



Improving mortality with tiny, temporary heart pump

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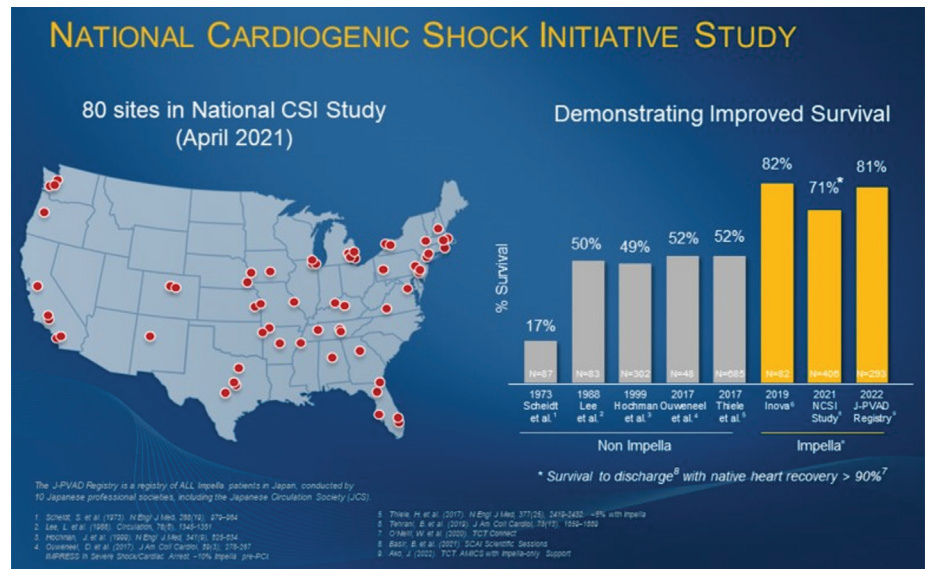
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Impella device gets impressive results for patients with cardiogenic shock and acute MI

This issue summarizes a presentation given by **Blair MacPhail, MD**, in November 2022. It includes short video clips and images of the case studies. To view the presentation, go to: <https://www.youtube.com/watch?v=iOq1dDKwbCM>.

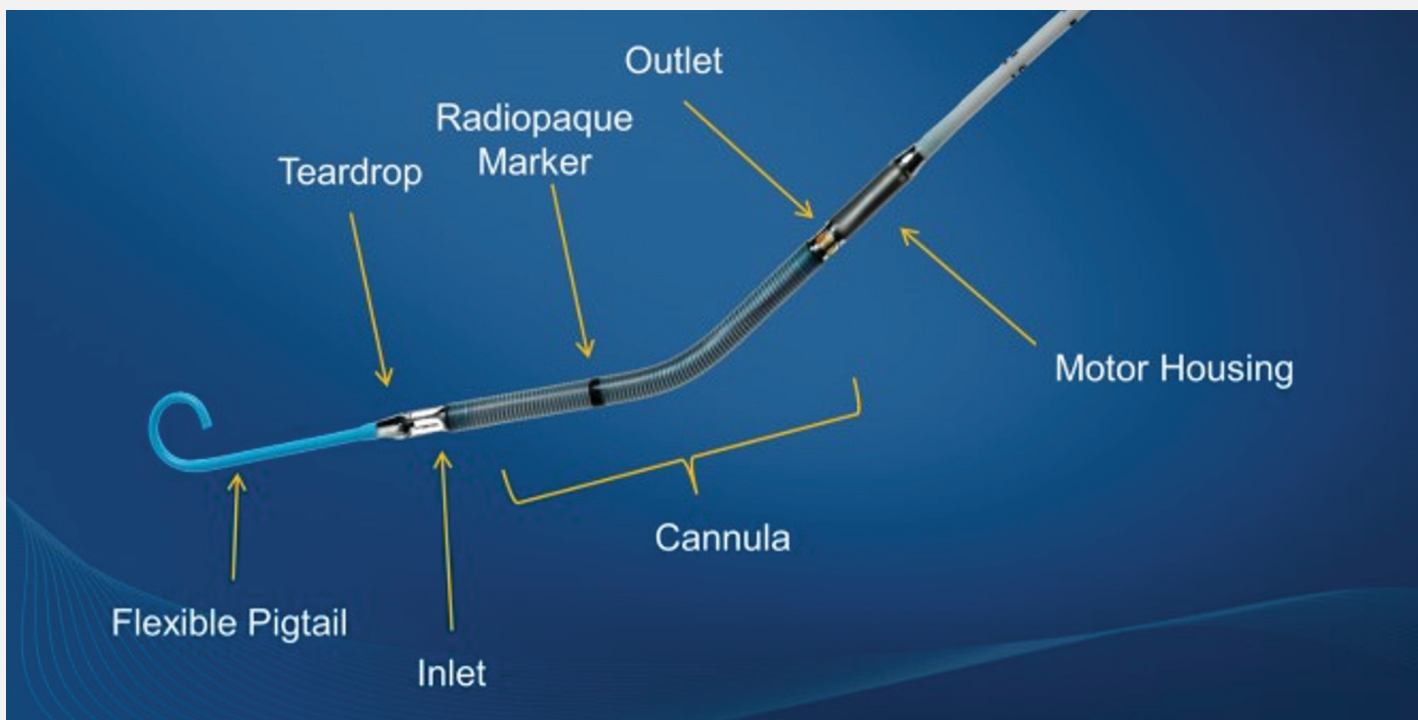


Findings from the National Cardiogenic Shock Initiative Study

The National Cardiogenic Shock Initiative Study looked at cardiogenic shock and acute MI. For patients who had cardiogenic shock and did not undergo PCI, their mortality was about 90 percent. If they did undergo PCI, their mortality was about 50 percent. Then they put in a balloon pump to see how they would do, and there was really no benefit at 30 days or a year. Mortality was still 50 percent.

The first study to show any benefit was out of Detroit. They got all the hospitals to agree to treat patients with cardiogenic shock with the Impella first and then revascularize them – and they began to see an improvement in outcomes. When they looked at patients at a national level, in 2017 they saw an increase in survival to 58 percent. In 2018, that had improved to 81 percent survival – as long as they placed an Impella device first. This is now a national ongoing study. They’ve been taking things they’ve learned to make the outcomes better – and put them into their protocol, which has resulted in improved survival for patients with cardiogenic shock.

The balloon pump didn’t show much difference in outcomes because the enhanced cardiac output is only about 1 to 1.1 liters per minute. For the Impella, the cardiac output additional support is 3.5 to 3.7 liters per minute. This permits adequate temporary support allowing the operator time to perform needed procedures.



What is the Impella device?

Impella is a support device utilized during a cardiac cath to help maintain hemodynamic stabilization. It's an artificial heart that's put in from the periphery, from the femoral artery. You put the pigtail end in the left ventricle, in the apex of the left ventricle. And where the inlet is, it draws the blood out and pumps it to the outlet across the aortic valve. This allows a cardiac output of 3.5 to 3.7 liters of support, which causes better perfusion to the coronary arteries and better perfusion to the rest of the body and helps support the blood pressure.

When the Impella is used

The three most common reasons to use the Impella are when patients come in with any of the following:

- They are in cardiogenic shock with acute MI.
- They're a high-risk intervention. They may have only one open vessel to the heart and their heart function is very poor.
- They need time to be transported to another facility. If they come in with severe heart failure and they need to be bridged to getting LVAD or a transplant.

Protected PCI is the most common use of the device. It has been shown that it can allow you to support a patient during a lot of complex procedures: bifurcation, left mains, multivessel disease. Sometimes it's the only open blood vessel to the heart or severe left ventricular weakness. Even though you only inflate the balloon for a short time, that may be too long for them to go without support.

Contraindications for using the Impella

The Impella is contraindicated if the patient has

- a mural thrombus
- a mechanical prosthesis in the aortic valve position
- the aortic valve area is less than .6
- moderate aortic regurgitation
- right-sided heart failure (The return of blood flow to the right side of the heart is so strong that if you have right-sided heart failure, it's a contraindication because you'll overwhelm the right side of the heart.)
- ASD or VSD

Case study #1

- 55-year-old male cut his hand at work. While he was at Urgent Care, he became diaphoretic and hypotensive. His heart rate was in the 30s and he complained of chest heaviness.
- Risk factors: tobacco use, hypertension, hyperlipidemia.
- EKG: ST elevation anterior lateral.
- General decline in B/P, worsening respirations, was sent with his EKG to ER.
- Had cardiogenic shock with acute MI.
- STEMI activated by EMS.
- ASA given by EMS.
- IV fluids to support B/P (blood pressure was about 100, then it started to drift down to 90, then 80. We got him to the lab as fast as possible to take pictures to prepare for Impella. Vascularization wasn't great – but there's a lot of vasoconstriction when patients show up in cardiogenic shock. It was one of the worse situations I've seen in 30 years of acute MIs. The left main was 100 percent occluded at the ostia, heavily calcified. Rather than trying to open that up right away, our next step was to put the Impella in to support him because that gave us time to get the artery open and place stents. We got flow restored to the diagonal and the LAD. The only reason he made it to the ER was that there were collaterals off the tip of the right of the coronary artery going to the distal LAD.

Outcome

- Ejection fraction improved slightly from 16.5 percent to 20, and then to 29 percent. We could not keep the Impella in longer than a few hours because he got ischemic in his leg, so we used an intra-aortic balloon pump to stabilize him.
- He was transferred to the heart failure specialists at IU Health Critical Care and CHF specialist. And he did well. He was discharged from IU Health approximately 2 weeks later.

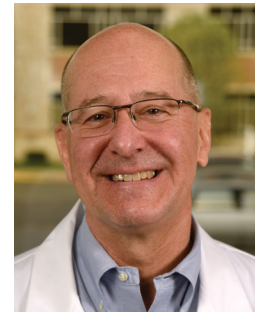
Case study #2

- 67-year-old female crescendo angina now class 4, was very obese. She was told at another hospital she had a 50 percent risk of death from CABG, which she turned down. Showed up at Goshen having ongoing relentless chest pain. Heart failure was occurring regularly.
- Had NonQ MI and repeated resting symptoms on Max GDMT.
- Risk factors: hypertension, hyperlipidemia, obesity.
- After looking at everything, we offered her Impella-supported intervention, which she agreed to.
- Distal left main: hazy 60 percent stenosis bifurcation of the LAD and circumflex artery.
- LAD: 80 percent calcified at the ostium, 80 percent stenosis at the ostium of the diagonal branch. Stented with 0 percent residual. We put in two stents, deployed the stent, then we took the balloon and wire out.
- She had to go to surgery to close the femoral artery since she was bleeding, but she did beautifully. She's now over two years out. She's lost weight and her diabetes is better.

In conclusion

These devices make all the difference to the patients. Patients go from literally not being able to move in bed to being able to do cardiac rehab and get back into their lives. For shock, you have to put the device in first. If you wait until the patient crashes, the results are not as good.

These procedures are labor intensive. We work as a team. Dr. Farid Jalinous and I've done about 35 cases. Dr. Sreenivas Kamath is starting to as well. We've been doing about nine to 12 Impella placements a year. We feel like this is a valuable tool to support patients and get them through a lot of tough situations and save patients we could not have saved before.



Blair MacPhail, MD, FACC, is an interventional cardiologist with more than 25 years of experience. He addresses general cardiology and peripheral vascular problems, including treatment of narrowed and blocked arteries; use of laser and atherectomy devices; and strategic placement of balloons and stents to stabilize and improve blood flow.



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This publication is for healthcare providers

“A 22-30 percent improvement in mortality is a big deal. Using the Impella device in emergency situations offers us a chance to take care of patients who otherwise would not survive.”

~ Dr. Blair MacPhail



TO REFER A PATIENT

To refer a patient, fax a referral form to (574) 533-7145. A referral form can be downloaded at GoshenQuickGuide.com.

Call for an appointment at (574) 364-3921.

We make every effort to see referrals the same day or within 24 hours as needed.

If you would like more information or to meet any of our doctors, please contact **Jenny Rupp, Physician Liaison**, at JRupp2@GoshenHealth.com or (574) 364-2978.

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