

Assessment of Surgical Decision-Making in cT1 Kidney Tumor Using the Location Index Obtained from Measured Value on 3-Dimensional CT Image

Introduction and Objective: Assessment of tumor size and location might affect the treatment decisions for kidney tumor. We explored a simple method to quantify the distribution of kidney tumors for standardized reporting and surgical management.

Materials and Methods: The measurement was carried out using 3-dimensional computerized tomography images in 92 consecutive patients with cT1 kidney tumors undergoing radical and partial nephrectomy between January 2008 and December 2011. A center was fixed on a position where renal artery crosses to renal hilus representing as tangent surface of renal parenchyma. Measurements for index are based on three values including a) shortest distance between the center and close tumor edge, b) longest distance between the center and distant tumor edge, and c) longest distance between the center and assumed renal capsule intersecting tumor. Tumor location index was calculated on the equation, $a/b \times a/c =$ index score. We assessed the correlation of the index with surgical procedure in comparison with R.E.N.A.L. nephrometry score.

Results: A lower index indicates a tumor that has more complexity for partial nephrectomy. There was significant correlation between the index score and R.E.N.A.L. nephrometry score. ($r = -0.778$, $P < 0.001$) As the index increases, the tumor size becomes smaller and the tumor is located more distant from the center. Radical nephrectomy was performed for tumors with significantly lower index. Partial nephrectomy, especially laparoscopic partial nephrectomy, was performed for higher index tumors. (RNx; $n=42$: 0.163 ± 0.020 , PNx; $n=20$: 0.399 ± 0.034 , LPNx; $n=30$: 0.520 ± 0.026 , Mean \pm SEM) Analysis revealed an association of the index score with surgical procedure. ($P < 0.001$)

Conclusion: Current index system may facilitate reporting of quantitative tumor location and provide a simple measure of tumor complexity for improved surgical planning.