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Consequences of obese kidney: The Fat-kidney axis

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The prevalence of obesity is increasing worldwide. Epidemiologic studies have noted an association of high body mass index with risk for end stage renal disease in population with chronic kidney disease (CKD). A meta-analysis of 630,000 participants showed that obesity increases the risk of development of new-onset CKD and albuminuria.
The major pathologic finding of obesity related kidney disease is glomerulomegaly. Obesity, especially morbid obesity, can increase blood volume and induce afferent arteriolar dilatation. In addition, obesity activates renin-angiotensin aldosterone system which leads to resorption of sodium and water and deactivation of tubuloglomerular feedback, and induce glomerular hyperfiltration. Our data suggested that the prevalence of glomerular hyperfiltration is significantly increased in obesity in the general population irrespective of diabetes. Glomerular hyperfiltration can be improved after the bariatric surgery in previous study. Glomerular autoregulation may be impaired elevated blood pressure can be transmitted to the glomerular capillaries and causes barotrauma. Increase of capillary wall tension and diameter could result in podocyte injury and proteinuria. The progressive renal kidney with obesity include thickening of glomerular basement membrane, effacement of podocyte, and focal segmental glomerulosclerosis.
Other than hemodynamic effect, inflammation of adipose tissue could be associated with renal injury. Markedly, the composition of neutrophils and macrophage are increased in adipose tissue of obese patients. After the bariatric surgery, the fraction of neutrophils, macrophages, and pro-inflammatory monocytes are significantly decrease in visceral and subcutaneous adipose tissue. Inflammation within adipose tissue could induce the migration and activation of immune cells into the kidney, further inducing inflammation and the release of chemokines. The migration of inflammation into kidney could be associated with the development of renal cell carcinoma. We found the significant association of obesity with renal cell carcinoma, especially in patients with higher inflammation.
Obesity is related to various spectrum of kidney disease. Close monitoring of renal function and efforts to reduce obesity are needed in obese individuals.