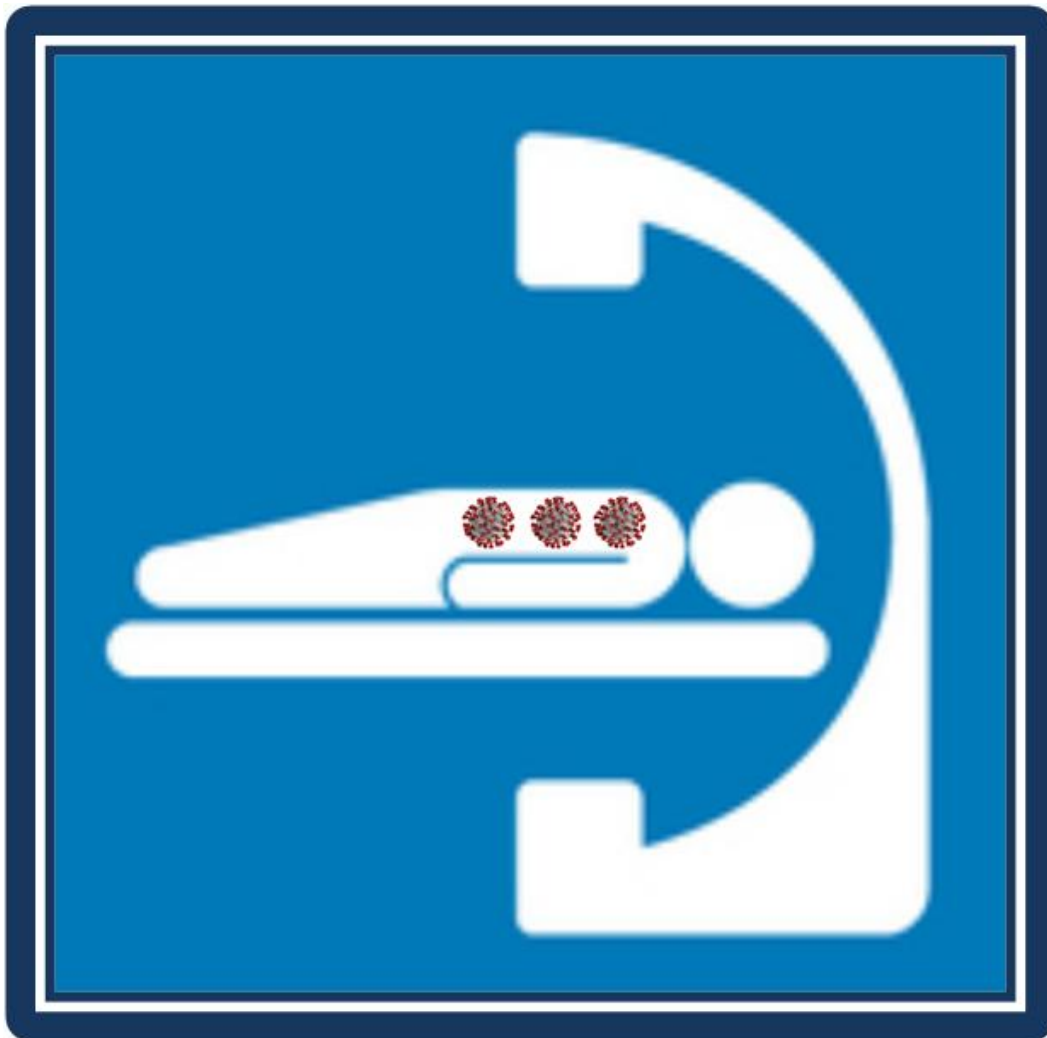


COVID-19 and Interventional Cardiology: To Cath or Not to Cath! That May Not Be The Only Question!

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Introduction

The COVID-19 pandemic has not only altered daily life for most people around the world, it has also created turmoil in the medical field. This pandemic has forced physicians to adopt alternative standards of care practices in many ways in order to reduce infection exposure to health care workers and the healthcare system

as a whole [1]. The ramifications continue to be far reaching at multiple clinical and financial levels, including the impact of canceling or deferring elective procedures and surgeries to reduce the spread of the infection [2]. The rapid scholarly dissemination and expedited reviews and publications on the topic [3], together with

employing data registries [4] has resulted in better understanding of the behavior of COVID-19 and its effect on multiple organ systems, especially the heart [5], and elucidating some of the molecular mechanisms of cardiovascular injury [6]. The heart has been recognized early on as a primary target of the COVID-19 infection [7], and the cardiovascular system has emerged as the culprit of catastrophic outcomes and demise of many patients secondary to arrhythmia [8], acute coronary syndrome and myocarditis [9], and the cardiovascular syndrome of extreme cardiovascular stress even in the absence of obstructive coronary disease [10]. COVID-19 infection tends to predominantly impact patients with underlying cardiovascular disease [11] or risk factors such as hypertension [12], and diabetes [13], imposing added cardio-respiratory burden on these patients [14].

COVID-19 & Cardiovascular Procedures:

The COVID-19 pandemic has created new logistical consideration in the triage and treatment of cardiovascular patients [15], necessitating the prompt dissemination of multiple new guidelines on how to approach the need for cardiovascular procedures in the setting of heightened infection risk. Such guidelines, calling for vigilance and extreme precautions, using personal protective equipment (PPE), were published addressing cardiopulmonary resuscitation, CPR [16], electrophysiology studies [17], and interventional/structural heart disease procedures [18] by multiple cardiovascular societies.

The extent of preparedness required to perform a coronary intervention in the COVID-19 or suspect patient is enormous and should involve a team-based structured approach with well delineated priorities and responsibilities [19]. This may not be feasible in many low volume, less prepared centers. The length of time required for preparedness may exceed the recommended door to balloon time of 90 minutes, which calls into question the necessity or feasibility of transferring such patients to facilities capable of performing prompt percutaneous coronary intervention (PCI), at a

time when many hospitals are inundated and may decline transfers, as opposed to the administration of thrombolysis. The thrombolytic option may allow the cath lab staff extra time to get prepared for a rescue PCI according to preparedness guidelines [20] or transfer the patient if needed, if thrombolysis is not successful in reestablishing coronary flow. High risk PCI with the support of Impella device in a COVID-19 patient has been reported [21], however, such cases and outcomes would likely depend on a particular center's preparedness, resources and patient presentation.

The American College of Cardiology (ACC) and Society for Cardiovascular Angiography and Interventions (SCAI) released a joint consensus statement addressing the concern for COVID-19 infection exposure in the catheterization lab [22] by calling for more conservative noninvasive treatment for Non-ST-segment Elevation Myocardial Infarction (NSTEMI) in COVID-19 patients. The same statement urged consideration of thrombolysis in eligible ST-segment Elevation Myocardial Infarction (STEMI) patients who are COVID-19 positive or suspect rather than primary PCI. The statement further called for postponing all elective cardiac catheterization procedures to minimize potential exposure to patients and staff and to preserve the much needed PPE.

Despite this joint consensus statement, there remains debate on whether the use of thrombolytic agents in STEMI and medical management in NSTEMI is the appropriate course of action [23, 24]. A recent poll published by the ACC addressed this divide [25]. Out of 1800 votes, 44% of respondents chose to use thrombolytic agents to manage STEMI in the absence of cardiogenic shock or failed thrombolytic therapy, while 33% chose to continue with primary PCI as usual. For NSTEMIs, 63% of respondents chose the more conservative approach with medical management, while 21% chose an invasive strategy. A small percentage of physicians also stated that treatment plans should consider availability of resources and experience of each healthcare system. The lack of readily available testing and the shortage of PPE may have led more physicians to favor the conservative

approach. The balance of COVID-19 exposure and patient benefit must be considered. Additionally, resources must be taken into account as the COVID-19 pandemic evolves. For healthcare systems that are lacking timely preparedness, it would be appropriate to consider thrombolysis in patients who do not have cardiogenic shock. Currently, thrombolytic agents are primarily considered in STEMI patients who arrive at PCI-incapable facilities, when the anticipated first medical contact to balloon time exceeds 120 minutes, as an alternative means of early reperfusion. In the 1960s – 1970s, thrombolytic agents were considered the gold standard treatment for STEMI before the advent of PCI [26]. The GUSTO-I trial published in NEJM in 1993 showed a mortality benefit with the use of accelerated tissue plasminogen activator (TPA) and heparin together [27]. Although it may not be common practice, the use of thrombolysis in STEMI patients does afford mortality benefit and successful reperfusion, as evidenced by improvement in clinical symptoms and normalization of EKG changes. Overall, a decrease in cath lab activations for STEMI were observed during the COVID-19 pandemic [28].

Discussion:

The interventional cardiologist is often the first to call on ACS patients. Perhaps the term “interventional” conveys the expectation and obligation to perform PCI. However, the interventional cardiologist is first and foremost a cardiology consultant [29] who provides a comprehensive cardiovascular evaluation, with the extra qualifications to perform interventional procedures if deemed necessary, feasible and justifiable by a risk/benefit analysis. Beyond the duty of providing the optimal care for their patients, interventional cardiologists have to guarantee a safe environment for themselves and the cath lab personnel. While the interventional field has perfected protection against the deadly radiation with accurate exposure-measuring devices, there is no such tool for the deadly COVID-19 virus infection exposure, leaving personnel with a sense of unease and uncertainty about the adequacy of

any level of preparedness. These are unprecedented considerations which call for swift decision making with regards to the optimal approach to treat ACS, taking into consideration a multitude of factors to assure the best outcome. Therefore, the approach to ACS in the COVID-19 or suspect patient cannot be narrowed down to a simplistic “to cath or not to cath”, as this under represents the complex decision making the interventional cardiologist has to take in approaching ACS in the current pandemic. Among the many considerations is whether an intervention would be expected to provide the anticipated therapeutic benefit seen in non-COVID-19 patients, given the non-traditional pathophysiology seen. Further factors include the risk of arrhythmia and need for CPR with even further risk of exposure and potential breach of protective precautions, the feasibility of performing PCI in such an environment, utilizing minimum staff, with the potential need for circulatory support devices such as intra-aortic balloon pump (IABP), Impella peripheral ventricular assist device (PVAD) or extracorporeal membrane oxygenation (ECMO) to support an intervention, in addition to many other unknowns.

Current medical practices have become diverse and dynamic amidst the battle against COVID-19, which has led to controversy and uncertainty about the appropriate management of patients in different clinical settings. As the outside world continues to look up to us and greet us as heroes, we remain plagued with new realities, with little proven treatments to guide our practices; we have to strive to live up to this title ! [30]

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