- I
- S

e

nula



Intraoperative algorithm of MCS in patients with cardiogenic shock



JTCVS Open 2021;8:55-65

Summary

- Impella는 일단 희소의료기기로 심인성 쇼크의 적응증에 한해서 도입될 가능성이 높다
- CP가 먼저 도입될 예정이고 5.5가 이어서 도입예정이나 가격이 관건
- CP는 hemolysis에 의해 합병증 발생 위험성이 높아 궁극적인 심장 보조를 위해서는 cardiac surgeon에 의해 삽입되는 5.5가 필요하게 될 것으로 예상, 특히 postcardiotomy syndrome에서는 향후 ECMO보다는 Impella 5.5가 더 많이 쓰이게 될 가능성이 높아보임
- ECPELLA를 비롯한 다양한 조합의 temporary MCS 구비하게 됨으로써 치료 선택의 폭이 높아지지 않을 까 하는 기대가 있다

SmartAssist® Platform

The latest innovation on the Impella platform integrates the trusted performance of the Impella heart pump with state-of-the-art SmartAssist technology. This next generation heart pump is designed to improve patient outcomes by using real-time intelligence to optimize positioning, managing and weaning of the Impella device for better patient care.

Impella 5.5® Heart Pump

Greater hemodynamic support and ease of use. New sensor technology allows for repositioning in the ICU without the need for imaging.*

Advanced Pump Metrics

Intelligent pump metrics on the Automated Impella Controller™ assist in positioning, managing and weaning the Impella device.

Impella Connect®

Cloud-based mobile view of the Impella device status for remote patient monitoring and collaborative patient management to optimize patient outcomes.

* For ventricularized pumps

Thank you for your attention