

Best Practices Management of STEMI in the Cath Lab: Overview of the 2024 SCAI Consensus Statement

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There was a time decades ago when “heart attacks” (now mostly known as ST-elevation myocardial infarctions [STEMI]) were among the most feared and lethal conditions faced by North Americans. I recall as a fellow participating in the first MILAS (Myocardial Infarction Limitation) trial at Brigham and Women’s Hospital with Dr.

Eugene Braunwald as the principal investigator. The MILAS fellows were tasked with meeting the STEMI patient, often in the middle of the night, to discuss the study protocol of randomly assigning the patient to treatment with hyaluronidase, beta blocker, or placebo. MILAS fellows collected electrocardiogram (ECG) and radionuclide data,

oversaw the administration of the test agent, and 90 minutes later, collected the ECG data again. There was no coronary angiography performed in these patients, as it was considered dangerous. Percutaneous coronary intervention (PCI) had just been introduced to the USA (1980). At the American Heart Association meeting in Miami in 1981, William Ganz of Cedars-Sinai Medical Center in Los Angeles showed an angiogram of a thrombus moving through a right coronary artery after intracoronary fibrinolytic treatment, which was a real game-changer. As for the MILAS trial, we hoped that medical treatments would reduce the 20%-30% mortality of the STEMI patient.

Fast forward. Everything changed. Today, advances in the management of the patient with STEMI have dramatically reduced mortality and morbidity for most patients to <5% and even reduced adverse events in the most shock patients. This month, the *Journal of the Society for Cardiovascular Angiography and Interventions* (JSCAI) published their expert consensus opinions and practice review of the management of STEMI referred to the cath lab, an effort chaired by Dr. Jacqueline E. Tamis-Holland from Cleveland Clinic, along with co-chair Dr. Yader Sandoval from the Minneapolis Heart Institute, and a distinguished writing group.¹ The consensus document conscientiously reviews the current thinking on the best diagnostic and therapeutic interventions to treat a patient with STEMI in the catheterization laboratory. Addressing some controversial areas to provide a consensus opinion of best practices, the group discusses common and important aspects of care such as vascular access, management of large thrombus burden, and managing the STEMI patient with nonatherosclerotic causes of STEMI. Table 1 lists the equipment STEMI centers should have available.

While I am no longer taking call for STEMI patients, after reading the expert consensus,¹ I thought it would be useful to summarize its findings.

Is Your Cath Lab STEMI-Capable?

The SCAI consensus document is of value to cath labs that do not treat STEMI patients emergently as well as the larger centers performing primary PCI to treat STEMI patients. Although not every hospital with a cath lab is a STEMI receiving center, many of their emergency departments (ED) will see STEMI patients and then arrange for transfer of STEMI patients to PCI-capable sites for definitive care. The timeline for these actions is addressed in the consensus document. Those hospitals without on-site surgery and without STEMI call teams are usually not receiving centers. Our VA hospital is one such center. Although we perform STEMI PCI during working hours, we transfer acute coronary syndrome (ACS) patients requiring a higher level of care arriving after working hours to a full-service hospital. The door-to-balloon (DTB) time of 90 minutes remains a standard to keep everyone in the care delivery focused on the goal of the quickest

TABLE 1. Essential equipment for the cardiac catheterization laboratory treating patients with STEMI.

Table 1 is available with the original article here:

[https://www.jsc.ai.org/article/S2772-9303\(24\)01740-X/fulltext](https://www.jsc.ai.org/article/S2772-9303(24)01740-X/fulltext)

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Figure 1 is available with the original article here:

[https://www.jsc.ai.org/article/S2772-9303\(24\)01740-X/fulltext#fig2](https://www.jsc.ai.org/article/S2772-9303(24)01740-X/fulltext#fig2)

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Figure 1. An algorithm for determining the proper arterial access in ST-elevation myocardial infarction.

CABG, coronary artery bypass graft surgery; ESRD, end-stage renal disease; IMA, internal mammary artery graft; LIMA, left internal mammary artery graft; MCS, mechanical circulatory support; PCI, percutaneous coronary intervention.

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The Society for Cardiovascular Angiography and Interventions (SCAI) expert consensus document is of value to cath labs that do not treat STEMI patients emergently as well as the larger centers performing primary PCI to treat STEMI patients.

TABLE 2. Best practices for arterial access in STEMI.

Table 2 is available with the original article here:

[https://www.jsc.ai.org/article/S2772-9303\(24\)01740-X/fulltext](https://www.jsc.ai.org/article/S2772-9303(24)01740-X/fulltext)

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reperfusion to save heart muscle and hence reduce adverse outcomes. For transfer patients, DTB time is 120 minutes with a 45-minute window of transfer.

The consensus document points out that the cardiac cath lab (CCL) team readiness can be facilitated by prehospital notification and ECG transmission (from the ambulance or ED), thus streamlining care. It is recommended that, when feasible, bypassing the ED and sending the patient directly to the cath lab should be implemented. In some programs, the logistics of this step are challenging. Also noted is the expected arrival time of the cath lab staff of <30 minutes from notification. To this end, a STEMI box was developed to reduce time in the ED for transfer to the cath lab.²

Radial or Femoral Access for STEMI?

For diagnostic catheterizations in the U.S., radial artery access is used in about 50%-60% of cases. Femoral artery access is still routine in many hospitals despite the decade of evidence that the radial approach has distinct benefits for patient comfort, staff workflow, and clinical outcomes. For emergencies and STEMI cases, many operators preferred and still use the femoral approach, perceiving it to be quicker and more suitable in case large-bore equipment (eg, 8 French [Fr] guide, myocardial support device) is needed. The expert consensus indicates that transradial access is the preferred route for coronary angiography and PCI. When femoral access is necessary, the use of contemporary techniques, including routine ultrasound and fluoroscopy, is advised. Of course, if there are extenuating circumstances, eg, the patient will likely need mechanical circulatory support (MCS), has no radial access, a dialysis fistula, or prior coronary artery bypass graft (CABG) surgery (Figure 1), femoral access is appropriate. Table 2 lists the best practices for arterial access in the STEMI patient.

Do We Need LVEDP in the STEMI Patient?

The techniques of coronary angiography in the STEMI patient have been discussed in these Clinical Editor's pages over the years and a variety of practices have been recommended by different experts. While there is no single best way, many prefer to have a complete knowledge of the coronary anatomy while others are satisfied with visualizing only the culprit artery and proceeding to PCI, completing angiography of the remaining arteries after stenting. The consensus document does not address how to do the angiogram, only that a complete diagnostic coronary angiogram should be performed during the index procedure. Moreover, in the last decade, the measurement of left ventricular end-diastolic pressure (LVEDP) was often considered unnecessary unless hypotension or the patient's volume status was of concern. Avoiding dogma, the consensus states that the measurement of LVEDP "can help guide further treatment".¹

TABLE 3. Intracoronary drugs and doses for coronary no reflow.

Table 3 is available with the original article here:

[https://www.jscai.org/article/S2772-9303\(24\)01740-X/fulltext](https://www.jscai.org/article/S2772-9303(24)01740-X/fulltext)

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Thrombus Aspiration Routinely?

Because every STEMI involves a variable amount of thrombus in the artery, heparin, ASA, and P2Y12 agents are routinely given. Thrombus aspiration, once thought to be helpful, became a niche tool for some situations involving large thrombus burden. The expert consensus provided several key points, one of which is that the angiographic assessment of the thrombus should be made after the wire crosses the lesion. This approach helps decision-making in a few ways. The totally occluded site is presumed to be associated with significant thrombus burden. Angiography after a guidewire has crossed often permits some blood flow, with activation of the intrinsic lytic system and inducing thrombus changes. The writing group recommended that when poor flow or large thrombus burden persists, bailout aspiration thrombectomy in selected cases is acceptable. While rarely needed, intracoronary or intravenous antiplatelet agents for refractory thrombus may be helpful.

No Reflow

Reperfusion may be accompanied by the no-reflow phenomenon. We have discussed the causes and approach to no reflow occurring during PCI of a saphenous vein graft (SVG) or arteries with large thrombotic occlusion.³ Little progress has been made in finding better therapeutics for no reflow. The consensus statement supports the use of intracoronary arteriolar vasodilators (Table 3) delivered to the distal bed (through micro or PCI catheters). Additionally, coronary perfusion pressure should be assisted with augmentation of mean arterial pressure (eg, intra-aortic balloon pump [IABP]) and reduction of LVEDP.

Role of IVUS in STEMI PCI

The consensus for intracoronary imaging encourages its routine use to guide PCI. For management of stent thrombosis or stent failure, intracoronary imaging is essential to identify the mechanism. For example,

intravascular ultrasound (IVUS) can identify stent under-expansion, malapposition, tissue protrusion, edge stent dissection, or stent-adjacent intramural hematoma, all of which are associated with acute or subacute stent failure. For patients suspected of having a nonatherosclerotic cause of STEMI (such as spontaneous coronary dissection), intracoronary imaging can help to characterize the ambiguous lesions and their contribution to the vessel occlusion.

Key Points for Special Circumstances

For routine PCI, a right heart cath (RHC) or preemptive pacemaker (for right coronary artery occlusions) are not performed. However, a RHC should be performed in STEMI with cardiogenic shock (CS) during the index procedure. For STEMI patients with CS, microaxial flow pumps can be beneficial. A RHC also helps optimize hemodynamics for these patients.

For failed fibrinolytic therapy, immediate rescue PCI is needed. In stable patients, early catheterization within 24 hours of fibrinolytic therapy is indicated. While the consensus writers support complete revascularization with treatment of significant non-infarct stenosis in patients with STEMI and multivessel disease, some operators still prefer to stage the PCI in the non-infarct vessel unless the patient is in extremis, ie, shock.

For non-atherosclerotic causes of STEMI in the absence of contraindications, intracoronary nitroglycerin should be administered during the diagnostic angiogram to help identify cases of epicardial spasm. IVUS may be helpful as well. In patients with spontaneous coronary artery dissection (SCAD) and a patent infarct artery with TIMI-3 flow, conservative management is advised.

When myocardial infarction without occlusive coronary artery disease (MINOCA) is identified, additional investigations such as left ventriculogram, intracoronary imaging, cardiac magnetic resonance imaging (MRI), and/or coronary microvascular

function testing may be necessary to identify the etiology and exclude MINOCA mimics.

Quality of Care and Outcomes

The writing group reiterated that all hospitals/health care systems should track every STEMI case to assess time-to-treatment metrics and outcomes, with an aim for continued quality improvement.

The Bottom Line

The SCAI expert consensus document¹ on managing STEMI in 2024 should be mandatory reading for all those participating in STEMI initiatives. Improvement in STEMI care saves lives, the goal of our cath lab efforts. On October 16, 2024, my 75th birthday, my day ended with a call from the ED to take care of a 91-year-old male with a STEMI. The lab was still open and the patient did well. I was happy to have reviewed the STEMI guidelines, and was reminded of where things started and where STEMI care is today. ■

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