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Assessment of iron overload and cardiac disease in patients with transfusion-dependent myelodysplastic syndromes with cardiac magnetic resonance new sequences

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**Background:** Iron overload cardiomyopathy (IOC) is a rare condition, although with an increasing incidence due to hematological disorders i.e. myelodysplastic syndromes (MDS) requiring repeated red blood cell (RBC) transfusions. Nowadays, the most frequent clinical presentation begins as dilated cardiomyopathy with significant restriction and arrhythmias. Even more, the heart failure is the main cause of death in patients (P) with IOC.

The finding of P in early stages of IOC is essential, as they would get benefit from a chelation therapy which may prevent and reverse the affection.

**Purpose:** To carry out a comprehensive cardiac assessment through the use of new cardiac imaging techniques in P with low-risk MDS under chronic transfusional support to identify myocardial iron overload (MIO) and cardiac disease.

**Methods:** Observational prospective study in P with low-grade MDS under treatment with RBC transfusional support. They were studied with echocardiography and cardiac magnetic resonance (CMR) with sequences recently implanted (T1 and T2 mapping) comparing with the methods of quantification of MIO validated (T2*). MIO was defined by T2* <20ms

**Results:** 28 P with low-grade MDS were recruited by 2016. Most of P were elderly (82% ≥65 years old), 79% had cardiovascular risk factors and 29% suffered background of heart disease.

CMR could be performed in 24 P. Echocardiography and blood analysis were performed on our population. We identified unknown left ventricular (LV) dilatation and systolic dysfunction in 25% and 16.7% of P, respectively, as well as right ventricular (RV) dilatation and systolic dysfunction in 33.3% and 4.2%. Moreover, unknown coronary artery disease was diagnosed in 2% by alterations in segmental mobility and ischemic pattern late gadolinium enhancement. 14% of P had an unknown valvular heart disease with a severity more than mild. Overall mean hemoglobin and ferritin levels were 9.1±1.3 g/dL and 1619±1103ng/mL, respectively. 50% of P had elevated NT-proBNP value (>400pg/ml) and high sensitive troponine was elevated in 42%.

Tissue characterization (T2*, T2 and native T1 relaxation times) were significantly correlated (0.732, p<0.05). Native T1 time and T2 relaxation time were significantly different in T2 and T2* relaxation times and a tendency with significant restriction and arrhythmias. Even more, the heart failure is the main cause of death in patients (P) with IOC.

The finding of P in early stages of IOC is essential, as they would get benefit from a chelation therapy which may prevent and reverse the affection.

**Aim:** To compare which therapeutic decisions have a positive impact on in-hospital mortality, in patients with ACS stratified according to ejection fraction.

**Methods:** The authors analyzed a cohort of patients with ACS enrolled in a multicenter national registry between 2010 and 2016, and stratified according to their EF. Patients with previously known HF or with no echocardiography EF estimation were excluded. 9429 patients were included and classified in three groups; Group1: EF<50%, (n=6113, 65%); Group 2: EF 40–49% (n=1922, 20%); Group 3: EF ≥50% (n=1390, 15%). To exclude confounding factors, a multivariate logistic regression analysis was performed, including pharmacological treatment and also pre-hospital, clinical and laboratory data, ACS classification and coronary anatomy when known.

**Results:** Overall mortality was 2.8% (n=263); Group1: 0.9% (n=53), Group 2: 2.4% (n=37) and Group 3: 11.4% (n=159), p-value <0.001. Multivariate analysis results are shown in the table.

**Conclusion:** Post-ACS mRFE patients seem to be an intermediate risk group in which beta blocker administration had a positive impact on survival. An invasive strategy was a survival predictor for all groups, regardless of EF.

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**Prediction of heart failure and atrial fibrillation using the CHARGE-AF and ARIC risk scores**

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**Introduction:** The CHARGE-AF is a clinical score which gives an assessment of 5 year risk of developing atrial fibrillation (AF). Heart failure (HF) shares a similar risk factor profile to atrial fibrillation. AF risk assessment tools such as the CHARGE-AF score share similar characteristics to other HF risk scores such as the ARIC score.

**Aim:** We aimed to compare the CHARGE-AF score to the ARIC score in prediction of HF and AF in patients with risk factors.

**Methods:** A community based study of 503 participants (mean±SD age 70.8±4.7yrs, male 48% with medianIQR follow up 12 months) ≥65 years were recruited if they had presence of 1 or more risk factor for HF (hypertension (HTN), diabetes mellitus (DM), obesity, previous chemotherapy, previous history of ischaemic heart disease (IHD)). HF and AF risk was assessed using the CHARGE-AF and ARIC scores. Baseline ECG and echocardiography was performed in all participants. HF reduced or preserved ejection fraction was diagnosed as per ESC guidelines. AF was diagnosed by local doctors during the follow up period, by 12 lead ECG during outpatient clinics or using a single lead portable ECG monitoring device (Remon, Semacare, China). Receiver operator characteristic (ROC) curves were compared between both scores using the Hanley and McNeil method.

**Results:** The baseline median CHARGE-AF and ARIC scores were 7.5% (3.8–11.3%) and 5.9% (2.6–9.3%) respectively. During the follow up period 55 patients developed HF. 173/503 participants completed portable ECG monitoring follow up and 43 (25%) were diagnosed with subclinical AF. Patients with HF were older with higher rates of DM, HTN and IHD (p<0.05). Patients with AF were older, more likely to be male and had higher baseline CHARGE-AF score (p<0.05). In patients with HF and AF, echocardiography showed impaired global longitudinal strain and increased left atrial volume (p<0.05). For HF, there was modest discriminative ability using both CHARGE-AF and ARIC scores and no significant discrimination using other CHARGE-AF and ARIC scores.

**Table 1. Receiver Operator Characteristic (ROC) curves comparing CHARGE-AF and ARIC for heart failure and atrial fibrillation**

<table>
<thead>
<tr>
<th>AUC (CHARGE-AF)</th>
<th>95% CI p value</th>
<th>AUC (ARIC)</th>
<th>95% CI p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Failure</td>
<td>0.65</td>
<td>0.58–0.73</td>
<td>0.65</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>0.61</td>
<td>0.51–0.71</td>
<td>0.59</td>
</tr>
</tbody>
</table>

**Conclusion:** The CHARGE-AF score shared similar characteristics to other HF risk scores such as the ARIC score.

**Aim:** To carry out a comprehensive cardiac assessment through the use of new cardiac imaging techniques in P with low-grade MDS allowing to identify underlying not uncommon cardiac structural disease. Furthermore, the analysis of tissue characterization (T2*, T2 and native T1 relaxation times) shows differences depending on the number of transfusions and probably could be a prognostic predictor and a marker for early chelation therapy of this population.

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<table>
<thead>
<tr>
<th>Group 1 (n=6113)</th>
<th>Group 2 (n=1922)</th>
<th>Group 3 (n=1390)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGR [95%] p value</td>
<td>OR [95%] p value</td>
<td>OR [95%] p value</td>
</tr>
<tr>
<td>Invasive strategy</td>
<td>0.2 [1.0–1.4] &lt;0.001</td>
<td></td>
</tr>
<tr>
<td>IH beta-blockers</td>
<td>0.3 [0.1–0.6] 0.003</td>
<td>IH beta-blockers</td>
</tr>
<tr>
<td>Invasive strategy</td>
<td>0.1 [0.0–0.2] &lt;0.001</td>
<td>IH ACE</td>
</tr>
<tr>
<td>IH spironolactone</td>
<td>0.5 [0.3–0.9] 0.024</td>
<td>Invasive strategy</td>
</tr>
</tbody>
</table>

ACEI, angiotensin conversion enzyme inhibitors; IH, In Hospital.