

Abstract

A close relation between the kidneys and the heart functions is a long lasting clinical experience. In the second half of the XXth century, many studies documented a role of the kidneys in blood pressure regulation. Since the beginning of the XXI century, many findings have highlighted a role of a damaged kidney function as a risk factor for the heart injury.

A close link between the heart and kidney functions is mediated by many common pathophysiologic mechanisms. It is surprising, that terms cardio-renal and renocardiac syndromes have got in a common awareness of clinicians only in the last 15 years. Some links between echocardiographic signs of the systolic and diastolic heart dysfunction and the glomerular kidney function has already been described. Relations between the cardiorenal syndrome and echocardiographic findings versus the renal concentrating capacity are unknown. It is well established, that even mild renal insufficiency increases the mortality risk in ischemic heart disease patients. A question arises, if only a transient decrease of the renal function influences a mortality risk in ischemic heart disease patients.

The aim of our study was to find out:

- A) The associations between the echocardiographic signs of systolic and diastolic heart dysfunction, the eGFR and the kidney concentrating capacity
- B) Which of the echocardiographic parameters of systolic and diastolic heart function correlate most closely with glomerular and tubular kidney function parameters?
- C) Which of two parameters of glomerular function, i.e. cystatin C serum levels and eGFR-cystatin C or creatinine serum levels and eGFR-MDRD are more sensitive parameters of echocardiographic signs of systolic and diastolic heart dysfunction.
- D) A mortality risk of the transient renal function decrease in patients hospitalized for myocardial infarction

Main results: There is the convincing relation between the echocardiographic findings and the functional ability of the two fundamental nephron segments, i.e., the glomeruli and tubules. The echocardiographic signs characterizing systolic and diastolic heart dysfunction correlated both with the eGFR and the kidney concentrating capacity.

Both glomerular filtration rate and the kidney concentrating capacity were decreasing simultaneously with the decreasing left ventricle ejection fraction. The A (peak velocity of late diastolic filling due to atrial contraction), Ea (peak early diastolic mitral annular velocity), and E/A (E is the peak velocity of early diastolic filling) were the most frequent parameters of the diastolic heart dysfunction associated with the glomerular filtration rate and the kidney concentrating capacity decreases. The E and DT (the deceleration time of E wave) were rarely connected with the renal function decrease. The left atrium area and left ventricle ESD (the end-systolic left ventricle diameter) were the echocardiographic structural parameters which correlated with the glomerular function estimated from cystatin C serum levels. The kidney concentrating capacity decreased simultaneously to the left atrium enlargement. The parallel decrease of eGFR and renal concentrating capacity accompanied both systolic and diastolic heart dysfunction. We conclude that the cystatin C serum level and eGFR-cystatin C are the more sensitive correlates of a damaged kidney function than the serum creatinine level and eGFR-MDRD in the cardio-renal syndrome.

Even temporary renal function decrease in patients with myocardial infarction increases their mortality risk.

Key words: cardio-renal syndrome; echocardiography; eGFR; kidney concentrating ability; mortality risk; coronary artery disease.