European Heart Journal Supplements (2020) **22** (Supplement P), P38–P41
The Heart of the Matter
doi:10.1093/eurheartj/suaa184

ESC European Society of Cardiology

Patient with heart failure: importance to treat valvular diseases

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KEYWORDS
Heart failure;
Valve disease;
COVID-19

COVID-19 pandemic is causing an unprecedented burden on healthcare resources and this includes treatment of heart failure and valvular heart diseases (VHD). Percutaneous procedures have broadened the number of patients with VHD who could be treated. However, COVID-19 pandemic has challenged their implementation. The risk of in-hospital infection, resources reallocation, reduced access to hospital caused a substantial delay of VHD treatment with an increased risk of clinical worsening and mortality. Now, the pandemic is not ended and subsequent waves are likely. Reorganization of our healthcare resources is needed, including a proper algorithm for patients' prioritization, based on the severity of their valve disease, their life expectancy, complexity of the intervention, and the resources available. A wider use of telemedicine for patients' selection and follow-up and any measurement that can shorten the duration of the hospital stay must be adopted. Patients' and healthcare staff screening for COVID-19 and all needed procedures to prevent infection will continue to be mandatory. Percutaneous procedures, compared to surgery, are associated with a lower risk of infection and a lower need for in-hospital resources, including a shorter duration of hospital stay. This may favour their adoption when the risk of viral infection is high.

Peak of the COVID-19 pandemic: care of heart failure patients with valvular heart diseases

Valvular heart diseases (VHD) are major causes of acute and chronic heart failure (HF).[1] Aortic stenosis (AS) and mitral regurgitation (MR) represent the most frequent

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aetiologies of severe native VHD, frequently associated with congestive HF (15.5% and up to 50%, respectively).[2] Since the last decade, indications for left-sided percutaneous interventions have dramatically increased, allowing to treat patients formerly not deemed suitable for surgery.[1] Severe tricuspid regurgitation (TR) with end-stage right HF was poorly recognized until recently. Considering most patients do not undergo isolated right heart surgery, and given medical therapy is only palliative, several percutaneous devices are under development.[3]

Many clinical trials are currently ongoing in the field of valvular surgery or new percutaneous techniques. However, the COVID-19 pandemic has slowed down or even stopped the recruitment or proper monitoring of these patients.[4] Indeed, the COVID-19 pandemic has not only affected the patients who contracted the virus but also those without the coronavirus infection, who were the victims of a sudden and profound restructuration of our healthcare resources.[5] Most non-urgent surgical or percutaneous procedures for VHD were postponed.

The Heart Team has been facing many challenging decisions regarding the best triage of HF patients with VHD during this crisis.

First, the risk of delaying procedures. Patients awaiting for severe symptomatic AS or MR correction, with HF symptoms or impaired left ventricular ejection fraction due to VHD, exhibit a higher mortality if interventions are delayed.[6–8] Invasive treatments remain advised in those patients in the COVID-19 context, but this recommendation is to be considered according to local resources.[5] Patients in the waiting list should be assessed regularly through telemedicine.[9]

Second, the risk of in-hospital COVID-19 exposure. Mortality of COVID-19 is increased in the elderly with comorbidities and/or pre-existing cardiac conditions, raising concerns on the risk-benefit ratio of VHD treatment vs. COVID-19 nosocomial infection.[10] Moreover, VHD interventions usually require numerous investigations and physicians contacts, thus increasing the risk of COVID-19 infection. Finally, some patients cancelled procedures on their own, due to fears of contracting the coronavirus and/or the family isolation due to restrictive hospital visitation policies.

Third, the risk of hospital personnel contamination.

Fourth, the potentially suboptimal care because of limited hospital resources (staff redeployment in COVID-19 units, limited access to intensive care units in case of procedural complication...).

In HF patients with VHD, the Heart Team plays a central role not only during the peak of the pandemic but also after in order to be prepared for the unknown next steps. Reorganization of patients' care should be individualized and balanced between the likely risks and benefits.

Moving forward after COVID-19 outbreak: the new normality of valvular heart disease management in heart failure patients

Algorithm for patients' prioritization

Resuming elective VHD interventions is a challenge with the need for new pathways for patients' interventions. Specific strategies should be adopted in order to provide appropriate treatment to HF patients with VHD, limiting virus exposure, and preserving resources.[5,6,11,12]

Patients whose procedure have been cancelled or postponed during the pandemic should be re-evaluated in order to recategorize their priority. Cooperation with the outpatient clinic physicians is mandatory to avoid 'forgotten' patients. Medical staff will also have to deal with new patients, who have not been properly evaluated during the pandemic, and may thus present in a more advanced phase of their disease. A general evaluation can be done by telemedicine. However, when specific examinations are needed, the access to hospital should be planned provided a low risk of patient exposure to COVID-19. Hospitalization may be organized to perform specific investigations and intervention in the same time, trying to minimize the length of stay.

The medical staff must establish a prioritization strategy according to clinical status, such as the algorithm reported in *Figure 1*. High priority should be reserved to patients with refractory HF symptoms due to severe VHD. Valvular heart disease procedures with intermediate or low priority can be scheduled taking into account resource availability, patient life expectancy, and complexity of intervention.[6,11] Outpatients with HF needing a VHD intervention deemed at intermediate priority should be re-evaluated to ensure that their status is not worsening. Even patients of the low-priority group should be carefully re-evaluated if their interventions are postponed to more than 6 months.[6,11]

Resuming elective VHD procedures requires several general conditions. A significant reduction in the rate of new COVID-19 cases and the availability of hospital beds, ventilators, staff, and personal protective equipment (PPE) to treat all emergent/urgent patients are mandatory. Healthcare workers should be periodically tested for COVID-19 to protect staff and patients. All patients who need to be hospitalized should be carefully screened for any specific symptoms or recent potential contacts and tested for potential asymptomatic infection 24–72 h before the admission. Pre-hospital pathways, including telemedicine and cooperating out-clinic specialists, to optimize necessary diagnostic examinations, should be reinforced in order to shorten hospital stay. Finally, general principles of physical distancing and utilization of adequate PPE should be maintained.[12]

Telemedicine

After COVID-19 outbreak, we remain aware that infectious disease may spread easily. Thus, the risks related to close contacts and in-hospital procedures persist.

Telemedicine fits the major needs of physical distancing raised by COVID-19.[9,12] Many devices and platforms are now available. Simple technology, wireless connections, availability on smartphones are important features, although healthcare data security should be guaranteed for a proper medical use.[9,13]

The external barriers to telemedicine are mainly related to the network quality and lack of organizational support,

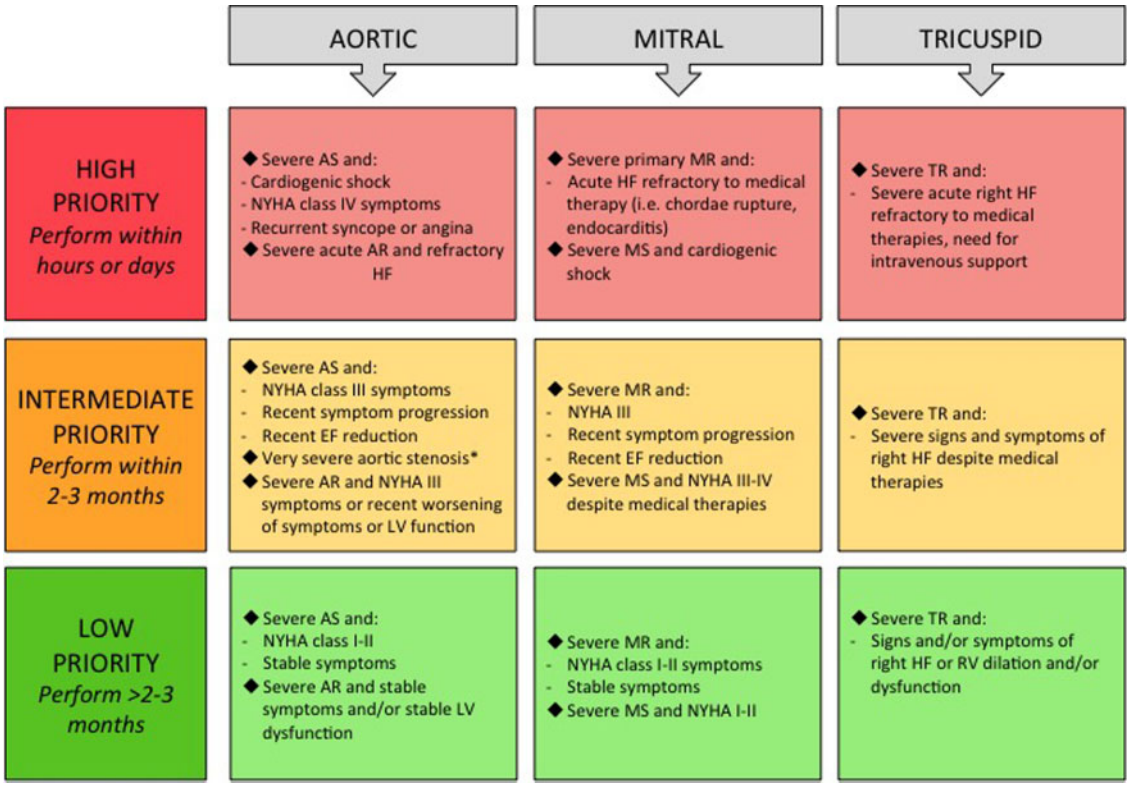

Figure 1 Categorization of patients with heart failure and valvular heart diseases by priority of intervention after COVID-19 pandemic. [a]Very severe aortic stenosis = AVA <0.6 cm^2 and/or peak gradient >60 mmHg or peak velocity >5 m/s. AR, aortic regurgitation; AS, aortic stenosis; HF, heart failure; LV, left ventricular; MR, mitral regurgitation; MS, mitral stenosis; NYHA, New York Heart Association; RV, right ventricular; TR, tricuspid regurgitation.

while the internal barriers are the patients' negative perceptions and the need for a learning curve for the professionals to get used to new programs. Patients with HF and VHD are generally an elderly population with difficulties expressing their needs through an e-consultation, which may be hindered by deafness problems.[14] The presence of patients' relatives may help for better communication. Moreover, telemedicine allows virtual discussion to be held, for instance, to present patients in the Heart Team meeting, including also their outpatient physicians. This could increase compliance of the patients, who would have the chance to clarify their wishes. Telemedicine is therefore crucial in this process and justifies the whole team to be involved.

Procedural aspects

During and after COVID-19 pandemic, limited resources in anaesthesiologists' support, intensive care facilities, or hospital beds may challenge resuming VHD interventions in HF patients.[6] In this context less invasive procedures with low/reasonable risk of complications and minimal resource utilization, as well as limited risk of exposure for health workers, should be promoted.

A 'minimalist' approach for trans aortic valve implantation (TAVI) aimed at optimizing patient outcome, while minimizing facility requirements has been previously reported as safe and effective.[15-18] In patients with severe AS, Heart Team may thus favour TAVI, which can be safely performed under local anaesthesia, with a higher probability of rapid discharge to home rather than surgery. In emergent situations, balloon aortic valvuloplasty may be considered as a bridge to TAVI or surgery.[10] TAVI remains an off-label procedure for patients with aortic regurgitation (AR), though it has been reported as feasible and effective. In patients with severe AR who need high-priority intervention, the Heart Team may figure out TAVI rather than surgery preferably in expert centres.

Selected patients affected by mitral regurgitation (MR) or tricuspid regurgitation (TR) could also receive transcatheter treatment rather than surgery to minimize hospital stay if their anatomy is favourable. However, these patients should be carefully categorized taking also into account the increased risks for the medical team associated with particulate aerosolization during transoesophagal echocardiography (TOE). In this regard, pre-procedural TOE should be limited and only on-table TOE may be considered at experienced centres.[5]

Severe bioprosthesis degeneration leading to HF and requiring intervention should also be considered for percutaneous valve-in-valve procedures rather than redo surgery, in order to minimize hospital length of stay.[5] Transcatheter valve-in-ring and valve-in-mitral annular calcification replacements are off-label procedures, and they should be figured out only if deemed at high priority (*Figure 1*) and according to the local resources.[5]

All transcatheter VHD procedures should be preferably performed in a designated negative pressure

catheterization laboratory with an anteroom, minimizing the number of healthcare workers in the room.[6,10]

Conclusion

COVID-19 pandemic caused an unprecedented disorganization of our healthcare systems. New pathways for appropriate treatments of patients with VHD and HF have been embodied during the surge phase, and should be pursued, in particular, every efforts to limit hospital length of stay (adequate patients' prioritization, use of telemedicine, role of outpatient clinic physicians, and preferential use of percutaneous techniques).

Funding

This paper was published as part of a supplement supported by an educational grant from Abbott.

Conflict of interest: M.M received consulting fees from Abbott Vascular, Amgen, Astra-Zeneca, Bayer, Edwards Therapeutics, Fresenius, Vifor, and Windtree Therapeutics. F. K: Proctoring for Abbott (Portico valve). T.L: Proctoring for Edwards (S3), Boston (Accurate Neo) and Abbott (Mitraclip). CT has received speaker fees and/or contributions to congresses from Abbott, Abiomed, Astra Zeneca, Bayer, Berlin Chemie, Pfizer, and Servier; all outside the submitted work. C.B has received speaker fees from Astra Zeneca and Novartis, Consulting for Novartis and Bayer, Research Grant from Pfizer; all outside the submitted work. All other authors have nothing to declare.

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