Primary Percutaneous Coronary Intervention or Fibrinolytic Therapy in COVID 19 Patients Presenting With ST-Segment Elevation Myocardial Infarction

The timely diagnosis and management of patients with suspected ST-segment myocardial infarction (STEMI) or acute coronary syndrome (ACS) in the COVID-19 era is an area of wide concern given variable presentation as well-associated risks of infection to healthcare teams. The recent manuscript by Hamadeh et al,[1] published in the journal adds to our existing knowledge by reporting the largest, multicenter case series on the clinical presentation, management, and outcomes of patients with symptomatic COVID-19 infection and STEMI.[1] There are several key findings in this study and we commend the authors on their investigation. However, certain aspects of the study merit attention before definite conclusions can be drawn, especially regarding the high incidence of stent thrombosis in this cohort and advocating broader use of fibrinolytic therapy in healthcare systems where access to primary percutaneous coronary intervention (PCI) is more prevalent.

First and foremost, this is a retrospective case study where many known and unknown factors confound the relation being examined. The finding of strikingly high rates of stent thrombosis needs to be interpreted with caution as patients in the PCI cohort were sicker and more likely to present with shock, develop acute respiratory distress syndrome and need mechanical ventilation. Given the smaller sample size of the study, especially the primary PCI cohort, any potential beneficial or harmful effect of a therapy may be amplified. Although the overall proportion of patients with stent thrombosis (21%) in the cohort is concerning, the absolute number (n = 4) is still relatively low. The authors did use the fourth universal definition of myocardial infarction for stent thrombosis, but it will be interesting to know more about angiographic factors in these patients. In our anecdotal practice in a high-volume public healthcare system in the United States, we have managed COVID-19 STEMI patients with primary PCI and used prolonged infusions of cangrelor or GP IIb/IIIa inhibitors after successful reperfusion given the heavy thrombus burden with good outcomes.

Second, outcomes in the fibrinolytic group of unsuccessful reperfusion (n = 9/59; 15%) and high incidence of hemorrhagic stroke (n = 5/59, 9%) question both efficacy and safety of fibrinolytic therapy in this cohort. This is also of considerable importance as 2 contemporary case series have suggested that between 30% and 39% of patients who undergo urgent coronary angiography for suspected STEMI in setting of COVID-19 do not have angiographic diagnosis to suggest coronary obstruction,[2,3] which make advocating fibrinolytic therapy for COVID-19 patients who present with suspected STEMI, unnecessary and potentially dangerous.

We propose that whenever possible, COVID-19 patients with findings suggestive of STEMI should be transferred to a PCI-capable facility. The recent statement published by the American College of Cardiology (ACC), Society for Cardiovascular Angiography and Interventions (SCAI) and American College of Emergency Physicians (ACEP) recommends primary PCI as the standard of care for COVID-19 patients who present with STEMI.[4]

It is becoming increasingly apparent that ACS in COVID-19 infected patients is not the same disease process compared with ACS without COVID-19 infection. The dichotomy of both increased mimickers of STEMI as well as a signal of higher thrombus burden in patients with angiographic STEMI adds to the already complex management of COVID-19 patients.[2,3,5]

Disclosures

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Association of Body Mass Index With Outcomes in Patients Undergoing Transcatheter Mitral Valve Repair

Obesity is a major independent risk factor for premature death due to cardiovascular diseases. Several studies have reported a better prognosis for obese patients who underwent transcatheter aortic valve replacement, coronary artery bypass grafting, hypertension, and heart failure compared with their leaner counterparts.[1,2] This counterintuitive phenomenon has been described as an "obesity

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paradox," and the exact pathophysiological mechanism of this association is not fully understood. Mitral regurgitation (MR) is the most frequent form of valvular heart disease in the United States. A previous study failed to show an association of body mass index (BMI) with outcomes in patients who underwent mitral valve surgery.[3] Transcatheter mitral valve repair (TMVr) has evolved as an important treatment option for patients with moderate-to-severe primary or secondary mitral regurgitation who are at prohibitive or high surgical risk despite maximal medical therapy. Data on the association of BMI with outcomes of TMVr in contemporary practice are limited. Thus, we sought to assess this association utilizing a large national database.

The Nationwide Readmission Database (NRD) was used to identify patient hospitalizations with International Classification of Diseases (ICD)-9th and-10th procedure codes for TMVr from 2014 to 2017.[4] BMI < 20 kg/m^2, ≥ 25.0 to 29.9 kg/m^2, and ≥30 kg/m^2 patients were further identified by their respective ICD codes. The remaining cohort was assumed to have normal BMI of >20 to 24.9 kg/m^2, and outcomes were compared among the 4 groups. Prior validation study showed that ICD-9-CM codes for obesity (BMI ≥ 30 kg/m^2) have a sensitivity of 75.9%, specificity of 93.6%, and positive predictive value (PPV) of 99.3%.[5] Similarly, ICD-10-CM codes have a sensitivity of 83.6, specificity of 93.1, and positive predictive value of 99.7.[5] The primary outcome was in-hospital mortality. Secondary outcomes were post procedure complications and 30-day readmission rate (all-cause and heart failure [HF]). Multivariable logistic regression analysis was done to determine association of BMI categories with outcomes. All statistical analyses were performed using SPSS software version 25.0 (IBM Corp., Armonk, New York).

Among 15,559 patients, 300 (2%) had BMI < 20 kg/m^2, 14,026 (90%) had BMI > 20 to 24.9 kg/m^2, 208 (1.4%) had BMI ≥ 25.0 to 29.9 kg/m^2, and 1,025 (6.6%) had BMI ≥ 30 kg/m^2. Patients with BMI ≥ 30 kg/m^2 had higher prevalence of diabetes mellitus, atrial fibrillation, prior coronary artery bypass grafting, smoking, and chronic kidney disease compared with those with BMI > 20 to 24.9 kg/m^2(p <0.001 for all). Patients with BMI < 20 kg/m^2 were older, more likely to be female, had the highest prevalence of HF, peripheral vascular disease, chronic lung disease, and were more likely to have a nonelective admission. On multivariate analysis, compared with individuals with a BMI of >20 to 24.9 kg/m^2, those with BMI ≥ 30 kg/m^2 had similar in-hospital mortality (adjusted odds ratio 1.20; 95% confidence interval [CI] 0.79 to 1.84, p = 0.37). Patients with BMI < 20 kg/m^2 were more likely to develop AKI, whereas those with BMI ≥ 25.0 to 29.9 kg/m^2 had higher rates of bleeding/transfusion but lower 30-day all-cause readmissions (Table 1). Rates of stroke/transient ischemic attack, acute myocardial infarction (AMI), pericardial effusion/tamponade requiring pericardiocentesis

Table 1
Association of body mass index with in-hospital clinical outcomes and 30-day readmission rate in patients undergoing transcatheter mitral valve repair

Variable	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	p Value
In-hospital mortality			
BMI > 20-24.9 kg/m^2	Reference	Reference	
BMI < 20 kg/m^2	2.15(1.29-3.58)	1.24(0.68-2.24)	0.47
BMI ≥ 25.0-29.9 kg/m^2	1.17(0.52-2.61)	1.23(0.53-2.86)	0.61
BMI ≥ 30 kg/m^2	1.05(0.71-1.55)	1.20(0.79-1.84)	0.37
Stroke/transient ischemic attack			
BMI > 20-24.9 kg/m^2	Reference	Reference	
BMI < 20 kg/m^2	1.99(0.94-4.18)	1.10(0.25-2.70)	0.82
BMI ≥ 25.0-29.9 kg/m^2	0.52(0.09-2.81)	0.54(0.10-2.94)	0.47
BMI ≥ 30 kg/m^2	0.52(0.24-1.13)	0.59(0.27-1.31)	0.20
Acute kidney injury/hemodialysis			
BMI > 20-24.9 kg/m^2	Reference	Reference	
BMI < 20 kg/m^2	1.78(1.37-2.31)	1.52(1.11-2.09)	0.009
BMI ≥ 25.0-29.9 kg/m^2	1.27(0.90-1.79)	1.25(0.85-1.84)	0.24
BMI ≥ 30 kg/m^2	1.26(1.07-1.48)	1.04(0.86-1.27)	0.63
Bleeding/transfusion			
BMI > 20-24.9 kg/m^2	Reference	Reference	
BMI <20 kg/m^2	1.24(0.95-1.69)	1.07(0.77-1.48)	0.68
BMI ≥ 25.0-29.9 kg/m^2	1.67(1.21-2.30)	1.75(1.24-2.45)	0.001
BMI ≥ 30 kg/m^2	0.97(0.81-1.15)	0.91(0.75-1.10)	0.37
Acute myocardial infarction			
BMI>20-24.9 kg/m^2	Reference	Reference	
BMI < 20 kg/m^2	1.54(0.80-2.96)	1.59(0.79-3.18)	0.18
BMI ≥ 25.0-29.9 kg/m^2	0.84(0.29-2.36)	0.79(0.26-2.34)	0.65
BMI ≥ 30 kg/m^2	0.82(0.52-1.33)	0.70(0.42-1.16)	0.17
Pericardial effusion/tamponade requiring pericardiocentesis/surgery			
BMI > 20-24.9 kg/m^2	Reference	Reference	
BMI < 20 kg/m^2	2.03(0.43-2.44)	0.84(0.35-2.03)	0.71
BMI ≥ 25.0-29.9 kg/m^2	0.36(0.06-2.01)	0.36(0.06-2.02)	0.25
BMI ≥ 30 kg/m^2	1.04(0.65-1.68)	0.91(0.53-1.55)	0.74
30-day all-cause readmissions			
BMI > 20-24.9 kg/m^2	Reference	Reference	
BMI < 20 kg/m^2	1.41(1.03-1.92)	1.22(0.89-1.69)	0.21
BMI ≥ 25.0-29.9 kg/m^2	0.62(0.38-0.99)	0.59(0.36-0.94)	0.029
BMI ≥ 30 kg/m^2	1.01(0.84-1.22)	0.97(0.80-1.18)	0.81
30-day heart failure readmissions			
BMI > 20-24.9 kg/m^2	Reference	Reference	
BMI < 20 kg/m^2	1.86(1.06-3.25)	1.44(0.77-2.66)	0.24
BMI ≥ 25.0-29.9 kg/m^2	0.23(0.04-1.27)	0.24(0.04-1.33)	0.10
BMI ≥ 30 kg/m^2	1.17(0.80-1.70)	1.20(0.81-1.79)	0.35

Multivariable model adjusted for age, sex, admission status (elective vs nonelective), hypertension, hyperlipidemia, diabetes mellitus, hypothyroidism, smoking, atrial fibrillation, 6 coronary artery disease, history of coronary artery bypass grafting, history of pacemaker/implantable cardioverter defibrillator, anemia, history of cerebrovascular accident, heart failure, peripheral vascular disease, chronic kidney disease, chronic lung disease, chronic liver disease, coagulopathy, fluid/electrolyte disorders, cancers, hospital bed-size (small, medium, and large), and teaching status of hospital (urban teaching, urban nonteaching, and rural).

or surgery, and 30-day HF readmissions did not differ among the 4 groups.

In this observational analysis, we evaluated the association of BMI with clinical outcomes in patients who underwent treatment for MR with TMVr. Our findings indicate that BMI does not significantly influence rates of in-hospital mortality, stroke/transient ischemic attack, AMI, pericardial effusion/tamponade requiring treatment, and 30-day HF readmissions. Patients with BMI < 20 kg/m^2 were more likely to develop AKI and those with BMI ≥ 25.0 to 29.9 kg/m^2 had higher rates of bleeding/transfusion.

In a previous study from the German TRAnscatheter Mitral valve Interventions registry of 799 patients, in-hospital mortality did not differ across the 4 BMI caregories.[6] Further, patients with BMI < 20 kg/m^2 had higher rates of postprocedure bleeding/transfusion and increased mortality at a median follow-up of 1 year. There is mounting evidence that frailty is associated with increased morbidity and mortality after cardiac surgery and percutaneous cardiac interventional procedures. Hence, BMI < 20 kg/m^2 is considered as an important marker of frailty according to the Valve Academic Research Consortium 2 criteria.[7] In our study, rates of AKI were higher in patients with BMI < 20 kg/m^2, but no significant difference was found for other outcomes.

This study is limited by database, which lacks information on laboratory variables, medications used, procedural details/success, and etiology of MR (degenerative vs functional) which may have affected outcomes. In addition, the NRD lacks long-term follow-up.

In conclusion, our study showed no significant association of BMI with short term outcomes in patients who underwent TMVr. Further studies are needed to determine long-term influence of BMI on outcomes of TMVr.

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Network Meta-Analysis Comparing Apixaban Versus Rivaroxaban in Morbidly Obese Patients With Atrial Fibrillation

The efficacy and safety of DOACs in morbidly obese patients have been well investigated over the last few years.[1–4] Our recent meta-analysis showed that the Direct oral anticoagulants (DOAC) group did not increase stroke or systemic embolism (SE) event rate compared with the warfarin group and the DOAC use was significantly associated with a lower major bleeding event rate compared with the warfarin group.[5] However, it is still unknown which DOAC is more appropriate than others. Apixaban and rivaroxaban are the 2 most common DOACs prescribed in the United States but there is no guidance on which agent should be selected in morbidly obese patients with AF.[6] Traditional meta-analyses cannot be used this time because no study directly compared apixaban with rivaroxaban. In addition, it is not feasible to conduct clinical studies directly comparing DOACs in real-world setting. Thus, we conducted a network meta-analysis (NMA) to indirectly compare apixaban and rivaroxaban and address which direct oral anticoagulant should be used.

Cochrane Library, Embase, Google Scholar, MEDLINE, and Web of Science database searches for relevant articles through December 23, 2019 were performed. The keywords used were (rivaroxaban OR apixaban OR warfarin) AND (obese OR obesity). The study selection was independently performed by 2 investigators (KK and MH) based on the pre-specified inclusion and exclusion criteria. This NMA included studies if patients are aged >18 years old with BMI >40 kg/m^2 or weight >120 kg receiving apixaban, or rivaroxaban who are diagnosed as AF. The NMA excluded studies if they included pregnant, dialysis or mechanical heart valve recipients. Case series, case-control studies and non-English articles were excluded. Conference abstracts were also excluded because Enough data were not provided for study quality assessment.

Two investigators independently extracted the following data from the