Prevalence of subcutaneous implantable cardioverter-defibrillator candidacy based on template ECG screening in patients with hypertrophic cardiomyopathy

**Methods:** the subcutaneous ICD is a relatively new device that avoids the placing of the leads in the heart. The device system recognizes dangerous arrhythmias by continuous analysis of the ECG of the patient: every beat must fit into a specific frame. In order to be able to implant the S-ICD, the patient ECG is analyzed and each beat must satisfy the analysis with the frame. Since HCM often exhibits morphologically altered ECGs we evaluated with the S-ICD frame the baseline ECG of each patient. We evaluated if any characteristic of the basal ECG could predict the ‘screening failure’ of the S-ICD, thereby preventing the S-ICD option to the patient. The individual arrhythmic risk at 5 years of each patient was calculated as suggested by 2015 ESC guidelines and also compared with the probability to pass or not the screening. Results showed that a third of high-risk HCM patients had severe abnormalities of the ECG (reflecting severe phenotype). Low-risk patients were more often suitable candidates for the S-ICD, but of course they need it less. Thus, the study calls for new developments in the S-ICD technology that may allow the inclusion of all HCM patients who may require the device.

**What this means for the patient:** By Dr. Iacopo Olivoto

This study addresses the issue of subcutaneous implantable cardioverter-defibrillators (S-ICD), devices that have been recently introduced and are appealing for younger HCM patients, because they are totally removable and less invasive than classic ICDs (the wires run under the chest skin but remain outside the rib cage; there are no wires that go inside heart as with classic ICDs). These devices, however, can only be implanted in patients with certain ECG features, that allow accurate detection of arrhythmias by the subcutaneous leads (that are unavoidably less sensitive than endocardial leads)- A simple test is done to determine whether each patients is an appropriate candidate, by examining tracings with a special template.
Because HCM patients often have markedly abnormal ECGs, however, they often fail this test. This study shows that currently available preimplant screening algorithms recommended by the manufacturer are associated with a significant failure rate in patients with HCM, particularly in the high-risk subgroup (the latter with over a third of patients who cannot benefit from the device because of this). The study calls for development of disease-specific algorithms, allowing more HCM patients to become candidates for the S-ICD.