



2020

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### Recommended Citation

Balgaith, Mohamed; Arifi, Ahmed; Ahmed, Dalia; and Metwally, A. Mounir (2020) "The Impact of COVID-19 Pandemic on the Hospital Management of TAVI Patients: TAVI team Thoughts and Recommendation," *Journal of the Saudi Heart Association*: Vol. 32 : Iss. 5 , Article 1.  
Available at: <https://doi.org/10.37616/2212-5043.1030>

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# The Impact of COVID-19 Pandemic on the Hospital Management of TAVI Patients: TAVI Team Thoughts and Recommendation

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## Abstract

The COVID-19 Pandemic has put enormous pressure on the healthcare system globally, causing many healthcare organizations all over the world to cancel or stop elective procedures in their cardiac catheterization laboratories. This delay in elective procedures with no doubt has led to a suspension of patient care primarily to those with severe aortic stenosis, which might place them at higher risk for cardiovascular complications like sudden death and heart failure.

Health Care Worker are faced with the uncertainty of contracting infections while performing procedures in patients with a confirmed diagnosis of COVID-19 or suspected cases. This unprecedented situation is very challenging for the safety of Health Care Worker. Hence, in this article, we aim to summarize some of the current guidelines as to how to triage patients in need for Trans Catheter Aortic Valve Implantation (TAVI), during this ongoing pandemic, and will address some necessary considerations related to the preparation of catheterization laboratories and personal during the COVID-19 pandemic.

**Keywords:** Aortic stenosis, TAVI, COVID-19, Coronavirus, Pandemic, Health care worker

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Received 28 April 2020; revised 30 April 2020; accepted 1 May 2020.  
Available online 18 May 2020

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## 1. Introduction

On December 31st, 2019, the authorities of the People's Republic of China informed the World Health Organization (WHO) of several cases of pneumonia of unknown causes in Wuhan, a city located in the Chinese province of Hubei. One week later, they confirmed that the cases were due to a new coronavirus, named COVID-19 [1]. Whereas COVID-19 is primarily a respiratory infection, it has significant systemic effects, including the cardiovascular system. Cardiac manifestations of COVID-19 infection including all types of myocardial injury, and arrhythmias have already been reported with COVID-19 disease [2,3]. Patients with pre-existing cardiovascular conditions represent significant proportions of patients with symptomatic infection and experience disproportionately worse outcomes [3]. Driggins E et al. have found the highest death rate (10.5%) in patients with COVID-19 in those with pre-existing cardiovascular disease [4].

The COVID-19 pandemic crisis puts a lot of pressure on the Health care systems worldwide; the Kingdom of Saudi Arabia is not an exception. All countries have experienced surges of critically ill patients with COVID-19, which resulted in a dramatic depletion of hospital resources, infection of health care workers and critical shortages of vital resources including personal protective equipment (PPE), ventilators, and intensive care unit (ICU) beds.

Because of this pandemic, the health care resources all over the world are directed to the care of COVID-19 patients. To prepare for the potential surge of COVID-19 patients, many medical centers around the globe have to defer all elective type cardiac procedures and surgeries [6]. Patients with severe aortic stenosis who require intervention constitute a challenging group. Many of aortic stenosis patients have conditions that may be life-threatening if the cardiac intervention is delayed. Therefore, decisions regarding timing of TAVI must consider the risk of delaying the procedure, the risk for the patient of COVID-19 exposure outside of home, the safety of HCW and utilization of limited hospital resources.

The purpose of this article is to summarize the recommendations and guidance published by

different international cardiac societies, including a framework for TAVI teams to triage patients in need of TAVI during the COVID-19 pandemic, and to discuss the procedural considerations for these patients.

## 2. TAVI Patients Selection During the Pandemic

The vast majority of severe aortic stenosis (AS) patients are elderly with multiple comorbidities, and they are at increased risk for contracting COVID-19 infection and death [5]. Numerous studies have shown an increased mortality among patients with severe symptomatic AS due to treatment delays [6–8]. This is a very real threat particularly in our practice, where patients are endangered because of the lockdown and the nature of our healthcare system, which makes the follow-up and the timing of the intervention very challenging. We thought to adjust the American working group (ACC, SCAI) recommendation according to our current situation regarding the timing of TAVI for severe AS during the COVID-19 pandemic [9] as below:

### 2.1. Symptomatic Severe Aortic Stenosis

Immediate TAVI should be considered for patients with severe symptomatic AS associated with a reduction in EF thought to be secondary to AS, presence of class III-IV congestive heart failure (CHF), and syncope secondary to AS.

### 2.2. Asymptomatic Severe to Critical AS

For asymptomatic patients, we recommend to postpone the TAVI procedure for three months or until after hospital services resume elective procedures. Close outpatient monitoring, possibly via telehealth, should be continued for all patients with severe AS.

### 2.3. Virtual Clinic Follow up

TAVI centers should establish a system that provides weekly telephone follow-up for patients whose procedures have been delayed. It is expected that some of these patients will develop worsening of their symptoms and will require their cardiac intervention to be performed more urgently during the pandemic.

#### 2.4. Virtual Heart Team Meetings

We recommend that the TAVI team convene virtually on at least a weekly basis to review the status of AS patients on the “waiting” list. Interventional cardiologist and cardiac surgeon should assume a leadership position and should be given the authority to arbitrate challenging cases. No triage system can accurately identify all patients who should safely be deferred; the triage system should be individualized to each medical center, patient population served, and the pandemic's local impact.

Our adjusted recommendation is in line with the document from the Canadian Association of Interventional Cardiology. The fundamental principles of this document are to maintain essential interventional cardiovascular care while minimizing risks of COVID-19 to patients/staff and maintaining the overall healthcare resources [10].

### 3. Procedural Considerations for TAVI During the COVID-19 Pandemic

#### 3.1. Cardiac Imaging Department Preparedness

The patients undergoing TAVI procedure will undergo a Computer Tomographic scan (CT) to prepare them for the TAVI procedure. Hence, the cardiac imaging developed a set of policies and procedures aimed at achieving sufficient capacity for continued operation during a health care emergency and optimize the care of patients with COVID-19 [11,12].

- 1) Implementation of standard policy and procedures for a patient with known or suspected COVID-19 exposure.
- 2) Imaging only for those patients where imaging will impact management.
- 3) The application of the standard protocols for decontamination after caring for COVID-19 patient.
- 4) Encourage improving the capability for remote imaging interpretation

#### 3.2. Local Anesthesia with Conscious Sedation (LACS) Versus General Anesthesia and Intubation

The use of general anesthesia for the TAVI procedure ensures patient stability. However, a few studies have demonstrated the feasibility of TAVI with the patient under local anesthesia with conscious sedation [13]. This has the advantage of being less invasive, a shorter procedure time, a shorter intensive care unit stay, an earlier recovery, and a shorter hospital stay [14]. Local anesthesia

with conscious sedation may be considered as the best anesthesia technique during this crisis provided that the patient is not in decompensated heart failure, can lie flat in the bed, and not morbidly obese. However, the anesthesia team should be prepared to use general anesthesia at any time during the procedure [15–17]. This approach is particularly crucial at this crisis, where the majority of TAVI patients will not utilize the intensive care unit for their recovery after the procedure, and this is important as critical care beds will be limited during the COVID-19 crisis in many countries. PCI should only be performed before TAVI when coronary artery disease is contributing to the patient's clinical presentation.

#### 3.3. TAVI Team Personnel

The TAVI team consists of interventional cardiologists, cardiac surgeons, cardiac imaging specialists, anesthesiologists, and nurse specialists. The TAVI team carries the responsibility to conduct virtual TAVI clinics, to follow up the patients on the waiting list, and select those who need to be done during the crisis without any delay. Depending on the potential exposure of the HCWs to COVID-19 infection, both within the hospital and out of the workplace, team members may need to be quarantined or treated for illness. Hence, consideration of scheduling using designated separate teams should help address interruptions due to the temporary absence of team personnel.

#### 3.4. Practical Recommendations for the Catheter Laboratory During the COVID-19 Pandemic

1. COVID-19 designated intervention catheter laboratories with negative room (air) pressure
2. Only essential staff or personnel should be allowed access into the catheter laboratory.
3. Clinical discussions between medical staff should be performed via phone, if possible.
4. Limit the amount of contact between groups of nursing/medical teams.
5. Limit waiting times for patients in the catheter laboratory corridor.
6. Accept patients only when ready in a catheter laboratory after the team has done with PPE.
7. Ensure there will be adequate personnel for the physical transfer of the patient onto the catheter lab bed (registrar/fellow, scrub nurse, and a minimum of 2 additional staff who are transferring patient).
8. The door between the control room and catheter lab should be “closed.”
9. All non-essential pieces of equipment should be stored outside the procedure room, preferably in cabinets.

#### 4. Conclusions

COVID-19 pandemic has impacted the healthcare provider in all aspects of health care. Intervention for structural heart disease is one of the services which has been heavily influenced. We, the heart team members, must re-prioritize many structural heart disease interventions, including TAVI. The current pandemic and lockdown crisis will require physicians to make challenging decisions regarding the proper triage and deferral of patients as necessary. There should be no compromise in the quality of interventional care provided to all patients, including TAVI patients during the COVID-19 pandemic. The TAVI procedures can be performed using a minimalist approach with moderate conscious sedation and applying all the required precautions to protect the patients and the healthcare workers.

#### Conflicts of Interest

The authors whose names are listed certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

#### Funding

The authors whose names are listed certify that the manuscript is not funded by any organization.

#### Author Contribution

**Mohammed A Balghith:** Conception, Literature Review, Writer-Original Draft, Writing- Review & Editing. **Ahmed A Arifi:** Conception, Literature Review, Writer-Original Draft, Writing- Review & Editing. **Dalia M Ahmed:** Literature Review, Analysis and/or Interpretation. **A Mounir Metwally:** Literature Review, Analysis and/or Interpretation.

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