

EVALUATION OF 3.0T MR DIFFUSION-WEIGHTED IMAGING IN DIAGNOSIS AND SHORT-TERM THERAPEUTIC EFFECT OF RENAL CLEAR CELL CARCINOMA

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Objective: To evaluate 3.0T MR-DWI and ADC value in diagnosis, histological grade, tumor staging, and short-time therapeutic effect of renal clear cell carcinoma.

Materials and methods: Fifty-one consecutive cases of renal clear cell carcinoma confirmed by surgery and pathology between June 2007 and February 2008 were reviewed. All patients undergone diffusion-weighted imaging (b value=0 and 800) at 3.0T superconducting magnet. ADC values of tumors and corresponding areas of lateral renal parenchyma were measured and compared by Independent-Samples T Test. Set a cut-off value at $1.8 \times 10^{-3} \text{mm}^2/\text{s}$ to divide entire cohort into two groups. To these two groups, the tumors' histological grade, staging and surgical method were analyzed by Chi-square test, and Kaplan-Meier way and log-rank test were used to study the short-time therapeutic effect.

Result: Statistical difference ($p < 0.01$) was observed between ADC value of renal clear cell carcinoma ($1.778 \pm 0.582 \times 10^{-3} \text{mm}^2/\text{s}$) and those of normal renal parenchyma ($2.314 \pm 0.223 \times 10^{-3} \text{mm}^2/\text{s}$). ADC values of 24 cases were less than $1.8 \times 10^{-3} \text{mm}^2/\text{s}$ (group one) and those of 27 cases were more than and equal to $1.8 \times 10^{-3} \text{mm}^2/\text{s}$ (group two). The percentages of cases with tumor grade higher than II, equal to T3/T4 and M1 (staging TNM), III /IV (clinical staging) and palliative operation in these two groups were 44%, 33%, 26%, 48%, 26% and 4%, 4%, 4%, 8%, 4% respectively. There were statistical differences in histological grade, staging T and clinical staging ($p < 0.01$) between these two groups. Up to February 2009, there were 49 cases followed up by reexaminations and telephone (period: 1-20 months, median: 14 months). The tumor control rate of these two groups by follow-up one year was 62% and 95% respectively. Kaplan-Meier curve and log-rank test showed statistical difference in tumor short-term control rate between these two groups.

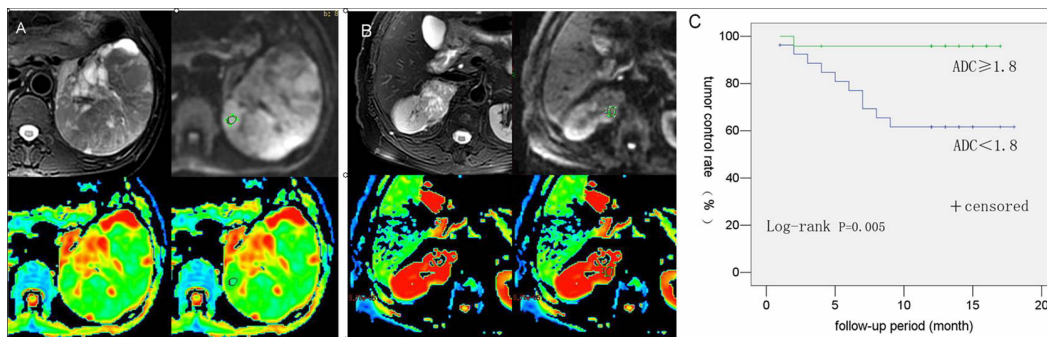


Figure A and B were composed of axial fat-suppressed T2-WI, DWI, ADC map and ROI on ADC map. Fig A 37-year-old woman with renal clear cell carcinoma of grade II, T2N0M0, clinical stage II at the time of operation, was died of metastasis of lung and bone after eight months. The ADC value of tumor was $0.95 \times 10^{-3} \text{mm}^2/\text{s}$. Fig B 67-year-old woman with renal clear cell carcinoma of grade II, T3N0M0, clinical stage III at the time of operation, was still alive without definite recurrence and metastasis after follow-up seventeen months. The ADC value of tumor was $2.56 \times 10^{-3} \text{mm}^2/\text{s}$. Figure C Kaplan-Meier curve. By one year follow-up after operation, cases with tumor progression were ten in the group with ADC values less than $1.8 \times 10^{-3} \text{mm}^2/\text{s}$ and only one in the group with ADC values equal and higher than $1.8 \times 10^{-3} \text{mm}^2/\text{s}$, and each group lost one case. Statistical difference was showed in tumor short-term control rate between these two groups in Kaplan-Meier curve and log-rank test ($P = 0.005$).

Conclusion: 3.0T MR-DWI can accurately differentiate renal clear cell carcinoma and normal renal parenchyma. Quantitative analysis of ADC value was helpful to evaluate the histological grade, tumor staging and short-term therapeutic effect of renal clear cell carcinoma.