VI. Streszczenie w języku angielskim

Background

Epidemiological studies indicate that the biggest problems in modern medicine are metabolic disorders and related diseases such as coronary heart disease, diabetes, hypertension, and obesity. Researchers and clinicians are currently placing a great emphasis on studying the risk factors for these diseases, particularly those that are modifiable. The association between uric acid levels and cardiovascular disease has been described since the 19th century. However, the last half-century has seen a return to the search for a relationship between the occurrence of heart and vascular diseases and increased or decreased uric acid levels.

Objectives

The purpose of the study was: 1) To assess the concentration of uric acid in STEMI and NSTEMI heart attacks. 2) To analyze the concentration of uric acid depending on the presence of risk factors for cardiovascular diseases. 3) To analyze changes in the coronary arteries depending on the concentration of uric acid. 4) To evaluate the influence of uric acid concentration on early and long-term prognosis in a group of patients with STEMI and NSTEMI heart attacks.

Material and methods

The study group was extracted after a retrospective analysis of the medical records of patients hospitalized in the Invasive Cardiology Clinic of the University Clinical Hospital. The data came from the internal database of the Invasive Cardiology Clinic "Kardmed" (Version 4.0.376, M.Go, Wasilków, Poland) and traditional medical records. The study included 1064 hospitalized patients diagnosed with myocardial infarction: with ST-segment elevation - STEMI (N-458) and without persistent ST-segment elevation - NSTEMI (N-572) from June 2010 to March 2014. Based on the study results, patients were classified into two groups: treated with xanthine oxidase inhibitor (N=34) and not treated with xanthine oxidase inhibitor (N=1030). The set of variables subjected to interpretation included demographic data, elements of clinical characteristics, selected biochemical parameters, echocardiographic characteristics, the occurrence of selected risk factors for heart attack and concomitant diseases, and the results of coronary angiography. The studied patients were divided into the

following groups - with uric acid concentration <6.8 mg/dL and ≥ 6.8 mg/dL, such division results from the crystallization of monosodium urate, and based on the quartile distribution of uric acid concentration: ≤ 3 mg/dL, > 3 mg/dL ≤ 5 mg/dL, > 5 mg/dL < 7 mg/dL, ≥ 7, mg/dL. Long-term mortality was determined based on data obtained from the Ministry of Digitalization in Warsaw based on the PESEL number. Total mortality was assessed in the entire study group as of November 14, 2018. The research project was approved by the Bioethics Committee at the Medical University of Białystok (Resolution No.: R-I-002/28/2013).

Results

In the studied group of patients (n=1030) with a heart attack, the average age was 69 years with a standard deviation of ±7.8 years. Women accounted for 31.3% (N=322) of the study group, while men numbered 708 (68.7%). The average systolic blood pressure was 138.00 ±24.4 mmHg (60-234 mmHg), and the diastolic blood pressure was 80.50 ±14.4 mmHg (30-130 mmHg). The average heart rate was 78.0±18.0 beats per minute. The most common risk factors were hypertension (72%), hyperlipidemia (57%), chronic kidney disease (25%) and diabetes (21%). The average BMI was 28 kg/m2. 70% of patients had an abnormal BMI according to WHO standards, and almost one in three patients was obese. The patients were divided into four quartiles depending on their uric acid levels. In the group of untreated patients with xanthine oxidase inhibitors, 425 patients (41.3%) were in the third quartile with uric acid values >5mg/dL ≤7mg/dL, while 367 individuals (36.5%) were in the second quartile with uric acid values >3mg/dL ≤5 mg/dL. The fourth quartile with uric acid ≥7 mg/dL had 201 patients (19.5%), while the first quartile with uric acid concentrations ≤3 mg/dL had 28 patients (2.7%). The average uric acid concentration in the studied group was 5.75 mg/dL. Uric acid values ≥6.8mg/dL were observed in 21% of patients with STEMI and 24% with NSTEMI. Age was a differentiating factor for uric acid concentration in the entire study group (5.79mg/dL) and in the NSTEMI group (5.94mg/dL). Regardless of the type of heart attack, men had higher uric acid concentrations, with an average of 5.85mg/dL. Patients with hypertension had higher uric acid concentrations, regardless of the type of heart attack. There was no statistical significance observed between glucose concentration at admission and uric acid concentration (p=0.38). The study also found that with an increase in BMI, uric acid concentration increased. The differences between BMI classification groups were statistically significant for both STEMI and NSTEMI. Higher uric acid concentrations were observed in patients with lower cholesterol levels in the entire studied group, but these differences were

not observed when dividing the groups by STEMI and NSTEMI. The study also found that higher uric acid concentrations occurred in the group of patients with heart attacks with extreme - low (6.37mg/dL) or high (6.32mg/dL) - HDL cholesterol levels. There was no statistically significant difference observed between LDL concentration and uric acid concentration. A significant statistical difference was found in risk factors correlated with uric acid concentration, which included age (only in the NSTEMI group), BMI, triglycerides, and HDL cholesterol fraction.

Among patients treated with a xanthine oxidase inhibitor (34 individuals), there were no patients in the first quartile with uric acid levels ≤3mg/dL. In the group of patients with uric acid levels ranging from >3mg/dL to ≤5mg/dL, 6% of patients were found. In the group with uric acid levels >5mg/dL to ≤7mg/dL, 29% of patients were found. The most, as much as 65% of patients, were those with uric acid values above 7mg/dL. The average value of uric acid in this group of patients was 7.9 mg/dL. The time from the onset of a heart attack to the end of observation or death was an average of 1865 days (SD=846), with a median of 2073 days. The longest observation time was 3082 days. In the studied group, 321 people died, which constituted 31%. The average survival of deceased individuals was 28.6 months. The average age was higher in the group of deceased individuals (73.28 vs 64.17). There were 115 deceased women, making up 36% of all hospitalized women. 206 men died, which constituted 29% of all hospitalized men. A greater number of deaths occurred in the group of patients previously diagnosed with diabetes compared to patients without diabetes (27.41% vs 17.63%), chronic kidney disease (40.5% vs 18.05%), arterial hypertension (73.83% vs 70.52%), and after myocardial infarction (24.3% vs 15.37%). Living patients smoked cigarettes more often (54.58% vs 41.43%) and had been diagnosed with hyperlipidemia (62.34% vs 44.86%) more often than deceased patients. The value of uric acid concentration was higher in the group of deceased individuals than in the group of living patients (6.01mg/dL vs 5.58mg/dL). Statistically significant differences were also found in the distribution of LDL, HDL, and TG between groups of patients whose treatment ended in death. In the group of individuals with uric acid levels of at least 7 mg/dL, the one-year survival rate was 77.2% compared to 90.1% for those with levels ranging from 3-5 mg/dL; the five-year survival rate was 59.7% compared to 78%, and the seven-year survival rate was 50.8% compared to 72.3%. The seven-year survival rate was also similar in the group of patients with uric acid levels below 3 mg/dL (50.5%).

Conclusions

1. Elevated uric acid levels were found in 1 out of 5 patients with myocardial infarction regardless of the presence of persistent ST-segment elevation. Among patients treated with a xanthine oxidase inhibitor, 3 out of 5 patients did not achieve target uric acid levels.

2. Higher average uric acid levels were found in older men with higher BMI, hypertension, elevated triglyceride levels, and lower left ventricular ejection fraction.

3. There was no association between uric acid levels and the degree of atherosclerotic changes or the diameter of the circumflex artery.

4. Elevated uric acid levels were associated with higher mortality in middle-term observation among hospitalized patients with a diagnosis of myocardial infarction without persistent ST-segment elevation. Other factors affecting prognosis were age, ejection fraction, and haemoglobin levels