Change of Renal Tissue Volume in Patients with Renal Cell Cancer Undergoing Radical Nephrectomy and Predicting Renal Dysfunction

Introduction and Objective: Currently, there is no significant preoperative or early postoperative predictive factor of renal insufficiency development due to GRF decrease after radical nephrectomy.
Materials and Methods: Surveillance data of 36 patients with RCC and GFR ranged 60-90 ml/min/1.73 m^2 before and after radical nephrectomy (at 3, 6, 9 and 12 month) was analyzed. Patients were divided into 2 groups, depending on renal tissue volume change at 3 month postoperatively. In Group 1, 14 patients with increasing of renal tissue volume (38.89%) were included and 22 patients with decreasing or no change of renal tissue volume were assigned to Group 2 (61.11%). Assessment of renal tissue volume was performed by CT data with calculation using formula: renal tissue volume was equal to sum of parenchyma slice square x slice thickness. GFR measurement was performed using Cockroft-Gault formula: GFR=(140-age)x(body weight)/(72xSCr) (x0.85-for women).
Results: The mean tissue volume of unaffected kidney prior to radical nephrectomy in Group 1 was 209.1±3.31 ml, and in Group 2 was 209.73±3.93 ml. The mean GFR was 75.86±2.88 and 76.45±2.51 ml/min/1.73m^2, respectively. At 3 month postoperatively in Group 1 patients the mean renal tissue volume increased by 39.14 ml and reached 245.14±3.67 ml, while in Group 2 it decreased by 12.09 ml and was 197.64±3.09 ml ($p<0.05$). There was no significant difference in mean GFR in both Groups. At 6- and 9-month postoperatively renal tissue volume in both groups did not changed. In Group 1 and 2 the mean GFR was 76.43±2.94 and 69.82±2.46 at 6 month, and 80.86±2.58 and 63.36±2.04 ml/min/1.73m^2 at 9 month, respectively. At 12 months the mean renal tissue volume in Group 1 and 2 was 247.71±4.41 ml and 195.45±3.04 ml, respectively. There was significant difference in the mean GFR in Group 1 (85.43±3.23) and Group 2 (58.09±3.02 ml/min/1.73m^2) ($p<0.05$). In 6 (42.86%) patients GFR was <60 ml/min/1.73m^2 with persistent hypercreatinemia.
Conclusions: Patients with baseline GFR from 60 to 90 ml/min/1.73 m^2 and absence of renal tissue volume increase have increased risk of renal insufficiency development 1 year postoperatively and they should be followed with surveillance by nephrologist.