Experience of remote cardiac care during the COVID-19 pandemic: the V-LAP™ device in advanced heart failure

The outbreak of coronavirus disease 2019 (COVID-19) has imposed disruptive changes in cardiovascular care worldwide. During the pandemic, allocating resources and mitigating risks have been puzzling processes, requiring extensive adaptations of inpatient and outpatient services. While a dramatic rise of cases has led to overwhelming hospital admissions, heart failure (HF) remained a challenging scenario because clinical presentation may overlap with COVID-19 infection. Therefore, the usual modalities of care delivery for HF patients have been implemented, favouring preventive measures, minimizing in-person contacts, reducing patients’ and health care providers’ risk of exposure.

This unprecedented scenario has accelerated the transition towards telemedicine as a way to provide safe, accountable, and effective care in HF. It is worth mentioning that HF is highly prevalent, especially among the elderly population, the most at risk for the worst outcomes with COVID-19: hospital readmissions negatively impact on patient prognosis and have been shown to predict mortality.2,3

The present context offers the framework for discussing a paradigmatic example of chronic HF management through remote telemonitoring of left atrial pressure (LAP) using the V-LAP™ device (Vectorious Medical Technologies, Ltd, Tel Aviv, Israel).

Figure 1 (A) Patients who accessed to the telemedicine service and access modality. (B) Outcome of the accesses performed and medical decisions.
Remote optimization of left atrial pressure (LAP)-guided therapy in the COVID-19 era: the timeline shows optimization of therapy according to LAP values measured with the V-LAP™ device. WHO, World Health Organization; QD, once daily.

Figure 1 Remote optimization of left atrial pressure (LAP)-guided therapy in the COVID-19 era: the timeline shows optimization of therapy according to LAP values measured with the V-LAP™ device. WHO, World Health Organization; QD, once daily.

The COVID-19 outbreak.

The study population consists of patients in New York Heart Association (NYHA) functional class III, with left ventricular ejection fraction (LVEF) >15%, who have a history of hospitalization for worsening HF or elevated ambulatory levels of brain natriuretic peptide (BNP)/N-terminal pro BNP. The device is implanted under fluoroscopy and transseptal fashion. Once implanted, the battery-free interatrial device captures the LAP. LAP measurements are daily collected via means of an external belt, sending data to the cardiologist via a cloud-based system. In our centre, two patients have been enrolled so far. Here we present the first case with the longer follow-up. The V-LAP system was implanted in a 75-year-old patient system was implanted in a 75-year-old patient with HF with severely reduced LVEF (25%), NYHA class III, and repeat HF hospitalizations (two in the previous 6 months). After 90 days, right heart catheterization confirmed the accuracy of LAP measurements as compared to pulmonary capillary wedge pressure. Once the reliability was confirmed, LAP trends have been monitored and used to guide optimization of medical therapy (Figure 1).

During the course of the COVID-19 pandemic, the V-LAP system showed remarkable reliability and easiness of use, encouraging patients to adhere with a high compliance rate (>99%) to the protocol. Remote analysis of LAP curves led to earlier detection of underlying disease progression preventing clinically relevant decompensation: when a rise in mean LAP was observed, diuretic therapy was modified accordingly. No hospital readmissions occurred over 6 months, avoiding medical contacts and in-hospital exposure. NYHA functional class improved (from III to II) and was coupled with an amelioration of the perceived quality of life, evaluated with the Kansas City Cardiomyopathy Questionnaire.

In the first-in-human cases, the V-LAP™ implant was feasible, safe, and showed good accuracy and precision. Although further data are needed, HF patient management guided by the V-LAP system has the potential to significantly improve patient outcomes and also to decrease direct and indirect costs: the paucity of healthcare resources under the pandemic has highlighted the importance of safer and clinically appropriate solutions of remote telemonitoring, paving the way for a wider use of similar means.

The COVID-19 pandemic has fostered the virtuous cycle of pre-clinical and clinical research, providing effective answers to the pressure of highly demanding therapeutic needs. Enduring advancements have been stimulated, and the benefits will last beyond the course of the outbreak. As telemedicine continues to flourish and to be applied even in ordinary settings, the words attributed to the late Albert Einstein seem appropriate: 'All crises bring progress. Creativity is born from anguish, just like the day is born from the dark night. It is in crisis that inventiveness is born, as well as discoveries made and big strategies.'

Conflict of interest: none declared.

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