RESPIRATORY VARIATION OF INFERIOR VENA CAVA DIAMETER AND ACUTE KIDNEY INJURY IN PATIENTS WITH ACUTE DECOMPENSATED HEART FAILURE

E.Makeeva, A.Shutov, E.Efremova, M.Menzorov
Ulyanovsk State University, Ulyanovsk, Russia

Objectives

Venous congestion strongly associated with increase inferior vena cava blood pressure and renal vena blood pressure. The size and shape of the inferior vena cava (IVC) is correlated with central venous pressure (CVP) and intravascular volume status. We assume that in patients with acute decompensated heart failure (ADHF) pulmonary congestion, is associated with decrease kidney function. Lung ultrasound with counting B-lines is a simple way to assess extravascular lung water.

The aim

The aim of this study was to determine the interaction between the inferior vena cava collapse, count B-lines and the risk of acute kidney injury (AKI) in patients with ADHF.

Methods

62 patients (43 males, 19 females, mean age was 62±9 years) admitted to hospital with acute decompensated heart failure were studied. The main cause of ADHF was a combination of coronary artery disease and arterial hypertension - 36 (58%). Acute kidney injury was diagnosed according to KDIGO Guidelines, 2012. According to the ESC Guidelines, 2016 on pre-hospital and early hospital management of acute heart failure we carried out bedside thoracic ultrasound for counting B-lines and abdominal ultrasound for assessment of inferior vena cava diameter and IVC respiratory collapse.

Table 1. Clinical characteristics in patients with ADHF

Parameters	Abs (%)
Patients	62
Males	43
Females	19
Mean age, years	62±9
Causes of heart failure	
Arterial hypertension (AH)	3 (5%)
Coronary heart disease (CHD)	10 (16%)
CHD with AH	36 (58%)
CHF before admitted	
NYHA class III	44 (70%)
NYHA class IV	18 (30%)
Comorbidity	
Myocardial infarction in past	163 (80,3 %)
Type 2 diabetes	46 (22,7 %)
Peripheral artery disease	57 (28,1 %)
Cerebrovascular disease	14 (22.5%)

Results

Acute kidney injury was diagnosed in 33 (53%) patients with ADHF. 23 (70%) patients had stage 1, 9 (27%) - stage 2, and 1 (3%) - stage 3 of AKI. There were not patients needing replacement kidney therapy.

Patients with ADHF and AKI during the first day of hospitalization had larger IVC diameter: 20.5 mm (95% CI: 15.3-22.6) vs. 14.4 mm (95% CI: 11.8-17.5), resp. (p=0.03) and respiratory IVC collapse was significantly lower: 8.1 mm (95% CI: 4.6-9.7) vs. 11.2 mm (95% CI: 9.2-15.6), resp. (p=0.03) (Fig.1).

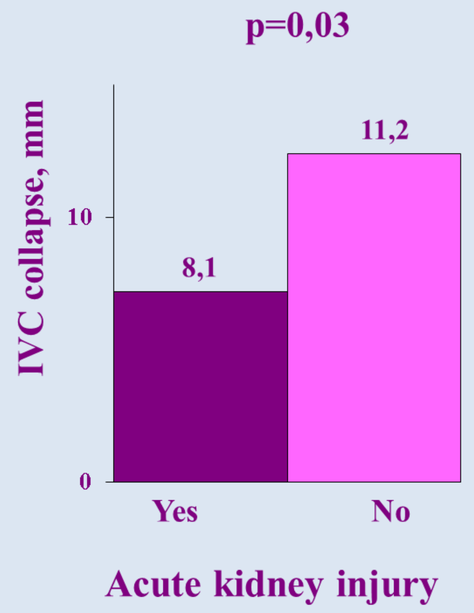

Figure 1. Inferior vena cava collapse during the first day of hospitalization

Cutoff point for predicting AKI was 8.7 mm for IVC collapse (area under the curve was 0.77; sensitivity 73%, specificity 69%) (Fig.2). The study showed no interaction between the count of pulmonary B-lines and the risk of AKI.

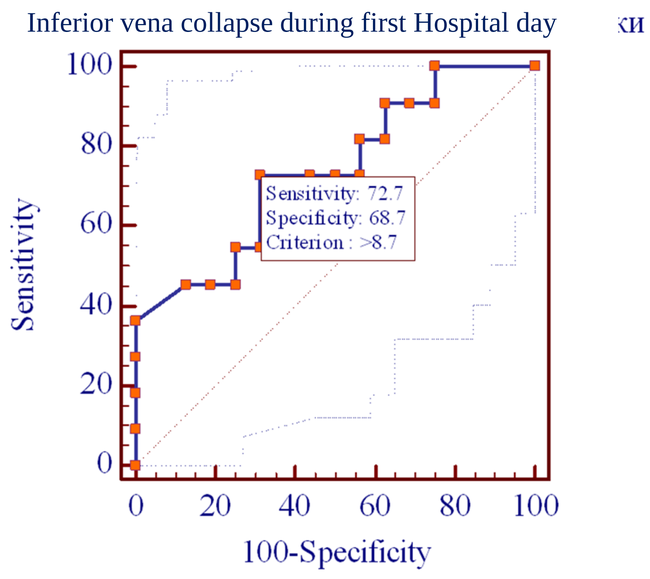

Figure 2. Inferior vena cava collapse during the first day of hospitalization

Conclusions

Study showed that AKI affected 53% of patients with ADHF. Kidney dysfunction is associated with venous congestion. There was no interaction between the count of pulmonary B-lines and the risk of AKI in patients with ADHF, but increasing IVC diameter and reducing respiratory IVC collapse is associated with AKI in patients with acute decompensated heart failure.

DOI: 10.3252/pso.eu.54ERA.2017