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SUPPLEMENTUM 2

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Czech Cardiovascular Research and Innovation Days 2023
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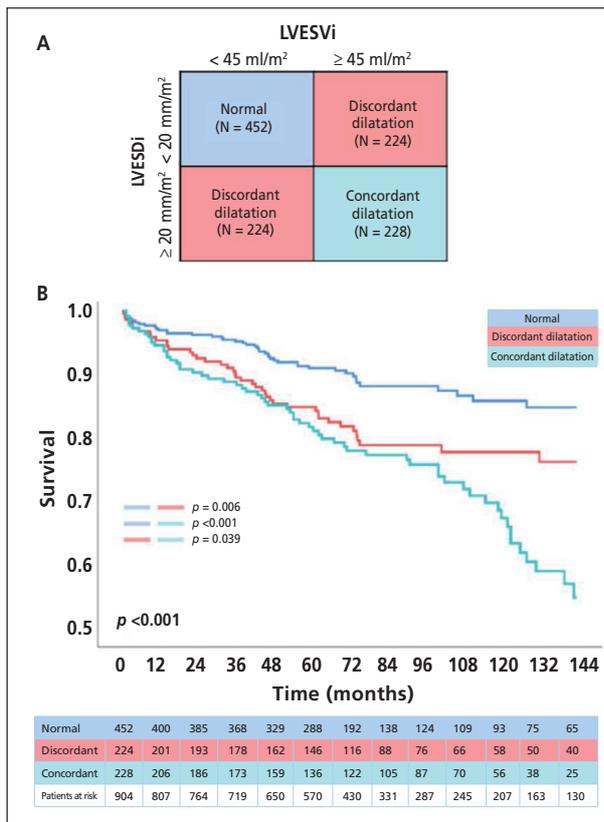


Fig. 1 – (A) Groups categories according to LV dilatation patterns. (B) Kaplan–Meier curves for all cause mortality.

Conclusion: In moderate and moderate-severe AR, the presence of LV dilatation documented by linear and/or volumetric methods was independently associated with increased mortality. Combining both methods for assessment of LV remodeling may improve risk stratification of these patients.

■ MONITORING OF VOLUME STATUS USING A NOVEL SENSOR FOR THE ASSESSMENT OF INFERIOR VENA CAVA AREA AND COLLAPSIBILITY IN A PATIENT WITH HFrEF RECEIVING ADVANCED HEART FAILURE THERAPIES

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Background: A novel sensor designed to measure inferior vena cava (IVC) area over time was used in this study (FIRE1). The system consists of the implantable sensor and an external belt, which is worn around the patient's abdomen for a minute per day. The resonant frequency of the sensor is detected externally by the belt. The results provide an accurate measurement of IVC area and collapsibility index.

Case study: A patient, 48-year-old male, had six years history of chronic HFrEF due to idiopathic dilated cardiomyopathy. The patient had stable NYHA class III symptoms at the time of enrolment in the study. The patient met the criteria for the study using this novel sensor, which was implanted in January 2020 and the system measured the changes in the patient's IVC area over time on a daily basis. The patient was admitted to hospital because of worsening of heart failure with symptoms and signs of low cardiac output and congestion due to slow ventricular tachycardia under the ICD detection in September 2021. The patient was dependent on inotropes and referred to an advanced heart failure therapy centre. Finally, the patient received an LVAD (HeartMate 3) as a bridge to heart transplant in October 2021. The patient stayed in the study and has continued to acquire daily sensor readings. The patient underwent successful heart transplantation on 26th March 2023.

Results: We report the changes of IVC area and collapsibility index as assessed at time of worsening of heart failure, after LVAD implantation and after heart transplantation.

Conclusion: In this case study, the changes in IVC area and collapsibility index as assessed by a novel sensor system appeared to have predictive value of the subject's deterioration towards advanced therapies, and subsequently responded positively post LVAD implantation and heart transplant.

■ HOW INFERIOR VENA CAVA COLLAPSIBILITY INDEX FROM A NOVEL IMPLANTABLE SENSOR CORRELATES WITH ESTIMATED PLASMA VOLUME AND NT-PROBNP: A STUDY IN PATIENTS WITH CHRONIC HEART FAILURE

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Type: clinician's oral presentation, topic: heart failure, transplantation, circulatory assist devices

Background: A new wireless implantable sensor can measure inferior vena cava (IVC) area and collapsibility index and was invented for remote monitoring in heart failure.

Study objective: To evaluate the relationship between IVC collapsibility, estimated plasma volume, and NT-proBNP concentration in patients with chronic heart failure (CHF).



Patients and methods: A novel sensor was implanted in six CHF participants of the First in Human Clinical Investigation of the FIRE1 System in Heart Failure Patients (FUTURE-HF) in our cardiac center. The collapsibility index of the IVC was recorded on each clinic follow-up visit. Patient's weight was recorded and hemoglobin, hematocrit, and NT-proBNP were analyzed from the blood samples. An estimated plasma volume (ePV) was calculated by the Tetsuko formula. The correlation of parameters was evaluated by Pearson's correlation coefficient.

Results: A total number of 58 measurements were analysed. The mean ePV was 7713.5 ml (median 7465 ml), the mean collapsibility index (Col) was 46.5% (median 42.2) and the mean NT-proBNP level was 1122.7 (median 988) ng/l. Statistically significant inverse correlation of collapsibility index (Col) and estimated plasma volume was found (ePV and Col, $r = -0.35$, $p = 0.0076$). The correlation of NT-proBNP with Col was not statistically significant ($r = -0.12$, $p = 0.31$). It was expected that IVC Col is accompanied by early volume increase and that its reduction precedes rise in NT-proBNP – a sign that pronounced strain is exerted on the cardiac muscle.

Conclusion: The collapsibility index of the inferior vena cava as assessed by a novel implantable sensor correlated with a biomarker of hemoconcentration, showing a statistically significant inverse correlation with plasma volume, and thus may provide a promising tool to evaluate volume status in heart failure patients in their homes.

■ RISK OF ATRIAL FIBRILLATION AND CARDIOVASCULAR HOSPITALISATION ONE YEAR AFTER DISCHARGE FOR COVID-19

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Type: clinician's oral presentation, topic: rhythm disorders, pacing

Objective: To evaluate the incidence of atrial fibrillation and cardiovascular hospitalisation during one year after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) COVID-19 with the necessity of in-hospital care.

Methods: Source of the data was the National Register of Reimbursed Health Services in the Czech Republic. The one-year incidence of newly developed atrial fibrillation and cardiovascular hospitalisation after COVID-19 hospitalisation from 1-Sep-2020 to 31-Dec-2020 was analysed in the Czech Republic (population 10.7 million). A control group was selected from the general population matched for sex and age in 1 : 5 ratio (case-control matching) without admission to the hospital for COVID-19 in the respective period. Patients who died within the first 30 days after COVID-19 admission were excluded.

Results: The study groups consisted of 27,975 patients and 139,875 controls, both without a history of atrial fibrillation or cardiovascular hospitalisation. The incidence of atrial fibrillation was 1.7% vs 0.7% (HR = 2.55 [95% CI: 2.27–2.86], $p < 0.001$) and incidence of cardiovascular hospitalisation was 3.2% vs 1.6% (HR 2.06 [95% CI: 1.91–2.22], $p < 0.001$). There is also a several-fold higher risk of death in the patient group (11.3% vs 2.6%; HR = 4.65 [95% CI: 4.44–4.88], $p < 0.001$).

Conclusion: The incidence of newly developed atrial fibrillation is 2.6 times higher during one year after discharge for hospitalisation for COVID-19 compared to matched general population. The risk of cardiovascular hospitalisation doubled over the same period. The risk of death is 4.7 times higher. Despite matching, there are many limitations to the analysis and the causality is unproven. The necessity of hospitalisation for COVID-19 is a more likely marker of frailty than an independent risk factor.

■ AL AMYLOIDOSIS AS THE CAUSE OF HYPERTROPHIC CARDIOMYOPATHY IN A 76-YEAR-OLD FEMALE PATIENT

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Type: clinician's poster, topic: myocardial and pericardial diseases

In cardiology, hypertrophic cardiomyopathy is an “umbrella diagnosis” including, in differential diagnosis, a relatively long list of conditions/diseases. Generally, hypertrophic cardiomyopathy is caused by mutation of sarcomere proteins or deposition of various molecules in the myocardium, e.g., in storage diseases, transthyretin amyloidosis, or AL amyloid deposition in primary amyloidosis. Accurate identification of the cause of myocardial hypertrophy requires a precise differential diagnostic process and, not infrequently, interdisciplinary collaboration of the cardiologist and hematologist or clinical geneticist. The aim of this case report is to describe the process of differential diagnosis in a female patient with *de novo* heart failure and myocardial hypertrophy, with AL amyloidosis eventually confirmed as the cause of hypertrophic cardiomyopathy.

■ PULMONARY PERFUSION IN LONG-TERM SURVIVORS OF COVID-19 RELATED SEVERE ARDS TREATED BY EXTRACORPOREAL MEMBRANE OXYGENATION

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