The Importance of Early Diagnosis for Left Ventricular Dysfunction

Undiagnosed Left Ventricular Dysfunction (LVD) in at-risk Patients

Despite tremendous advances in treatment and rehabilitation, heart disease is the leading killer in the US, responsible for ~ 610,000 deaths[1]. Considering that 84%/77% (male/female) patients are dying within 6 years[2], heart failure has a greater mortality than some cancers[3] and is putting a tremendous burden on patients, their care circles and society. For example, the cumulative cost of heart failure in the US is estimated to be $30bn/year[1], much of which would be avoidable with earlier detection and preventative intervention[4]. Heart failure develops from progressive left ventricular dysfunction (LVD) due to the underlying heart disease present in one third of the US population, an estimated 92.1 million US adults (Stage A)[1]. In further 16 million patients[1], the disease has progressed to structural changes in the heart (Stage B) and despite showing no or non-specific symptoms, the patients are at serious risk of exacerbation. The incidence of heart failure alone is dramatic, approximately 960,000[1] new patients are diagnosed with heart failure every year, often without any advanced clinical symptoms.

Left ventricular dysfunction often precedes acute heart disease[5] and can be detected with non-specific symptoms. Ammar et al[6] report, 34% of asymptomatic patients 45 years or older carry confirmed functional and/or structural abnormalities that are at risk of developing into heart failure if untreated. While LVD remains a serious clinical condition, it also presents itself as a relatively early marker for heart failure.

Risk Factors

LVD resulting from underlying heart disease is strongly influenced by well-characterized risk factors, smoking[7,8], obesity, genetics [9], Diabetes Mellitus[10], Hypertension[11,12], and Hypercholesterolemia[13]. In today's clinical practice, primary care practitioners routinely use the patient's medical check-up to diagnose symptomatic heart disease using auscultation and assessment of the known risk factors. Mitigating risk factors remains at the core of preventative intervention, however if no reliable, easy-to-use diagnostic system is available the effect on LVD remains unknown to clinician and patient.

Common Risk Factors for Heart Failure

HYPERTENSION[11,12]:
39%/59% (m/f) attributed to congestive heart failure

SMOKING[7,8]:
2-3x times more likely to experience heart failure

DIABETES[13]:
40% more likely to experience heart failure

GENETICS[9]:
e.g: Cardiomyopathy[14], familial hypercholesterolemia[13]

HYPERCHOLESTEROLEMIA[13]:
39%/18% (m/f) more likely to develop heart failure

HEART DISEASE: Coronary Artery Disease/Ischemic Heart Disease[12], Pulmonary Heart Disease[15], and Atrial fibrillation (AF), other cardiac arrhythmias[16]

Advantages of Early Diagnosis

The clinical need to evaluate patients with non-specific symptoms for cardiac functional and anatomical disease is well established[4] but satisfactory technology has not been available. Echocardiograms are not suitable for for patients without clear symptoms of heart disease, costing between $1000 and $2000 per patient and requiring 20-60 minutes of expert clinicians to administer and diagnose. Consequently, primary and urgent care physicians rarely use echocardiograms in patients with broad but non-specific symptoms. The risk is that these patients progress into later stages of heart disease and cardiologist intervention is indicated. Lower-cost imaging systems are entering the market aiming to fill this gap but have yet to establish themselves in routine clinical practice.

The needs are clear. Early diagnosis of at-risk patients would save lives, time, cost and unnecessary burden to patients and their care circles. To succeed, the system will have to be affordable and primary and urgent by primary care physicians and their staff, be easily integrated into the existing check-up of at-risk patients. The data must be of equal or better diagnostic value as an echocardiogram, at least to diagnose abnormalities allowing a referral to a cardiology clinic. Lastly, the system has to be fast from application to diagnosis, preferably assisted by algorithms that allow non-cardiology clinicians to be confident with the result.

To address this gap, Aventusoft is developing a new generation of easy-to-use devices for diagnosing patients with non-specific symptoms. Please contact info@hemotag.com for more information and a demonstration.

"Our findings point to the need for a more aggressive pharmacological and lifestyle management of patients with ALVD [Asymptomatic Left Ventricular Dysfunction] and for defining viable screening strategies, as well as testing and implementation of pre-emptive cost-effective interventions to reduce the burden of HF burden in our communities".[4]

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info@HEMOTAG.com | www.HEMOTAG.com