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REPLY: Triage Considerations for Patients Referred for Structural Heart Disease Intervention During the Coronavirus Disease 2019 (COVID-19) Pandemic

An ACC/SCAI Consensus Statement

We read with interest letters from Shreenivas et al. (1) from The Christ Hospital in Cincinnati and Li et al. (2) from Radboud University in the Netherlands regarding triage of patients with aortic stenosis for transcatheter aortic valve replacement (TAVR) during the COVID-19 pandemic. Both groups agree with the American College of Cardiology/Society for Cardiovascular Angiography and Interventions consensus statement that hospitalized patients with severe aortic stenosis should undergo urgent treatment despite the pandemic. However, Shreenivas et al. (1) have modified their TAVR practice in 2 important ways during the pandemic.

First, they use V_{max} ≥5.0 m/s or mean gradient ≥50 mm Hg on echocardiography as criteria for urgent TAVR, independent of symptom status. Because this remains an issue for ongoing investigation even before the COVID-19 pandemic, the writing group was hesitant to offer strict hemodynamic criteria for urgent TAVR during COVID-19, deferring to local judgement on a case-by-case basis.

Second, they have moved to performing TAVR with general anesthesia rather than conscious sedation during the COVID-19 pandemic to minimize risk of staff exposure during unexpected intubation. The benefits of avoiding general anesthesia for TAVR include rapid recovery, avoidance of the intensive care unit, and rapid discharge. Furthermore, a recent TVT registry analysis suggests that conscious sedation is associated with reduced mortality in patients undergoing TAVR (3). It is understood, however, that physician and staff safety must be considered, and balancing these goals is challenging. This decision is best made locally and will be easier with widespread COVID-19 testing. We do believe, however, the net benefit is toward avoidance of general anesthesia.

Li et al. (2) raise an important concern regarding the potential risk for outpatients referred for intervention. There is recognition of the risk of transmission from asymptomatic carriers of the novel coronavirus, insufficient local epidemiological data, variable availability of widespread testing, and a poor understanding of immunity. Furthermore, given the age and comorbid conditions of many patients with structural heart disease, the consequence of COVID-19 infection may be more severe than in the general population. We recognize that for each patient requiring intervention, a balance must be struck between the risk of exposing the patient to COVID-19 during hospitalization against the cardiovascular risk of delaying intervention. A threshold to offer intervention that is set too high during the pandemic will expose these patients to increased risk of adverse cardiovascular events (4). Shreenivas et al. (1) suggest that patient perception and avoidance of hospitalization potentially led to delays in treatment and sudden death in patients with aortic stenosis in their own practice.

During these unprecedented times, heart teams have to adjust their practice to ensure patient safety and optimal outcomes. We endorse the practice of weekly contact with deferred patients (potentially using telehealth options) and consideration of urgent intervention for clinical deterioration. Heart teams also have to adjust their consent process for patients in need of urgent intervention to document that the known risks of continued procedure deferral outweigh the unknown risks of contraction of COVID-19 during hospitalization.

As COVID-19 patients are increasingly being cohorted and testing becomes more widely available for patients and staff, the risk of COVID-19 acquisition in the hospital can be minimized. These difficult treatment decisions are best made by local health care delivery teams accounting for all of the previously mentioned variables. As more data are generated during the pandemic, clinicians will be further informed when making this complex decision.

Given the regional variation in COVID-19 prevalence and severity, guidance documents must avoid an overly prescriptive nature, and allow for physicians to adjust practice based on local disease prevalence. As such, hearing about local practices, such as those at The Christ Hospital and Radboud University, is informative and may be helpful to guide others in similar circumstances.

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the *JACC: Cardiovascular Interventions* author instructions page.

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TO THE EDITOR

Fractional Flow Reserve–Guided Coronary Artery Bypass Surgery

More Evidence Required to Say Less Is More

Spadaccio et al. (1) should be congratulated on their insightful and timely systematic review of fractional flow reserve (FFR)-guided coronary artery bypass graft surgery (CABG). Botman et al. (2) compared graft patency in coronary lesions that were functionally significant according to pre-operative FFR versus those that were not. The graft occlusion rate was almost 3 times higher in the non-significant lesions at 1-year follow-up after CABG. Toth et al. (3) replicated this finding and reported a 4-fold increase in graft occlusion at 3 years for functionally non-significant lesions, as well as an increase in angina symptoms. These results led to the GRAFFITI (Graft Patency After FFR-Guided Versus Angio-Guided CABG) and FARGO (Fractional Flow Reserve Versus Angiography Randomization for Graft Optimization) randomized trials, both of which failed to detect any differences in graft patency or major adverse cardiac and cerebrovascular events (4,5). They also highlighted patients lost to angiographic follow-up, reported protocol violations at surgery, and slow recruitment processes that resulted in underpowering of both studies. Toth et al. (4) estimated that 1,148 patients would be needed to adequately power a trial to assess graft patency, and almost 5,800 patients are needed to assess major adverse cardiac and cerebrovascular events.

Given that future randomized trials are unlikely, the available evidence suggests that: 1) FFR-guided CABG is associated with fewer grafts compared with angiography-guided CABG, which may facilitate off-pump and minimally invasive techniques; 2) FFR-guided CABG is at least as good as angiography-guided CABG with regard to angiographic and clinical outcomes at follow-up ranging from 6 months to 6 years; 3) whether these findings justify a paradigm shift to deviate from the traditional approach of complete angiographic revascularization remains controversial; and 4) FFR may be considered a complementary tool that could guide the use of arterial conduits when FFR is ≤0.78, as described in an observational study involving 68 patients (6).

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