Thyroid Dysfunction and its Relation to Myocardial Performance among Patients with Acute Myocardial Infarction

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Background: The cardiovascular system is one of the most important targets on which thyroid hormones act [(132)], thyroid hormone has a major role in the cardiovascular system function and cardiac hemodynamics [(133, 134)].
Serum thyroid hormone levels have been described in several systemic non-thyroidal illnesses, among them acute heart diseases. A slight change in thyroid status affects ventricular function, serum cholesterol levels, heart rate, heart rhythm, and increases risk of coronary artery disease and cardiovascular mortality [(149)]. Nevertheless, the relation between anomalous thyroid function and cardiovascular effects remains indistinct [(150)].

Objectives: The aim of our study is to evaluate the prevalence of thyroid dysfunction in patients with acute myocardial infarction and to study the impact of these dysfunctions on in-hospital morbidity and mortality among those subjects.

Patients and Methods: This study was conducted on one hundred critically ill patients admitted to the critical care department with the diagnosis of acute myocardial infarction in the period from April 2017 to January 2019. All patients were subjected to the following:

- Full history taking, clinical examination, ECG, and routine laboratory investigations.
- Echocardiography: to evaluate wall motion score index (WMSI), left ventricular ejection fraction (LVEF %), the myocardial performance index (MPI) and to detect any ischemic complications.
- Thyroid function tests: TSH, FT3, FT4

Exclusion criteria: Patients were excluded from the study if they were using amiodarone, corticosteroids or received any iodinated contrast agent within the previous two weeks or those with diseases that are known to affect thyroid function tests, such as neoplasia, chronic renal failure, liver cirrhosis and patients with heart failure.

Results: In our study the mean age of the patients was 54.3 ± 8.8 years, 50 patients (50%) were males, according to thyroid profile, 78 patients (78%) had euthyroid status and the remaining 22 patients (22%) had thyroid dysfunction which include: 12 patients (54.54%) were euthyroid sick syndrome, 7 patients (13.81%) had subclinical hypothyroidism, 3 patients (13.63%) had subclinical hyperthyroidism, and none of the patients in our study had neither overt hypothyroidism nor overt

hyperthyroidism. Also we didn't find significant difference between type of myocardial infarction (STEMI & NSTENI) and thyroid status (p = 0.477).

As regard lipid profile, we found that total cholesterol levels were significantly higher in patients with thyroid dysfunction than in patients with euthyroidism (218.4 ± 47.5 vs. 194.3 ± 51.0, p = 0.049).

Our study showed that patients with thyroid dysfunction had a higher initial killip class > I (54.5 % vs. 21.8 %, p = 0.003), lower LVEF < 50 % (86.4 % vs. 39.7 %, p < 0.001) with mean LVEF (45.0 ± 6.7 vs. 53.4 ± 9, p < 0.001), higher WMSI (1.87 ± 0.25 vs. 1.53 ± 0.83, p < 0.001), and a higher myocardial performance index (MPI ≥ 0.45) (100.0% vs. 51.3%, p < 0.001) with mean MPI (0.555 ± 0.062 vs. 0.473 ± 0.117, p = 0.002) than patients with normal thyroid profile.

As regard the in-hospital mortality in our study, mortality was 3.8% in patients with normal thyroid profile vs. 4.5% in those with thyroid dysfunction and there was no statistically significant difference between the two groups (p = 1.0).

Conclusion: The thyroid dysfunction in acute myocardial infarction is highly prevalent as 22% of our patients experienced thyroid dysfunction and the most frequent dysfunction was euthyroid sick syndrome (12 %). Also patients with thyroid dysfunction have significant higher levels of total serum cholesterol compared to patients with normal thyroid profile.

Thyroid dysfunction in association with acute myocardial infarction affect the myocardial performance and this was evident in our study by lower ejection fraction, higher initial killip class, higher wall motion score index, and increased myocardial performance index in patients with thyroid dysfunction compared to those with normal thyroid status but In our study the in-hospital mortality was not affected by the thyroid status.

Keywords: Thyroid dysfunction, myocardial performance, morbidity & mortality, acute myocardial infarction.