Streszczenie w języku angielskim

Acute kidney injury is defined as a sudden impairment of kidney function and is characterized by a large spectrum of clinical symptoms. It occurs 10 times more often among hospitalized patients, while its incidence is significantly higher in the population of critically ill patients requiring hospitalization in the intensive care units. The current diagnostic criteria are based on measurements of serum creatinine concentration and are defined as one of the following criteria: rise in creatinine levels ≥ 0.3 mg / dl (= 26.5 μmol / l), or ≥1.5x increase of serum creatinine level above the reference ranges observed within previous 7 days. The third criterion is a decrease in diuresis <0.5ml / kg / h for last 6 hours. One patient may have more than one condition leading to renal injury, therefore the definition of Acute Kidney Injury should be treated equally as Acute Coronary Syndrome (Acute Coronary Syndrome), or Acute Lung Syndrome.

Post-contrast acute kidney injury is not a synonym with contrast induced nephropathy. The first definition is used when the iodinated contrast media was not the only factor leading to impairment of kidney function. There are many factors leading to post-contrast acute kidney injury and the contrast agent inself is not always the only trigger for kidney injury. Contrast induced nephropathy is a specific term used to describe the sudden impairment of renal function caused by intravascular administration of iodinated contrast media.

The rate of acute contrast induced nephropathy after intravenous administration of contrast media varies depending on the study from 1% to 12%, single studies report up to 30%. The frequency of contrast induced nephropathy among patients with normal kidney function is low. The incidence of contrast induced nephropathy is higher after intraarterial administration of contrast media if compared intravenous administration. Its incidence has been reported as 7 to 16% depending on the study population. The most important patient-related risk factors for contrast induced nephropathy are pre-existing chronic kidney disease. diabetes, dehydration, cardiovascular diseases, the use of diuretics, advanced age (> 60 years), multiple myeloma, hypertension, hyperuricemia.

Intraarterial administration is associated with a higher risk of contrast induced nephropathy. Patients undergoing angiographic procedures have a higher risk of cardiovascular disease, are more often hemodynamically unstable (hypotension, lower cardiac output), and they are delivered higher volumes of contrast media. Intraarterial administration leads to a higher

concentration of contrast media in the renal vessels. Risk factors for contrast nephropathy associated with contrast media are their repeated administration and their osmolarity.

Iodine contrast media are divided into high-osmolar, low-osmolar and iso-osmolar. A higher volume of administrated contrast media is associated with a higher risk of contrast induced nephropathy. The tubular damage due to medullar ischemia is accepted background of contrast induced nephropathy as. The decrease in renal perfusion and the toxic effect of the administrated contrast media on the tubular cells are recognized and important mechanisms of contrast induced nephropathy.

The aim of the study:

• To estimate the risk of acute kidney injury after intravenous and intraarterial contrast media administration in the group of hospitalized patients.

• To estimate the impact of chronic kidney disease on the incidence of acute kidney injury in the study population.

• To present the relationship between the cause of hospitalization, other comorbidities, and the frequency of contrast induced nephropathy.

302 patients hospitalized in the Second Department of Nephrology and Hypertension with Dialysis Unit or in the Department of Invasive Cardiology of the Medical University of Bialystok Clinical Hospital in years 2008-2016 were enrolled in to the retrospective analysis. Patients were divided into 3 groups depending on the type of performed imaging - patients who underwent computer tomography without the use of an iodinated contrast media (40 people), patients who underwent medical imaging with the use of iodine contrast media administered intravenously (N=89, 29,5% of patients) or intra-arterially (N=173, 57,3%). The median age of patients in the study group was 72 years (minimum = 27; maximum = 96).

The incidence of post-contrast acute and acute kidney injury, kidney function at the hospital admission and after imaging were analyzed. Co-morbidities, pharmacological therapy and laboratory tests results were analyzed in 3 subgroups of patients. The type and volume of administrated intraarterially and intravenously contrast media were taken in to consideration.

Patients, who underwent computer tomography with the use of contrast medium were significantly older (Me = 75 years vs Me = 70 years, p = 0.013) and had significantly higher creatinine levels at the admission to hospital (1.28 mg/dl vs 0.99 mg/dl, p = 0.006) and one day after administration of the contrast medium (Me-1.14 mg/dl vs Me = 0.93 mg/dl, p=0.042)

compared to patients after coronary angiography /coronary angioplasty. Hypertension (75.2%), coronary artery disease (60.7%) and heart failure (55%) were the most frequent chronic diseases co-existing in the study group.

Four types iodine contrast media were used during the imaging tests in patients enrolled in the study. Iomeprol (400) was given in 65.2% of patients (N = 58) undergoing CT scans, and was the most frequent used contrast media in that subgroup. The remaining patients - 34.8% (N = 31) received Iopreol (350) during the computer tomography. 53.8% of patients (N = 93) received Iodixanol 320, 36.4% of patients (N = 63) were given Iopromide 370, and 6.4% (N = 11) of patients received Iomeprol 400 during coronary angiography / angioplasty,. Median volume of administered contrast medium in the study group was 110 ml. A significantly higher volume of contrast medium was given intraarterially during coronary artery imaging compared to the median volume of contrast medium used during computed tomography (Me = 150ml vs Me = 100ml, p = 0.0001). The median contrast volume used during the imaging in a subgroup of patients with eGFR <60 ml / min / 1.73m^2 on admission to the hospital was 110ml and was significantly lower if compared to the median contrast volume given during the imaging in patients with eGFR ≥60 ml / min / 1.73m2 on admission - Me = 120ml, p = 0.019.

The acute kidney injury occurred in 12 patients -4% of the whole study group. No cases of acute kidney injury were reported in patients who underwent CT scans using contrast media. 9 patients (5.2%) were diagnosed acute post-contrast kidney injury in the subgroup of patients undergoing coronary angiography/coronary angioplasty. 3 people (7.5%) had acute kidney damage in the group of patients who underwent CT scans without the use of contrast media. The median uric acid concentration was significantly higher in patients who were diagnosed acute post-contrast kidney injury during hospitalization (Me = 7.6mg / dl vs Me = 6.3 mg / dl, p = 0.048). Patients, who experienced acute renal injury after intraarterial contrast media administration were significantly more often treated with antibiotics during hospitalization if compared to patients who did not reveal worsening of renal function after intraarterial contrast media (16.7% vs. 3.9%, p = 0.02). All three patients who had CT scans without contrast media administration and had acute kidney damage were not treated with a statin (p=0,036).

Conclusion:

1. None of acute kidney injury cases in the subgroup of patients undergoing CT scans with intravenous contrast media administration may be a result of the insufficient number of patients

in the study group, the bias in the selection of patients or may be associated with the prevention of contrast nephropathy in the whole study group.

2. There was a significant difference in the frequency of acute kidney injury depending on route of administration of contrast media.

3. No significant correlation was found between acute kidney injury and the cause of hospitalization, the presence of chronic kidney disease and other comorbidities.

4. A significant correlation was observed between the volume of contrast media and the kidney function at the hospital admission. That suggests, that the baseline kidney function may influence the amount of administrated contrast media.