

Summary

Does the measurement of spleen and kidney resistive indices allow a selective assessment of chronic kidney injury?

Background

Ultrasound renal resistance indices („resistive indices“, RI) are suggested to be prognostic markers for progression of chronic kidney disease (CKD). However, renal resistance indices reflect local renal damage as well as systemic vascular disease. A more specific assessment of intrarenal damage may be achieved by adjusting renal resistance indices for resistance indices measured in arteries of non-renal organs, such as the spleen. After this method has been established in a cohort of subjects with intact renal function by our study group the present study intends to test the hypothesis that calculating the difference of resistive indices in spleen and kidney (DI-RISK) allows a more specific assessment of renal damage

Methods

In a cross sectional study, resistive indices (RI) of the spleen and the kidney were assessed in 132 patients with chronic kidney disease stage K/DOQI 1-5. RI were measured in three interlobar arteries of the upper-, middle and lower pole of both kidneys and three segmental arteries of the splenic artery. The DI-RISK was calculated by subtracting RI spleen from RI kidney. Intima-media-thickness (IMT) of the common carotid arteries was measured for assessment of subclinical atherosclerosis. Furthermore, risk factors for cardiovascular diseases were assessed.

Results

The resistive indices of spleen and kidney are correlated with IMT measurements (RI kidney $r=0.50$ [$p<0.001$], RI spleen $r=0.46$ [$p<0.001$]), age (RI kidney $r=0.55$ [$p<0.001$], RI spleen $r=0.55$ [$p<0.001$]) and pulse pressure (RI kidney $r=0.42$ [$p<0.001$], RI spleen $r=0.50$ [$p<0.001$]). In contrast, there is no correlation between the DI-RISK and IMT ($r=0.16$ [$p=0.10$]), age ($r=0.07$ [$p=0.41$]) and pulse pressure ($r=-0.07$ [$p=0.44$]). Estimated glomerular filtration rate is correlated with the resistive index of the kidney ($r=-0.41$ [$p<0.001$]) as well as with the DI-RISK ($r=-0.32$ [$p<0.001$]).

Conclusion

First, the results of this study confirmed earlier data demonstrating that renal resistive indices (RI) do not selectively reflect renal damage alone but rather mirror systemic vascular damage and cardiovascular risk factors. Secondly the study confirms the hypothesis that renal and splenic RI are equally associated with systemic vascular damage and cardiovascular risk factors whereas the difference of both (DI-RISK) is a specific ultrasound marker which selectively reflects local damage in the kidney.

Longitudinal follow-up of the study participants will answer the question whether DI-RISK measurements are better predictors of chronic kidney disease progression than renal resistive indices alone.